United States
Department of
Agriculture

Forest
Service

February 2013

Dorset Peru
Integrated Resource Project

Final Environmental Assessment:

Manchester Ranger District
Green Mountain National Forest
Towns of Dorset, Peru, Manchester and Winhall;
Bennington County, VT

Dorset Peak Vista

For Information Contact: Melissa Reichert
Project Team Leader
Green Mountain National Forest
Supervisor's Office
231 North Main Street
Rutland, VT 05701
(802)747-6754
FAX (802)747-6766
E-mail:mmreichert@fs.fed.us

Responsible Official: William F. Jackson
District Ranger
Manchester Ranger District
2538 Depot Street
Manchester, VT 05255
(802)362-2307, ext. 212
FAX (802)362-1251
E-mail: wfjackson@fs.fed.us

The United States Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political affiliation, sexual orientation, and marital or familial status (not all prohibited bases apply to all programs). Persons with disabilities who require alternative means of communication or program information (Braille, large print, audiotape, etc.) should contact the USDA's TARGET Center at 202/720-2600 (voice or TDD).

To file a complaint of discrimination, write the USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, Washington, DC, 20250-9410 or call 202/720-5964 (voice or TDD). The USDA is an equal opportunity provider and employer.

This document can be made available in large print.
Contact Melissa Reichert (802)747-6754 or
email: mmreichert@fs.fed.us

Table of Contents

Introduction and Document Structure 1
Chapter 1. Purpose and Need 2
1.1 Description of the Project Area 2
1.2 Forest Service Authority, Policy and Management Direction 4
1.3 Purpose and Need 6
1.4 Proposed Action 21
1.5 Decision Framework 21
1.6 Public Involvement 22
1.7 Identification of Issues 23
Chapter 2. Description of the Alternatives 26
2.1 Alternatives Considered for Detailed Analysis 26
2.2 Alternatives Considered but Eliminated from Detailed Analysis 43
2.3 Comparison of Alternatives 47
Chapter 3. Affected Environment and Environmental Consequences 54
3.1 Social 54
3.2 Recreation 57
3.3 Habitat Diversity 68
3.4 Timber Management and Economic Analysis 85
3.5 Management Indicator Species (MIS) 93
3.6 Threatened and Endangered Species (TES) Wildlife 100
3.7 TES Plants 107
3.8 Non-Native Invasive Plants 111
3.9 Soils and Wetlands 113
3.10 Fisheries and Water 119
3.11 Air 124
3.12 Visual Quality 127
3.13 Heritage Resources 132
3.14 Environmental Justice 134
Chapter 4. Consultation or Coordination 136
4.1 USDA Forest Service Participation 136
4.2 Other Governmental Agencies Contacted 137
Chapter 5. References 138
Chapter 6. Abbreviations and Acronyms 148
Appendix A: Summary of Proposed Wildlife Habitat and Timber Management Treatments A-1
Appendix B: Mitigation Measures B-1

List of Tables

Table 1.1: Distribution of land by ownership/management 2
Table 1.2: Dorset Peru project management area allocations 5
Table 1.3-1: Comparison of important existing habitat composition conditions with HMU objective ranges..... 7
Table 1.3-2: Comparison of the existing regenerating age class (0-9 years) with HMU objective range; and existing age class distribution for remaining age classes..... 8
Table 1.3-3: Comparison of existing LWD and pool habitat with Forest Plan objectives 15
Table 2.1-1: Proposed activities related to soil and water improvement 37
Table 2.1-2: Alternative C: Areas Eliminated from Treatment.....43
Table 2.3: Comparison of Management Actions by Alternative 47
Table 2.3: Summary of Environmental Resource Effects by Alternative. 49
Table 3.1 – 1: Dorset Peru Project Area Census Data 55
Table 3.2-1: Developed Recreation Sites within the Dorset Peru Project Area.....60
Table 3.2-2: Dorset Peru Project Area National Forest System Trails 62
Table 3.2-3: Annual Operations and Maintenance (O&M) and Deferred Maintenance Costs By Trail.....63
Table 3.2-4: NFS Trail System/Classification Review and Recommendations 66
Table 3.2-5: Summary of Recreation Resource Effects by Alternative 67
Table 3.3-1: Comparison of existing habitat composition conditions with HMU objective ranges 69
Table 3.3-2: Comparison of the existing age class distribution across all forested habitat types on all lands, and on suitable lands managed using even-aged management, with the HMU objective ranges for suitable lands of these age classes 69
Table 3.3-3: Comparison of existing composition with anticipated composition resulting from implementation of Alternative B in the short-, mid-, and long-term.....76
Table 3.3-4: Comparison of the existing age class distribution of forested stands with anticipated distribution in 2019 when vegetation treatments will have been completed 79
Table 3.4-1: Selected Financial Benefits and Costs 91
Table 3.5-1: Management Indicator Species (MIS) and the habitats they represent in the Dorset Peru Project Area.....95
Table 3.6-1: Species listed as threatened or endangered under the Endangered Species Act (ESA) with currently or historic occurrence in Vermont and on lands now administered by the Green Mountain National Forest 101
Table 3.6-2: Regional Forester Sensitive Species (RFSS) for the Green Mountain National Forest 103
Table 3.9-1: Dominant soil series within the Dorset Peru Project Area.....114
Table 3.9-2: Proposed Actions and potential effects on soils.....115
Table 3.7-1: Comparison of Forest Plan Objective for instream habitat with existing condition 122
Table 3.11-1: Primary greenhouse gas emissions (GHG) from prescribed burning for Alternatives B and C. 126
Table 3.12-1: Visual Quality Objectives for the Dorset Peru Project Area.....129
Table 3.14-1: Ethnic Demographics by County 135
Table 3.14-2: Income Demographics for the GMNF Region 135
Table 4.1: Forest Service Participation.....136
Table 4.2: Other Governmental Agencies Contacted 137

Table A-1: Proposed Wildlife Habitat Treatments. 1
Table A-2: Proposed Timber Harvest Treatments 3
Table A-3: Summary of Proposed Timber Harvest Treatments 6
Table A-4: Summary of Proposed Stand Improvement. 7

Introduction and Document Structure

The USDA Forest Service is proposing to implement management activities (proposed action) on the Green Mountain National Forest (GMNF), Manchester Ranger District collectively named the Dorset Peru Integrated Resource Project (Dorset Peru Project). Management activities are proposed to achieve multiple resource benefits within the Dorset Peru Project Area that meet goals and objectives; and work towards desired future conditions as provided in the 2006 GMNF Land and Resource Management Plan (Forest Plan).

The Forest Service has prepared this Environmental Assessment (EA) for the Dorset Peru Project in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and State laws and regulations. This EA discloses the analysis for direct, indirect, and cumulative environmental impacts that may result from the proposed action and alternatives if they were implemented. The document is organized into six parts or chapters, and includes several appendices to support the analysis. Additional documentation, including more detailed analyses of project area resources, may be found in the Dorset Peru Project planning record located at the Manchester Ranger District office in Manchester, Vermont.

Chapter 1) Purpose and Need: This chapter includes information on the history of the project proposal, the purpose of and need for the project, and the Forest Service proposal (proposed action) for achieving that purpose and need. This section also details the public involvement process for the Dorset Peru Project, including the identification of major and minor issues that are addressed in the EA.

Chapter 2) Description of Alternatives, including the Proposed Action: This chapter provides a more detailed description of the proposed action as well an alternative developed to address public issues. This section also provides a summary table of the environmental consequences associated with each alternative.

Chapter 3) Affected Environment and Environmental Consequences: This chapter describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Each section begins with the issue statement(s) and, if applicable, the measurement indicator(s) that tie the resource to the respective major or minor issue(s) identified from public comments. The affected environment section follows next describing the existing condition of the resource as it relates to the effects analysis. Finally, the direct, indirect, and cumulative effects are disclosed.

Chapter 4) Consultation and Coordination: This chapter provides a list of Forest Service staff that assisted in the preparation of the EA, as well as other agencies, organizations or individuals consulted during its development.

Chapter 5) References: This chapter provides a list of reference material cited in the EA.

Chapter 6) Glossary: This chapter provides a list of acronyms and abbreviations used in the EA.

Appendix A: This appendix provides a summary of the proposed wildlife and timber management treatments.

Appendix B: This appendix provides a list of mitigation measures associated with the proposed management activities.

Chapter 1. Purpose and Need

This chapter describes the Dorset Peru Project Area, provides the purpose of and need for the Dorset Peru proposed action, and summarizes the public involvement process associated with the project.

1.1 Description of the Project Area

Project Area Location

The Dorset Peru Project Area is located in the Battenkill River, Mettawee River, West River, and Otter Creek watersheds primarily within the Towns of Dorset and Peru, Vermont (refer to Map 1 Vicinity/Existing Condition Map). Small portions of the project area are also within the Towns of Winhall and Manchester along its southern boundary. The project area is bounded primarily by the Town boundary in Dorset to the south, west, and north continuing on the northern Town boundary of Peru until the Appalachian Trail/Long Trail, Mad Tom Road (Forest Road 21), North Road (Forest Road 22) and Hapgood Pond Road (Forest Highway 3) to the east. The final portion of the project area to the south is State Route (SR) 11, ridgelines from Bromley Mountain, SR 30 and then Stony Brook until it meets U.S. Highway 7 where it runs north to the Dorset Town boundary.

The project area encompasses approximately 41,699 acres with 25,910 acres (62 percent) in private ownership, 834 acres (2 percent) managed by the State (Emerald Lake State Park, and Hapgood State Forest), and 212 acres (<1 percent) in town ownership. The remaining area (14,770 acres, 35 percent) is National Forest System (NFS) lands administered by the Forest Service.

Table 1.1: Distribution of land by ownership/management.

Land Ownership/Management within the Dorset Project Area	Acres [1]	% of Total
National Forest	14,770	35
State (Emerald Lake State Park and Hapgood State Forest)	834	2
Town (Cutler Memorial, the Pinnacle, Owls Head and Freedleyville Town Forests in Dorset)	212	<1
Private	22,910	62
Total	41,699	100

[1] Approximate.

The NFS lands within the project area consist of all or portions of 14 Compartments (C) 50, 56 to 63, 195 to198, and 206. Forest Compartments are administrative land units averaging approximately 1,500 acres. Compartments are divided into Stands (S) which consist of similar vegetation and site conditions. Specific locations can be identified on maps by their Compartment and Stand number combination. For example, C56/S9 is Stand 9 within Compartment 56.

1.1.2 Project Area Background

The Dorset Peru Project Area has a mix of land ownerships and uses, and is served by an extensive network of Forest Service, Town and private roads. State Route (SR) 30 crosses the southern and western project area boundary; and SR 7A and U.S. Highway 7 bisect the project area from south to north. As noted previously, SR 11 runs along a portion of the southern boundary of the project area. Private lands dominate the area west of U.S. Highway 7 with minor amounts just to the east thereof. The vast majority of NFS lands are along the spine of the Green Mountains in the eastern part of the project area, and in the Taconic Range along the northern boundary of the Town of Dorset. While development is concentrated around the village centers of Peru, East Dorset, Dorset, South Dorset, and along US Highway 7; residences and farms are scattered throughout the project area on private lands. The intermixing of NFS, State, Town, and private lands offers an opportunity to manage resources cooperatively across landowner boundaries.

Elevations in the Dorset Peru Project Area range from over 3,700 feet on Dorset Mountain in the Taconic Range and 3,400 feet along the spine of the Green Mountains (Peru Peak) to elevations near 700 feet along U.S. Highway 7. The area lies in portions of four watersheds: Mettawee River, Battenkill River, Otter Creek and West River. Water resources throughout the Dorset Peru Project Area consist of cool, headwater mountain streams, wide, valley bottom streams, lakes, ponds, and wetlands that are highly valued by residents and visitors. The area is natural appearing with rugged terrain typified by Dorset Mountain, Mount Aeolus, Peru Peak and Bromley Mountain, and the pastoral/farm setting in the valleys, such as the Valley of Vermont.

Both NFS and non-NFS lands are mostly forested consisting of northern hardwood and softwood species. Timber harvesting has occurred on all ownerships within the project area and has helped shape the forest type and age class composition throughout the landscape. Openings of various sizes are typical on private lands for homes, crops and pastures. The Dorset Peru Project Area has a long history of active timber and wildlife management on NFS lands going back to the 1930's. Recent past timber sales were comprised of both even-aged and uneven-aged management systems that were last implemented about 10 to 20 years ago. Common treatments in more recent decades include thinnings, selection harvests, and regeneration harvests including variants of the shelterwood and clearcut harvest methods.

The primary recreation opportunities offered within the project area include hiking, biking, snowmobiling, skiing, hunting, fishing, camping, and viewing wildlife and natural features. Areas of special interest include: the Appalachian National Scenic Trail and Long National Recreation Trail (AT/LT) in the eastern portion of the project area at the crest of the Green Mountains; the Robert T. Stafford White Rocks National Recreation Area, and Big Branch and Peru Peak Wilderness Areas extend into the project area offering visitors a more primitive experience; Emerald Lake State Park managed by the State of Vermont is a popular recreational spot, and is located just north of the center part of the project area along US Highway 7; and Bromley Mountain Ski Area on private, State and NFS lands along SR 11 is located in Peru. Old roads, hiking trails, and snowmobile trails lead to Dorset Mountain and other peaks in the Dorset region. There are also numerous snowmobile trails on both NFS and private lands.

Hunting within the project area is actively pursued by visitors and residents alike due to the prime habitat it provides for a variety of small and large game species. Fishing is also a popular

attraction to the area with fishing in local streams and the world famous Battenkill River where native and stocked brook, rainbow and brown trout are available.

1.2 Forest Service Authority, Policy and Management Direction

The enabling authorities of the Forest Service are contained in many laws enacted by Congress and the regulations and administrative directives that implement these laws. The Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), as amended by the National Forest Management Act of 1976 (NFMA), provides the framework for land and resource management planning on National Forest System (NFS) lands, and ultimately requires the establishment and revision of national, regional, and local resource goals and objectives through development of land and resource management plans. The GMNF Land and Resource Management Plan (Forest Plan) was approved by the Regional Forester in April 2006 (USDA Forest Service 2006a). The 2006 Forest Plan describes the "local" resource goals and objectives and guides the day-to-day resource management operations for the GMNF. The Forest Plan and associated Environmental Impact Statement (EIS) are programmatic documents and did not make any project level decisions.

"Implementing the Forest Plan" means developing and implementing specific forest management projects in order to reach Forest Plan desired conditions. Project level compliance with the NFMA is primarily focused on consistency with the Forest Plan. Potential environmental impacts from projects implementing the Forest Plan are disclosed in separate analysis and decision documents following regulations established by the National Environmental Policy Act of 1969 (NEPA). Implementing regulations for NEPA are provided by 40 CFR Parts 1500-1508 and 36 CFR Part 220. Agency policies and procedural guidance for adhering to NEPA regulations include Forest Service Manual (FSM) 1950 and Forest Service Handbook (FSH) 1909.15.

Compliance with NEPA at the project level involves the environmental analysis process for a specific proposal to implement the Forest Plan. It includes the disclosure of environmental effects of proposed activities, public participation, and preparation of a decision document that provides specific direction for project implementation. The Dorset Project analysis is documented in this site-specific Environmental Assessment (EA), which is tiered to the Environmental Impact Statement (EIS) and Record of Decision (ROD) for the 2006 Forest Plan (USDA Forest Service 2006b and 2006c). All of the expected impacts from this project are consistent with, and within the range of, the expected impacts disclosed in the Forest Plan EIS.

The individual management activities that collectively define the Dorset Peru Project proposed action have been developed with direction found in the Forest Plan. The Dorset Peru Project is designed to move the existing conditions of NFS lands within the project area towards the Desired Future Conditions (DFC) as directed in the Forest Plan. The GMNF is designated to different Management Areas (MAs) with each having a major emphasis and DFC, and provides specific management direction for activities needed to achieve Forest Plan goals and objectives.

The NFS lands in the Dorset Peru Project Area fall within nine MAs although the vast majority is allocated to the Diverse Forest Use, Remote Backcountry Forest, Wilderness, and Green Mountain Escarpment MAs (82 percent of the project area). Refer to Maps 1, 2 and 3 for MA locations within the project area. A brief description of where each MA is located follows the table below.

Table 1.2: Dorset Peru project management area allocations.		
Forest Plan Management Area	**Acres [1]**	**% of Total**
Diverse Forest Use	4,202	28
Wilderness	2,879	19
Remote Backcountry Forest	2,952	20
Remote Wildlife Habitat	982	7
Alpine Ski Area	158	1
Appalachian National Scenic Trail	836	6
Robert T. Stafford White Rocks National Recreation Area	453	3
Green Mountain Escarpment	2,224	15
Alpine Ski Area Expansion	84	1
Total	14,770	100

[1] Approximate.

1. Diverse Forest Use (Forest Plan, USDA Forest Service 2006a, pp. 47 and 48): A majority of the land allocated to the Diverse Forest Use MA is located west of the Appalachian Trail/Long Trail between SR 11 and Mad Tom and Staple Brook Roads (Forest Roads 21 and 58 respectively). There is also a small portion south of the Appalachian Trail/Long Trail along SR 11 in Peru and Winhall. Another very small portion extends west of Hapgood Pond Road (Forest Highway 3) and south of Mad Tom Road (Forest Road 21) in Peru.
2. Wilderness (Forest Plan, pp. 49 to 53): The Big Branch Wilderness Area extends into the eastern portion of the project area where the Dorset and Peru Town boundaries meet. The Peru Peak Wilderness Area extends into the eastern portion of the project area adjacent to the Appalachian National Scenic Trail north of Mad Tom Road (Forest Road 21) and east of Staple Brook Road (Forest Road 58).
3. Remote Backcountry Forest (Forest Plan, pp. 54 to 57): All land allocated to the Remote Backcountry Forest MA is within the Town of Dorset and is located adjacent to the northern Town boundary.
4. Remote Wildlife Habitat (Forest Plan, pp. 60 to 62). The land allocated to the Remote Wildlife MA is in the eastern portion of the project areas between Mad Tom Notch Road (Forest Road 21), North Road, and SR 11 east of the Appalachian National Scenic Trail MA.
5. Alpine Ski Area (Forest Plan, pp. 63 to 65): The land allocated to the Alpine Ski Area MA (Bromley Mountain Ski Area) is located in the southeastern portion of the project area just north of SR 11 in the Town of Peru.
6. Appalachian National Scenic Trail (Forest Plan, pp. 66 to 72): The land allocated to the Appalachian National Scenic Trail MA is located along the spine of the Green Mountains from SR 11 in Winhall to Griffith Lake at the northern boundary of the Town of Peru.
7. Robert T. Stafford White Rocks National Recreation Area (Forest Plan, pp. 79 to 81): A portion of the Robert T. Stafford White Rocks National Recreation Area is between Big Branch and Peru Peak Wilderness Areas at the northern boundary of the Town of Peru.
8. Green Mountain Escarpment (Forest Plan, pp. 86 to 89): The land allocated to the Green Mountain Escarpment MA is located in the center portion of the project area east of U.S. Highway 7 along the western slopes of the Green Mountains.
9. Alpine Ski Area Expansion (Forest Plan, pp. 103 to 104): The land allocated to the Ski Area Expansion MA is located east and adjacent to the Alpine Ski Area MA.

Both action alternatives analyzed in this EA (Alternatives B, and C) are consistent with the goals, objectives, and standards and guidelines (S&Gs) as specified in the 2006 Forest Plan. Forest-wide S&Gs are listed on Forest Plan pp. 19 to 45, and apply to all Forest areas for the

purpose of protecting or managing forest resources. This section of the Forest Plan, in particular pp. 23-25, also describes how the various harvest practices can be applied. Management Area S&Gs are found in the Forest Plan (pp. 46 to 112), and apply to the respective MAs.

1.3 PURPOSE AND NEED

The Dorset Peru Project includes management activities that work towards meeting the Forest Plan goals and objectives. This section provides the purpose and need for the proposed action within the Dorset Peru Project Area for the following resource categories:

1. Habitat Diversity
2. Timber
3. Fisheries
4. Non-Native Invasive Plants
5. Soil and Water
6. Recreation
7. Scenery
8. Transportation
9. Heritage

The pertinent Forest Plan goals, objectives and management direction for each resource category is the basis for defining the activities that may be implemented as part of the Dorset Peru Project. The purpose and need section answers the question: “why are management activities being considered for the Dorset Peru Project Area?” Identifying the opportunities that move the existing resource conditions within the project area toward the Forest Plan desired future conditions are the main function of defining the purpose and need.

1.3.1. Habitat Diversity

1.3.1.1 Improve the Composition and Age Class Structure of Ecosystems

Forest Plan Goal #2 is to “[m]aintain and restore quality, amount and distribution of habitats to produce viable and sustainable populations of native and desirable non-native plants and animals” (Forest Plan, p. 10). In order to contribute to this goal, the Forest Plan identifies forest habitat type composition and age class objectives to ensure that diversity of composition, structure, and function is maintained or increased on the GMNF (Forest Plan, pp. 10 to 12).

While some of the composition and age class objectives can be met through natural processes, vegetation management is often used to restore and enhance diversity of habitat types and structures (Forest Plan, p. 15). Vegetation management is also used to enhance habitats and features of particular value to certain plant and animal species where that habitat is uncommon in the forest, such as aspen, upland openings, and oak. Within the Dorset Peru Project Area, these types of management actions would generally occur within the Diverse Forest Use, Remote Wildlife Habitat, and Escarpment MAs.

The Forest Plan states that management activities within the Diverse Forest Use and Remote Wildlife Habitat MAs will provide suitable habitat for a variety of wildlife and plant species (Forest Plan, pp. 47 and 58). Activities within the Remote Wildlife Habitat MA will also widen the diversity of habitats by enhancing the younger and older age classes, and targeting management to meet specific wildlife habitat needs (Forest Plan, p. 60). Both MAs identify a desire for a mix of deciduous and coniferous forest stands of various types, and a desire for

suitable habitat for a wide variety of wildlife and plant species. The stands will vary in size, age, and tree species and both even-aged and uneven-aged harvest techniques will be used. The Forest Plan also states that the purpose of management activities in the Escarpment MA will be to enhance several less common oak-affiliated natural communities in order to meet the needs of their associated plant and animal species (Forest Plan, p. 86).

An assessment of habitat diversity within the Dorset Peru Project Area, called a "habitat management unit (HMU) analysis", was conducted by Forest Service resource specialists during 2009 to 2011. The analysis was based on existing records as well as vegetation inventory data recently gathered in the project area. The purpose of this analysis is to apply Forest Plan habitat type composition and age class objectives at the site-specific (HMU analysis) scale. Specific HMU objectives take into consideration the current condition and overall Forest Plan objectives, as well ecological conditions and long-term tendencies of ecosystems found in the project area. The difference between the current condition of the Dorset Peru HMU and the specific HMU objectives is the basis for identifying potential management activities within the project area. Based on this difference, stands can be identified for silvicultural treatment or other vegetation management to achieve HMU composition and age class objectives.

Tables 1 and 2 illustrate the following important gaps between the current and desired future condition for habitat composition and age class:

- A significant imbalance in desired composition among northern hardwood, mixedwood, and softwood habitat types, with northern hardwoods significantly over-represented, likely due to historical land uses.
- A small amount of oak habitat along the Green Mountain escarpment, where we expect to see more oak, likely due to lack of historical natural disturbance regimes like fire.
- A significant deficit in aspen-birch and permanent upland opening habitat, particularly in suitable lands where these habitats can be maintained at desired levels.
- An absence of regenerating age class (0-9 years old) across all habitats on suitable lands; this is related to an over-abundance of mature and old age class, and to the shift of stands harvested in the 1980s into the young age class.

Table 1.3-1: Comparison of important Habitat Management Unit (HMU) objective ranges with existing habitat composition conditions.

Habitat Type	**HMU Objective (all NFS lands)**		**Existing Habitats (all NFS lands)**		**Existing Habitats (suitable lands)[1]**	
	%	Acres	acres	%	acres	%[2]
Northern Hardwoods	40-50	5,900-7,370	11,624	79	6,281	43
Mixedwood	35-45	5,150-6,650	1,167	8	475	3
Softwood (spruce/ fir and hemlock/ white pine)	10-20	1,450-3,000	701	5	166	1
Aspen/Birch	1-2	150-300	850	6	0	0
Oak	1-2	150-300	125	1	95	1
Upland Opening	2-3	300-450	80	<1	80	<1
Total			**14,547**			

[1]Represents the proportion of all NFS lands in the Dorset Peru Project Area suitable for timber management by habitat type; shown for context, as some habitat types (such as Aspen/Birch) require timber management to exist at the levels defined by the Forest Plan and Project objectives.
[2] Percent of total habitat type acres on all NFS lands.

Table 1.3-2: Comparison of the Habitat Management Unit (HMU) objective range for regenerating age class (0-9 years) with existing conditions, and existing age class distribution for remaining age classes.

Age Class (Includes All Habitat Types)	**HMU Objective[1]**	**Existing Condition (all NFS lands)[2]**		**Existing Condition (suitable lands)[3]**	
	Acres	*acres*	*%*	*acres*	*%*
Regenerating (0-9 years)	203-753	0	0	0	0
Young		1,415	10	1,004	24
Mature		9,722	67	2,786	67
Old		3,329	23	386	9

[1]Acre range represents potential natural vegetation of suitable NFS lands assigned to an even-aged management status (60 to 80 percent of suitable lands), adjusted for conversions to or maintenance of existing aspen, birch, and openings.
[2] Condition across all NFS lands within the Dorset Peru Project Area.
[3] Applies only to NFS lands suitable for timber management and assigned to an even-aged management status prior to project development.

There is an opportunity to:

- Work toward balancing age class distribution of lands suitable for even-aged silviculture in order to provide variety in habitat structure for plant and animal species.
- Increase the softwood component in mixedwood and hardwood stands where soils and ecological landtypes indicate inherent softwood tendencies.
- Increase the amount of oak in stands within the Green Mountain Escarpment MA.
- Increase the abundance of aspen and upland opening habitat.
- Increase the amount of regenerating forest within the 0-9 year old age class for wildlife species that require this habitat.

1.3.1.2 Aspen Habitat

Management objectives used to provide a mix of habitats include increasing acres of aspen to support species that prefer these habitats (Forest Plan, p. 10). Aspen can occur in both pure stands, as well as scattered small clones within stands of other habitat types. Aspen clones in other habitats can be managed over time to create new stands of aspen.

There are currently no stands of pure or mixed aspen within the project area. While there are 850 acres of paper birch stands within the project area (Table 1.3-1), all of these stands are in Wilderness, and are starting to deteriorate and convert to northern hardwood and mixedwood stands through natural succession. There are no existing paper birch stands in the project area that are suitable for timber management. Several stands of other habitat types have been identified where clones of aspen exist in various age and structural conditions. If mature aspen clones are not managed, the clones can become less productive and die, removing this habitat feature from the landscape. Allowing these clones to decline also removes the potential to convert them to pure aspen stands. Providing age and structural diversity of aspen clones and stands can increase available wildlife habitat within the project area. However, there are not very many stands with enough of an aspen component to be able to create whole stands of aspen. Management is more likely to increase the abundance of aspen within stands of various other habitat types, but will not likely create many acres of pure aspen habitat.

There is an opportunity to:

- Create new early-successional aspen habitat in stands suitable for timber management within the project area for wildlife species that require a mix of these unique habitats, replacing declining large stands of paper birch in Wilderness.
- Improve aspen clone diversity in stands suitable for timber management within the project area, expanding some clones into full aspen stands where ecological landtypes and field data suggest potential for a strong regeneration response.

1.3.1.3 Oak Habitat

The Green Mountain Escarpment MA is where vegetation management is focused on enhancing and expanding oak, oak-pine, and oak-hardwood habitat. In the project area oak habitat is restricted even within the Green Mountain Escarpment MA occurring north of Mad Tom Ravine, and along Beech Ridge. Only one stand, C50/S9, is dominated by oak. Several additional stands within this management area are dominated by northern hardwoods but include varying amounts of red oak, ranging from scattered to single mature trees, and occasional patches of red oak seedlings. Two additional stands near but outside of this MA also include small amounts of red oak. Management to improve oak habitat includes regenerating oak stands and stands with a strong oak component to allow oak seedlings to get established in high levels of light; and releasing established oak seedlings, saplings and small trees from over-topping vegetation in stands with a minor amount of oak. Increasing the abundance of red oak in such stands adds compositional diversity to the stand and increases oak seed sources as well as oak mast.

There is an opportunity to:

- Increase the abundance of oak in stands that have an oak component by releasing them from competing vegetation.
- Regenerate oak and oak-hardwood stands to create new stands of oak.

1.3.1.4 Deer Wintering Areas

Management direction for wildlife on the GMNF includes a Forest-wide emphasis to maintain and enhance wintering habitat for white-tailed deer (*Odocoileus virginianus*) by retaining and encouraging vegetative conditions for both shelter and browse (Forest Plan, pp. 29 and 30). Wintering habitat for deer will be emphasized within, or adjacent to, identified Deer Wintering Areas (DWAs), and permanent upland wildlife openings containing grasses, forbs, and shrub growth should be provided adjacent to DWAs to provide forage in early spring. The Diverse Forest Use MA (Forest Plan, pp. 47 and 48) and the Remote Wildlife Habitat MA (Forest Plan, pp. 60 to 62) each emphasizes providing a mix of habitats for wildlife species, including white-tailed deer.

There are 10 to 15 DWAs within or adjacent to the project area (refer to Map 1 Vicinity/Existing Condition Map), although most are located on non-NFS lands, particularly in the Otter Creek and Mettawee River valleys. The DWAs on NFS lands typically lack abundant early-succession hardwood vegetation for browse and/or the softwood vegetation may not provide winter cover of desirable quality. Without maintenance and enhancement, the quality of deer wintering habitat and ultimately the winter survival of white-tailed deer within and adjacent to the project area may decline.

There is an opportunity to:

- Improve quality of winter cover in DWAs.
- Enhance availability and quality of browse adjacent to DWA cover areas to improve overall DWA conditions.

1.3.1.5 Permanent Upland Openings

The desired future conditions for the Diverse Forest Use MA (Forest Plan, pp. 47 and 48) and the Remote Wildlife Habitat MA (Forest Plan, pp. 60 to 62) include providing permanent upland opening habitats in shapes and sizes that are consistent with visual objectives. Permanent upland openings provide important early-successional wildlife habitat, ranging from grass-forb meadows to openings with young, shrub-scrub, woody vegetation. Without early-successional habitat like that provided by permanent upland openings, the diversity and quality of wildlife habitat in the project area would decrease.

Currently less than one percent of the suitable NFS lands within the project area are in the permanent upland opening habitat type which is below the minimum objective set by the HMU analysis (Table 1.3-1). There are currently 25 upland openings in the project area totaling about 80 acres. Most of the existing opening stands are human-made openings, typically log landings from pervious timber sales, that are small (less than 1 or 2 acres), and are being lost as forest succession encroaches upon them. Scientific literature indicates that these small openings do not provide ecologically functional, early-successional habitat for most wildlife species. Thirteen of these stands are also too small or difficult to maintain. These stands would be merged into and managed as part of the surrounding timber stand. Two of these stands are ski trails or tree islands and maintained by Bromley Mountain ski area.

The Dorset Peru Project includes a large component of the Remote Wildlife Habitat MA where upland openings and regenerating forest habitats are critically important for reclusive wildlife species such as black bears, bobcats and northern goshawks (Forest Plan, p. 60). Early-successional habitat provided by permanent upland openings can be treated by mowing, hand-cutting, and/or prescribed fire applied on an annual to five-year schedule to maintain vegetation in young early-successional stages such as grasses and forbs. Other early-successional habitat is provided by temporary openings created by silvicultural regeneration treatments (such as clearcut or shelterwood). These regenerating stands provide early-successional habitat conditions that change gradually over time for as many as twenty years, at which time early-successional habitat benefits rapidly diminish.

A major emphasis of the Remote Wildlife Habitat MA is to create diverse habitats, including permanent upland and temporary openings and brushy areas (Forest Plan, p. 60). There is an opportunity to prescribe treatments in this MA that would benefit reclusive wildlife species by providing “late-stage” early-successional habitat. Designating some stands as late-stage permanent upland openings that would be regenerated every 20 years would increase the continuing availability of older early-successional habitat (5 years and older). These habitats with small diameter woody vegetation as a component would complement the permanent upland openings that are maintained on an annual to five-year schedule and the temporary openings of silvicultural regeneration treatments that mature to older forest stands.

There is an opportunity to:

- Restore, enlarge, and enhance existing upland openings to provide early-successional habitat for wildlife.

- Create new permanent openings in the project area to provide additional early-successional habitat to meet forest habitat composition objectives.
- Create some permanent openings to be managed for late-stage early-successional habitat with older age classes of vegetation (5 to 20 years).

1.3.1.6 Apple Tree Management

Forest-wide management direction for wildlife includes retaining and releasing apple trees whenever and wherever possible (Forest Plan, pp. 27 and 29). Individual apple trees and remnant orchards are an important source of wildlife food and are historic features of the GMNF. As the forest matures, other tree species encroach upon and shade apple trees, which become less productive in the reduced light of the understory and eventually die. Removal of over-topping trees immediately around the apples invigorates their growth and promotes fruit production. Occasional pruning of these apple trees helps redirect production from vegetative growth to production of fruit.

Apple trees are located in at least three sites in the project area. Although our current knowledge suggests that the abundance and distribution of apple trees is considerably lower within this project area than in other parts of the GMNF, it is anticipated that more apple trees would be discovered during additional inventory, planning and project implementation.

There is an opportunity to:

- Release apple trees so that these historic features continue to provide food for wildlife.
- Prune apple trees to enhance soft mast production, providing an increased food source important to many wildlife species.
- Pile material cut to release and prune apple trees to enhance habitat for small mammals, reptiles, and amphibians.

1.3.1.7 Down Woody Debris Habitat

Across the project area in a variety of MAs, there are historic sites including rock walls, building foundations, and wells. These sites are often located in small- or medium-size openings and they may include other habitat features such as small ponds, wetlands, or apple trees. The features themselves (such as rock walls, wells, and foundations) provide unique wildlife habitat providing nesting shelter or travel ways for small mammals, reptiles, and amphibians.

The Heritage Section discusses the need to provide stewardship for historic sites throughout the project area that are within or near proposed vegetation management activities. Trees and shrubs cut to maintain structures associated with these sites can be retained in brush piles that provide nesting, foraging, and travel habitat for small mammals, reptiles, and amphibians.

There is an opportunity to:

- Maintain historic structures and improve the wildlife habitats they provide.
- Creatively place removed material in such a way as to provide nesting, foraging, and travel habitat for small mammals, reptiles, and amphibians.

1.3.1.8 Bat Hibernacula

One bat hibernaculum (Aeolus or Dorset Cave) is located within the project area and a second hibernaculum (Skinner Hollow or Little Skinner Hollow Cave) is located south of the project area. Both hibernacula have in the recent past included federally-listed, endangered Indiana

bats. The 5-mile hibernaculum buffer for each site overlaps with the project area (refer to Map 1 Vicinity/Existing Condition Map). All timber harvest from April 15 through October 30 within five miles of a known Indiana bat hibernaculum shall be in accordance with provisions of a Forest Service management plan for that hibernaculum (Forest Plan, p. 28).

White Nose Syndrome (WNS), a virulent and fatal disease condition that infects cave- and mine-hibernating bats has resulted in profound mortality of these bats throughout the Northeast, including Vermont. At present, it is not known if Indiana bats still over-winter in these hibernacula or if they occur within the project area. Although it is apparent that local populations of other cave- and mine-hibernating bats (such as little brown bat, *Myotis lucifugus*, or northern long-eared bat, *M. septentrionalis*), have suffered extreme mortality over the past few years, the exact status of these populations in the project area is not known. As bat mortality has resulted in suitable bat foraging and roosting habitat that is "under-occupied," it is unlikely that habitat enhancement activities are required in the project area at this time. The Forest Service remains in close contact with the U.S. Fish and Wildlife Service and the Vermont Fish and Wildlife Department. Any management activities that might benefit these bat species may be incorporated into the project, as appropriate.

There is an opportunity to:

- Partner and collaborate with federal and state wildlife agencies, university researchers, and other agencies and groups to promote research on WNS, to monitor the presence of bats within the project area, and to implement management actions as they develop.
- Maintain key habitat features throughout the home ranges of bat species that occur on NFS and non-NFS lands.

1.3.1.9 Wildlife Habitat Improvement on Non-NFS Lands

Many wildlife species occur across large home ranges that span NFS and non-NFS lands. Non-NFS lands adjacent to the GMNF include habitats that provide food and shelter for many of these species. The project area also includes known wildlife travel corridors that connect large areas of habitat. In many cases these travel corridors transect non-NFS lands, connecting large tracts of habitat located on the GMNF. Some of these wildlife corridors intersect State highways and other roads.

There is an opportunity to:

- Partner and collaborate with private land owners within the Dorset Peru Project Area to identify potential improvements to existing wildlife habitat conditions.
- Partner and collaborate with the Vermont Agency of Transportation and Vermont Agency of Natural Resources to enhance habitat conditions along wildlife travel corridors.
- Maintain and increase key habitat features throughout the home ranges of wildlife species that occur on NFS and non-NFS lands.

1.3.2. Timber

1.3.2.1. Enhance Forest Health and Diversity; and Promote High Quality Timber Production

Quality habitats through diverse forest composition and age classes are important Forest Plan objectives (Forest Plan, pp. 10 and 11). Timber harvesting is the primary tool to achieve or work toward these objectives (Forest Plan Objective under Goal #10, p. 15). Silvicultural practices will be used to meet wildlife and ecological objectives in the Diverse Forest Use MA

(Forest Plan, p. 47). Likewise, silvicultural practices will be used to meet wildlife habitat objectives in the Remote Wildlife Habitat MA (Forest Plan, p. 60), and the use of commercial tree harvesting is required to maintain desired habitats in the Green Mountain Escarpment (Forest Plan, p. 86). Providing high-quality sawtimber and other timber products on a sustained yield basis is also an important management objective of the Forest Plan, and a major vegetative management emphasis of the Diverse Forest Use MA (Forest Plan, pp. 14 and 47).

Inventories have shown that a number of timber stands managed for high-quality timber within the Dorset Peru Project Area are overstocked with trees. Some stands have trees afflicted with old age, insect, disease or physical damage from the elements to a degree that would designate them as low quality stands. Some stands are now mature or over mature; and desired tree size, age and quality have been achieved, or growth levels have dropped off. These stands are now ready to be harvested before sawlog quality is reduced, or the trees decline in economic value and die.

Without any vegetation management, the forest habitat composition and age class distribution within the project area would not contribute towards achieving the Forest-wide objectives specified by the Forest Plan. In addition, stands would continue to decline in health and timber quality would decrease.

There is an opportunity to:

- Implement both even-aged and uneven-aged silviculture practices to meet wildlife habitat objectives.
- Create a mix of deciduous and coniferous forest stands of various types in stands that vary in size, shape, age, height, and tree species composition.
- Improve size and quality of sawtimber by reducing stand density, improving spacing and retention of more desirable species.
- Improve sawlog production and wood quality by removing trees in low quality stands afflicted with insect, disease and other damage to prevent the spread of the damaging agent or to remove a species that may be a vector for insect spread.
- Capture sawlog quality in mature and over mature trees before it is reduced or the trees decline in value.
- Improve pulpwood and fuelwood production that can be used as a local alternative to fossil fuels.
- Improve forest and stand health and diversity by:
  - ✓ Regenerating poorly stocked, low quality, mature stands, and stands that are declining in productivity to grow new stands and sustain forest cover and timber production for the long-term.
  - ✓ Promoting an increase in red oak habitat by releasing oak from competing hardwoods.
  - ✓ Promoting an increase in softwood and mixedwood habitats by releasing spruce/fir and hemlock from competing hardwoods.
  - ✓ Promoting an increase in aspen/paper birch habitat by creating openings in areas with a presence and propensity to growing aspen/birch.
  - ✓ Increasing the diversity of wildlife habitat that relies on open and early successional habitat by creating temporary and permanent openings.

1.3.2.2 Provide Forest Products

Forest Plan Goal #8 is to “[p]rovide a sustainable supply of forest products” while an associated objective is to “provide high-quality saw timber and other wood products for local economies”

(Forest Plan, p. 14). Forest Plan Goal #17 is to "[s]upport regional and local economies through resource use, production, and protection" (Forest Plan, p. 17). Timber sales resulting from vegetation management can be offered to public bidders through Standard Timber Sale and/or Stewardship contracts to help support local and regional economies.

The availability of timber sales from NFS lands is an important component to the local and regional wood product based economies in Vermont. Without timber sales generated from vegetation management activities within the Dorset Peru Project Area, the opportunity to benefit these economies would be lost.

There is an opportunity to:

- Provide a number of different sized timber sales which would support local and regional economies.
- Provide a number of post-harvest service contracts such as site preparation and tree planting to help establish reforestation while supporting the local economy.

1.3.3. Fisheries

Forest Plan Goal #4 is to "[m]aintain or restore aquatic, fisheries, riparian, and wetland habitats" (Forest Plan, p. 13). Also, Forest Plan Goal # 6 is to "[m]aintain and restore ecological processes and systems on the GMNF within a desired range of variability, including a variety of native vegetation and stream channel types, and their patterns and structural components" (Forest Plan, p.14). Principles of stream geomorphology and habitat management are used to restore and enhance fisheries habitat (Forest Plan, p. 13) while knowledge of riparian/floodplain functions and large woody debris (LWD) dynamics are used to restore and enhance stream ecosystem processes (Forest Plan, p. 14).

1.3.3.1. Improve Fish Habitat Quality

Stream habitat in Mad Tom and Little Mad Tom Brooks and the headwater reaches of the Mettawee River lack the quantities of LWD that would naturally be found in upland streams. LWD is critical to creating diverse stream habitats for fish, amphibians, and aquatic insects. It is also important for maintaining streambank and channel stability. Habitat surveys have not been completed in the headwaters of the Mettawee River on NFS lands. Visual observations during fish population surveys indicate LWD quantities are similar to those found throughout the Forest.

The amount of pool habitat in forested headwater streams is closely tied to the quantity of LWD found in the streams. Large trees that fall into streams create deep pools with hiding cover for aquatic biota. Low percentages of pool habitat are indicative of low quantities of LWD.

Table 1.3-3 compares the natural or desired LWD quantities and pool habitat with the existing conditions for LWD and pool habitat in the Mettawee headwaters, Mad Tom, and Little Mad Tom Brooks.

Table 1.3-3: Comparison of existing LWD and pool habitat with Forest Plan objectives.

Stream	# LWD/Mile	Pool Habitat	
		Percent Pool Area (%)	Percent High Quality Pools[2] (%)
Forest Plan Objective[1]	**175-230**	**30**	**33**
Mettawee River headwaters[3]	80 (estimate)	16 (estimate)	33 (estimate)
Mad Tom Brook	70	14	35%
Little Mad Tom Brook	93	18	34

[1] 2006 Forest Plan objectives establish the desired future condition for fish habitat.
[2] High quality pools are as long as the stream width, with a depth of 2 feet or greater and abundant cover.
[3] Estimates based on survey data from similar streams in the project area.

In addition to the deficiencies in existing LWD in area brooks, several stream culverts along existing roads in the project area are migration barriers to native Brook trout and other aquatic species. The streams currently impacted on NFS land are a tributary to Mad Tom Brook along the proposed East Dorset Trail. In addition, there are two culverts on town roads that are barriers to aquatic organisms: 1) Tower Road in the Town of Dorset in the headwaters of the Mettawee River and; 2) Town Highway (TH) 14 on Farnum Brook in the Town of Peru.

Without increasing the amount of LWD and aquatic organism passage improvements, aquatic habitat diversity and connectivity will remain below desirable levels and may decrease over time.

There is an opportunity to:

- Increase the amount of LWD and pool habitat in the headwaters of the Mettawee River and in Mad Tom and Little Mad Tom Brooks.
- Improve fish passage at road-stream crossings where culverts have created migration barriers.

1.3.3.2 Improve Fish Habitat Quality on Non-NFS Lands

Stream habitat and culvert surveys have not been completed and/or fully evaluated on streams crossing private lands within the project area. It is likely that most of these streams are affected by low quantities of LWD similar to streams on NFS lands resulting in reduced habitat diversity, stability and sediment storage. Likewise, many culverts along roads under town, state or private jurisdiction are likely blocking aquatic organism migration.

There is an opportunity to:

- Collaborate and establish partnerships with private landowners, organizations, towns, and state agencies to identify streams with poor fish habitat quality on non-NFS lands within the project area.
- Improve fish habitat in streams on non-NFS lands within the project area.

1.3.4 Non-Native Invasive Plants

Control Existing Populations of Non-Native Invasive Plants (NNIP) on Non-NFS Lands

Forest Plan Goal #2 is to “[m]aintain and restore quality, amount, and distribution of habitats to produce viable and sustainable populations of native and desirable non-native plants and

animals" (Forest Plan, p. 10). An associated objective is to "[m]inimize adverse effects of NNI[P] on National Forest resources (Forest Plan, p. 13).

Non-native invasive plant surveys have focused on roads, trails, and rivers in the Dorset Peru Project Area. There have been 12 species of NNIP found in 156 individual infestations. Approximately 40 percent of the infestations are on private land, while the remaining 60 percent are on NFS lands. The most common NNIP found is Morrow honeysuckle. Of all the places surveyed, Forest Road (FR) 259 has the most infestations in a fairly concentrated area. Control of NNIP on NFS lands within the project area is already authorized by the Forest-wide Non-Native Invasive Plant Control Project Decision Notice dated October 19, 2010 and treatment of existing infestations is ongoing through a variety of methods. There is a need, however, to focus on the treatment of infestation on non-NFS lands to effectively manage NNIP across land owner boundaries.

There is an opportunity to:

- Collaborate and establish partnerships with private land owners, organizations, Towns, and State agencies to identify and control existing and future populations of NNIP on non-NFS lands that complement NNIP treatment activities on NFS lands.

1.3.5. Soil and Water

Address existing or potential risks of erosion, soil compaction, stream sedimentation, or impacts to wetland functions

Forest Plan Goal #3 is to "[m]aintain or restore the natural, ecological functions of soil' (Forest Plan, p. 13). Forest Plan Goal #4 is to "[m]aintain or restore aquatic, fisheries, riparian, and wetland habitats" (Forest Plan, p. 13). Soil, wetland, and water resource inventories were conducted to identify areas where these Forest Plan objectives are not fully met due to existing or potential risks of erosion, soil compaction, stream sedimentation, or impacts to wetland functions. Inventories identified on-going or potential future resource degradation at the following locations (refer to Maps 2 and 3):

- Dorset Peak East (old skid road where it climbs up the ridge and old woods roads in the wetland sections)
- East Ridge (old skid road)
- Dorset Mountain West Side (old skid road)
- Beech Ridge Access (currently a town pent road that accesses several camps on Beech Ridge)
- Forest Road 285 (Forest Service right-of-way, the first section of which is a town trail)
- Old Mad Tom Trail/ Proposed East Dorset Trail (formerly a town road as well as Forest Service Trail)
- Pierce Road Extension (woods road accessing NFS lands, off the end of the traveled portion of Pierce Road)

There is an opportunity to:

- Reduce soil and water resource degradation resulting from illegal trail or road recreation uses, poor trail design and locations, and/or unneeded roads at the identified locations.

1.3.6 Recreation

Forest Plan Goal #12 is to "[p]rovide a diverse range of high quality, sustainable recreation opportunities that complement those provided off National Forest System lands" (Forest Plan, p. 15). The Forest Plan provides opportunities for a diversity of trail uses including hiking, biking, cross-country skiing, and horseback riding (Forest Plan ROD, p. 19).

Forest Plan Goal #14 is to "[p]rovide a safe, efficient, and effective Forest transportation system that meets both the needs of the Forest Service and the public" (Forest Plan, p.16). A Travel Analysis was completed for the Dorset Peru Project Area which includes a narrative of the existing condition and needs of the trail system (Travel Analysis for the Dorset Peru Integrated Resource Project, (USDA Forest Service 2012g). The recommendations contained in the trails component portion of the Travel Analysis provide the basis for the trails management needs within the Dorset Peru Project Area.

The desired future condition for recreation opportunities varies across MAs in the Dorset Peru Project Area:

- The Diverse Forest Use MA is to provide diverse trail opportunities (Forest Plan, p. 47) with a desired Recreation Opportunity Spectrum (ROS) class towards Roaded Natural.
- The Wilderness MA is to have little evidence of human development with several exceptions including trails, trail shelters, trail blazes, and limited trail signing with a desired ROS class towards Primitive (Forest Plan, p. 49).
- The Remote Backcountry Forest MA is to be accessible by foot and other non-motorized means of transport with a ROS of class towards semi-primitive non-motorized (Forest Plan, p. 54).
- In the Remote Wildlife Habitat MA, recreation related disturbances to wildlife will be minimal, and trails will be managed for access by foot or other non-motorized means of transport with a ROS of class towards semi-primitive non-motorized (Forest Plan, p. 60).
- The Appalachian National Scenic Trail MA is to provide a variety of opportunities in the most primitive and natural setting and recognize the nationally significant aesthetic value of these lands with a ROS of class towards semi-primitive non-motorized (Forest Plan, p. 67).
- In the Robert T. Stafford White Rocks National Recreation Area, a range of recreational opportunities will be provided in a predominantly roadless setting. These opportunities will include foot and other non-motorized means of transport such as skis, snowshoes, horses, and bicycles, as well as winter motorized uses with a ROS of class towards semi-primitive non-motorized (Forest Plan, p. 67).
- The Green Mountain Escarpment MA provides non-motorized and winter motorized trail opportunities with an ROS of class towards semi-primitive motorized.

Provide Hiking Trail Opportunities

The project area contains trails managed for hiking, biking, and snowmobiling including: 10.8 miles of the AT/LT; 7.7 miles of Forest Trail (FT) 385 which is also Vermont Association of Snow Travelers (VAST) Corridor 7, a primary snowmobile trail; the 3.2 mile FT 355 known as the Mad Tom snowmobile trail that connects parking at Emerald Lake State Park and VAST Corridor 7 snowmobile trail; a trailhead on SRs 11/30; and small parking areas or pull-offs on Grouse Lane, FR 21, and FR 58.

The project area also contains trails that are not classified as managed NFS Trails. The old Mad Tom Trail follows the Mad Tom Brook with termini at Mad Tom Road and FR 21. The trail

was once a side trail to the Long Trail, and is still in use by area residents for hiking, snowshoeing and cross country skiing. Lack of management and maintenance on the trail has caused erosion of the trail near the Mad Tom Brook. There are three stream crossings where bridges have washed out, and there are no designated parking areas for use of the trail.

The Dorset Mountain area is a 3,000 acre acquisition of NFS land on the west side of US Highway 7. There is a network of trails that currently are not classified as managed NFS Trails. The trail system is listed in hiking books, and based on public collaboration and discussions with VFPR staff, an interest in connecting a Dorset Mountain Trail system to Emerald Lake State Park and developing a connector trail between the State Park, the GMNF and AT was identified. Some members of the public have expressed an interest in adding uses to the trails such as mountain biking and horseback riding. The trails traverse a number of wet and steep areas that do not have adequate drainage structures and trail treads. Some of the trails also have unauthorized uses (snowmobiles and All-Terrain Vehicles (ATVs)). The trail system has the potential to form a loop system with a designated trailhead although this potential has been made more difficult to realize due to damage caused by Tropical Storm Irene.

There is an opportunity to:

- Improve recreation opportunities and sustain a safe, efficient, and effective transportation system by reconstructing and retaining high quality trails that are used by the public, and by connecting these trails with Emerald Lake State Park.
- There is an opportunity to designate new trails in the East Dorset and Dorset Mountain area and expand partnerships to help maintain them.
- There is an opportunity to improve access by creating, expanding, and improving trailheads.

1.3.7 Scenery

Enhance Viewing Opportunities along Existing Roads and Trails

One of the top public activities on the GMNF is viewing scenery accessed by established vistas (Forest Plan EIS, pp. 3-211 and 3-306). Forest Plan Goal #15 is to “[m]aintain or enhance visual resources such as view sheds, vistas, overlooks, and special features” (Forest Plan, p. 16). Forest Service staff has identified opportunities to enhance viewing points along roads and trails including opportunities created by some past vegetation treatments. According to vista inventory data, the project area contains a few managed vistas along the AT and NFS roads. There are opportunities to create new vistas along roads and on the Dorset Mountain parcel.

There is an opportunity to:

- Provide new vistas by creating new openings along existing roads and trails.
- Maintain existing permanent and temporary openings along roads and trails to perpetuate views of scenery.
- Maintain and enhance the vista on Little Dorset Peak.

1.3.8. Transportation

Forest Plan Goal #14 is to “[p]rovide a safe, efficient, and effective Forest transportation system that meets both the needs of the public and the Forest Service (Forest Plan, p. 16). A Travel Analysis was completed for the Dorset Peru Project Area which includes a narrative of the existing condition and needs of the transportation system (Travel Analysis for the Dorset Peru Project, (USDA Forest Service 2012g). The recommendations contained in the roads

component portion of the Travel Analysis provide the basis for the transportation management needs within the Dorset Peru Project Area.

1.3.8.1 Improve Safety on Forest Roads in the Project Area

National Forest System Roads in the project area that need to meet Federal Highway Safety Act standards for Forest Service objective/operational maintenance level (OML) 3, 4 and 5 roads, are in constant need of maintenance on a yearly basis. There is a need to review NFS roads and their uses in the area to determine whether the maintenance is in line with the use needs or whether some roads can be maintained less often and reduced to a lower OML with standards less than Highway Safety Act requirements. Additionally, Forest Road signing within the general project area has aged over the years and is in need of updating to meet federal signing regulations. This mostly involves replacing worn and/or illegible existing signing with more highly visible (retro-reflective) signing.

There is an opportunity to:

- Review road maintenance levels to ensure Highway Safety Act standards are met where needed, and maintenance levels are reduced where they are not.
- Change and replace signing on many project area roads to comply with current signing regulations.

1.3.8.2 Align NFS Road Infrastructure with Current and Future Predicted Transportation Needs

Existing conditions and some changes in use of roads require the Forest Service to re-evaluate Road Management Objectives (RMO's) for each of the seven existing National Forest System Roads (NFSR) within the project area. Existing and future predicted conditions for the NFS Roads were analyzed in a Travel Analysis for the Dorset Peru Project completed in January 2012. This document makes recommendations for the future of the road system in the project area such as changes to RMO's, OML's, road and parking improvements, new temporary or permanent roads, and the decommissioning of roads.

There is an opportunity to:

- Implement recommendations made in the January 2012 Travel Analysis for NFS Roads within the project area.

1.3.8.3 Increase Cooperation with Local Governments on Management of the Forest and Town Road Infrastructure as it Relates to Forest Access

The Forest Service currently has a Road Cooperative Agreement with the Town of Peru in the project area. Participation with this town has mainly been on FR 21 (Mad Tom Notch Road). There is a need to continue this cooperation with the Town of Peru and to also establish a new road cooperative agreement with the Town of Dorset to achieve Forest access improvements. Though overall Forest road budgets have fallen behind increased construction and maintenance costs, the Forest Service is committed to continuing cooperation when funding is available, and where there is mutual benefit to the public.
There is an opportunity to:

- Explore new opportunities for Road Cooperative Agreement participation with the Town of Dorset and continue work with the Town of Peru to:
  - Improve Forest access, reduce soil erosion.
  - Discourage unauthorized off-road motorized activity.

