Deer Ridge Integrated Resource Project
Berlin and Milan Townships, Coos County, NH
Environmental Assessment
Androscoggin Ranger District
January 2017

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Cover photo: A conk growing on an American beech in the Deer Ridge Project Area (WMNF photo).
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Disclaimer: The Forest Service uses the most current and complete data available. The accuracy of GIS and other data products (e.g., tables and figures) may vary. These data may be: developed from sources differing in accuracy, accurate only at certain scales, based on modeling, interpretation, or estimates, incomplete while being created or revised, etc. Using GIS or other products for purposes other than those for which they were created, may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify, or replace GIS products without notification.
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Chapter 1 - Proposed Action and Purpose and Need

Summary

The Deer Ridge Integrated Resource Project (Deer Ridge Project) is designed to promote desired wildlife habitat and vegetation conditions outlined in the 2005 White Mountain National Forest (WMNF) Land and Resource Management Plan (USDA Forest Service 2005a; Forest Plan), improve recreational opportunities, provide a sustained yield of high quality sawtimber and other forest products, and manage the transportation system to meet administrative and public needs.

The project is located on the Androscoggin Ranger District of the WMNF, in the towns of Milan and Berlin in Coos County, New Hampshire. This document provides the details of an environmental analysis of the Proposed Action as well as No Action, which were analyzed for this project.

This document, based on and tiered to the 2005 WMNF Forest Plan Final Environmental Impact Statement (USDA Forest Service 2005b; FEIS), analyzes the effects from implementation of the proposed Deer Ridge Project to physical, biological, and social resources. Chapters 1 and 2 of this document provide background information, public involvement, issues, and a detailed description of the Proposed Action and other alternatives considered for the project. The effects of the alternatives on aquatic habitats and fisheries, Federal Threatened, Endangered, and Proposed species (TEP), Regional Forester Sensitive Species (RFSS), heritage, recreation, scenery, socioeconomics and environmental justice, soil, vegetation, water, and wildlife were analyzed in detail and are included in Chapter 3 of this Environmental Assessment.

The Deer Ridge Project would help to achieve the desired future conditions described in the Forest Plan (pp. 1-3 to 1-22) and as discussed in the Purpose and Need section of this report. All proposed activities would be undertaken within the scope of the Forest Plan’s goals and objectives and Standards and Guidelines.

This project would incorporate a variety of project design features to minimize impacts to natural, cultural, and social resources. The design features would protect water resources, maintain high quality wildlife habitat features, protect public health and safety, reduce adverse impacts
to scenic quality from timber harvest activities, protect cultural resources, protect trail integrity, and minimize impacts to forest visitors recreating in the Project Area. The majority of the proposed project activities would be implemented over the next 5 to 10 years. Table 1 contains the site specific activities that would be implemented under the Proposed Action for the Deer Ridge Project. Chapter 2 of this document describes additional details on the Proposed Action and other alternatives for this project.

The Proposed Action alternative for the Deer Ridge IRM project, as well as the analysis of its effects described in this document, are confined in scope to the area of the WMNF within which they are contained. Neither the Environmental Assessment, nor the eventual decision document will apply to or set precedent for any area outside of this project.

**Deer Ridge Project Area**

The Deer Ridge Project is in the northern section of the WMNF in the Upper Ammonoosuc River Watershed in the South Pond South Habitat Management Unit (HMU, Figure 1). The HMU is generally defined to the north by a ridgeline which includes Rogers Ledge, Square Mountain, and Greens Ledge; to the east by the Upper Ammonoosuc River; to the west by the Unknown Pond hiking trail; and to the south by the West Branch of the Upper Ammonoosuc River. This HMU is approximately 9,014 acres with approximately 6,289 acres in Management Area (MA) 2.1 (where vegetation management can occur). The remaining lands are in MA 6.1 and 6.2. The terrain ranges from 1,100 to 2,300 feet, and the soil type is primarily a well-drained, fine till.

The Deer Ridge Project Area encompasses approximately 3,778 acres (Figure 2). Commercial and non-commercial treatments are proposed on approximately 2,450 gross acres of forest stands with approximately 1,070 net acres undergoing silvicultural treatment to meet vegetation and wildlife habitat objectives. The gross acres include the area of stands being treated while the net acres include just the areas of harvest. For example, in group selection treatments, harvest is only completed on 15-20% of the total stand area.

The Project Area is composed of a diversity of habitats of varying forest types and age. The majority of the area consists of northern hardwood stands comprised of sugar and red maple, yellow birch, beech, ash, aspen, and paper birch. Also within the Project Area are several mixedwood,
aspen-birch and spruce-fir stands. The spruce-fir habitat includes both red spruce-balsam fir and Norway spruce; three stands of Norway spruce were planted in the Project Area in the early-1930s. There is a minor component of white pine and hemlock in several stands.

The Project Area includes a number of forest roads, several water bodies and perennial streams, and three permanent wildlife openings. Recreational resources include trailheads and portions of the Mill Brook and Unknown Pond hiking trails and segments of the Rocky Pond Snowmobile trail. Many of the Fish Hatchery and Barry Conservation Camp structures are within the Project Area.

The Project Area doesn’t contain any Congressionally-designated Wilderness Areas or Wild and Scenic Rivers, nor are there any lands included in the 2001 Roadless Area Conservation Rule. There are approximately 390 acres in the northwestern portion of the Project Area that were identified as having roadless characteristics during the 2005 WMNF Land and Resource Management Plan (USDA 2005a) revision process. The Project Area also contains segments of the West Branch of the Upper Ammonoosuc River (classified as scenic) and the Upper Ammonoosuc River (classified as recreational) that were determined to be eligible for listing under the Wild and Scenic River Act during the 2005 Forest Plan revision process.

All actions proposed for this project are on MA 2.1: General Forest Management lands. MA 2.1 allows for a range of uses and activities, including timber harvest, prescribed fire, roads, snowmobiling, and developed campgrounds (Forest Plan, pp. 3-3 to 3-8). The Project Area also includes approximately 60 acres of lands designated as MA 6.2: Semi-Primitive Non-Motorized Recreation (Forest Plan, pp. 3-23 to 3-26), but no actions are proposed on these lands.

HMUs are areas of Forest land in which habitat composition and age class objectives are established to help ensure that habitats are well-distributed across the Forest (Forest Plan, pp. 1-20 to 1-21). The results from an analysis of the South Pond South HMU were integrated into the development of the Deer Ridge project to help ensure a connection between WMNF landscape-level goals and objectives and project-level ecological conditions. Applicable Forest Plan goals and objectives, and Standards and Guidelines were also used to develop the Deer Ridge project proposal.
The purpose of this project is to work towards the vegetation, wildlife habitat, transportation, and recreation goals and objectives established by the Forest Plan for MA 2.1 lands in the South Pond South HMU (Forest Plan pp. 1-20 to 1-21, 3-3 to 3-8). Lands in MA 2.1 were identified in the Forest Plan as those areas where silviculture practices (both even-aged and uneven-aged) would be used to meet timber, ecological, visual, and recreational objectives (Forest Plan p. 3-3).

The need for the project is identified by 1) comparing existing habitat conditions within the South Pond South HMU to the desired conditions for MA 2.1 lands and 2) assessing other Forest resources for issues that need to be addressed to meet desired conditions. The actions proposed by this project are designed to maintain existing desirable conditions and to improve conditions where necessary to more closely meet the desired conditions established by the Forest Plan.

The Deer Ridge Project addresses ecosystem management within the Project Area, and within the broader context of the WMNF and New England. This project is designed to maintain and promote a sustainable, healthy forest using relevant, current scientific knowledge and to address concerns associated with other resources in the Project Area including transportation and recreation. The purpose and need for action to address specific resources is described in detail below.

**Vegetation Management and Wildlife Habitat Improvement**

Provide sustainable forest products

The WMNF represents approximately 15% of New Hampshire’s forested lands and contributes about 2% annually to New Hampshire’s economy through harvest activities. Approximately 15% of the area within the Androscoggin Valley-Mahoosuc region (where this project is located) is public lands and these lands accounts for over 25% of the total acres of sawtimber (Mahaffey 2014).

One of the goals of the Forest Plan is to “Manage vegetation using an ecological approach to provide healthy ecosystems and a sustainable yield
of high quality forest products with special emphasis on sawtimber and veneer” (USDA Forest Service, 2005a p.1-17). From a forest products perspective, sustainable management of public lands is very important to local businesses associated with timber harvesting and processing because it provides a dependable and stable source of income, and the high quality sawtimber provides a higher profit margin (Mahaffey, 2014). A report by the Northern Forest Investment Initiative found that “While private lands have been producing high volumes of pulpwood, publicly-owned lands have been growing a significant amount of top-quality, high-value sawlogs. For instance, data show that 57% of the total Grade 1 (16 inches DBH or greater) hardwood sawlog removals in the State of New Hampshire are contributed by this federal ownership. The WMNF is practicing exemplary silviculture that benefits the forest-based economy and communities of the region.” (Mahaffey 2014).

Upon harvest, these high value wood products generate income that flows into local economies. In 2012, The Center for Rural Partnerships at Plymouth State University did a study for the New Hampshire Timberland Owners Association (NHTOA) to estimate the economic contribution of the logging industry to New Hampshire’s economy (Lee 2014). Using the IMPLAN model, economic multipliers were generated for labor income, value added and output. From 2003 to 2014, the WMNF sold over $17,129,000 of forest products in the form of pulp and sawlog. Applying multipliers generated by the IMPLAN, the timber program over the past twelve years generated $8,564,500 in additional labor income, $5,138,700 of added value, and $15,416,140 of additional output. This equates to the WMNF contributing over $3.8 million annually to New Hampshire’s economy.

A long term objective of silvicultural prescriptions proposed in this project is to provide a sustainable supply of wood products while also providing a diversity of age classes and product classes (sawlogs and pulpwood) to support a healthy forest-based economy. The majority of the stands (98%) in the project area are northern hardwoods, mixedwood or softwoods comprised of shade tolerant or intermediate shade tolerant species which are well-suited for uneven-aged treatments. The treatments proposed are rooted in sustainable management and will maintain over 80% of the treated area in the mature age class while accomplishing the following
goals: (1) promote stand diversity through new age-classes; (2) improve forest health and vigor through removal of poor quality and damaged trees; (3) capture optimum economic value from trees before they lose grade or succumb to mortality; and (4) improve growth on residual trees through individual tree removal.

Manage forest habitats consistent with Ecological Land Types (ELT)

Vegetation management within the Project Area and across all suitable lands on the Forest is intended to “use an ecological approach to provide both healthy ecosystems and a sustainable yield of high quality forest products” (Forest Plan, p. 1-17). Managing forest composition for the broad habitat types (northern hardwood, mixed hardwood-softwood, and spruce-fir forest) consistent with the Ecological Land Types (ELT) is a Forest Plan wildlife habitat objective (p. 1-20). Monitoring has shown successful conversion of stands from the existing forest type to types more consistent with the ELT (Wigler 2015). The WMNF describes its lands by permanent ecological features. This provides a basis to relate all plans and activities to the inherent capability of the land. It is also provides a mechanism for summarizing other characteristics of the landscape. The approach, known as ecological classification and inventory, has been used locally for about twenty-five years. The idea is to describe landscapes which share common biological and physical features. It is meant to separate this mountainous terrain into relatively large, general areas useful for long range land use planning (land type associations) and smaller delineations (ELT) more useful for site specific projects. ELTs are areas of land ranging from 100 to a few 1000 acres in size with a well-known succession of forest species on unique soil materials. ELT classification is based on geomorphic history, nature of soil substrata, and potential natural vegetation.

The review of the South Pond South HMU showed differences between current forest conditions and land capability. Where current conditions do not match objectives for forest habitat types and age classes, silvicultural prescriptions are needed to move stands closer to desired conditions. For example, there are opportunities in the Project Area to initiate conversion of some northern hardwoods forest types to mixedwood forest types.

Another example is the Norway spruce plantations that are situated on soils that support northern hardwoods (Figure 3). Increasing the amount of sunlight reaching the forest floor in these plantations would result in
regeneration of sugar and red maple, yellow birch as well as a smaller component of paper birch, aspen and spruce-fir. This would better align the stands with their ELT which would lead to more vigorous and healthier stands that are more resilient to the anticipated effects of climate change.

Figure 3. This non-native Norway spruce plantation has little structural complexity and low species diversity.

Promote Forest Health and Vigor

The purpose of this project includes managing for long-term forest health and vigor, and increasing resistance to insects and disease by maintaining a diverse forest, removing diseased and damaged trees, and providing growing space for residual trees. Vegetation management is needed to meet these objectives. For example, some treatments would occur in mature stands which have a component of high-risk, poorly formed and damaged trees (boles and crowns) resulting from insects, past management activities and natural events. Removal of high risk trees (mature aspen-paper birch, Norway Spruce and ice damaged trees), would occur on approximately 15% of the gross acres. This would reduce the spread of insect and disease, as well as the risk of potential outbreaks in the future. Reducing stand density in stands such as the Norway spruce plantation would increase the vigor of remaining trees by decreasing the stress from overcrowding and providing more growing space for residual trees to maintain a higher growth rate.
Address a Changing Climate

The purpose of the project also includes increasing the resilience and resistance of the forest ecosystem within the Project Area to the effects of climate change. Vegetation management can be used to increase within and among stand diversity in terms of stand age, structure, and species composition. Vegetation management can also maintain species diversity by regenerating species such as aspen and paper birch that are on the southern edge of their range and are vulnerable to the effects of climate change.