1.3.8.4 Unauthorized Non-System Roads

There are currently several existing unauthorized non-system roads and trails within the project area. The majority are short sections of former skid trails off Forest Roads 21, 58, and various Town roads adjacent to Forest lands that were not blocked or closed adequately when timber sales were completed. These non-system roads and trails are intermittently providing unmanaged recreational access to ATV's and 4 wheel drive vehicles, and causing localized rutting and soil disturbance. If the unauthorized use of these non-system roads and trails is not addressed, more serious soil disturbance and resource damage could occur.

There is an opportunity to:

- Address unauthorized roads and skid trails which are causing some localized soil disturbance (refer also to the Soil and Water Section).

1.3.9 Heritage

Enhance Protection, Stewardship and Knowledge of the Forest's Heritage Resources

Forest Plan Goal #16 is to "[p]rovide protection and stewardship for significant heritage resources on the GMNF" (Forest Plan, p. 17). This protection/stewardship generally takes the form of identifying, evaluating and occasionally interpreting heritage sites; ensuring that Forest Service management and other activities do not harm them; and in some cases stabilizing the remains, removing encroaching vegetation, and making them more visible for the public.

Heritage resources are the archaeological and historic sites, structures, features, artifacts and landscapes created by people who lived and worked on the land in the past. The Forest Service has an obligation to protect and manage heritage resources that are or may be significant. Heritage resource sites are considered significant if they meet the criteria for inclusion on the National Register of Historic Places; if so, they are referred to as "Historic Properties". More specifically, heritage resource sites on the Forest can include archaeological remains of Native American hunting and living sites, and sacred places; the remains of historic period farmsteads (such as cellar holes), mills, schools, cemeteries, stone fences/walls, transportation systems, charcoal kilns, and more; standing historic structures (such as buildings, fire towers, Civilian Conservation Corps (CCC) camps, Long Trail shelters, cairns, that are more than 50 years old); and (occasionally) entire landscapes that still reflect a past condition or land-use or significant event.

It is worth noting that sites on NFS lands tend to be better preserved than their counterparts on privately owned lands due to different developmental pressures and our legal obligation to provide stewardship. Therefore, over time, sites managed by the Forest Service become more significant because they represent an increasingly higher percentage of historic archaeological sites in the State that have good physical preservation.

Based on background information from our inventory of known sites, the use of the State-developed predictive/suitability model for the location of prehistoric archaeological sites, and broad scale field reconnaissance, we know that heritage sites occur in or near Areas of Potential Effect (project activity areas) throughout the Dorset Peru Project Area. This demonstrates both a need to protect, and an opportunity to enhance, these sites.

Both Western Abenaki and Mohican tribes (and their ancestors) used and laid claim to the area. Pre-contact Native American sites surely exist, but their visibility is very low. Despite numerous "finds" by individuals over the years, there are very few formally documented or excavated sites. A suitability model indicates that the highest potential for preserved sites is in the valleys and along significant drainages and wetlands.

The great majority of the known heritage resource sites in the project area date to the late 1700's through the 1800's and include the remains of numerous farms, stream-side mills, charcoal kilns, cemeteries, and marble quarries (although none of these latter sites are on NFS lands). Many of these sites are at least partially visible on the surface and represent a land-use history that is often largely unknown to many Forest users.

There is an opportunity to:

- Provide stewardship for heritage resource sites through mandated site inventory and protection.
- Increase site visibility and stability in the project area using volunteers, Vermont Youth Conservation Corps (VYCC) crews, and/or stewardship contracting at historic and "industrial" period sites (like the Cochran-Manley mill and kilns), and through coordinated efforts related to releasing apple trees, establishing wildlife openings, and creating 'down woody debris habitat' near historic period sites.
- Increase public awareness of land-use history in the area through interpretation of the 19th century Bromley Book charcoal kilns along the AT/LT at the trailhead, and of the mills and other historic features along the proposed East Dorset (old Mad Tom) Trail.

1.4 Proposed Action

The proposed action is designed to meet Forest Plan goals and objectives, move the resource conditions within the Dorset Peru Project Area towards desired future conditions, and meet the project purpose and need for each resource category as provided in Section 1.3. The proposed action section answers the questions: "what is being proposed, how and when is it to be implemented, and where is it located?" Refer to Chapter 2 (Section 2.1.2) for a detailed description of the Dorset Project proposed action.

1.5 Decision Framework

The main decision to be made by the Responsible Official is whether to implement management activities as proposed (proposed action), an alternative to the proposed action, or the "no-action" alternative. The Responsible Official will review the proposed action, the alternatives, and the anticipated effects of implementation as provided in this EA and supporting documentation. The Responsible Official will then select the alternative that best meets the project purpose and need, and addresses issues and concerns while keeping environmental effects to an acceptable level. Consideration will also be given to how well each alternative meets Forest Plan goals, objectives, and desired future conditions.

Other decisions to be made include:

- If an action alternative is selected, what mitigation measures and monitoring should be required to meet Forest Plan standards and guidelines for all resources?
- Is the information provided by the analysis sufficient to make a decision to implement the proposed activities?

- Does the proposed project have a significant impact that would trigger a need to prepare an Environmental Impact Statement?

The District Ranger for the Manchester Ranger District is the Responsible Official for decisions to be made for the Dorset Peru Project.

1.6 Public Involvement

1.6.1 Pre-NEPA

The Dorset Peru Project was initiated in the spring of 2007 in meetings with town officials, community members, stakeholders and Vermont Department Forest Parks and Recreation (VFPR) and Vermont Fish and Wildlife Department (VFWD) staff; and a public field trip to Dorset Mountain held in June 2007. A public meeting was held in October 2009 at Bromley Mountain in Peru, VT to present information on resource inventories that were conducted in the project area, and to provide an opportunity for public input on this information. In April and May 2010 meetings were held in Dorset and Peru, VT to further collaborate with the public. Individuals, organizations, towns and agencies were invited to: 1) learn about the Forest Service desire to implement integrated resource management activities; 2) provide local knowledge and ideas for possible site-specific activities and opportunities; and 3) identify areas of particular interest in the project area. Potential management opportunities were identified through exchange of ideas between meeting participants.

Two public field visits were held during the summer of 2010: one to explore the potential East Dorset Trail, the other to look at existing and potential wildlife openings. The ideas for management activities developed through public collaboration and resource specialists' condition assessments were explored and expanded upon throughout the next year. During this same time period Forest Service staff collected more detailed inventory information to further verify and refine management activity options. The Forest Service narrowed the list of potential project activities based on these efforts and presented them at a public meeting held in Peru, VT in May 2011.

1.6.2 Formal Scoping

Additional feedback provided by the public during and after the May 2011 meeting resulted in the proposed action detailed in the *Dorset Peru Integrate Resource Management Project Scoping Information* document dated July 20, 2011. This Scoping Information was mailed or emailed to approximately 280 individuals, organizations, towns and agencies for a 30-day comment period ending August 26, 2011. It was also posted on the GMNF web site at the same time as the mailing. Notification of the project has also been published in the quarterly *GMNF Schedule of Proposed Actions* (SOPA) since April 2010. The SOPA is made available for those interested in projects proposed to implement the Forest Plan.

The *Dorset Peru Integrated Resource Project Preliminary Environmental Assessment: 30-Day Comment Document* was made available to an extensive list of individuals, agencies, and organizations in August 2012. The Preliminary EA was also available on the GMNF website. The public was notified by a legal notice in the Rutland Herald on August 13, 2012 triggering an opportunity to comment on the Preliminary EA and the proposed management activities for a 30-day period from August 14 to September 12, 2012.

There were 14 timely comments received for the Preliminary EA. One new key issue was identified from these comments and was addressed through an additional mitigation. There were also parts of the EA that were clarified or improved as a result of the content of comments. The *Dorset Peru Integrated Resource Project Preliminary Environmental Assessment 30-Day Comment Period: Comment Content Analysis and Response to Comments, February 2013,* was prepared to disclose how all comments were addressed in this final phase of the analysis process.

1.7 Identification of Issues

There were 18 individual responses received specific to the proposed Dorset Peru Project public scoping process. Issues were developed by the Forest Service Dorset Peru Project interdisciplinary team (IDT) from written correspondence, telephone conversations, and meetings held in response to the Scoping Information document which described the Proposed Action. Scoping comments (including letters, emails and recorded verbal communication) are located in the project planning record.

An issue is defined as a point of disagreement, debate, or dispute with a proposed activity based on some anticipated effect. The Forest Service IDT separated the issues into two categories: major, and other issues.

- Major issues: These are issues that represent unresolved conflicts associated with the proposed action and are addressed with the development of an alternative(s) and/or mitigation measure(s). Alternatives provide a clear difference in environmental effects associated with the major issue. Issues can be identified as major because of the extent of their geographic distribution, the duration of their effects, or the intensity of interest or resource conflict. Major issues meet the intent of the Council for Environmental Quality (CEQ) NEPA regulations at 40 CFR Sec. 1500.1(b) and 1500.4(g), "…NEPA documents must concentrate on the issues that are truly significant…" and "…deserving of study…"

- Other Issues: These are issues that are not addressed in the environmental analysis or are only briefly discussed. The CEQ NEPA regulations require this delineation in 40 CFR Sec. 1501.7(a) (3.), "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review …" These non-significant issues are defined as "other" issues in the EA. Sub-categories of "other" issues include:

- The issue is outside the scope of the proposed action.
- The issue is already decided by law, regulation, Forest Plan, or other higher level decision.
- The issue is irrelevant to the decision to be made.
- The issue is conjectural and not supported by scientific or factual evidence.

The major issues used for the Dorset Peru Project EA are described in Sections 1.7.1. Issues identified from comments are often phrased as a cause-effect "issue statement" to describe a specific action and the environmental effect(s) expected to result from that action. Issue statements often capture similar issues from multiple comments that have been organized and grouped by a common resource, cause and effect relationships, same or common geographic area, or linked to the same action.

1.7.1 Major Issues

Major issues are determined to be key factors when developing alternatives to the Proposed Action based on the extent of their geographical distribution, the duration of their effects, or the intensity of interest or resource conflict. These issues also help to focus the environmental effects analysis on the relevant resources in Chapter 3 of the EA.

There are three major issues from public scoping that were identified by the Forest Service IDT. "Indicators" are also included for the issue statement associated with the major issue to provide a meaningful measure of environmental effects related to the resource issues. The issue statement and indicators can be used to track how the issue is addressed in Chapter 3 (Sections 3.1 Social Factors, and 3.2 Recreation).

Major Issue 1: Public comment suggests that the Forest Service should reconsider using Bromley Forest Road and Chandolin Road for use by log trucks and harvest equipment because of the following reasons cited by the public:

- there will be severe damage to the road especially during rainy months; and result in high reconstruction or maintenance costs;
- the roads are not wide enough in the winter for safe passage of two-way traffic;
- it would result in significant public safety issues, especially for children who live along the road;
- it would result in noise and dust;
- it will impact rental and property values in the area.

Indicators:

1. Number of logging trucks per day
2. Length of time and season that log hauling would occur
3. Road design and condition

Major Issue 2: Public comment suggests that the Forest Service should reconsider the time frame and location for the proposed logging along the Corridor 7 snowmobile trail because of the following reasons cited by the public:

- logging operations would cripple my winter business and livelihood;
- it causes very rough terrain for snowmobile use;
- it is not a good idea to mix logging and snowmobile operations on the same trail;
- it is the only north/south snowmobile trail that exists;
- plowing FR21 for logging activities conflicts with snowmobile use of the road.

Indicator:
Amount of time a main corridor snowmobile trail would be closed for snowmobile use.

Major Issue 3: Public comment suggests that the Forest Service should not close down FT355 for logging activities because of the following reasons cited by the public:

- it is an important snowmobile access route to services in East Dorset;
- it will pose hardship on business owners in East Dorset dependent on snowmobile use.

Indicator:
Amount of time a secondary snowmobile trail would be closed for snowmobile use.

Major Issue 4: Public comment suggests that the Forest Service should reconsider locating the Emerald Lake Connector Trail on lands between the Mad Tom Trail and Mad Tom Road because of its proximity to private land.

Indicator:
Distance between Emerald Lake Connector Trail and private land.

Chapter 2. Description of the Alternatives

This chapter describes and compares the range of alternatives that have been considered for the Dorset Peru Project. It presents the alternatives in comparative form and sharply defines the differences between each alternative. This comparison provides a clear basis for choice by the Responsible Official to implement the alternative that best meets the purpose and need, and addresses the issues identified through public scoping discussed in Chapter 1.

2.1 Alternatives Considered for Detailed Analysis

Alternative development was considered by the Forest Service IDT and the Responsible Official to address the issues discussed in Chapter 1 (Section 1.7.). There are three alternatives that have been carried forward for detailed analysis including the “no action” and “proposed action” alternatives. Another alternative was developed to address the major issues identified through public scoping.

The three alternatives considered for detailed analysis are:

1. Alternative A: No Action
   The activities associated with the proposed action would not take place, thus providing a baseline that enables the comparison of the environmental effects of the action alternatives.

2. Alternative B: Proposed Action
   The activities under Alternative B are proposed to meet the purpose and need for the Dorset Peru Project as provided in the July 2011 Scoping Information document. Some modifications have been made to address public comments received during the scoping process. It also includes changes made that reflect new information obtained since the scoping document was distributed.

3. Alternative C: Eliminate timber harvesting in C59/S15 and18, C60/S35,36, and 37 to eliminate the need for access over Bromley Forest and Chandolin Roads
   This alternative was developed to address issues identified from public comments received during the scoping process associated with timber harvesting and access on Bromley Forest and Chandolin Roads.

Management activities proposed in the action alternatives (Alternatives B and C) would be implemented within the next 5 to 10 years. Management activities proposed are also designed to be consistent with Forest Plan Forest-wide and Management Area Standards and Guidelines (S&Gs) while moving the existing condition of each resource towards the goals, objectives and desired future conditions provided in the Forest Plan. Mitigation measures have also been developed as part of the actions alternatives to address resource concerns associated with proposed management activities. A detailed description of mitigation measures is located in Appendix B. In addition, refer to Map 1 (Vicinity/Existing Condition Map), Map 2 (Dorset Mountain Proposed Activities Alternatives B and C), Map 3 (East Dorset/Peru Proposed Activities Alternative B) and Map 4 (East Dorset/Peru Proposed Activities Alternative C) for locations of proposed activities and Tables 2.2 and 2.3 for a comparison of proposed activities and their associated effects by alternative.

2.1.1 Alternative A: No Action

Alternative A is the “no action” alternative. The no action alternative provides a baseline to compare the environmental effects from the action alternatives. There would be no implementation of any of

the management activities associated with the Proposed Action under this alternative. Management activities that have been previously approved under other NEPA decisions would still be implemented such as maintenance of existing permanent upland openings and apple trees (USDA Forest Service 2006a,b,c and 2009). Other ongoing routine management activities associated with existing infrastructure would also occur such as road and trail maintenance.

2.1.2 Alternative B: Proposed Action

This section details the proposed management activities (proposed action) within the Dorset Peru Project Area that has been designed to meet the purposed and need as provided in Section 1.3 for the following resource categories (refer to Maps 2 and 4 for activities specifically associated with this alternative):

1. Habitat Diversity
2. Timber
3. Fisheries
4. Non-Native Invasive Plants
5. Soil and Water
6. Recreation
7. Scenery
8. Transportation
9. Heritage

Alternative B is similar to the proposed management activities described in the Dorset Peru Project Scoping Information document dated July 2011. Some modifications have been made to the initial proposal to reflect scoping comments received during the project scoping process, more detailed resource information available to Forest Service staff including damage from Tropical Storm Irene, narrow the scope of the proposal. The following is a summary of the modifications made to the July 2011 proposed action:

1) Changes to Habitat Diversity Proposed Action:
   a) Early Successional Habitat – decrease acres created
   b) Softwood habitat – decrease acres enhanced
   c) Aspen habitat – decrease acres regenerated
   d) Oak Habitat – decrease acres enhanced
2) Changes to Timber Proposed Action:
   a) C50 – There would be no timber harvesting in C50 due to shallow soils and steep slopes.
   b) C56/S2, and4 – reduce treatment acres
   c) C56/S3 – has been renumbered to be C56/S28
   d) C56/S8 - add a 25 acre clearcut to regenerate aspen, spruce/fir
   e) C56/S9 – change from clearcut to improvement cut
   f) C58/S8 - reduce treatment acres due to shallow soils
   g) C58/S9 - remove due to shallow soils
   h) C59/S4,15,16,18, - reduce treatment acres due to shallow soils
   i) C59/s10 - remove due to shallow soils
   j) C60/S29,32,35,36,37 – reduce treatment acres due to shallow soils
   k) C60/S33 – remove due to shallow soils
   l) C61S18,19 - reduce treatment acres due to shallow soils
   m) C62/S9,10,13,18,19,21 - reduce treatment acres due to shallow soils
   n) C62/S13 – eliminated land clearing due to shallow soils
   o) C62/S14 – remove due to shallow soils
   p) C63/S5 - remove due to shallow soils
   q) C63/S8,25,30 - reduce treatment acres due to shallow soils

r) Clearcut acres would increase from 29 to 49 acres
s) All other treatment type acres are reduced

3) Changes to Soil and Water Proposed Action:
   a) Dorset Peak East - Close and restore all portions of this old skid road. Water bars would be installed to prevent existing and future risks of soil erosion and stream sedimentation, and the lower (east) end of the road would be blocked with boulders or an earthen berm.
   b) Compartment 50 Erosion Control - Water bars would be improved, and additional water bars added to numerous old ski roads on west-facing side slopes in Compartment 50. This would correct existing, and prevent future erosion.

4) Changes to Recreation Proposed Action:
   a) East Dorset trail - Trail reconstruction is proposed to occur in phases. The first phase would re-establish the trail from FR 21 and from Mad Tom Road. The second phase would re-establish the relocated middle portion of the trail. This section of the proposed trail experienced landslides from Tropical Storm Irene and will need a few years to stabilize before a trail can be constructed.
   b) Emerald Lake Connector Trail - The connector trail would go through the NFS lands adjacent to FT 355 on Mad Tom Road and on Bowen Hill Road. The land adjacent to the northern portion of FT 355 is forested and would remove the need for a section of the connector trail to be located on Mad Tom Road. The land on Bowen Hill Road is an open meadow.
   c) Dorset Mountain - The project would include: construction of approximately 3 miles of switchback trail designed for mountain biking and pedestrian use from the Grouse Lane trailhead to the trail on the east ridge of Dorset Mountain, rehabilitation of approximately three miles of existing trail on the east ridge of Dorset Mountain including drainage work, brush removal, puncheons, and trail tread stabilization; and the relocation of approximately one quarter mile of trail that became a stream bed as a result of Tropical Storm Irene. The unmanaged trail on the west side of Dorset Mountain would be closed and restored. This trail and the right-of-way from Tower Road were damaged in Tropical Storm Irene.

5) Changes to Scenery Proposed Action:
   a) East Ridge trail on Dorset Mountain: Maintain existing vistas in C195/S9 and C195/s6 using hand tools.

6) Changes to Transportation Proposed Action
   a) Eliminate the proposal to expand NFSR 286 parking area on Routes 11/30 due to proximity to stream protective strip and wetlands

7) Changes to Heritage Proposed Action:
   a) Conduct maintenance and restoration work at the small, historic North Dorset cemetery located at Emerald Lake State Park. This action involves manual labor to clean stones, re-erect fallen stones and, on occasion, mend a broken stone. Labor would be provided by adult volunteers, and direction provided by the Forest Archaeologist. Efforts will be coordinated with State Park personnel and the North Dorset Cemetery Association, and may include opportunities for State Park campers to observe and/or participate.
   b) Stabilize a mill site near the proposed East Dorset Trail. The remains of the Cochrane-Manley mill (just off the Trail in association with 3 charcoal kilns) would be treated by removing vegetation (generally small, non-merchantable saplings, poles and brush) with hand tools, and cutting an occasional encroaching hardwood tree, thus stabilizing structural remains.

The following is a detailed description of the proposed activities included in Alternative B:

1. Habitat Diversity

Appendix A, Tables A-1 and A-2 provide a summary of wildlife habitat and vegetation management treatments proposed within the Dorset Peru Project Area. These treatments contribute to habitat diversity in the following ways. Refer to Map 3 East Dorset/Peru Proposed Activities Alternative B for treatment locations.

Diversify the Composition and Ages of Forest Types to Improve Wildlife Habitat
The harvesting of timber is proposed to diversify the composition and ages of forest types which would improve overall compositional and structural diversity, and so improve wildlife habitat throughout the project area. The proposal includes the following activities:

- Increase early-successional (regenerating) habitat through clearcut, seed tree, and shelterwood harvesting on approximately **517 acres**.
- Enhance softwood and oak species composition and increase mixedwood and softwood habitat through approximately **229 acres** of single-tree and group selection harvesting in hardwood, mixedwood, and softwood stands.
- Enhance early-successional habitats in the Remote Wildlife Habitat MA through the development of **107 acres** of “late-stage” openings (see below under Openings section).
- Enhance late successional habitats in the Remote Wildlife Habitat MA through **385 acres** of thinning and improvement cuts to extend the growth and longevity of trees in areas of extended rotations of 150 to 200 years.

Refer to the Timber Section for more detailed discussion of the proposed even-aged and uneven-aged harvest treatments. The following activities are also proposed to contribute to the improvement of the wildlife habitat within the project area.

Diversify Aspen Habitat
The proposal includes regeneration of aspen clones within approximately **93 acres** of existing hardwood and mixedwood habitats using a variety of silvicultural methods in order to enhance the abundance and distribution of this important but limited habitat feature. Clearcut harvesting on 49 acres is proposed to create stands that have a high proportion of aspen while thinning and improvement cuts on 44 acres would release aspen clones and create a more vigorous aspen component within each stand.

Enhance Oak Habitat
The proposal includes enhancing oak habitat within the Green Mountain Escarpment MA through regenerating one **28-acre** hardwood stand, C59/S11, using a shelterwood with reserves harvest while enhancing existing oak in the stand. The objective for this stand is to initiate the conversion of this stand to an oak-northern hardwood forest type.

Several stands within the Escarpment MA and elsewhere (including Comp 57/ Stds 1, 2, 5, 10; Comp 58/ Stds 15, 22; Comp 59/ Stds 11, 15, 16, 18; Comp 60/ Stds 36, 37; Comp 61/ Std 37; Comp 63/ Std 30) include oak as a minor component of the stand. These stands are dominated by other forest types, such as northern hardwoods or hemlock-northern hardwoods, but include scattered oak trees, saplings, and/or seedlings. The proposal will increase the abundance of oak on **360 acres** of these hardwood and mixedwood stands while implementing the treatments proposed for these stands. Prescriptions for these stands will include release of existing oak seedlings, saplings, and small trees from competing vegetation, thereby increasing the proportion of oak in the stands, and ensuring a healthy seed source for future regeneration and mast crops for wildlife.

Two new openings are proposed in Compartment 57 (in Stands 1 and 5) that also have scattered red oak trees. FS staff anticipates that red oak seedlings may germinate and grow in these openings if the new open conditions, aspect, and soils are suitable. If red oak seedlings are abundant and vigorous in these openings, FS staff proposes to manage them for red oak regeneration by implementing opening restoration treatments to favor the development of sturdy tap roots on the red oak seedlings, and limit competition from red maple and beech. If successful, FS staff may in the future decide to allow one of these openings to revert to forest as a red oak stand.

Deer Winter Areas

Wintering habitat for white tailed deer would be maintained and enhanced through vegetation management to improve availability and quality of winter cover and browse. Only a small proportion of the State-mapped deer wintering areas overlap with NFS lands that are suitable for timber management within the project area. Timber and vegetation management elsewhere in the project area would provide improved, year-round habitat for deer. Even-aged regeneration treatments (clearcut, seed tree, and shelterwood), would promote hardwood and aspen regeneration for browse. Some uneven-aged treatments (single-tree and group selection) would be laid out to encourage softwood regeneration that would provide winter cover. Permanent upland wildlife openings containing grasses, forbs, and shrubby browse provide important year-round habitat for deer, even if they are not within or adjacent to mapped deer wintering areas. Refer to the Timber Section for discussion of the proposed even-aged and uneven-aged harvest treatments and to section below.

Maintain, Restore, and Expand Existing Permanent Upland Openings and Create New Upland Openings

The proposal includes management of 17 permanent upland openings for a total of **250 acres**. This management includes continued maintenance or restoration of some openings that currently exist, expansion of some existing openings into neighboring stands to create larger openings, and creation of new openings.

Restoration and maintenance of openings would be accomplished through timber harvest, mechanical chipping, or mowing; cutting with chainsaws, brush saws, or other hand tools; prescribed burning; or a combination of these treatment methods. Each stand typically would receive one to three treatments over a period of 5 to 7 years with some stands receiving multiple treatments in the same year. The treatment type, the number of treatments and the timing of treatments would be site-specific, depending on existing conditions compared to desired vegetative composition and structure identified for each stand.

The proposed actions would restore or create 17 upland openings. Two of the existing openings currently are managed and maintained under previous NEPA decisions: one 10-acre meadow and one 9-acre hayfield, for a total of **19 acres**. Five small existing openings in various stages of re-growth, for a combined total of **seven acres**, would serve as the seeds for expansion into four larger openings, for an expanded total of **44 acres**. In addition, 11 new openings would be created as part of this proposal, for a total of **187 acres**. Most of these enlarged or new openings would be between 10 and 20 acres in size. These larger openings provide a relatively-greater benefit to wildlife than smaller openings, and FS staff anticipates that future maintenance would be more cost effective. Once established, these newly created permanent upland openings will be restored as needed using the same treatment methods proposed for existing upland openings.

The management approach for six of the new large openings (three each in Compartments 56 and 62 for a total of **107 acres**) would be different than for other openings in the project area and on the GMNF. These six openings fall within the Remote Wildlife Habitat management area, and would be designated as “late-stage” permanent upland openings. Within each compartment, three grouped openings would be regenerated on a rotating 7-year schedule so that at any given time, the vegetation in one stand would be 0 to 6 years old, one stand would be 7 to 13 years old, and one

stand would be 14 to 20 years old. Each stand would be regenerated after the twentieth year. These late-stage stands would increase the continuing availability of older early-successional habitat (7 to 20 years) that would complement the permanent upland openings maintained on annual to five-year schedules, and temporary openings created through silvicultural treatment that grow through early-successional stages to mature forest.

Authorization for future, continuing maintenance of all openings maintained, restored, or created as part of this project would be sought through future NEPA decisions.

Four other existing openings within the project area, two alpine ski trails and two powerline rights-of-way, are included under long-term special use permits and maintained by the holders of those permits. These openings are not considered part of the proposed action and are not included in Appendix A-1.

Apple Tree/Soft Mast Release and Pruning
The proposal includes release and pruning of apple trees at four sites (see Appendix A, Table A-1)) where they are known to occur. It is anticipated that more apple trees would be discovered during project inventory, planning and implementation. Any newly-discovered apple trees would be considered for inclusion in the proposal for release and pruning activity. Treatment would include removal of over-topping trees that shade the apples, as well as small saplings and pole-size trees near or under the canopy of individual apple trees. This work would be completed using hand tools such as bow saws, chain saws, and other portable cutting devices designed for removal of woody vegetation.

Create Down Woody Debris Habitat
Cut and remove trees growing in and near select historical sites such as foundations of homes or mills, stone walls, charcoal kilns, etc. (refer to the Heritage Section). Trees cut to maintain these structures would be left on site and placed in such a way as to provide nesting, foraging, and travel habitat for small mammals, reptiles, and amphibians.

2. Timber

The proposal includes a variety of timber stand treatments on a total of **2,136 acres** (2,047 acres of timber harvest and 89 acres of stand improvement) to provide forest products to the local and regional economy, improve forest health and diversity, and to move the existing forest habitat composition and age class toward the objectives as provided in the Forest Plan and HMU analysis. Appendix A, Table A-2 lists the proposed harvest treatments, number of stand acres for each Compartment/Stand and the actual harvest acres proposed for each treatment. Table A-3 summarizes proposed harvest treatments. Table A-4 lists proposed stand improvement (TSI) and tree planting activities. Table A-5 lists site preparation for natural or artificial regeneration proposed for all stands receiving regeneration cuts. Map 3 East Dorset/Peru Proposed Activities Alternative B shows the locations of the timber harvests and other treatments proposed within the Dorset Peru Project Area.

Harvest Treatments
The following is a summary of the proposed harvest treatments and methods within the Dorset Peru Project Area:

1. Uneven-aged Harvest Treatments

There are a total of **572 acres** of uneven-aged harvest treatments proposed. An uneven-aged system is a silvicultural system involves manipulation of a forest to simultaneously maintain: a) continuous high-forest cover, b) recurring regeneration of desirable species, and c) orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest

products. Cutting methods that develop and maintain uneven-aged stands are single tree selection and group selection.

- **Approximately 518 acres of single tree selection** would be conducted in 19 hardwood stands and five mixedwood stands. Individual trees of all size classes are removed more or less uniformly throughout the stand creating or maintaining a multiage structure to promote growth of remaining trees and to provide space for regeneration. Multiple entries of this activity ultimately results in an uneven-aged stand of 3 or more age classes. Single tree selection maintains a fairly uniform and continuous crown cover appropriate for regenerating shade tolerant species.

  In addition, small groups or gaps of 1/20 to 1/5 acre in size may be mixed in to help establish a multiage structure. This action would produce sawtimber and pulpwood products, and reduce overall stocking of trees to appropriate levels for small amounts of sunlight to reach the forest floor. This would favor mostly regeneration of shade tolerant species of trees in the understory such as sugar maple, beech, hemlock, spruce and fir; and create a stand of trees of different sizes and ages.

  Where inclusions of aspen may occur, or where shade intolerant or intermediate shade intolerant species such as paper birch, black cherry, or red oak exist, the gaps created with this method would be slightly larger, no larger than a 1/4 acre. This would favor the growing of aspen and desirable shade-intolerant hardwoods that requires more sunlight. This method would be applied to hardwood stands (comprised of beech, birches, maples, ash, and oak) and mixedwood stands (comprised of hardwoods mixed with white pine, spruce, fir and hemlock).

- **Approximately 54 acres of group selection** would be conducted in two hardwood stands and one mixedwood stand. This harvest method, similar to the larger gaps described above, would harvest small groups of trees 1/20 to 2 acres in size and favor the growing of shade intolerant (sun-loving) species such as aspen, paper birch, and black cherry, and intermediate shade tolerant species such as red maple, yellow birch, red oak, white ash, and white pine.

2. <u>Even-aged Harvest Treatments</u>

There are a total of **1251 acres** of even-aged harvest treatments proposed. An even-aged system is a silvicultural system that produces stands in which all trees are about the same age; that is, the difference in age between trees forming the main crown canopy level will usually not exceed 20 percent of the rotation length.

Intermediate Cuts – *the removal of trees from a stand sometime between the beginning of formation of the stand and the regeneration cut. Types of intermediate cuts include thinning, release, and improvement cuttings*.

- **Approximately 316 acres of thinning** would be conducted in 12 hardwood stands and one mixedwood stand by removing individual trees to provide pockets of sunlight, growing space for improving growth on reserved trees while enhancing forest health through salvage of some dying trees. Basal area would be reduced to about 70 square feet per acre for hardwood stands and to about 100 square feet per acre in mixedwood stands. Red spruce, hemlock, and red oak trees and aspen clones in some of these stands can also be released from competition through thinning.

- **Approximately 399 acres of improvement cutting** would be conducted in 21 hardwood stands and three mixedwood stands by removing individual less desirable trees to improve the composition and quality of the trees within the stand, and to release desirable species such as

red spruce, hemlock, red oak, and aspen. Residual spacing would be similar to a thinning treatment.

Regeneration Cuts – *trees are removed from the stand to create conditions that will allow the forest to renew or reproduce itself.*

- **Approximately 420 acres of shelterwood** cutting would be conducted in 17 hardwood stands. A shelterwood treatment is the cutting of essentially most trees, leaving those needed to produce sufficient shade to produce a new age class in a moderated microenvironment. The sequence of treatments can include three types of cutting: 1) an optional preparatory cut to enhance conditions for seed production and to develop windfirmness, 2) an establishment cut to prepare the seed bed and to create a new age class, and 3) a removal cut to release established regeneration from competition with the overstory. These shelterwood stands would be separated by forested conditions and manageable stands so that they do not border each other.

    - **Shelterwood preparatory cut (three-cut treatment)** would be conducted in three hardwood stands (81 acres). An initial light preparatory cut similar to a thinning that enhances conditions for seed production and windfirmness would be conducted. Approximately 2-3 years later, a shelterwood establishment cut would occur, leaving about 1/3 of the trees. Once regeneration has been established, a removal cut would occur to remove the remaining overstory and release the understory.

    - **Shelterwood establishment cut (two-cut treatment)** would be conducted in 12 hardwood stands (292 acres). Approximately two thirds of the trees would be removed within each of these stands with the first cut leaving about 30 to 40 square feet of basal area per acre for seed and shelter trees. The remaining trees providing seed and shaded “shelter” to the new crop of understory trees may be harvested in about 3 to 5 years following initial harvest if compatible with other resources and after regeneration has been established.

    - **Shelterwood with reserves** would be conducted in two hardwood stands (47 acres). Approximately two-thirds of the trees would be removed within these stands leaving about 30 to 40 square feet of BA per acre in residual hardwood stands for seed and shelter trees. The remaining trees provide seed and shaded “shelter” to the new crop of understory trees. No overstory removal is planned. The remaining portion of the stand is retained at least 20 percent into the next rotation of the new stand, usually 40 to 60 years, and could be removed at that time during the first thinning of the new stand as larger sawtimber.

- **Overstory removal on 20 acres** (from advanced regeneration) would be conducted in one hardwood stand. Overstory removal is the cutting of trees constituting an upper canopy layer to release understory trees. The primary source of regeneration is advance reproduction. This is a result of a stand that was previously harvested.

- **Approximately 47 acres of seed tree** harvest would be conducted in two hardwood stands. Seed tree harvests remove most of the mature timber from an area in one cut except for a small number of desirable trees retained to provide seed or shelter for regeneration. These seed tree stands would be separated by forested conditions and manageable stands.

- **Approximately 49 acres of clearcuts** would be conducted in one hardwood, one mixedwood, and one softwood stand to regenerate the aspen/birch type and release existing softwood regeneration. The regenerated clearcut stands would have most trees removed leaving about

10 to 15 square feet of basal area (BA) per acre in desirable trees. In addition, patches of trees would be left uncut within about 10 percent of the stands to meet other wildlife, visual, soil and water Forest Plan standards and guidelines.

3. Land Clearing to Convert Forest to Openings

Approximately 224 acres of harvest without restocking would be conducted in 17 hardwood stands, two mixedwood stands, and two softwood stands. The timber harvest would be followed by land clearing to convert forested stands to permanent upland openings of early successional habitat. Patches of trees would be left uncut within about 10 percent of the stand area to meet other wildlife, visual, soil and water Forest Plan standards and guidelines. These stands would be separated by forested stands.

4. Estimated Timber Volume

The amount of sawlogs and pulpwood that could be produced from all uneven-aged and even-aged treatments is estimated to be 10.364 million board feet (MMBF) or 17,273 hundred cubic feet (CCF). The breakdown of wood products is approximately:

- 11,400 CCF of sawlogs
- 5,873 CCF of pulpwood

Another measurement some may be more familiar with is:

- 6,840 thousand board feet (MBF) of sawtimber
- 7,434 cords of pulpwood (divide pulp wood volume by 2 to get an MBF equivalent)

Connected Actions

Connected actions are management activities that are automatically triggered by other actions. The following activities are connected actions within the Dorset Peru Project Area as a result of proposed timber harvest treatments (Appendix A, Tables A-4 and A-5):

Post-Harvest Activities (Stand Improvement, Permanent Opening Creation, Site Preparation, Stocking Surveys, and Tree Planting):

- Stand Improvement: There are approximately **89 acres of stand improvements** (precommercial thinning) proposed to improve the composition, structure, condition, health and growth of young even-aged stands. These stands are generally less than 25 years old, created from past even-aged regeneration harvests. Within these stands, crop trees of desired species would be selected on a spacing of about 16 x 16 feet. Less desirable competing trees touching the crowns of the crop trees would be cut away to allow for better growth of selected crop trees intended to become a component of future commercial harvest.

- Site Preparation: There are approximately **1,089 acres of site preparation** proposed to provide for natural or artificial regeneration of harvested stands. Site preparation involves hand or mechanized manipulation of a site designed to enhance the success of regeneration. There are a variety of treatments to accomplish this. For this project, the primary treatments proposed are manual methods such as, cutting competing vegetation with a chainsaw or cutting blade, soil scarification by raking, and burning.

    - Site Preparation for Natural Regeneration - Manual (use of a chainsaw or cutting blade) - following harvest by the shelterwood, single/group selection, seed tree, and clearcut methods; saplings of tree species 1 to 6 inches Diameter at Breast Height (DBH) that may be bent or broken, not commercially valuable or less desirable would be cut within one year following the harvest. This preparation of the site allows more space and sunlight for the establishment of more desired timber species.

- Site Preparation for Natural Regeneration - Manual (scarification by raking) – involves the removal of vegetation or interfering debris, or disturbance of the soil surface, to enhance reforestation. Post-harvest monitoring can determine if raking within a stand would enhance regeneration. Soil scarification can also be accomplished through ground disturbance by logging such as during summer logging. This treatment is proposed for the following stands:
    - Compartment 57, Stands 1, 2, and 10
    - Compartment 59, Stand 16
- Site Preparation for Natural Regeneration - Burning – use of prescribed fire can be an effective way to control competing vegetation and reduce ground litter to promote germination. This type of treatment is particularly useful for stands with oak in them in order to enhance the success of oak regeneration. This treatment is proposed for the following stands:
    - Compartment 57, Stands 1, 2, and 10
    - Compartment 59, Stands 11 and 16

- Permanent Opening Creation: There are approximately **224 acres of vegetation clearing** proposed to complete the creation of permanent upland openings after the stands have been harvested. Following harvest, saplings of tree species 1 to 6 inches DBH that are not needed for wildlife would be cut within one year following harvest. This post-sale treatment allows for the growth of early successional habitat. Stumps would be left in openings or piled in wind rows, and/or slash burned followed by seeding.

- Stocking Surveys: Tree stocking surveys would be conducted following the first and third year of harvest to monitor regeneration success in all stands proposed for regeneration treatments (clearcuts, shelterwoods, shelterwood with reserves, overstory removals, single tree selection, and group selection harvest methods).

- Tree Planting: Although unlikely, if stocking surveys determine natural regeneration is not adequate in any of the regeneration harvest treatment areas (clearcuts, shelterwoods, shelterwood with reserves, overstory removals, single tree selection, and group selection harvest methods), tree planting would be necessary. To have adequate stocking, a stand should have at least 50 percent of the plots with at least one acceptable growing stock by the third year after harvest. If planting is necessary, a mix of native softwood species would be planted on a 4 foot by 4 foot spacing in areas proposed for regeneration to softwoods or mixedwood. The mix of native softwoods would improve cover and forage availability for big game. In areas to be regenerated to hardwoods, desired species would be planted. In the case of the proposed clearcuts, quaking aspen and paper birch are the desired hardwood species. Direct seeding through broadcast or aerial means is another option to hand planting.

Transportation Network: Town roads, NFS Roads and skid roads/trails would be used for log truck access to existing log landings. Existing log landings and skid roads/trails that meet current Forest Plan Standards and Guidelines would be used again for logging. There is a need to locate and construct new log landings, and some sections of skid roads/trails to access all areas being considered for harvest. It is anticipated that approximately 12 to 16 existing log landings would be used, and 3 to 6 new log landings would be constructed to meet the needs associated with proposed harvest treatments. Specific locations for new landings and skid roads/skid trails would be mutually agreed to by the sale(s) purchaser and the Forest Service.

The construction of temporary roads, and any improvement and/or maintenance needs associated with the existing transportation network to support timber harvest activities are discussed in the Transportation Section.

Implementation of Harvest Treatments (Timing)
The harvesting proposed within the project area would be packaged in a series of timber sales and/ or stewardship contracts and agreements which would be conducted within a 5 to 7 year period. This project lends itself to the implementation of several timber sales or stewardship contracts/ agreements of various sizes. The size and timing of the contract offerings and implementation of harvests would be determined by market conditions, interest and collaboration for stewardship contracts, and feedback from timber purchasers.

3. Fisheries

Refer to Maps 2 and 3 for the locations of proposed fisheries habitat treatments.

Placement of Large Woody Debris
To increase existing Large Woody Debris (LWD) amounts from 70 to 93 pieces per mile to approximately 200 pieces per mile, a total of about 894 trees are proposed to be cut along streamside areas and placed as LWD in sections of Mad Tom and Little Mad Tom Brooks, and in the headwaters of the Mettawee River (total stream length of approximately 7.2 miles). This would restore stream processes and LWD functions, such as creating pools, adding protective cover, and trapping and sorting of spawning gravel. This would include the following activities:

- Mettawee headwaters: Cut and place approximately 112 trees into sections of the stream along 0.86 miles (4,541 linear feet).
- Little Mad Tom Brook: Cut and place approximately 197 trees into sections of the stream along 1.84 miles (9,715 linear feet).
- Mad Tom Brook: Cut and place about 585 trees into sections of the stream along 4.50 miles (23,760 linear feet).

Of the trees to be felled, about half would be a minimum of 12 inch DBH with the other half between 8 to 12 inches DBH. The primary placement of trees would be accomplished through directional felling. A grip hoist or log carrier may be used to assist in placing the trees in desired stream locations. Heavy equipment would not be used in the placement of LWD.

Provide Fish Passage
Replace or retrofit three culverts to provide upstream aquatic organism passage in: 1) a tributary of Mad Tom Brook on an undesignated trail on a portion of the “East Dorset Trail”; 2) Farnum Brook on TH #14 in Peru; and 3) in the headwaters of the Mettawee River on Tower Road in Dorset. Fish passage improvement work at culverts may require the use of heavy equipment where access and stream size would render such activities feasible and necessary. Project work would include completion of detailed, existing condition assessments, designing of retrofits to existing structures or replacement of crossing structures in the same location, and constructing the retrofits or replacements. Replacement structures would be bottomless arch culvert designs or bridges.

4. Non-Native Invasive Plants

When Non-Native Invasive Plants (NNIP) infestations occur at or adjacent to sites of other proposed project activities within the Dorset-Peru project area and have the potential to spread as a result of those activities, NNIP treatment will occur prior to or in conjunction with project activities. Treatment methods and mitigation measures will be in keeping with those in the Green Mountain Invasive Plant Control Project Decision Notice dated October 19, 2010.

NNIP control on non-NFS lands will be considered pending the identification of willing landowners and/or partners.

5. Soil and Water

Soil and wetland rehabilitation work would be integrated into several Recreation and Transportation proposed projects (see these sections for additional information). Table 2.1-1 shows the proposed activities related to soil and water improvement within the project area. Refer to Maps 2 and 3 for locations of activities.

Critical soil areas, such as stream crossings or steep road grades, would be seeded and mulched to quickly stabilize and revegetate the area. Projects would be implemented within the next 2 to 7 years. All projects would be implemented using an excavator or with hand tools.

Table 2.1-1. Proposed activities related to soil and water improvement.

Site and Location	Proposed Action and Reason for Project
1. Dorset Peak East (old skid road where it climbs up the ridge).	Close and restore all portions of this old skid road. Water bars would be installed to prevent existing and future erosion, and the lower (east) end of the road would be blocked with boulders, barriers, or an earthen berm. Estimated length of the skid road to be closed is 0.75 mile.
2. Dorset Peak South Approach (old skid road).	Close and restore (includes water-bar construction) the northern-most section of road, 0.2 miles in length, heading toward Dorset Peak. This trail section would not be incorporated into the new NFS trail system.
3. Dorset Mountain West Side (old skid roads).	Close and restore (includes water-bar construction) all sections. Estimated length of old skid road to be closed is 1.4 miles.
4. Beech Ridge Access	Close un-needed segments of the old skid/woods roads (on NFS land) leading off of the Beech Ridge access road using earthen berms or boulders. Install signs at each closure identifying appropriate road uses (for example, hiking, and cross country skiing). This would help stop illegal ATV/ORV use, and allow the soil and vegetation to be restored. Estimated length of skid/woods roads to be closed is 1.1 miles.
5. Forest Road 285 (a Forest Service right-of-way, the first section of which is a town trail).	Close this road using an earthen berm or boulders at the start of NFS ownership. Install water bars to prevent existing and potential future erosion, and control illegal ATV use. Estimated length of road to be closed is 0.5 mile.
6. Old Mad Tom Trail/Proposed East Dorset Trail (formerly a town road as well as NFS Trail).	Close, remove culverts, and install water bars on sections of this trail not incorporated into proposed new NFS trail system. Closing these sections would allow soils to stabilize and re-vegetate over time reducing the risk of eroded soil reaching the stream. Estimated length of trail to be closed is 1.5 miles.
7. Pierce Road Extension (woods road on NFS land off the end of the traveled portion of Pierce Road).	Install drivable water bars and drainage ditches to minimize current and future erosion. Estimated length of road to be improved is 1.0 mile.
8. Compartment 50 Erosion Control.	Water bars would be improved, and additional water bars added to numerous old skid roads on west-facing side slopes in Compartment 50. This would correct existing erosion and prevent it in the future.

6. Recreation

Refer to Maps 2 and 3 for the locations of proposed recreation activities.

East Dorset Trail
The Forest Service proposes to redevelop the trail along Mad Tom Brook renaming it the East Dorset Trail since the snowmobile trail that runs from FR 21 to Mad Tom Road is now known as the Mad Tom Trail. The project would involve re-establishing 3.1 miles of trail including drainage work, brush removal and trail tread stabilization, and the development of 0.5 miles of new trail eliminating two stream crossings and moving the trail away from the brook to a more sustainable trail location. Trail reconstruction is proposed to occur in phases. The first phase would re-establish the trail from FR 21 and from Mad Tom Road. The second phase would re-establish the relocated middle portion of the trail. This section of the proposed trail experienced landslides from Tropical Storm Irene and will need a few years to stabilize before a trail can be constructed. Forest Service staff anticipates trail reconstruction to be done using a small tractor/excavator where feasible, and hand tools on most areas of the trail due to the terrain. A bridge is proposed for the one stream crossing that would still be required. This crossing may initially be constructed with stepping stones until funding is available to construct the bridge.

The project would require the creation of two trailheads, one off of Mad Tom Road in East Dorset in the Dorset Town trail right-of-way so that people do not park along the road, and another trailhead on FR 21. The trail is proposed to be a primitive hiking, snowshoeing and cross country skiing trail. The trail has a number of historic features providing opportunities for interpretation. The East Dorset Trail meets the Mad Tom Trail near FR 21.

Emerald Lake Connector Trail
The Forest Service proposes to develop a connecting hiking, snowshoeing and cross country skiing trail between the Mad Tom Trail (FT 355) and Emerald Lake State Park. Trails in the State Park could then link to the Dorset Mountain trails. The connector trail would go through the NFS lands adjacent to FT 355 on Mad Tom Road and on Bowen Hill Road. The land adjacent to the northern portion of FT 355 is forested and would remove the need for a section of the connector trail to be located on Mad Tom Road. The land on Bowen Hill Road is an open meadow. It is anticipated construction would only require hand tools and brush hogging a path.

Dorset Mountain
Dorset Mountain currently has a number of old skid roads and unmanaged hiking trails that are featured in day hiking guides and used for hiking, snowshoeing and skiing. Many of the trails are steep, eroded, or wet. The Forest Service proposes to develop a trail system to little Dorset Peak with access from Grouse Lane, and Legal Town Trail 6 off of Dorset Hill Road The project would include: construction of approximately 3 miles of switchback trail designed for mountain biking and hiking from the Grouse Lane trailhead to the trail on the east ridge of Dorset Mountain, rehabilitation of approximately three miles of existing trail on the east ridge of Dorset Mountain including drainage work, brush removal, puncheons and trail tread stabilization; and the relocation of approximately one quarter mile of trail that became a stream bed as a result of Tropical Storm Irene. The trail would also be open to non-motorized winter uses such as snowshoeing and cross-country skiing. Trail construction is anticipated to be accomplished using hand tools on much of the trail due to the steep terrain, although a small tractor/excavator may be used where feasible. The Forest Service proposes to close and restore the unmanaged trail on the west side of Dorset Mountain. This trail and the right-of-way from Tower Road were damaged in Tropical Storm Irene.

An existing parking area on Grouse Lane would be improved and used as a trailhead. To prevent unauthorized motorized use that is currently occurring on NFS lands, gates or barriers would be installed at the beginning of the trail from the Grouse Lane trailhead and the southeastern spur trail

that provides access to the Legal Town Trail 6. The Dorset Mountain trail would feature a vista from the summit of little Dorset Peak and could connect to Emerald Lake State Park at some point in the future.

7. Scenery

Refer to Maps 2 and 3 for locations of proposed scenery management treatments.

Vista Maintenance and Creation
The Forest Service proposes to enhance visual resources in five areas by creating openings or selective cutting of trees.

- West side of FR 21 next to a pull-off: Establish a 180 degree vista in C61/S23, S42, S43, and S45 by creating a three to seven acre opening using large mechanical cutting devices (commonly called a "brontosaurus") or through commercial timber harvesting.
- West side of FR 58 across from a pull-off: Establish a vista in C58/S28, S29, S30 and S31 by creating a two to five acre opening using a brontosaurus or through commercial timber harvesting.
- East side of the AT/LT: Establish a vista in C56/S20 through selective cutting and pruning within 200 feet of the trail tread using hand tools.
- Dorset Peak: In C196/S16 and S998 maintain and enhance the existing vista by creating small openings and selective cutting using hand tools.
- East ridge trail on Dorset Mountain: Maintain existing vistas in C195/S9 and C195/s6 by maintaining a one to two acre clearing using hand tools.

8. Transportation

Refer to Maps 1, 2 and 3 for location of existing road network and key proposed transportation related activities. Refer to the Travel Analysis (USDA Forest Service 2012g) for more detailed information on transportation management. Refer to the Logging Systems and Transportation Analysis and Harvest Zone Map available in the project record for more detailed information on logging transportation management. All proposed road activities would be implemented using customary mechanized power equipment and machinery unless noted otherwise.

Improve Safety on Forest Roads

- Review area roads for current and expected use and budgets, and assign an Objective/Operational Maintenance Level (OML) appropriate for each road to ensure the Forest's ability to maintain roads according to Highway Safety Act standards where needed.
- Remove and replace any non-compliant traffic and route marker signing on all existing or new project area NFS roads with new, more highly visible (retro-reflective) signing. Add any new signing as required by the current edition of the Manual on Uniform Traffic Control Devices (MUTCD).

Align NFS Road Infrastructure with Current and Future Predicted Transportation Needs
The assignment of an Operational Maintenance Level (OML) to roads provides guidance on how it should be managed and maintained. In summary, OML 3, 4 and 5 roads are managed and maintained for passenger vehicles; OML 2 roads are managed and maintained for high clearance 4-wheel drive vehicles; and OML 1 roads are closed to vehicles although they can occasionally be opened as intermittent service roads. More detailed descriptions of OML 1 to 5 roads can be found in the Dorset Peru Travel Analysis ((USDA Forest Service 2012g, p. 9); the Forest Plan, p. 153; and in FSH 7709.58.

- National Forest System Road (NFSR) 21: To better align use with short and long term road maintenance costs, change road maintenance activities from OML 3 (passenger car) to OML 2

(high clearance) from milepost 2.77 to 5.48. The character of the road would be allowed to change slowly over time. NFSR 21 section under Forest Service jurisdiction from milepost 2.65 to 2.77 would remain as OML 3 to provide passenger car surface to proposed new trailhead parking area. Create an approximately 25 feet by 70 feet, five car, three season trailhead parking area along NFSR 21 at approximately milepost 2.76 for proposed East Dorset Trail down to Dorset Legal Trail 10 and Forest Road (FR) 259, Mad Tom Road, in Dorset where the Town may consider a trailhead and parking area. Install a new 24 foot, single arm road gate at milepost 2.65 (end of Town road jurisdiction) just east of the FR 58 intersection to protect NFSR 21 and NFSR 58 road surfaces during late winter and mud season. During road maintenance planning and activities, improve or replace larger road culvert pipes (greater than 48 inches in diameter) carrying live streams to allow aquatic organism passage.

- NFSR 21A: Keep this spring-fall parking area off the Town of Peru portion of FR 21 Mad Tom Notch Road at OML 3 continuing to maintain it for public and administrative passenger car use.
- NFSR 21B: Keep this winter parking area off the Town of Peru portion of FR 21 Mad Tom Notch Road at OML 3 continuing to maintain it for public and administrative passenger car use, allowing for winter plowing and maintenance by the Town of Peru or under agreement with VAST.
- NFSR 21C: Improve and add this existing road off FR 21 at mile 1.661 and to the south the right-of-way to U.S. Tracts 31 and 31b to the National Forest System (NFS) of roads as a 0.60 mile long, OML 1 road for important administrative access to Compartments 56 and 62 for creation and maintenance of wildlife openings. Work would include ditching, template shaping, grade dips, and spot graveling to allow high clearance (4WD) administrative access. Install a 14 foot, single arm road gate at the entrance near FR 21 to prevent unauthorized public motorized access.
- NFSR 58: Keep at OML 3 (2.07 miles) continuing to maintain road to Highway Safety Act standards. Expand the parking area near the trailhead at the end of the road by 40 feet to the south making a new lot that is 25 feet deep by 70 feet long to accommodate existing and future use. This expansion would allow the lot to comfortably accommodate up to five cars. During road maintenance planning and activities, improve or replace larger road culvert pipes (greater than 48 inches in diameter) carrying live streams to allow aquatic organism passage.
- NFSR 79: Change from OML 2 to OML 3 and improve and maintain to Highway Safety Act standards to allow for improved access to the Hapgood Pumphouse facilities adjacent to the road. Remove the northern curb-cut and entrance from FR 22 North Road (TH 4) maintaining only the southern entrance.
- NFSR 258: Improve and add this existing road off FR 258 Pierce Road (TH18) at mile 0.42 and to the north the right-of-way to U.S. Tract 27 to the NFS boundary as a 0.50 mile long OML 1 road (NFSR 258) for important administrative access to Compartment 62 for creation and maintenance of wildlife openings. Work would include ditching, template shaping, grade dips, and spot graveling to allow high clearance (4WD) administrative access. Install a 14 foot, single arm road gate north of TH 18 end to prevent unauthorized public motorized access.
- NFSR 283: Decommission as NFSR in Forest road database (0.50 miles of OML 1), but retain right-of-way to U.S. Tract 41 (Compartment 50) for possible future access needs. Establish where right-of-way is located. Use of access and right-of-way to U.S. Tract 41 (Compartment 50) would be via a temporary haul road that would be discontinued and closed-off after use.
- NFSR 285: Decommission as NFSR in Forest road database (1.0 miles of OML 1) but retain all right-of-way rights to U.S. Tract 64 (Compartment 57) for administrative access needs. This is Dorset Legal Trail 8 (0.97 miles long) and should not be in Forest database as NFSR. Work with the Town of Dorset and private landowners on existing gate and other access issues to clarify responsibilities and obligations.