This project is needed to enhance the forested ecosystems ability to adapt to the effects of climate change. Managing for resiliency is one action that can be taken to enhance the ability of forested ecosystems to adapt to the effects of climate change. Healthy forests may be better able to adapt to climate change and may be better poised to persist or even thrive under future conditions, and therefore, be able to continue to meet forest management goals and objectives. Increasing the diversity of stand age, structure, and species composition, both within and among stands, makes the overall ecosystem more resilient to climate change. For example, one stressor, like an infestation by a non-native insect that is able to persist in a warmer Northeastern climate, would be unlikely to affect all species or stands the same way.

The aspen-birch habitat type is considered highly vulnerable to the effects of climate change (Janowiak et al. 2011) and there is concern for long-term management of this habitat type on the Forest. Climate change models indicate that average annual and seasonal temperatures in the Northeast will increase and that the precipitation regime will change. These changes are expected to have an adverse effect on the ability of aspen and paper birch to naturally regenerate and thrive. This project is needed to take advantage of trees in these stands that can produce seeds and healthy sprouts to regenerate aspen and birch species while climatic conditions are adequate for them to develop into healthy vigorous trees. The variability in climatic conditions during the next entry into these stands in 15 to 20 years may not be conducive to regeneration. If this were the case, these species could be lost within these stands.

Even modest changes in climate could result in substantial increases in the distribution of many forest insects and pathogens (Ayers and Lombardero 2000, Dukes et al. 2009). Reducing the susceptibility of forests to biological
Meet Wildlife Habitat Diversity Goals

The National Forest Management Act (NFMA) of 1976 requires each Forest to evaluate their lands and develop and implement a Forest Plan based on multiple-use and sustained-yield principles. Part of the direction in the NFMA is to “provide for a diversity of plant and animal communities based on the suitability and capability of the specific land in order to meet overall multiple use objectives. The approach Forests take to meet this direction to plant and animal’s diversity is to manage for the full diversity of habitats suitable to the landscape. The Forest only deals with species specific management when habitat management is not sufficient.

Through field reconnaissance and literature review (DeGraaf and Yamasaki 2001) it is known that a wide array of wildlife species inhabit the WMNF throughout all, or part of the year. This includes approximately 31 species of reptiles and amphibians, 190 species of birds, and 56 species of mammals (DeGraaf and Yamasaki 2001). Many of the wildlife species on the Forest use more than one forest habitat and/or age class during their life cycle (DeGraaf and Yamasaki 2001, USDA Forest Service 2002). For example, in forested habitats, approximately 70% of wildlife species will use mature habitat while 66% will use early successional habitats for all or part of their life cycle (DeGraaf and Yamasaki 2001, DeGraaf et al 2006).

To meet the goals of the NFMA, the WMNF developed a wildlife habitat strategy based on Habitat Management Units (HMU) to provide necessary habitat diversity to maintain wildlife populations on the Forest (Forest Plan Chapter 1, Pages 20-21, USDA Forest Service 2002, 2007). The two primary goals of this strategy are to provide a matrix of habitat types including northern hardwood, aspen-birch, spruce/fir as well as different successional stages within each habitat type such as regeneration (defined
as 0-9 years old) or mature (defined as greater than 60 years old) (see Forest Plan, Appendix D for age class definitions).

Management Indicator Species were selected to estimate the effects of projects on wildlife (36 CFR 219.19). Species selected included those associated with the various habitat types and age classes defined in the HMU strategy (USDA Forest Service 2005b, pp. 166-174).

An analysis of the South Pond South HMU compared the existing conditions (Table 2) to the desired conditions established by the Forest Plan (Rowse and Williams 2015). An evaluation of the MA 2.1 lands found that the land capability (soil condition that favors certain habitats, see MA 2.1 Habitat Composition Objectives, Forest Plan p. 1-20) shows that there is an abundance of northern hardwood growing on sites that favor mixedwood (3710 acres of existing northern hardwood with a potential of 2602 northern hardwood acres while there is 593 acres of existing mixedwood habitat with 1893 acres of potential mixedwood habitat (Table 2). Therefore, long term goals for this HMU would be to manage for mixedwood habitats on northern hardwood sites with a mixedwood land capability where possible. The HMU analysis also showed an overabundance of mature habitat (approximately 5100 acres versus 4200 proposed and a lack of regeneration habitat (none existing versus approximately 300 acres proposed) (Table 2) based on the age class objectives outlined in the Forest Plan (Forest Plan p. 1-21).

Based on that analysis, the following age class and wildlife habitat objectives were developed to meet desired wildlife goals for the South Pond South HMU (Rowse and Williams 2015): 1) create regeneration age (0-9 years) habitat; 2) maintain or slightly increase uncommon habitat types such as aspen/birch; 3) maintain mature habitat; 4) match forest habitat types to land capability (such as moving northern hardwood to mixedwood) and 5) increase acres of existing permanent wildlife openings if possible.

**Provide regeneration-age forest habitat**

Providing regeneration-age forest habitat to sustain biological diversity and support species that prefer these habitats is another Forest Plan objective (p. 1-20). While there is an abundance of mature and young (10 to 40 or 70 years old depending on species) age class in the South Pond South HMU, no regeneration age class (0 to 9 years old) in the northern
hardwood, mixedwood, spruce-fir and aspen-birch habitat types exist in the Project Area (Table 2). This age class provides important habitat for several wildlife species who use it during some stage of their life cycle (DeGraaf and Yamasaki 2001, DeGraaf et al 2006). Chestnut-sided warblers are the Management Indicator Species (MIS) for this habitat (Forest Plan FEIS Chapter 3, Page 167).

Table 2. The number of acres by Management Area (MA), for each habitat type and age class was used to assess the current conditions and develop the objectives for the South Pond South Habitat Management Unit and the acres proposed for treatment to increase regeneration age class.

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Current Condition / Land Capability</th>
<th>Regeneration (0-9)</th>
<th>Age Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Existing / Proposed</td>
<td>Young Existing / Proposed</td>
</tr>
<tr>
<td>Hardwood</td>
<td>3719 / 2600</td>
<td>0 / 148-186</td>
<td>656 / 557-744</td>
</tr>
<tr>
<td>Mixedwood</td>
<td>590 / 1839</td>
<td>0 / 6</td>
<td>41 / 29</td>
</tr>
<tr>
<td>Spruce-fir</td>
<td>1213 / 1118</td>
<td>0 / 12-24</td>
<td>90 / 36 -73</td>
</tr>
<tr>
<td>Aspen-birch</td>
<td>597</td>
<td>0 / 72-90</td>
<td>197/215-269</td>
</tr>
<tr>
<td>Opening</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-forest</td>
<td>157</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>6289</td>
<td>0 / 238-306</td>
<td>984 / 837-1115</td>
</tr>
</tbody>
</table>

Forest land that is managed for timber production. See Forest Plan Appendix D for additional information on age class definitions by habitat type. See Rowse and Williams 2015 for discussion of South Pond South HMU objectives. The goal for aspen/birch is to maintain the existing amount on the landscape. Existing wildlife openings will be enlarged if possible to increase habitat quality (USDA Forest Service 2007, pages 8 – 11).

Maintain less common habitat types

Maintaining less common habitat types where ecologically feasible and desirable is another Forest Plan objective (p. 1-20). Aspen-birch is a less common habitat that occurs in the Project Area and is at the southern edge of its range and is vulnerable to climate change. This habitat type is a pioneer type that regenerates from large natural and man-made disturbance (Perala 1977; Safford 1983) and is replaced by other habitat types if disturbance does not provide an opportunity for regeneration. There are approximately six hundred acres of aspen-birch habitat within
the HMU on lands that do not allow for vegetation management (located in the 2001 IRA), but none in MA 2.1 lands. Many of these paper birch and aspen are in declining health; the paper birch is dying from old age while much of the aspen is infected with pathogenic diseases. Within the Project Area there are approximately 60 acres where a component of adequate aspen-birch seed trees or mature aspen are present and site conditions exist to support this forest type. This project is needed to take advantage of the opportunity to regenerate these species now while they can still produce viable seeds and sprouts to create young, vigorous stands so that these species are present on the landscape for some time into the future.

Maintain mature forest habitat

Another habitat management objective established by the Forest Plan is to maintain high quality mature and old age class forest habitats on a majority of the Forest (Forest Plan, p.1-20). A wide variety of wildlife uses mature forest habitats and over 80% of the Project Area is mature forest. Uneven-aged silviculture prescriptions such as group selection and individual tree selection would provide forest products without changing the mature character of these stands. A large portion of the proposed management for northern hardwood, mixedwood, and spruce-fir is through uneven-aged prescriptions.

Provide open habitat

Maintaining Permanent Wildlife Openings (PWO) is another wildlife habitat objective established by the Forest Plan (pp. 1-20 to 1-21). PWO are upland areas dominated by grasses, forbs, and/or shrubs that are maintained in non-forested condition through stumping, mowing, prescribed fire, brushing, or other means to benefit wildlife (Forest Plan, p. 34). Prescribed fire, brushing, and mowing are effective tools to temporarily reduce woody vegetation and maintain PWO. The first several years after treatment berries, grasses, and other low-growing vegetation, which are used by a wide variety of wildlife, flourish. These openings provide habitat for a wide variety of wildlife species during some or all of their life history (DeGraff and Yamaski 2001). The habitat composition objective is for 1% of MA 2.1 lands to be managed as open habitat, but less than 1% of the South Pond South HMU is currently maintained as PWO. This project is needed to improve the amount of this important wildlife habitat component.
Recreation Improvements

The purpose of the recreational improvements action is to improve public safety and visitor experience, to mitigate resource damage, and to meet the demand for public use at the Unknown Pond Trailhead access from York Pond Road. The proposal supports the goals established by the Forest Plan for recreation, addresses Standards and Guidelines for Developed Recreation, and meets the desired condition of MA 2.1 lands (Forest Plan p. 1-10, p. 2-17, and p. 3-3 respectively). The project is needed because the current Unknown Pond trailhead parking lot was not designed well for traffic flow, does not accommodate the current level of use, overflow parking has raised concerns for visitor safety, and for resource protection since parking along the edges of the road and parking area has encroached on the forest over time.

The Unknown Pond trailhead is the primary access point for Mt. Cabot (NH’s northernmost 4000’ peak), the middle section of the over 20 mile long Kilkenny Ridge Trail, and designated overnight sites including the Unknown Pond Tent site and Cabot Cabin. The parking lot receives use year-round and is plowed in the winter. Since the lot was constructed, the other access trail to Mt. Cabot has been closed due to access issues on private land. As a result, nearly all use funnels through the Unknown Pond trailhead. The parking lot was originally designed for 11 people at one time (PAOT) and was approximately 1,300 ft². The number of parking spaces is typically calculated by dividing PAOT by 3.5, thus the original lot was designed for about 3 vehicles. Overtime, the lot has increased in size likely in part due to people parking along the edges. The lot is now about 3,600 ft² and holds between 4-5 vehicles depending on vehicle size and parking arrangement. Even with the expansion, the parking lot isn’t large enough to accommodate the level of use and as a result, vehicles continue to park along the edges of the parking lot and along York Pond Road, damaging vegetation and compromising visitor safety.

Transportation System

Forest Road System

Forest Roads are managed to provide a safe, efficient, and seamless transportation and parking network that allows for current and future management, use, and enjoyment of the Forest. Roads that aren’t needed to meet management objectives may be decommissioned, and those retained are maintained to meet Forest standards for the desired
maintenance level and the requirements of the Highway Transportation Safety Act (Forest Plan, pp. 1-16 to 1-17 and 2-28 to 2-29).

The purpose of the Transportation System component of this project is to: 1) assess unauthorized roads, to determine the need for roads, road segments, trails and trail segments for long-term Forest management objectives; 2) assess existing forest system roads to determine if they are needed for long-term Forest management objectives; 3) evaluate current conditions, use levels and maintenance of each road, comparing it to the Maintenance Levels (ML) in the Forest Roads database, and updating the database as needed; and 4) integrate the recommendations developed through the Forest Travel Analysis Process (USDA Forest Service 2015). This project is needed to conduct a project specific travel analysis for the Deer Ridge Project Area.

The forest roads system in the Project Area needs to be assessed in order for the Forest to be able to: 1) plan and manage for current, continued, and projected management, use, and enjoyment of the Forest with a variety of challenge levels; 2) meet Forest standards for the desired maintenance level; and 3) meet requirements of the Highway Transportation Safety Act. The Forest uses project-level analysis, in conjunction with environmental analysis, to determine the final disposition of the remaining miles of unauthorized roads on the Forest. Decisions are made whether to add roads to the Forest classified road system, remove them, or convert them to trails (USDA Forest Service 2005b, D-12). Roads needed to meet long-term management objectives are retained and included as Forest Roads in the Forest Roads database. Roads less than 500 feet leading to landings are considered driveways, and are removed from the Forest Roads database. The analysis also examines culverts and bridges to determine if they need to be improved or replaced to maintain and/or improve fish and stream passage and prevent flooding and washouts of roadways.

**Gravel Pit Development**

The purpose for this project is to maintain the classified road network through an alternative and local resource. The project is needed to determine if additional material is available within the Fifield Brook gravel site and if this pit could serve as a local on-Forest gravel source. The existing gravel pit is located on the Fifield Brook Road (FR105, Figure 4).
Although it hasn’t been mined in over fifteen years, it still contains material.

An assessment of the gravel pit as a potential local source of material is needed for the Forest to identify if this location is an option for local sourced material and if this source could be used to address future impacts to Forest road systems resulting from climate change. Climate change scenarios are predicting increases in temperature, shorter winters, and more frequent intense rain events in the Northeast. Shorter winters would result in shorter time frames for hauling forest products on frozen roads, and more intense rain events could put a strain on drainage structures potentially increasing the frequency and magnitude of damage to roads. Gravel is needed to prepare roads in the area for appropriate use during snow-free conditions and to have material readily available for emergency road repairs. Well-maintained roads minimize surface rutting, sedimentation, and erosion that can impact watershed function.

Figure 4. Fifield Brook Road gravel pit.

Decision to be Made

Based on the analysis in this report, comments from the public and contributions from the interdisciplinary team, Androscoggin District Ranger will decide:

- whether to implement the action as proposed, to modify the proposed action, or implement another alternative;
- under what conditions and design features the decision should be implemented,
• whether to issue a Finding of No Significant Impact or to prepare an Environmental Impact Statement (EIS), and
• whether the decision meets all applicable laws, regulations, and policies, and if it is consistent with the Forest Plan or if an amendment is needed.

Public Participation

This project was listed on the quarterly WMNF Schedule of Proposed Actions (SOPA) beginning in April 2015 and it will remain on the SOPA until after the decision is made. Each quarter the SOPA is sent out to over 300 individuals, and private and government organizations by the WMNF and it is posted on the Forest Service website. Individuals and organizations that are interested in particular projects are encouraged to contact the Forest and request being added to the Project’s contact list. On October 1, 2015 a Scoping Report was released to the public and it was published to the WMNF website:


Notification of the availability of this report (via email or letter) was sent to approximately 50 individuals and organizations including adjacent land owners, local and state officials, and other interested members of the public. A press release announcing the scoping period was also sent out to media outlets and the release was published in the Berlin Daily Sun, and the New Hampshire Union Leader.

In response to the Scoping Report, we received comments from seven individuals and organizations, including one letter from an ATV club signed by numerous club members and a letter from New Hampshire Fish and Game Department. A summary of these comments and Forest Service responses are included in the project record along with the original public comments received on this project.

On August 8, 2016 a legal notice initiating the 30-day comment period was published in the New Hampshire Union Leader and the Draft EA and a copy of the legal notice was posted on the project’s website. Notification of the comment period was sent to individuals who had commented during the scoping period, along with approximately 50 individuals and organizations including adjacent property owners, the towns of Berlin and Milan Selectboards, Coos County Commissioners, New Hampshire Fish and Game Department, the Androscoggin Valley ATV club, New
Hampshire Timber Owners Association, and other interested members of the public.

Five individuals commented during the project’s 30-day comment period. A summary of these comments and the scoping comments are included as an appendix to this EA. The original comments are in the project record.
Chapter 2 - Alternatives

Formulation of Alternatives

This chapter provides a detailed description of the Proposed Action and Alternatives to the Proposed Action. Alternative 1, referred to as the “No Action” alternative, proposes no new management activities within the Deer Ridge Project Area at this time. Alternative 2, the Proposed Action, proposes habitat, vegetation, recreation, and transportation management projects within the Deer Ridge Project Area, which was designed to respond to the Need for Action. Forest Plan Standards and Guidelines are incorporated into the design of the Proposed Action alternative. Most of the proposed project activities in the Proposed Action alternative are expected to be implemented within the next 5 to 15 years. Since funding for projects is dependent upon budgets; implementation of project activities will be scheduled over time, as funds become available.

Alternatives Considered in Detail

Alternative 1: No Action

The No Action Alternative would initiate no new federal actions in the Project Area. Activities covered under previous decisions and administrative use would continue. Analysis of no action provides a baseline from which to compare the effects of the action alternative and discloses the effects of no action. If the No Action alternative is chosen for the Deer Ridge Integrated Resource Project, that decision would only affect this point in time. At some future date, a new analysis could be done of this area and a decision made to include some type of new management proposal.

Alternative 2: Proposed Action

The Proposed Action has been developed in response to the needs identified for the Project Area. The Proposed Action is briefly described in Chapter 1.

Silvicultural Treatments

Based on the purpose and need for this project, silvicultural prescriptions for each stand were identified and assessed for their ability to improve desired conditions by reviewing stand records and conducting field examinations. Harvest treatments were developed to balance age class
distribution and species composition; improve wildlife habitat, stand health and productivity, and improve forest resistance and resiliency to the projected effects of climate change. Meeting these objectives would be accomplished through the harvest and sale of marketable timber products.

The Proposed Action is to conduct commercial and non-commercial treatments on approximately 2,380 gross acres of forest stands with approximately 1,070 acres undergoing actual silvicultural treatment (Figure 5 and Table 3). Additional field reconnaissance would be conducted prior to finalizing the stand acres and boundaries and modifications would be made to account for specific ground conditions (e.g., wet areas, inoperable terrain, and forest type changes).

Table 3. Proposed silvicultural treatments for the Deer Ridge Project. Acres are approximate. Site preparation would only be conducted on lands proposed for harvesting and would not result in additional acres of treatment (See Appendix A for more details).

<table>
<thead>
<tr>
<th>Proposed Activity</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Silvicultural Treatments</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Regeneration of forest stands through even-aged treatments</strong></td>
<td></td>
</tr>
<tr>
<td>Clearcut with Reserves</td>
<td></td>
</tr>
<tr>
<td>• Northern hardwood</td>
<td>136</td>
</tr>
<tr>
<td>• Aspen/paper birch</td>
<td>35</td>
</tr>
<tr>
<td>Patchcut</td>
<td></td>
</tr>
<tr>
<td>• Northern hardwoods</td>
<td>43 (122)</td>
</tr>
<tr>
<td>• Aspen/paper birch</td>
<td>12</td>
</tr>
<tr>
<td><strong>Converting forest land to Permanent Wildlife Openings (PWO)</strong></td>
<td></td>
</tr>
<tr>
<td>• Fifield Brook</td>
<td>20</td>
</tr>
<tr>
<td>• Upper Betty Brook</td>
<td>10</td>
</tr>
<tr>
<td>• Lower Betty Brook</td>
<td>3</td>
</tr>
<tr>
<td><strong>Releasing young forest through even aged treatments</strong></td>
<td></td>
</tr>
<tr>
<td>• Overstory Removal</td>
<td>116</td>
</tr>
<tr>
<td><strong>Creating multi-aged forest through uneven-aged treatments</strong></td>
<td></td>
</tr>
<tr>
<td>• Group Selection</td>
<td>264 (1,566)</td>
</tr>
<tr>
<td>• Individual Tree Selection</td>
<td>10</td>
</tr>
<tr>
<td>• Individual Tree and Group Selection</td>
<td>155</td>
</tr>
</tbody>
</table>
Deer Ridge Integrated Resource Project

<table>
<thead>
<tr>
<th>Proposed Activity</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Silvicultural Treatments</strong></td>
<td></td>
</tr>
<tr>
<td>Total Treated (Gross Acres)</td>
<td></td>
</tr>
<tr>
<td>• Salvage</td>
<td>93</td>
</tr>
<tr>
<td><strong>Creating multi-age forest through even-aged treatments</strong></td>
<td></td>
</tr>
<tr>
<td>• Shelterwood Preparatory Cut</td>
<td>95</td>
</tr>
<tr>
<td><strong>Restoring stands through understory treatments</strong></td>
<td></td>
</tr>
<tr>
<td>• Site preparation (removal of non-commercial trees)</td>
<td>540</td>
</tr>
</tbody>
</table>

In addition, the stand acres may be reduced to meet visual and water quality objectives, to account for the incorporation of reserve patches of uncut trees in final-harvest stands, and to include protective buffers around features including vernal pools, cultural artifacts, wildlife trees, trails and riparian zones.

The interdisciplinary team used the framework presented in Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers (Swanston and Janowiak 2012) to integrate climate change adaptations into the project proposal.

A range of silvicultural treatments from shelterwood to group harvests to clearcutting would provide wood products of commercial value, and would create small and large openings in the forest to allow regeneration of trees and other vegetation, provide additional growing space to enhance crown and bole development, and encourage the establishment of shade-intolerant species in the understory. We may use a variety of authorities to accomplish our project objectives including, but not limited to stewardship authorities, traditional timber sales, and appropriated funds. Appendix A contains a list of the proposed stands, prescriptions and season of operation.

Even-Aged Management

Even-Aged Management is a timber management system that results in the creation of stands in which trees of essentially the same age grow together.

**Clearcutting with Reserves** would create openings (>10 to 30 acres in size) that allow high levels of sunlight to reach the forest floor so that shade
intolerant (aspen and paper birch) and intermediate shade tolerant (white ash and yellow birch) trees can regenerate and grow to their full potential. This treatment is proposed in northern hardwood stands containing poor quality and low vigor mature trees, within aspen-paper birch stands and for the expansion of two PWO. Five percent of the harvested stand would remain uncut in reserves per (Forest Plan, p. 2-35).

**Patch Cuts** are between two to ten acres (2-10 acres). Patch cuts are proposed in stands that incurred a moderate to high percent of crown damage during the 1998 ice storm and to expand an existing PWO. Fire lines would be constructed around the PWO using hand tools or mechanized equipment and the PWO would be maintained using prescribed fire within three to five years after cutting. Brush piles created by hand or mechanical brushing would be burned.

**Shelterwood Preparatory Cut** is the first step in a shelterwood regeneration system and would harvest approximately 30-35% of the overstory trees to promote the establishment of a new age class in the understory beneath the shelter of residual trees. It would also create additional growing space for remaining mature trees. This treatment is proposed in two of the Norway spruce plantations.

**Overstory Removal** is the removal of the majority of mature overstory to release advance regeneration. Overstory removals are prescribed as the final step of shelterwood system that initiates regeneration in the understory. The result would be an even-age stand of healthy, high quality seedlings, saplings and poles.

**Uneven-Aged Management**

The application of a combination of actions needed to maintain continuous high forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameters or age classes to provide a sustained yield of forest products.

**Group Selection** would result in the creation of openings approximately 1/10 to two acres in size for the purpose of releasing advance regeneration or regenerating new trees. Generally groups would be smaller in size in softwood or mixedwood stands where the goal is to favor softwood regeneration. Groups would be created in areas where desirable advance reproduction could be released from competition or where advance
reproduction is currently lacking. Group locations would also target areas containing poor quality, low vigor and/or mature overstory trees. Each

Figure 5. The stand boundaries and acres are calculated assuming treatment of entire stands. The final boundaries may be adjusted and the treated acres reduced as site conditions are factored into the final harvest treatment.
future entry into a stand proposed for group selection would involve treating an additional 10-20 percent of the stand’s area.

**Single Tree Selection** would primarily remove poor quality, low vigor trees, trees with physical damage or defects caused by ice, insects and/or disease and trees which have maximized in value. Approximately 1/3 of the trees would be removed to create space for residual trees to grow and to provide light for tree seeds to germinate. Trees would be cut from all size classes uniformly throughout the stand. Single tree selection would create or maintain an uneven-aged stand condition, as well as stimulate stand regeneration, leading to a diversity of within-stand age classes.

**Salvage Cut** would harvest trees after a natural disturbance to salvage potential wood products before the trees become less valuable or unmerchantable. Depending on the severity of damage, the harvest may consist of cutting individual trees, groups of trees or all trees in a stand. Disturbances may include, but not be limited to wind, ice storms, fire, insect infestations and disease.

**Site Preparation**

Trees that are less than four inch in diameter at breast height within group selection, patchcuts and clearcuts would be removed after commercial harvest. Without site preparation, the midstory competition of shade tolerant and poor quality saplings would limit establishment and prevent full stocking of desirable seedlings. Cut trees would be left on site. This would allow a full array of tree species such as red spruce, balsam fir, hemlock, sugar maple, red maple, aspen, paper birch, yellow birch, and white pine to regenerate in these open areas. Without post-harvest treatment, these patchcut and clearcut areas would be classified as understocked “young” stands and would lack the intended stand characteristics for wildlife species associated with regeneration forest habitat. Manual or mechanical methods would be used for site preparation.