- NFSR 461: Add a new road to the NFSR in the Dorset Mountain area (U.S. Tract 271) off of Dorset TH 10 (Tower Road) via Grouse Lane (existing Appurtenant Easement No. 3 to U.S. Tract 271), and an existing 0.12 miles native surface road on NFS lands. Improve an existing 50 feet by 150 feet parking area/trailhead at the end of this road on NFS lands for public access to the proposed Dorset Mountain trails. The road would be improved and maintained to OML 3 requirements and would be approximately 0.32 miles long (including Grouse Lane portion). The parking lot would accommodate up to 10 cars.
- Construct the following temporary haul roads for timber access:
  - U.S.Tract 63 temporary haul road access: Implement temporary haul road access to a landing area on NFS lands under a timber sale or stewardship contract off of NFS right-of-way at end of Chandolin Road (Winhall TH 72) for access to Compartments 59, 60, and 63.
  - U.S. Tract 214 temporary haul road access: Implement temporary haul road access to landing areas on NFS lands under a timber sale or stewardship contract to U.S. Tracts 214, 463, and 485 in Compartments 57 and 59 via Beech Ridge Road. This would likely require petitioning the Selectboards of Manchester, Winhall, and Dorset for use of the road for this purpose.
  - U.S. Tract 10c temporary haul road access: Implement temporary haul road access to landing area in Compartment 58/61 via use of the existing FT 355 snowmobile trail/new East Dorset trail. This temporary haul road enters FR 21 at milepost 2.77.
- Improve access to NFS lands over new permanent or temporary access permits or easements at the following areas:
  - North off SR 11/30 east of the SR 11/30 and Bromley Forest Road intersection for potential access to Compartments 59, 60, and 63
  - North off SR 11/30 west of the SR 11/30 and FR 286 intersection for potential access to Compartment 63
  - North off SR 11 east of the SR 30 and SR 11 intersection for potential access to Compartments 63 and 64.
- Construct temporary short haul roads to new and existing landings to provide access for timber management. Previously used temporary roads would need to be reopened to access existing landing locations that meet current standards for use. Temporary roads would be restored to pre-sale conditions after use according to Forest Plan Standards and Guidelines as a part of the timber sale to prevent unauthorized motorized use. Skid roads leading from these temporary roads and log landings would be closed off at the completion of harvest activities to prevent unauthorized vehicle use into the Forest.

Increase Cooperation with Local Governments on Management of the Forest and Town Road Infrastructure as it Relates to Forest Access

- Dorset Town Highways: Explore a Road Cooperative Agreement with the Town of Dorset to possibly include Town roads and trails providing trailhead access to NFS lands at Legal Trail 10 off Mad Tom Road and TH 10 (Tower Road) or roads providing timber access off Legal Trail 8 (Tennis Way) or the Beech Ridge Pent Road. Depending on success of any proposals for new trails, trailheads, parking areas, and aquatic passage culvert work, it may be in the interest of both the Forest Service and the Town to cooperate on any associated road improvement or maintenance needs where funding is available and there is a mutual interest.
- Peru Town Highways: Explore increased cooperation on FR21 (Mad Tom Notch Road) and FR 258 (Pierce Road) through the existing Road Cooperative Agreement with the Town of Peru to reduce soil erosion and any unauthorized off-road, 4 wheel drive and ATV activity, and provide for timber and wildlife management access to NFS lands in Compartments 56, 58, 60, 61, 62, and 63. With Town approval improvements could include spot graveling, road template shaping, water bar, culvert, and ditching work, brushing, and other similar road maintenance activities.

- Winhall Town Highways: Explore possibilities for cooperation on Town roads accessing Compartments 57, 59, 60 and 63. These would be TH 72 (Chandolin Road), TH 57 (Bromley Forest Road), and the Winhall portion of the Beech Ridge pent road.
- Manchester Town Highways: Explore possibilities for cooperation on Town roads accessing Compartments 57 and 59. This would be the Manchester portion of Winter Street and the Beech Ridge pent road.

Close Unauthorized Non-System Roads
Close-off any unauthorized roads and skid trails at or near the main road entrance by: placing large boulders (or similar physical barrier); re-planting some native vegetation; and re-establishing the main road template and/or ditchline as needed. Until the vegetation is established small, temporary travel management signing may be installed to discourage unauthorized use. Small, single car pull-off areas may be created (when needed) at existing unauthorized road entrances where the pull-off can be located by extending the shoulder of the main road (without cuts or fills) and where they will not be separated by ditches or drainage structures. Law enforcement would monitor the various locations for illegal use.

9. <u>Heritage</u>

- Conduct maintenance and restoration work at the small, historic North Dorset ("Whitney") cemetery located at Emerald Lake State Park. This action involves manual labor to clean stones, re-erect fallen stones and in one or two cases mend a broken stone. Labor would be provided by adult volunteers, and direction provided by the Forest Archaeologist. Efforts will be coordinated with State Park personnel and may include opportunities for State Park campers to observe and/or participate. No actions will be taken until there is coordination with the North Dorset/Whitney Cemetery Association.
- Create 'Down Woody Debris Habitat' in coordination with Wildlife biologists. This means brush and trees (generally small, non-merchantable saplings, poles and brush, and the occasional encroaching hardwood) growing in or near select historical sites would be cut and removed with hand tools. The cut vegetation would be left on site and placed in such a way as to provide nesting, foraging, and travel habitat for small mammals, reptiles and amphibians. This could be accomplished through partnerships, stewardship contracting and/or Vermont Youth Conservation Corps (VYCC) crews. Four good examples of sites that could benefit from this activity follow:
  - Stabilize the Cochrane-Manley mill and kiln site near the proposed East Dorset Trail. The remains of this historic mill (just off the Trail, in association with 3 charcoal kilns) would be treated by removing vegetation per the above description.
  - Stabilize the historic house site remains located at the corner of Mad Tom and Bowen Hill Roads. This center-chimney foundation may represent the 19th c. Wheeler homestead, and is currently obscured by dead-and-down trees, brush, weeds and some litter. Two or three hardwood trees within the foundation area may need to be removed by a certified sawyer.
  - Stabilize the East Dorset Blast Furnace. This proposal consists primarily of the removal of a dozen or so small trees growing out of the remains of this significant industrial site. The site is owned by the State, so this project will be coordinated and implemented with Emerald Lake State Park personnel.
  - Clean up and interpret the well-preserved Bromley Brook charcoal kilns remains along the AT/LT just north of the trailhead at SR 11/30. "Clean up" activities would consist of the removal of small saplings, dead-and-down material, and weeds. Interpretive material would be posted at the trailhead bulletin board, not on-site.
- Preservation of stone work along the East Dorset Trail as part of the trail rehabilitation. Technical advice from historic preservation specialists at the State Historic Preservation Office

will be solicited. Contribute historic interpretive material about the East Dorset Trail and historic sites along it relying on existing documentation and the Dorset Historical Society.

- Conduct prehistoric site inventory activity. While much of the project area appears to have relatively low potential for the presence of prehistoric Native American sites, it surrounds private and State lands along the Battekill which have high potential for such sites. A limited test pit survey – less than 100 small (50cm sq) test pits at 10m intervals, dug to an average depth of 50cm - would be conducted on NFS lands (the former O'Neal farm) due to high potential for site presence on the higher ground above a significant spring feeding the wetland.

2.1.3 Alternative C

Alternative C was developed to address public concerns regarding potential negative impacts from timber harvesting and access over Bromley Forest and Chandolin Roads. Refer to Maps 2 and 4 for activities specifically associated with this alternative. Alternative C would eliminate timber harvesting in C59/S15 and18, C60/S35, 36, and 37 to eliminate the need for access over Bromley Forest and Chandolin Roads. This alternative was developed to address issues identified from public comments received during the scoping process.

Alternative C includes a variety of timber stand treatments on a total of **2,062 acres** (1,943 acres of timber harvest and 89 acres of stand improvement).

Estimated Timber Volume:
The amount of sawlogs and pulpwood that could be produced from all uneven-aged and even-aged treatments is estimated to be 9.839 million board feet (MMBF) or hundred cubic feet 16, 398 (CCF). The breakdown of wood products is approximately:

- 10,823 CCF of sawlogs
- 5,575 CCF of pulpwood

Another measurement some may be more familiar with is:

- 6,494 thousand board feet (MBF) of sawtimber
- 7,057 cords of pulpwood (divide pulp wood volume by 2 to get an MBF equivalent)

Table 2.1-2 Alternative C: Areas Eliminated from Treatment

Stand	Acres	Forest Type	Harvest Method	Harvest Acres
COMPARTMENT 59				
15	61	Hardwood	Two-cut Shelterwood	25
15	61	Hardwood	Single Tree Selection	31
18	40	Hardwood	Thinning	18
COMPARTMENT 60				
35	21	Hardwood	Shelterwood with Reserves	19
36	8	Hardwood	Thinning	4
37	12	Hardwood	Thinning	7

All other project activities proposed in Alternative B would remain the same in Alternative C.

2.2 Alternatives Considered but Eliminated from Detailed Analysis

There were several alternatives suggested by the public or by the Forest Service IDT to address concerns associated with the proposed action as described in the Dorset Peru Project Scoping Information document dated July 2011. Many of these alternatives have been considered but

eliminated from detailed analysis. A description of these alternatives and the concern(s) they address are provided in this section. The rationale for their elimination from detailed analysis in this EA is also provided.

2.2.1 Harvest Fewer Stands Along VAST Corridor 7 Snowmobile Trail

Public comment expressed concerns that harvesting along FR 21 would impact use of the VAST Corridor 7 snowmobile trail by requiring that the trail be closed for all or part of the season or by making the trail difficult to traverse and potentially unsafe. An alternative was considered that would reduce the number of stands harvested along FR 21 which would eliminate any need to close Corridor 7 or impact the quality of the snow trail tread.

Rationale for Dismissal
Additional public collaboration with snowmobile interests developed potential mitigations that would reduce the impact of harvesting on VAST Corridor 7. Access to some harvest units was changed between Scoping and the Proposed Action to eliminate the need to skid logs across Corridor 7. Reducing the harvest units along FR 21 to a level that would eliminate any need to close Corridor 7 or impact the quality of the trail tread would fail to meet the project purpose and need. FR 21 is the access to many of the harvest units. Removing the portion of FR 21 that is also the VAST Corridor 7 snowmobile trail from use as harvest access would prevent the project from meeting composition and age class objectives, desired future conditions for improving forest health and providing a diversity of wildlife habitats.

2.2.2 Harvest No Stands Along FT 355

Public comment expressed concerns that harvesting along FT 355 and using the trail as a skid road would require the trail to be closed. Closing the trail would impact snowmobilers who use it as access to services in East Dorset and who use it as access from East Dorset to NFS lands. There is also a concern that closing FT 355 during the snowmobile season would economically impact businesses in East Dorset. An alternative was considered that would eliminate using FT 355 as a skid road by eliminating harvesting dependent on FT 355 for access.

Rationale for Dismissal
Additional public collaboration with snowmobile interests developed potential mitigations that would reduce the impact of harvesting on FT 355 by compressing the amount of time that harvesting would require the trail to be closed. Compartment 50 and several stands in Compartment 58 which required access on FT 355 were dropped from harvesting between Scoping and the Proposed Action due to shallow soils and steep slopes. Eliminating harvesting in these stands increases the potential that harvesting along FT 355 can be accomplished in one season. This alternative was eliminated from detailed analysis because mitigations would reduce the impact of harvesting on FT 355.

2.2.3 Other Alternatives for Removing Timber from Compartments 59 and 60

Public comment expressed concerns that using Bromley Forest and Chandolin Roads to remove timber harvested from Compartment 59, Stands 15 and 18, and Compartment 60, Stands 35, 36 and 37 would cause road damage, create unsafe conditions on the road, result in dust and noise, and impact rental and property values in the area. Public comment also suggested that alternative access be found to remove the timber from these Compartments and Stands. Forest Service staff investigated four alternatives for removing timber in Compartments 59 and 60:

1. Skid all or part of the volume to a proposed landing to the east near SR 11/30

2. Skid timber volume from western stands in the area to a landing along Beech Ridge in Compartment 64
3. Harvest all or part of Compartments 59 and 60 using helicopter yarding
4. Acquire additional legal access to Compartments 59 and 60

Rationale for Dismissal

1. Skid all or part of the volume to a proposed landing to the east near Route 11

A ridge oriented NE-SW lies between Compartments 59 and 60 and the proposed landing to the east near Route 11. Skidding over this ridge or to its south is infeasible due to a combination of steep slopes, shallow soils, rocky ground and adverse grades. Skidding around the ridge to the north and west is possible; however a large area of poorly drained soils and forested wetlands was identified just north of the ridge (NE of C60, S35). In order to meet Forest Plan Standards and Guidelines for soils, a skid road would need to be located north of this area, resulting in skidding distances well over one mile. Skid distances in excess of one mile are generally not economically feasible for harvest of pulpwood and lower quality sawtimber

2. Skid timber volume from western stands in the area to a landing along Beech Ridge in Compartment 64

A band of steep and rocky slopes exists between Compartments 59 and 60, and the proposed landing along Beech Ridge. Slopes average 45-50% with some areas approaching 60%. Although there is some evidence of very old abandoned road grades at the foot of the slope, no existing skid roads or grades were found traversing the steeper slopes. Construction of a new skid trail would require some earth moving, which would likely be accomplished with a bulldozer. Without an existing grade, skidding on these slopes would not be consistent with Forest Plan Standards and Guidelines for soil and water protection.

3. Harvest all or part of Compartments 59 and 60 using helicopter yarding

The proposed treatment areas in Compartments 59 and 60 offer limited options for helicopter yarding and landings. Helicopter yarding systems require relatively large level log landings, with good road access and large accessible service landings for fueling and support services. In order to be economically viable, distances between harvest areas and landings should be minimized and uphill yarding should be avoided. For safety reasons, flight paths should not cross power lines or homes. Roads, trails and other areas must be closed before logs are flown overhead. Given these criteria and the limited legal access points in the area, the only landing locations identified for consideration are in the Beech Ridge area. The Beech Ridge road which accesses the area would require significant improvements to accommodate helicopter operations. The high rate of production characteristic of helicopter logging would require very heavy haul traffic over a short amount of time. A service landing would also need to be constructed in the area requiring good roads over which to haul fuel and support equipment. According to the LOGCOST analysis done to evaluate the cost of helicopter logging for this area, the increased costs for helicopter yarding as opposed to ground based are estimated to total $100K-$200K. Although it may be possible, to create an economically viable timber sale in this area using helicopter logging systems, it is unlikely that the planned vegetation treatments could be accomplished except in high market conditions and/or with considerable manipulation of the stand prescriptions to address economic concerns.

4. Acquire additional legal access to Compartments 59 and 60

Two potential legal access options were identified for Compartments 59 and 60, a private road immediately east of Bromley Forest Rd and access points to the west between Bromley Forest Road and Snowflake Lane.

Forest Service (FS) staff contacted the property owner of the possible eastern access about the use of his road and property to access Compartments 59 and 60. The property owner will not

grant the Forest Service access for hauling timber. There is no legal NFS access available in the area west between Bromley Forest Road and Snowflake Lane. Snowflake Lane is a dead-end town road, with a small number of private residences. The road terminates at a private home south of NFS lands. Logging access for Compartments 59 and 60 would require construction of a new road through private property including a bridge over Bromley Brook.

Rock formation Compartment 50 Stand 9

2.3 Comparison of Alternatives

2.3.1 Management Action Summary

Table 2.3 displays and compares proposed management activities by alternative.

Table 2.3: Comparison of Management Actions by Alternative.

	Alternative		
Management Action	**A**	**B**	**C**
Habitat Diversity			
Increase early successional habitat with regeneration harvests	0	517 acres	517 acres
Enhance softwood and oak species composition and increase mixedwood and softwood habitat	0	229 acres	229 acres
Remove non-native tree species with clearcut and land clearing	0	124 acres	124 acres
Enhance early-successional habitats through the development of “late-stage” openings		107 acres	107 acres
Enhance late successional habitats by thinning and improvement cuts to extend the growth and longevity of trees in areas of extended rotations of 150 to 200 years.		385 acres	385 acres
Provide aspen regeneration	0	93 acres	93 acres
Enhance oak habitat		360 acres	275 acres
Maintain, and/or restore existing permanent upland openings (mechanical, mowing; hand cutting, prescribed burning and/or a combination of treatments)	0	26 acres	26 acres
Create permanent upland openings	0	224 acres	224 acres
Apple tree/soft mast release and pruning		4 acres	4 acres
Create down woody debris habitat	0	Stands found during project layout	
Timber Resource			
Single tree selection with gaps	0	518 acres	487 acres
Group selection		54 acres	54 acres
Thinning	0	316 acres	287 acres
Improvement cuts		399 acres	399 acres
Shelterwood preparatory cut (three-cut method)		81 acres	81 acres
Shelterwood establishment cut (two-cut method)	0	292 acres	267 acres
Shelterwood with reserves		47 acres	28 acres
Overstory removal		20 acres	20 acres
Seed tree cut		47 acres	47 acres
Clearcut to regenerate aspen and/or birch, native softwoods, and spruce/fir		49 acres	49 acres
Total uneven-aged harvest	0	572 acres	541 acres
Total even-aged harvest	0	1251 acres	1178 acres
Total land clearing to convert into upland opening	0	224 acres	224 acres
Total Harvest	**0**	**2047 acres**	**1973 acres**
Total Timber Volume	**0**	**10.364 MMBF**	**9.839MMBF**
Timber stand improvement	0	89 acres	89 acres
Permanent Opening Creation	0	224 acres	224 acres
Site preparation for natural regeneration or artificial regeneration	0	1,089 acres	1,014 acres

Table 2.3: Comparison of Management Actions by Alternative.

	Alternative	
Management Action	**Alternative A**	**Alternatives B and C**
Fisheries Resource		
Large woody debris (LWD) placement (stream habitat restoration)	0	3 streams; about 7.2 miles
Fish passage improvements	0	3 culverts
Non-Native Invasive Plants		
NNIP control	No	Yes
Soil and Water		
Soil and water resource improvement	No	Yes
Recreation		
Improve recreation opportunities	No	Yes
Designate new trails	No	Yes
Create, expand improve trailheads	No	Yes
Scenery		
Vista maintenance and creation	No	Yes
Transportation		
Road sign replacement	No	All NFS Roads
Enlarge parking area: NFS Road 58 NFS Road 461	 No No	 5 vehicle capacity 10 vehicle capacity
Construct NFS Road 21 parking area	No	5 vehicle capacity
Changed Operational Maintenance Level (OML) of NFS Roads: • NFS Road 21 (OML 3 to OML 2); 2.71 mi. • NFS Road 79 (OML 2 to OML 3); 0.1 mi.	 No No	 Yes Yes Total: 2.81 miles
NFS Roads de-commissioned: • NFS Road 283; 0.5 mi. • NFS Road 285; 1.0 mi.	 No No	 Yes Yes Total: 1.5 miles
Install new NFS Road gates and associated signing: NFS Road 21 MP 2.65 NFS Road 21C MP 1.66 NFS Road 258 end of TH18	 No No No	 Yes Yes Yes
Improve NFS Road 79; Remove curb-cut and northern entrance, maintain southern entrance	No	Yes
Improve and add NFS Road to the NFSR system: NFS Road 21C (OML 1; 0.6 miles) NFS Road 258 (OML 1; 0.5 miles) NFS Road 461 (OML 3; 0.32 miles)	 No No No	 Yes Yes Yes
Improve or replace culverts: NFS Road 21 NFS Road 58	 No No	 Yes Yes
Construct temporary haul roads: U.S. Tract 41 (establish ROW) U.S. Tract 63 U.S. Tract 214 U.S. Tract 394 (inc. curb-cut permit for U.S. Tracts 394b and 294c)	 No No No No	 Yes Yes Yes Yes
Construct temporary short haul (skid) roads and trails to new and existing landings	No	Yes

Table 2.3: Comparison of Management Actions by Alternative.

	Alternative	
Management Action	**Alternative A**	**Alternatives B and C**
Explore Road Cooperative Agreements with Towns	No	Yes
Close un-authorized roads and skid trails	No	Yes
Heritage Resource		
Cemetery maintenance and restoration	No	Yes
Site stewardship (control encroaching vegetation)	0	stands found during project layout
Preserve stone work	No	Yes
Site testing and inventory	No	Yes

2.3.2 Resource Effects Summary

Table 2.3 summarizes the environmental resource effects of each alternative that are disclosed in more detail in Chapter 3**.**

Table 2.3: Summary of Environmental Resource Effects by Alternative.

Alternative A	Alternative B	Alternative C
Social		
• No increase in vehicle trips per day on Bromley Forest and Chandolin Roads	• Increase in vehicle trips per day of approximately 14 vehicles on Bromley Forest and Chandolin Roads during harvest.	• No increase in vehicle trips per day on Bromley Forest and Chandolin Roads.
Recreation: Trails		
• No effects to VAST Corridor 7 and FT 355 snowmobile trails. • 23.9 miles of unmanaged trails would not be restored, reconstructed, relocated, maintained or become NFSTs. • There would be no opportunity to increase the diversity of trail opportunities. • Unmanaged trails would not be closed and rehabilitated.	• Minor effects to VAST Corridor 7and FT 355 with application of mitigation measures. • 34.4 miles of unmanaged trails would be restored, reconstructed, relocated, maintained or become NFSTs. • There would be opportunity to increase the diversity of trail opportunities. • 4 miles of unmanaged trails would be closed and rehabilitated.	• Same as Alternative B.
Recreation: Roadless		
• Character retained due to no management in Roadless Area Conservation Rule (RACR) areas or 2006 inventoried Roadless Areas (RA). • Land continuing to regaining a natural, untrammeled appearance as past harvest units and some wildlife openings grow up and no new harvest occurs.	• No management in RACR areas. • Character retained in 2006 RAs since approximately 8 acres of wildlife opening creation would not exceed roadless character criteria ≤ 20 % of Roadless Area being harvested within past 10 years. • Land continuing to regaining a natural, untrammeled appearance.	• Same as Alternative B.

Table 2.3: Summary of Environmental Resource Effects by Alternative.		
Alternative A	**Alternative B**	**Alternative C**
Habitat Diversity (Habitat Type Composition and Age Class)		
• No vegetation management activities • Northern hardwoods would continue to dominate. • Contributes long term toward transition from northern hardwood to softwood and mixedwood composition. • Paper birch and oak would decline. • Permanent openings would become very limited in extent and generally small in size. • The forest structure would become more un-evenaged over the long-term. • The regenerating age class objectives would not be met; least structural diversity. • Forested stands would continue to age continuing the trend of imbalanced age classes. • Habitats would benefit wildlife species requiring mature and old forest habitats. • Contributes to the trend of decreased early successional habitat and associated wildlife species. • Overall, provides the lowest level of habitat diversity of the alternatives. • Decline in apple tree mast production; decrease in availability and diversity of wildlife food sources • Contributes small amount of down woody debris • Negligible changes to bat foraging or roosting habitat.	• 2,077 acres of vegetation management activities • Contributes toward transition from northern hardwood and mixedwood to mixedwood and softwood composition. • Short-term increase in aspen/birch type; long-term composition is well below objectives. • Increase in oak habitat and abundance short-term; oak habitat would decline by 50% mid and long-term and no longer meet objectives. • Potential to create uncommon oak-dominated shrublands and add to wildlife diversity • Restores existing permanent openings and creates new permanent openings; just meets habitat objectives; range of sizes provides large diversity of habitat for bird and other wildlife, including neotropical migratory birds. • The regenerating age class would meet objectives over the short-term. • Mature and old habitats would continue to account for at least 80% of forested lands and 60% of suitable forested lands. • Overall, provides a greater diversity of habitats resulting in the potential for a greater diversity of wildlife species than Alternative A. • Continued apple tree mast production; improve availability and diversity of wildlife food sources • Contributes more down woody debris short-term than Alternative A; same as Alternative A mid- and long-term. • Negligible changes to bat foraging or roosting habitat.	• 1,973 acres of vegetation management activities • Composition and age class is similar to Alternative B. • Slight increase in oak habitat and abundance short-term. • Other wildlife habitat features would be the same as Alternative B.
Timber Management and Economic Analysis		
• Timber stands would continue to decline in economic value. • There would be no local or	• Improved stand conditions would result in high quality sawtimber, pulpwood and	• Improved stand conditions would result in high quality sawtimber, pulpwood and

Table 2.3: Summary of Environmental Resource Effects by Alternative.		
Alternative A	**Alternative B**	**Alternative C**
regional economic benefit from harvested timber.	firewood; economic value would depend on market when sold and logging costs. • There would be local or regional economic benefit from harvested timber. • Would provide about 17,273 CCF (10.364 MMBF) of sawtimber and pulpwood to the local timber market • Financial benefit/cost ratio of 0.96.	firewood; economic value would depend on market when sold and logging costs. • There would be local or regional economic benefit from harvested timber. • Would provide about 16,398 CCF (9.839 MMBF) of sawtimber and pulpwood to the local timber market • Financial benefit/cost ratio of 0.96.
Management Indicator Species (MIS)		
• Condition and use of deer wintering areas would continue to be low and declining; number of deer occurring in the project area may decline over time. • Early successional habitat would continue to be of low abundance; American woodcock and other species that benefit from early successional habitats would be expected to decline in abundance and distribution. • Distribution, abundance and overall condition of aspen would continue to decline; abundance of ruffed grouse and other species that benefit from aspen habitats would be expected to decline in abundance and distribution. • No oak/oak-pine habitat effects. • No aquatic-riparian habitat effects.	• Increase in browse would benefit deer through winter conditions. • American woodcock and other species would benefit from the increased availability of early successional habitat. • Aspen would increase in abundance and distribution increasing suitable habitat for ruffed grouse and numerous other species. • Increase in oak/oak-pine habitat would benefit gray squirrels, black bears, wild turkeys, white-tailed deer and many other species. • Populations of brook trout would benefit from stream habitat improvement in 3 streams.	• Same as Alternative B.
Threatened, Endangered, and Sensitive (TES) Species - Wildlife		
• No effects.	• Harvest activities may create additional stress to individual woodland bats having White Nose Syndrome, but potential effects would be very minimal. • No effects on Bicknell's Thrush. • Minimal effects to rusty blackbird and other RFSS due to implementation of Forest Plan stream S&Gs. • Minimal effects to West Virginia white butterfly due to implementation of Forest Plan stream and wetlands S&Gs.	• Same as Alternative B.

Table 2.3: Summary of Environmental Resource Effects by Alternative.		
Alternative A	**Alternative B**	**Alternative C**
Threatened, Endangered, and Sensitive (TES) Species - Plants		
• No effects.	• Minimal direct effects to RFSS associated with openings; beneficial indirect effects to RFSS associated with openings. • Possible direct effects to streamside RFSS; no indirect effects to streamside RFSS. • Potential indirect effects to RFSS plants associated with rich northern hardwoods, acidic oak woods, or conifers and mixed woods, but not highly likely.	• Same as Alternative B.
Non-Native Invasive Plants		
• Fewer opportunities for NNIP to establish and spread; NNIP could still be treated.	• Greater potential for NNIP spreading from vegetation management and other proposed activities; minimal effects.	• Same as Alternative B.
Soil and Wetlands		
• No additional effects, but no soil improvement activities would occur. • Soil enriched by on-site biomass.	• Minor effects with application of Forest Plan S&Gs, AMPs and mitigation measures.	• Slightly lower than Alternative B.
Water and Fish		
• No additional effects, but existing aquatic organism barriers and low productivity in stream habitat would continue.	• Minor effects with application of Forest Plan S&Gs, AMPs and mitigation measures. • Minor short-term water quality impacts during stream improvement projects, but long term benefits to water quality, fish populations and habitat, and other aquatic species would be substantial.	• Same as Alternative B.
Air		
•No effects although opportunities for prescribed burning would not occur.	• For short durations PM-2.5 concentrations can exceed “Unhealthy” levels in immediate proximity to the burn; actual concentration would stay well below the 24-hour National Ambient Air Quality Standard.	• Same as Alternative B.
Visual Resources		
• No effects, although increased opportunities for viewing scenery would not occur.	• Meets VQOs with application of mitigation measures.	• Slightly less stands treated on ridgelines and side slopes are visible than Alternative B. •

Table 2.3: Summary of Environmental Resource Effects by Alternative.		
Alternative A	**Alternative B**	**Alternative C**
Heritage		
• No effects, although no heritage site stewardship or enhancement would occur.	• No effects with application of mitigation measures; heritage site stewardship or enhancement would occur on several historic properties.	• Same as Alternative B.

Chapter 3. Affected Environment and Environmental Consequences

This chapter discloses the direct, indirect, and cumulative environmental consequences ("effects") to the physical, biological, social, and economic resources from the proposed action and tis alternatives as described in Chapter 2. It consists of a description of the existing condition ("affected environment") for each resource areas, and then discloses the environmental effects under each alternative. These effects are summarized in a comparative format in Table 2.3 in Chapter 2.

Each resource section in Chapter 3 is organized in the following sequence:

Issue Statement(s) are provided for each respective major issue associated with the resource identified during public scoping as detailed in Chapter 1 (Section 1.71. and 1.7.2). "Indicators" follow all major issues where they provide meaningful measurement of the effects relative to the issue. "Thresholds" are also included when they can give additional context for the resource effects associated with the issue.

The **Indirect and Indirect Effects Analysis Area** provides the "area of influence" where the effects are predicted to take place.

The **Affected Environment** describes the existing conditions within the area of influence.

The **Direct and Indirect Effects** are disclosed from the activities proposed under each alternative (Alternative A, B, and C).

The **Cumulative Effects** disclose the effects of other past, present or foreseeable future actions that may overlap with the effects in time and space with those predicted for the proposed action. The analysis area for cumulative effects may be different from that described for direct and indirect effects for the same resource. Actions on NFS, private, and State lands are included when considering cumulative effect.

3.1 Social

3.1.1 Issue Statements

Issue Statement 3.1.1a:

Public comment suggests that the Forest Service should reconsider using Bromley Forest Road and Chandolin Road for use by log trucks and harvest equipment because of the following reasons cited by the public:

- There will be severe damage to the road especially during rainy months; and result in high reconstruction or maintenance costs.
- The roads are not wide enough in the winter for safe passage of two-way traffic.
- It would result in significant public safety issues, especially for children who live along the road.
- It would result in noise and dust.
- It will impact rental and property values in the area.

<u>Indicator(s):</u>

1. Number of logging trucks per day
2. Length of time and season that log hauling would occur

3. Road design and condition

Threshold(s):

1. Average Annual Daily Traffic:

Annual Average Daily Traffic (AADT): is the total volume of vehicle traffic in both directions of a highway or road for a year divided by 365 days. Bromley Forest Road and Chandolin Road are a Very Low-Volume Local Road with a design speed of 15 mph and an AADT of less than 400 vehicles per day. If volumes were to exceed the 400 vehicles per day threshold, then maintenance and operations would likely need to change, and upgrades to the roads geometric characteristics may be necessary using Chapter 5 of the AASHTO Policy on Geometric Design of Highways and Streets instead of the Guidelines for Geometric Design of Very Low-Volume Local Roads (AADT<400) (American Association of State Highway and Transportation Officials (AASHTO), 2001a and 2001b).

2. Road use would not meet Forest Plan Road Operations and Maintenance Standard 3.

Road Operation and Maintenance Standard 3 states:

Road restrictions, year-round or seasonal, shall be considered when:

- Use causes unacceptable damage to roadbed or soil and water resources
- Use causes unacceptable wildlife conflict or habitat degradation
- Use results in unsafe conditions
- A seasonal public or administration need is served
- The area accessed has seasonal need for protection or non-use

It is necessary to resolve conflicts between users. (USDA Forest Service 2006a, p. 43).

3.1.2 Direct and Indirect Effects Analysis Area

The direct and indirect social and economic factors impact analysis area for the Dorset Peru Project includes all of the project area as described in the proposed action. This area was chosen because the main impacts of increased road use caused by timber harvesting will predominately occur within the project area. The direct and indirect effects are described for a period of 10 years (from project implementation - or about 2013 - to 2023).

3.1.3 Affected Environment

The Dorset Peru Project Area encompasses 41,699 acres in the Towns of Dorset, Peru, Manchester and Winhall including 25,910 acres that are in private ownership. The majority of the 25,910 acres of privately owned lands are accessed by class 2 and 3 town roads which are maintained by the towns year-round. The Dorset Peru Project Area is characterized by one urban center, Manchester Center, and villages surrounded by a rural landscape of farmlands, forests and scattered rural residential areas. The Town of Peru is home to the Bromley Mountain Ski Area and the Town of Winhall is adjacent to the Stratton Mountain Ski Area. Manchester is the largest town in the area with a population of 4,391 and Peru is the smallest with a population of 375 (Vermont State Data Center website: http*://crs.uvm.edu/census/*). Table 3.1 – 1 displays the population and housing census data for the four towns.

Table 3.1 – 1 Dorset Peru Project Area Census Data

Town	Population	Total Housing Units	Total Occupied Housing Units	Percentage
Dorset	2031	1450	898	61.9
Manchester	4391	2864	2047	71.5
Peru	375	697	165	23.7
Winhall	769	1749	343	19.6
Source US Census Bureau, 2010 Census				

The Dorset Peru Project Area transportation system, described in depth in the Travel Analysis for the Dorset Peru Integrated Resource Project, consists of US Highway 7 and 7A, Vermont State Routes (SR) 11 and 30, Town Highway (TH) systems including Class 2, 3 and 4 town roads and town trails, and National Forest System (NFS) roads and trails. This system provides connects population centers, rural residential areas, the rural landscape and NFS lands.

The Bromley Forest Road residential development consists of approximately 15 homes located off of SR 11/30. Bromley Forest Road TH 57, .3 miles in length and Chandolin Road, TH 72, .07 miles in length are dirt/gravel Class 3 Town of Winhall roads that provide access to the 15 homes and to NFS lands north of the homes. According to the Institute of Transportation Engineers Trip Generation, 6th Edition, single-family detached housing generates 9.57 vehicle trips per day (Institute of Transportation Engineers, 1997). A trip is defined as one exit or entrance on the road. The existing level of residential development provides for an estimated 144 vehicle trips per day on Bromley Forest Road. A number of homes in the Bromley Forest development are used as second homes so the vehicle trips per day would likely be less during times when homes are unoccupied. Noise levels in the Bromley Forest Road area are those associated with residential development such as car traffic, lawnmowers, and human voices.

3.1.4 Direct and Indirect Effects

3.1.4.1 Effects Common to Alternative A – No Action and Alternative C

Issue 3.1.1: The Forest Service should reconsider using Bromley Forest Road and Chandolin Road for use by log trucks and harvest equipment.
Under Alternatives A and C no timber harvesting would occur in Harvest Zone 3 and no logging trucks would use Chandolin Road and Bromley Forest Road to haul timber. There would be no increase in vehicle trips per day on these roads resulting from the Dorset Peru project

3.1.4.2 Alternative B – Proposed Action

Issue 3.1.1: The Forest Service should reconsider using Bromley Forest Road and Chandolin Road for use by log trucks and harvest equipment.
Under Alternative B, Chandolin Road and the southern portion of Bromley Forest Road would serve as a haul road for logging trucks. Other suitable accesses were investigated and were not feasible Compartment 59 Stands 15 and 18, and Compartment 60 Stands 35,36 and 37 (Harvest Zone 3) would generate an estimated 0.525 million board feet (MMBF) or 875 hundred cubic feet (CCF) of timber. This amount of timber would take approximately 17 weeks to harvest for a small timber operation and would generate 1 to 2 loads of logs a day. It is anticipated that Harvest Zone 3 would take 1 to 2 winter seasons to harvest. Logging operations in Harvest Zone 3 would generate approximately 4 vehicle trips per day by logging trucks and another 10 vehicle trips per day by loggers conducting the logging operation. This would make the total AADT for Bromley Forest Road approximately 158 vehicle trips per day well below the threshold of 400 vehicle trips per day for a Very Low-Volume Local Road.

Forest Service engineering staff has reviewed the road conditions on Bromley Forest and Chandolin Roads, and find that the roads conditions currently meet Forest Plan Road Operations and Maintenance Standard 3, and would continue to meet the threshold of Forest Plan Road Operations and Maintenance Standard 3 with the traffic added by the Proposed Action. Increased traffic and noise resulting from the Proposed Action would occur during winter months with a duration of one to two seasons. Restricting harvesting operations to the winter operating season in Harvest Zone 3 will mitigate impacts in three ways; by minimizing damage to the road during frozen conditions; by minimizing the potential for creating dust, and by confining haul during the winter season when there is likely less pedestrian and outdoor activity. The logging contractor would be required to use signs, special marking and/or pylons to notify residents of the timber sales and the presence of logging

trucks. The Forest Service has also consulted with the Town of Winhall on multiple occasions regarding the use of these roads (since they are town roads) and the Selectboard has been supportive of the use of these roads for timber haul. The Town of Winhall Selectboard has indicated that the Town may place mitigations on the contractor as a condition of receiving an overweight permit (if needed). These mitigations could include:

- No logging or hauling on weekends and federal holidays.
- No hauling during school bus pick-up and drop-off times.
- Keeping the road plowed to the widest extent possible.

The addition of the mitigations that may be placed on the contractor by the Town and the Forest Service would likely decrease potential concerns from area residents about the logging operation.

3.1.5 Cumulative Effects

The analysis area for cumulative effects is the same as for the direct and indirect effects analysis area. There are no past, present and reasonably foreseeable future actions that would increase the level or type of use of Bromley Forest and Chandolin Roads. The town roads see use from the residents, visitors and commercial services such as heating oil or propane trucks, package delivery, normal construction traffic associated with home repairs, improvements, etc. The road also sees use from the Town plowing trucks in the wintertime. Cumulative effects from past, present and reasonably foreseeable future road use within the project area would therefore, be the same as that disclosed in the direct and indirect effects section.

3.2 Recreation

3.2.1 Issue Statement

Issue Statement 3.2.1a:

Recreation (Snowmobile Trails): Public comment suggests that the Forest Service should reconsider the time frame and location for the proposed logging along the Vermont Association of Snow Travelers (VAST) Corridor 7, also known as Forest Trail (FT) 385 snowmobile trail because of the following reasons cited by the public:

- Logging operations would cripple my winter business and livelihood.
- It causes very rough terrain for snowmobile use.
- It is not a good idea to mix logging and snowmobile operations on the same trail.
- It is the only north/south snowmobile trail that exists.
- Plowing FR21 for logging activities conflicts with snowmobile use of the road.

<u>Indicator:</u>
Amount of time a main corridor snowmobile trail would be closed for snowmobile use.

<u>Threshold(s):</u>
A goal for the GMNF is to provide for a diverse range of high-quality, sustainable recreation opportunities (Forest Plan Goal 12, p. 15) and guides Forest Service management of trails on the Forest. The GMNF does not have a specific target amount of trail experience opportunities identified by trail use for the Forest or the Dorset Peru Project Area. VAST Corridor 7 (FT 385) is the main north-south snowmobile corridor trail. According to VAST monitoring information, 10,000 snowmobilers use this trail per year and according to the Equinox Tour owner, 1700 drivers and 700 riders use this trail on guided tours. Snowmobile season on the GMNF lasts four months from December 16th to April 16th as long as snow conditions are adequate. Closure of this VAST corridor

trail for more than 25 % of the snowmobile season could have an adverse affect on snowmobile users and special use permit operators.

Issue Statement 3.2.1b:
Recreation (Snowmobile Trails): Public comment suggests that the Forest Service should not close down Mad Tom (FT 355) for logging activities because of the following reasons cited by the public:

- It is an important snowmobile access route to services in East Dorset.
- It will pose hardship on business owners in East Dorset dependent on snowmobile use.

Indicator:
Amount of time a secondary snowmobile trail would be closed for snowmobile use.

Threshold(s):
FT 355 is a secondary snowmobile trail providing access to East Dorset and Emerald Lake State Park. Access to Corridor 7 is available from the south in Manchester and from the North in Mount Tabor. The GMNF does not have a specific target amount of trail access opportunities for the Forest or the Dorset Peru Project Area. Closure of this secondary snowmobile trail for more than one snowmobile season could have an adverse affect on snowmobile users and special use permit operators.

Issue Statement 3.2.1c:
Recreation (Trails): Public comment suggests that the Forest Service should reconsider locating the Emerald Lake Connector Trail on lands between the Mad Tom Trail and Mad Tom Road because of its proximity to private land.

Indicator:
Distance between Emerald Lake Connector Trail and private land.

Threshold:
A goal for the GMNF is to provide for a diverse range of high-quality, sustainable recreation opportunities (Forest Plan Goal 12, p. 15) and guides Forest Service management of trails on the Forest. The GMNF does not have a specific target amount of trail experience opportunities identified by trail use for the Forest or the Dorset Peru Project Area. The Emerald Lake Connector Trail would link Emerald Lake State Park trails and GMNF trails. A threshold of visibility of the Emerald Lake Connector Trail from private land will be used to display the effects of the alternatives.

Issue Statement 3.2.1d
Recreation (Trails): Public comment suggests that the Forest Service should improve the trail system in the Dorset Peru Project Area because:

- There are frequently used unmanaged trails that are in need of restoration, reconstruction, relocation and maintenance, and should be National Forest System Trails.
- There are unmanaged trails that are unsustainable and should be closed and rehabilitated.

Indicators(s):

1. Number of miles of trail to be restored, reconstructed, relocated and maintained as National Forest System Trails (NFST).
2. Number of miles of unmanaged trails to be closed and rehabilitated.

Threshold(s):
A goal for the GMNF is to provide for a diverse range of high-quality, sustainable recreation opportunities (Forest Plan Goal 12, p. 15) and guides Forest Service management of trails on the Forest. The GMNF does not have a specific target amount of trail experience opportunities identified by trail use for the Forest or the Dorset Peru Project Area. A threshold of improving the diversity of

trail uses and the sustainability of the trail system in the Dorset Peru Project Area will be used to display effects of the alternatives.

Issue Statement 3.2.1e:
Inventoried Roadless Areas: There is a concern that management activities within inventoried roadless areas (RA) will negatively impact their roadless values.

Indicator(s):
1. Acres and percent of timber harvested in the past 10 years within each 2006 inventoried RA.
2. Acres and percent of timber proposed for harvest within each 2006 inventoried RA.

Threshold:
The 2006 inventoried roadless areas (RA) within the Dorset Peru Project Area were identified during the development of the 2006 Forest Plan. Proposed harvest treatments and other management activities located in these RAs have the potential to impact their roadless character. The Dorset Peru Project analysis will assess the impacts to the Wilderness evaluation criteria found in Forest Service Handbook (FSH) 1909.12 Chapter 70. The FSH identifies roadless character criteria for determining whether NFS lands meet the baseline standard to be identified as Roadless Areas. Some of the criteria apply nationwide; other criteria apply only to the 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 roadless character criteria that apply on the GMNF are:

- 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 NFS 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 one-half 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 NFS lands.

3.3.2 Direct and Indirect Effects Analysis Area

The direct and indirect effects analysis area for the recreation resource includes all of the project area as defined in Chapter 1 (Section 1.1.1) because the effects of the action alternatives are not expected, nor can be measured beyond the vicinity of proposed ground disturbing activities. The direct and indirect effects analysis area for inventoried roadless areas includes the lands within two 2006 Inventoried Roadless Areas (RA), Mad Tom and Emerald, identified in the 2006 Forest Plan (Forest Plan FEIS, Appendix C); and one 2001 Roadless Area Conservation Rule area (RACR), Griffith Lake. Direct and indirect effects to the recreation and RA resources would occur upon implementation of the project for up to ten years.

3.3.3 Affected Environment

The Dorset Peru Project Area holds a vast array of recreation opportunities. Popular recreation activities within the Dorset Peru Project Area include hiking, snowmobiling, alpine skiing, cross

country skiing, horseback riding, mountain biking, fishing, camping, swimming, boating, hunting, and viewing wildlife and natural features. Recreation users primarily access the area via Forest Road (FR) 21, off of US Highway 7 and State Routes (SR) 11/30, and local roads Mad Tom Road, Mad Tom Notch Road, Tower Road and Dorset Hill Road. Roadside and trailside camping is occurring along the FR 21 and FR 58, and the Appalachian National Scenic Trail/Long National Recreation Trail (AT/LT). There are two managed portals to the Peru Peak Wilderness Area via the AT/LT and opportunities to access the Big Branch Wilderness Area from VAST Corridor 7 (FT 385) which runs adjacent to the Big Branch Wilderness in the Robert T. Stafford White Rocks National Recreation Area (RTSWR NRA). FR 58 and FT 385 provide a managed portal to the RTSWR NRA.

Emerald Lake State Park is located within the north central portion of the project area. This 930 acre parcel is managed by the State of Vermont for camping, hiking, and water based recreation. The Town of Dorset has four town forests within the project area that provide opportunities for recreation, education and wildlife habitat. Bromley Mountain Ski Area is also located within the project area on Hapgood State Forest and Green Mountain National Forest lands along SR 11.

3.2.3.1 Developed Recreation

There are six Forest Service developed recreation sites within the Dorset Peru Project Area including trailheads, AT/LT shelters, and an alpine ski area. There are also State and private developed recreation sites including Emerald Lake State Park. Emerald Lake State Park is located between GMNF lands in the project area and provides camping, boating and hiking opportunities. Table 3.2-1 displays the existing developed recreation sites, PAOTs (maximum capacity of people at one time), primary access travel route, and recreation opportunities within the Dorset Peru Project Area.

Table 3.2-1: Developed Recreation Sites within the Dorset Peru Project Area.

Forest Service Recreation Site	PAOTs	Primary Access (Travel Route)	Recreation Opportunities
Bromley Mountain Ski Resort	NA	VT 11/30	Provides downhill skiing, snowboarding, and summer adventure opportunities. There is lodging and a base lodge with a restaurant at the resort.
Bromley Shelter	22	VT 11/30	Provides camping for AT/LT hikers.
Peru Peak Shelter	13	FR58	Provides camping for AT/LT hikers.
Appalachian/Long Trail trailhead at Rte 11/30	35	VT 11/30	Provides hiking access to Bromley Shelter, Bromley Mountain and Spruce Peak shelter (not in IRP). Trailhead also provides parking for mountain biking access to Mad Tom Notch (and further), and for snowmobiling north and south on Corridor 7. Kiosk at site and 2 VAST backboard signs.
Appalachian/Long Trail trailhead at Mad Tom Road	35	FR 21	Provides hiking access to Bromley Mountain, and Spruce Peak (Peru Peak Wilderness), Peru Peak (Peru Peak Wilderness), and Griffith Lake. Kiosk located across from Trailhead on north side of the road (out of IRP).
Griffith Lake trailhead	18	FR58	Provides mountain biking access south to VT 11/30 and north to Griffith Lake (not designated as such). Also used for hiking access to Griffith Lake, Baker Peak (Big Branch Wilderness) and Peru Peak Shelter. Hiking trail is not in INFRA. Kiosk at site.

Table 3.2-1: Developed Recreation Sites within the Dorset Peru Project Area.			
Forest Service Recreation Site	**PAOTs**	**Primary Access (Travel Route)**	**Recreation Opportunities**
Grouse Lane parking (Not an official Developed Recreation Site)	NA	Dorset Hollow Road	Provides access for hunters (mostly) in the Dorset Peak Area. Has Forest Service Trail Sign (P71 and Parking), but area not maintained.
Other Recreation Sites		**Primary Access (Travel Route)**	**Recreation Opportunities**
Emerald Lake State Park and parking (VAST TH) (Not a developed Recreation Site)		VT7	Provides camping and boating facilities, and serves as an unofficial access to Dorset Peak Ridge from State Land, across private land.
Mad Tom Notch/FR21 town snow plow turnaround (Not a developed recreation site)		FR21	Provides parking for snowmobile access to Corridor 7/FT385. Not on FS land. Town snowplow turn around.
Mad Tom Road Trailhead (Not a Developed Recreation Site)		VT7	Provides access to an abandoned historical trail up Mad Tom Brook from Dorset Town Trail right-of-way.
Dorset Field Club		Church ST	Provides 18 hole golf course, tennis courts and related facilities, private.
Dorset RV Campground		VT30	Provides RV camping, private.
Maryville Campground		VT7	Provides RV camping, private.

3.2.3.2 Dispersed Recreation

In addition to the developed recreation sites, there are a number of user-created dispersed recreation sites located along roads and trails, FR 21, FR 58 and the unmanaged East Dorset Trail, in the Dorset Peru Project Area. These sites usually have remnants of stone fire rings and are often located next to the stream, within old log landing locations or within wildlife openings.

A Travel Analysis was prepared for the Dorset Peru project in January 2012 that provides recommendations for trail management within the project area (USDA Forest Service, 2012g). Data from that report was incorporated into this analysis. Table 3.2-2 displays the existing National Forest System Trails (NFST) within the Dorset Peru Project Area by designed and managed use, trail class (TC) jurisdiction, and the associated trail mileage.

There are approximately 11 miles of managed National Forest System (NFS) hiking trails within the area which are all part of the Appalachian National Scenic Trail and Long National Recreation Trail (AT/LT) systems managed cooperatively with the National Park Service, Appalachian Trail Conservancy and the Green Mountain Club. Hiking on the AT/LT consists of overnight long-distance backpacking and day hiking. The Dorset Peru Project Area also contains 12 miles of unmanaged hiking trails on NFS lands. Dorset Mountain is a popular hiking destination listed in the Green Mountain Club's "Day Hiker's Guide to Vermont and Dorset Peak is listed by Appalachian Mountain Club as one of New England Highest 100 peaks (3,770 feet). Hikers park at the end of Tower Road in Dorset to access this loop trail. A three mile unmanaged trail along Mad Tom Brook that was once a side trail to the AT/LT can be accessed from FR 21 and Mad Tom Road. This trail is used by hikers, snowshoers, and anglers. Hiking trails are also available at Emerald Lake State Park and Dorset Town Forests. There are 8 miles of Legal Town Trails in the Dorset Peru Project Area that are open to a variety of uses. VAST Corridor 7 is managed for mountain biking as well as snowmobiling for 8.3

miles in the Dorset Peru Project Area. There are currently no managed horse trails within the project area, although they are allowed on existing roads. It is not uncommon to see summer trail users on the winter trail system for access to the general forest area for hunting, viewing nature and gathering forest products.

The Forest Service maintains a snowmobile trail network within the project area totaling about 11.5 miles in cooperation with VAST. There is also 1.5 miles of snowmobile trail on FR 21 (Mad Tom Notch Road) that is under local jurisdiction. Of the total trail system within the project area, about 11.5 miles are TC 4 groomed trails (100 percent of the total), and there are no TC 3 ungroomed trails under FS jurisdiction in the project area. Vast Corridor 7 receives a high level of use by snowmobiles averaging around 10,000 visits per year. The only Forest Service managed winter trailhead in the project area is located on Route 11/30 at the AT/LT trailhead. It is not uncommon for this trailhead to be at or over capacity on weekends and holidays with snowmobile users. Another winter trailhead is located on FR 21 (Mad Tom Notch Road) and is under local jurisdiction. Both these trailheads provide parking and access to VAST Corridor 7.

Table 3.2-2: Dorset Peru Project Area National Forest System Trails

Trail Name	Trail #	Total Length	FS Jurisdic-tion, Miles	Local / other Jurisdic-tion, Miles	Trail Class	Designed* & Managed Uses	Desired ROS	Co-located with Road (Miles)
AT/LT	1	10.8	10.8	0	3	Hiker/ Pedestrian	SPNM From Rt11to Mad Tom notch Primitive within Peru Peak Wilderness SPM within the Robert T. Stafford White Rocks NRA	
Mad Tom	355	3.2	3.2		4	Hiker/ Pedestrian	SPM and Roaded Natural	
VAST Corridor 7	385	8.3	8.3		4	Snowmobile Pack and Saddle and bike	SPM and Roaded Natural	FR 21 for 1.9 mi. FR 58 for 2.06 miles
FR 21	358	1.5	0	1.5 local on FR 21	4	Snowmobile	SPNM	FR21 local jurisdiction for 1.5 miles
Bromley Shelter Spur	455	0.0725	0.0725		3	Hiker/ Pedestrian	SPNM	
Bromley Brook Vista	456	0.0189	0.0189		3	Hiker/ Pedestrian	SPNM	
TOTAL		**23.8914**	**22.3914**	**1.5**				**5.46**

The 2012 Dorset Peru Project Travel Analysis (USDA Forest Service 2012g) provides information regarding existing trail use and costs for maintaining the National Forest System trail system on NFS lands within the project area. Table 3.2-3 provides a display of this information for each trail in terms of the annual operation and maintenance (O&M), and deferred maintenance costs needed to sustain the trail system at desired levels.

Table 3.2-3: Annual Operations and Maintenance (O&M) and Deferred Maintenance Costs By Trail.

Trail Name/ Number	Managed Uses	Annual O&M	Deferred Maintenance	Trail Partner
AT/LT/ 1	Hiker/Pedestrian	$51,197.83	16,419.30	GMC/ATC
Mad Tom 355	Snowmobile	$4,373.74	10,428.58	VAST
FR21 358	Snowmobile	$1355.52	10,019.58	VAST
VAST Corridor 7 385	Snowmobile/Pack and Saddle/bike	$8,715.62	57,810.28	VAST
Bromley Shelter Spur 455	Hiker/Pedestrian	$54.10	--	GMC/ATC
Bromley Brook Vista 456	Hiker/Pedestrian	$23.12	--	GMC/ATC
TOTAL		**$65,719.93**	**$94,677.74**	
Dollar figures generated from Trails INFRA Database. Data was collected during fall of 2011 after the August 2011 tropical storm Irene.				

3.2.3.3 Inventoried Roadless Areas

Refer to the Existing Condition Map (Figure A-1) for the specific locations of the 2006 inventoried roadless areas (RA) and the 2001 Roadless Area Conservation Rule (RACR) areas within the project area.

2006 Inventoried Roadless Areas

There are two 2006 inventoried roadless areas (RA) within the Dorset Peru Project Area that were identified during the roadless inventory process during the development of the 2006 Forest Plan (Forest Plan FEIS, Appendix C), Mad Tom RA and Emerald RA (Table 3.1-4). Management for 2006 inventoried RAs is in accordance to 2006 Forest Plan Management Area direction in which they are located (Diverse Forest Use and Escarpment MAs).

The Mad Tom RA (RA Number 92007, Forest Plan FEIS, Appendix C, pp. C-55 to C-60) consists of approximately 918 acres of NFS land adjacent to Big Branch and Peru Peak Wildernesses. All of this RA is within the project area. The 2006 New England Wilderness Act (P.L. 109-382) did not designate any of this RA as Wilderness. No timber harvest has occurred in the past 10 years (2002 to 2012) within this RA.

The Emerald RA (RA Number 92015, Forest Plan FEIS, Appendix C, pp. C-105 to C-109) consists of approximately 236 acres located adjacent to the western boundary of the Big Branch Wilderness. All of this RA is within the project area. The 2006 New England Wilderness Act (P.L. 109-382) did not designate any of this RA as Wilderness. There are no NFS roads or trails located within this RA. No timber harvest has occurred in the past 10 years (2002 to 2012) within this RA.

2001 Roadless Area Conservation Rule Areas

There is one 2001 Roadless Area Conservation Rule area (RACR) in the Dorset Peru Project Area. The Griffith Lake RACR consists 990.5 acres with approximately 599.8 acres (60.6%) in the Dorset Peru Project Area. The Griffith Lake RACR is located adjacent to Big Branch and Peru Peak Wildernesses. Timber harvesting and road construction are only allowed in RACR's for specific and restricted reasons.