**Recreation Improvements**

The Proposed Action would increase the size of the Unknown Pond trailhead so that it can accommodate 12-15 vehicles. A landing is proposed for the area directly behind the trailhead parking lot. Upon completion of harvest activities a portion of that landing would be converted into a parking lot addition. This would be accomplished by adding gravel and providing definition (e.g. boulders) to the lot’s boundaries. The parking lot
would be approximately 6,500 ft². The total area of disturbance (including a 10 ft buffer around the parking area) would be approximately 10,100 ft².

**Transportation System**

**Road Classifications and Improvements**

A preliminary Deer Ridge Travel Analysis aided in evaluating long-term objectives for Forest system roads within the Project Area. This process helped identify roads that needed to be classified or decommissioned and where changes in maintenance levels were warranted (Figure 6). The travel analysis and Proposed Action integrated the recommendations developed through the Forest Travel Analysis Process (USDA Forest Service 2015). The exception was the proposal to keep FR 106 as a ML 2 road rather than downgrading it to ML 1. This was proposed because it may be very difficult to upgrade that section of road back to ML 2 if necessary in the future.

Forest roads in the Project Area are typically low speed, single lane with turnouts, and spot surfacing. Some roads may be fully surfaced with either native or processed material. Definitions of the terms used for describing Forest roads and maintenance are included in the glossary and a table of the Proposed Action is in Appendix B.

The proposal is to:

- Convert 1.54 miles of non-system roads (FR 2288, 2217, 2219, 2220, U-0015) and 0.7 miles of previously unmapped roads (FR 105X and 105XX) to Forest Roads with Maintenance Level (ML) 1. These roads have a defined roadbed, were used for past management access including hauling wood products, and they continue to be needed for long-term forest management.
- Remove three non-system roads (FR 2221, 2273, 2276) totaling approximately 0.24 miles from the Forest Roads database. These roads are less than 500 feet (less than 0.1 miles) in length and are considered driveways rather than system roads. Although the Travel Analysis process resulted in the recommendation to keep FR 2276, this proposal would remove it from the database given it’s short length.
- Change 4.3 miles of York Pond Road (FR 13) from ML 5 to ML 4, change the first 1.1 miles of Fifield Brook Road (FR 105) and 0.14 miles of York Pond Spur X (FR 8010) from ML 3 to ML 2.
- Install temporary bridges over Fogg and Fifield Brooks on FR 105A and FR 106.
- Use approximately 20 to 25 existing landings and construct approximately three new landings for timber harvest activities.

Forest roads, temporary roads and log landings would be maintained or reconstructed to provide safe access to treatment areas and meet modern design standards. No new road construction is proposed. Upon completion of timber harvest, roads that were previously closed (barricaded) or were not drivable will remain closed to the public. Temporary culverts and bridges would be removed, waterbars would be installed and roadbeds would revegetate to native grasses. Small segments of the Unknown Pond Trail (approximately 1800 feet) and the Rocky Pond Snowmobile Trail (approximately 300 feet) may be used for hauling during harvest operations.

**Gravel**

There is an existing gravel pit on Fifield Brook Road (FR 105; Figure 6). This site is about ½ acre in size and is not vegetated. Shovel holes were dug along the periphery of the site to determine the extent and quality of material remaining on site. From these test pits it was determined that the site can be expanded by one acre to the east and has the capacity to produce a minimum of 10,000 cubic yards of material. Site work would include removing trees and top soil at the expanded site and then excavating approximately 8-12 feet down. When gravel extraction is completed the area would be rehabilitated, which would include replacing topsoil and planting trees or other vegetation.
Figure 6. The transportation proposal was developed following a transportation analysis of the Deer Ridge Project Area.

**Project Design Features and Mitigation**

In addition to the activities described above, the Proposed Action Alternative incorporates a variety of project design features intended to define where and how Forest Plan Standards and Guidelines and Best Management Practices (BMP) are applied to this project, as well as
mitigation measures designed to reduce or eliminate potential adverse effects on resources located in, or within close proximity to, the Project Area. The following design features are integrated into the Proposed Action (Alternative 2) for this project:

- Forest Plan Standards and Guidelines (Forest Plan Chapters 2 and 3). Additional Forest Plan Standards and Guidelines and BMP that are emphasized in this project are listed in Appendix D.
- State of New Hampshire BMPs (NHDRED 2004; NHDFL 2016).

**Air Resources**

- State Air Quality Coordination: On-premises burning for forestry or wildlife habitat improvement is permissible without authorization from NH Department of Environmental Services as per NHDES Part Env-A 1001.05(b). (Androscoggin Ranger District Programmatic Burn Plan, pg. 43).
- Burning would be dependent upon site conditions and weather conditions. All burning would take place under the guidelines in the prescribed fire burn plan developed specifically for project-related burning activities. Prescribed burn plans address parameters for weather, air quality, contingency resources and potential escapes.

**Aquatic Habitats, Fisheries, and Water Resources**

- Locate roads, landings and skid trails to minimize the number of stream crossings needed and maximize the harvest area accessed by each crossing. (UNH Cooperative Extension 2005, p. 38).
- Minimize disturbance to the stream banks, channel and streambed during installation, use and removal of stream crossings (UNH Cooperative Extension 2005, p. 42).
- Stabilize stream crossing approaches with brush or similar materials, before and during operations. Maintain approaches in a stable condition through close out (UNH Cooperative Extension 2005, p. 42).
- Trail grades approaching stream crossings shall be broken and surface water dispersed so it will not reach the water course. Silt fencing, hay bale erosion checks or water diversions shall be used to prevent soil from skid trails from entering streams and other surface waters (NHDFL 2004).
When closing out a stream crossing, remove temporary structures from the stream, leave brush in place on approaches and banks, and stabilize exposed soil in approaches to the riparian area using brush, hay or seeding and mulching (UNH Cooperative Extension 2005, p.51).

National BMP for Water Quality Management on National Forest System Lands, Volume 1: National Core BMP Technical Guide. FS-990a. (USDA Forest Service 2012b). Considerations for activities AqEco-2; Rec-4; Road-2- 4; Road 6-10; Veg 2-4 and Veg-6-7 should be reviewed and applied as appropriate.

Ground-disturbing activity for parking area construction and road maintenance and reconstruction will be done during appropriate seasons and conditions to prevent excessive erosion and sedimentation. Temporary and permanent erosion control will be used on disturbed areas in accordance with State BMPs (NHDRED 2004, NHDES 2008) until the ground has stabilized.

In accordance with Riparian and Aquatic Habitats G-9 (p. 2-25), the following design features are prescribed for intermittent streams to protect soil integrity, bank stability and downstream water resources:

- No even-age regeneration treatments shall occur within 50 feet of York Pond T8b in Unit 48.
- No even-age regeneration treatments shall occur within 25 feet of Fogg Brook upstream in Unit 19. Due to the patch cut prescription, wider zones would remain uncut along some portions of this stream.
- No even-age regeneration treatments shall occur within a 1.7-acre stream-wetland complex around Upper Ammo T47a in Unit 5 (mapped in Project Record).
- No heavy equipment shall enter a zone extending 25 feet from the top of bank of the following intermittent streams, aside from designated crossings with proper mitigations:
  - Upper Ammo T87a in unit 35.
  - Fogg Brook T9a in unit 20a.
  - Upper Ammo T59a in unit 26a.
  - Upper Ammo T6a in unit 2a.

These site-specific measures were assigned based on vegetation prescriptions, riparian conditions, and/or existence of sensitive resources.
Additional measures will be taken as needed on the ground to comply with BMPs, Forest Plan guidance and contract provisions for prevention of resource damage.

- If additional streams, wetlands or other water bodies are located or found to have a different flow regime (i.e. intermittent or perennial), design features will be applied to comply with the Forest Plan, NH BMPs, NH Basal Area Law, and any additional site-specific protection deemed necessary by a watershed specialist.
- Landings near the following units are located near the 100 foot distance from perennial streams/rivers:
  - Unit 55 (2 existing landings).
  - Unit 33 (existing landing to west).

A 100 foot buffer will be delineated on the ground to prevent extension of the landings into this zone. If a landing must be within 100 feet of the stream it must be reviewed by a watershed specialist before or during implementation to ensure that all necessary soil and water conservation practices have been applied. While existing landings are permissible within 100 feet of streams under Riparian and Aquatic Habitats G-6 in the Forest Plan, this design feature will ensure compliance with state forestry BMPs and FS National Core BMPs.

- Streams listed in Table 4 do not appear as perennial streams on USGS topographic maps, but have been newly mapped as perennial streams during project planning. These streams will have the Forest Plan-designated RMZ for 1st or 2nd order perennial streams (75 feet) plus no cutting within 25 feet of the bank. The purpose of prescribing a no-cut zone in addition to the 75-foot RMZ applied to all perennial streams is to provide a continuous supply of woody material to streams with quality fish habitat and to avoid operation on steep banks or wet areas.

Table 4. Newly mapped perennial streams within the Project Area.

<table>
<thead>
<tr>
<th>Streams</th>
<th>Harvest Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Branch Upper Ammo T1</td>
<td>55</td>
</tr>
<tr>
<td>York Pond T8a</td>
<td>45</td>
</tr>
<tr>
<td>West Branch Upper Ammo T4</td>
<td>38a, 38b, 39a</td>
</tr>
<tr>
<td>Betty Brook</td>
<td>37 and 39</td>
</tr>
<tr>
<td>Upper Ammo T2a</td>
<td>33</td>
</tr>
<tr>
<td>Upper Ammo T2b</td>
<td>32 and 33</td>
</tr>
<tr>
<td>Upper Ammo T13</td>
<td>28</td>
</tr>
</tbody>
</table>
Gravel pit management should include the following measures:

- No excavation within 5 feet of the seasonal high water table. If the maximum excavation depth is approached (within 3 feet), the depth to water table will be verified with a test pit or monitoring well. Mining only above the water table prevents impacts on groundwater flow to nearby waterbodies (Green et al. 2005). Leaving a buffer of soil above the water table protects water quality due to the filtering capacity of the soil layer (Peckenham et al. 2009; Hatva 1994).

- Refueling operations, oil changes and other maintenance activities requiring the handling of fuels, petroleum products, hydraulic fluids, and other on-site activity involving the storage or use of products that, if spilled, may contaminate groundwater, must be conducted in a manner consistent with NH BMP for Groundwater Protection (NH Env-Wq 401). Petroleum products and other substances that may contaminate groundwater must be stored and handled over impervious surfaces that are designed to contain spills.

- Drainage from the gravel pit, road, and pit development area should be dispersed through well-vegetated areas. Stockpiles of topsoil must be seeded with native materials, mulched or otherwise temporarily stabilized. State BMP for erosion and sedimentation control must be employed on access roads, disturbed areas, and in site reclamation such that no sediment enters nearby water bodies.
Heritage Resources

- No ground disturbance, tree harvest, or operation of heavy equipment shall occur within marked heritage reserve areas.
- Linear historic features (e.g. abandoned early 20th century fish hatchery ditches and railroad grade), shall be avoided when possible, and crossed or breached when necessary at right angles with minimal disturbance.

Non-Native Invasive Species (NNIS)

- Any heavy equipment must be visibly free of seeds and plant parts prior to entering the Project Area. Cleaning should take place off-Forest unless an on-Forest cleaning site has been approved by a Forest Officer in advance.
- Before ground disturbance is initiated, control small infestations of weeds already existing in the Project Area (add “project-specific control” if applicable). This will be undertaken under the 2007a WMNF Forest-wide Invasive Plant Control Project EA and its associated prioritization strategy.
- Whenever possible conduct project activities working from areas of no or lesser infestation to areas of heavier infestation.
- Gravel and fill must come from weed-free sources. The Forest will be available to work with owners of local gravel sources to identify weed-free borrow material in their pits. The entire pit or fill area need not be identified as weed-free; material may be used that is not likely to contain invasive plants or seeds.
- Minimize soil disturbance to no more than needed to meet project objectives.
- Where project disturbance creates bare ground, consistent with project objectives, reestablish vegetation to prevent conditions to establish weeds. Use native seed where appropriate and feasible, and use certified weed-free or weed-seed free hay or stray where certified materials are reasonably available.
- Periodically monitor log landings and haul roads for dispersal or expansion of NNIS plants.

Recreation, Transportation, and Vegetation

- Caution/Closure signs placed along trails and at trailheads during active timber harvest operations.
• Caution signs placed along Rocky Pond Snowmobile Trail (PT 109) if used as a haul route during harvest.

• Skid trails should cross trails a minimum number of times and at right angles when possible.

• Crossing trails will be done during appropriate seasons and conditions to prevent excessive erosion and sedimentation.

• Hauling on any trail within the Project Area would be restricted to weekdays only and would be prohibited on weekends and federally recognized holidays.

• Minimize crushing or hauling gravel on weekends or holidays to reduce noise and encounters between Forest visitors and gravel trucks.

• Signs would be posted informing visitors of gravel crushing and hauling activities.

**Scenery**

• Include one large or several smaller reserve areas in stands 13 and 14 located in a manner that will shadow the open acres.

• Establish an irregular buffer (setback) between the York Pond Trail and the Unknown Pond Trail and the proposed treatments (overstory removal and patch cuts). This buffer would be based upon the density of the forest in the areas effected as well as the prescription proposed. The visual buffer will be extended 100 feet on both sides of these trails and only light harvesting would occur within this area, mostly removal of high-risk trees. A specific provision would be included in the timber sale contract designating a slash disposal zone 100 feet on both sides of these trails; all slash would be removed within 50 feet of these trails and then lopped to within three feet of the ground for another 50 feet.

• Harvest slash within 50 feet on either side snowmobile trails and forest roads would be removed or lopped and scattered to lie within three feet of the ground.

• Individual tree marking within approximately 100 feet from trails should be marked on the opposite side of the tree to reduce marking paint visibility.

• Provide a vegetative screening between the two eligible wild and scenic rivers and harvested areas to mask the shape and visibility
of individual openings so that they are less noticeable from the river banks.

Wildlife

- Follow Forest Plan Standard and Guidelines for naturally occurring vernal pools (Forest Plan, Riparian and Aquatic Habitats, G-1, G-2, G-11, G-12, pp. 2-24 through 2-26), (Glossary Administrative Correction 11, Wildlife, G-1, G-2, G-11, G-12) Follow State of NH BMP (Forest Plan, Vegetation, S-4, 2-29) (NHDFL 2016, outlined in Bennett 2010) to protect vernal pools. In addition, follow the intent of Forestry Habitat Management Guidelines for Vernal Pool Wildlife (Calhoun and deMaynadier 2004) which apply to vernal pools with two or more indicator species: wood frog (Rana sylvatica), spotted salamander (Ambystoma maculatum), blue-spotted salamander (Ambystoma laterale), and four-toed salamander (Hemidactylium scutatum) or greater than 20 egg masses of one indicator species.
- Should any listed species be found prior to implementation, mitigations would occur to protect these species (Forest Plan, Rare and Unique Species, p 1-8, USDA Forest Service 2005b).
- Where possible, reserve small softwood inclusions or unique tree species that are within other forest habitat types especially adjacent to streams. In particular, reserve spruce inclusion in Unit 9 along stream. Exceptions may include hazardous trees and trees located where parts of skid trails or landings that cannot be moved because of land features (Forest Plan, Wildlife, G-3, p 2-33, USDA Forest Service 2005b).
- To maintain hard mast component as a food source for wildlife, where possible, beech trees with abundant bear claw marks or having clumps of branches in the crown should not be marked for cutting unless the tree is expected to die in the near future. Favor trees that have recent bear claw marks. Trees that are reserved should be managed to maintain healthy crowns to improve mast production. Exceptions may include hazardous trees, trees located where parts of skid trails or landings that cannot be moved because of land features, and trees with >75% crown damage since there is a high probability they will die in the near future. In areas with heavy concentration of bear trees, patches of habitat will be
Deer Ridge Integrated Resource Project

reserved to minimize damage to the trees (Forest Plan, Wildlife, G-3, p 2-33).
- To maintain and enhance spruce-fir habitat, try to minimize skid trail widths to protect existing softwood regeneration, and minimize the amount of light entering the stand (Forest Plan, Wildlife, S-1, p 2-33).
- Use smaller group when managing for softwood to maintain cover value and increase softwood regeneration in understory. Retain sprouting hardwoods where needed to minimize hardwood competition in groups. Consult forest silviculturist and district biologist during layout. (Forest Plan, Wildlife, G-3, p 2-33).

**Monitoring**

**Prescribed Fire for Wildlife-Permanent Wildlife Openings**

- The Fire Team would monitor pre- and post-burn to include assessment of fuel conditions (particularly leaf litter), tree mortality and understory species composition.

**Aquatic Habitats, Fisheries, and Water Resources**

- The Timber Sale Administrator (TSA) would visually monitor stream crossing sites, roads, skid trails, landings and Riparian Management Zones to catch and rectify any problems in the early stage. This monitoring shall continue until the area has successfully stabilized.

**Soils**

- The Forest Soil Scientist would make periodic checks during and after the project to monitor the effects of the project on soils to determine if the effect are the same as those anticipated in this soils report and the Environmental Assessment for this project. If the soil effects are not within those anticipated, then adaptive management would be applied to improve the soil productivity.

**Vegetation**

- All proposed regeneration treatments would be monitored approximately three growing seasons following completion of timber harvesting. Monitoring would include an assessment of the abundance and distribution of trees.
- Monitoring of the proposed activities would occur by various professionals during and following implementation. Prior to
selling a timber sale, a field review would be conducted with the district foresters, district biologist and Forest silviculturist (and sometimes the District Ranger) to ensure compliance with marking guidelines, the environmental analysis and decision, and Forest Plan standard and guidelines.

- During implementation, the timber sale administrator would ensure that BMP (NHDFL. 2016), UNH 2009), and Forest Standards and Guidelines (USDA Forest Service 2005a) are followed. In accordance with vegetation management goals, the timber sale administrator would also ensure forest products are fully accounted for and fair value is received for all products sold.

- Monitoring on the WMNF has demonstrated that silvicultural treatments are effective means to manage a diversity of vegetation that is consistent with meeting wildlife objectives (USDA FS 2005b, pp 2-6). In accordance with the FS Manual 2472.4 and the NFMA, reforestation surveys are required to monitor reforestation activities following implementation of regeneration treatments. Accordingly, all proposed regeneration treatments would be monitored approximately three growing season following completion of logging operations. Monitoring would include a quantitative assessment of the abundance and distribution of trees or qualitative assessment of the regeneration response including documentation of the dominant stem at each plot.

**Water**

- Regular monitoring by a TSA or Contracting Officer’s Representative (COR) is required and will ensure compliance with Forest Plan Standards and Guidelines, applicable laws, BMP and project design features for activities not directly implemented by Forest Service personnel. If detrimental effects to water resources are found as a result of these activities, further work will cease until the situation is resolved. Water quality monitoring and formal BMP monitoring involving watershed specialists will occur on previously established or randomly selected sites. Both corrective actions during implementation and adaptive management actions at the programmatic level would be noted and implemented if outcomes are not consistent with BMPs.
Changes to the Proposed Action Since 30-Day Comment Period

The Design Features have been amended to address concerns raised by the public regarding potential impacts to scenery, wildlife, recreation, and water resources.

Alternatives Considered but not Analyzed in Detail

No timber harvesting within the Kilkenny 2005 Forest Plan inventoried area or the West Branch of the Upper Ammonoosuc and Upper Ammonoosuc eligible Wild and Scenic River boundaries

This alternative was developed to address concerns expressed by the public during the 30-day comment period regarding the potential direct, indirect, and cumulative impacts of harvesting on the character and eligibility of these areas. This alternative would eliminate harvesting on approximately 660 gross acres (210 net acres) of land: 270 gross acres (70 net acres) in the Kilkenny 2005 Forest Plan inventoried area and approximately 390 gross acres (140 net acres) in the Upper Ammonoosuc and West Branch of the Upper Ammonoosuc eligible Wild and Scenic River corridors.

The District Ranger considered information in the EA and the project record, including all public comments, and determined that the analysis of effects for Alternatives 1 (No Action) and 2 (Proposed Action) provided her with enough information to decide whether to implement Alternative 2 as proposed, to modify the proposed action by eliminating harvesting in the Kilkenny inventoried roadless area and/or the eligible Wild and Scenic River corridors, or to not implement the project.

The potential direct, indirect, and cumulative effects of “No Harvesting” to the eligibility of these areas for future designation under the Wilderness Act and the Wild and Scenic River Act, respectively, were fully analyzed in the No Action Alternative (Alternative 1). Although, the No Action Alternative provides a baseline, it also provides the decision maker with information to use in determining whether to implement all aspects of the Proposed Action or to modify the Proposed Action. The results of these analyses are summarized in Chapter 3 of the EA (pp. 37-38) and are fully documented in Pellerin 2016a and 2016c (project record). The potential effects of the Proposed Action (Alternative 2) are also analyzed and disclosed in these documents.
## Comparison of Alternatives

<table>
<thead>
<tr>
<th>Proposed Activity (all acres and miles are approximate)</th>
<th>Alternative 1 No Action</th>
<th>Alternative 2 Proposed Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetation Management and Wildlife Habitat Improvement (acres proposed for treatment)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearcut</td>
<td>0</td>
<td>171</td>
</tr>
<tr>
<td>Patchcut</td>
<td>0</td>
<td>55</td>
</tr>
<tr>
<td>Permanent Wildlife Openings (PWO)</td>
<td>0</td>
<td>33</td>
</tr>
<tr>
<td>Fire line construction for PWO creation</td>
<td>0</td>
<td>&lt;1.25</td>
</tr>
<tr>
<td>Overstory Removal</td>
<td>0</td>
<td>116</td>
</tr>
<tr>
<td>Group Selection</td>
<td>0</td>
<td>264</td>
</tr>
<tr>
<td>Individual Tree Selection</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Individual Tree and Group Selection</td>
<td>0</td>
<td>155</td>
</tr>
<tr>
<td>Salvage</td>
<td>0</td>
<td>93</td>
</tr>
<tr>
<td>Shelterwood Preparatory Cut</td>
<td>0</td>
<td>95</td>
</tr>
<tr>
<td>Pre-commercial Harvest</td>
<td>0</td>
<td>540</td>
</tr>
<tr>
<td>Estimated Board Feet of Harvest (million board feet)</td>
<td>0</td>
<td>12.5</td>
</tr>
<tr>
<td>Recreation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expand Unknown Pond Trailhead</td>
<td>0</td>
<td>&lt;1 acre</td>
</tr>
<tr>
<td>Public Access and Transportation System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary bridge installation</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Road maintenance and reconstruction</td>
<td>0</td>
<td>8.5 miles</td>
</tr>
<tr>
<td>Landing existing restoration</td>
<td>0</td>
<td>20-25 landings</td>
</tr>
<tr>
<td>Landing new construction</td>
<td>0</td>
<td>3 landings</td>
</tr>
<tr>
<td>Fifield Brook Road gravel pit expansion</td>
<td>0</td>
<td>1 acre</td>
</tr>
</tbody>
</table>
Chapter 3 - Affected Environment and Environmental Consequences

Introduction

This site-specific Environmental Assessment (EA) has been designed to comply with the regulations established by the National Environmental Policy Act of 1969 (NEPA). Compliance with NEPA at the project level through an EA uses the environmental analysis process to disclose the environmental effects of the proposed activities and determine if an Environmental Impact Statement (EIS) is warranted. An EA is not intended to be a complete discussion of all potential environmental and human variables; an EA is only required to “briefly” discuss the need for the Proposed Action, the alternatives, if any, and the environmental effects of the Proposed Action and its alternatives.

The following resources were considered during project development and the effects analysis, but are not included in this EA because either the project would not affect them or the project effects would be so negligible that they cannot be measured, and/or there was no comment received from the public that would indicate concern over these resources.

- There are no congressionally designated wilderness areas within or near the Project Area nor are there any congressionally designated wild and scenic rivers within or near the Project Area.
- The Project Area include portions of the bed and banks, and/or the area within one quarter mile of the ordinary high water mark of the Upper Ammonoosuc River and the West Branch Upper Ammonoosuc River. These river segments were identified as potentially eligible for Wild and Scenic River (WSR) designation (USDA Forest Service, 2005a, Appendix C). The effects of the Proposed Action would not alter the eligibility of these rivers for future designation (Pellerin 2016c).
- There are no lands inventoried under 2001 Roadless Area Conservation Rule within the Project Area. Additional lands were determined to have roadless characteristics during the 2005 Forest Plan revision process. The Kilkenny inventoried area was analyzed during this process but was not recommended for wilderness designation (USDA Forest Service, 2005b, Appendix C). The Project Area includes 390 acres within the Kilkenny inventory area.
Alternative 2 proposes harvest on stands that equal approximately 270 acres of MA 2.1 land of which approximately 70 acres would be harvested. Alternative 2 would not affect the Kilkenny inventoried area’s ability to meet the inventory criteria (Pellerin 2016a).

- There are no Class I airsheds located within or near the Project Area. Prescribed burning proposed for expanding and maintaining permanent wildlife openings on approximately 33 acres would be conducted with site specific burn plans and would employ smoke management techniques. These burn plans would include smoke information, state air quality coordination, and emissions estimates. The extent of prescribed burning proposed in this project would be in relatively small areas for short durations. Monitoring the effects to air quality during previous prescribed burns has shown that, when implemented under controlled conditions with prescribed smoke management measures, smoke generated by prescribed burning is generally confined to the immediate burn area and dissipates quickly, making it difficult to quantify (Buhl 2016).

**Climate Change**

Appendix E of this EA summarizes recent trends in the local climate, discusses broadly the modeled expected changes in future climate and discusses the expected effects of modeled climate change on many of the Project Area resources where there is a nexus with climate change. A discussion of the effects of the proposed project activities and how they may interact with the projected changes in climate is addressed in individual resource sections of this chapter. Project effects on carbon dynamics are also summarized in Appendix E (Simmons 2016).