3.2.3.4 Congressionally Designated Areas

Congressionally designated areas on the GMNF consist of National Scenic Trails, Wilderness, and National Recreation Areas. All of three these congressional designations exist within the project area.

Approximately1,632.3 acres of the 6,767 acre Big Branch Wilderness, and 1246.8 acres of the 7,672 acre Peru Peak Wilderness, and approximately 452.7 acres of the 22,610 acre Robert T. Stafford White Rocks National Recreation Area are located in the Dorset Peru Project Area. There is also 10.8 miles of the Appalachian National Scenic Trail traversing the project area in a north/south direction.

The Otter Creek is identified as an Eligible National Recreational River in the 2006 Forest Plan, but has not been congressionally designated. Within the project area none of the area that would potentially be included in the Eligible Wild, Scenic and Recreational Rivers MA is on NFS lands. The Otter Creek was deemed eligible as a National Recreational River due to its outstandingly remarkable hydrologic values (Forest Plan, p. 107).

3.2.4 Direct and Indirect Effects

3.2.4.1 Alternative A – No Action

Issue 3.2.1a: The Forest Service should reconsider the time frame and location for the proposed logging along the VAST Corridor 7 snowmobile trail.
Under Alternative A – No Action, no harvesting would occur along the VAST Corridor 7 snowmobile trail, and snowmobile use of the trail would not be affected.

Issue 3.2.1b: The Forest Service should not close down FT355 for logging activities. Under Alternative A – No Action, no harvesting would occur along the FT 355, and snowmobile use of the trail would not be affected.

Issue 3.2.1c: The Forest Service should reconsider locating the Emerald Lake Connector Trail on lands between the Mad Tom Trail and Mad Tom Road because of its proximity to private land.
Under Alternative A – No Action, the Emerald Lake Connector Trail would not be constructed and the trail would not be visible from private land.

Issue 3.2.1d: The Forest Service should improve the trail system in the Dorset Peru Project Area.
Under Alternative A – No Action, unmanaged trails would not be restored, reconstructed, relocated, maintained or become NFSTs. There would be no change in trail uses to increase the diversity of trail opportunities. Unmanaged trails would not be closed and rehabilitated.

Issue 3.2.1e: There is a concern that management activities within inventoried roadless areas (RA) will negatively impact their roadless values.
There would be no timber harvest or wildlife management within any of the four 2006 inventoried RA‟s in the project area under Alternative A. In addition, there would be no management activities occurring within any RACR or RAs in the project area. As a result, the lands would continue to regain a natural untrammeled appearance and there would be no impact to the roadless character due to vegetation management.

3.2.4.2 Alternative B – Proposed Action and Alternative C

Issue 3.2.1a: The Forest Service should reconsider the time frame and location for the proposed logging along the VAST Corridor 7 snowmobile trail.
Vegetation management activities in Alternatives B and C that use FR 21, also known as FT 385 or VAST Corridor 7, as a haul road would have some effect on the use of the road as a snowmobile trail.

Typical impacts from vegetation management activities would generally include plowing and sanding of FR 21 to accommodate haul trucks, sharing FR 21 with haul trucks, and the sights and sounds of harvest activities including the sounds of chainsaws for felling trees, and the use of motorized vehicles such as log skidders and haul trucks. The mitigation measures (See Appendix B) for the project are designed to minimize the impact to snowmobile use from the haul trucks using FR 21. Mitigation measures include: minimizing the years of the contract, not allowing hauling timber on weekends or federal holidays, maintaining a groomed lane for snowmobile use, signage, and speed limits. These mitigations would allow for VAST Corridor 7 to stay open most of the time that timber is being harvested and improve the safety for snowmobilers while shared use is occurring. The threshold of not closing VAST Corridor 7 for more than 25 % of the snowmobile season would be met using the mitigations. Trail closures would be expected to be occasional and not for prolonged time periods.

Issue 3.2.1b: The Forest Service should not close down FT355 for logging activities.
Vegetation management activities in Alternatives B and C that use FT 355 as a haul road would require that the Mad Tom Trail (FT 355) be closed to snowmobiling during the harvest period. Approximately 269 acres is planned to be harvested in the harvest zone that would use FT 355 as a haul road. Typical impacts from vegetation management activities would generally include plowing and sanding of FT to accommodate haul trucks, and the sights and sounds of harvest activities including the sounds of chainsaws for felling trees, and the use of motorized vehicles such as log skidders and haul trucks. It is estimated that harvest could occur during one winter season (normally December first to March fifteenth) or the equivalent time period over two years. A mitigation to minimize the number of years of harvesting has been added in Appendix B. During the harvest period, access to VAST Corridor 7 (FT 385) from East Dorset and Emerald Lake State Park would be curtailed. Access to VAST Corridor 7 (FT 385) would still be able to occur from Mount Tabor, Route 11/30 parking area, and the Mad Tom Notch (FR 21) parking area. A mitigation measure requiring the trail to be restored to a condition suitable for designed trail use and trail class after harvesting is completed has been added to Appendix B.

Issue 3.2.1c: The Forest Service should reconsider locating the Emerald Lake Connector Trail on lands between the Mad Tom Trail and Mad Tom Road because of its proximity to private land.
Under Alternatives B and C a trail would be created to link Emerald Lake State Park with FT 355. The approximate location of the proposed Emerald Lake Connector Trail is 690 feet (one eighth mile) from private land. Visual inventories done by Forest Service staff on the Appalachian Trail in leaf-off conditions have found that 200 to 300 feet of the foreground is visible in wooded areas. The trail would be located more than 300 feet out of the range of the visible foreground in leaf-off conditions. A mitigation measure requiring Forest Service staff to work with adjacent property owners when determining an alignment for the Emerald Lake Connector Trail has been added to Appendix B.

Issue 3.2.1d: There is a concern that that the Forest Service should improve the trail system in the Dorset Peru Project Area.
Alternatives B and C would result in:

- restoring and relocating approximately 3 miles of hiking trail along Mad Tom Brook in East Dorset
- constructing 0.7 miles hiking trail to connect Emerald Lake State Park trails, the Mad Tom Trail (FT 355) and the AT/LT
- constructing approximately 3.3 miles of purpose-built single track mountain bike and hiking trail from Grouse Lane trailhead to the ridge on the east side of Dorset Mountain
- restoring/reconstructing/relocating approximately 3.4 miles of existing trail on Dorset Mountain
- Closing and rehabilitating the approximately 3 mile steep, eroded, unmanaged trail form Tower Road to the Little Dorset Peak Summit.

These actions would improve the diversity of trail uses in the Dorset Peru Project Area (See Table 3.2–4 NFS Trail System/Classification Review and Recommendation) by adding at least 3.3 miles of

mountain bike trail and 11 miles of hiking trails. These actions will improve the sustainability of the trail system by restoring, reconstructing, relocating unmanaged trails that are desired for future use so that these trails will be able to be maintained economically, and by closing and rehabilitating unmanaged trails that are steep eroded and unsustainable.

Table 3.2-4: NFS Trail System/Classification Review and Recommendations

Trail Name Trail Type	**Trail Number**	**Current Condition**			**Post Analysis Recommendation**			
		Current Length (miles)	**Trail Class**	**Existing Uses**	**TMO Length** (miles)	**Trail Class**	**Designed Use**	**Managed Uses**
AT/LT	1	10.8	3	Hike/ pedestrian	10.8	3	Hike	Hike/ pedestrian
Mad Tom	355	3.2	4	Snowmobile	3.2	4	Snowmobile	Snowmobile
FR 21	358	1.5	4	Snowmobile	1.5	4	Snowmobile	Snowmobile
VAST Corridor 7	385	8.3	4	Snowmobile, mountain bike	8.3	4	Snowmobile	Snowmobile, mountain bike
Bromley Shelter Spur	455	0.0725	3	Hike/ pedestrian	.0725	3	Hike	Hike
Bromley Brook Vista	456	0.0189	3	Hike/ pedestrian	0.0189	3	Hike	Hike
Grouse Lane – non-system trail and trailhead	None	1.5	None	Hike/ pedestrian	3.3	3	Hike/ pedestrian, mountain bike	Hike/ pedestrian, mountain bike
Dorset Mountain - non-system trails	None	7.43	None	Hike/ Pedestrian, unauthorized snowmobile	3.4	3	Hike/ pedestrian, mountain bike	Hike/ pedestrian, mountain bike
Emerald Lake Connector – proposed new trail	None	0	None	NA	0.678	2	Hike/ pedestrian	Hike/ pedestrian
East Dorset - non-system trail	None	3.1	None	Hike/ pedestrian	3.1	3	Hike/ pedestrian	Hike/ pedestrian
Total Miles		35.92			34.37			

Issue 3.2.1e: There is a concern that management activities within inventoried roadless areas (RA) will negatively impact their roadless values.

There would be no management activities within the RACR under Alternatives B and C. The Emerald Lake Connector trail is proposed for the Emerald RA. This would involve a small amount of tree cutting. A four acre wildlife upland opening is proposed for the Mad Tom RA. Three acres of the wildlife opening is being converted from forest and one acre is a restored wildlife opening. The wildlife openings would affect less than one half a percent of the Mad Tom RA. There has been no timber harvesting in the Mad Tom RA in the past 10 years. The harvesting to create wildlife openings would not exceed the roadless character criteria of twenty percent or less of the RA being harvested within the past 10 years.

Table 3.2-5 Summary of Recreation Resource Effects by Alternative

Indicator	Alternative A No Action	Alternative B Proposed Action	Alternative C
Amount of time a main corridor snowmobile trail would be closed for snowmobile use	Not closed	mitigations would allow for VAST Corridor 7 to stay open most of the time that timber is being harvested and improve the safety for snowmobilers while shared use is occurring	Same as Alternative B
Amount of time a secondary snowmobile trail would be closed for snowmobile use	Not closed	Trail would be closed during harvesting - A mitigation to minimize the number of years of harvesting has been added	Same as Alternative B
Number of miles of trail to be restored, reconstructed, relocated and maintained as National Forest System Trails	23.9 miles	34.4 miles	Same as Alternative B
Number of miles of unmanaged trails to be closed and rehabilitated	None	4 miles	Same as Alternative B

3.2.5 Cumulative Effects

The analysis area for cumulative effects is the same as for the direct and indirect effects analysis area. Vermont Forest Parks and Recreation staff is in the process of developing a loop trail system at Emerald Lake State park. This would have the cumulative impact of enhancing trail opportunities and connectivity in the Dorset Peru area in the foreseeable future. There are no past, present or reasonably foreseeable future actions that would have a cumulative negative impact on the recreation resource. In addition, there are no timber harvest activities proposed within the Dorset Peru project over the next 10 years that would impact the roadless character within inventoried roadless areas. Therefore, there would be no negative cumulative impact from implementing the proposed action or alternatives.

3.3 Habitat Diversity

3.3.1 Issue Statements

Although there were no public issues specifically related to habitat diversity, this section analyzes the extent to which the alternatives contribute toward Forest Plan objectives for habitat type composition and age class (Forest Plan, USDA Forest Service 2006a, pp. 11-12) to ensure that habitat diversity is maintained or increased on the GMNF.

Indicator:

- The indicator for this issue is acres of improvements to habitat type composition and age class within the project area, compared to objectives defined in the habitat management unit (HMU) analysis.

3.3.2 Direct and Indirect Effects Analysis Area

The analysis area for direct and indirect effects for habitat diversity issues includes NFS lands within the project area. This area was chosen because NFS lands are where the proposed actions would be implemented that could cause potential impacts or change to wildlife habitats. The temporal context for this analysis includes both short-term (by 2019) and mid- to long-term (50 to over 100 years from now) scales. The short-term scale reflects the year when the proposed vegetation treatments would be expected to be fully implemented and the immediate impacts of management activities would result in noticeable change, such as conversion of a hardwood stand to an aspen stand based on stocking surveys. The mid- to long-term scale accounts for management actions or disturbances that may result in changes that take a longer time to be detectable, such as shifts from hardwood to mixedwood or softwood forest types.

3.3.3 Affected Environment

Composition and Age Class

An assessment of habitat diversity on NFS lands within the Dorset-Peru project area, called a “habitat management unit (HMU) analysis,” was conducted by Forest Service resource specialists during 2009-2011 (Burbank 2011). The analysis was based on existing records as well as vegetation inventory data recently gathered in the project area. The purpose of this analysis was to apply Forest Plan habitat type composition and age-class objectives at the site-specific (HMU analysis) scale, thus creating HMU-specific objectives. HMU composition objectives apply to all NFS lands within the HMU, regardless of management area designation, while age-class objectives apply only to lands within the HMU that are suitable for timber management using even-age silvicultural techniques. Specific HMU objectives take into consideration the current condition and overall Forest Plan objectives (USDA Forest Service 2006a), as well ecological conditions and long-term tendencies of ecosystems found in the project area. The difference between the current condition of the Dorset Peru HMU and the specific HMU objectives is the basis for identifying potential management activities within the project area. Based on this difference, stands can be identified for silvicultural treatment or other vegetation management to achieve HMU composition and age-class objectives.

Table 3.3-1 summarizes the important existing habitat composition conditions compared to the desired future conditions identified by the HMU objectives.

Table 3.3-1: Comparison of existing habitat composition conditions with HMU objective ranges.

Habitat Type (all)	Existing Habitats (all)		Existing Habitats (suitable[1])		HMU Objectives (all)	
	acres	%	acres	%	%	acres
Northern Hardwoods	11,589	78	5,912	40	40-50	5,900-7,350
Mixedwood	1,303	9	608	4	35-45	5,150-6,650
Softwood (spruce/ fir and hemlock/ white pine)	642	4	107	1	10-20	1,450-3,000
Aspen/Birch	850	6	0	0	1-2	150-300
Oak	125	1	95	1	~1	95-150
Open Uplands	67	<1	56[2]	<1	2-3	300-450
Non-forest Wetlands/ Water	197	1	-	-	1-2	150-300
Total	**14,773**	**100**	**6,778**	**46**	**n/a**	**n/a**

[1]Represents the proportion of all lands in the HMU suitable for timber management by habitat type (about 46% of the total HMU acres); shown for context, as some habitat types (e.g. Aspen/Birch) require timber management to exist at the levels defined by the Forest Plan (USDA Forest Service 2006a) and HMU objectives.
[2]Permanent upland openings which are maintained for various reasons and provide wildlife habitat

Table 3.3-2 summarizes the existing regenerating age class condition (0-9 years) for all habitat types compared to the HMU objective. It also shows the existing age class distribution of the remaining age classes.

Table 3.3-2: Comparison of the existing age class distribution across all forested habitat types on all lands, and on suitable lands managed using even-aged management, with the HMU objective ranges for suitable lands of these age classes.[1]

Age Class (Includes All Forested Habitat Types)	Existing Condition (all)[1]		Existing Condition (suitable EA[2])		HMU Objectives[1,2]
	acres	*%*	*acres*	*%*	*acres*
Regenerating (0-9 years)	0	0	0	0	188-698
Young	1,419	10	994	24	885-2,531
Mature	9,783	67	2,655	66	1,259-2,812
Old	3,307	23	387	10	180-1,785
Total Forested Acres	14,509		4,036		

[1] To simplify display, the acres of current and desired age classes have been summarized across all forested habitat types and converted into percents and ranges in this table; the Forest Plan (USDA Forest Service 2006a) and the more detailed HMU objectives specify acre and percent objectives by habitat type. To see these more detailed distributions, see Burbank (2011).
[2] Lands suitable for even-aged timber management.

Tables 3.3-1 and 3.3-2 illustrate the following important gaps between the current and desired future condition for forested habitat composition and age class:

- A significant imbalance in desired composition among northern hardwood, mixedwood, and softwood habitat types, with mixedwood habitat significantly under-represented, (at 9 percent compared to ecological tendencies of between 35-45 percent), likely due to historical land uses.
- A significant deficit in aspen-birch, particularly in suitable lands where these habitats can be maintained at desired levels. Aspen-birch habitats are short-lived and their continuing presence on the landscape is dependent on vegetation management activities that prevent succession to longer-lived habitats like northern hardwood or mixedwood types. There are no

known stands of aspen of at least an acre in size anywhere on NFS lands within the project area, although there are small groups of aspen trees embedded within other habitat types widely scattered within the project area. The entire extent of paper birch habitat falls within Wilderness, a management area where this habitat cannot be actively maintained. These 850 acres of paper birch stands are currently a mix of mature and old age classes, and succeeding to longer-lived habitats like northern hardwood or mixedwood types. Outside of these stands that are disappearing, paper birch habitat is almost completely absent from the project area.

- A small amount of oak habitat along the Escarpment, where this habitat type should be more prevalent. The lack of oak is likely due in part to lack or suppression of historical natural disturbance regimes like fire. The Escarpment Management Area is where vegetation management is focused on enhancing and expanding oak, oak-pine, and oak-hardwood habitat. In the project area, oak habitat is restricted even within the Escarpment MA, occurring north of Mad Tom Ravine, and along Beech Ridge. Only one stand is dominated by oak, although several others are composed of a mix of oak and northern hardwoods, or have scattered individual oak trees, saplings, or seedlings among stands dominated by other hardwood and/or softwood species.
- An absence of regenerating age class (0-9 years old) across all habitats on suitable lands; this is related to an over-abundance of mature and old age classes, and to the succession of stands harvested in the 1980s from the regenerating into the young age class. While lack of vegetation management and succession of stands to mature forest provides beneficial habitat conditions for some wildlife species, this is not the case for all species occurring on the GMNF. Many species depend on regenerating and young age classes in a diversity of habitats during one or more life-history stages; some of these species may disappear from the project area without vegetation management.

The project area does not include any rare terrestrial natural communities of State or federal significance. It does include around 10 acres of temperate acidic outcrop habitat, which occurs occasionally in the Escarpment Management Area (MA) and more generally in the Escarpment landscape.

There are eight stands older than 150 years, of which three have been identified by FS staff as ecologically significant. All three stands are within the Escarpment MA, and have clearly begun the transition to uneven-aged forest. One stand is around 186 years old and is dominated by red spruce and white pine, with abundant down woody debris. An adjacent stand is younger (154 years old) but of similar structure and dominated by hemlock and white pine along with a few northern hardwood and red oak trees. The third stand is dominated by red oak and other northern hardwoods of large size, is around 155 years old, and is starting to break up, meaning that some of the largest trees are shedding limbs or dying, creating small gaps in the canopy of around a tenth of an acre in size. These gaps create opportunities for young trees to become established in more light, adding more structural diversity to the stand. All three stands occur on very steep slopes with thin soils, and were avoided by loggers and managers based on management records from the 1930s and 1940s. These stands, and possibly two smaller stands in Wilderness, are the most likely places to find remnant old trees in the project area.

In addition to the composition and age class conditions described above, there are additional habitat conditions important to wildlife that could be enhanced to better meet Forest Plan goals and objectives (USDA Forest Service 2006a).

Permanent Upland Openings

NFS lands within the Dorset-Peru project area include fewer acres than desired of open upland habitat, including permanent upland openings maintained for wildlife habitat diversity (Table 3.3-1). Of the 67 open upland acres in the project area, almost 10 acres consist of rock outcrops and talus.

The remaining acres are dominated by permanent upland openings that may provide some benefit to wildlife, but are not managed primarily as wildlife habitat, including 16 acres of ski trails at Bromley Ski Area, 13 acres of powerline corridor, and 9 acres of hayfield mowed annually under Special Use Permit (SUP). Only about 17 acres of NFS land in the project area are maintained specifically for wildlife habitat. Of these acres, only one 10-acre meadow is actively maintained, whereas the remaining seven acres are divided among five small openings that are in various stages of succession into forest. Although open lands do comprise about 11 percent of the larger Dorset-Peru project area (including private lands), most of those lands are wetlands or agricultural lands; only about 375 acres within the 41,699 acre project area (less than one percent) are considered upland openings that could provide high-value terrestrial wildlife habitat.

Research has indicated that upland openings smaller than two to four acres provide minimal benefit to early-successional bird species. Early-successional bird species benefit, and diversity of bird species present increases, directly with increasing size of openings to about 20 acres, at which point the incremental increase in benefit and diversity slows (Rodewald and Vitz 2005; Schlossberg and King 2007; Schlossberg and King 2008). Wildlife species that use only non-forested habitats tend to be found in openings larger than 5 to 10 acres, whereas species that use a wider variety of habitats can often make use of the smaller openings (DeGraaf et.al. 2006, p. 133). More than half of the large (parcels greater than 5 acres) maintained upland opening habitat in the analysis area are long, narrow, and linear, consisting of mostly edge habitat. These linear conditions do not effectively provide for the diversity of species one would expect from habitat of that size. Two grassy fields (the hayfield and meadow) meet the size and configuration criteria, however the remaining openings are too small, and some are overgrown. A greater acreage in open habitat and a more balanced distribution of opening size classes, shapes, and composition (e.g. forb and shrub-dominated openings as well as grassy meadows) would provide suitable habitat for a wider diversity of wildlife species than is currently available.

Deer Wintering Areas

Suitable winter habitat is essential for the long-term survival of white-tailed deer (*Odocoileus virginianus*) in Vermont. Deer wintering areas (DWAs) include two basic habitat components: shelter from harsh weather conditions, and food. Softwood stands with high crown closure create shelter or “cover,” which provides protection from snow depth, wind, and cold temperatures. Hardwood and softwood regeneration provide accessible food or “browse.” The quality of deer wintering areas is determined by forest stand characteristics, such as species composition, maturity, height, and closure of the canopy, which vary by site-specific features, such as elevation, slope, aspect, and soil type (Reay et al. 1990). There are 10 to 15 State-mapped DWAs within or adjacent to the project area, although most are located on non-NFS lands, particularly in the Otter Creek and Mettawee valleys. The DWAs on NFS lands typically lack abundant early-succession hardwood vegetation for browse and/or the softwood vegetation may not provide winter cover of desirable quality. The lack of regenerating softwoods compromises the abundance and quality of future winter cover for deer, and for other wintering species such as ruffed grouse (*Bonasa umbellus*) and wild turkey (*Meleagris gallopavo*). Without maintenance and enhancement, the quality of deer wintering habitat, and ultimately the winter survival of white-tailed deer within and adjacent to the project area, may decline.

Apple Tree Management

Apple trees found within the project area are often associated with historical home and farm sites. These apple trees are located at a number of locations in the project area, although our current knowledge suggests that the abundance and distribution of apples is considerably lower within this project area than in other parts of the GMNF. Individual apple trees and remnant orchards are an important source of wildlife food and are historical features of the GMNF. As the forest matures, other tree species encroach upon and shade apple trees, which become less productive in the reduced light

of the understory and eventually die. Removal of over-topping trees immediately around the apples invigorates their growth and promotes fruit production. Occasional pruning of these apple trees helps redirect production from vegetative growth to fruit production. Without active management these historical features and sources of soft mast for foraging wildlife would be lost. The Forest Service anticipates that more apple trees will be discovered as the project is designed and implemented.

Down Woody Debris Habitat

Across the project area there are historical sites including rock walls, building foundations, and wells. These sites are often located in small- or medium-size openings and they may include other habitat features such as small ponds, wetlands, or apple trees. The features themselves (e.g., rock walls, wells, and foundations) provide unique wildlife habitat providing nesting shelter or travel ways for small mammals, reptiles, and amphibians. These habitats tend to be lacking down woody debris because they tend to have few dead and dying trees. Down logs and piles of brush can provide nesting, foraging, and travel habitat for small mammals, reptiles, and amphibians, enhancing species diversity in these small areas. Tropical Storm Irene enhanced large woody debris quantities in the project area, but primarily in riparian corridors and not in the uplands.

Bat Hibernacula

One bat hibernaculum (Aeolus or Dorset Cave) is located within the project area and a second hibernaculum (Skinner Hollow) is located immediately south of the project area. Both hibernacula have in the recent past included federally-listed, endangered Indiana bats (*Myotis sodalis*). A 5-mile buffer, shown on the Exisitng Condition Map, around each hibernaculum overlaps with the project area. As stipulated in the GMNF Forest Plan (USDA Forest Service 2006a: p.28), all timber harvest from April 15 through October 30 within five miles of a known Indiana bat hibernaculum shall be in accordance with provisions of a Forest Service management plan for that hibernaculum. White-Nose Syndrome (WNS), a virulent and fatal disease condition that infects cave- and mine-hibernating bats has resulted in profound mortality of these bats throughout the Northeast, including Vermont. At present, it is not known if Indiana bats still over-winter in these hibernacula or if they continue to occur within the project area. Local populations of other cave- and mine-hibernating bats (e.g. little brown bat, *Myotis lucifugus*, or northern long-eared bat, *M. septentrionalis*) have suffered extreme mortality over the past few years due to WNS; however, the exact status of these populations in the project area is not known. As bat mortality has resulted in suitable bat foraging and roosting habitat that is "under-occupied," it is unlikely that habitat enhancement activities are required in the project area at this time for the sake of bat species. The Forest Service remains in close contact with the US Fish and Wildlife Service and the Vermont Fish and Wildlife Department about the condition of these hibernacula and any bats therein.

3.3.4 Direct and Indirect Effects

3.3.4.1 Alternative A – No Action

No new timber harvesting, wildlife and fisheries habitat work, soil and water restoration work, road/trail construction work, or vista management work would occur under Alternative A. Work authorized under previous NEPA decisions and SUP agreements, such as maintenance of seven upland openings (including the ski trails and powerline corridors), and non-native invasive plant control activities, would continue.

Composition

If no vegetation management takes place on NFS lands within the project area, forested communities would be expected over long periods of time to progress toward composition objectives. Over the short and mid-term, however, conditions would remain out of balance with the ecological tendencies

of the landscape. Northern hardwoods would continue to dominate with much smaller amounts of mixedwood and softwood forest. In another 100 years or so forest composition will make the slow natural transition from northern hardwood domination to a mix of forest habitat types more suited to ecological site conditions. Softwoods are likely to be found on sites at moderate to upper elevations that are wet, are shallow to bedrock, have cooler aspects (e.g. north and east), or have lower fertility (Lee et al. 2005; Leak 1976). Areas with abundant natural softwood reproduction below northern hardwood canopies are likely to develop into softwood or mixedwood forests once the older hardwood canopy trees start to die. Unhealthy trees will be the first to die and form gaps in the canopy; this happens continuously, but especially in stands that are mature or old. The smallest of these gaps (a single tree) will generally be filled by branches of adjacent trees and already established saplings and pole-sized trees of shade-tolerant species. Unless a gap is created over a patch of softwoods, a shift in composition to mixedwood or softwood habitat is unlikely to occur in the short to mid-term as a result of these small single-tree deaths. As these even-aged stands age further over the mid to long-term, more trees will die more frequently and in larger patches. Established softwood regeneration is more likely to grow into the canopy as these trees die, facilitating the transition to mixedwood and softwood habitats.

Paper birch and oak stands, all of which are mature or old now, would decline and be succeeded by northern hardwood and mixedwood forests over the long term. Oak, aspen, and paper birch are shade-intolerant species and cannot become established under closed forest canopies. Trees of these species may continue to be present in stands over the long term, but in limited quantities, except in moderate to large areas of natural disturbance due to windthrow, fire, or insects or disease. Existing oak trees are more likely to persist as part of hardwood and mixedwood stands over the long-term as they are longer-lived than paper birch and aspen. As these mature oaks decline over the next 100-200 years, without disturbance to create large gaps in the canopy, there would be no young oak to take their place.

Age Class

Alternative A would result in less structural diversity by age class, than either Alternatives B or C over the short and mid-term. Alternative A would not address the absence of the regenerating age class, and would continue the natural succession of the forested stands to mature and old age conditions. Without any regenerating age class to fill in behind the young age class as it transitions toward maturity, the young age class along with the regenerating age class would be absent within 40 years; this age class is already absent from the paper birch and oak habitat types.

The existing age class distribution has developed over the past century as a result of land use patterns, including settlement, land abandonment, and management by the Forest Service or other landowners prior to federal ownership. During settlement, most of what are now NFS lands within the project area were harvested for timber, charcoal, or converted to hill farms. As the lands were abandoned around the turn of the 20th century, forests regenerated. The current age class distribution shows a bubble of mature/old age class dominating the distribution, representing these new forest stands. Stands 70-120 years old represent two-thirds of all stands in the project area, and another 20 percent of stands are younger than 70 years. In terms of habitat diversity, these younger stands in the young age class and the early stages of the mature age class represent the least diverse stages of forest development (Carey and Curtis 1996). Most of the existing older mature and old forest stands have not matured enough to develop the more complex structure, broken canopy, and natural gaps associated with old uneven-aged forests under natural disturbance regimes. This increase in complexity with age creates additional habitat diversity, but over long periods of time. Most trees in these mature and old forests will not reach their maximum natural lifespans for at least another 150-200 years, and so are still relatively resistant to disturbances that fell trees of old age. For example, mature trees and stands of sugar maple reach 300-400 years old (Godman et al. 1990), and so sugar

maple trees in the project area that are 100 years old are not even halfway through their maximum lifespan.

Most stands in the project area are at the threshold or early stages of developing higher levels of habitat diversity that result from aging forests. However, several stands surveyed in the project area were found to have trees with disease problems and poor growth. Without treatment, these trees may die over the short or mid-term, creating more and larger canopy gaps and enhancing diversity. For the remaining stands, it will require several decades to develop higher levels of structural complexity and accompanying increased levels of habitat diversity through natural disturbance processes. While individual tree-sized gaps will occur through tree death, or ice/wind damage, these gaps will fill in from the side-growth of adjacent trees; few gaps large enough to provide quality early-successional forb/shrub habitat will exist until these even-aged stands approach the maximum life-spans of the major tree species, and break up through the death of multiple trees at increasing frequencies. A large insect or disease outbreak, or a large disturbance such as a major wind event or fire, can also create early-successional habitat. Such events are not common, but may become more so with increasing threats from non-native invasive insects and diseases, and more frequent extreme weather events. Models of forest development in the Northeast generally predict that patches of 0-9 year old age class will comprise no more than two percent of the age class distribution under natural disturbance regimes (Lorimer and White 2003). Given that most stands in the project area are mature even-aged stands with a similar land use history, it is expected that less than two percent of the age class distribution will be in early-successional habitat resulting from natural disturbance over the short and mid-term. Once the stands start to break up, it is expected that more than two percent of the age class distribution will fall within the regenerating age class until the stands develop uneven-aged characteristics. The legacy of land use and abandonment in the project area, along with historical land management but no future vegetation management, will force increases in habitat diversity to wait for natural ecosystem processes to drive stand development over the course of many decades.

The lower levels of habitat diversity in the short and mid-term under Alternative A would support generally lower diversity of wildlife, with varied benefits for wildlife species associated with these habitats. Those species that occur in mature and old forest habitats would benefit. Those species that require early-successional habitat would continue to find limited habitat in the project area and, at least for the short and mid-term. This alternative would contribute to the trend of decreased early-successional habitat and associated wildlife species.

In summary, as a result of Alternative A, regenerating age class objectives for the various forest communities defined by the HMU analysis would not be met. Forested stands would continue to age, continuing over the short and mid-term the trend of imbalance in age class. Associated with this imbalance are lower levels of habitat and age class diversity, exemplified by less stand structure (less complex or missing vegetative layers of canopy, midstory, shrub/forb, and ground/woody debris layers), and a preponderance of even-aged mature and older northern hardwoods over all other forest types and age classes. Between 50 and 100 years from now, the existing even-aged structure will start to break down as more trees age and start to die. During this time there may be a pulse of early-successional habitat in response to large gaps made by dead and dying trees, which would provide benefits to species associated with this habitat. Over the long-term, the forest structure would begin to become more uneven-aged overall, and may start to reflect expected age class distributions under natural disturbance regimes with a high proportion in old uneven-aged conditions (Lorimer and White 2003).

Permanent Upland Openings

Alternative A would not create new permanent upland wildlife openings. None of the old openings proposed for restoration would be treated. The Forest Service likely will continue to maintain the hayfield and meadow in their current conditions, although this would require separate, site-specific

NEPA analyses to authorize such maintenance. Maintenance of 32 acres of powerline corridors and ski trails in the project area would continue over the short and mid-term under provisions of the SUPs that apply to them. On the GMNF regeneration of trees is abundant and vigorous, and within about 10 years after the last treatment the openings that would not be restored would begin to disappear as they transition into forested habitat types. Over the short and long-term, then, NFS lands within the project area would only include 32 acres of moderate-sized upland openings, all of which are habitats of limited value to wildlife (powerline corridors, ski trails), representing 0.2 percent of those lands. The HMU composition objectives of two to three percent (Table 3.3-1) for this habitat would not be met. Over the mid-term, the only additional opening habitat likely to occur would be small ephemeral openings resulting from natural disturbances such as windthrow, flooding, insects, and disease. As mature and old forest stands start to break apart over the long-term, more opening patches would appear in the project area, generally in a range of sizes but likely to be heavily weighted toward small patches of less than an acre in size (Lorimer and White 2003).

Larger windstorms and ice storms can create larger opening patches, but their frequency is unpredictable. Models of forest development and stand history suggest that only about 1 to 3 percent of old forest under natural disturbance regimes would be within the 0 to 15 year old age class (Lorimer and White 2003). In addition, the types of openings provided by regenerating forest are different than those dominated by grasses, shrubs, and scattered small trees, and are used by different wildlife species (DeGraff et. al. 2006). Most openings created by natural disturbances in this part of the Green Mountains would be dominated by regenerating forest. Opening habitat under Alternative A would therefore be of very limited extent, generally small in size, temporary, and not very diverse when compared to the other Alternatives. These characteristics limit the diversity of wildlife species likely to use this habitat, and likely to occur in the Dorset-Peru Project Area as a result.

Deer Wintering Areas

Under Alternative A, with no vegetation management actions taking place in the project area, the condition and use of deer wintering areas on NFS lands would continue to be low and declining. Additionally, the small and declining component of regenerating age classes on NFS lands would not provide browse for deer that occupy deer wintering areas on non-NFS lands. Overall, winter habitat conditions for deer within the project area would be expected to decline over time.

Apple Tree Management

Under Alternative A, the proposed release and pruning of apple trees within opening and forested stands would not occur. As a result mast production for most apple trees in the project area would continue to decline adding to a decrease in availability and diversity of wildlife food sources within the project area. Eventually, many or most of the apple trees currently overtopped in forested stands would die. The Forest Service could authorize release and maintenance of apple trees within the project area, but this would require separate, site-specific NEPA analyses.

Down Woody Debris

Alternative A would not enhance down woody debris quantities in upland parts of the project area. Over the short and mid-term, NFS lands in the project area would continue to have a limited quantity of down woody debris due to the mature age class of forested stands. Around a quarter of these lands are in the old age class, but only around 320 acres are over 150 years old, and none are 200 years old or older. For three-quarters of the NFS lands in the project area, individual trees would continue to occasionally die due to natural disturbances, such as disease or windthrow, adding small amounts of woody debris to the forest floor. It would require large wind events, large scale insect or disease outbreaks, or substantially older forests to generate more abundant quantities of down woody debris.

Bat Hibernacula

Alternative A would not have any impacts to the bat hibernacula at Mount Aeolus or at Skinner Hollow (which is outside the project area), or to bat habitat within 5 miles of these hibernacula. As noted under the Affected Environment section, suitable bat foraging and roosting habitat is "under-occupied" in the project area due to severe population declines for resident, hibernating bat species. Therefore, any changes in bat foraging or roosting habitat would be inconsequential relative to bat hibernacula and to bats themselves.

3.3.4.2 Alternative B – Proposed Action

Alternative B proposes 2,077acres of vegetation management activities that would increase habitat diversity compared to the Alternative A.

Composition

Table 3.2-3 compares current composition with that expected in the short-term (2019), mid-term (after 50 years), and long-term (after 100 years) as a result of the actions taken under Alternative B.

Table 3.3-3: Comparison of existing composition with anticipated composition resulting from implementation of Alternative B in the short-, mid-, and long-term.

Habitat Type	Existing Habitats		Anticipated Habitats					
			In 2019[1]		After 50 Yrs.[2]		After 100 Yrs.[2]	
	acres	%	acres	%	acres	%	acres	%
Northern Hardwoods	11,589	78	11,279	77	9,503	64	7,951	54
Mixedwood	1,303	9	1,346	9	3,061	21	4,608	31
Softwood (spruce/ fir and hemlock/ white pine)	642	4	650	4	1,174	8	1,602	11
Aspen/Birch	850	6	858	6	472	3	49	<1
Oak	125	1	153	1	76	<1	76	<1
Open Uplands	67	<1	290	2	290	2	290	2
Non-forest Wetlands, Water	197	1	197	1	197	1	197	1
Total	**14,773**	**100**	**14,773**	**100**	**14,773**	**100**	**14,773**	**100**

[1] These habitat acres assume that treatments to create openings, aspen, and oak habitat from other habitat types are successful; that unmaintained openings transition to forest; that some hardwood, oak, mixedwood, and softwood stands over 150 years old have transitioned to other types based on ecological tendencies, that some old paper birch stands on unsuitable lands will have transitioned to longer-lived habitat types based on ecological tendencies, and aspen, birch, and opening stands on suitable lands are maintained.
[2] These habitat acres make the same assumptions as for habitats at 2019; in addition, they assume that treatments to enhance softwoods, such as selection treatments in some hardwood and mixedwood stands, will have led to transitions to mixedwood and softwood types.

This analysis assumes that by 2019, all treatments that were meant to convert a stand immediately from one habitat to another would be evident, such as conversions to openings and aspen. This would be validated by stocking surveys that take place within five years of harvesting, and document the density of seedlings and saplings of the tree species that dominate the stand. After 50 and 100 years, treatments to enhance softwoods in hardwood and mixedwood stands are assumed to have resulted in conversions of these stands to mixedwood and softwood habitats. For all future projections, it is assumed that most hardwood, oak, mixedwood, and softwood stands older than 150 years that have not otherwise been treated for conversion to another habitat type, have transitioned through natural succession to habitats expected at these sites based on their ecological tendencies. It is assumed for the birch stands on lands unsuitable for timber management that they will transition

to an ecologically-suitable habitat at 130 years or older. These assumptions are based on research indicating that transitions of even-aged stands to uneven-aged conditions start at about 150 years for the longer-lived habitats (Lorimer and White 2003), and that during those transitions the softwoods expected to be resident in the understory would start moving into the overstory as the stands break up. This would be the earliest that these transitions would be expected, so these changes may be overestimated, particularly for hardwoods transitioning to mixedwood or oak/hardwoods transitioning to hardwoods. The assumptions about paper birch transitions are based on observations in the field and were made by adding 50 years to the minimum age of the old age class. Since paper birch is a shorter-lived species, these projections are considered more reliable. It is also assumed that openings and aspen-birch stands on suitable land would continue to be managed for those habitats based on the HMU objectives.

Hardwood, Mixedwood, Softwood: Increasing the relative abundance of softwood and mixedwood types compared to northern hardwoods would take many decades to achieve, and for the most part would occur through natural succession. However, some kinds of vegetation management activities can help to accelerate these natural changes. Single tree and group selection treatments are proposed on 229 acres, of which 103 are hardwood stands on sites with ecological tendencies toward mixedwood habitats. The remaining 126 acres are mixedwood stands with a strong softwood component. One objective of selection harvesting in these stands is to target softwood regeneration where it occurs for release by removing competing mature hardwood trees. These actions would increase the proportion of softwood trees in many stands, and accelerate their natural conversion to mixedwood and softwood habitat types. After 50 years Table 3.3-3 shows a reduction in northern hardwoods and a doubling of mixedwood and softwood composition. While much of this change in composition would be a result of natural succession, these treatments to enhance softwoods have the potential to contribute four to five percent toward this increase in mixedwood and softwood composition and away from northern hardwood dominance over the mid-to long-term.

Aspen-Birch: Over the next 50 years, close to half of the paper birch habitat within lands unsuitable for timber management would decline and transition through natural succession to other longer-lived habitat types. What would remain of the aspen-paper birch habitat are those paper birch stands that are currently in the young or mature age class, and any newly created stands of aspen and/or paper birch. Alternatives B proposes to increase aspen-paper birch habitat by clearcutting three stands that have aspen clones in them. There are enough of these clones scattered about the stands that they are likely to dominate the regeneration through root suckering. About 49 acres of new aspen habitat would be created this way. In addition, around 44 acres of thinning and improvement cuts are proposed in 4 stands that would release aspen clones and create a more vigorous aspen component in the stand. In another 30-40 years, if successful, these stands may have enough aspen in them to be converted to aspen and move the project area closer to the composition objectives for this type. After the treatments are implemented by 2019, the proportion of aspen-birch would remain well above the HMU objectives because most of the paper birch stands on unsuitable lands would not have shifted to other types yet. After 50 years, about half of the paper birch on these unsuitable lands would have transitioned to other types, bringing the total aspen-birch habitat to about 472 acres or three percent, still slightly higher than objectives. After 80 years, the youngest paper birch stands would have transitioned to other habitat types, so that over the long-term, if no new additional habitat is created, aspen-birch habitat in the project area would fall to 49 acres, representing only the aspen habitat created under this alternative. This is well below the desired minimum HMU objective, and probably not much better in the long-term than Alternative A, which is governed by natural disturbance regimes. This alternative improves on Alternative A in the short and mid-term by providing aspen habitat that does not currently exist in the project area, and by enhancing aspen clones through thinning and improvement cuts, which is intended to create additional aspen habitat. Without additional future aspen habitat management however, it is unlikely that this alternative would meet the HMU objectives for this habitat over the long term.

Oak: There are over 1,300 acres of oak, hardwood, and mixedwood habitat in 28 stands that are known to or may include a red oak component. All of this habitat is either within the Escarpment MA or nearby. Of this habitat, only 125 acres (10%, 3 stands) have enough red oak to be considered as having a significant oak component (over 50% of the basal area is red oak). These stands are not proposed for treatment due to shallow soils and steep terrain. In the remaining habitat, oak does not or is not likely to exceed 20% of the basal area, making it a minor or incidental component. Of this remaining habitat, about 60% (almost 800 acres)is either documented or suspected as unsuitable for timber harvesting due to steep terrain and shallow soils. This leaves around 30% or around 400 acres of habitat where management can potentially increase oak abundance.

In stands where oak is a minor component, most of the oaks are scattered, mature overstory trees, generally larger than the remaining tree species in the stand; very few young oaks were observed during field surveys, although first year seedlings were often abundant along trail edges and in open areas. It is clear that the problem is not regeneration of oak, but in getting oak to survive long enough to grow into saplings and pole-sized trees. Hardwood species such as red maple, sweet birch, and beech are very competitive with red oak on the drier, shallow, west-facing slopes of the Escarpment MA, while sugar maple and white ash will out-compete red oak on the more mesic benches and saddles of this landscape. Without fire, major wind or ice disturbance, or other cultural treatments, red oak seedlings are shaded by these competing hardwoods, and few survive. Many red oak seedlings also succumb to deer browsing, as they are favored by deer during the winter.

Alternative B proposes treatments in 13 stands (360 acres) with an oak component in which part of the silvicultural objective will be to increase the abundance of red oak in the stand. This will be achieved by providing opportunities for oak regeneration through creation of openings in the canopy that allow oak seedlings to become established, as well as by the release of existing oak seedlings, saplings, and small trees. Treatments include one shelterwood with reserves (Comp 59/ Std11), one two-cut shelterwood (Comp 59/ Std 15), six single tree selection harvests (Comp 57/ Stds 1, 2, and 10; Comp 58/ Std 22; Comp 59/ Std 15; Comp 63/ Std 30), five thinnings (Comp 58/ Std 15; Comp 59/ Stds 16, 18; Comp 60/ Stds 36, 37), a group selection harvest (Comp 59/ Std 16), and an improvement cut (Comp 61/ Std 37). Additional cultural treatments, such as planting, timber stand improvement, and/or fire would be implemented if conditions for oak regeneration are met and such activities could help to enhance the oak. In all of these stands oak represents no more than a quarter of the basal area of the stand so these treatments are not likely to result in a conversion to an oak stand, but rather would continue these stands as mixed northern hardwood-red oak stands or stands of various types with an oak component. In the shelterwood with reserves stand, there is potential to create enough of an oak mix for this to be considered oak habitat for composition objectives. The objective of increasing the abundance of oak in these stands, if successful, is intended to provide future opportunities to work toward conversion of these stands to oak-dominated habitat.

Overall, Table 3.3-3 shows a slight increase in oak habitat over the short-term on the assumption that Stand 11 in Compartment 59 is successful enough in increasing oak regeneration to be considered oak habitat. This increase is slightly higher than objectives, although the objectives are at the low end of the overall Forest-wide composition objective range due to the small quantity of this habitat in the project area. If this treatment is successful, the FS may increase the HMU objective for this habitat. Over the mid- and long-term, however, oak habitat abundance would decline by half and would no longer meet HMU objectives. As under Alternative A, hardwood and mixedwood stands with an oak component that are neither suitable for nor treated with a timber harvest, would slowly lose their oak component without disturbances of large enough size and intensity to create openings where red oak seedlings can compete. Even then, without regular disturbances like fire, most of these seedlings would eventually die due to shading by other hardwoods. Alternative B also proposes to evaluate the potential to manage permanent upland wildlife openings within the Escarpment MA with methods that can create oak-dominated shrublands (e.g. fire at certain intensities and intervals). Such habitats are uncommon on the Forest, and would add to wildlife habitat diversity. If oak shrubland habitat can be

successfully created over a 20-30 year period, some of this habitat could eventually be allowed to revert back to a forest habitat dominated by oak, thus providing another treatment option for creating oak habitat.

Age Class

Table 3.3-4 provides a summary of the age class distribution under Alternative B within the Dorset-Peru project area.

Table 3.3-4: Comparison of the existing age class distribution of forested stands with anticipated distribution in 2019 when vegetation treatments will have been completed.

Age Class (includes all forested habitats)	Existing Condition (all)		2019 Condition (all)		Existing Condition (suitable[1])		2019 Condition (suitable[1])	
	acres	*%*	*acres*	*%*	*acres*	*%*	*acres*	*%*
Regenerating (0-9 years)	0	0	517	4	0	0	517	13
Young	1,419	10	1,279	9	994	24	1,016	26
Mature	9,783	67	8,853	62	2,655	66	2,018	51
Old	3,307	23	3,636	25	387	10	418	10
Total	**14,509**	**100**	**14,285**	**100**	**4,036**	**100**	**3,969**	**100**

[1]Lands suitable for even-aged timber management.

Alternative B would create 517 acres of regenerating age class through shelterwood, seed tree, and clearcut harvesting. The regenerating age class would meet HMU objectives by 2019, when this project is expected to be fully implemented (Table 3.3-2). This alternative would also create 107 acres of permanent upland opening habitat in the Remote Wildlife Habitat MA to be managed for early-successional habitat on a 21-year rotation (see Permanent Upland Openings). Assuming all of these acres are harvested by 2019 to initiate the rotation schedule in an economical fashion, the addition of these 107 acres of habitat to the 517 created by forest management would create 624 acres of this habitat in total across the project area, at the high end of the HMU objectives. The addition of abundant and well-distributed early-successional habitats created in this alternative would provide an increase of potential territories for wildlife species associated with this habitat. The regenerating age class is by definition ephemeral, and so after 10 years this age class would transition to the young age class. Late stage early-successional habitat would still exist during the early years of the young age class, but after 20 years even this would become unsuitable for species that require this habitat. Over the mid- to long-term, if no additional forest management is conducted to regenerate forested stands, the 107 acres of upland opening managed for early-successional habitat, along with habitat created through natural disturbance events, would be what remains to meet this habitat need. Overall structural diversity would be improved over the mid- and long-term, however, because a new cohort of stands of similar age would have been created that would transition through the age classes, replacing the current young stands when they transition to mature, and replacing the mature stands as they transition to old.

Mature and old habitats would continue to account for at least 80 percent of all forested lands and at least 60 percent of suitable forested lands (Table 3.3-4) due to natural successional shifts of several hundred acres of young to mature and mature to old age classes by 2019. Alternative B would make a large dent in the existing bubble of mature age class in the area. Within suitable lands, the mature and old age classes are reduced collectively by about 15 percent from existing conditions due to the vegetation management proposed and resulting increases in regenerating age class and openings. As a result, all age classes on suitable lands fall within the HMU objectives for those age classes across habitat types, and the overall general age class structure in the project area would be much more in balance than under Alternative A. None of the stands over 150 years old are managed under

this alternative, allowing them to continue to develop late successional forest characteristics driven by natural disturbances.

Age class structure within individual habitat types would take longer to bring into balance while forest management and/or natural succession works to shift composition toward HMU objectives. For instance, aspen habitat would be created under this alternative where none currently exists; this means that over time, this cohort of aspen habitat would exist as one age class, having regenerated at the same time. Unless more aspen habitat is created within the next 10 to 20 years to replace the regenerating age class, the age class diversity for this habitat over the mid- and long-term would be low, consisting of only one age class. It would take several decades of forest management at regular intervals to re-balance age class distribution to within habitat-specific HMU objectives in this area (Burbank 2011). Over the mid- and long-term, without additional pulses of regenerating age class from forest management, age class distribution would shift away from the HMU objectives and more toward that of Alternative A and late successional uneven-age forests (Lorimer and White 2003). Given the continued substantial amount of mature and old age classes, those species associated with mature closed canopy forest would find abundant suitable habitat, and would continue to do so over the long-term. The project area would remain overall in a closed-canopy mature landscape; the regeneration harvests and openings are small to moderate in size and are scattered throughout the project area and thus would have a minor impact on the mature forest landscape.

Permanent Upland Openings

Alternative B assumes, as in Alternative A, that permanent upland openings associated with powerline corridors and ski trails (32 acres) would be maintained under SUPs over all timeframes. It also assumes that the 10 acres of rock outcrop habitat will remain open over time. The creation and restoration of an additional 250 acres of upland opening habitat in 17 patches under this alternative would more than quadruple the acres of this habitat on NFS land over the short-term, and would approach the low end of the HMU objectives for this habitat (Table 3.3-3). If maintained as proposed, this habitat would continue to provide greater habitat diversity than Alternative A to the larger project area landscape over the mid- and long-term.

About 143 acres of permanent upland opening habitat (11 stands) typically would receive one to three treatments, such as mowing, hand cutting and burning, over a period of 5 to 7 years with some stands receiving multiple treatments in the same year. This management approach encourages growth of grasses and forbs, and creates productive and diverse meadow and shrubland habitat for many species, including neotropical migratory songbirds and small mammals. The remaining permanent upland openings (107 acres, 6 stands) located within the Remote Wildlife Habitat MA, would be managed for late-stage early-successional habitat, which would include more shrubs and small trees. These openings would be managed so that at any given time after the first 21 year cycle, two openings would exist in each of three age classes: 0-6 years old; 7-13 years old; and 14-20 years old. Each opening would be restored during its twenty-first year.

Alternative B provides more diversity than Alternative A in terms of opening size by creating a mix of sizes of new permanent upland wildlife openings. While under the current condition five of the seven existing openings are less than 4 acres in size, under this alternative permanent upland openings would range from 7 to 19 acres in size. The addition of larger opening sizes would provide habitat for bird species that depend on larger openings, such as bluebirds and potentially bobolinks. Openings greater than 4 acres have been found to provide habitat for a large diversity of bird and other wildlife, including many neotropical migratory birds that are considered to be interior forest species (King et.al. 2009; Schlossberg and King 2008; Schlossberg and King 2007). In addition, including patches of shrub and trees, mast trees, apple trees, and snags in permanent upland openings, as per Forest Plan direction (USDA Forest Service 2006a: p. 27), increases the diversity of habitats within the opening. This diversity would improve cover, food, and breeding opportunities for a wide range of

wildlife species. Proposed regeneration cuts would not have a negative impact on interior forest bird species in the project area, as extensive mature forest habitat would continue to be available.

Deer Wintering Areas

Proposed actions under Alternative B include 467 acres of shelterwood and seed tree harvests and 49 acres of clearcut to regenerate hardwood and mixedwood stands. Regeneration in these stands primarily would be hardwood, which would provide browse for deer during the winter. The areas predominated by softwood regeneration could eventually provide winter cover. Alternative B also would include 224 acres for clearcut conversion to permanent opening and 26 acres of restoration and maintenance of existing openings. Although not specifically designed for the benefit of white-tailed deer, these openings do provide browse and grazing for deer. Of the proposed treatment acres, approximately 53 acres of shelterwood and 34 acres of clearcut conversion to permanent opening are within or touching mapped DWAs. An additional 112 acres of proposed shelterwood treatments are within about one mile of mapped DWAs. White tailed deer would benefit from increased availability of browse in proximity to deer wintering (cover) habitat, as well as across the project area as a whole.

Apple Tree Management

Alternative B would provide continued apple tree production in four stands within the project area, with the potential for more if additional apple trees are found in stands planned for treatments. This alternative would perpetuate and improve an existing wildlife food resource that would otherwise decline and be lost over time under Alternative A.

Down Woody Debris

Alternative B would include placement of down woody debris in and near select historical sites such as foundations of homes or mills, stone walls, charcoal kilns, etc. (see Section 3.13 Heritage). These activities would improve the diversity of nesting, cover, and foraging habitat within the project area, particularly for small mammals, reptiles, and amphibians. These activities provide additional habitat diversity over the short-term when compared to Alternative A. Over the mid- and long-term, there would not be a noticeable difference between Alternatives A and B. Within these timeframes, much of the forest within the project area will have transitioned toward late successional and uneven-age conditions, down woody debris will have increased as trees die, and woody debris placed by this project would have decayed beyond recognition.

Bat Hibernacula

Alternative B would not have any impacts to the bat hibernacula at Mount Aeolus or at Skinner Hollow (which is outside the project area). Prior to WNS analysis of bat habitat considered changes in distribution and abundance of foraging and roosting habitat, particularly within five miles of these hibernacula. As noted previously under the Affected Environment section, suitable bat foraging and roosting habitat is “under-occupied” in the project area due to severe population declines for resident, hibernating bat species. Therefore, any changes in bat foraging or roosting habitat would be inconsequential relative to bat hibernacula and to bats themselves. Under the provisions of the Forest Plan (USDA Forest Service 2006a: p. 28), all timber harvest from April 15 through October 30 within five miles of a known Indiana bat hibernaculum shall be in accordance with provisions of a Forest Service management plan for that hibernaculum. These hibernaculum management plans are being developed in collaboration with the Vermont Department of Fish and Wildlife and will be approved by the US Fish and Wildlife Service prior to any timber management activity within the five-mile buffer areas.

3.3.4.3 Alternative C

Under Alternative C, five stands would not be treated as proposed under Alternative B, resulting in a reduction in shelterwood harvest of 44 acres, a reduction in single tree selection harvest of 31 acres, and a reduction in thinning of 29 acres.

Composition and Age Class

The effects of this alternative on composition objectives are identical to those described for Alternative B for all habitat types except oak. With that exception, none of the changes affect any stands in such a way as to change their composition, or their ecological potential to transition to a different or desired composition. None of the stands involved had aspen or softwoods that are targeted for enhancement, nor do they include any stands identified for conversion to permanent upland openings.

This alternative will lead to an overall smaller increase in oak abundance in the project area when compared to Alternative B due to fewer stand acres receiving oak enhancement treatments (275 acres of enhancement compared to 360 acres in Alternative B, a 24% reduction). Four of the five stands eliminated under this alternative (Comp 59/ Stds 15, 18; Comp 60/ Stds 36, 37) have a small oak component targeted for enhancement under Alternative B, which would not be released or otherwise encouraged to increase in abundance under this alternative. The remaining stands with an oak component would be treated as under Alternative B with the same effects anticipated. Long-term effects on oak habitat are expected to be nearly identical to those described for Alternative B. The loss of opportunity to enhance oak in four stands will mean a smaller number of potential mature trees in the future to provide seed and mast in those two compartments. Although this difference would be small in the larger context of the Green Mountain Escarpment, it will be important as oak habitat becomes rarer, given overall successional tendencies without future management or disturbance. If climate change provides oak a competitive advantage, which some believe is likely, then under Alternative C it will take a bit longer for these four stands to shift to oak dominance as they will not have had the head start they would receive under Alternative B.