The following Sections describe the effects to Aquatic Habitat and Fisheries,

**Aquatic Habitat and Fisheries**

The following discussion incorporates by reference the analysis and conclusions documented in the *Deer Ridge Integrated Resource Project Riparian and Aquatic Habitat Report* (Prout 2016) located in the Project Record.
Affected Environment

In general, fisheries within the Upper Ammonoosuc River and its tributaries between the Godfrey Dam and the North Branch of the Upper Ammonoosuc River in the town of Milan are within the affected environment of the Deer Ridge Project Area. This includes tributaries of the Upper Ammonoosuc River such as the West Branch of the Upper Ammonoosuc River, Fogg Brook, and Fifield Brook. Unnamed, and in some cases, unmapped perennial streams have been identified and their subwatersheds were delineated and can be found in the Deer Ridge Integrated Project Water Resources Report (Roberts 2016).

Stream Thermal Regime

Streams in the Project Area are a mix of both coldwater and coolwater streams, based on measurements of average July temperature (Table 5). In general, the Upper Ammonoosuc River is a coolwater river and all tributaries from the west are coldwater streams. Tributaries from the east tend to be coolwater streams.

Table 5. Mean July Water Temperatures (MJWT; measured hourly over 31 day period) and corresponding Thermal Classification for sample sites in the Project Area. (Cold = <18 C; Cool = 18-21 C; and Warm = >21 c).

<table>
<thead>
<tr>
<th>River/Stream Location</th>
<th>2005</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>Thermal Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Ammo – Above Godfrey Dam</td>
<td>17.5</td>
<td>18.8</td>
<td>18.1</td>
<td>17.3</td>
<td></td>
<td>Cold/Cool</td>
</tr>
<tr>
<td>Upper Ammo – Below Godfrey Dam</td>
<td>19.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cool</td>
</tr>
<tr>
<td>West Branch of Upper Ammo</td>
<td>16.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cold</td>
</tr>
<tr>
<td>Upper Ammo – FR13 Bridge</td>
<td>18.4</td>
<td>19.1</td>
<td>18.2</td>
<td>17.9</td>
<td>17.2</td>
<td>Cool</td>
</tr>
<tr>
<td>Fogg Brook</td>
<td></td>
<td>13.7</td>
<td>13.5</td>
<td>13.1</td>
<td>12.2</td>
<td>Cold</td>
</tr>
<tr>
<td>One Mile Brook</td>
<td>20.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cool</td>
</tr>
</tbody>
</table>

This suggests that tributaries in the Project Area provide habitats for resident brook trout and sculpin fish populations, but some brook trout, certainly hatchery fish that are stocked in the main river, may be mobile between the Upper Ammonoosuc River and these coldwater tributaries during the hottest times of the year. Fogg Brook, Fifield Brook, and the West Branch of the Upper Ammonoosuc would serve as the largest
coldwater sanctuaries in the affected environment. Coldwater tributaries such as Fogg Brook are very cold and well below the coolwater threshold of 18 C. The Upper Ammonoosuc River, although a coolwater river, is well below the warmwater threshold of 21 C.

Steam Connectivity

Connection between the Upper Ammonoosuc River and its coldwater tributaries is important given the coolwater temperature regime of the river within the analysis area, between the Godfrey dam and the mouth of the North Branch of the Upper Ammonoosuc River. During the hotter summer months, those brook trout that inhabit the river will seek the mouths of these tributaries for refuge. During the fall months, fish may also seek these tributaries for spawning. In the vicinity of the Project Area, Higgins Brook, Fifield Brook, Fogg Brook, and the West Branch of the Upper Ammonoosuc River are the major tributaries that link summer coldwater habitats to the coolwater habitat of the Upper Ammonoosuc River.

York Pond Road (FR 13) is the only major road within the Project Area and there are nine crossings of perennial streams and four of these are bridges. The other crossings are of very small headwater perennial streams and some of these may be barriers to fish movement at various flows. A secondary road, Fifield Brook Road (FR105), crosses Fogg Brook and may also be a barrier to upstream brook trout movement. Given the complexity of the brook downstream of this culvert, the extent of natural connectivity in absence of the culvert is uncertain. Elsewhere in the Project Area, the closed roads that can be opened for future management activities do not have any crossing structures in place. Structures were removed after activities were completed.

**In-stream Fish Habitat Quality and Productivity**

The Upper Ammonoosuc River within the analysis area is generally considered low quality brook trout habitat due to its coolwater thermal regime and its lack of habitat complexity. This river habitat tends to be dominated by minnow species, burbot, hatchery-raised trout species, and lower number of wild trout which tend to be more mobile. The major tributaries within the Project Area are more typical coldwater trout habitats (West Branch of the Upper Ammonoosuc River, Fogg Brook, and Fifield Brook).
Many of the smaller perennial tributaries of the West Branch on the eastern end of the Project Area tend to be lower productive streams as they meander through flat wetland-like landscapes. On the western end of the Project Area, the streams are more typical coldwater streams of the mountains, but many have been manipulated along their lower reaches when the Berlin Fish hatchery was constructed many decades ago. Both stream channels and local hydrology were manipulated many decades ago to accommodate this large fish hatchery and its many raceways used for fish production. It is unclear how much separation there is between hatchery raised trout and the habitats of the tributaries that flow through the hatchery complex.

**Environmental Consequences**

The relevant factors for analysis of the effects to riparian and aquatic habitats are stream thermal class, stream connectivity, and in-stream habitat quality and productivity (Table 6).

Table 6. Factors used in effects analysis

<table>
<thead>
<tr>
<th>Concern</th>
<th>Indicator</th>
<th>Surrogate Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of coldwater streams</td>
<td>Stream Thermal Class: coldwater, coolwater, warmwater</td>
<td>Number of Perennial streams Changing Thermal Class (Coldwater streams average &lt; 18ºC in July; coolwater average between 18-21ºC; warmwater streams average &gt; 21ºC)</td>
</tr>
<tr>
<td>Barriers to movement of fish, aquatic life, and in-stream sediments and wood.</td>
<td>Stream Connectivity</td>
<td>Number of Stream Crossings Acting as Fish Barriers Improved or Eliminated</td>
</tr>
<tr>
<td>Degradation of stream fish habitat conditions</td>
<td>In-stream Fish Habitat Quality and Productivity</td>
<td>Number of Watersheds where &gt;25% Basal Area is Removed Number Of Temporary Perennial &amp; Intermittent Stream Crossings Needed</td>
</tr>
</tbody>
</table>

**Stream Thermal Class**

Stream temperature is an important environmental variable which affects the growth, reproduction, abundance, and landscape distribution of fish. Natural daily changes in-stream temperature may affect the behavior of individual fish, but land use changes may affect seasonal or annual growth, reproduction, or abundance of fish populations. Understanding when changes in temperatures affect the distribution of fish populations is
critical to fisheries managers and environmental regulators.

Fisheries managers generally classified stream fisheries as coldwater, coolwater, and warmwater based on temperature thresholds that fish species can tolerate. These thermal thresholds determine the composition of fish communities (or the group of fish populations that can inhabit a particular stream reach) have been studied in detail in recent years. Specific thermal thresholds that define breaks in these thermal classes have been estimated in several studies throughout the Midwest and northeastern U.S. The WMNF has considered mean July water temperatures (MJWT) of <18 C, 18-21C, and >21 C respectively as the cold, cool, and warmwater thermal classes in past analyses. Coolwater streams have been viewed as either transitional stream thermal types where coldwater and warmwater species can be found, or as a separate thermal class. Lyons et al. (2009) identified coldwater streams as those with average July water temperatures below 17.5C, coolwater as 17.5 C to 21 C, and warmwater above 21 C. They also considered 17.5-19.5 C as a “cold transition” class and 19.5-21 C as a “warm transition” class. Beauchene et al. (2014) classified coolwater streams in Connecticut as having average July temperatures <18.5 C, coolwater streams between 18.5–22.3 C, and warm streams > 22.3 C. Magee (2006) concluded that wild young brook trout will not occur in streams with average July water temperatures > 21 C based on sampling of 48 sites in New Hampshire. Hartman and Cox (2008) showed that metabolic rates of brook trout increased with water temperature up to 20 C before declining precipitously at a higher temperature. Eaton et al. (1995) estimated the maximum average weekly temperature tolerance threshold for brook trout to be 22.3 C. Based on more recent studies and the best available science, the following stream thermal classes will be used for this analysis:

**Cold** = MJWT <18 C; highest quality thermal habitat for brook trout

**Cool** = MJWT 18–21 C; transitional thermal range where conditions for brook trout become more stressed as you approach 21 C, but generally high numbers of trout up to 19.5 C

**Warm** = MJWT >21 C; brook trout cannot persist.

Effects of actions from alternatives analyzed in this project will be discussed in terms of how potential changes in stream temperatures translate into a streams’ thermal class. Changes in thermal class represent a threshold for when changes in riparian forest structure and or average
air temperatures result in changes in the composition of the aquatic faunal community. Measuring effects to thermal class is a qualitative prediction based on known temperature ranges documented on the WMNF and on the responses of stream temperature from various forest canopy treatments reported in the literature.

Studies in the White Mountains have shown that timber harvesting can increase summertime stream temperatures and widen diurnal\(^1\) stream temperatures (Burton and Likens 1973). A more recent study examined the effectiveness of different buffer widths on the effect of timber harvesting on headwater stream temperatures in western Maine (Wilkerson et. al., 2006). This study documented an increase of approximately 1.4-4.4°C in average weekly maximum stream temperatures after timber clear-cutting occurred with no stream buffers. The study found that streams with selection harvesting applied to the stream edge (no clearcuts) and also streams where clearcuts were applied with 75 feet partially harvested buffers did not show significant increases in stream temperatures as compared to non-harvested control streams. Streams which received clearcuts with 36 feet partially harvested buffers had minor, but not significant, increase in stream temperature (1.0-1.4° C). The study did not evaluate “no cut” buffers because Maine BMP’s permit harvest in buffer areas and it is a common practice. The WMNF applies more conservative restrictions, a 25’ no-cut buffer, as a standard practice on all mapped perennial streams, in addition to an additional 75’ buffer on clearcuts over 1 acre in size.

**Stream Connectivity**

Stream connectivity refers to the ability of a stream to move water, organisms, stream sediments, and in-stream wood freely within the natural capacity of the stream network. The occurrence of both man-made (culverts and dams) and natural barriers (waterfalls, beaver dams, landslides) influence stream connectivity within a watershed. While connectivity generally has recently focused on the passage of aquatic organisms, it also includes linkages of other biotic and physical processes and materials between upstream and downstream reaches. Physical

\(^{1}\) Diurnal: happening during the day or daily
processes include the movement and distribution of woody debris, sediment, and migration of channel patterns. It is important that woody debris and bed material be allowed to pass unhindered through the stream crossing structure. When debris is trapped at the inlet of a structure, aquatic organism passage barriers are created, and habitat may be degraded both above and below the stream crossing. In addition, when structures constrict stream channels, trapped debris and sediment can reduce the capacity of the structure, and stream flows may overtop the road surface. This could initiate a suite of erosional consequences that include impacts to water quality, stream habitat, and aquatic life (Flanagan, 2005). Structures with bottoms, like round culverts, that constrict the stream channel width, generally scour the stream channel away from the outlet of the pipe, creating a fish barrier to upstream movement.

The notion that resident stream trout species were generally sedentary has been challenged with new technologies for monitoring fish movements (Gowan et. al., 1994). The dominant vertebrate species in White Mountain streams is the native eastern brook trout. Gowan and Fausch (1996) documented brook trout summer seasonal movements of over a mile and shorter distances traveled regularly by resident brook trout. In addition to moving during higher flows to access suitable spawning habitat in spring and fall, trout also move during summer low flows and in anticipation of winter low flows. Peterson and Fausch (2003) observed peak movement of brook trout in the summer and fall, with nearly 80 percent of recaptured fish moving upstream and up to two kilometers away within a summer.

The motivation for resident fish movement is tied to the life history needs of the species. Brook trout often spawn in areas of groundwater inflow (Witzel and MacCrimmon 1983, Curry and Noakes 1995), and have been observed to overwinter in pools in proximity to groundwater discharges (Cunjak and Power 1986). Groundwater upwellings or flows can protect brook trout eggs from extreme cold temperatures since the species spawns in the autumn and eggs hatch in the early spring. Access to groundwater upwellings and tributary confluences is also important for thermal refuge for trout and other species during summer months (Baird and Kruger 2003).

Streams in the White Mountains that can be crossed with culverts are typically coldwater or coolwater habitats. Most of the impacts associated with culverts in the White Mountains will affect coldwater and coolwater
fish populations – salmonids (brook trout), cyprinids (minnows and dace), catostomids (suckers), and cottids (sculpin). Aquatic salamanders associated with these habitats may include spring (Gyrinophilus porphyriticus), two-lined (Eurycea bislineata), and dusky (Desmognathus fuscus) salamanders.