The primary difference between Alternatives B and C in terms of age class is the reduction in shelterwood harvesting. Alternative C would produce 44 fewer acres of the regenerating age class, for a total of 473 acres in 2019, a reduction of less than a half a percent overall all lands, and one percent within suitable even-age lands. These acres still fall well within the age class objectives of 198 to 698 acres defined by the HMU analysis. The difference between the two alternatives is negligible in terms of providing the structural diversity currently missing from the project area.

Other Wildlife Habitat Features

The effects of this alternative on other wildlife habitat features would be identical to those described for Alternative B. Proposals regarding permanent upland openings, deer wintering areas, apple tree management, down woody debris, or bat hibernacula are not different under this alternative.

3.3.5 Cumulative Effects

The analysis area for cumulative effects consists of NFS and private lands within the Dorset-Peru Project Area. This area (including private lands) is analyzed because it is the context for the HMU analysis which is used to apply Forest Plan composition and age class objectives to the project level. The lands suitable for timber harvesting that could affect composition and age class within the analysis area are within the Diverse Forest Use MA (MA 3.1), the Remote Wildlife Habitat MA (MA 6.3) and the Green Mountain Escarpment MA (MA 8.5), as well as some forest lands in state ownership at Emerald Lake State Park, and forest lands in private ownership, particularly those enrolled in Vermont's Use Value Appraisal program (also known as the Current Use program).

The cumulative effects analysis considers activities approximately 10 years past and 10 years into the future. A ten year time frame was selected because 10 years represents the length of time after a stand is harvested when it is considered to be in the regeneration (0-9 years) stage providing early-successional habitat. This time frame is key also to initiating trends and changes in overall composition and age class distribution. The creation of the regenerating age class requires the reduction of acres in another age class, usually the mature or old age class, and it also initiates changes in composition through the creation of openings and aspen habitat. Other activities that may affect age class and composition are not expected to show results for several decades, and so are beyond the foreseeable future.

Historically across the analysis area landscape, there was a much greater proportion of red spruce relative to northern hardwoods. Much of it was harvested during the nineteenth and early twentieth centuries, leaving the area predominantly in northern hardwood forest existing today (Burbank 2011). Most of these hardwood forests are of similar age, having regenerated into abandoned agricultural fields or after logging around the turn of the twentieth century. As a result of these historical changes, the analysis area is dominated by large blocks of mature and old northern hardwood forest habitat, much of which is protected by management area direction within the Big Branch and Peru Peak Wildernesses, and within the Remote Backcountry Forest MA, all in the northern portion of the project area. Development and agriculture are concentrated in the Vermont Valley and the Mettawee River valley, and that is where most of the remaining open land is found. This land has value for species of open and mowed fields and cultivated lands, although not for species that prefer shrubland and early-successional forest habitat.

Currently, there is very little suitable early-successional habitat within the analysis area on NFS and private lands. Two-thirds of the land in the Dorset Peru Project Area is in private or state ownership. On private and state lands, recent harvesting is limited, with selection harvesting and thinning being the most common silvicultural treatments, although some shelterwood harvesting does occur (C.Stone, personal communication, October 24, 2011; R.Kelley Jr., personal communication December 14, 2011; State of Vermont, Agency of Natural Resources, Department of Forest, Parks, and Recreation, 2011). . A review of the National Land Cover Datasets from 2006 and 2001, and the Land Use Land Cover Dataset for 1996, (available at: http://www.csc.noaa.gov/crs/lca/northeast.html) show a small but increasing amount of land variously described as early-successional habitat (scrub/shrub, shrubland, brush, transitional) dominated by shrubs and small trees. In 1996 this land amounted to 90 acres out of the 41,699 acre analysis area; in 2001 it had doubled to 180 acres, and by 2006 it had reached around 230 acres. It appears that the bulk of the increase is due to shifts from forested habitat to shrubland habitat. While this increase is substantial, by 2006 it still represented only one half of one percent of the analysis area. With the increasing conversion of fallow land to forest, farm, or development, forest management is becoming increasingly important as the primary means of creating early-successional habitat.

The last harvesting to occur on NFS lands within the project area was the Mad Tom timber sale, completed in 2001. Most of the harvesting consisted of overstory removals from previous shelterwood harvests in the 1980s and 1990s. Most of this activity was intended to and succeeded in perpetuating the current composition of the analysis area, and did not contribute toward composition goals as identified in the HMU analysis (e.g. conversion of hardwood stands to mixedwood; creation of aspen, oak, and upland opening habitat). Clearcuts and shelterwood harvests have been done periodically over the past 40 years, with the bulk of the acres being cut 28 to 39 years ago. Since then, cuts have been more sporadic and have amounted to generally less than 50 acres in any given year. Twenty-seven acres of new shelterwood harvesting created early-successional habitat 14 years ago; this stand is now part of the young age class, although it still provides some late-stage early-successional habitat. Within the ten-year timeframe being considered, all of the regenerating age class and most of the early-successional habitat resulting from these past harvests has been lost to

natural succession. The only timber harvests planned for the next 10 years within the analysis area on NFS lands are those associated with this project.

Discussion with the Bennington County Forester and review of selected Use Value Appraisal Forest Management Plans for adjacent private lands indicates some land management has occurred near and adjacent to NFS lands in the analysis area (C.Stone, personal communication October 24, 2011). . However the amount and scale of land management on private lands within the analysis area has been low over the past 10 years. An oak management harvest conducted on 31 acres in Emerald Lake State Forest in 2008 is the extent of recent harvesting on state lands (State of Vermont, Agency of Natural Resources, Department of Forest, Parks, and Recreation, 2011) . Current harvesting on private and state land is selection cutting, while future plans over the next 10 years include 99 acres of shelterwood harvesting on private lands (C. Stone, personal communication, October 24, 2011; R. Kelley, Jr., personal communication, December 14, 2011). Natural disturbances, such as windthrow and heavy ice storms, can also create early-successional habitat and initiate shifts in composition. Effects of the 1998 ice storm have become muted and any early-successional habitat created as a result has transitioned into the young age class. This ice storm has helped some stands move toward a greater softwood composition because it released young softwoods from paper birch overstories. Since then, only small disturbance events (windthrow, small ice events) are known to have occurred intermittently across the landscape, typical of northern hardwood forests. There have been no known occurrences of any moderate-sized early-successional habitat created within the past 10 years by natural disturbances.

Climate change research suggests that a warming climate would likely influence ecosystem composition and ecological processes over the long-term (see reviews in Millen 2009, Prout 2009, Colter 2009, Mattrick 2009, and Burbank 2010). Ecosystems are complex, and those complexities are manifest in the variety and sometimes contradictory observations and anticipated changes predicted by this research. It is unclear how climate change would ultimately influence individual species-site relationships, or the ability of species to compete for resources or respond to disturbances. Most scientists studying changes in vegetation composition and forest dynamics related to climate change acknowledge these difficulties and our limited knowledge in this area.

A review of this research indicates that within the 10-year period of this cumulative effects analysis, climate change is likely to have little if any measureable effect. Research into shifts in elevation zones of forest vegetation in New England suggests that some climate-related changes are occurring now in some areas (e.g. Beckage et al. 2007, Hamburg and Cogbill 1988) and not in others (e.g. Solomon and Leak 1994). There is research that suggests other factors such as substrate and land use history interact with climate and make it difficult to attribute ecosystem changes simply to climate (e.g. Lee et al. 2005). A comparison of ecological land types with current forest composition in the project area (Burbank 2011) suggests that the legacy of land use history and forest recovery is what is driving composition changes within the cumulative effects analysis window. There is no evidence to suggest that red spruce is declining in the project area beyond the decline initiated by selective harvesting of red spruce during the 19th century. There is evidence that red spruce legacy trees are regenerating successfully within expected elevation zones, including in areas that are currently hardwood-dominated, suggesting that red spruce would persist and expand in some areas. There is also strong evidence that even-age regeneration methods in mixedwood and softwood habitats (independent of climate change) will hasten a conversion to northern hardwood domination (Leak 1976). It is likely that this type of harvesting on mixedwood and softwood sites is a contributing factor in both the initial and continued reduced abundance of red spruce at middle and upper elevations on the GMNF, and is why the Dorset Peru management activities includes selection harvesting to favor softwoods on such sites. In spite of models suggesting that oak forests will become more prevalent in Vermont with climate change (Iverson et al. 2008b), there is clear evidence, from the field and research throughout the range of oak and in Vermont, that oak is not successfully recruiting into the sapling and pole size classes, due in large part to lack of the disturbances necessary for it to compete

with other hardwoods (Iverson et al. 2008a; Brose et al. 1999; Abrams 1992; Calfee 1990; Crow 1988; Nyland et al. 1982). Management strategies to encourage oak reproduction and recruitment can only help to facilitate the continuation of oak trees and their acorns in these ecosystems as they shift over time.

Conservation of, and management for, ecological diversity is fundamental to building resilience within ecosystems. As Aldo Leopold (1972) noted in *Round River*, "If the biota, in the course of aeons, has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering." Resilience of forest ecosystems will be critical to mitigating potential impacts of climatic change. This project proposes specific actions to enhance compositional and structural diversity within the Dorset Peru Project Area, consistent with objectives of the GMNF Forest Plan (USDA Forest Service 2006a). These actions will increase species and habitat diversity, and improve forest health, all of which will improve the resilience of ecosystems within the Dorset Peru Project Area.

It is clear that given past, present, and foreseeable future activities and events related to habitat composition and age class structure, Alternatives B and C provide a substantial increase in habitat diversity when compared to Alternative A. With the low proportion of early-successional habitats across the Dorset-Peru landscape, the increase that would result from either of these alternatives would raise the proportion of this habitat to close to two percent, more than three times what exists now. The work proposed in these alternatives to enhance oak would contribute cumulatively to that being done at Emerald Lake State Park so that oak forest habitat would be enhanced in the analysis area, providing more benefits to associated species than without these federal actions. The work proposed under both alternatives to enhance softwoods to accelerate shifts to natural communities more ecologically suited to these sites will also contribute to habitat diversity in the landscape, which is dominated by and generally managed for hardwoods.

3.4 Timber Management and Economic Analysis

3.4.1 Issue Statement(s)

No major issues were identified with this resource topic.

3.4.2 Direct and Indirect Effects Analysis Area

The direct and indirect effects analysis area for timber and economic related resources is Bennington, Rutland, Windsor, and Windham Counties, Vermont. From an economic and social standpoint, this area is closely connected to the Towns of Peru, Dorset, Manchester, and Winhall. The effects on forest product related companies are far reaching. Harvested timber from the Dorset Peru project is likely to be transported to various locations in Vermont, New York, New Hampshire, and Canada.

3.4.3 Affected Environment

Timber Management

Existing forest stand conditions within the Dorset Peru analysis area range from a few well stocked seedling-sapling stands to mostly mature and over mature hardwood, mixedwood, and softwood stands. Here, mortality to large trees from old age, insects, disease, competition, wind throw, and ice damage is taking its toll on the timber resource. Stands identified for treatments have a stand condition wherein they are either overstocked; have a preponderance of low quality trees; have high risk conditions due to weather, insect and disease impacts; or could contribute towards meeting composition and age class objectives on suitable timber lands.

The analysis area has an extensive system of forest and town roads, skid roads, and log landings that provide access for timber, other resource management, and public use. Forested stands in the Dorset Peru analysis area have been managed periodically since their acquisition to maintain proper stocking and maximum growing conditions for production of high quality sawtimber and wildlife habitat. From the 1960's through the late 1970's, even-aged management was used as the primary silvicultural system to regenerate hardwood, mixedwood, and softwood forests. Since then, uneven-aged management has become more widely practiced to maintain visual quality objectives along roads, trails, and other visually prominent locations. The implementation of these two silvicultural harvest systems has created the current forest conditions and road and skid trail density that exist in the analysis area today. Refer to Habitat Diversity, Section 3.3 of this EA for more information regarding the existing forest habitat composition and age class distribution within the Dorset Peru analysis area.

Timber Economic Analysis

National Forest lands are an integral part of the economic life of local communities, as a destination point for outdoor recreation, as a scenic backdrop for commercial and recreation activities on private and non-federally managed lands, and as employment opportunities in forest management and the wood products industries. Local employment is largely centered on retail and service sectors, though there is lesser but substantial employment in light manufacturing, construction, and forest products industries. Additionally, local tourism is based around destination resorts such as Bromley Mountain Ski Resort, Stratton Mountain Ski and Summer Resort, motels, hotels, bed and breakfast inns, restaurants, stores and access to National Forest administered lands.

One of the ways the Green Mountain National Forest contributes to the economic well-being of Vermont is by serving as a source of material for the forest products industry. Through collaboration with the State of Vermont, regional organizations, and towns, activities such as those proposed in the Dorset Peru IRP contribute toward sustaining the character of Vermont's rural landscape and fostering vibrant local communities and economies. To this end, there are two primary goals associated with timber economics in the Forest Plan. One is to provide for a sustainable supply of forest products by providing high-quality sawtimber and other wood products for local economies and by providing sustainable opportunities. The other goal is to support regional and local economies through resource use, production, and protection (US Department of Agriculture 2006). Timber harvesting on the Green Mountain National Forest (GMNF) is and has been an established economic activity in Vermont. Under Forest Service administration, modern timber sale programs and timber stand management on the National Forest began in the 1950's with the emergence of second growth forests that had been extensively cutover around the turn of the previous century. Sustained timber harvesting today remains an important contributor to local economies in communities of the GMNF.

Since local wood manufacturers and sawmills rely on a steady and predictable supply of raw materials, product flow from National Forest timber sales is in demand and welcomed by the businesses and related companies, especially when sales from state, private or industrial forest lands are low. There is also an active and growing interest in use of wood biomass from the forest as a fuel source and alternative to fossil fuels in and around the State of Vermont.

The Allowable Sale Quantity (ASQ) for timber harvest under the 2006 Forest Plan is 19.7 million board feet (MMBF) per year (US Department of Agriculture, Forest Service 2006a p.D-3). Prior to about 1990, the GMNF offered roughly 10 million board feet of timber per year in commercial timber sales. During the 1990's, the Forest offering dropped to approximately 6 million board feet per year. From 2000 to 2003, no commercial timber was offered for sale while the Forest completed a Forest Plan Amendment to address Indiana Bat conservation issues. Beginning again in 2004, less than 2 million board feet was offered for sale, increasing to roughly 4 million board feet per year over the next

few years. Additional factors have influenced the overall reduction in timber offer and harvest levels, including cyclical poor markets for pulp or lower value material, appeals and litigation on timber sales and fluctuating funding and staffing levels (USDA Forest Service, 2012d).

In the past five years, the Forest has consistently sold between 4.5 and 5 million board feet of timber annually, providing a stable supply for the forest products industry. The high value timber harvested on the Forest supports employment in value-added wood processing facilities and workshops. Approximately half of timber sale contracts sold are stewardship contracts which allow the Forest to use timber revenue to directly fund restoration activities within a project, maximizing the economic benefits to local communities. In addition to timber, the Forest annually sells over 400 cords in personal use firewood permits and administers a maple tapping program.

There has been a slow and steady decline in the number of sawmills operating in the State from roughly 250 in 1983 to just over 100 in 2008 (State of Vermont, Agency of Natural Resources, Department of Forest, Parks, and Recreation, 2008). As the number of sawmills decline, there is a point where there are too few to provide adequate market diversity for forest products. Likewise, the increased distance sawlogs must travel to mills increases the cost of transportation. There has also been a major decline in construction due to the recession of recent years. Vermont's secondary wood product manufacturing sector has also declined in the past few years with closure or scaled back manufacturing operations (State of Vermont, Agency of Natural Resources, Department of Forest, Parks, and Recreation, 2010).

Locally, discussions with GMNF timber purchasers indicate that there is a modest increase in the amount of timber being offered from private lands in the area. Some private sellers may no longer be willing to wait for higher markets due to the extended market down cycle. An increase in private timber sales may have contributed to a slight decrease in interest for GMNF timber. Although interest has declined slightly and sawtimber prices remain low, competition for GMNF timber remains strong (USDA Forest Service 2011a).

3.4.4 Direct and Indirect Effects

3.4.4.1 Alternative A – No Action

Timber Management

Alternative A would result in no vegetation management on National Forest Lands within the project area. Timber quality and forest health would continue to decline in stands identified for treatment acres of timber harvest. Stands identified for treatment would continue to decline in value. No wood products would be harvested to benefit the local economy or regional timber economies. There would be no management to improve stand quality, health or productivity.

3.4.4.2 Alternatives B and C

Timber Management

Refer to Appendix A, Table A-2 for the specific types and amounts of harvest treatments proposed for Alternatives B and C. These alternatives would improve stand conditions that would result in high quality sawtimber over time, as well as provide for pulpwood and firewood products. Approximately 17,273 CCF (hundred cubic feet) or 10.364 million board feet (MMBF) and 16,398 CCF or 9.839 MMBF of hardwood and softwood sawtimber, and pulpwood would be produced by the proposed harvest treatments for Alternatives B and C respectively. Alternative B proposes 2,047 acres of vegetation management activities that would improve forest health and timber quality. Under Alternative C, five stands would not be treated as proposed under Alternative B, resulting in a

reduction in shelterwood harvest of 44 acres, a reduction in single tree selection harvest of 31 acres, and a reduction in thinning of 29 acres. These stands would not be managed to improve forest health and timber quality.

Alternative C was developed as an alternative to address the issue of concern over log truck use of Bromley Forest and Chandolin Roads, which some of the local residents do not want. These town roads, located 4 ½ miles northeast of Manchester Center and along the southwesterly flank of Bromley Mountain, branch off north from Vermont Route 11/30 and are the primary access point for this part of the National Forest. Under this alternative, five stands would not be able to be feasibly accessed without the use of Bromley and Chandolin Roads and would be dropped from timber harvest consideration. The five stands that would be dropped under Alternative C include: C59 S15, C59 S18, C60 S35, C60 S36, and C60 S37.

Compartment 59, Stand 15 abuts the end of Chandolin Road. The trees within this stand are currently above suggested residual stocking which means the stand is starting to get crowded, which increases competition among trees for growing space and increases the chance for mortality. Mortality and crown dieback has occurred in the sugar maple, beech, black cherry, yellow birch, red maple, and red spruce overstory. The average diameter of the stand is 16” which is high compared to most of the forest. 38% of the stand has reached maturity (some of the older trees are approaching 150 years of age). Trees that have reached maturity will slowdown in growth and start to develop defect and disease, and eventually die as evidenced by tree mortality of 15% within the stand. Under Alternative C, as the stand continues to increase in age and more trees reach maturity, there will continue to be tree mortality without recouping the timber value. Currently, there is an opportunity to maintain and regenerate mid-tolerant to intolerant species such as black cherry (which are common in this stand) and oak through management. Under Alternative B, some of the mature timber would be harvested, creating growing space for new trees and reducing the competition for sunlight among the remaining trees. By removing the defective and diseased trees and leaving the healthy ones, the stand overall will be healthier. Under Alternative C, the stand will continue to get crowded and stagnate.

The east side of Compartment 59 Stand 15 was purchased in 2004 by the U.S. Forest Service and like the rest of the stand, was designated for management under the guidelines of the Green Mountain Escarpment, which emphasizes timber management to enhance regeneration of natural communities such as pine and oak. There are a small number of oak trees within this stand. Under Alternative B, silvicultural treatment will be designed to enhance the oak and promote regeneration. This can be done through timber harvest, opening the stand to increase the amount of sunlight reaching the forest floor, in combination with controlling hardwood competition by cutting hardwood saplings, use of prescribed fire, and planting if necessary, This stand is proposed for shelterwood harvest treatment on the west ½ of the stand and single tree selection on the east side of the stand. Both of which would help regenerate oak. Alternative B would move the stand towards desired conditions under the Forest Plan by restoring natural communities. Alternative C would forgo the opportunity to restore the oak community and would not move the stand towards desired future condition as directed by the Forest Plan. Leaving the stand in its current condition will prevent the oak from being able to regenerate as the oak needs sunlight and release from competition to successfully regenerate.

Under Alternative B, the shelterwood treatment would be modified (by retaining more trees) to maintain the “Retention” visual quality objective on the upper part of the ridge as viewed from Route 7. As such, this stand would be designated as a demonstration project and monitored to determine the effectiveness of this mitigation measure. Under Alternative C, this demonstration project would not occur and we would not learn the effectiveness of the proposed mitigation measure to ensure visual quality for future similar treatments.

Compartment 59, Stand 18 although younger than Stand 15, has trees over 100 years of age. It is fully stocked which means it has reached the maximum density this forest type can tolerate before the stand begins to decline in volume, growth, and health. The thinning treatment proposed under Alternative B would reduce stand density to desired levels for optimum growth. Under Alternative C, this stand would become overstocked, thereby decreasing forest health within this stand.

Stand 18 also contains oak and like Stand 15, would not regenerate well enough to increase or maintain the amount of oak under Alternative C. Alternative B would provide a better opportunity for maintaining oak in the stand.

Compartment 60, Stand 35 is a beech/birch /maple stand that is close to being fully stocked. Ice damage has occurred in this stand and diseases such as Armillaria root disease, Inonotus obliquus (a disease that affects yellow birch), and beech bark disease are present. Under Alternative B, a shelterwood with reserve trees treatment would regenerate the stand while retaining 40-60 sq. ft. of basal area (35 to 50%) of the trees. Under Alternative C, this stand would not be regenerated.

Compartment 60, Stand 36 is a beech/birch/maple stand that is overstocked which means the stand density it too high for good tree growth. This stand would benefit from a thinning which would occur under Alternative B. There is also oak in this stand which would benefit from the thinning. Under Alternative C, the stand would remain overstocked and the oak would be in jeopardy of disappearing from this stand.

Compartment 60, Stand 37 is dominated by sugar maple. It too is overstocked and would benefit from a thinning as would occur under Alternative B. There is also oak in this stand that would benefit from thinning by creating more open conditions. Under Alternative C, the stand would remain overstocked and the oak would have a more difficult time maintaining its population.

In summary, Alternative B would allow timber management to occur in five stands that would be dropped under Alternative C include: C59 S15, C59 S18, C60 S35, C60 S36, and C60 S37. Timber management would harvest trees that are over-mature, high risk, or with defect or disease, while retaining the healthy and most vigorous trees. Alternative B would also meet the Forest Plan objective for this area to maintain and improve conditions for natural communities such as oak. Timber management activities would not occur in these five stands under Alternative C.
Timber harvest treatments implemented under these alternatives would have the following results to the timber resource with the Dorset Peru analysis area:

- Improved size and quality of sawtimber through reduction in stand density.
- Improved spacing and retention of more desirable species.
- Improved sawtimber production and wood quality through the removal of trees in low quality stands or those afflicted with insect, disease and other damage.
- Captured sawtimber quality in mature and over mature trees before it is reduced or the trees decline in value.
- Improved pulpwood and fuelwood production that can be used as a local alternative to fossil fuels.
- Improved forest and stand health and diversity by:
    - regenerating poorly stocked, low quality, mature stands, and stands that are declining in productivity to grow new stands and sustain forest cover and timber production for the long-term,
    - providing new early successional seedling-sapling habitat and upland opening habitat,
    - removing monotypes and non-native trees found in plantations and convert them to native tree species, and.
    - promoting an increase in softwood and mixedwood habitats by releasing spruce/fir and hemlock from competing hardwoods.

3.2.4.5 Alternatives A, B and C

Timber Economic Analysis

Commercial Timber Harvest, Economic Analysis Management Direction
Forest Service Handbooks 1909.17 and 2409.18 direct the evaluation of economic efficiency for proposed projects. Values for timber have been generated using average timber sale stumpage rates from the local geographic area and appraisal zone (GMNF, Vermont). Rates were established for the fiscal years 2007 to 2011 time period and expressed on a per hundred cubic foot (CCF) basis. Stumpage values were then collapsed from individual tree species into four (4) distinct categories: hardwood sawtimber, softwood sawtimber, hardwood pulp, and softwood pulp.

Financial Analysis
The financial analysis prepared for the Dorset Peru project displays a comparison of key benefits and costs associated with the project, specifically related to vegetation management activities (Table 3.4-1). Included are estimates for commonly established cost factors that the Responsible Official has deemed as useful criteria to compare alternatives and to aid in the decision making process. At the request of the Responsible Official, cost calculations are estimated and displayed from the NEPA decision point forward (such as when the decision to implement some alternatives of the Dorset Peru project is made), rather than including those costs incurred prior to actually making the decision. As an example, the rather substantial cost of preparing the analysis documentation (the EA and associated documents) is not included in this financial analysis. Quick-Silver Investment Analysis software was used with a discount rate of 4 percent. Further explanation of key factors is found in the footnotes following Table 3.4-1.

The analysis has utility for comparing alternatives, but not necessarily for providing absolute valuation of forest product outputs, as residual benefits and costs vary greatly due to market, workforce, transportation and seasonal fluctuations. Numbers useful for comparing and evaluating a given alternative include a benefit to cost ratio, discounted benefits, discounted costs and present net value. Effects on the local economy include estimated number of jobs created or maintained by implementation of this project.

The Forest Service Manual (FSM 1970.6) also provides non-binding guidance as to the scope of economic analysis required in project decision making: “the responsible line officer determines the scope, appropriate level, and complexity of economic and social analysis needed.” If a unit prepares an economic analysis, then one must be prepared and displayed for all alternatives (40CFR 1502.23). NEPA regulations do not require a quantitative, monetary benefit-cost analysis be prepared. The disclosure of economic effects under NEPA is limited (40 CFR 1508.14).

Value and Volume
As noted, timber values were derived by comparing similar commercial harvest activities located in the same geographic area and timber type.

Costs
The net timber sale value would depend on the market value of the timber when sold and the actual logging costs. Logging costs include stump to truck (what it costs to get the trees or logs from the harvest area to the truck loading site), haul (trucking the logs to the mill), road and drainage maintenance, establishing temporary logging facilities and slash disposal.

Table 3.4-1: Selected Financial Benefits and Costs			
	Alternative A No Action	**Alternative B** Proposed Action	**Alternative C**
BENEFITS[1] Estimated			
Total Est. Volume (CCF)	0	17,273	16,398
Forestry Jobs Provided (36 person years per 1,670 CCF)	0	372	353
Est. Stumpage Revenues	0	$1,360,494.73	$1,291,533.73
PROJECT COSTS[2] Estimated			
Sale Administration	0	$190,003	$180,378
Sale Preparation	0	$1,070,926	$1,016,676
Required Reforestation Costs Estimated			
Site Preparation & Stocking Surveys	0	$150,750	$140,368
Stand Improvement	0	$11,036	$11,036
ESTIMATE OF TOTAL REVENUES, COSTS, PRESENT NET VALUE, AND BENEFIT: COST RATIOS AFTER DISCOUNTING			
Total Benefits	0	$1,360,494.73	$1,291,533.73
Total Costs	0	$1,422,715.27	$1,348,458.02
Present Net Value	0	-$62,220.54	-$56,924.29
Benefit/Cost Ratio	N/A	0.96	0.96

[1]Benefits listed are not a complete list of priced and non-priced benefits that may result from implementation of the action alternatives. An estimate of revenue that could occur from the sale of wood products to the highest bidder was made. Hardwood and softwood sawtimber and pulpwood volumes for Alternatives B and C were estimated. The estimated volume for each species and product group was then multiplied by prices that may be paid for timber on the stump using the average prices paid for these products from GMNF timber sales in FY 2007 to 2011.

Job calculation is based on estimates provided by the State of Vermont that a 1,670 CCF (1 million board feet) timber sale would yield 36 Vermont jobs. Such jobs consist only of “tree to board” processing of products, and do not include the jobs created from the actual application of lumber into finished wood products such as furniture, flooring or other items commonly used in homes or in home building.

[2]Sale preparation and administration costs were estimated from the most recent unit costs experienced during FY 2007 to 2011 in preparing timber sale contract appraisals, salvage and KV reforestation plans on the GMNF. The items listed are not the sum total of all costs associated with producing GMNF timber sales or all activities listed in this proposal, but are shown to provide a relative comparison of the primary direct and indirect costs of implementing timber management for Alternatives B and C.

3.4.5 Cumulative Effects

The cumulative effects analysis area is the same as that described for the direct and indirect effects.

One factor to consider in cumulative effects of timber management and economic analysis is the combined effects of timber harvesting across land ownerships such as national forest, state, and private lands over time.

Historical use of the cumulative effects analysis area relating to the timber resource includes timber clearing for farming, grazing, orchard operations, logging, and mining. In 1885 Vermont’s first Forestry Commission reported that the state had lost 90% of its forest cover within two generations.

Following the catastrophic flood of November 1927 which identified the need for scientific forest management, the GMNF was created in 1932 to protect watersheds, support timber communities, and promote recreation (Purdy 2009).

The offer of GMNF timber sales forest-wide has been low (but stable) for the last six years; averaging 4.635 million board feet per year (about 24 percent of the average annual ASQ). Likewise, over the past 25 years, an average of approximately 4.6 million board feet (7667 CCF) has been sold per year. The amount of timber offered for sale in the immediate future is expected to be near this annual average, and as such, the action alternatives (Alternatives B and C) would not provide a cumulative increase in economic activity to the region, but is important to the local area. The Forest Service is expecting to continue to offer timber for sale from the GMNF and make such contributions to the local economy as a result of timber harvest activities.

There have been approximately 18 recent (since 2004 to present) GMNF timber sales, and related timber stand reforestation and improvement activities outside the Dorset Peru analysis area but within the cumulative effects analysis area of Windsor, Bennington, and Windham Counties.

Past:
Within the Dorset Peru analysis area, there are approximately 39 recorded past timber sale activities since Forest Service acquisition in 1932. The last timber sale was completed in 2001. Many reforestation and timber stand improvement activities have occurred as well including vegetation clearing of competing sapling vegetation to prepare sites for regeneration, tree planting, prescribed burning, and timber stand improvement work such as thinning immature forest stands.

There are two areas of state land within the Dorset Peru analysis area; Emerald Lake State Park and Hapgood State Forest. Approximately 12 past timber harvest activities occurred within the Emerald Lake State Park area dating back to 1959 conducted by the State of Vermont. Approximately 6 timber sales were conducted by private entities prior to the purchase of the Emerald Lake area by the State of Vermont. Other activities the State has implemented include prescribed burning, thinning, pruning, planting, and invasive plant species control. Within Hapgood State Forest, there are no records of past timber sale activity. Much of it is leased to Bromley Mountain Ski Resort. Some cutting of trees has occurred associated with the ski trails (State of Vermont, Agency of Natural Resources, Department of Forest, Parks, and Recreation, 2011).

Past timber harvesting on private land within the analysis area occurred on up to 59 parcels encompassing 5321 acres within current use value forest management plans on file with the Bennington County Forester. Most harvesting was achieved through selection system, thinning, and shelterwood establishment cuts. Harvested products reported are 2.373 million board feet of sawtimber, 6,096 cords of hardwood and softwood (includes pulp, firewood, other), and 373 tons of softwood pulp (C. Stone, personal communication, October 24, 2011).

Present:
There are no current National Forest timber sales within the Dorset Peru analysis area. There is one current timber sale on state land within Emerald Lake State Park planned for harvest consisting of single tree and group selection on 77 acres to be completed in 2012 (Vermont Department of Forests, Parks & Recreation 2011). There is also one timber sale on private land within the analysis area planned for harvest this winter (2012) that consists of single tree and group selection on 26 acres (Kelley, Jr. , personal communication, December 14, 2011).

Future:
GMNF timber sales resulting from the Dorset Peru integrated resource project would likely be offered for sale within 2-7 years of the Decision Notice date and probably completed within a 10 year period of that date. Up to 2,047 acres is proposed for harvest (Alternative B) along with post-harvest site

prep activities and stands improvement work. Alternative C (1,943 acres) would have less cumulative effect than Alternative B, but the difference is negligible. Another integrated resource project on the GMNF is beginning in the southern part of the cumulative effects analysis area (southern Bennington County). The number of acres proposed for treatment has not been determined yet but it is likely to be more than proposed for Dorset Peru.

Future timber harvesting on private land in the next 10 years within and near the Dorset Peru analysis area is estimated to be: 1976 acres scheduled for selection systems, 416 acres scheduled for thinning, 99 acres scheduled for shelterwood establishment cuts, and 49 acres are scheduled for overstory removals (Stone 2011).

The review of relevant research and reports associated with timber management and climate change indicates that climate change will have an influence on vegetation, water, disturbance frequencies, and forest pests in the northeast, including the GMNF in Vermont. These changes will influence one another making it difficult to predict what changes will occur and when. It can be concluded, however, that within the 10-year period cumulative effects analysis timeframe for the Dorset Peru project, climate change on the GMNF should have little if any measurable effect on local forests or the ability for the Forest Service to implement timber management treatments to achieve desired results. The exceptions might be isolated pest infestations, if those are related to climate change, and slight changes in the location of some forest species at higher elevations (Beckage et al. 2008, Lee et al. 2005).

Within a few decades, there may be measurable changes, but the extent of those changes is uncertain (Millen 2009b). Maintaining optimal forest and tree health is widely supported as a means to buffer climate change influences on resources. The diversity of species composition, age, and structure are several factors that affect forest ecosystem resiliency to stressors triggered by climate change. For example, forests that have greater species diversity are less likely to have insect outbreaks that could become more prevalent as a result of a changing climate (USDA Forest Service 2008c).

In addition, management actions such as thinning, prescribed fire, or altering species composition through final harvest and planting could create characteristics that increase resiliency in the face of climate change (Millen 2009a, Millen 2009b). Stocking surveys of regenerated forest stands conducted from 2007 to 2009 on the GMNF indicate that desired species can be established, after which they would be relatively resilient to longer-term trends, especially if stands are maintained, and insect and disease outbreaks are treated. The time scale for regeneration is shorter than the time scale over which species distributions change in response to climate change (5 to 10 years, vs. the 90-year endpoint of the tree distribution models) (Shugart et al. 2003). As a result, it is expected that species regeneration proposed as part of the Dorset Peru project stand treatments would be successful in light of climate change influences.

3.5 Management Indicator Species (MIS)

Management Indicator Species (MIS) are vertebrate or invertebrate species selected for monitoring habitat conditions on the Forest because their population changes are believed to indicate the effects of management activities. MIS serve as broad-scale or “coarse-filter” monitors of general habitat conditions. Threatened, endangered, and sensitive (TES) species, on the other hand, serve as more-focused or “fine-filter” monitors that examine effects of management activities on individual species of concern. Analyses of TES are provided in Section 3.6 of this document. Together, MIS and TES provide the opportunity to assess how implementation of the 2006 Forest Plan (USDA Forest Service 2006a) affects biodiversity at a variety of geographical scales. A more general discussion of Habitat Diversity, including analysis of effects on wildlife, is contained is Section 3.3.

The 2006 Forest Plan (USDA Forest Service 2006a) identifies five major resource and habitat issues or conditions on the GMNF that are associated directly with active habitat manipulation and with habitat conditions that would be expected to change over time. The Forest Plan identifies an MIS that is ecologically linked to each of these habitats to serve as indicators for the general abundance and condition of that habitat and for the status of other species or resources that also depend on the same habitat. For example, the Forest Service will monitor American woodcock (*Scolopax minor*) as an MIS, not to determine the number of woodcock on the Forest, but rather as an indicator for the abundance, distribution, and quality of early-successional habitat on the Forest, and by extension, for the availability of habitat and the likely status of many other species that are associated with early-successional habitat.

3.5.1 Issue Statement

No specific issues regarding Management Indicator Species (MIS) species were raised during scoping.

Indicators:
Indicators for comparing environmental effects of proposed actions and alternatives are the relative changes in amount and availability of suitable habitat for each of the MIS.

3.5.2 Direct and Indirect Effects Analysis Area

The analysis area for direct and indirect effects on MIS is all suitable habitats for MIS located on NFS lands within the Dorset Peru Project Area. This analysis area includes the locations of proposed management activities that may have an impact on MIS and/or their habitats.

The temporal context for this analysis includes both short-term (by 2019) and mid- to long-term (50 to over 100 years from now) scales. The short-term scale would be expected to encompass full implementation of all proposed vegetation treatments and the immediate impacts of all management activities on habitat conditions. The long-term scale would account for management actions or disturbances that may result in changes that take a longer time to be detectable, such as shifts in forest types, age classes and habitat juxtaposition.

3.5.3 Affected Environment

The affected environment for analysis of effects on MIS includes the habitats associated with the species, as well as the current condition and trends for both the MIS and their habitats. The MIS established for the GMNF that may be affected within or adjacent to the Dorset Peru Project Area are listed in Table 3.5-1.

Table 3.5-1: Management Indicator Species (MIS) and the habitats they represent in the Dorset Peru Project Area

MIS	Related Habitat	Habitat Community Represented
White-tailed deer (*Odocoileus virginianus*)	Deer wintering habitat	Low-elevation, mature softwood
Ruffed grouse (*Bonasa umbellus*)	Aspen/aspen-birch habitat	Regenerating, young aspen and birch
Gray squirrel (*Sciurus carolinensis*)	Oak/oak-pine habitat	Mature oak
American woodcock (*Scolopax minor*)	Early-successional habitat	Upland opening
Brook trout (*Salvelinus fontinalis*)	Aquatic-riparian habitat	Streams
Source: Forest Plan (USDA Forest Service 2006a), Appendix C.		

The following summarizes the current condition of each of the MIS and the associated habitat conditions within the project area. Additional discussion of these habitat conditions is included in Section 3.3 (Habitat Diversity) and Section 3.10 (Water and Fish) of this EA.

Deer Wintering Habitat – White-Tailed Deer

There are 10 to 15 State-mapped Deer Wintering Areas (DWAs) within or adjacent to the project area, although most are located on non-NFS lands, particularly in the Otter Creek and Mettawee valleys. DWAs on NFS lands typically lack abundant early-succession hardwood vegetation for browse and/or the softwood vegetation may not provide winter cover of desirable quality. The lack of regenerating softwoods compromises the abundance and quality of future winter cover for deer, and for other wintering species such as ruffed grouse and wild turkeys (*Meleagris gallopavo*). Without maintenance and enhancement, the quality of deer wintering habitat, and ultimately the winter survival of white-tailed deer within and adjacent to the project area, may decline. Recent winter surveys identified low occupancy of deer wintering areas (DWAs) in the project area, although snow cover and overall winter weather conditions have been variable at the time of surveys and deer may have been widely dispersed across the area.

Early-Successional Habitat – American Woodcock

Early-successional habitat on the GMNF includes both open, scrub-shrub habitats that are maintained in that condition, as well as regenerating forest stands that in time will revert to mature forest stands. NFS lands within the Dorset Peru Project Area include few acres of open upland habitat, including permanent upland openings maintained for wildlife habitat diversity. In addition, forested lands include essentially no acres of regenerating age class (0-9 years old) across all habitats on suitable lands. Lack of regenerating stands is a function of an over-abundance of mature and old age classes, and succession of stands harvested in the 1980s from regeneration into the young age class. Section 3.3 Habitat Diversity includes greater detail about early-successional habitat and other habitat types. Results from North American Breeding Bird Surveys (Sauer et al. 2011) and Singing Ground Surveys (Cooper and Parker 2011) present conflicting estimated population trends for woodcock regionally and in Vermont over recent decades, and habitat conditions are highly variable across the State. The Forest Service conducts singing-ground surveys along designated routes, but these surveys indicate no clear population trends on the GMNF or in the project area (Toth 2000; GMNF, unpublished data).

Aspen and Aspen-Birch Habitat – Ruffed Grouse

Aspen and aspen-birch habitats occur on about 850 acres (6%) of NFS lands within the project area, although none is located on lands suitable for timber management activities. Existing aspen stands are heavily distributed toward mature and older age classes. Over the next 50 years approximately

half of the paper birch habitat within lands unsuitable for timber management will decline and transition through natural succession to other, longer-lived habitat types. Aspen also occurs as inclusions in other stands and it may be present along roadsides, but abundance and distribution at this scale does not provide measurable habitat. Section 3.3 Habitat Diversity includes greater detail about aspen, aspen-birch, and other habitat types. Data collected during North American Breeding Bird Surveys (Sauer et al. 2011) from 1966 through 2002 suggest no discernable population trend for ruffed grouse in Vermont, moderate increase for northern New England, but a significant decline for the Northeast as a whole. The Forest Service conducts drumming surveys along designated routes, but these surveys indicate no clear population trends on the GMNF or in the project area (Toth 2000; GMNF, unpublished data).

Oak and Oak-Pine Habitat – Gray Squirrel
Oak probably has never been abundant on the GMNF as a whole. In the project area oak stands occupy about 125 acres (<1%) of all NFS lands, or about 95 acres of suitable NFS lands. Some oak occurs as inclusions in other stands. Most of the oak habitat is located along the Escarpment, where this habitat type should be more prevalent than it is today. The lack of oak likely is due, in part, to lack or suppression of historical natural disturbance regimes like fire. Section 3.3 Habitat Diversity includes greater detail about oak and other habitat types. The gray squirrel is a game species in Vermont; the level of hunter interest is unknown but likely low. The population is considered viable, but trend data are not available at the State or local level.

Aquatic-Riparian Habitat – Brook Trout
Streams in the project area provide abundant habitat for brook trout. Much of the existing habitat is on non-NFS lands, especially in the Mettawee Valley. Existing habitat conditions in these streams generally are good, although below their productive potential, primarily due to the limited availability of pool habitat. In the short-term, management activities can substantially improve habitat for brook trout through introduction of large woody debris (LWD), stabilization of stream banks, improvement of passage for aquatic organisms through culverts, road crossings, and other obstacles, as well as general maintenance and enhancement. In the project area and on the GMNF in general, wild brook trout populations continue to sustain themselves through natural reproduction although their numbers may fluctuate substantially from year to year. Section 3.10 (Water and Fish) includes additional detail about brook trout and brook trout habitat.

3.5.4 Direct and Indirect Effects

MIS are fundamentally different from other resource elements relative to analysis of potential effects. Rather than analyze direct and indirect effects that the proposed management actions may have on MIS, this section analyzes effects that the proposed actions may have on five habitat types and, in turn, how each of the MIS may respond to these effects. Responses of MIS serve as proxy for the anticipated responses of other species that occur in the same habitats.

3.2.4.6 <u>Alternative A – No Action</u>

Deer Wintering Habitat – White-Tailed Deer
Under Alternative A, with no management actions taking place in the project area, the condition and use of deer wintering areas on NFS lands would continue to be low and declining. Additionally, the small and declining component of regenerating age classes on NFS lands would not provide browse for deer that occupy deer wintering areas on non-NFS lands. Overall winter habitat conditions for deer within the project area would be expected to decline over time.

Early-Successional Habitat – American Woodcock
Early-successional habitat includes open, scrub-shrub habitats that are maintained in that condition, as well as regenerating forest stands that in time will revert to mature forest stands. Alternative A

would not create any new permanent upland wildlife openings. Maintenance of two of the existing openings proposed for restoration or maintenance, the 10-acre meadow and the 9-acre hayfield, has been authorized under prior NEPA decisions and likely would continue. Maintenance of 32 acres of powerline right-of-way corridors and ski trails in the project area would continue over the short and mid-term under terms of the Special Use Permits that apply to them. Alternative A would not address the absence of the regenerating age class, and would continue the natural succession of the forested stands to mature and old age conditions. On the GMNF, regeneration of trees is abundant and vigorous. After about 10 to 20 years of growth, openings that are not maintained and regenerating stands transition into older seral stages, at which time they provide diminishing early-successional benefit as they blend into the surrounding forest and disappear. Section 3.3 Habitat Diversity includes greater detail about effects to early-successional habitat and other habitat types. Abundance of American woodcock and other species that benefit from early-successional habitats would be expected to decline in abundance or distribution over time on NFS lands within the project area.

Aspen and Aspen-Birch Habitat – Ruffed Grouse
Under Alternative A, the distribution, abundance, and overall condition of aspen in the project area would decline as old aspen and birch trees die and are replaced by other species. Continued maturation of hardwood and mixedwood stands with limited natural disturbance would preclude substantial regeneration of aspen. In addition, much of the aspen-birch habitat in the project area is in Wilderness areas, where timber management and habitat manipulation are not authorized. Over the short-term, abundance of aspen under Alternative A would remain at the lower end of the range for species composition described in the 2006 Forest Plan (USDA Forest Service 2006a). Over the long-term, abundance of aspen would decline as old aspen trees die and are replaced by other species, eventually falling below the lower limit of the desired threshold. Section 3.3 Habitat Diversity includes greater detail about effects to aspen, aspen-birch, and other habitat types. Abundance of ruffed grouse and other species that benefit from aspen-birch habitats would be expected to decline in abundance or distribution over time on NFS lands within the project area.

Oak and Oak-Pine Habitat – Gray Squirrel
Where they occur existing oak trees in the project area would be expected to persist as part of hardwood and mixedwood stands over the short- and long-term as they are longer-lived than many of the other species of trees that occur in the area. As these mature oaks decline over the next 100-200 years without disturbance to create large gaps in the canopy, there will be no young oak to take their place. Section 3.3 Habitat Diversity includes greater detail about effects on oak, oak-pine, and other habitat types. Gray squirrels and other species that benefit from oak mast would be expected to persist in the project area with no anticipated positive or negative response to Alternative A.

Aquatic-Riparian Habitat – Brook Trout
Existing aquatic-riparian habitat conditions in project area streams generally are good although they are below their productive potential. Alternative A would result in no direct or indirect effects on perennial streams in the project area. There would be no disturbance to the stream environment and therefore no change to or loss of habitat caused by management activity. Conversely, there also would be no activities to enhance the stream environments, or to enhance water flow and passage of aquatic organisms through road crossings and other barriers. There would be no anticipated positive or negative response by brook trout in the area under Alternative A.

3.5.4.2 Alternative B – Proposed Action

Deer Wintering Habitat – White-Tailed Deer
Proposed actions under Alternative B include 467 acres of shelterwood and seed tree harvests, and 49 acres of clearcut to regenerate hardwood and mixedwood stands. Regeneration in these stands primarily would be hardwood, which would provide browse for deer during the winter. The areas predominated by softwood regeneration could eventually provide winter cover. Alternative B also

would include 224 acres for clearcut conversion to permanent opening, and 26 acres of restoration and maintenance of existing openings. Although not specifically designed for the benefit of white-tailed deer, these openings do provide browse and grazing for deer. Of the proposed treatment acres, approximately 53 acres of shelterwood and 34 acres of clearcut conversion to permanent opening are within or touching mapped DWAs. An additional 112 acres of proposed shelterwood treatments are within about one mile of mapped DWAs. White tailed deer would benefit from increased availability of browse in proximity to deer wintering (cover) habitat, as well as across the project area as a whole.

Early-Successional Habitat – American Woodcock
Proposed actions under Alternative B would create 517 acres of regenerating age class through shelterwood, seed tree, and clearcut harvesting. The regenerating age class would meet HMU objectives by 2019 when this project is expected to be fully implemented. Implementation of Alternative B would restore and/or maintain 26 acres of existing opening stands, and would clearcut 224 acres of forest land for conversion to permanent upland opening habitat. The creation and restoration of upland opening habitat in 17 patches under this alternative would more than quadruple the acres of this habitat on federal land in the project area over the short-term, and would approach the low end of the HMU objectives for this habitat. The overall total acreage in regenerating and permanently-maintained early-successional habitat would be 767 acres. After about 10 to 20 years of growth, regenerating stands and openings that are not maintained would transition into older seral stages, at which time they would provide diminishing early-successional benefit as they blend into the surrounding forest. Section 3.3 Habitat Diversity includes greater detail about effects to early-successional habitat and other habitat types.

Approximately 143 acres of the permanent opening habitat (11 stands) typically would receive one to three treatments (for example, mowing and or burning) over a period of 5 to 7 years with some stands receiving multiple treatments in the same year. For approximately 107 acres (6 stands) within the Remote Wildlife Habitat MA, proposed management would be for “late-stage” early-successional habitat, which would allow growth for longer time to provide more and larger shrubs and small trees before restoration. These openings would be managed on a 7-year rotating schedule such that at any given time two openings would exist in each of three age classes: 0-6 years; 7-13 years; and 14-20 years. Each opening would be regenerated by clearcut during its twenty-first year. Section 3.3 (Habitat Diversity) provides additional analysis on early-successional habitats. The abundance, distribution, and range of vegetation age classes of early successional habitats created in this alternative would provide benefit to American woodcock and many other species that are dependent on different types and seral stages of early successional habitat.

Aspen and Aspen-Birch Habitat – Ruffed Grouse
Alternative B includes 49 acres of clearcut specifically for regeneration of various mixes of hardwood and mixedwood stands. Aspen-birch habitat would be expected to be a major component of these regenerating stands. In addition, some aspen and birch would be expected to regenerate and occur in the 224 acres proposed for clearcut conversion to permanent openings and the 26 acres proposed for restoration and/or maintenance of existing permanent openings. Most of these permanent openings would be maintained over the short- and long-term in various seral stages of shrubby vegetation, which would include aspen and birch. Ruffed grouse and many other species would receive benefit from the regeneration of aspen-birch habitat. Section 3.3 (Habitat Diversity) provides greater detail about impacts to aspen-birch habitats.

Oak and Oak-Pine Habitat – Gray Squirrel
Alternative B would be expected to produce an increase in oak habitat over the short-term, which would elevate the oak component in the project area to within Forest Plan (USDA Forest Service 2006a) objectives. Over the mid- and long-term, however, oak habitat abundance would be expected to decline by half and no longer meet HMU objectives. Alternative B also proposes to evaluate the

potential to manage permanent upland wildlife openings within the Escarpment MA with methods that can create oak-dominated shrublands (e.g. fire at certain intensities and intervals). Such habitats are uncommon on the Forest, and increasing them would add to wildlife habitat diversity in the project area. If oak shrubland habitat can be successfully created over a 20-30 year period, some of this habitat could eventually be allowed to revert back to a forest habitat dominated by oak, eventually increasing the amount of oak habitat in the project area. Section 3.3 (Habitat Diversity) provides greater detail about impacts to oak and oak-pine habitats. Gray squirrels, as well as black bears (*Ursus americanus*), wild turkeys, white-tailed deer, and many other species would benefit from increased oak habitat and increased oak mast.

Aquatic-Riparian Habitat – Brook Trout
Alternative B includes proposals for 7.2 miles of habitat restoration at sites in the Mettawee headwaters, in Little Mad Tom Brook, and in Mad Tom Brook. This restoration would be primarily accomplished by introducing large woody debris into the streams to increase pool habitat and overall habitat diversity in the streams. Alternative B also proposes to replace or retrofit two culverts to enhance passage of aquatic organism past inadequate culverts in a tributary of Mad Tom Brook and in the headwaters of the Mettawee River. Brook trout and other native aquatic species would benefit from these habitat-enhancement efforts. Section 3.10 provides greater detail about impacts to water and fish resources.

3.5.4.3 Alternative C

Deer Wintering Habitat – White-Tailed Deer
Under Alternative C, vegetation management activities would create 44 fewer acres of regenerating age class than under Alternative B. Effects to deer wintering habitat, and consequently to white-tailed deer, would not be measurably different from those described previously for Alternative B.

Early-Successional Habitat – American Woodcock
Under Alternative C, vegetation management activities would create 44 fewer acres of regenerating age class than under Alternative B. Effects to early-successional habitat, and consequently to American woodcock and other species that benefit from this habitat, would not be measurably different from those described for Alternative B.

Aspen and Aspen-Birch Habitat – Ruffed Grouse
Under Alternative C, effects to aspen-birch habitat, and consequently to ruffed grouse and other species that benefit from this habitat, would not be measurably different from those described for Alternative B.

Oak and Oak-Pine Habitat – Gray Squirrel
Effects of Alternative C on oak habitats and consequently to gray squirrels and other species that benefit from oak habitat, would not be measurably different from those described for Alternative B.

Aquatic-Riparian Habitat – Brook Trout
Under Alternative C effects to aquatic-riparian habitat, and consequently to brook trout and other native aquatic organisms that benefit from this habitat, would be identical to those described for Alternative B.

3.5.5 Cumulative Effects

The analysis area for cumulative effects to MIS and their associated habitats includes NFS, State, and private lands within the Dorset Peru Project Area, and extending out to cover normal movement areas of each indicator species. Past and present activities in the analysis area that resulted in or that could result in effects to terrestrial MIS habitats are primarily commercial timber management, non-

commercial vegetation management, and maintenance of permanent upland openings. These are actions that create or maintain measurable acres of regenerating hardwood forest, aspen, and other early-successional, shrub-scrub habitats. Construction or maintenance of roads and trails could alter habitat conditions as well, particularly the aquatic and riparian habitats occupied by brook trout.

The cumulative effects analysis considers activities for approximately the last 10 years and 10 years into the future. This 10-year time frame represents the length of time after a stand is harvested when it is in the regeneration (0-9 years) stage that provides important early-successional habitat. This time frame also is key to initiating trends and changes in overall composition and age class distribution. More detailed discussion of trends and changes in forest composition and age distribution are provided in Section 3.3 (Habitat Diversity). In addition, attempts to predict future actions beyond 10 years are unlikely to be realistic.

Essentially all timber harvests on NFS lands in the project area took place more than 10 years ago, most of it during the 1980s and 1990s or earlier. The only timber harvests planned for the next 10 years within the analysis area on NFS lands are those associated with this project. Some land management has taken place on private lands near and adjacent to NFS lands, although the volume and scale has been low over the past 10 years. An oak management harvest conducted on 31 acres in Emerald Lake State Park in 2008 is the extent of recent harvesting on State lands. Current harvesting on private and State land is selection cutting, whereas future plans over the next 10 years include 99 acres of shelterwood harvesting on private lands. There have been no known occurrences of any moderate-sized early successional habitat created within the past 10 years by natural disturbances. Section 3.3 (Habitat Diversity) provides greater detail on prior timber management activity in the project area.

Alternatives B and C provide a substantial increase in early-successional, aspen, and aspen-birch habitats, and moderate enhancements to deer wintering habitat and to aquatic and riverine habitats that are not provided by Alternative A. For all practical purposes, cumulative effects are the same as the direct and indirect effects, as known past, present, and foreseeable future activities and events related to the five MIS and MIS habitats likely are negligible. The management actions proposed in Alternatives B and C to enhance oak would contribute cumulatively to prior management at Emerald Lake State Park. The cumulative effect would be greater enhancement of oak in the analysis area, providing more benefits to associated species than without these federal actions.

Predictions of effects that climate changes may have on MIS are imprecise at best, especially looking further into the future. Review of relevant research suggests that substantive shifts in wildlife habitat or populations would not be anticipated in response to climate change within the analysis timeframe for this project (Burbank 2010, Prout 2009). In the long term, proposed activities might lessen the effects of future climate impacts by maintaining, and in many cases increasing, the diversity of the habitats within the landscape of the project area. Changes in habitat through management activities yield negative and positive effects initially, depending on the species considered. Changes that enhance and maintain an abundance of diverse habitats, however, should provide the most beneficial future conditions for to support the most diverse assemblages of species as anticipated climate impacts develop.

3.6 Threatened and Endangered Species (TES) Wildlife

3.6.1 Issue Statement

No specific issues regarding Threatened, Endangered and Sensitive (TES) species arose during scoping. The Forest Service does have very specific statutory and regulatory obligations for management and conservation of TES species, and this section analyzes direct, indirect, and

cumulative effects of the proposed actions on these species. Of particular concern on the GMNF are the Indiana bat, which is listed as endangered under the Endangered Species Act (ESA), and four other species of bats that are Regional Forester Sensitive Species (RFSS) and under review by the US Fish and Wildlife Service for possible listing under the ESA. Concern for the RFSS bat species is the result of severe population declines suffered by these species due to White Nose Syndrome (WNS). WNS is a complex and fatal disease condition that affects hibernating bats in northeastern North America.

A Biological Evaluation (BE) was prepared for the Dorset Peru project that discloses effects associated with the TES wildlife species (USDA Forest Service 2012b). This section provides a synopsis of the analyses in that BE.

Indicators:
Indicators for comparing environmental effects of proposed actions and alternatives are the relative changes in the amount, distribution, and overall availability of suitable habitats for affected species. Indicators for bats are the availability of suitable foraging and roosting habitat and relative changes in the number of available roost trees or other suitable roost sites within the project area. Of particular interest are actions proposed on lands within 5 miles of hibernacula where Indiana bats have occurred in recent years.

3.6.2 Direct and Indirect Effects Analysis Area

The analysis area for direct and indirect effects on TES wildlife species is all suitable habitats for TES species located on NFS lands within the Dorset Peru Project Area. This analysis area includes the locations of proposed management activities that may have an impact on TES species or their habitats.

The temporal context for this analysis includes both short-term (by 2019) and mid- to long-term (50 to over 100 years from now) scales. The short-term scale would be expected to encompass full implementation of all proposed vegetation treatments and the immediate impacts of all management activities on habitat conditions. The long-term scale would account for management actions or disturbances that may result in changes that take a longer time to be detectable, such as shifts in habitat conditions related to forest types, age class distribution of vegetation, and habitat juxtaposition.

3.6.3 Affected Environment

The GMNF has only historic occurrence records for three T&E species (Table 3.6-1): gray wolf (*Canis lupus*), eastern cougar (*Puma concolor couguar*), and Canada lynx (*Lynx canadensis*). As described in the BE, these species are not known to occur on the GMNF, and their presence at any time in the near future is unlikely (Tumosa 2001a,f,i). Consequently, these species are not included in the effects analyses in the BE or in this section.

Table 3.6-1: Species listed as threatened or endangered under the Endangered Species Act (ESA) with currently or historic occurrence in Vermont and on lands now administered by the Green Mountain National Forest.

Common Name	Scientific Name	ESA Status	Status on GMNF
Gray wolf	*Canis lupus*	Endangered	Historic only
Eastern mountain lion	*Puma concolor couguar*	Endangered	Historic only
Canada lynx	*Lynx canadensis*	Threatened	Historic only
Indiana bat	*Myotis sodalis*	Endangered	Current

Indiana bats have occured on and near the GMNF during recent years, and likely continue to occur within the project area (Tumosa 2001h; Darling and Smith 2011; Vermont Fish and Wildlife Department, unpublished data). Indiana bats have occurred in small numbers in two hibernacula located in the immediate area; one (Aeolus or Dorset Cave) is within the Dorset Peru Project Area, the other (Skinner Hollow or Little Skinner Hollow Cave) is about four miles south of the project area boundary. Prior to WNS the Indiana bat was considered rare on the GMNF, and rarely encountered except at hibernacula or known summer roosting sites. Although Indiana bats are known to have suffered mortality from WNS (Langwig et al. 2009), inconsistent results from surveys and analyses of other data preclude definitive conclusions about the current population status in Vermont (Darling and Smith 2011). A conservative approach leads to the assumption that Indiana bats still may occur and roost in the project area, especially in the valley bottoms along US Highway 7 and State Route 30 within five miles of the hibernacula, and during the fall swarming period. Due to cool temperatures at higher elevations, much of the project area is unlikely to include suitable maternity roosting habitat, and the likelihood of occurrence for Indiana bats diminishes rapidly beyond five miles from the hibernacula (USDA Forest Service 2006b).

There are 22 Regional Forester Sensitive Species (RFSS) for the GMNF (Table 3.6-2). The project area does not provide the specialized types of habitats suitable for or required by some RFSS species, or the nearest know occurrences of the species are geographically distant from the area. Accordingly, the likelihood of occurrence in the project area is low for common loon (*Gavia immer*), bald eagle (*Haliaeetus leucocephalus*), peregrine falcons (*Falco peregrines*), sedge wren (*Cistothorus platensis*), boulder beach (Appalachian) tiger beetle (*Cicindela ancocisconensis*), and brook floater (*Alasmidonta varicosa*) (Kibbe 1985; Chandler 2001a, Marchowsky 2001a, Tumosa 2001d,e; Tumosa 2002; VFWD 2005; VBBA 2012a). These six species are not considered further in this analysis.

Four RFSS are bats that occur on and near the GMNF. Prior to WNS, little brown bats (*Myotis lucifugus*) were common on the GMNF and surrounding areas, and in New England in general, ranked as “common” and “secure” in Vermont. The northern long-eared bat (*Myotis septentrionalis*) was considered locally common, scattered, or uncommon, whereas the eastern small-footed (*Myotis leibii*) and tri-colored (*Perimyotis subflavus*) bats have always been considered uncommon or rare (Tumosa 2001g, VNNHP 2008, Darling and Smith 2011). The project area provides foraging and roosting habitat for all four species. All four species have been identified in the two hibernacula in the region; the little brown bat in large numbers, the other species in low numbers. Both hibernacula and all four bat species are affected by WNS. Langwig et al. (2009) estimated mortality of little brown and northern long-eared bats in WNS-infected hibernacula at 93%, eastern small-footed bats at 78%, and tri-colored bats at 86%. After additional winters, mortality at these sites likely is much be greater (Darling and Smith 2011; VTFWD, unpublished data). The State of Vermont lists little brown bat and northern long-eared bats as endangered and the eastern small-footed bat as threatened. The tri-colored bat is proposed for listing as endangered in Vermont (VNHIP 2011a,d).

The likelihood of occurrence for Bicknell's thrush (*Catharus bicknelli*) currently is low in the project area. The elevations on Bromley Mountain and Dorset Peak (also called Danby Mountain or Dorset Mountain) exceed 3,000 feet, which is the approximate lower elevation threshold for this species (Rimmer et al. 2001, 2005; Tumosa 2001b). At present, however, suitable dense spruce-fir habitat is limited and Bicknell’s thrush is not known to occur at these locations or elsewhere within the project area. The Vermont Center for Ecostudies initiated a new Mountain Birdwatch survey route on Dorset Peak in 2010. Mountain Birdwatch targets Bicknell’s thrush and other high-elevation songbirds. To date Bicknell’s thrush has not been observed during these surveys (Scarl, personal communication, 2012).

Less is known about other RFSS on the GMNF, although suitable habitat does occur in and near the project area. The rusty blackbird (*Euphagus carolinus*) prefers isolated coniferous or mixedwood wetlands, typically adjacent to fens, alder-willow bogs, muskegs, beaver ponds, swampy shores along

lakes and streams, and similar forest openings. It has been found nesting in smaller clearcuts near water in Vermont. It is known to occur on the GMNF near the project area (Tumosa 2001c, VBBA 2012a).

Table 3.6-2: Regional Forester Sensitive Species (RFSS) for the Green Mountain National Forest.

Common Name	Scientific Name	State Conservation Rank[1]/Status[2]	Likelihood of Occurrence in Project Area
Eastern small-footed bat	*Myotis leibii*	S1/Threatened	Moderate
Little brown bat[3]	*Myotis lucifugus*	S1/Endangered	High
Northern long-eared bat[3]	*Myotis septentrionalis*	S1/Endangered	High
Tri-colored bat	*Perimyotis subflavus*	S1/Proposed Endangered	Moderate
Common loon	*Gavia immer*	S3	Low
Bald eagle	*Haliaeetus leucocephalus*	S1/Endangered	Low
Peregrine falcon	*Falco peregrinus anatum*	S3	Low
Sedge wren[3]	*Cistothorus platensis*	S2/Endangered	Low
Bicknell's thrush	*Catharus bicknelli*	S2/Special Concern	Low
Rusty blackbird	*Euphagus carolinus*	S3/Special Concern	Moderate
Wood turtle	*Clemmys insculpta*	S3/Special Concern	High
Jefferson salamander	*Ambystoma jeffersonianum*	S2/Special Concern	High
Blue-spotted salamander	*Ambystoma laterale*	S3/Special Concern	Moderate
Four-toed salamander	*Hemidactylium scutatum*	S2/Special Concern	Moderate
Brook floater	*Alasmidonta varicosa*	S1/Threatened	Low
Creek heelsplitter	*Lasmigona compressa*	S2	Moderate
Boulder-beach tiger beetle	*Cicindela ancocisconensis*	S1	Low
West Virginia white	*Pieris virginiensis*	S3S4/Special Concern	Moderate
Harpoon clubtail	*Gomphus descriptus*	S3	Moderate
Southern pygmy clubtail	*Lanthus vernalis*	S3	Moderate
Forcipate emerald	*Somatochlora forcipata*	S2S3	Moderate
Gray petaltail	*Tachopteryx thoreyi*	SU[3]	Moderate

[1]Conservation ranks provide an informational assessment of extinction risk based on factors such as abundance, distribution, population trends, and threats. State ranks are assigned by the Vermont Nongame and Natural Heritage Program to reflect the rarity of the species within the state of Vermont. For avian species, the ranks apply to breeding status only. S1 = critically imperiled; S2 = imperiled; S3 = vulnerable to extirpation or extinction; S4 = apparently secure; S5 = demonstrably widespread, abundant, and secure (VNHIP 2011a,b,c,d);
[2]Vermont State Status has two categories afforded legal protection under the Vermont Endangered Species Law (10 V.S.A. Chapter 123), endangered and threatened. The additional informational category of special concern is not established by law, but used to track rare species (VNHIP 2011a,b,c,d).
[3]SU = status uncertain (NatureServe 2012).

Wood turtle (*Clemmys insculpta*), Jefferson salamander (*Ambystoma jeffersonianum*), blue-spotted salamander (*A. laterale*), and four-toed salamander (*Hemidactylium scutatum*), occur in specific riparian or wetland habitats and adjacent uplands. Upland travel away from appropriate riparian or wetland habitat likely would be within 400 meters for wood turtles and 200 meters for the salamanders. Wood Turtles can adapt to a mixture of openings, patch cuts, and mature growth, whereas the salamander species require more mature, closed canopy settings. Each of these

species is most likely to occur at elevations below about 1,200 feet (Andrews 2005; Marchowsky 2001b; Wright 2002a,b; Sweeney 2002; VRAA 2012a,b,c,d). Suitable habitat is located within the project area, although only limited portions are of suitable low elevation. The wood turtle and Jefferson salamander have been recorded occurring in towns within the project area, whereas the blue-spotted and four-toed salamanders are not known to occur within the project area (VRAA 2012a,b,c,d).

The creek heelsplitter (*Lasmigona compressa*) typically is found in creeks and the headwaters of small to medium rivers in fine gravel or sand. Although not known to occur in the project area, it is known to occur on the GMNF near the project area (Marchowsky 2003c).

Habitat for the West Virginia white (*Pieris virginiensis*) is restricted to well-shaded, rich, moist, deciduous or mixed woodlands, particularly sites with limy soils. It is completely absent from large open areas. Larvae are dependent on toothwart (*Dentaria diphylla* and *D. laciniata*) for successful development, which restricts their suitable habitat significantly, as the West Virginia white usually does not wander from its host plant (Chandler 2001b). Appropriate habitat, rich northern hardwood stands (site index of 60 or higher) adjacent to streams, does occur in the project area (Deller, personal communication, 2012; GMNF, unpublished data).

There are four odonate (dragonfly) RFSS for the GMNF: harpoon clubtail (*Gomphus descriptus*), southern pygmy clubtail (*Lanthus vernalis*), forcipate emerald (*Somatochlora forcipata*), and gray petaltail (*Tachopteryx thoreyi*). Collectively, these species inhabit a variety of wetland habitats, ranging from small- to medium-sized streams and rivers, to small, muddy or boggy, spring-fed streams, to hillside seeps. Little is known about their abundance on the GMNF or in Vermont, but each species has one or two recorded occurrences on or adjacent to the Manchester District of the GMNF, and suitable habitat exists in the project area (Coletti 2002a,b,c,d).

3.6.4 Direct and Indirect Effects

3.6.4.1 Alternative A – No Action

No new timber harvesting, wildlife and fisheries habitat work, soil and water restoration work, road/trail construction work, or vista management work would occur under Alternative A. Routine maintenance of trails and roads, and work authorized under previous NEPA decisions and Special Use Permits agreements, such as maintenance of seven upland openings (including the ski trails and powerline corridors), and non-native invasive plant control activities, would continue. Most changes in habitat conditions on NFS lands in the project area would take place through natural processes such as wind and ice storms, fire, beaver activity, and forest succession. In the short- or long-term, effects to habitat conditions for TES species under Alternative A would be negligible.

3.6.4.2 Alternative B – Proposed Action

Alternative B proposes a variety of management actions that would affect vegetation, and therefore alter habitat conditions within the project area. The most significant habitat-altering actions would be timber harvests and creation of wildlife habitat, including application of a wide range of uneven-aged and even-aged harvest, from single tree selection to clearcut. For details, see Section 3.3 Habitat Diversity and Section 3.4 Timber Management and Economic Analysis.

Analysis of potential management effects relative to bats focuses on habitats essential to four major aspects of the species' natural history: summer roosts, summer foraging habitat, roosting and foraging habitat near hibernacula where bats swarm prior to hibernation, and the hibernacula themselves. Any management action that removes mature trees could remove a suitable roost tree, or could injure bats roosting in that tree. As described in the BE (USDA Forest Service 2012b), management direction in

the GMNF Forest Plan (USDA Forest Service 2006a: pp.12, 27-29) addresses retention of wildlife trees and snags that are suitable as roosts for bats, as well as dens and nests for other wildlife. Retention of these trees and snags minimizes possible impact to bats. Under "normal" circumstances, regeneration harvests would be considered beneficial for bats, as they create improved foraging conditions compared to dense, unbroken forest. During recent years, bat mortality from WNS has severely reduced local populations of bats. Consequently, suitable bat roosting and foraging habitat is "under-occupied," and it is unlikely that beneficial or detrimental habitat-altering activities would have any effect on TES bat species.

The two hibernacula in the area are not located on NFS lands, although some NFS lands within the project area do lie within five miles of these hibernacula. The GMNF Forest Plan Standard (USDA Forest Service 2006a: p.28) provides that timber harvest within five miles of a known Indiana bat hibernaculum from April 15 through October 30 shall be in accordance with provisions of a management plan for that hibernaculum. The Forest Service is developing these hibernaculum management plans in collaboration with the Vermont Department of Fish and Wildlife; the plans must be approved by the US Fish and Wildlife Service prior to any timber management activity within the five-mile buffer areas. The intention of this standard is that potential roosting habitat would be identified prior to any timber harvest, and that any harvest plan would minimize to the greatest extent possible any adverse impact on Indiana bats, but it should prove equally beneficial for the four RFSS bats, as well.

WNS is pervasive in Vermont and much of the Northeast. Hibernacula in and near the project area are known to be infected, and have experienced unprecedented mortality of hibernating bats (Darling and Smith 2011). Whether or not hibernating bats within the project area display signs and symptoms of the disease, it can be assumed that they have been exposed to it. The proposed timber harvesting activities in Alternative B could create an additional stress to individual woodland bats having WNS and occupying a roost tree that is removed and/or harvested as part proposed management activities. Winter harvests would not disturb roosting bats as they would have left the Forest for their winter hibernacula. Adherence to the plan for managing timber harvest within five miles of hibernacula to protect Indiana bats also would minimize disturbance and other impacts to WNS-stressed bats.

Considering all the above, the likelihood of direct or indirect impacts to TES bat species from implementation of Alternative B would be negligible. For the purposes of this EA, however, the BE conservatively determined that Alternative B may affect Indiana bats, but is not likely to adversely affect the species. Similarly, there is a minimal likelihood that Alternative B would impact individual little brown bats, northern long-eared bats, eastern small-footed bats, or tri-colored bats, but it would not be likely to cause a trend towards federal listing or loss of viability for any of these species within the project area.

At present, Bicknell's thrush is not known to occur within the project area. If future surveys detect the presence of the species, it would certainly be in high-elevation (≥3,000 feet) dense spruce-fir habitat. The only possible vegetation management in this habitat under Alternative B would be minor activities related to trail improvement or maintenance on Dorset Peak. Accordingly, Alternative B should have no impact on Bicknell's thrush.

Many of the GMNF RFSS are closely associated with wetlands or the habitats immediately adjacent to wetlands. Management direction in the GMNF Forest Plan (USDA Forest Service 2006a: Guideline G-10, p. 22) states that, "Within 100 feet of wetlands and seasonal pools, activities should be limited to those that protect, manage, and improve the condition of these resources. Acceptable activities should be approved on a case-by-case basis." In addition, timber harvesting in stands with moist or wet soils generally takes place during frozen-ground conditions, and buffers for shading are retained around wetlands. The overlap of proposed timber management actions with habitats of these species is minimal. Consequently, as described in greater detail in the BE (USDA Forest

Service 2012a), the likelihood of direct or indirect impacts to individuals of these species is low, and the likelihood that impacts could compromise the continued presence of these species in the project area is negligible. Thus, for rusty blackbird, wood turtle, Jefferson salamander, blue-spotted salamander, four-toed salamander, creek heelsplitter, and the four odonate species, Alternative B may impact individual animals, but it would not be likely to cause a trend towards federal listing or loss of viability for any of these species within the project area.

The West Virginia white butterfly is known to occur within the project area and in adjacent towns. Further, there is a possibility that this butterfly may be present due to the presence of its host plant (toothwort). Some of the timber harvesting and habitat management activities proposed as part of the Dorset Peru Project would make portions of these stands no longer suitable for West Virginia whites. However, abundant suitable habitat would continue to exist in the project area and on the GMNF in general, and proposed actions would not create impassable barriers to prevent movement of West Virginia whites in the area. Therefore, the BE concludes that although Alternative B could impact individual butterflies, it would not be likely to cause a trend towards federal listing or loss of viability of the species within the project area.

3.6.4.3 Alternative C

Under Alternative C, five stands would not be treated as proposed under Alternative B, resulting in a reduction in shelterwood harvest of 44 acres, a reduction in single tree selection harvest of 31 acres, and a reduction in thinning of 29 acres. The effects of this alternative on TES species and their associated habitats would not be measurably different from those described for Alternative B.

3.6.5 Cumulative Effects

The analysis area for cumulative effects to TES and their associated habitats includes NFS, State, and private lands within the Dorset-Peru Project Area, and extending out to cover normal movement areas of each indicator species. Past and present activities in the analysis area that resulted in or that could result in effects to TES habitats are primarily commercial timber management, non-commercial vegetation management, and maintenance of permanent upland openings. Construction or maintenance of roads and trails could alter habitat conditions as well, particularly the aquatic and riparian habitats.

The cumulative effects analysis considers activities for approximately the last 10 years and 10 years into the future. This 10-year time frame represents the length of time after a stand is harvested when it is in the regeneration (0-9 years) stage that provides important early-successional habitat. This time frame also is key to initiating trends and changes in overall composition and age class distribution. More detailed discussion of trends and changes in forest composition and age distribution are provided in Section 3.3 (Habitat Diversity). In addition, attempts to predict future actions beyond 10 years are unlikely to be realistic.

Essentially all timber harvests on NFS lands in the project area took place more than 10 years ago, most of it during the 1980s and 1990s or earlier. The only timber harvests planned for the next 10 years within the analysis area on NFS lands are those associated with this project. Some land management has taken place on private lands near and adjacent to NFS lands, although the volume and scale has been low over the past 10 years. Current harvesting on private and State land typically emphasizes selection cutting, whereas future plans over the next 10 years include 99 acres of shelterwood harvesting on private lands. Section 3.3 (Habitat Diversity) provides greater detail on prior timber management activity in the project area.

Predictions of effects that climate change may have on TES species are imprecise at best, especially looking further into the future. Review of relevant research suggests that in general, substantive shifts

in wildlife habitat or populations would not be anticipated in response to climate change within the analysis timeframe for this project, that is, the next 10 years (Burbank 2010, Prout 2009). TES species already are, by definition, less secure in the project area and surrounding region than most other species of wildlife. Consequently, TES species might be more susceptible to impacts from stemming from climate change. As a case in point, Bicknell's thrush occurs in high-elevation, montane "islands" in Vermont and adjacent states. The very specific habitat requirements for this species are closely correlated with local climate conditions. Measurable increases in climate local temperatures would be expected to reduce available habitat for Bicknell's thrush dramatically in the New England states. Climatic changes that affect ephemeral vernal pools would, in turn affect RFSS salamander species (Rodenhouse et al. 2008, Prout 2009). Review of relevant research suggests that in general, substantive shifts in wildlife habitat or populations would not be anticipated in the short term. Despite the possibility of higher susceptibility to climate change for TES compared to other species, impacts to TES cannot be predicted with any degree of certainty, and they are unlikely to be measurable during the 10-year planning period (Burbank 2010, Prout 2009).

Considering the minimal likelihood of measurable effects to TES species from actions proposed under Alternatives B and C, and the relatively low level of other known past, present, and future actions within the project area and in the region in general, Alternatives B and C are unlikely to result in cumulative impacts to TES species. WNS continues to be a major concern for local, hibernating bat species, although the likelihood of actions from Alternatives B or C exacerbating impacts of WNS is low. The Forest Service continues to work collaboratively with the US Fish and Wildlife Service, and the Vermont Fish and Wildlife Department for assessment and management of WNS in Vermont.

3.7 TES Plants

3.7.1 Issue Statement

No issues were raised specifically regarding Threatened, Endangered, and Sensitive (TES) plant species. A Biological Evaluation (BE) for plants was prepared for the Dorset-Peru project that discloses effects associated with TES plant species (USDA Forest Service, 2012a). This section provides a summary of the BE.

Indicator:
The indicator for this issue is the extent to which proposed activities could have negative impacts on plants on the RFSS list.

Threshold(s):
Since Forest Service Manual (2670) directs us to maintain viability of plant species on the National Forest, the threshold to be avoided would be whether or not the proposed activities would be expected to cause a trend toward loss of viability on the Forest or federal listing for any plants on the Regional Forester Sensitive Species (RFSS) list.

3.7.2 Direct and Indirect Effects Analysis Area

For the effects discussion that follows, direct effects could result from activities such as equipment driving over plants, trees being felled on top of them, prescribed fire that burns them, ground scarification digging them up, or people trampling them. Indirect effects could result from a change in light that would make the habitat less suitable or a conversion of one habitat type to another (e.g., conversion of forest to opening). Since these effects would occur only in the physical locations of the proposed activities, the spatial extent of the direct and indirect effects analysis is the stands, sections of rivers, or travel-ways in or along which proposed activities would occur. The temporal extent of the direct and indirect effects analysis would start when management activities begin and would continue

into the future until harvested stands are regenerated, or in the case of habitat conversion or modification to small sites, would continue indefinitely.

3.7.3 Affected Environment

The Dorset Peru Project Area includes a mix of upland and wetland habitat types. Forest types (FT) are hemlock (FT = 5), red spruce/balsam fir (FT = 13), mixed conifer swamp (FT = 18), hemlock/northern hardwoods (FT = 20), red oak (FT = 55), oak/northern hardwoods (FT = 60), sugar maple/beech/yellow birch (FT = 81), sugar maple/basswood (FT = 82), red maple/beech dry site (FT = 84), sugar maple (FT = 85), beech (FT = 86), mixed woods (FT = 87), old field northern hardwoods (FT = 89), and openings (FT = 97, 98, or 99). Although a few other habitat types occur in the general project area, they do not overlap with proposed activities, and are not considered here. Some of the hardwoods stands had high site indexes (SI), suggesting potential soil enrichment (SI ≥ 60); on the ground, however, signs of enrichment were often lacking, sparse, or patchy. On the ground, stands that had an oak component were generally not suitably dry to offer potential habitat for RFSS associated with dry, rocky oak woods. Wetlands, mostly small, occur in both forested and open sites, but are excluded from project activities. The terrain is mostly sloped, and several small streams run through many of the stands. None of the bedrock is believed to be calcareous.

3.7.4 Direct and Indirect Effects

3.7.4.1 Alternative A – No Action

No direct effects would be expected, since no project activities would occur, timber would not be harvested, habitats would not be managed, and habitat suitability would not change. Although plants associated with openings would not have their suitable habitat maintained, openings maintenance would most likely occur as part of the overall wildlife habitat management program activities.

3.7.4.2 Alternative B – Proposed Action and Alternative C

For proposed heritage projects, there are no known occurrences of RFSS at these sites, and the potential botanical effects of proposed heritage resource activities are not further discussed.

For proposed trail and transportation projects, project sites have either been surveyed with negative results (no RFSS were found), or mitigations are expected to protect RFSS from direct, indirect, and therefore cumulative effects.

Additional mitigation measures are expected to protect butternut (Juglans cinerea) from direct effects wherever it occurs, and to minimize direct effects to RFSS associated with openings.

Plants of openings:

Plants associated with openings (non-wetlands species) that could occur in openings proposed for maintenance/restoration, could be used as log landings, or that are part of harvest zones and would have logs skidded through them are:

1. Hay sedge (*Carex argyrantha*)
2. Bronze sedge (*Carex foenea*) – VT E
3. Musk flower (*Mimulus moschatus*) – also associated with stream sides
4. Fall dropseed muhly (*Muehlenbergia uniflora*)
5. Pennsylvania buttercup (*Ranunculus pensylvanicus*)
6. Pointed blue-eyed grass (*Sisyrinchium angustifolium*)
7. Eastern blue-eyed grass (*Sisyrinchium atlanticum*)

Since all openings where project activities are proposed will have field surveys prior to implementation, and protective measures would be developed to minimize negative direct effects during project implementation, direct effects would be expected to be minimal. Indirect effects of openings maintenance would be expected to be positive, since these species depend on open habitats for their existence.

Plants of stream sides:

Two species on the RFSS list could potentially occur along stream sides in the project area:

1. Musk flower (*Mimulus moschatus*) – also associated with openings
2. Bog chickweed (*Stellaria alsine*)

In places where timber would be harvested, it is expected that these plants would be adequately protected by buffer strips. In places where placement of LWD is proposed, there is a potential for there to be a direct effect from having logs felled on top of these species. Since the project will not change habitat suitability, no indirect effects are expected.

Plants of forested stands:

1. *Plants of rich northern hardwoods:*

Of the stands proposed for harvest, 44 were considered to have potential habitat. Of these 44, 22 had botanical surveys, and no RFSS were found, nor did conditions on the ground suggest that these would be ideal sites for species that are associated with rich northern hardwoods. An additional 28 stands where other activities are proposed may also have potential habitat, but were not surveyed: 10 stands are within harvest zones where skidding could occur, 2 stands have existing landings that could be used, 3 stands have erosion control activities proposed, and 13 stands are along brooks where large woody debris placement is proposed. The plants on the RFSS list that may occur in rich northern hardwoodse are:

- Summer sedge (*Carex aestivalis*)
- Large yellow lady's slipper (*Cypripedium parviflorum* var. *pubescens*)
- Butternut (*Juglans cinerea*)
- Ginseng (*Panax quinquefolius*)

Summer sedge is known to tolerate, and perhaps prosper with some disturbance. It is extant in three places on GMNF land and in a fourth place immediately next to GMNF; many of the plants are on the edges of trails and blow-downs. Large yellow lady's slippers may tolerate some thinning, but are not otherwise very tolerant of habitat change. They are extant in seven locations on the GMNF. Butternut is widespread on the GMNF, though declining because of the butternut canker. It can occur either in openings or in woods, and so is less likely to be affected by habitat changes. In addition, a mitigation measure that protects this species from cutting should also prevent any direct effects to this species. Ginseng thrives in deep shade, and is not tolerant of major habitat changes. It is extant in 17 sites on the GMNF.

2. *Plants of acidic oak hardwoods*

Two stands where vegetation management is proposed and three stands where erosion control is proposed have had brief field review (but not thorough inventory) are considered acidic oak woods that could have potential habitat for one plant on the RFSS:

- Large whorled pogonia (*Isotria verticillata*)

Large whorled pogonia is extant in on the GMNF in Pownal, at two sites close to each other in Leicester, and near the GMNF in Salisbury. It does not thrive in late successional forests, but also would not be tolerant of habitat conversion from forested to open. If any plants of this species do occur in the project, they could be harmed by project activities (types of direct and indirect effects described previously): individual plants could be destroyed, or habitat could become unsuitable in some places; in places where erosion control activities are proposed, habitat could become more stable for this species.

3. *Plants of conifers or mixed woods*

Ten stands where vegetation management is proposed were considered to be potential habitat for the round-leaved orchis; of these 10 stands, 3 stands were reviewed in the field with negative results (no RFSS were found). An additional 14 stands where other activities are proposed may also have potential habitat, but were not surveyed. Of these, 4 stands are within harvest zones where skidding could occur (2 of which have existing landings that could be used), 6 stands have erosion control activities proposed, 2 stands are proposed for scenery management, and 2 stands are along brooks where large woody debris placement is proposed. Because these plants rarely flower and are extremely easy to overlook (their single pair of leaves lies prostrate to the ground), dedicated searches are rarely productive, and new populations are generally found serendipitously.

- Round-leaved orchis (*Platanthera orbiculata*)

Extant from six locations on the GMNF (but not seen recently at several) and historical from two more, round-leaved orchis has only recently started to be tracked by the State of Vermont, and is now ranked S2. This species tends to occur as single plants or tiny populations that are difficult to locate, and the plants have a reputation for not being found again. Although it is believed to be sensitive to forest disturbance, and direct impacts from timber harvest could be detrimental, round-leaved orchis has also been seen in a 20-year old clear-cut area.

If any plants of these RFSS associated with rich northern hardwoods, acidic oak woods, or conifers and mixed woods do occur in the project, they could be harmed by project activities (types of direct and indirect effects described previously). Individual plants could be destroyed, or habitat could become unsuitable in some places; and in places where erosion control activities are proposed, habitat could become more stable for these species. Although searches have occurred for RFSS associated with these habitat types, and they were not found, it is possible that they occur in places not searched, or were overlooked in places that were searched. Given that none of these species were found despite searches for them, it is possible that they occur there, but it is not highly likely, and so direct and indirect effects are possible, but not highly likely.

In Alternative C, four fewer stands with potential habitat for RFSS associated with rich northern hardwoods would be harvested. The direct and indirect effects are otherwise the same as for the proposed action.

3.7.5 Cumulative Effects

Because the Forest Service Manual (2670) directs us to prevent loss of viability for a species on the Forest, the spatial extent of the cumulative effects area is the entire GMNF. Because species viability evaluations were completed during Forest Plan Revision, are reevaluated whenever the RFSS list is updated, and would be completed again the next time the Forest Plan is revised (no longer than 20 years from the previous evaluation), the temporal extent of the cumulative effects is the length of the planning period.

The kinds of past activities that could have affected any of these species in the cumulative effects analysis area (the entire GMNF) are the same kinds that are proposed in the Dorset-Peru project: vegetation management of any kind and ground disturbance of any kind in areas where they occur. For all but one of the RFSS discussed that are associated with openings, stream sides, or forested stands, no projects have occurred where these species occur, or if projects occurred near them, the plants were protected through mitigation measures/design criteria. The exception is round-leaved orchis, which has not been found recently at some of the sites where it previously occurred, and where projects have occurred. In all instances, mitigation measures were in place that should have protected this species during project implementation, and post project monitoring showed what appears to be intact habitat. It is not known why the plants are no longer present. At the same time that some individuals (and hence entire populations, since they tend to occur singly or in very small numbers) have not been found, new occurrences have been reported elsewhere, and its decline in

previous project locations is not thought to be the result of any project activities. At this time, there are no other present or future foreseeable projects that are planned for locations where these species are known to occur. In addition, although it is not known exactly how far pollen or seeds of any of these species travel, given that they are all well established elsewhere on the GMNF and none of these other populations are geographically close, it is unlikely that any plants that did occur in the project area would be exchanging genetic material with other populations of these species on the GMNF. Therefore, any harm that comes to any of these species as a result of this project would not be expected to lead to loss of viability on the GMNF or a trend toward federal listing.

An additional factor that could affect plants on the RFSS list associated with any of the above habitats is climate change. Climate change research (summarized in part by C. Mattrick, 2009) suggests that while there is no doubt climate is changing, and habitats and species may be affected by this change; the nature of the change is uncertain, is likely to vary greatly by species and geographic area, and is not likely to contribute cumulatively to a change in RFSS populations in these types of habitats within the analysis timeframe, because plant community changes occur relatively slowly.

3.8 Non-Native Invasive Plants

3.8.1 Issue Statement(s)

No issues were raised regarding non-native invasive plants (NNIP) in the project area. Forest Service Manual 2900 directs us to determine the risk of introducing, establishing, or spreading invasive species associated with any proposed action, and to provide alternatives or mitigation measures to reduce or eliminate that risk prior to project approval.

3.8.2 Direct and Indirect Effects Analysis Area

For all NNIP, direct effects include things such as wheeled or tracked equipment moving seeds or other viable plant propagules from one location to another. Indirect effects include the potential for ground disturbance and increased light from project implementation providing increased opportunities for NNIP to become established in new locations. Since these activities would occur at the exact location of project implementation, the area of analysis includes all sites where proposed ground disturbance or vegetation management would occur.

3.8.3 Affected Environment

Surveys for NNIP occurred in 2009, 2010, and 2011 in all places where rare plant surveys occurred (primarily forested stands proposed for timber harvest, and sites of proposed transportation and recreation projects). Surveys also occurred along many roads in the general vicinity, and had previously occurred along many streams. Species most commonly found along roads were honeysuckles, purple loosestrife, garlic mustard, common buckthorn, barberry, and Japanese knotweed. Other NNIP found were goutweed, glossy buckthorn, pale yellow iris, oriental bittersweet, multiflora rose, and winged burning bush. Over 150 infestations were found on private and NFS lands in the Dorset Peru Project Area and because not all land within the project area was surveyed, the total number of infestations is expected to be much higher. While NNIP were not found in stands proposed for vegetation management (with the exception of one of the openings proposed for maintenance), NNIP were found on roads, streams, and power lines along the stand edges. Tropical Storm Irene may have already spread many seeds from many infestations, and their extent may already be much greater than data suggests.

3.8.4 Direct and Indirect Effects

3.8.4.1 Alternative A – No Action

Under the no action alternative, no new ground disturbance would occur and no increased light would reach forested stands. There would, therefore, be fewer opportunities for NNIP to establish and spread. Because the Forest has completed an environmental assessment for treating NNIP forest wide using a variety of techniques, NNIP could still be treated.

3.8.4.2 Alternative B – Proposed Action and Alternative C

Forest Plan standards and guidelines will help prevent NNIP from being introduced to site of proposed activities. In addition, the proposed action includes treating infestations at or adjacent to sites of other proposed project activities, when the infestations have the potential to spread as a result of those activities. Project activities are also expected to be monitored post implementation, with NNIP treatments occurring as needed. As a result, although the ground disturbance and increased light associated with vegetation management and other proposed activities has the potential to facilitate the spread and establishment of NNIP, that potential would be reduced by these treatment activities. Given that declining budgets affect the amount of NNIP treatment that can be accomplished, treatments are not always 100% effective, NNIP seed banks can be long-lived, and dispersal by natural means (e.g., wind, water, animals) would still occur; new infestations may still become established at the site of project activities. If NNIP become established in sites that were previously uninfested, the native plant communities may have trouble competing for light, water, and soil nutrients. As a result, tree regeneration, wildlife habitat, and soil quality may be negatively affected. While these negative direct and indirect effects are expected to be minimized, they may still occur.

3.8.5 Cumulative Effects

Since the current model for NNIP risk assessment focuses on NNIP within or immediately adjacent to the project area, the analysis area for cumulative effects is defined as such. Any activity that disturbs ground, increases the amount of light reaching the soil, or involves the movement of equipment from sites with NNIP to uninfested sites has the potential to increase the effect of NNIP on other resources. Since disturbances that spread NNIP or increase the chance of infestations are ongoing, no timeframe is defined for the analysis.

The cumulative effect of these proposed activities plus other activities (past, present, or future foreseeable) in or adjacent to the project area that either disturb ground, increase sunlight, or increase the number of pathways of dispersal (e.g., new trails) is an increased potential for new infestations to establish, for existing infestations to spread, and for a resulting higher impact on other resources. The more extensive or widespread the infestations are, the harder it would be to control them which in turn increases the potential for impact on other resources.

A connected future action, however, is that (in keeping with the new FSM 2900) project activities are expected to be monitored post implementation, with NNIP treatments occurring as needed. This monitoring and treatment is expected to reduce, but not eliminate, the impact of NNIP on other resources.

3.9 Soils and Wetlands

3.9.1 Issue Statements

Although there were no public issues specifically related to the soil and wetland resources, this section provides a brief disclosure of the effects expected to these resources from proposed activities.

For this analysis, wetlands will be considered a category of soils. Wetlands have poorly drained soils (termed hydric) soils, with a hydrology typified by saturated soil conditions for all or part of the growing season. Wetlands also harbor water loving vegetation (hydrophytic) vegetation.

3.9.2 Direct and Indirect Effects Analysis Area

The soil resource effects analysis area consists of those areas where soils could be disturbed, as a result of any activities in the Proposed Action. For this analysis, disturbance consists of where soils are excavated, moved, mixed, compacted, organic matter is lost or burned, or where sediment enters a wetland through processes such as erosion, sedimentation, or placement of fill. Spatially, the affected environment consists of:

- All stands proposed for vegetation management, plus all haul roads, landings, skid roads and trails, needed to access the stands.
- All stands where new wildlife openings are proposed.
- All wildlife openings where vegetation is proposed to be maintained or improved via mowing or prescribed burning.
- All proposed new, improved, or relocated recreational trails.
- All vistas to be created by the use of a mechanical brush chopper, or by commercial timber harvest.
- All watershed improvement projects using heavy machinery or hand tools to close and restore unneeded roads and trails, or install erosion and sediment control structures such as water bars.
- All areas where road construction, improvement, maintenance, or closure actions are proposed, including the replacement of culverts to provide for upstream aquatic organism passage, and new parking areas.

The timeframe for the effects analysis is 10 years (by 2022), the approximate number of years expected to implement all proposed projects of Alternatives B or C.

3.9.3 Affected Environment

Dominant soils in the Affected Environment are listed in Table 3.9-1 along with brief soil descriptions.

Table 3.9-1: Dominant soil series within the Dorset Peru Project Area.

Dominant Soil Series	Brief Soil Descriptions (as the soils occur in the Dorset Peru Project Area)
Berkshire, Tunbridge	These soils commonly occur in association together. Berkshire is a well drained, deep (greater than 40 inches deep over bedrock), acidic, loamy soil. Tunbridge is similar, but only 20 to 40 inches deep to bedrock. Slope gradients of 15 to 40 percent dominate. Elevations are most commonly below 2,500 ft.
Houghtonville, Rawsonville	These soils commonly occur in association with each other. Houghtonville is a well-drained, deep, acidic, loamy soil. Rawsonville is similar, but only 20 to 40 inches deep to bedrock. These soils differ from Berkshire and Tunbridge in that they have higher levels of organic matter, and tend to occur at higher elevations. Slope gradients of 15 to 40 percent dominate.
Peru	Peru is moderately well-drained, acidic, loamy soil, underlain by a hardpan (a compacted water and root restricting layer) at a depth of 18 to 30 inches.

Sources: 1) Field observations by Nancy Burt, Soil Scientist (USDA Forest Service 2012c); 2) Soil maps by the Natural Resource Conservation Service available online at: http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

On average Natural Resource Conservation Service (NRCS) soil erosion hazard ratings for the Dorset Peru Project Area are low on slope gradients of less than 15 percent, moderate on slopes of 15 to 30 percent, and high on slopes over 30 percent. A high erosion hazard indicates that soil conservation measures commonly used in mountainous terrain are essential to keep erosion at low levels. Examples of such measures to be used in the Dorset Peru Project Area are winter logging, skid trails constructed across the slope, and water bars. A high erosion hazard does not imply forest management activities should not take place.

Wetlands in the analysis area vary in size and location. There are eleven wetlands equal to or greater than 0.5 acres in or adjacent to planned harvest activities. Nearly all these wetlands have beaver ponds. Most of these wetlands are State Class II Wetlands, which have special protection under the State Wetlands Rules. Numerous other small wetlands, most under a tenth of an acre in size, are scattered throughout the analysis area. These are State Class III Wetlands, which have no special protection under state laws. These small wetlands occur in concave landscape positions as small openings in the forest, dominated by forbs, ferns and/or sedges.

3.9.4 Direct and Indirect Effects

3.9.4.1 Alternative A - No Action

Alternative A would result in no soil disturbing management activities. On most sites soils would become more enriched because all biomass would remain on-site. Soils would not be subject to the risks of erosion and compaction inherent with activities such as tree harvesting, road construction, and wildlife opening creation. Wetlands and their riparian areas would not be disturbed.

Opportunities to improve soil and wetland conditions, as described in the proposed Watershed Improvement Projects, would be forgone:

- Erosion control work would not be done on numerous roads, old skid trails, and recreation trails.
- Proposed road and trail closures and restoration work would not be done.

3.9.4.2 Alternative B - Proposed Action

Alternative B Proposed Actions and corresponding soil (including wetland) resource risks are displayed in Table 3.9-2. Note that potential effects can be largely avoided through the implementation of various soil or wetland protection measures. These measures are discussed later in this section.

Table 3.9-2 Proposed Actions and potential effects on soils.

Proposed Action	Resource Risks
All vegetation management activities, including: • Felling and skidding of trees • Construction of landings, and skid roads and trails • Construction, improvement, and use of plus haul roads needed to access the stands.	Soil (including wetland) compaction, rutting, erosion, and/or loss in soil productivity. Sediment deposition in wetlands.
Creation of new wildlife openings	Soil disturbance and/or compaction associated with stump removal. Loss of soil nutrients due to whole tree harvest.
Wildlife opening maintenance using prescribed burning or mechanical cutting of vegetation.	Loss of or changes in the availability of, soil nutrients as a result of heating.
Road and parking area construction, improvement or maintenance.	Soil compaction, rutting, disturbance, erosion, and/or loss in soil productivity. Sediment deposition in wetlands.
Creation of new recreational trails.	Soil disturbance and/or compaction associated with trail construction and use.
Source: Nancy Burt, GMNF Soil Scientist	

Alternative B would only be implemented with Forest Plan S&Gs for Soil, Water, and Riparian Area Protection and Restoration from in the Forest Plan (USDA Forest Service 2006a; pages 20-22), State of Vermont Acceptable Management Practices (AMPs; State of Vermont 1987), and the additional soil and wetland protection mitigation measures listed in Appendix B. The most important S&Gs for this project area are:

- S-2, the Protective Strip standard, which provides for a buffer strip between management activities and streams and wetlands. These strips minimize or eliminate impacts to wetlands and their corresponding riparian areas.
- S-3 requires that logging equipment operations only be allowed when soil conditions are such that compaction, rutting, and erosion will be minimal.
- G-6 requires prompt mulching and revegetation of critical bare soil areas, following implementation of management activities. Examples of critical bare soil areas are stream crossings along roads, and where road drainage dips empty close to streams.
- G-10 is designed to limit the activities within 100 feet of many wetlands, to those that protect, manage, or improve wetland riparian area condition. For example, limited harvesting of trees may be allowed within 100 feet of wetlands in order to promote aspen regeneration, or specific food sources such as young tree browse.
- G-2 directs the Forest Service to implement AMPs for Maintaining Water Quality on Logging Jobs. Best Management Practices (similar to AMPs) have been shown to be effective in minimizing these impacts (Hornbeck and Kochenderfer 2000; Martin and Hornbeck 1994; Stuart and Edwards 2006).

A discussion of the benefits of the most important mitigation follows:

- Winter harvesting would be done in most stands (Mitigation Measure S-2). Harvesting when the soils on skid roads are frozen and the ground is or covered with a foot or more snow prevents erosion, rutting, and compaction.
- Commercial harvesting would be avoided in areas of shallow and/or steep soils, greater than one-quarter acre in size (Mitigation Measure S-4). Shallow soils are less than 20 to 25 inches deep over bedrock, and steep slopes have a slope gradient of over 50 percent. Shallow and steep sites tend to have low-productivity soils. Avoiding harvest in these areas protects the existing soil productivity.
- Prescribed burning would be done only when mineral soil heating would be low (Mitigation Measure S-5). This would minimize soil nutrient losses associated with burns. An NRCS report (Villars 2004) provides a review of scientific literature regarding the effects of prescribed burning on soils. While this report was completed for the Finger Lakes National Forest located in upstate New York, the information on soil effects is generally applicable to the GMNF, including the Dorset Peru Project Area.
- Bole-only harvesting would be done in all stands, except those that would become wildlife openings (Mitigation Measure S-3), or be converted to native softwood species. This measure limits nutrient removal associated with harvesting. The scientific literature shows that soil nutrient levels and soil/site productivity does not decrease over the long term due to harvesting when Best Management Practices (similar to AMPs) are implemented, long rotations (80-100 years+) are used, and slash is left on-site (USDA-FS 2005; pages 330-331).

Monitoring by the Forest Service on the GMNF has repeatedly shown that S&Gs and AMPs are successfully implemented most of the time in harvest areas, and that measures are effective in keeping erosion, compaction, and impacts to wetlands at low levels (USDA Forest Service 2009; USDA Forest Service 2006b, pages 3-22 through 3-32). Monitoring also shows that areas impacted by harvest activities recover over time, to a large extent. For example in 2010, eight stands in and near the Dorset Peru areas were evaluated using Forest Service soil Disturbance Monitoring Protocols (UVM July 2010). These stands were last harvested 15-30 years ago. Monitoring protocols included recording the presence and magnitude of compaction, rutting, erosion, and loss of organic matter, all known to decrease soil productivity. Monitoring showed that soil productivity appeared to be unaffected by past soil disturbance, and when present, disturbances observed in 2010 were rare and minimal.

Watershed improvement projects would improve soil conditions in each project area, since existing erosion and compaction problems would be corrected. Some projects would also improve soil condition through the revegetation of bare soil areas, and reduce the risk of sediment entering small wetlands.

The effects of the Proposed Action on soils (including wetlands) would be within the scope of effects assessed in the Green Mountain National Forest Final Environmental Impact Statement (USDA Forest Service 2006b, pages 3-25, and 3-27 to 3-29). Additional supporting information resides in the FEIS Project Record.

Finally, additional information used in this analysis is listed on the first page of the Soil Scientist's Specialists Report, in Project Record. This information contains reports and publications relevant to the effects of climate change, atmospheric deposition, and harvesting on soils on the GMNF.

3.9.4.3 Alternative C

The soil resource effects from Alternative C would be lower than those disclosed for Alternative B since the acres proposed for harvest in Alternative C are approximately 5% less than for Alternative B. An advantage of not harvesting these stands is that shallow soils occupy 10-30% of each stand, and

are often scattered throughout the stands. These areas would need to be excluded from harvest. The existence of these shallow soil areas also carries two risks:

- They may make the remaining trees more difficult to access.
- Occasional exposed bedrock ledges exist, which may limit skid road locations, and make water bar construction difficult.

3.9.5 Cumulative Effects

The cumulative effects analysis area for soils (including wetlands) is all lands within the Dorset Peru Project Area boundary, as shown in the Scoping Letter map. This includes both National Forest System and privately-owned lands. This analysis area was selected primarily because: 1) it is a reasonably-sized land base; and 2) soil disturbances in response to management activities such as those in the Proposed Action, rarely extend beyond the immediate impact area (for example, a harvest unit, mowed wildlife opening, or a constructed trail). Watershed boundaries were considered for the boundary of the analysis area, but rejected because the project area takes in parts of seven 6th-level watersheds, making it too large an analysis area.

The cumulative effects of past, present and foreseeable future soil disturbing activities within the analysis area are evaluated here using a timeframe of 20 years into the past and future. No distinction is made between alternatives since the differences in direct and indirect soil effects would be relatively small. Three issues are addressed in this section:

1. Would currently proposed activities result in a cumulative loss in wetland extent or values?

This issue is important because there have been historical losses in wetland extent and values in Vermont. Wetland values include things like wetland plant and animal habitats, flood storage, water purification, carbon storage, and nutrient cycling. There are no known wetland losses in extent on National Forest System lands over the past 20 years, in the analysis area. If wetland extent has changed over the past two decades, it was likely due to changes in the level of beaver activity. The effects on wetlands associated with the Proposed Action would be small (see Section 3.9.4.2, Alternative B – Proposed Action). In addition, wetland losses are not expected to increase in the future.

There is no data on losses in wetland quantity or values on private lands over the past 20 years. Some losses have probably occurred on private lands, though they are probably small, since large wetland losses usually equate to a state or federal wetland violation. There are some limited on-going threats to wetland values on private lands, particularity where wetlands are being used as agricultural lands, or where residential or commercial development is on-going. With increasing awareness of the public about the importance and values of wetlands, acres may increase due to wetland restoration efforts in the watershed.

Given this information, cumulative losses in wetland quantity or values in the analysis area in response to past, present, and future actions, is very small. This is because actions on National Forest System lands are unlikely to result in losses in wetland quantity or values, and similar wetland losses on private lands have been, and are expected to be small due to state and federal wetland regulations.

2. Would proposed activities result in a cumulative loss in long-term soil productivity?

The primary activities with the potential to affect long-term soil productivity within the analysis area are:

- Poorly implemented timber harvest. This can happen if Acceptable Management Practices are not implemented. Erosion, compaction, and loss of soil nutrients can result in reduced soil productivity.
- Development, such as residential and commercial construction and road building. These activities can change the soil properties, and reduce soil productivity.
- Atmospheric deposition, such as the deposition of sulfur and nitrogen. This may reduce soil productivity through the leaching out of soil nutrients.

Harvesting on National Forest System lands follows Vermont's Acceptable Management Practices, Forest Plan S&Gs, and mitigation measures listed in this EA. These measures minimize erosion and compaction. Whole tree harvest would be limited, and longer harvest rotations are typically used on the GMNF. These measures minimize soil nutrient losses. Only minimal development has and would occur on National Forest System lands over the timeframe of the analysis. This would be limited to things like a small amount of road improvement, or construction of small road-side parking areas. Again, this minimizes the effects on soil nutrient levels.

There is some indication of the extent soils in Dorset Peru Project Area have been affected by atmospheric deposition. Based on the most recent model available, approximately 30% of the analysis area is identified as having sulfur and nitrogen deposition in excess of the critical load. These areas are located primarily at the upper elevations of the analysis area, and on the west-facing side slopes just east of US Highway 7. Deposition in excess of the critical load means the ecosystems do not have the capacity to buffer incoming acids (NEG/ECP 2005). The soils in these areas have probably been acidified to varying degrees. Forest decline is a likely indicator of soil productivity loss (USDA-FS April 2005). More specifically, soil acidification might manifest itself in changes in tree growth and/or vegetative community species composition. There is, however, no evidence of broad-scale forest decline at middle and lower elevations of the GMNF, such as where the project area is located. The forests are, in fact, quite productive, as indicated by our reforestation and stand exam site index data.

On privately-owned lands, the amount of past and future planned harvest is minimal. Acceptable Management Practices, at least the most critical ones, are usually implemented on private lands. The amount of development on private lands has also been low, and it is reasonable to expect that low levels of development will continue in the future. Agricultural practices have had an effect on soil productivity in the analysis area, but the magnitude and extent of this has not been quantified. It is likely that the magnitude of agricultural effects will stay the same in the future. The effects of atmospheric deposition on private lands are similar to that on the GMNF, based on the most recent model.

To conclude, the cumulative losses in soil productivity is expected to be small in the analysis area within the analysis timeframe because:

- Based on the best scientific information available, atmospheric deposition has not triggered a reduction in forest productivity at middle and lower elevations of the GMNF.
- At least on National Forest System lands, longer rotations are used to manage stands providing time for nutrients to accumulate in the soil following harvest.
- In the future only small changes will be foreseen in the magnitude of impacts to soil productivity due to harvesting or development.

3. What are the cumulative effects to soils from climate change, in combination with proposed management activities in the Dorset Peru Project Area?

The best available scientific literature was reviewed in order to answer this question. Most of the literature indicates the climate is, and will continue to change over the timeframe of this analysis. There is no monitoring data from the GMNF to quantify the effects of climate change on soils and wetlands to date. The effects of climate change on soils should be based on the scientific literature most applicable to Vermont or New England. The literature describes a variety of effects climate change could have on soil over the long-term. Based on the review of the literature, however, and the fact that climate change is very slow, it is expected that the effects would be small over the analysis period.

In additional to the literature, the following points are worth highlighting:

a) Deep snow provides a protective cover for the soil during harvesting operations. Based on casual observations by several field-going staff on the GMNF, deep winter snow conditions occur less frequently than in the 1980s and 1990s. In general this results in slightly greater effects (erosion, compaction, rutting) of harvesting on soils. It has been found that more careful adherence to soil and wetland protection measures is needed to protect the soil from rutting, compaction and erosion. In addition soil effects monitoring is increasingly important. The Forest Service has already taken steps to keep the soil effects a low levels (see Section 3.9.1.3.2 Alternative B - Proposed Action).
b) Sustainable forestry is frequently cited in the scientific literature as the best way to minimize the effects of climate change on forest ecosystems including the soils. The Forest Service is implementing sustainable forest management on the GMNF as reflected in Forest Plan direction.
c) There is no evidence that soil productivity has decreased on the GMNF in response to climate change. Productivity is most frequently measured using indirect indicators such as regeneration or tree health surveys. All GMNF data indicate that the productivity is being maintained (USDA Forest Service April 2005). It is expected that this will continue over the next 20 years.

3.10 Fisheries and Water

3.10.1 Issue Statement

Although there were no Major Issues raised by the public specifically related to fisheries or water resources, there were 3 concerns (Other Issues) identified during scoping related to fisheries and water resources:

Water: The Forest Service should address potential impacts to a private spring and pond from proposed activities because they comprise the home water supply for the land owner.
Fisheries: The Forest Service should prevent the potential flooding in East Dorset Village and vicinity from trees moving downstream from fish habitat improvement work within the Mad Tom Brook watershed.
Fisheries: The Forest Service should consider impacts to a private pond downstream from large woody debris work and culvert replacement along the Mettawee River.

These three concerns are addressed in this section as well as a brief disclosure of the effects expected on fish and water resources from proposed activities.

There are no Threatened, Endangered and Sensitive (TES) fish species identified on the GMNF. Brook trout (*Salvelinus fontinalis)* are the Management Indicator Species (MIS) for aquatic and riparian habitat on the Forest. The effects on brook trout are discussed in Management Indicator Species, Section 3.5 of the EA. Atlantic salmon (*Salmo salar*) is identified as a species of concern on the GMNF. The Forest Service is involved in a multi-agency restoration effort for Connecticut River

Atlantic salmon which is found in Farnum Brook, a headwater tributary of the West River, within the project area.