**In-Stream Fish Habitat Quality and Productivity**

In-stream habitat quality and productivity is a description of those variables that have the most influence over stream productivity in the White Mountains: risk of aluminum toxicity from episodic acidification; excessive sedimentation from roads associated with logging activity or from large scale natural flood events; and the status of in-stream large woody debris and pool habitat area.

Lachance et.al (2008) found in Ontario brook trout streams that fine sediments accumulated 2-5 times greater in stream sections below new logging road culvert installations than in stream sections above the new crossing and were evident three years post-construction. Hakala (2000) found that fine sediment, of sizes generally documented from logging roads, could negatively affect the abundance of newborn brook trout. This study also found that fine sediment did not reach threshold levels in brook trout spawning sites in steeper gradients or where high stream flows are encountered. Curry and MacNeill (2004) showed that sedimentation does increase mortality of certain life stages of brook trout (i.e. siltation of late fertilized egg stage), but they could not document effects to populations because of the dispersal of young trout throughout the watershed. They found brook trout populations were highly successful despite chronic sedimentation from farming. It is clear that fine sediment can affect the egg survival of trout species, it is less clear at what point this threatens the local population or what compensatory mechanisms allow the population to mitigate reductions in spawning success.

The effects of sedimentation from forest land management (i.e. logging, road construction and reconstruction, stream crossings, and other ground disturbances) on stream invertebrates and indirect effects on fish growth (i.e. impacts to fish feeding opportunities) have been more difficult to isolate in scientific studies. Most studies have occurred in high intensity logging with clearcutting removing large areas of the watershed with and without riparian buffers. A typical response is a large increase in stream invertebrate populations due primarily to large increases in algae.
abundance due to the increased sunlight (Noel et al., 1986). Lemly (1982) was able to isolate sedimentation effects from logging and residential housing development effects on stream invertebrates and found both species abundance and overall diversity was altered in a southern Appalachian stream. The study found fewer species of mayflies, stoneflies, and caddisflies in areas of both higher sand deposits and higher organic sediments, while more generalist species (dipterans such as midges) increased.

Correlating changes in stream invertebrate populations to fish growth is even more challenging as brook trout in the northeastern United States are dependent on terrestrial insects for food during low flow periods of the late summer months (Sotiropoulos et al. 2006). In mountain streams were groundwater is less relevant for maintaining stream flows, brook trout are known to choose pool habitats over riffle habitats for feeding. Saving energy in low velocity environments appears to be more important than occupying environments with higher feeding opportunities normally associated with riffles. During this time terrestrial insects compose more than half of the brook trout diet.

Marschall and Crowder (1996) modeled the responses of various anthropogenic effects on brook trout populations and determined that, while severe sedimentation could have potentially strong negative effects from an extreme increase in the egg to larva mortality, this effect was not likely to result in local extinction. The authors could not detect an effect at the population level as young brook trout apparently dispersed from habitat areas saturated with young to areas that were not saturated. Martin and Hornbeck (1994) suggest that sedimentation from logging in New England forests need not be of great concern to aquatic resources if BMPs are followed.

Research has shown the effects of both acid deposition and clean air regulations on soil and surface water chemistry within the White Mountains (Likens et al., 1996). Reductions in emissions have resulted in some improvement in the chemistry of New England surface waters (Driscoll et al., 2001). Full chemical and biological recovery has been

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2 Anthropogenic: caused or produced by humans
delayed from the leaching of soil base cations\(^3\). Therefore, episodic acidification still occurs in sensitive areas. Studies have shown that episodic acidification can have detrimental effects to fish species in mountain streams of the northeastern United States (Baker et al. 1996; Baldigo and Lawrence 2000; Baldigo and Lawrence 2007). Baker et al. (1996) demonstrated that downstream fish movement, fish mortality, and fish community composition were all strongly correlated to stream acidity and inorganic monomeric\(^4\) aluminum concentrations during episodic events. Warren et al. (2008) suggested the extirpation of at least two fish species occurred during a period of chronic acidification during the early 1970s in the Hubbard Brook watershed.

The interaction of land use and episodic acidification is less researched. Intensive timber harvesting worsened the effects of acid deposition on stream chemistry and brook trout survival in the acid sensitive waters of the Catskill Mountains, while more moderate partial harvesting treatments did not (Baldigo et al. 2005). In this study, 5-14 percent basal area removal had no effect on brook trout survival, while 73 percent basal area removal caused 100 percent mortality in this acid sensitive drainage of the Catskills. No other research on more moderate basal area removals exists so conservative thresholds ranging from 17-25% are considered as protective thresholds depending on local buffering capacity of soils and water.

**Spatial and Temporal Context for Effects Analysis**

The analysis area for direct and indirect effects on riparian and aquatic resources is all subwatersheds of the West Branch of the Upper Ammonoosuc River that include harvest treatments, and also all subwatersheds of the Upper Ammonoosuc River from the mouth of the West Branch to the mouth of Higgins Brook. This area was chosen because it includes all potential fish-bearing streams in or directly downstream of the Project Area. The analysis period for direct and indirect effects is 10 years in the past and 20 years in the future, because water quality and quantity effects from vegetation management and temporary disturbance

\(^3\) Cations: any positively charged atom or group of atoms (opposed to anion)
\(^4\) Monomeric: a molecule of low molecular weight capable of reacting with identical or different molecules of low molecular weight to form a polymer.
would be expected to subside in this period (Hornbeck et al. 1993; Martin et al. 2000).

The analysis area for cumulative effects on riparian and aquatic resources includes the entire West Branch of the Upper Ammonoosuc River watershed, and all subwatersheds of the Upper Ammonoosuc River between the Godfrey Dam impoundment and the North Branch of the Upper Ammonoosuc River. This area was chosen to adequately analyze the cumulative effect of activities that could potentially affect fish and fish habitat between the Godfrey Dam which is a fish barrier, and the North Branch of the Upper Ammonoosuc River which significantly alters water temperatures due to its warmer temperatures. The analysis period for cumulative effects is 10 years in the past and 20 years into the future (2006-2036), because water quality and quantity effects from vegetation management would be expected to subside within ten years of implementation due to vegetation regrowth (Hornbeck et al. 1993; Martin et al. 2000). Project activities are expected to be implemented in ten years or less. Appendix C of this EA includes the list of past, present, and reasonably foreseeable future actions considered in this analysis.

**Alternative 1: No Action**

**Direct and Indirect Effects**

**Stream Thermal Class**

Stream thermal classes of streams is not expected to change in the analysis area over the next 20 years. Riparian areas are dominated by mature forests; therefore, increased shading is not expected. Localized changes in riparian canopy of streams may occur from the death of individual trees but generally these events have little impact on overall stream temperatures. Only widespread mortality of riparian trees along a stream reach caused by disease or a large storm event would lead to changes in thermal class.

**Stream Connectivity**

Stream connectivity would generally not change in the no action alternative. Connectivity could improve if a large storm event caused failure of some of the undersized culverts on the York Pond Road (FR13) and larger culverts were installed to open this road.

**In-stream Fish Habitat Quality and Productivity**

Stream habitat quality would be a function of trends in stream flow that
result in either in-channel erosion or sediment deposition. Overall, habitat would be expected to be similar to conditions over the last ten years. Very localized changes may occur due to random bank erosion, tree falls, and downstream of undersized crossings and road surfaces. Aquatic productivity would also remain similar, with localized changes in aquatic life abundance as downed wood recruitment continues to occur. Water quality and water quantity trends would be similar to what is currently observed, resulting in similar habitat conditions that are observed now. Given current habitat conditions, no changes in fish or aquatic organism productivity is expected.

Cumulative Effects
Stream Thermal Class

It is unlikely that land use in the larger cumulative effects area will alter stream thermal classes. Although the existence and continued operation of the Berlin water supply definitely causes slightly warmer water temperatures in the Upper Ammonoosuc River downstream of the dam, this effect has existed for many decades and is not expected to increase substantially in the next twenty years. However, if climate change trends continue or worsen, the thermal class of the Upper Ammonoosuc River from Godfrey Dam to the West Branch of the Upper Ammonoosuc River may approach the warmwater thermal class. In all other streams, no changes in thermal class are expected even if temperatures warm from climate change. Small tributaries are very cold and the West Branch of the Upper Ammonoosuc River averages 2 degrees C below the coolwater threshold. Model projections of air temperature increases due to climate change could translate into an increase of 1.7º C in average stream temperature in a worst case scenario by the year 2035 (Prout 2010). None of the other past, ongoing, or future activities in the remainder of cumulative effects area would contribute to changes in thermal classes of streams.

Stream Connectivity

There are no expected additions or removals of stream crossings within the cumulative effects area for fish and aquatic habitats, therefore there are no cumulative effects.
In-stream Fish Habitat Quality and Productivity

For the cumulative effects area, no cumulative effects to fish and aquatic habitats are expected as no direct and indirect effects are expected in this alternative.

**Alternative 2: Proposed Action**

**Direct and Indirect Effects**

**Stream Thermal Class**

Vegetation management near perennial streams would not alter the stream thermal classification of any perennial stream reach. Clearcutting adjacent to coldwater streams without buffers is the most widely demonstrated silvicultural practice to cause increases in stream temperatures, as documented by Wilkerson et.al. (2006). The application of WMNF Plan Riparian and Aquatic Habitat guidelines G-1 and G-2, and design features for unmapped perennial streams, would prevent any substantial removal of riparian forest canopy cover shading these streams because no clearcutting would occur within 100’ of a perennial stream. Other treatments such as single tree selection, thinnings, and improvement cuts would not create openings in the canopy that would have any measureable impact on stream temperatures, especially since they would not occur within 25’ of a perennial stream.

The best available science regarding the effects of forest harvesting on stream temperatures demonstrates that the buffers prescribed in Forest Plan guidelines, as well as additional design features, would prevent any substantial warming in stream temperatures. Since these guidelines, as well as additional design features, are being prescribed on all known perennial stream reaches generally used by fish year after year, no changes in stream thermal class in the Project Area would be caused from timber harvest activities in this alternative.

Landings, road construction, temporary stream crossings associated with vegetation management, watershed improvements, and prescribed burning would not change the thermal class of any stream reach within the Project Area. Adhering to Forest Plan guidelines, state of New Hampshire BMPs, and project design features would limit the size and location of openings within the riparian forest canopy. The best available science suggests that the small area of riparian forest altered by these activities would not cause substantial increases in water temperatures; therefore,
these activities would not alter the stream thermal class of perennial streams in this alternative.

Stream Connectivity
Stream connectivity would remain unchanged with implementation of this alternative. No existing barriers would be improved. All new crossings for implementation of vegetation treatments and removal of forest products would be temporary. At least 2 of the 4 crossings would be bridges, and all temporary crosses are generally only in place for 1 to 3 years. All 10 permanent crossings used for the hauling of forest products are already in place and are used for many other transportation needs.

In-stream Fish Habitat Quality and Production
According to the Water Resources Report, sources of sedimentation associated with vegetation management are primarily from the associated transportation system and stream crossings. This alternative would utilize 11 existing permanent stream crossings and install 34 temporary stream crossings on 13 intermittent streams and 21 perennial streams. The magnitude of sedimentation would be greatly reduced due to the implementation of design features, BMPs, and Forest Plan Guidelines. The overall design of the transportation system limits the number of crossings, considers proper crossing locations that minimize sedimentation, and uses primarily temporary crossings. For these reasons, sedimentation effects to aquatic resources are expected to very minimal.

The best available science indicates that sedimentation of the magnitude and duration potentially occurring could locally effect fish growth, fish egg survival, and stream invertebrate production, but the free movement of fish and other aquatic life would allow areas to quickly re-colonize. In addition, since forest harvesting impacts would not be chronic (due to sale administrator oversight and proper sale closeout rehabilitation), and harvesting would occur over a 10-year period, these minor impacts to habitat quality and aquatic populations would be localized, not occurring in all habitats in the analysis area at the same time. This allows populations to quickly rebound as they commonly do from natural disturbances such as stream bank failures and stream channel relocations which contribute substantial amounts of sediments for many years.

Removal of forest products from the Project Area is not likely to cause increased acidity or the mobilization of aluminum, known to be toxic to
fish, as discussed in the Water Resources Report. No more than 25% of the basal area of forest would be removed from any perennial stream watershed, therefore no detrimental direct or indirect effect on water chemistry is expected due to forest harvesting, log landings, road reconstruction, and gravel pit expansion, combined with the prior effects from acid deposition. Based on the best available science, no increase in the mobilization of aluminum that can cause fish mortality is expected in any perennial stream catchment in either alternative, because the total volume of forest removed is below conservative thresholds determined from the scientific literature and local chemistry of the Project Area.

Riparian stand structure would not be degraded in either alternative due to Forest Plan Standards and Guidelines as well as project design features, thereby ensuring future woody debris inputs would continue the long-term trend towards increased stream habitat complexity. Inputs of downed woody debris into streams would continue over the next 20 years in both alternatives.