3.10.2 Direct and Indirect Effects Analysis Area

The analysis area for the direct and indirect effects for the fishery and water resources consists of those areas in streams and riparian areas where water quality and fish habitat would be disturbed either by forest management, recreation, and fish habitat restoration activities. Specifically, this would include all stands proposed for commercial vegetation management and associated haul roads, skid trails and landings along streams; and snowmobile trail and road reconstruction activities that cross streams or are in riparian areas. It also includes large woody debris (LWD) placement and culvert maintenance to restore fish passage.

3.10.3 Affected Environment

The Dorset Peru Project Area is drained by many intermittent and perennial streams. Six primary perennial streams lie within 4 major watersheds in the project area: Farnum Brook (West River Watershed); Battenkill, Mad Tom and Little Mad Tom (Battenkill Watershed); Mettawee headwaters (Mettawee River Watershed); and Otter Creek (Otter Creek Watershed). The streams have moderate to high gradient channels with stream bottoms consisting mostly of boulder, rubble, gravel and sand. Riffles and runs are the predominate habitat types found in these streams, while pool habitat comprises only a small percentage (generally less than 20 percent in National Forest stream sections) of the total habitat area of each stream. A few beaver impoundments exist along some of the drainages. Although transitory and temporary in nature, these ponds provide pool habitat for a variety of fish and wildlife species. The streams in the project area also have low quantities LWD in their channels which results in low habitat diversity, and limited cover for fish and aquatic organisms.

Riparian habitat along the upland (higher elevation/mountain-side) streams in the project area contain a variety of vegetation types including hardwood, mixed forest, wetland meadows; and hemlock dominated stands. The under-story vegetation contains a mix of hardwood and softwood saplings and small diameter trees, and many common species of ground flora. The riparian vegetation is functioning to provide shade over stream channels, maintain bank stability, and filter sediment and water runoff to protect aquatic habitats for fish, amphibians, reptiles and aquatic insects, and provide good water quality. There is, however, a conspicuous lack of organic matter and large woody debris/material in stream channels. As a result aquatic habitat in the project area has low habitat diversity and is less productive than streams that are structurally and energy rich from large quantities of woody debris and organic matter.

Stream survey data for the Dorset Peru Project Area indicate that existing fish habitat conditions are good but likely below its productive potential. This is primarily due to the low amount of existing pool area (average less than 20 percent) compared to the desired condition of 30 percent. Also, there is a lack of high quality pools needed for optimum fish survival during periods of low water (summer and winter). The amount of LWD is substantially below historic conditions as described for fish habitat objectives in the Forest Plan (175-225 pieces per mile). Currently, streams in the project area average about 82 pieces of LWD per mile which is less than 50% of the Forest Plan objective.

Fisheries and stream habitat survey data from project area streams indicate that water quality is suitable to support fish and macro invertebrate communities. Fish communities are dominated by native brook trout in headwater streams with occurrences of brown trout at lower elevations. Griffith Lake is stocked annually with brook trout fingerlings to support a recreational fishery. Farnum Brook, a West River tributary, supports populations of Atlantic salmon which are stocked as fry annually. Non-game species include long-nose dace, blacknose dace, creek chub, common shiner, and brown bullhead.

3.10.4 Direct and Indirect Effects

3.10.4.1 Alternative A – No Action

Alternative A would result in no effects on the fisheries or water resources in the Dorset Peru Project Area. There would be no disturbance to the stream channel, no change or loss of fish habitat and riparian vegetation, no risk to other aquatic resources, and no degradation of water quality.

There would continue to be barriers to aquatic organism at several culverts, and stream habitat would remain below its productive potential because the proposed habitat restoration activities would not take place.

3.10.4.2 Alternative B - Proposed Action

Activities associated with Alternative B are: commercial vegetation management, (felling trees, skidding trees, use of log landings), trail construction and rehabilitation; temporary road construction, system road reconstruction or decommissioning; and wildlife openings creation, and prescribed burning. These activities generally result in varying degrees of soil or vegetation disturbance that could impact water quality and fish habitat. Other proposed activities such as apple tee release and pruning, timber stand improvement, vista maintenance, protection of archeological sites, and stream habitat and fish passage restoration would have little or no soil or vegetation disturbance that would impact water resources.

Alternative B would be implemented in compliance with Forest Plan S&Gs for Fisheries and Soil, Water and Riparian Area Protection and Restoration, Vermont Acceptable Management Practices (AMPs) (State of Vermont 1987) and project specific mitigation measures for fisheries and water resource protection. Also, filter strip standards for riparian areas (S1 and S2, Forest Plan, p. 20) direct the application of a protective vegetation buffer along water sources to prevent sediment delivery into streams, to provide adequate shading for maintaining in-stream temperatures, and to enhance habitat for native fish and aquatic organisms. The S&Gs would also provide for future LWD recruitment into stream channels, creating habitat diversity and complexity within the headwaters of the Dorset Peru Project Area. In addition permanent and temporary stream crossings would maintain passage in fish bearing streams, and would not create barriers to migration.

A sale administrator would frequent the project during timber harvesting to assure that S&Gs and AMPs are implemented and effective. The sale administrator would also apply immediate corrective measures if problems are identified.

Overall, the effects of wildlife management, timber harvest, and prescribed burning activities on stream habitat and water quality resources would be minor because S&Gs, AMPs and project specific mitigation measures would be effective in avoiding and/or minimizing effects. Monitoring projects including channel stability, sedimentation, turbidity, stream temperatures, aquatic insects; and fish populations indicate forest management activities are not negatively impacting aquatic resources (GMNF Monitoring and Evaluation Reports: 2000, 2004, 2006 and 2008).

The proposed Dorset Mountain trail leading from Grouse Lane would be up-slope of a private pond and water source. The trail would be a narrow “single track” designated for pedestrians and mountain bikes only. Construction would be primarily with hand tools and small tracked excavator where access is feasible. During trail construction there is potential for trail drainage (ditching, water bars, cut slope) to intercept subsurface water and affect water quality or quantity reaching the private pond. Given that an old road exists upslope of the functioning water source, it is unlikely that trail

construction would have a negative impact on flow to water to the private pond. To avoid impacts to the private spring and pond the following mitigation measure would be implemented:

Dorset Mountain trail in the vicinity of the private spring and pond will be located and designed in cooperation with the adjacent landowner to avoid altering water quantity and quality. (Mitigation Measure F-1).

Alternative B would also initiate restoration of stream habitat for fish and other aquatic organisms in approximately 0.85 miles of Mettawee River headwaters, 1.84 miles of Little Mad Tom Brook, and 4.5 miles of Mad Tom Brook. This activity would enhance stream habitat to attain desired conditions described by Forest Plan objectives and S&Gs for fish and riparian resources. An additional purpose and need for this project is to restore LWD functions in the stream channel. LWD is critical to the creation of stream habitat diversity and features used by both fish and aquatic insects. Stream habitat inventories identified a range of 70-93 pieces of LWD per mile that currently exist in project area streams. Research data and scientific literature indicate that under natural conditions, riparian forest in New England are capable of sustaining and providing organic matter and LWD to stream channels totaling approximately 175-230 pieces per mile (Lester 2003). In addition current monitoring and evaluation data from stream habitat restoration projects on NFS and private lands in Vermont indicate that when LWD quantities in streams approach natural loading levels, overall habitat diversity and cover as well as pool quality and quantity are vastly increased and improved. Wild brook trout population monitoring in restoration sites also indicates that more LWD in streams increases fish spawning and rearing habitat (USDA Forest Service 2001 and 2005).

Table 3.10-1: Comparison of Forest Plan Objective for instream habitat with existing condition.

Table 3.10-1 compares the natural, or desired, LWD loading and pool habitat with the currently existing LWD loading and pool habitat in Mad Tom Brook, Little Mad Tom Brook and Mettawee headwaters.

Stream	# LWD/mile	Percent Pool Area (%)	Quality Pools (% of total)[3]
Forest Plan Objective	175-230[1]	30[2]	>33%
Mad Tom Brook (Stream Average)	93	14	35
Little Mad Tom Brook (Stream Avg.)	70	18	34
Mettawee headwaters (Estimated[4])	<52	<30	<33

1. Desired condition per Lester 2003.
2. Desired condition established per 2006 Forest Plan objectives and S&Gs.
3. Quality Pools are large and deep with abundant cover, and suitable for overwinter habitat for trout.
4. Mettawee headwaters has not be surveyed. Qualitative assessments indicate it is well be Forest Plan objectives for LWD and pool habitat

Placement of whole trees for LWD would be done in sections of stream that are less than 35 feet wide to address concerns for downstream infrastructure (Mitigation X). Monitoring of LWD placements in other GMNF streams indicate that when wood pieces are longer than the stream width there is very little movement. Placements of LWD in Mad Tom brook in 2005 show that 90% of pieces are retained in the project area (Personal communication with Scott Wixsom, USFS). Trees are felled into channels in ways that attempt to wedge them behind standing trees or boulders, and to interlock the pieces and create stability. Research (Keim 2000) also shows that by establishing large stable pieces of LWD instream, woody material tends to be trapped and retained as opposed to being transported downstream where it could potentially impact infrastructure such as culverts and bridges.

In the Mettawee headwaters where LWD would be placed, the downstream culvert will be replaced with a larger structure to reduce potential for natural or placed LWD from blocking the structure and damaging private lands. The new structure would be at least as wide as the stream, and greatly improve flood resilience with increased capacity to pass debris, flood flows and sediment. There would be minor short-term impacts during construction of stream restoration projects but substantial long-term benefits to water quality and aquatic habitat.

Direct and Indirect effects of climate change on water and fisheries resources would be difficult to detect given predicted water temperature increases of 2 degrees F may not be realized for another 10 years (Prout, 2010). Most streams on the GMNF are well below the water temperature threshold to maintain coldwater habitats for native stream fishes, and are not currently impacted by climate change.

3.10.4.3 Alternative C

The fisheries and water quality effects from Alternative C would be the same as for disclosed for Proposed Action (Alternative B). A reduction of 104 acres of harvest in Compartments 59 and 60 would slightly reduce the overall ground disturbance in the project area.

3.10.5 Cumulative Effects

The analysis area for cumulative effects includes NFS and private lands encompassing the project area within the Battenkill, Mettawee, Otter Creek and West River watersheds. The timeframe for this cumulative effects analysis is 20 years in the past and future. The cumulative effects of past, present, and foreseeable future activities in the analysis area that have resulted in, or that could result in, additional stream habitat and water quality effects are timber harvesting, non-native invasive plant control, road/trail construction and maintenance, agriculture, development and other ground disturbing activities, and encroachment into riparian areas. These activities have increased sedimentation and reduced riparian vegetation.

It is also reasonable to believe that sediment and runoff from ground disturbing activities have entered streams over the past several decades. Habitat surveys in GMNF headwater streams however, indicate that sedimentation levels are relatively low and are not adversely affecting stream bottom habitat and fish populations. Therefore, the ground disturbing activities from this project will not have an adverse cumulative impact.

Total pool habitat area, LWD and the cover it provides are still below natural levels and the habitat objectives in the Forest Plan. Adding LWD to stream channels would bring project area streams closer to natural conditions, improve habitat diversity, and overall capabilities for native fish and other aquatic organisms.

Removal and replacement of culverts that create barriers to aquatic organism passage in the project area will reconnect fragmented habitat in the project area. New state permitting requirements will result in future stream crossings further restoring habitat connectivity. Consequently, future road and culvert repairs will have a positive cumulative effect on aquatic habitat.

There are no known foreseeable future vegetation management activities proposed on NFS lands, and minimal amounts projected on private lands within the project area in the next 5 to 10 years. It is assumed that Vermont AMPs for protecting and maintaining instream and riparian habitats would be followed during private land timber harvesting. As a result, the cumulative effects on fisheries and water resources are expected to be negligible.

Review of relevant scientific information indicates there are not likely to be substantive changes to aquatic habitats or species populations from climate change within the analysis timeframe (Prout, 2009, and Johnson and Lafayette, 2009). Therefore, climate change is not expected to affect water quality and aquatic habitat within the Dorset Peru Project Area or desired outcomes as disclosed in the project proposal.

Prout (Prout, 2010), and Johnson and Lafayette (Johnson and Lafayette, 2009) summarized the possible effects of climate change on fisheries and water resources for the White Mountain National Forest which are applicable to the GMNF. Climate change models predict higher stream temperatures and lower summer flows. Because there are no direct or indirect effects from climate change on water and fisheries resources, there are no cumulative effects from climate change.

3.11 Air

3.11.1 Issue Statement

There were no public issues specifically related to the air resource. The main activity that is proposed for this project that would have the most potential impact to the quality of the air resource is the prescribed burning to maintain wildlife openings. For this reason, the analysis for the air resource mainly focuses on the effects from smoke from prescribed burning activities on human health and welfare (nuisance impacts). The analysis also briefly discusses greenhouse gas emissions from prescribed burning and their contributions to global climate change.

3.11.2 Direct and Indirect Effects Analysis Area

The direct and indirect effects analysis area for the air resource consists of the atmosphere covering the NFS land and surrounding adjacent private land within 5 miles of the GMNF. This area was selected because the smoke emissions from the proposed prescribed burning would enter the atmosphere within this spatial area, and emission measurements beyond 5 miles begin to become negligible. The timeframe for the analysis is 5 to 7 years, since this is the expected time period for implementation of this project.

3.11.3 Affected Environment

Local Air Quality – Emissions and Concentrations
The primary products of combustion are water and carbon dioxide. Other by products of combustion include carbon monoxide and particulate matter. Particulate matter smaller than 2.5 microns in diameter (PM-2.5) impacts visibility and human health. Approximately two percent of the pollutants emitted from wildland fire and prescribed fire are PM-2.5. The amount of particulate matter in the air which could impact human health is measured as a concentration, such as the amount of mass of particulate per unit volume of air. This concentration is typically expressed in micrograms per cubic meter (µg/m3). The US EPA established National Ambient Air Quality Standards (NAAQS) for PM-2.5 for both a 24-hour period and an annual period. Although there are technicalities in how concentrations are measured and compared to the NAAQS, in general, concentrations must not exceed 35 µg/m3 when averaged over 24 hours and must not exceed 15 µg/m3 when averaged annually (US EPA May 1, 2012 http://www.epa.gov/air/criteria.html). This standard is meant to protect the groups at greatest risk to air pollution impacts: the elderly, individuals with cardiopulmonary diseases such as asthma, and children.

- Proposed burn units are not within a Class I area nor a non-attainment area.
- Public complaints have not happened in past prescribed fire activities
- There are no other sources of PM-2.5 within the modeling area.

Air quality monitoring data from 1999 to 2007 collected by the Vermont Air Pollution Control Division indicates that Vermont complies with both the 24-hour and annual PM-2.5 standard. Monitors in Vermont indicate 24-hour average concentrations from 2003-2008 (http://www.anr.state.vt.us/air/Monitoring/htm/PM2524hrTrends.htm) were less than 35 µg/m3 and all annual average concentrations are between 6 and 12 µg/m3 (State of Vermont 2008 http://www.anr.state.vt.us/air/Monitoring/htm/PM25AnnualTrends.htm).

Air quality assessments are done prior to implementing prescribed burns (Forest Plan, Section 2.3.10 Fire Management, Guideline G-1, p. 34). The air quality assessment quantifies particulate matter emissions anticipated as a result of planned burn activities to ensure activities are in compliance with national and State ambient air quality standards. The alternatives have been reviewed, including the cumulative effects of implementing the proposed action in conjunction with potential prescribed burns generating smoke elsewhere on the GMNF.

Prescribed burning also produces gases that are emitted into the atmosphere such as carbon monoxide (CO), carbon dioxide (CO2), and methane (CH4). Most of these gases resulting from prescribed burning generally pose little or no direct risk to public health since fires are spatially and temporally dispersed, and these emissions are rapidly diluted into the atmosphere at short distances from their source (Sandberg and Dost 1990). However, gases such as CO2 and CH4 are some of the primary sources for greenhouse gases that contribute to global climate change (US EPA 2009).

The temperature of the earth's atmosphere is regulated by a balance between radiation received from the sun, the amount reflected by the earth's surface and clouds, and the amount of radiation absorbed by the earth and atmosphere. Greenhouse gases (GHG) keep the earth's surface warmer than it would be otherwise because they absorb infrared radiation from the earth and, in turn, radiate the energy back down to the surface. While these atmospheric gases occur naturally, there has been a rapid increase in concentrations of greenhouse gases in the earth's atmosphere from anthropogenic sources since the start of industrialization which has caused concerns over potential changes in global climate change (IPCC 2007). The largest potential effect on global climate is from CO2 human caused emissions which accounted for 85.4 percent of the total GHG emissions in the U.S. in 2007 (US EPA 2009).

Global emissions can be measured in terms of teragrams (Tg), where one Tg is one million metric tons. The largest source of CO2 emissions is fossil fuel combustion. The estimated global CO2 emission rate from combustion of fossil fuels in 2006 is approximately 29,195 Tg of which the U.S. accounted for nearly 20 percent or 5,635 Tg (US EPA 2009). Although total CH4 emissions are less, the gas is more than 20 times as effective as CO2 at trapping heat in the atmosphere (IPCC 2007). The estimated total U.S. CH4 emissions rate in 2006 is approximately 582 Tg in CO2 equivalents (US EPA 2009).

Scientists continue to assess and estimate the total global effects on warming or cooling from the various GHG. The global averaged surface temperature in the 1906 to 2005 time period has increased by 1.3 ± 0.32 °F. Eleven of the 12 years during the period from 1995 to 2006 rank among the warmest years globally, since about 1850 (IPCC 2007). Future projections of GHG over the 21st century have been made using a number of emission scenarios. Based on model simulations applied to various GHG assumptions, the U.N. Intergovernmental Panel on Climate Change (IPCC) has projected an increase of the globally averaged surface temperature ranging from 2.0 to 11.5 °F by the end of the 21st century relative to the period between 1980 to 1990 (IPCC 2007). This level of global climate change would lead to devastating results such as more erratic weather patterns, coastline erosion and flooding, and widespread ecosystem degradation.

3.11.4 Direct and Indirect Effects

3.11.4.1 Alternative A – No Action

There would be no direct or indirect effects related to air quality under Alternative A since there would be no prescribed burning implemented and therefore no smoke would occur.

3.11.4.2 Alternative B - Proposed Action and Alternative C

The greatest amount of prescribed burning proposed for this project under any of the alternatives is 250 acres of "Openings Maintenance" and 122 acres of "Oak Site Preparation." The maximum amount of burning which the GMNF could practicably accomplish in one day is estimated at 50 acres (Schow, 2011). This burning would generally occur during the spring with a mix of fuel loadings. 50 acres of hardwood and mix conifer broadcast burn was modeled to estimate smoke impacts to ambient air quality for a single day a mile from the Town of Peru. This amount of burning was modeled using First Order Fire Effects Modeling (FOFEM) to approximate particulate production and V-Smoke (http://shrmc.ggy.uga.edu/maps/vsmoke.html) to approximate PM 2.5 concentrations. V-Smoke is a web based screening level modeling system for calculating PM-2.5 emissions downwind of the prescribed burn. Modeling results indicate that burning 50 acres in a single day under spring conditions produce PM-2.5 concentrations 20-25 $\mu g/m^3$ (peak hourly concentrations) within a mile of the burn location. For short durations (during ignition phase) PM-2.5 concentrations can exceed "Unhealthy" levels (above 139 µg/m3) in immediate proximity to the burn. It is reasonable to expect that the actual concentration would stay well below the 24-hour National Ambient Air Quality Standard of 35 $\mu g/m^3$ (24-hour average) if burning conditions are similar to those modeled. Concentrations are not compared against the annual standard since a prescribed burning project is a temporary source lasting only a few days.

Table 3.11-1 Primary greenhouse gas emissions (GHG) from prescribed burning for Alternatives B and C.

Type of GHG	Prescribed Fire Activity	GHG Emissions* (Metric Tons/Acre)	Total GHG Emissions (Metric Tons)[1]
Carbon Dioxide (CO2)	Opening Maintenance 250 acre total	10.56	6272
	Oak Site Prep 122 acre total	6.30	
Methane (CH4)	Opening Maintenance	0.08	41
	Oak Site Prep	0.03	

*FOFEM5 model outputs in project file

[1] Base on burning entire 372 acres in one year.

The First Order Fire Effects Model (FOFEM5) was used to estimate the primary GHG emissions from the proposed prescribed burning activities (CO2 and CH4) that have the most potential to contribute to global climate change. Table 3.11-1 displays these gas emissions from prescribed burning activities proposed for Alternatives B and C based on the maximum amount of burning that could occur in one year (250acres).

Cumulative Effects

The smoke modeling conducted for this project indicates smoke does not exceed the PM-2.5 concentrations with fair to excellent smoke dispersion (air mass instability) for any adjacent smoke sensitive areas. Visibility range for this project during ignition, decreases the closer a receptor is to the burn location and the lower the wind speeds. Visibility from a public health stand point is a temporary impact and only a concern during nighttime vehicle travel. The Prescribed Fire Burn Plan associated with this project will mitigate smoke impacts prior and during implementation. Cumulative effects from other sources of air pollution (such as industry, vehicles, and residential wood combustion) are represented by existing background air quality concentrations, which are generally low.

3.12 Visual Quality

3.12.1 Issue Statement(s)

The public is concerned about the negative visual effects of timber harvesting on the side slopes and ridgelines that are visible from US Highway (US) 7, State Route (SR) 7A, SR 11 and SR 30.

Although there were no additional public issues specifically related to the visual resource, this section also provides a brief disclosure of the visual effects expected from proposed timber, wildlife, and vista treatments.

Indicator:
Proposed activities that do not meet Visual Quality Objectives.

3.12.2 Direct and Indirect Effects Analysis Area

The direct and indirect analysis area for the visual resource lies both within and outside the Dorset Peru Project Area. The Dorset Peru Project Area is included in the analysis area but the project area does not define the analysis area for the visual analysis of the proposed timber harvest. On site views (within ½ mile of the proposed timber treatments – foreground views) as well as offsite views (more than ½ mile of the proposed timber treatments - middleground to background views) of the Dorset Peru Project Area were determined based on terrain features and vista locations. Working clockwise around the project area, the following locations define the outer reaches of the analysis area for the visual analysis: Griffith Lake on the northern boundary of the project, Magic Mountain Ski Area (and the adjacent Glebe Mountain) is 7 miles southeast of the project area, Stratton Tower is 8.5 miles south on the Long Trail, and Mount Equinox is 3 miles southeast of the project area.

3.12.3 Affected Environment

Timber harvest activities and wildlife treatments associated with the Dorset Peru project have the greatest potential to affect visual quality. For this reason the affected environment for the visual resource emphasizes the portions of the project area associated with these proposed activities.

The Dorset Peru Project Area lies within portions of the Taconic and Green Mountain ranges and the US 7, SR 7A, SR 11, and SR 30 highway corridors. The landscape has a mosaic of vegetation patterns with streams and wetlands adding to the mix. There is a great deal of topographic relief within the Dorset Peru Project Area; as the viewer moves across the landscape on roads and trails within and adjacent to the project area, new vantage points are opened up to view in this complex landscape.

From the US 7 and SR 7A corridor much of the Escarpment MA on the western side slopes of the Green Mountains are within full view. One particular stand, Compartment 60 Stand 24, caused public concern for visual quality in the 1980's. This stand was harvested in the early 1990's (Forest Road 21 South Timber Sale) to mitigate a visual impact called the "palm trees" visible from SR 7A in the vicinity of the Manchester Country Club. In 1980 this stand had a shelterwood treatment and in 1987 storm effects caused blowdowns and the resulting visual impact. The final treatment in the early nineties removed the remaining overstory trees and mitigated the visual concerns.

From SR 11 and SR 30 portions of the project area lie directly next to the highways with numerous vantage points that open up to the project area. The Bromley alpine ski area lies within this area on private, State, and NFS lands.

From trails along the ridgeline of Dorset Mountain and the vista at Little Dorset Peak there are off-site views in many directions. Toward the east the Dorset Peru Project Area is seen up to 5 miles away where the AT/LT (Appalachian Trail/Long Trail) runs along the height of land in the Green Mountain range. Here a mosaic of openings including farms and fields on private lands (most noticeable in the US 7 and SR 7A valley corridor), and forested side slopes mix with some evidence of past timber harvest (change in texture, not noticeable on ridgelines) higher up on the landscape on National Forest System (NFS) lands. The view from Dorset peak looks out to the north with a view of Danby Pond and a mosaic of farmland and forest land. To the southwest filtered views look out toward Spruce Mountain in the Taconics just outside the western project boundary up to 7 miles away. Inside the project boundary the view looks out on the forested canopy of the National Forest as well as what is seen as a mosaic of openings in Dorset and the Mettawee River on private lands in the valley bottom.

The Appalachian Trail (AT) foreground visibility has been mapped for the project area and is reflected by the Appalachian National Scenic Trail management area shown on Map 1 Vicinity/Existing Condition Map. Views from the AT/LT in the Green Mountain range look out in all directions. Views to the west look toward the Taconic Mountains including the Dorset Mountain area which is the height of land in the western part of the project area. Views to the east reflect the scattered GMNF ownership with forested lands on NFS lands and a mosaic of openings mixed in with forest on private lands.

Views of the project area are visible as scenic background from points south such as Glebe Mountain, adjacent Magic Mountain Ski Area and Mount Equinox on private lands and Stratton Mountain Fire Tower on National Forest lands (up to 10 miles away).

Stands that have been recently harvested (1997-2012, less than 15 years old) occur on less than 200 acres (1%) of NFS lands within the project area. Evidence of past timber harvest on NFS lands in the project area are not noticeable on the perimeter of the project area along the SR 7, SR 11, and SR 30 Corridors. When viewed from vantage points in the higher elevations of the Taconic Mountains and from the AT/LT, however, there are textural changes visible in the tree canopy. Evidence of timber harvest is more apparent on the interior of the project area along FR58 and FR21 where past timber harvest have opened up opportunities for viewing scenery that look out toward the west and the Taconic Mountains.

There are numerous streams lakes and ponds within the Dorset Peru Project Area that offer scenic value to the area. Specially noted are Mad Tom Brook, Little Mad Tom Brook, Otter Creek, Mettawee River, and Emerald Lake. The project area also contains a Vermont Class 1 wetland, Dorset Marsh, and numerous beaver ponds which add scenic diversity to the landscape.

3.12.3.1 Visual Quality Objectives

The Forest Plan established visual condition guidelines that lead to Visual Quality Objectives (VQO) for NFS lands within the GMNF. These guidelines and objectives are based on criteria defined in the National Forest Visual Management System Handbook (USDA Forest Service 1974) and the Forest Plan (Section 2.3.13 Visuals, pp. 37 to 39), and vary depending on whether activities can be seen from certain areas, viewer sensitivity, and the desired recreation opportunity spectrum (ROS). Visual Quality Objectives help provide a threshold of acceptable impacts that may result from management activities across the landscape. Table 3.12-1 displays the VQO thresholds that are applicable to the Dorset Peru Project Area.

Table 3.12-1: Visual Quality Objectives for the Dorset Peru Project Area

Visual Quality Objective	Threshold
Retention	Alterations made by people are not visually evident to the casual forest visitor.
Partial Retention	Alterations made by people must appear subordinate within the surrounding natural appearing landscape.
Modification	Alterations may dominate the original surrounding landscape, but constructed facilities must be compatible with the landscape.
Source: 2006 GMNF Forest Plan	

On site views (less than one-half mile) from US 7, SR 11, SR 30, and the Appalachian/Long Trail have high viewer sensitivity and should meet the Retention VQO.

On site views (less than one-half mile) from the remaining Forest Roads and NFS Trails have moderate viewer sensitivity and should meet the Partial Retention VQO.

On site views (less than one-half mile) from travelways maintained primarily for non-recreation purposes such as timber access roads have lower visual sensitivity and should meet the Modification VQO.

Off site views (more than one-half mile) from the high and moderate sensitive roads and Forest Service System trails (other than the Appalachian/Long Trail and the Escarpment MA) in the project area should meet the Partial Retention VQO on the upper part of the more noticeable peaks and ridges, and meet the Modification VQO on the remainder of the landscape.

When viewing offsite to proposed timber harvest that fall within the Escarpment MA, the VQO of those lands is elevated so that on the upper part of the more noticeable peaks and ridges the Retention VQO should be met and on the remainder of the landscape the Partial Retention VQO should be met.

Off site views (more than one-half mile) from the Appalachian/Long Trail should meet the Partial Retention VQO.

Current visual conditions within the project area meet VQO's from both onsite and offsite views.

3.12.4 Direct and Indirect Effects

Field review and computer modeling was used to determine visual effects and the subsequent mitigation measures needed to meet VQO's.

3.12.4.1 Alternative A – No Action

Alternative A would have no timber harvest and wildlife habitat treatments other than continued maintenance of openings (ski trails) maintained under Special Use Permit in the Bromley Ski Area and along a powe line corridor adjacent to SR 11/30. There would be no evidence of logging slash and tree stumps, but little opportunity for viewing scenery from on-site vistas located on NFS lands. Temporary vistas created by timber harvest would not be created along roads and trails in the project area. Roadside and trailside vistas that are growing in would continue to mature and limit views. Opportunities to view into the Dorset Peru Project Area would be limited to vistas on the AT/LT created by the Bromley Ski Area, from viewing opportunities created off-site along roads and private lands, or on-site through natural features such as beaver ponds and terrain features (i.e. rock outcrops, blow downs, and sparsely vegetated ridgelines with deciduous trees).

There would be no change to the landscape along ridgelines and side slopes in the GMNF lands in the project area other than through storm events and natural decay. Visual Quality Objectives would be met for all on-site and off-site views.

3.12.4.2 Alternative B – Proposed Action

Under Alternative B there would be a great deal of limbs and branches (slash) left over after timber harvesting is completed. Trees removed under the single tree selection, group selection, improvement cut, and thinning treatments leave less slash and tree stumps within the stand than the clearcut, land clearing, seed tree and shelterwood methods since fewer trees are harvested, and the remaining trees mask leftover slash and stumps. Land clearing to create permanent openings would include additional treatments (i.e. mechanical, hand cutting, and/or burning) to work toward creating natural appearing stands.

Stand treatments were located and designed to meet the public concern over visual impact to ridgelines from US 7, SR7A, SR11 and SR30. Some treatments were changed over the course of the development of the Proposed Action so that visual quality would be met. The shelterwood treatments proposed in C59 S15B would be designed with mitigation to maintain the “Retention” visual quality objective on the upper part of the ridgeline as viewed from US 7 and SR 7A (Mitigation Measure V-4).

Evidence of timber harvest activities would be apparent along roads, trails, and the general forest area, but are located and designed so that they do not create individual tree silhouette or visible notches void of trees on the ridgelines. Stands proposed for clearcut and shelterwood harvest treatments have been located away from areas of high viewer sensitivity or have additional mitigations specified to minimize visual impact (Appendix B). Some of these stands are proposed to be located on the interior of the project area away from roads and trails, and would not be visible on ridgelines from US 7, SR11 and SR30. Mitigation Measures V-1 to V-7 are intended to ensure adequate retention on the ridgeline and side slopes in C57 S1A, C59 S4A, C59 S4B, C59 S15A, C59 15B, C59 S16B, C59 S18, C60 S37, C63 S25, and C63 S30 to meet visual quality and public concern.

In C56 along the North Road, Mitigation Measures V-8 to V-10 were designed to meet visual quality of private lands and privacy/security near the GMNF Pump Station for Hapgood Pond.

Eight existing trailside and roadside vistas are prescribed for enhancement in the project area. These vistas are expected to be maintained over time. All but two (in the Taconic Range) of the vistas look out onto the project area. In addition to these eight vistas many of the vegetative treatments proposed along the roads and trails in the Dorset Peru Project Area would also serve as scenic vistas. Some of these would be maintained over time as permanent upland openings, and others would serve as temporary vistas from shelterwood and clearcut treatments until the vegetation grows back and block views.

By following mitigation measures for the Proposed Action alternative harvest treatments would fit into the landscape mosaic, and would meet the VQO's from on-site and off-site views.

3.12.4.3 Alternative C

Alternative C has similar visual effects of proposed timber harvest as Alternative B with the following exceptions.

This alternative has 104 acres (6%) less acres of timber harvest than Alternative B. This includes 44 acres of shelterwood harvest and the remainder in single tree selection and thinning treatments. These stands would be visible from off-site views in the vicinity of the Manchester Country Club on SR 7A and US 7 to the ridgeline and side slopes of the Green Mountains. By not having these stands proposed for treatment in this alternative, there would be 4 less stands treated on side slopes and ridgelines visible from areas of high visual sensitivity. In addition, Mitigation Measures V-3 and V-4 and portions of V-1 and V-7 would not need to be followed.

By following mitigation measures for Alternative C, harvest treatments would fit into the landscape mosaic and would meet the VQO's from on-site and off-site views.

3.12.5 Cumulative Effects

The visual resource cumulative effects analysis area is the same as for the direct and indirect effects. This analysis area was chosen since it offers vantage points that area at the height of land as well as road and trail locations that are directly adjacent to proposed activities. A fifteen year time frame was used to measure past timber harvest activities since this is the length of time assumed for a harvested stand to grow back to a condition when it begins to blend in with the adjacent forested stand and no longer appears as an opening (Table 2.3-3, Forest Plan, p. 39).

The cumulative effects of timber harvest activities and wildlife treatments would not impact visual quality in the Dorset Peru Project Area. Timber harvest activities would be similar to timber harvest activities that have occurred in the past. These past harvest activities have not adversely impacted the long-term, overall character of the landscape having retained forested conditions and created naturally appearing wildlife openings and scenic vistas.

As described in the Affected Environment, Section 3.1.3 of the Visual analysis, recent timber harvest activities (less than 15 years old) exist within the interior of the Dorset Peru Project Area on 1% of the NFS lands. Location and design of proposed treatments took these past timber and wildlife treatments into account. Locations of three of the proposed vistas (along FR58 and FR21) are stands that have had previous harvest activities within the last 15 years. Landings from past timber harvest activities would be used again for the Dorset Peru project to access stands proposed for harvest. In addition, new landings proposed for use would be expected to be reused some day for future harvest activities.

Future vegetation management activities would be expected to occur within the project area on both NFS and private lands although none other than those in this project are specifically identified for NFS lands. As with this project the design and location of future vegetation management activities on NFS lands would take these landscape changes into account, and ensure visual quality is maintained in the area. This may mean additional mitigation measures, limitations on the type of tree harvest used, or the avoidance of certain areas where visual quality would be compromised. The Forest Service has no control over vegetation management on private lands. Development has and will continue to open up private lands from forest to more open landscape. This could create opportunities to view NFS lands, and the management applied to these lands from new vantage points into the future.

There are no reasonably foreseeable future actions on private lands that are expected to substantially affect the visual resource.

3.13 Heritage Resources

3.13.1 Issue Statement

Although there were no public issues specifically related to Heritage Resources, this section provides a brief disclosure of the effects expected to this resource from proposed activities. Aspects of timber and terrestrial habitat work, stream/fisheries enhancements, NNIP treatments, vista maintenance, transportation actions, and trail work all have the potential to disturb archaeological remains located within the Dorset Peru Project Area through the physical disturbance of these surface and subsurface remains.

3.13.2 Direct and Indirect Effects Analysis Area

Heritage resource sites are bounded places on the landscape (e.g., the archaeological remains of a farm site, a standing historic structure, or a stone wall), thus the physical integrity of the resource is a local phenomenon. On this basis the direct and indirect effects analysis area for the heritage resource can generally be restricted to those areas directly affected by a physical project or activity. Therefore, for this project the analysis area, or “Area of Potential Effect” (APE), for heritage resources consists of the maximum acreage of activity areas in any of the project alternatives as well as any landings, access routes or trail re-routes that occur outside those specific, areas.

3.13.3 Affected Environment

Heritage resources are the archaeological and historic sites, structures, features, artifacts and landscapes left by people who lived and worked on the land in the past. A Forest Plan goal is to provide protection and stewardship for significant heritage resources on the GMNF (Goal 16, Forest Plan, p. 17).

More specifically, heritage resource sites on the Forest can include archaeological remains of Native American hunting and living sites, and sacred places, the remains of historic period farmsteads (such as cellar holes), mills, schools, cemeteries, stone fences/walls, transportation systems, charcoal kilns, and more; standing historic structures (including buildings, fire towers, CCC camps, Long Trail shelters, and cairns that are more than 50 years old); and occasionally, entire landscapes that still reflect a past condition, land-use and/or significant event. Heritage Resource sites are considered significant if they meet the criteria for inclusion on the National Register of Historic Places; if so, they are formally referred to as “Historic Properties”.

The Dorset Peru Project Area encompasses a dramatic range of natural resources and landscapes at least compared to some other areas on the GMNF. There is, thus, a correspondingly wide range of human economic activities (i.e., “life”) spanning a long period of time reflected on this landscape.

The project area contains the headwaters for both the Battenkill and Otter Creek, marking a strategic point on the regional landscape for Native Americans - the Abenaki (Haviland and Power 1994) and Mohican tribes, and their more ancient predecessors - and a natural route-of-least-resistance travel-way throughout time. In fact, the Otter Creek is referred to as the “Indian Road” (see Petersen 1990). While Native people traveled through, and hunted and lived on this land for thousands years, the current inventory of known sites in this part of the Forest is small (Lacy 1994, 1999) due largely to a lack of intensive survey. Nevertheless, there appears to be at least one area on NFS land within the Dorset Peru Project Area, but outside specific proposed activities which warrants further investigation.

This high potential area for prehistoric Native American sites is near a spring on recently acquired land in the valley.

The Euro-American historic trajectory is officially marked for both Peru and Dorset when they were chartered by New Hampshire's Governor Benning Wentworth in 1761. While it does not appear that there was substantial settlement prior to that time, there may have been a brief Dutch presence as early as 1724 - thus, the naming of the Battenkill (Humphrey 1924). There is an account of a raiding party from Fort Dummer passing through (and having a confrontation with Abenaki) in 1748 (Batchelder 1891), and at least a few homesteaders were present well before the official charter. The settlement of the area grew incrementally (moving north from Bennington) in the mid-1760s (Resch 1989) and didn't really take off until around the time of the Revolution. Still, this pattern reflects an earlier period of settlement activity than many of the exclusively upland towns that constitute the majority of (especially the northern) the GMNF.

On the east side of the study area, the timber resource has been exploited since the middle of the 19th century for lumber (including, apparently, making the railroad ties for the valley's train transport system) and charcoal (Rolando 1992). To the west are the great marble deposits and quarries that were the literal bedrock for that industry for a century or more. In between on the valley bottom, and up the Mettawee Valley, are the limestone-enriched and floodplain soils so suitable for agriculture through time. 18th and 19th century farmsteads (or their archaeological remains) are dispersed throughout the project area, disproportionately clustered in the lower elevations and, logically, aligned with historic transportation systems. Industrial activity is well-represented by the kilns and mills on the east side, the quarries to the west, and the blast furnaces and mill in and near Emerald Lake State Park in the valley. The Depression-Era Peru Camp of the Civilian Conservation Corps was on the very eastern edge of the project area and their contributions included construction of the Hapgood Pond Recreation Area.

3.13.4 Direct and Indirect Effects

3.13.4.1 Alternative A – No Action

There would be no adverse effect to any Historic Properties known to occur within the Area of Potential Effect within the Dorset Peru Project Area, since no ground disturbing activities would be implemented. The selection of Alternative A, however, would represent a missed opportunity to provide stewardship/enhancement for a number of sites within the project area.

3.13.4.2 Alternative B - Proposed Action and Alternative C

Significant activities proposed for Alternatives B and C include timber harvest and terrestrial habitat work, stream/fisheries habitat enhancements, vista maintenance and creation, trail (re)construction, soil-and-water conservation actions, and transportation activities (e.g., parking areas, minor improvements, spurs for timber access, closing and decommissioning roads). While many aspects of these proposed activities have the potential to adversely affect the condition of heritage resources (primarily through ground-disturbing activity resulting in the displacement of structural and artifactual components of heritage sites), implementation of the recommended Heritage Resource Mitigation Measures (Appendix B) would prevent such effects. Therefore, although the land-use history of the area is broad and long, and there are numerous heritage resource sites known within the Area of Potential Effect, neither Alternatives B nor C would have an adverse effect on any Historic Properties.

Alternatives B and C would provide opportunities for stewardship and enhancement of the condition of several historic properties, including cemetery, saw mill, blast furnace, charcoal kiln and home sites.

3.13.5 Cumulative Effects

The National Register of Historic Sites includes sites ("historic properties") that are significant at the local, state or national levels, and Forest Service staff is obligated to account for any impacts or effects Forest Service actions may have on them. Because heritage resource sites are by and large bounded places on the landscape, the physical integrity of the resource is largely a local phenomenon. Over the last 25 years there have been several Forest Service sponsored timber projects within the Dorset Peru Project Area, each of which met their National Historic Preservation Act, Section 106 responsibilities by identifying and protecting archaeological and historic sites. Prior to the late 1970s, however, it is difficult to determine how well heritage sites were protected. What can be said with some confidence is that there have been few if any direct effects over the last generation. In the absence of a direct or indirect effect on the specific, concrete remains of sites or their historic context in a project area, there can be no cumulative effects. Such is the case in this project: despite the number of past, present and foreseeable future actions and activities in the area, there is no evidence to suggest that there would be a further cumulative effect on either a specific site or the population of related historic properties in the community as a result of this undertaking.

3.14 Environmental Justice

3.14.1 Effects of the Alternatives

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Population and Low-income Populations," mandates that "…each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, policies, and activities on minority populations and low-income populations," (Executive Order 12898, February 11, 1994). Evidence shows that low income and minority populations bear a disproportionate risk of suffering adverse environmental conditions in their communities. Some examples of this problem include the siting of toxic waste facilities, garbage disposal operations, or unmonitored factory dumping grounds in impoverished or heavily ethnic areas. In order to protect the rights and health of these populations, the Executive Order dictates the consideration and analysis of the demographics of a proposed project's location within the NEPA framework.

Before a policy or proposal is implemented, the likelihood of a disproportionate effect on minority or low-income populations must be investigated and disclosed. The standards used to analyze a given project location are as follows:

1) If the demographics of a proposed location show a minority or low-income population greater than twice that of the State average, then the potential for environmental injustice exists;
2) If the demographics of a proposed location show a minority or low-income population greater than, but less than two times greater than the State average, and there are community-identified environmental justice issues, then the potential for environmental injustice exists; and
3) If the demographics of a proposed location show minority or low-income populations equal to or less than that of the State average, then the potential for environmental injustice is considered nonexistent, and there is no basis for disregarding the proposal on account of ethnic or financial discrimination.

Tables 3.14-1 and 3.14-2 compare the ethnic and income demographics for the county that potentially would be affected by the proposed actions (Bennington County) to the Vermont State averages. The project area lies within Bennington County.

Table 3.14-1: Ethnic Demographics by County				
County	**% Native American**	**% African American**	**% Asian**	**% Hispanic**
Bennington	0.8	0.8	0.7	0.7
Vermont Average.	0.4	1.0	1.3	1.5
Data compiled from U.S. Census Bureau, Census 2010 Demographic Profile Data[1].				

Table 3.14-1 demonstrates that all ethnic population segments in Bennington County are equal to or less than the State average. The proposed project is not expected to have a disproportionate effect on these ethnic populations. Project activities are not planned in areas in which concentrated ethnic populations reside, and no physical or financial ripple effects on ethnic populations are expected to occur.

Table 3.14-2: Income Demographics for the GMNF Region	
County	**% Below Poverty Level**
Bennington	13.8
Vermont Average	12.4
Data compiled from U.S. Census Bureau, Small Area Income and Poverty Estimates, 2010[2].	

Table 3.14-2 shows that Bennington County's poverty level is slightly greater than, but less than two times greater than the State average. The Forest Service is not aware of any community-identified environmental justice issues. Project activities are not planned in areas in which a disproportionately large poverty-level population resides, and no disproportionate impact on such populations is expected.

None of the alternatives considered are expected to adversely impact minority or low-income populations. There were no issues related to potential impacts on either of these demographic groups identified during public scoping.

[1]http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml accessed 4/16/2012
[2]http://www.census.gov/cgi-bin/saipe/saipe.cgi accessed 4/16/2012

Chapter 4. Consultation or Coordination

The Forest Service consulted the following individuals, federal, State, and local agencies, tribes and members of the public during the development of the Dorset Peru Project Environmental Assessment (EA).

4.1 USDA Forest Service Participation

The following Forest Service employees participated in development of the proposed action and/or preparation of the Dorset Peru Project EA as members of the Interdisciplinary Team (IDT), or provided technical assistance and/or review of the EA.

Table 4.1: Forest Service Participation

Name	Title	Area of Responsibility
1. Melissa Reichert	Forest Planner	IDT Leader, Recreation, Transportation (trails), Social Factors
2. Jay Strand	Forest NEPA Coordinator	IDT member
3. Carol Knight	NEPA Coordinator	Writer/Editor, IDT member
4. Kathleen Donna[1]	NEPA Coordinator	Writer/Editor, Water, IDT member
5. John Sease	District Wildlife Biologist	Wildlife, IDT member
6. Diane Burbank	Forest Ecologist	Ecology, IDT member
7. Jay Klink	District Silviculturist	Timber, Economics, IDT member
8. Chad VanOrmer[1]	Recreation, Heritage and Wilderness Program Manager	Recreation, Transportation (trails), IDT member
9. Jeff Tilley	Timber Management Assistant	Timber operations, IDT member
10. Chris Casey	Forest Silviculturist	Timber
11. Bill Peterson[1]	Forest Management Program Manager	Timber
12. Donna Marks	Landscape Architect	Visuals
13. Joan McCloud	Recreation and Trails Coordinator	Recreation, Trails
14. Kate Walker[1]	Recreation Technician	Trails, Botany, Non-Native Invasive Plants
15. Doug Reeves[1]	Wilderness and Appalachian/Long Trail (AT/LT) Coordinator	Wilderness, AT/LT
16. Jennifer Wright	Wilderness and Appalachian/Long Trail (AT/LT) Coordinator	Wilderness, AT/LT
17. Dave Lacy	Forest Archeologist	Cultural Resources
18. Eric Bowman	Biological Technician	Cultural Resources
19. John Kamb	Civil Engineer & Acting District Ranger	Transportation (roads)
20. Dave Bosch	Realty Specialist	Special Use Management
21. Pat D'Andrea	Realty Specialist	Land Ownership
22. Nancy Burt	Soil Scientist	Soils, wetlands
23. Dan McKinley	Fisheries/Wildlife Program Manager	Fisheries
24. MaryBeth Deller	Botanist	Botany, Non-Native Invasive Plants
25. Chris Schow[1]	Fire Management	Prescribed Fire, Smoke Emissions
26. Ralph Perron	Air Specialist	Air Resource
27. Dick Gaiotti[1]	Forestry Technician	Soil, Water
28. Scott Wixsom	Biological Technician	Fisheries

Table 4.1: Forest Service Participation		
Name	**Title**	**Area of Responsibility**
29. Bill Kirchhoff[1]	GIS Coordinator	Geographic Information Systems (GIS)
30. Gini Stoddard[1]	GIS Coordinator	GIS
31. Thomas Tenyah	GIS Coordinator	GIS
32. Mary Beth Poli	Biological Technician	GIS, Soils, Water
33. Erick Walker[1]	Deputy District Ranger	Public Involvement
34. Alex Sienkiewicz[1]	District Ranger	Responsible Official
35. Becky Ewing[1]	Acting District Ranger	Responsible Official
36. William Jackson	District Ranger	Responsible Official
[1]Employee has transferred to an off-Forest position or retired.		

4.2 Other Governmental Agencies Contacted

The following federal, State or local agencies were contacted during the environmental analysis process, and provided materials or information that was incorporated into the EA.

Table 4.2: Other Governmental Agencies Contacted	
Person Contacted	**Title and Agency**
1. Jim Henderson	Regional Planner/Environmental Projects Manager, Bennington County Regional Commission, Bennington, VT
2. Jay Maciejowski	Forestry District Manager, Vermont Agency of Natural Resources (VANR), Vermont Department of Forests, Parks and Recreation (VFPR), Springfield, VT
3. Maria Mayer	Parks Regional Manager, VANR, VFPR, Rutland, VT
4. Chris Stone	Bennington County Forester, VANR, VFPR, Bennington, VT
5. Nate Fice[1]	Bennington County Forester, VANR, VFPR, Shaftsbury, VT
6. Lisa Thornton	Stewardship Forester, VANR, VFPR, Rutland, VT
7. Eric Sorenson	Natural Communities Ecologist, VANR, Vermont Fish and Wildlife Department (VFWD), Waterbury, VT
8. Doug Blodgett	Wildlife Biologist, VANR, Vermont Fish and Wildlife Department (VFWD), Rutland, VT
9. Scott Darling	Wildlife Biologist, VANR, Vermont Fish and Wildlife Department (VFWD), Rutland, VT
10. Forrest Hammond	Wildlife Biologist, VANR, Vermont Fish and Wildlife Department (VFWD), Springfield, VT
11. David King	Research Wildlife Biologist, USDA Forest Service Northern Research Station, Amherst, MA

Chapter 5. References

Abrams, M.D. 1992. Fire and the development of oak forests. *BioScience*, Vol. 42. pp. 346-353.

American Association of State Highway and Transportation Officials (AASHTO). 2001a. A Policy on Geometric Design of Highways and Streets, 4th Edition. Washington DC

American Association of State Highway and Transportation Officials (AASHTO). 2001b. Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT<400). Washington DC

Andrews, J.S. 2005. "Review of the Affected Environment and Effects Analysis for Reptile and Amphibian Species of Potential Viability Concern in the Green Mountain National Forest Proposed Plan." Unpublished comments provided to the Green Mountain National Forest, Rutland, VT.

Batchelder, Ira K. 1891 (reprinted 1975). *Reunion Celebration Together with an Historical Sketch of Peru, Bennington County, Vermont, and Its Inhabitants from the First Settlement of the Town*. Peru Library Association, Peru, VT. 143 p.

Beckage, B. B. Osborne, D.G. Gavin, C. Pucko, T. Siccama, and T. Perkins. 2008. A rapid upward shift of a forest ecotone during 40 years of warming in the Green Mountains of Vermont. *Proceedings of the National Academy of Sciences,* Vol. 105, No. 11. pp. 4197-4202.

Brose, P., D. Van Lear, and R. Cooper. 1999. Using shelterwood harvests and prescribed fire to regenerate oak stands on productive upland sites. *Forest Ecology and Management,* Vol. 113. pp. 125-141.

Burbank, D.H. 2010. Climate change and potential impacts to vegetation and forested ecosystems on the Green Mountain National Forest. On file with USDA Forest Service, Green Mountain National Forest, 1007 Route 7 South, Middlebury, VT, 05753.

Burbank, D.H. 2011. Dorset-Peru Integrated Resource Project Environmental Assessment, Habitat Management Unit Analysis & Rationale for Habitat Objectives. 12 pp. Administrative Report in planning record. On file with USDA Forest Service, Green Mountain National Forest, 2538 Depot Street, Manchester Center, VT 05255.

Calfee, A.E. 1990. *Red oak regeneration in two shelterwoods in Vermont*. M.S. Thesis, University of Vermont, Burlington, VT. 56 p.

Carey, A.B. and R.O. Curtis. 1996. Conservation of biodiversity: a useful paradigm for forest ecosystem management. *Wildlife Society Bulletin* Vol. 24. pp. 610-620.

Casjens, Laurel 1978 "A Cultural Resource Overview of the Green Mountain National Forest, Vermont." Institute for Conservation Archaeology Report No. 72, Harvard University, Cambridge, MA.

Chandler, D.S. 2001a. "Species Data Collection Form for *Cicindela ancocisconensis*." Unpublished, US Department of Agriculture, Forest Service, Green Mountain National Forest, Rutland, VT.

Chandler, D.S. 2001b. "Species Data Collection Form for *Pieris virginiensis*." Revised by S. Lemieux, 2002. Unpublished, US Department of Agriculture, Forest Service, Green Mountain National Forest, Rutland, VT.

Coletti, C. 2002a. Species Data Collection Form for *Lanthus vernalis*." Revised by S. Lemieux, 2003. Unpublished, US Department of Agriculture, Forest Service, Green Mountain National Forest, Rutland, VT.

Coletti, C. 2002b. "Species Data Collection Form for *Somatochlora forcipata*." Revised by C. Persichilli, 2002. Unpublished, US Department of Agriculture, Forest Service, Green Mountain National Forest, Rutland, VT.

Coletti, C. 2002c. "Species Data Collection Form for *Tachopteryx thoreyi*." Revised by T. Gokee, 2003. Unpublished, US Department of Agriculture, Forest Service, Green Mountain National Forest, Rutland, VT.

Coletti, C. 2002d. "Species Data Collection Form for *Gomphus descriptus*." Revised by T. Gokee, 2003. Unpublished, US Department of Agriculture, Forest Service, Green Mountain National Forest, Rutland, VT.

Colter, A. 2009. "Soils and Climate Change." US Department of Agriculture, Forest Service, White Mountain National Forest, Campton, NH. 9 p.

Cooper, T.R., and K. Parker. 2011. "American woodcock population status, 2011." U.S. Fish and Wildlife Service, Laurel, Maryland. 17 p.

Crow, T.R. 1988. Reproductive mode and mechanisms for self-replacement of northern red oak (Quercus rubra) – a review. *Forest Science,* Vol. 34. pp. 19-40.

Darling S. and R. Smith. 2011. "Assessment of Vermont Cave Bat Populations and Proposal to List Bat Species." Unpublished report for the Vermont Fish and Wildlife Department, Rutland, VT. 19 p.

DeGraaf, R.M., M. Yamasaki, W.B. Leak, A.M. Lester. 2006. *Technical guide to forest wildlife habitat management in New England*. University of Vermont Press, Burlington, VT. 133 p.

Deller, M.B., Botanist and Non-native Invasive Plant Program Coordinator, Green Mountain and Finger Lakes National Forest, 2012, personal communication with J. Sease, February 3, 2012.

Godman, R.M., H.W. Yawney, and C.H. Tubbs. 1990. *Acer saccharum* Marsh. Sugar Maple. In: *Silvics of North America: Vol. 2. Hardwoods*, R.M. Burns and B.H. Honkala, technical coordinators. Agricultural Handbook 654. Washington DC, US Department of Agriculture, Forest Service. pp. 78-91.

Hamburg, S.P. and C.V. Cogbill. 1988. Historical decline of red spruce populations and climatic warming. *Nature,* Vol. 331. pp. 428-431.

Haviland, William A., and Marjory W. Power 1994 *The Original Vermonters: Native Inhabitants, Past and Present*. University Press of New England, Hanover, NH. 326 p.

Hornbeck, James W., and Kochenderfer, James N. 2000. "Forestry effects on water quality." A paper in the proceedings of the conference: Forestry and the Riparian Zone, October 26, 2000, University of Maine, Orono, Maine. 79 p.

Humphrey, Zephine. 1924. *The Story of Dorset, Vermont*. Charles E. Tuttle Company, Rutland, VT.

Institute of Transportation Engineers. 1997. Trip Generation, Vol. 1 of 3, 6th Edition. Single Family Detached Housing (210) p. 263. Washington DC

Iverson, L.R., T.F. Hutchinson, A.M. Prasad, and M.P. Peters. 2008a. Thinning, fire, and oak regeneration across a heterogeneous landscape in the eastern U.S.: 7-year results. *Forest Ecology and Management,* Vol. 255. pp. 3035-3050.

Iverson, L.R., A.M. Prasad, S.N. Matthews and M. Peters. 2008b. Estimating potential habitat for 134 US tree species under six climate scenarios. *Forest Ecology and Management,* Vol. 254. pp. 390-406.

Kelley, Richard G., Jr., 2011, conversation with Jay Klink, December 14, 2011.

Kibbe, D.P. 1985. Sedge Wren in: *The Atlas of Breeding Birds of Vermont*. Ed. Laughlin, S.B. and D.P. Kibbe. University of New England Press, Hanover, New Hampshire. pp. 228-229.

King, D.I., R.B. Chandler, S. Schlossberg, and C.C. Chandler. 2009. Habitat use and nest success of scrub-shrub birds in wildlife and silvicultural openings in western Massachusetts, USA. *Forest Ecology and Management*, Vol. 257. pp. 421-426.

Lacy, David M. 1994. Prehistoric land-use in the Green Mountains: A view from the National Forest. *Journal of Vermont Archaeology*, Vol. 1. pp. 92-102.

Lacy, David M. 1999. Myth busting and prehistoric land use in the Green Mountains of Vermont. In *The Archaeological Northeast*. Ed. Levine, Mary Ann, Kenneth E. Sassaman and Michael S. Nassaney. Bergin and Garvey, Westport, CT. pp. 115-124.

Langwig, K., A. Hicks, R. von Linden, C. Herzog, S. Darling, T. French, and J. Armstrong. 2009. "White nose syndrome related declines of hibernating bat species in the Northeast." Presentation at 39th Annual Symposium on Bat Research, November 4-7, 2009, Portland, Oregon.

Leak, W.B. 1976. *Relation of tolerant species to habitat in the White Mountains of New Hampshire*. USDA Forest Service, Northeastern Forest Experiment Station, Research Paper NE-351. 10 p.

Lee, T.D., J.P. Barrett, and D. Hartman. 2005. Elevation, substrate, and the potential for climate-induced tree migration in the White Mountains, New Hampshire, USA. *Forest Ecology and Management,* Vol. 212. pp. 75-91.

Leopold, A. 1972. *Round River, From the Journals of Aldo Leopold*. Oxford University Press, New York, NY. 173 p.

Lorimer, C.G. and A.S. White. 2003. Scale and frequency of natural disturbances in the Northeastern US: implications for early successional forest habitats and regional age distributions. *Forest Ecology and Management*, Vol. 185. pp. 41-64.

Marchowsky, K. 2001a. "Species Data Collection Form for *Alasmidonta varicosa*." Revised by T. Gokee, 2003. Unpublished, US Department of Agriculture, Green Mountain National Forest, Rutland, VT.

Marchowsky, K. 2001b. "Species Data Collection Form for *Glyptemys insculpta*." Revised by T. Gokee and J. Smith, 2003. Unpublished, US Department of Agriculture, Green Mountain National Forest, Rutland, VT.

Marchowsky, K. 2003c. "Species Data Collection Form for *Lasmigona compressa*." Revised by T. Gokee, 2003. Unpublished, US Department of Agriculture, Green Mountain National Forest, Rutland, VT.

Martin, C. Wayne, and Hornbeck, James W. 1994. Logging in New England need not cause sedimentation ofsStreams. *Northern Journal of Applied Forestry*, Vol. 11, No. 1. pp. 17-23.

Mattrick, C. 2009. "Climate change and botanical resources on the White Mountain National Forest." US Department of Agriculture, Forest Service, White Mountain National Forest, Campton, NH. 10 p.

Millen, W. 2009. "Estimating climate change effects on New England Forests – literature review and summary." US Department of Agriculture, White Mountain National Forest, Campton, NH. 2 p.

Millen, W. 2009b. "Forestry and climate change – Is there a role in forestry? What do we know at this point that's related to New England? A review of applicable literature." US Department of Agriculture, White Mountain National Forest, Campton, NH. 3 p.

Miller, Eric. 2005. "Assessment of Forest Sensitivity to Nitrogen and Sulfur Deposition in New Hampshire and Vermont." Conference of New England Governors and Eastern Canadian Premiers (NEG/ECP) Forest Mapping Group, December 15, 2005. Available: des.nh.gov/organization/divisions/air/tsb/tps/acidrain/documents/nh_forest_mapping_report_2005.pdf

NatureServe. 2012. *Tachopteryx thoreyi* (Hagen in Selys, 1858) gray petaltail. NatureServe Explorer: An online encyclopedia of life. Version 7.1. NatureServe, Arlington, Virginia. Available: www.natureserve.org/explorer. Accessed: 3 October 2012.

Nyland, R.D., L.P. Abrahamson, and K.B. Adams. 1982. "Use of fire for regenerating red and white oak in New York" in: America's Hardwood Forests: Opportunities Unlimited. Proceedings of the Society of American Foresters National Convention, September 19-22, 1982, Cincinnati, OH. pp. 163-167.

Petersen, James E. 1990. *Otter Creek: The Indian Road*. Dunmore House, Salisbury, VT.

Prout, L. 2009. "Climate change and wildlife – summary of available literature." US Department of Agriculture, White Mountain National Forest, Campton, NH. 11 p.

Purdy, Julia. 2009. Origins of the Green Mountain National Forest VT: In the Aftermath of Environmental Disaster, A Managed Forest is Born. Environmentalism @ Suite 101. Available: www.julia-purdy.suite101.com/origins-of-the-green-mountain-national-forest-a99420.

Reay, R.S., D.W. Blodgett, B.S. Burns, S.J. Weber, and T. Frey. 1990. "Management guide for deer wintering areas in Vermont." Vermont Department of Forests, Parks, and Recreation and Vermont Department of Fish and Wildlife. Waterbury, VT. 40 p.

Resch, Tyler. 1989. *Dorset: in the Shadow of the Marble Mountain*. Phoenix Publishing for the Dorset Historical Society, West Kennebunk, Maine. 405 p.

Resch, Tyler. 1975. *The Shires of Bennington, A Sampler of Green Mountain Heritage*. Published by the Bennington Banner for the Bennington Museum, Bennington, VT. 220 p.

Rimmer, C., J. Lambert, and K.P. McFarland. 2005. "Bicknell's Thrush conservation strategy for the Green Mountain National Forest." VINS Technical Report 05-5, Vermont Institute of Natural Science, Woodstock, VT. 28 p.

Rimmer, C., K.P. McFarland, W.G. Ellison, and J.E. Goetz. 2001. Bicknell's Thrush (*Catharus bicknelli*), The Birds of North America Online (A. Poole, Ed.). Cornell Lab of Ornithology; Ithaca, NY. Available: bna.birds.cornell.edu/bna/species/592.

Rodewald, A.D. and A.C. Vitz. 2005. Edge-and area-sensitivity of shrubland birds. *Journal of Wildlife Management,* Vol., 69. pp. 681-688.

Rolando, Victor R. 1992. *200 Years of Soot and Sweat*: *The History and Archaeology of Vermont's Iron, Charcoal and Lime Industries*. Vermont Archaeological Society and Mountain Publications, Manchester Center, VT. 296 p.

Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2011. *The North American breeding bird survey, results and analysis 1966 - 2009. Version 3.23.2011.* USGS Patuxent Wildlife Research Center, Laurel, MD.

Scarl, J., Vermont Center for Ecostudies, Norwich, VT, personal communication to J. Sease, February 10, 2012.

Schlossberg, S. and D.I. King. 2007. "Ecology and management of scrub-shrub birds in New England: a comprehensive review." Report submitted to US Department of Agriculture, Natural Resources Conservation Service, Resource Inventory and Assessment Division. 120 p.

Schlossberg, S. and D.I. King. 2008. Are shrubland birds edge specialists? *Ecological Applications*, Vol. 18, No. 6. pp. 1325-1330.

Shugart, H., R. Sedjo, and B. Sohngen. 2003. Forests and global climate change, potential impacts on U.S. forest resources. PEW Center on Global Climate Change. 64p. Available: www.pewclimate.org/docUploads/forestry.pdf.

Solomon, D.S. and W.B. Leak. 1994. *Migration of tree species in New England based on elevational and regional analyses*. USDA Forest Service, Northern Research Station, Radnor, PA, Research Paper NE-688. 13 p.

State of Vermont. 1987. "Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont." Agency of Natural Resources, Department of Forests, Parks, and Recreation, Waterbury, VT. 56 p. Available:
http://www.vtfpr.org/watershed/documents/Amp2006.pdf

State of Vermont. 2005. "Appendix A1, Bird species of greatest conservation need. Vermont's wildlife action plan (formally the comprehensive wildlife conservation strategy)." Agency of Natural Resources, Fish & Wildlife Department, Waterbury, VT.

State of Vermont. 2008. . "Annual Harvest Report". Vermont Department of Forests, Parks and Recreation, Division of Forests, Waterbury, VT.

State of Vermont. 2008. "Mammals of Vermont." Agency of Natural Resources, Fish & Wildlife Department, Nongame and Natural Heritage Program, Waterbury, VT. Online content accessed November 21, 2008.

State of Vermont. 2010. 2010 Vermont Forest Resources Plan – "State Assessment and Resource Strategies." Agency of Natural Resources, Vermont Department of Forests, Parks and Recreation, Waterbury, VT.

State of Vermont. 2011. "Cumulative records of past vegetation activities, Emerald Lake State Park." Agency of Natural Resources, Department of Forest, Parks, and Recreation, Waterbury, VT. 10 p.

State of Vermont. 2011. "Rare and Uncommon Animals of Vermont." .Agency of Natural Resources, Fish and Wildlife Department, Nongame and Natural Heritage Program, Waterbury, VT. Online content accessed July 25, 2011.

State of Vermont. 2008. Vermont Air Quality Plots. Agency of Natural Resource, Vermont Department of Environmental Conservation, Air Pollution Control Division, Waterbury, VT. Available:

http://www.anr.state.vt.us/air/Monitoring/htm/PM2524hrTrends.htm
http://www.anr.state.vt.us/air/Monitoring/htm/PM25AnnualTrends.htm

Stone, Chris, 2011, email communication with Jeffrey Tilley, October 24, 2011.

Stuart, Gordon W., and Edwards, Pamela J. 2006. Concepts about forests and water. *Northern Journal of Applied Forestry*, Vol. 23, No. 1. pp. 11-19.

Sweeney, J. 2002. "Species Data Collection Form for *Hemidactylium scutatum*." Revised by M. Marchand, 2002. Unpublished, US Department of Agriculture, Green Mountain National Forest, Rutland, VT.

Toth, E. 2000. "A systematic review of the selection, use, and monitoring of management indicator species on the Green Mountain and Finger Lakes National Forests." Unpublished

Report, US Department of Agriculture, Green Mountain and Finger Lakes National Forests, Rutland, VT. 35 p.

Tumosa, J. 2001a. "Species Data Collection Form for *Canis lupis*." Revised by M.A. Stevens, 2002. Unpublished, US Department of Agriculture, Green Mountain National Forest, Rutland, VT.

Tumosa, J. 2001b. "Species Data Collection Form for *Catharus bicknelli*." Revised by A. Gokee, 2002. Unpublished, US Department of Agriculture, Green Mountain National Forest, Rutland, VT.

Tumosa, J. 2001c. "Species Data Collection Form for *Euphagus carolinus*." Revised by C. Persichilli, 2002. Unpublished, US Department of Agriculture, Green Mountain National Forest, Rutland, VT.

Tumosa, J. 2001d. "Species Data Collection Form for *Falco peregrinus anatum*." Revised by C. Persichilli, 2002. Unpublished, US Department of Agriculture, Green Mountain National Forest, Rutland, VT.

Tumosa, J. 2001e. "Species Data Collection Form for *Gavia immer*." Revised by M. Boehme, 2002. Unpublished, US Department of Agriculture, Green Mountain National Forest, Rutland, VT.

Tumosa, J. 2001f. "Species Data Collection Form for *Lynx canadensis*." Revised by D. Batchelder, 2002. Unpublished, US Department of Agriculture, Green Mountain National Forest, Rutland, VT.

Tumosa, J. 2001g. "Species Data Collection Form for *Myotis leibii*." Revised by J. Belwood, 2002, and S. Lemieux, 2003. Unpublished, US Department of Agriculture, Green Mountain National Forest, Rutland, VT.

Tumosa, J. 2001h. "Species Data Collection Form for *Myotis sodalis*." Revised by S. Lemieux, 2003. Unpublished, US Department of Agriculture, Green Mountain National Forest, Rutland, VT.

Tumosa, J. 2001i. "Species Data Collection Form for *Puma concolor couguar*." Revised by M.A. Stevens, 2002. Unpublished, US Department of Agriculture, Green Mountain National Forest, Rutland, VT.

Tumosa, J. 2002. "Species Data Collection Form for *Haliaeetus leucocephalus*." Revised by M. Boehme, 2002. Unpublished, US Department of Agriculture, Green Mountain National Forest, Rutland, VT.

US Department of Agriculture, Forest Service. 1974. *National Forest Landscape Management Volume 2*, Agriculture Handbook 462. Washington DC, US Department of Agriculture, Forest Service.

US Department of Agriculture, Forest Service. April 2005. Report: "Acid Deposition and its Potential Effects on Soil Productivity and Timber Management in the Green Mountain National Forest, Vermont." Green Mountain National Forest, Rutland, VT 25 p.

US Department of Agriculture, Forest Service, 2006a. Green Mountain National Forest Land and Resource Management Plan (2006 Forest Plan). Eastern Region, Milwaukee, Wisconsin. 164 p. plus Appendices. On file with: Forest Supervisor, Green Mountain and Finger Lakes National Forests, 231 North Main St., Rutland, VT 05701.

US Department of Agriculture, Forest Service 2006b. Final Environmental Impact Statement, Green Mountain National Forest Land and Resource Management Plan. 390 p. with appendices. On file with: Forest Supervisor, Green Mountain and Finger Lakes National Forests, 231 North Main St., Rutland, VT 05701.

US Department of Agriculture, Forest Service 2006c. Record of Decision, Final Environmental Impact Statement, Green Mountain National Forest Land and Resource Management Plan. 54 p. On file with: Forest Supervisor, Green Mountain and Finger Lakes National Forests, 231 North Main St., Rutland, VT 05701.

US Department of Agriculture, Forest Service, 2008c. "Forest Service Strategic Framework for Responding to Climate Change." Washington Office. 22 p.

US Department of Agriculture, Forest Service. March 4, 2009. Report: "Soil, Water and Riparian Monitoring in Harvest Areas, Monitoring Results from 2005-2008." Green Mountain National Forest, Rutland, VT. 5 p.

US Department of Agriculture, Forest Service, Green Mountain National Forest. 2011a. "FY 2011 Bid Monitoring Report-Green Mountain and Finger Lakes National Forests". Unpublished report, Rutland, Vermont. 2 p.

US Department of Agriculture, Forest Service, Green Mountain National Forest. 2011b. "Dorset Peru Integrated Resource Project: Trail Feasibility Assessment." Unpublished report, Green Mountain and Finger Lakes National Forests Rutland, Vermont.

US Department of Agriculture, Forest Service. 2012a**.** Dorset-Peru Integrated Resource Project Biological Evaluation for Threatened, Endangered, and Sensitive Plants. Administrative Report in planning record. On file with USDA Forest Service, Green Mountain National Forest, 2538 Depot Street, Manchester Center, VT 05255.

US Department of Agriculture, Forest Service. 2012b**.** Biological Evaluation of the Dorset-Peru Integrated Resource Project on Federally-listed Endangered, Threatened and Proposed Species and Regional Forester Sensitive Species. On file with USDA Forest Service, Green Mountain National Forest, 2538 Depot Street, Manchester Center, VT 05255.

US Department of Agriculture, Forest Service. 2012c. "Dorset Peru Integrated Resource Project – Soil and Wetland Information by Compartment and Stand." Administrative Report in planning record, Soil and Wetlands Specialist's Report. On file with USDA Forest Service, Green Mountain National Forest, 2538 Depot Street, Manchester Center, VT 05255. 4 p.

US Department of Agriculture, Forest Service, Green Mountain National Forest. 2012d. "Green Mountain Forest Vegetation Management and Timber Program". Unpublished report, Rutland, Vermont. 2 p.

US Department of Agriculture, Forest Service. 2012e. "Working Bibliography of Publications on the Effects of Climate Change on Forest Soils, Applicable to the Dorset Peru Project Area,

Green Mountain National Forest." Administrative Report in planning record. On file with USDA Forest Service, Green Mountain National Forest, 2538 Depot Street, Manchester Center, VT 05255. 2 p.

US Department of Agriculture, Forest Service. 2012f. "Timber Harvest Access Routes – Soil and Wetlands Protection Measures." Administrative Report in planning record. On file with USDA Forest Service, Green Mountain National Forest, 2538 Depot Street, Manchester Center, VT 05255. 4 p.

US Department of Agriculture, Forest Service. 2012g. "Travel Analysis for the Dorset Peru Integrated Resource Project." Green Mountain National Forest." Rutland, VT.

US Department of Commerce: Census Bureau. US Census 2010. Data available at: http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk. Washington DC

University of Vermont, LAND Stewardship Program. 2010. "Soil Disturbance Monitoring in the Green Mountain National Forest." USDA Forest Service, Green Mountain National Forest, Rutland, VT. 23 p.

Villars, Thomas, US Department of Agriculture, Natural Resources Conservation Service. 2004. "A Review of the Impacts to Soils from Prescribed Burns and Other Activities on Overgrown Meadows and Thickets in the Finger Lakes National Forest." USDA Forest Service, Green Mountain National Forest, Rutland, VT. 12 p.

Vermont Breeding Bird Altas. 2012a. Sedge wren. Vermont Center for Ecostudies, Norwich, VT. Online content accessed February 9, 2012.

Vermont Breeding Bird Altas. 2012b. Rusty blackbird. Vermont Center for Ecostudies, Norwich, VT. Online content accessed February 9, 2012.

VNHIP (Vermont Natural Heritage Information Project). 2011a. Mammals of Vermont. Vermont Fish and Wildlife Department. 15 July 2011.

VNHIP (Vermont Natural Heritage Information Project). 2011b. Birds of Vermont. Vermont Fish and Wildlife Department. 15 July 2011.

VNHIP (Vermont Natural Heritage Information Project). 2011c. Reptiles and amphibians of Vermont. Vermont Fish and Wildlife Department. 15 July 2011.

VNHIP (Vermont Natural Heritage Information Project). 2011d. Rare and uncommon animals of Vermont. Vermont Fish and Wildlife Department. 15 July 2011.

VRAA (Vermont Reptile and Amphibian Atlas). 2012a. *Glyptemys insculpta*, wood turtle. Available online: http://community.middlebury.edu/~herpatlas/ (30 October 2012).

VRAA (Vermont Reptile and Amphibian Atlas). 2012b. *Ambystoma jeffersonianum*, Jefferson salamander. Available online: http://community.middlebury.edu/~herpatlas/ (30 October 2012).

VRAA (Vermont Reptile and Amphibian Atlas). 2012c. *Ambystoma laterale*, blue-spotted salamander. Available online: http://community.middlebury.edu/~herpatlas/ (30 October 2012).

VRAA (Vermont Reptile and Amphibian Atlas). 2012d. *Hemidactylium scutatum*, four-toed salamander Available online: http://community.middlebury.edu/~herpatlas/ (30 October 2012).

Wright, K. 2002a. "Species Data Collection Form for *Ambystoma jeffersonianum*." Revised by T Gokee and J. Smith, 2003. Unpublished, US Department of Agriculture, Green Mountain National Forest, Rutland, VT.

Wright, K. 2002b. "Species Data Collection Form for *Ambystoma laterale*." Revised by T Gokee and J. Smith, 2003. Unpublished, US Department of Agriculture,Green Mountain National Forest, Rutland, VT.

Chapter 6. Abbreviations and Acronyms

AMP Acceptable Management Practices
APE Area of Potential Effect
ASQ Allowable Sale Quantity
AT Appalachian National Scenic Trail
ATV All-Terrain Vehicle
BE Biological Evaluation
C Compartment
CCC Civilian Conservation Corps
CCF Hundred Cubic Feet
CEQ Council for Environmental Quality
CFR Code of Federal Regulations
CH4 Methane
CO2 Carbon Dioxide
DBH Diameter at Breast Height
DFC Desired Future Condition
DWA Deer Wintering Area
EA Environmental Assessment
EIS Environmental Impact Statement
EPA Environmental Protection Agency
FEIS Final Environmental Impact Statement
FH Forest Highway
FR Forest Road
FT Forest Trail
FSH Forest Service Handbook
FSM Forest Service Manual
GHG Greenhouse Gas
GMNF Green Mountain National Forest
HMU Habitat Management Unit
IDT Interdisciplinary Team
IRA Inventoried Roadless Area
IPCC Intergovernmental Panel on Climate Change
LT Long National Recreation Trail
LWD Large Woody Debris
MA Management Area
MBF One Thousand Board Feet
MMBF One Million Board Feet
MIS Management Indicator Species
NEPA National Environmental Policy Act
NF National Forest
NFMA National Forest Management Act
NFS National Forest System
NFSR National Forest System Road
NFST National Forest System Trail
NNIP Non-Native Invasive Plants
NRCS Natural Resource Conservation Service
NWI National Wetland Inventory
O&M Operation and Maintenance
OML Operation Maintenance Level
RA Roadless Area
RACR Roadless Area Conservation Rule
RFSS Regional Forester Sensitive Species
RMO Road Management Objective
ROD Record of Decision
ROS Recreation Opportunity Spectrum
RPA Rangeland Renewable Resources Planning Act of 1974
S Stand
S&Gs Standards and Guidelines
SOPA Schedule of Proposed Actions
SR State Route
SUP Special Use Permit
TC Trail Class
TE Threatened or Endangered
TES Threatened, Endangered, and Sensitive
TH Town Highway
TSI Timber Stand Improvement
USDA United States Department of Agriculture
USFS United States Forest Service
VAST Vermont Association of Snow Travelers
VFPR Vermont Department of Forests, Parks and Recreation
VFWD Vermont Fish and Wildlife Department
VQO Visual Quality Objective
WNS White Nose Syndrome

Appendix A: Summary of Proposed Wildlife Habitat and Timber Management Treatments

Table A-1: Proposed Wildlife Habitat Treatments.

Apple tree/soft mast release and pruning: Release and prune all apple trees throughout the stand.

Comp	Stand	Acres	Treatment Acres		Additional Information
			Alt. B	Alt. C	
56	8	30	1	1	Within stand proposed for clearcut/permanent opening
58	15	47	1	1	Partly within inventoried roadless area (IRA).
62	101	1	1	1	
62	103	1	1	1	
--	--	--	--	--	Other stands found to include apple trees that are discovered during project layout.
Total Acres		**79**	**4**	**4**	

Clearcut for aspen/birch regeneration (also included in Table A-2: Summary of Proposed Timber Treatments).

Comp	Stand	Acres	Treatment Acres		Additional Information
			Alt. B	Alt. C	
56	8	30	25	25	
60	5	37	15	15	
61	25	9	9	9	
Total Acres		**76**	**49**	**49**	

Restore and/or maintain existing permanent upland opening: Mechanical, mowing, hand cutting, and/or burning treatment methods.

Comp	Stand	Acres	Treatment Acres		Additional Information
			Alt. B	Alt. C	
39	106	10	10	10	Meadow maintained under a previous NEPA decision
56	102	3	3	3	Expand into Stand 8
61	104	1	1	1	Expand into Stand 14
61	106	1	1	1	Within IRA; expand into Stands 24 and 43
62	101	1	1	1	Expand into Stands 2, 27, and 103
62	103	1	1	1	Expand into Stands 2, 27, and 101
227	102	9	9	9	Hayfield maintained under a previous NEPA decision
Total Acres		**26**	**26**	**26**	

Land clearing to create permanent upland opening (also included in Table A-2: Summary of Timber Treatments); Restore as needed: Mowing, hand cutting and/or burning treatment methods.

Comp	Stand	Acres	Treatment Acres		Additional Information
			Alt. B	Alt. C	
56	2	12	8	8	Combine with part of S12 for one opening.
56	4	43	6	6	Combine with parts of S28 and C 62/S21 for one opening.
56	8	30	5	5	Combine with S102 for one larger opening.
56	10	33	3	3	Combine with part of S17 for one opening.
56	12	36	10	10	Combine with part of S2 for one opening.
56	17	84	15	15	Combine with part of S10 for one opening.

Table A-1: Proposed Wildlife Habitat Treatments.

56	28	19	3	3	Combine with parts of C 56/S4 and C 62/S21 for one opening.
Comp	**Stand**	**Acres**	**Treatment Acres**		**Additional Information**
			Alt. B	**Alt. C**	
57	1	80	16	16	
57	5	88	18	18	
58	8	43	19	19	
60	5	37	17	17	
61	13	27	14	14	
61	14	28	12	12	Combine with S104 for one opening
61	24	82	3	3	Combine with S106 and part of S43 for one opening; within IRA.
61	43	22	3	3	Combine with Stand 106 and part of S24 for one opening.
62	1	47	17	17	
62	2	41	11	11	Combine with S101, S103, and part of S27 for one opening.
62	12	30	19	19	
62	21	32	10	10	Combine with parts of C 56/S28 and 4 for one opening.
62	27	18	3	3	Combine with S101, S103, and part of S2 for one opening.
63	48	25	12	12	
Total Acres		**857**	**224**	**224**	
Create down woody debris habitat: Cut and leave trees on site; scatter and/or pile debris for wildlife habitat.					
--	--	--	--		Stands found during project layout which include heritage sites that require vegetation cutting for restoration.
Total Acres		**--**	**--**		

Table A-2: Proposed Timber Harvest Treatments

Compartment 56

Stand	Acres	Forest Type	Harvest Method	Harvest acres	
				Alt. B	Alt. C
2	12	Hardwood	Land Clearing for Permanent Wildlife Opening	8	8
3	25	Mixedwood	Single Tree Selection in two blocks	23	23
4	43	Hardwood	Land Clearing for Permanent Wildlife Opening	6	6
5	5	Mixedwood	Improvement Cut, aspen release	5	5
6	7	Mixedwood	Thinning, aspen release	7	7
7	15	Hardwood	Improvement Cut, aspen release	10	10
8	30	Softwood	Land Clearing for Permanent Wildlife Opening	5	5
8	30	Softwood	Clearcut for aspen, spruce/fir	25	25
9	22	Hardwood	Improvement Cut, aspen release	22	22
10	33	Hardwood	Land Clearing for Permanent Wildlife Opening	3	3
11	16	Hardwood	Single Tree Selection	16	16
12	36	Hardwood	Thinning	25	25
12	36	Hardwood	Land Clearing for Permanent Wildlife Opening	10	10
13	28	Hardwood	Thinning	28	28
14	23	Hardwood	Seed Tree	20	20
14	23	Hardwood	Improvement Cut	3	3
15	12	Hardwood	Improvement Cut	10	10
16	30	Hardwood	Improvement Cut	19	19
17	84	Hardwood	Land Clearing for Permanent Wildlife Opening	15	15
17	84	Hardwood	Thinning	48	48
28	19	Mixedwood	Land Clearing for Permanent Wildlife Opening	3	3
28	19	Mixedwood	Single Tree Selection	9	9

Compartment 57

Stand	Acres	Forest Type	Harvest Method	Harvest acres	
				Alt. B	Alt. C
1	80	Mixedwood	Land Clearing for Permanent Wildlife Opening	16	16
1	80	Mixedwood	Single Tree Selection	64	64
2	23	Mixedwood	Single Tree Selection	5	5
5	88	Hardwood	Land Clearing for Permanent Wildlife Opening	18	18
10	8	Mixedwood	Single Tree Selection, softwood release	8	8

Compartment 58

Stand	Acres	Forest Type	Harvest Method	Harvest acres	
				Alt. B	Alt. C
8	43	Hardwood	Land Clearing for Permanent Wildlife Opening	19	19
8	43	Hardwood	Overstory Removal Cut	20	20
14	38	Hardwood	Single Tree Selection	38	38
15	47	Hardwood	Thinning	45	45
16	67	Hardwood	Three-cut Shelterwood, softwood release	28	28
16	67	Hardwood	Single Tree Selection, softwood release	35	35
18	63	Hardwood	Three-cut Shelterwood, softwood release in two blocks	33	33
18	63	Hardwood	Single Tree Selection, softwood release	16	16
19	71	Hardwood	Single Tree Selection	26	26
22	9	Hardwood	Single Tree Selection	9	9

Table A-2: Proposed Timber Harvest Treatments

Compartment 59

Stand	Acres	Forest Type	Harvest Method	Harvest acres	
				Alt. B	Alt. C
4	55	Hardwood	Two-cut Shelterwood	25	25
4	55	Hardwood	Single Tree Selection	26	26
11	28	Hardwood	Shelterwood with Reserves, enhance oak	28	28
15	61	Hardwood	Two-cut Shelterwood	25	**0**
15	61	Hardwood	Single Tree Selection	31	**0**
16	36	Mixedwood	Thinning	8	8
16	36	Mixedwood	Group Selection	17	17
18	40	Hardwood	Thinning	18	**0**

Compartment 60

Stand	Acres	Forest Type	Harvest Method	Harvest acres	
				Alt. B	Alt. C
4	9	Hardwood	Two-cut Shelterwood	9	9
5	37	Hardwood	Clearcut for aspen/paper birch	15	15
5	37	Hardwood	Land Clearing for Permanent Wildlife Opening	17	17
21	63	Hardwood	Improvement Cut	35	35
21	63	Hardwood	Two-cut Shelterwood	28	28
29	52	Hardwood	Group Selection	10	10
29	52	Hardwood	Two-cut Shelterwood in two blocks	17	17
32	36	Hardwood	Two-cut Shelterwood	14	14
35	21	Hardwood	Shelterwood with Reserves	19	**0**
36	8	Hardwood	Thinning	4	**0**
37	12	Hardwood	Thinning	7	**0**
45	17	Hardwood	Two-cut Shelterwood	17	17

Compartment 61

Stand	Acres	Forest Type	Harvest Method	Harvest acres	
				Alt. B	Alt. C
2	22	Hardwood	Two-cut Shelterwood	22	22
5	33	Hardwood	Improvement Cut	9	9
5	33	Hardwood	Two-cut Shelterwood	24	24
7	90	Hardwood	Improvement Cut	1	1
7	90	Hardwood	Two-cut Shelterwood Removal in 3 blocks	61	61
7	90	Hardwood	Single Tree Selection, softwood release	26	26
10	20	Hardwood	Three-cut Shelterwood	20	20
13	27	Hardwood	Land Clearing for Permanent Wildlife Opening	14	14
14	28	Hardwood	Land Clearing for Permanent Wildlife Opening	12	12
15	8	Hardwood	Single Tree Selection	8	8
18	31	Hardwood	Single Tree Selection	22	22
19	31	Hardwood	Two-cut Shelterwood	23	23
23	36	Hardwood	Improvement Cut	36	36
24	82	Hardwood	Land Clearing for Permanent Wildlife Opening	3	3
25	9	Mixedwood	Clearcut for softwood and aspen/paper birch	9	9
37	28	Hardwood	Improvement Cut	28	28
40	11	Hardwood	Improvement Cut in two blocks	9	9
42	16	Hardwood	Single Tree Selection	12	12
43	22	Hardwood	Land Clearing for Permanent Wildlife Opening	3	3
44	27	Hardwood	Seed Tree	27	27
46	27	Hardwood	Group Selection	27	27

Table A-2: Proposed Timber Harvest Treatments

Stand	Acres	Forest Type	Harvest Method	Harvest acres	
				Alt. B	Alt. C
Compartment 62					
1	47	Hardwood	Improvement Cut	19	19
1	47	Hardwood	Land Clearing for Permanent Wildlife Opening	17	17
2	41	Hardwood	Land Clearing for Permanent Wildlife Opening	11	11
4	15	Hardwood	Single Tree Selection, release softwoods	15	15
6	32	Hardwood	Thinning	32	32
9	34	Hardwood	Improvement Cut	14	14
10	54	Hardwood	Improvement Cut	41	41
11	8	Hardwood	Single Tree Selection	8	8
12	30	Hardwood	Land Clearing for Permanent Wildlife Opening	19	19
12	30	Hardwood	Single Tree Selection, release softwoods	11	11
13	15	Hardwood	Single Tree Selection	12	12
18	44	Hardwood	Improvement Cut	26	26
19	29	Hardwood	Improvement Cut	7	7
21	32	Hardwood	Thinning	4	4
21	32	Hardwood	Improvement Cut	11	11
21	32	Hardwood	Land Clearing for Permanent Wildlife Opening	10	10
23	60	Hardwood	Thinning	60	60
24	13	Hardwood	Improvement Cut	12	12
25	17	Hardwood	Thinning	17	17
27	18	Softwood	Land Clearing for Permanent Wildlife Opening	3	3
33	9	Mixedwood	Improvement Cut	9	9
Compartment 63					
Stand	**Acres**	**Forest Type**	**Harvest Method**	**Harvest acres**	
				Alt. B	**Alt. C**
8	73	Hardwood	Single Tree Selection	21	21
23	9	Hardwood	Improvement Cut	9	9
24	12	Mixedwood	Improvement Cut	12	12
25	28	Hardwood	Two-cut Shelterwood	27	27
27	39	Hardwood	Improvement Cut	39	39
29	13	Hardwood	Thinning	13	13
30	69	Hardwood	Single Tree Selection	63	63
48	25	Hardwood	Improvement Cut	13	13
48	25	Hardwood	Land Clearing for Permanent Wildlife Opening	12	12
49	14	Hardwood	Single Tree Selection	14	14
Total Stand Acres:				***2,780 acres***	
Total Harvest Acres:				***Alt B: 2,047 ac.***	***Alt C: 1,943 ac.***

Table A-3: Summary of Proposed Timber Harvest Treatments

Summary of Proposed Harvest Treatments	Harvest Acres	
	Alt. B	Alt. C
Uneven-Aged Harvest Treatments		
Hardwood Single Tree Selection with gaps to regenerate uneven-aged hardwoods	306	275
Hardwood Single Tree Selection with gaps to create an uneven-aged mixedwood stand	103	103
Mixedwood Single Tree Selection with gaps to regenerate uneven-aged softwoods/hardwoods	109	109
Total Single Tree Selection	**518**	**487**
Hardwood Group Selection to regenerate uneven-aged hardwoods	37	37
Mixedwood Group Selection to regenerate uneven-aged softwoods	17	17
Total Group Selection	**54**	**54**
Even-Aged Harvest Treatments		
Hardwood Thinning to improve composition, growth and spacing	301	272
Mixedwood Thinning to improve composition, growth and spacing	15	15
Total Thinning	**316**	**287**
Hardwood Improvement Cut to improve stand health	341	341
Hardwood Improvement Cut to improve stand health and release aspen	32	32
Mixedwood Improvement Cut to improve stand health	21	21
Mixedwood Improvement Cut to improve stand health and release aspen	5	5
Total Improvement Cuts	**399**	**399**
Hardwood Three-cut Shelterwood to regenerate even-aged hardwoods	20	20
Hardwood Three-cut Shelterwood to regenerate even-aged softwoods	61	61
Total Three-cut Shelterwood	**81**	**81**
Hardwood Two-cut Shelterwood	292	267
Total Two-cut Shelterwood	**292**	**267**
Hardwood Shelterwood with Reserves to regenerate even-aged hardwoods and oak	28	28
Hardwood Shelterwood with Reserves to regenerate even-aged hardwoods	19	0
Total Shelterwood with Reserves	**47**	**28**
Hardwood Overstory Removal Cut to release young hardwood saplings and small trees	20	20
Total Overstory Removal Cut	**20**	**20**
Hardwood Seed Tree cut to regenerate even-aged hardwoods	47	47
Total Seed Tree	**47**	**47**
Hardwood Clearcut to regenerate aspen and/or birch	15	15
Mixedwood Clearcut to regenerate softwoods and aspen/birch	9	9
Softwood Clearcut to regenerate aspen and spruce/fir	25	25
Total Clearcut	**49**	**49**
Land Clearing to Convert Forest to Openings		
Hardwood Land Clearing to convert stand into a permanent upland wildlife opening	197	197
Mixedwood Land Clearing to convert stand into a permanent upland wildlife opening	19	19
Softwood Land Clearing to convert stand into a permanent upland wildlife opening	8	8
Total Land Clearing to Convert Forest to Openings	**224**	**224**
Total Uneven-aged Harvest Treatment	***572***	***541***
Total Even-aged Harvest Treatment	***1,251***	***1,178***
Total Land Clearing	***224***	***224***
TOTAL HARVEST TREATMENT	***2,047***	***1,943***

Table A-4: Summary of Proposed Stand Improvement.

Stand	Stand Acres	Forest Type	Treatment Method	Treatment Acres	
				Alt. B	Alt. C
Compartment 56					
4	43	Hardwood	Crop tree release	37	37
10	33	Hardwood	Crop tree release	29	29
Compartment 61					
14	28	Hardwood	Crop tree release	15	15
45	8	Hardwood	Crop tree release	8	8
Total Stand Acres				***112***	***112***
Total Stand Improvement Treatment				***89***	***89***

Table A-5: Summary of Reforestation Activities (Site Preparation for Natural Regeneration or Artificial Regeneration following all Clearcut, Seed Tree, Shelterwood, Single Tree Selection and Group Selection Harvests).

Forest Type	Alternative B (acres)	Alternative C (acres)
Hardwood	929	854
Mixedwood	135	135
Softwood	25	25
Total Acres	***1,089***	***1,014***

Appendix B: Mitigation Measures

The Green Mountain National Forest Land and Resource Management Plan (Forest Plan) established Forest-wide and Management Area Standards and Guidelines (S&Gs) to mitigate potential adverse effects of management activities (Forest Plan, Chapter 2, Section 2.3; and Chapter 3). The Dorset Peru Integrated Resource Project (Dorset Peru) Project Area has been designed to be consistent with all Forest Plan S&Gs. Although S&Gs are usually implemented without any need for repetition in site-specific NEPA documents, there are occasions when clarifications specific to a project is needed to ensure compliance with the Forest Plan. Mitigation measures have also been developed specifically for the Dorset Peru Project to address resource concerns beyond those addressed by Forest Plan S&Gs.

Listed below are relevant S&G clarifications and mitigation measures associated with the Dorset Peru Project by resource area. They apply to all action alternatives (Alternatives B and C) unless specifically stated otherwise.

SOCIAL FACTORS

<u>Apply to Harvest Zone 3 – Compartments 59 and 60 (town highways - Chandolin and Bromley Forest Roads)</u>

SF-1 Temporary traffic controls defined in a traffic control plan will be used that provide road users with adequate warning of hazardous or potentially hazardous conditions associated with timber harvesting operations.

SF-2 All timber harvest operations will be conducted during the winter operating season.

SF-3 Ways to minimize the number of winter seasons will be considered during project implementation.

SF-4 Forest Service staff will work with the Town of Winhall to develop any appropriate restrictions to hauling activities on Chandolin and Bromley Forest Roads. Restrictions to be considered may include:

- No hauling activities on weekends and federal holidays.
- No hauling or restricted hauling activities during school bus pick-up and drop-off times.
- Keeping town road plowed to the widest extent possible.

RECREATION

R-1 Temporary traffic controls will be used that provide road users with adequate warning of hazardous or potentially hazardous conditions associated with timber harvesting operations.

R-2 Trail tread will be restored back to pre-harvest conditions following completion of harvest activities.

R-3 Skid Road crossings on trails will be perpendicular to the trail tread and have a site distance safe enough to allow visibility for recreation users.

R-4 Skid roads that cross system trails will be “slashed in” (place 6 inches or less diameter tree branches in a random natural appearing pattern along the width of the road where it intersects the trail to a height of 2 to 3 feet and a depth of 6 to 8 feet) prior to completion of harvest activities.

R-5 Where feasible fell trees away from the trail prism to reduce slash immediately adjacent to the trail.

R-6 Forest Service staff will work with adjacent property owners when determining an alignment for the Emerald Lake Connector Trail.

Apply to Corridor 7 (FT385) and FR 21.

R-7 Ways to minimize the number of winter seasons impacted by operation and to maximize the possibility for summer harvest operations will be considered during project implementation (see S-2).

R-8 Hauling activities will not take place on weekends and federal holidays unless snowmobile use will not be occurring due to snow conditions.

R-9 Limit the depth to which snow may be plowed and/or retain an unplowed lane to facilitate snowmobile use.

R-10 Purchaser and Forest Service will agree to a specific traffic control plan for each individual project prior to commencing operations to address safety concerns associated with snowmobile traffic including:

- placing speed limits on haul trucks in areas where the road is shared with snowmobiles
- providing haul truck drivers with schedule of snowmobile tours using the area.

WILDLIFE

W-1 The Dorset Peru IRP project area includes a known Indiana bat hibernaculum, Aeolus (Dorset) Cave. Timber harvest within 5 miles of Aeolus Cave from April 15 through October 30 shall be in accordance with provisions of a management plan for that hibernaculum which was developed in consultation with the US Fish and Wildlife Service and the Vermont Fish and Wildlife Department. Timber harvest shall not take place within 5 miles of the Aeolus hibernaculum from April 15 through October 30 until such a management plan is in effect.

W-2 For thinning, single tree and group selection, and overstory removal treatments in stands with wetlands, a shade buffer should be left around the wetland to maintain water levels and temperatures for amphibian habitat.

W-3 Apple tree release and pruning will occur throughout the project area wherever live apple trees are found, including within the 100 ft. zone of wetlands, to improve mast production for wildlife.

W-4 Maintenance of wildlife openings will not be done between May 15 and August 1st unless surveys indicate nesting birds are not an issue.

W-5 In units where summer harvest is planned, consider retention of trees near wildlife cover areas (eg. Rock piles and large woody debris/logs) within 50' of wetland areas to minimize the potential disturbance or individual mortality to reptiles and/or amphibians during operations.

TIMBER MANAGEMENT

TM-1 Where harvest occurs to regenerate aspen, the timing of harvest shall be in the winter. This includes C56, S5, 6, 7, 8, 9; C60, S5; and C61, S25. In stands not proposed for regeneration treatment but where aspen is present, silvicultural prescriptions will be designed to promote aspen propagation. Winter harvest is preferred. This includes C56, Stands 5, 6, 9; C57, Stands 1, 2.

THREATENED, ENDANGERED AND SENSITIVE SPECIES PLANTS

T-1 Anywhere that trees will be harvested, do not cut healthy butternut trees are on the RFSS list for the GMNF.

T-2 Prior to maintenance of wildlife openings, botanical surveys will occur followed by development of plans to minimize impacts to any plants on the RFSS list found there.

T-3 Prior to project implementation, botanical surveys will occur in the following locations, and if any plants on the RFSS list occur there project activities will be designed to avoid them:

- The proposed Emerald Lake Connector, Dorset Mountain Trails, and on any proposed changes to the East Dorset Trail
- NFSR 58 parking lot expansion site and locations of culvert work
- Two temporary haul road locations – off Chandolin Road (Winhall TH 72) and the curb-cut permit area off 259.

NON-NATIVE INVASIVE PLANTS

N-1 Prior to project implementation, the following will have surveys for NNIP:

a. Legal Town Trail 8 from Rte. 7 across Beech Ridge into proposed new landing
b. The proposed new haul road off Chandolin Road in to proposed new landing H3L1
c. The power line ROW that cuts through HZ4, is on the north edge of HZ 5, and cuts through HZ6
d. The skid Road (FR 285) that comes into HZ 7 from US 7
e. The proposed Emerald Lake Connector and Dorset Mountain Trails
f. The Mettawee LWD project site, starting from its southern access point, and continuing upstream to the point where NNIP are no longer found
g. The Little Mad Tom LWD project site, starting at the end of FR 21, where there are known infestations, and continuing downstream and upstream to the point where NNIP are no longer found
h. Openings proposed for maintenance that have not already been surveyed
i. On Dorset Legal Trail 10 and Forest Road (FR) 259 Mad Tom Road, the location of any new trail head or parking lot proposed by the town
j. The proposed parking lot expansion site on FR 58

k. In the general vicinity of sites where we propose to construct temporary haul roads for timber access and new log landings.
l. All sites where we propose to improve access to NFS lands over new permanent or temporary access permits or easements
m. All sites where previously used temporary roads would need to be reopened to access existing landing locations
n. All existing log landings proposed for use during vegetation management

N-2 Incorporate measures to prevent the introduction and spread of NNIP whenever developing plans to increase cooperation with local governments on management of the Forest and town road infrastructure.

SOIL AND WATER

S-1 Implement soil and wetland protection measures described in the following spreadsheets (both reside in the Project Record) unless other options are identified during project implementation which provide equal or greater resource benefits:

a) Timber Harvest Access Routes – Soil and Wetland Protection Measures (USDA-FS 01/30/2012)
b) Dorset Peru Soil and Wetland Information by Compartment and Stand (USDA-FS 02/01/2012).

S-2 Commercial harvest would be done in winter, in most stands. However, a small number of stands have soils, road, and landing access suited to harvest operations in the driest part of summer. These stands are listed in Table B-1, below. A small number of additional stands may be identified by the soil specialist as suited to summer harvest, if for example more suitable haul/skid routes are identified, special harvest equipment is used, or there is a particularity dry summer.

Table B-1 Stands with Soils Suited to Summer Harvest.

Compartment	Stands
56	6, 7, 8, 9; also 2, 10, 11, 12, 14, 15, 16, and 17, if wet spots on the haul road are hardened.
57	1, 2, 5, 10
61	2, 5, 7, 13, 14, 23, 40

Sources: USDA-FS 01/30/2012 and USDA-FS 02/01/2012, both available in the Project Record, Soil and Wetland Specialist's Report.

S-3 Bole-only harvesting would be done in all stands except those planned for conversion to wildlife openings. This measure limits nutrient removal associated with harvesting harvesting by leaving tops and slash on site to decompose naturally.

S-4 Commercial harvesting would be avoided in areas of shallow and/or steep soils, greater than approximately one-quarter acre in size. Shallow soils are less than 20 to 25 inches deep over bedrock. Steep slopes have a slope gradient of over 50 percent. This measure maintains soil productivity in these areas.

S-5 Prescribed burning would be done only when overall mineral soil heating would be low. This would minimize soil nutrient losses. In addition, burning would not be done in areas dominated by outcrops and soils less than 12" deep over bedrock.

S-6 The exact location of the first mile of the East Dorset Trail, beginning at the National Forest boundary to the west, would be reviewed by a soil specialist prior to final decisions on the trail location and design. This is important to minimize the effects on steep, shallow, or unstable soils along the trail.

FISHERIES

F-1. Dorset Mountain trail in the vicinity of the private spring and pond will be located and designed in cooperation with the adjacent landowner to avoid altering water quantity and quality.

F-2. Placement of whole trees for LWD would be done in sections of stream that are less than 35 feet wide to address concerns for downstream infrastructure.

AIR

A-1 *Smoke Ahead* signs will be placed on all paved roads that will be impacted by nighttime smoke.

A-2 The Burn Boss will implement the ignition phase of the project to allow fuels to combust prior to a valley inversion setting in.

A-3 Burning will be conducted under atmospheric conditions with a smoke dispersion index of "Good" or better.

SCENERY

<u>Views to Ridgelines and side slopes from SR7, SR7A, SR11 and SR30</u>

V- 1. In single tree selection units C57 S1A, C59 S4B, C59 S15A(alt B only), and C63 S30 work with the Landscape Architect to layout stand so harvest is not evident on the ridgeline as viewed from US 7,SR7A, SR11 and SR30. This may involve harvesting individual trees and fewer small groups in some portions of the stands.

V-2. In group selection units C59 S16B limit size of group to less than 1 acre and locate in a linear shape with the contour so the harvest is not evident from US 7 or SR7A.

V-3. In thinning units in C59 S18 (Alternative B only) and C60 S37 (Alternative B only) work with the GMNF Landscape Architect to leave a higher BA and only cut individual trees in portions of the stand visible from the vicinity of the Manchester Country Club on SR7A so that the ridgeline does not appear sparse of trees.

V- 4. In the proposed shelterwood unit in C59 S15B (Alt B only) work with the GMNF Landscape Architect to layout stand to meet the Retention VQO on the upper part of the ridge as viewed from the vicinity of the Manchester Country Club on SR7A and US 7 north of the Exit 4 ramp. Trees would be harvested in the traditional shelterwood on the natural benches within the stand, and be retained (some thinning within the bands could occur) perpendicular to the slope in bands located on portions of the side slopes. In addition, a feathering technique should

occur to ease in and out of the bands of trees that are retained. The intention is that the shelterwood treatment would not be visible from US Highway 7 (to the casual Forest visitor) since the bands would screen the remaining parts of the stand from view. Monitoring of this stand would occur after the initial harvest to confirm that the subsequent treatments (i.e. site prep and overstory removal) would also meet VQOs and what mitigations would be needed.

V- 5. In the shelterwood unit in C63 S25 work with the GMNF Landscape Architect to leave a patch of higher BA toward the upper reaches of the stand in the north east corner to best meet the VQO. Have the GMNF Landscape Architect monitor the harvest before proceeding with the next phase of the shelterwood treatment schedule to help determine when overstory should be removed (possibly more than 3-5 years as proposed and closer to 10 years as described in the 2006 Forest Plan).

V-6. In C59 S4A work with GMNF Landscape Architect to leave more trees on the highest elevation of the stand so individual trees left in the shelterwood on the ridgeline are not visible from US 7 and seen as a silhouette against the skyline.

V-7. In the shelterwood units in C59 S15B (Alt B only), C59 S4A, and C63 S 25 have the GMNF Landscape Architect monitor the harvest unit after the first harvest and before prescribing the site preparation for these stands in case portions of the stand would best meet VQOs with more stems left in place.

Wildlife Opening Maintenance, Conversion and Vista Maintenance

V-8. Retaining some existing mature trees or recruiting some young trees is desirable along the edge of the road or trail where it meets the vista or wildlife opening to enhance the view. This need not be done in each stand but should be implemented where visual quality would be enhanced.

V-9. Along North Road retain trees along the private property line on the east side of C56 S8B and the south side of C56 S102 for the aesthetic of the view for the private property owner and the Town of Peru playground. Some of these trees are the larger boundary trees.

V-10. Retain windfirm vegetative screening (including red pine where possible) in C56 S102 and C56 S8A for the protection and security of the Hapgood Pond Recreation Area Pump Station.

Clearcut and Shelterwood Treatments (including wildlife openings) along Roads and Trails

V-11. Units that have recreation trails and roads adjacent to them and are prescribed for clearcut and shelterwood harvests will be designed and marked to meet the visual condition for moderate viewer sensitivity guidelines (Table 2.3-3 in Forest Plan). Where the length of harvest along trails exceeds 200 feet (for clearcut and shelterwood units), along roads exceeds 200 feet (for clearcut units) and exceeds 400 feet along roads (for shelterwood units), mark the remaining stand to leave enough trees to create a visual buffer for a minimum depth of 100 feet with at least 1,000 feet between openings.

Slash Treatments

V-12. Where timber harvest takes place adjacent to recreation trails and maintained residential areas, lop and scatter remaining slash within 25 feet of the residential boundary and each side of recreation trails to within 2 feet of the ground.

V-13. Where timber harvest takes place adjacent to roads pull back remaining slash from the road edge a minimum of 25 feet, then lop and scatter to within 2 feet of the ground so as not to create an unnatural edge.

V-14. Beyond the 25 foot slash free area, reduce slash to within 2 feet of the ground for 25 to150 feet distance back from SR7A, SR11/30, and North Road (Peru). For remaining roads that have harvesting adjacent to roads (not skid roads), lop slash to within 2 feet of the ground for 25 to 100 feet distance back from road edges where visible from the roads except for the section of FR 21 where it is located south of the intersection with FR58 where slash can be reduced to 3 feet of the ground for 25 to100 feet distance.

HERITAGE

H-1. Historic period archaeological sites will have a buffer zone to protect the site from disturbance. Ideally this buffer zone is customized to reflect the kind of site, its associated features, level and location of prior use or disturbance, as well as the nature of the proposed project activity. In the absence of a unique/specified buffer (or the incidental discovery of a site during project layout or implementation) the Vermont Division for Historic Preservation has determined that the default buffer is 200 feet in every direction. Alternately, customization may lead to harvest activities within the site area under circumstances that minimize disturbance and maximize benefit to the site's condition. Such measures are agreed to by the Forest Archaeologist and the Sale Administrator.

H-2. Harvest Zones ("HZ") have been identified within the Dorset-Peru project area. An HZ is an area within which landings, skid routes and other actions related to harvest activities in nearby units may be established. Heritage Resource Mitigation Measures are necessary in 4 HZs, as follows:

- *Harvest Zone 7*: Two sites (Drt-027.00 & -027.01), consisting of a cellar hole and a possible small barn foundation, were reported more than 20 years ago during a previous timber sale survey in the northeast portion of this HZ near the stream. We were not able to re-locate them during recent (2006, 2011) field surveys, possibly because they were swept away during tropical storm Irene or perhaps they were mis-mapped. This Measure is to ask timber markers to monitor the area and report if they encounter these remains during their work.

- *Harvest Zone 11*: The remains of five 19th c. charcoal kilns (Pru-050.03) lie on the downslope sides of the existing landing in the northern end of HZ-11. No expansion of the landing in the direction of the sites should be allowed. The opportunity to do some stewardship "clean up" exists.

- *Harvest Zone 14*: Pierce Road extension leads to the existing landing in HZ-14. Re-opening and expansion of the landing should be planned in coordination with the Forest archaeologist (see Mitigation Measure H-6).

- *Harvest Zone 15*: establishment of the new proposed landing along Savage Road should be planned in coordination with the Forest Archaeologist to protect historic archaeological remains in that area.

H-3. The several Heritage Resource sites along the proposed East Dorset Trail (cellar hole, charcoal kilns, mill remains, bridge abutments) will be identified/flagged on the ground by the Forest Archaeologist prior to implementing the trail improvement project(s) so they can be avoided/protected.

H-4. The Forest will consult with the VT Division for Historic Preservation to determine "best methods" for the preservation of the stone retaining walls along the existing East Dorset Trail and Mad Tom Brook prior to implementation of the trail rehabilitation/reconstruction project.

H-5. Proposed re-routes of the East Dorset Trail (e.g., to avoid areas that have been washed out and/or to find a route that does not require dangerous stream crossings) will be surveyed by the Forest Archaeologist before implementation.

H-6. Pierce Road (NFSR 258, TH 18) extension: the proposed extension of this road for access into US Tract 27/HZ-14 involves Road, Timber, and Soil-&-Water resources. The proposed route passes through a maze of stone walls and the remains of an upland farm (partially buried by the present landing). Re-opening and expansion of the landing as well as the layout/location of the road should be planned in coordination with the Forest Archaeologist in order to protect these Heritage Resources.

H-7: The Forest Archaeologist should survey the proposed location of the Emerald Lake Connector Trail before implementation (including the Heritage Drt-38 District) given the proximity of at least one known historic period archaeological site.

NOTE: General mitigation measures for areas sensitive for the location of prehistoric Native American sites seek to ensure that disturbance to the subsurface soil horizon in which these sites do, or may, exist is avoided or minimized. This can be accomplished through avoidance of the area altogether, operating over-snow (8 to 12 inches) or frozen ground conditions, or through the use of alternative harvest technologies such as tracked feller buncher machines or helicopters. In the Dorset-Peru project area, however, none of the stands where proposed activities will take place appear to warrant this treatment: by applying predictive criteria established by the Vermont Division for Historic Preservation and through extensive walk-over reconnaissance, it has been concluded that all proposed activity areas are either too far from water, too steep, too wet, or a combination of all three to warrant concern.