**Cumulative Effects**

**Stream Thermal Class**

Since there are no direct or indirect effects from project activities there will be no cumulative effects to stream thermal class. The effects of climate change may be the same as discussed in the no-action alternative, but there are likely no cumulative effects with other activities from this alternative as mitigations would prevent any direct or indirect effects.

**Stream Connectivity**

There would be no cumulative effect to stream connectivity as there is no direct and indirect effects to connectivity from Alternative 2, nor are there any changes expected in connectivity in the cumulative effects area from past, ongoing, or future actions.

**Habitat Quality and Aquatic Productivity**

In general, any effects to in-stream fish habitat quality due to sedimentation that occurs in one stream, in one year, will generally be localized effects, and will be undetectable in 3-5 years after project closeout or rehabilitation. In the cumulative effects analysis area, these localized effects will be distributed in space and time, so no adverse cumulative effects are expected.
Deer Ridge Integrated Resource Project

See Table 7 for a summary of the effects of the alternatives on riparian and aquatic habitats.

Table 7. Summary of effects of alternatives for surrogate measures for Riparian and Aquatic Habitats.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Perennial Streams Changing Thermal Class</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number of Stream Crossings (acting as fish barriers) Improved or Eliminated</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number of Watersheds Where &gt;25% Basal Area is Removed</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number Of Temporary Perennial and Intermittent Stream Crossings Needed (includes both road and skid crossings)</td>
<td>0</td>
<td>34</td>
</tr>
</tbody>
</table>

**Federally-listed Threatened, Endangered, Proposed Species (TEPS) and Regional Forester Sensitive Species (RFSS)**

The following discussion incorporates by reference the analysis and conclusions documented in the Deer Ridge Integrated Resource Project Wildlife Report and Summary of Biological Evaluation for Federally Threatened and Endangered Species (TES) and Regional Forester Sensitive Species (RFSS) (Rowse 2016) located in the Project Record.

**Affected Environment**

Conclusions about whether threatened, endangered, proposed, and sensitive species and their habitat are known or suspected within the Project Area are based on Best Available Science which includes a review of literature on habitat requirements and known occurrences for each species. Recent sources of information on species considered in the Biological Evaluation (BE) include information on habitat, occurrence, threats, and limiting factors evaluated for the Species Viability Evaluation (SVE) and the Biological Evaluation conducted for the WMNF FEIS (USDA Forest Service 2005b, Appendices F and G, USDA Forest Service 2005d). Additionally current literature, site specific monitoring and field reviews (cited in BE) were used to assess effects to TES/RFSS in the Project Area. General habitat condition of the Project Area was determined from past field reviews of stand condition, which is stored in District compartment records. Field reviews of the Project Area were conducted between 2008 to 2013 by Forest Service staff for planning this project. Acoustic bats surveys
were in all proposed summer harvest and prescribe fire units in the Project Area between May and August 2014 following survey protocols from United State Department of Interior Fish and Wildlife Service (USFWS) (USFWS 2014a, 2104b, http://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveysguidance.html).

Botanical field surveys were conducted through most of the Project Area by a Botanical Technician during the 2013 field season, with additional surveys performed by the Forest Botanist in 2015 (unpublished WMNF data, Campton, NH). Nearly all stands within the Project Area had botanical surveys conducted, in addition to many surrounding stands that are not proposed for harvest. All species encountered within a stand were recorded; and other habitat and ecological characteristics were documented. Plant surveys of the existing permanent wildlife opening in the Project Area were conducted in 2005 by a qualified botanist (WMNF 2005 unpublished data).

The area analyzed for direct and indirect effects on TEPS/RFSS is the Project Area, since the impact of the Proposed Action and its Alternative on TES/RFSS is dependent on the presence of individuals and/or specific habitat where the activity occurs. The temporal scope for direct and indirect effects on TES/RFSS is the duration of proposed activities because this is when TES/RFSS species would most likely be affected. This time period is estimated to be approximately seven to ten years.

The Analysis Area for cumulative effects for TEPS/RFSS species encompasses National Forest lands within the South Pond South HMU (Compartments 9, 10, and 23) (Figure 1). The area was chosen because the habitat objectives for the South Pond South HMU provides a measurable assessment of how the Proposed Action contribute to the habitat objectives of the WMNF, as defined in the 2005 Forest Plan. This area was chosen because it is large enough to cover the home ranges of both wildlife and plant species as well as addressing habitat connectivity and travel and migration corridors of some of the species discussed in this document. This area also considers habitat diversity at the landscape level as well as considering recent or proposed projects in the vicinity of the Project Area that may affect habitat diversity. We considered adjacent private land to this HMU and determined that there were no management activities in this area that would affect specific HMU objectives. Oftentimes the cumulative
effects analysis area exceeds what is necessary for a species that has a limited home range or very specific habitat criteria. However, it encompasses effects on species with smaller home ranges as well as species that occupy larger areas in a wider array of habitat types.

In some cases, a more defined cumulative effects analysis area is defined based on the species biology. The Northern Long-eared Bat (NLEB) has a more defined cumulative effects analysis area based on scientific information that has been recently reviewed due to the changed status of this species to federally-listed. Maternity habitat within one mile of the Project Area was evaluated for NLEB. An analysis of maternity sites in this area determined the cumulative effects analysis area for NLEB (see occupied and unoccupied habitat for NLEB analysis).

White Nose Syndrome (NWS) has been detected in woodland bats that spend the winter in hibernacula in many eastern states including New Hampshire and Maine (USDA Forest Service 2012c). The disease is caused by a fungus that infects the skin of hibernating bats. WNS has caused the deaths of millions of bats in the eastern United States and Canada (Perry 2013). WNS was confirmed on the WMNF in 2010. Bat species on the WMNF susceptible to WNS include eastern small-footed bat, northern long-eared bat, tri-colored bat, little brown bat, and big brown bat. Many of the woodland bats that occur on the Forest in the non-hibernation season (April 15 to October 31) hibernate off the Forest.

The Lynx Analysis Unit (LAU) 1 considers lynx habitat at a landscape scale. The LAU 1 map shows denning, suitable foraging, and unsuitable lynx habitat in the HMUs (Forest Plan definitions of Canada lynx habitat are based on age class and vegetation type, USDA Forest Service 2005a, Glossary, page 16, 17).

The temporal scope for cumulative effects for TES/RFSS species is ten years in the past and fourteen years in the future (2006 to 2033) because this time period encompasses active harvest operations and connected actions as well as reasonably foreseeable future actions that have or will occur concurrently in the cumulative effects analysis area. It also includes the timeframe when any regeneration harvests would move into a young age class. The temporal scope for the Northern long-eared bat and little brown bat is 2010 when white-nosed syndrome was confirmed on the WMNF through the life of the project as well as reasonably foreseeable future actions that have or will occur concurrently in the cumulative effects
analysis area, which would be 2033. Individuals would most likely be affected during this timeframe.

**Environmental Consequences**

A Biological Evaluation (BE) for Federally Threatened and Endangered Species, and Regional Forester Sensitive Species was completed on May 9, 2016 for the Proposed Action (BE, Project Record). A review of all available information was used to determine which species are known to occur or have potential habitat within the Project Area. All species listed under the Endangered Species Act or designated by the Regional Forester as sensitive species were considered for evaluation of effects in this project (BE, Project Record). Should any listed species be found prior to implementation, mitigations would occur to protect these species.

**Effects Determination and Rationale – Federally Threatened, Endangered, and Proposed Species (TES)**

Northern Long-eared Bat (*Myotis septentrionalis*)

**Alternative 1: No Action**

The No Action Alternative would have no effect on northern long-eared bat.

**Alternative 2: Proposed Action**

The Proposed Action is likely to adversely affect the northern long-eared bat; however, there are no effects beyond those previously disclosed in the programmatic biological opinion on implementing the final 4(d) rule published in the Federal Register on January 14, 2016. Any taking that may occur incidental to this project is not prohibited under the final 4(d) rule (50 CFR §17.40(o)). This project is consistent with the WMNF Forest Plan, the description of the Proposed Action in the programmatic biological opinion, and activities that do not require special exemption from taking prohibitions applicable to the northern long-eared bat; therefore, the programmatic biological opinion satisfies the Forest Service’s responsibilities under ESA section 7(a)(2) relative to the northern long-eared bat for this project.
Rationale

1. Northern long-eared bat would likely occur north of Forest Road 106 based on acoustic surveys conducted in the Project Area.
2. In the portion of the Project Area where northern long-eared bat would likely occur, approximately 80 acres of clearcut and patch cuts harvest could occur during the summer or winter season (June 30 to October 31/Dec. 15 to March 30). Approximately 93 acres of salvage harvest and 32 total (5 net) acres of group harvest could occur during the late summer or winter (August 1 to October 15, December 15 to March 15) when bats would be present but young bats would be able to fly. All other proposed harvest in this area would occur during the winter season (approximately December 15 to March 30).
3. Approximately 6.5 acres of tree felling could occur during the summer for road reconstruction, landing and skid trail construction, gravel pit expansion, and expansion of the trailhead parking area in the northern long-eared bat area.
4. Bats would not be affected by recurring prescribed fire in the permanent wildlife openings. Northern long-eared bat would not likely roost in an opening. Individuals might forage in the opening but only at night. Prescribed fire activity would occur during daylight hours. Prescribed fire may increase insect abundance in opening habitat.
5. Less than 20% of the suitable habitat in the two potential maternity sites in the Project Area would be disturbed by tree felling.
6. Harvesting may create travel corridors and small open areas for foraging.
7. The implementation of Forest Plan Standards and Guidelines (USDA Forest Service 2005b, Chapter 1, pages 20 and 21, Chapter 2, pages 24-26 and 33 to 36) to maintain a diversity of habitat conditions well distributed across the Forest, reserve large wildlife trees, retain standing dead trees where possible, and maintain riparian habitats in areas managed for vegetation should ensure that adequate habitat is maintained for northern long-eared bat.
8. Potential roost trees are not considered limiting on the WMNF.
9. White-nose syndrome is the greatest threat to these woodland bat species. It is expected that effects from WNS (e.g., continued losses
of previously unexposed individuals, reduced reproductive success of surviving individuals etc.) may persist over the next ten years, regardless of any actions in the Deer Ridge Project Area.

Canada Lynx (*Lynx canadensis*)

**Alternative 1: No Action and Alternative 2: Proposed Action**

The No Action Alternative and Proposed would have no effect on Canada lynx.

**Rationale**

1. While there have been some lynx sightings on the Forest and adjacent to the Project Area in the past decade, ongoing track counts and wildlife cameras in the Kilkenny area have not detected any Canada lynx recently. Moreover, the amount of suitable lynx habitat in the Project Area is minimal. So, while it is possible that a Canada lynx could occur in the project area, the likelihood is very unlikely.

2. The Action Alternative could directly affect a Canada lynx by displacing an individual during active harvest operations, connected actions, and other proposed activities but this is unlikely as the chance of an individual being in the Project Area is minimal.

3. Under the No Action Alternative there would be the loss of opportunity to increase suitable habitat by increasing a component of young spruce-fir in the area.

4. In the short term suitable lynx habitat would be maintained or slightly increased and denning habitat would be maintained under the Proposed Action. In the long term, mixedwood habitat with a softwood tendency would be managed to increase the spruce-fir component. These treatments would adhere to lynx habitat Standards and Guidelines in the Forest Plan (USDA Forest Service 2005a, Chapter 2, pages 14-16)

5. Road reconstruction would not affect Canada lynx habitat as roads that were closed before this proposal would be barricaded upon completion of the timber sale. (USDA Forest Service 2005a, Chapter 2, page 16).
Effects Determination and Rationale–Regional Forester Sensitive Species (RFSS)

Little Brown Bat (*Myotis lucifugus*)

**Alternative 1: No Action**

The No Action Alternative would have no impact on little brown bat.

**Alternative 2: Proposed Action**

The Proposed Action may impact individual little brown bat but would not likely cause a trend toward federal listing or loss of viability.

**Rationale**

1. Little brown bat may be present in the Project Area between April 15 and October 31.
2. The period of risk for little brown bat is greatest during the non-hibernation season when tree removal and prescribed fire would occur (April 15 through October 31) with the greatest potential for effects during the early spring and summer season after bats emerge from hibernation and are raising young (April 15 through July 31).
3. Approximately 152 acres of harvest (clearcut, parch cut, overstory removal) could occur during the non-hibernation season between June 30 and October 31, December 15 to March 30. Another 188 acres of salvage, shelterwood and 476 total acres (81 net acres) of group selection could also occur during the non-hibernation season but likely when young bats could fly (August 1 and October 15, December 15 to March 30). All other proposed harvest in the Project Area would occur during the winter season.
4. Other activities that might directly affect a little brown bat include approximately 18 acres of tree felling associated with road reconstruction, building new landings, gravel pit expansion, and skid trail construction. Most of these activities also would likely occur sometime during the non-hibernation season.
5. The potential exists that little brown bats could be roosting in trees selected for removal or during a prescribed fire during the non-hibernation season. However, the potential for a bat to be in a roost tree during these activities is small considering the relatively few individuals recorded in areas and the small percentage of habitat
affected by tree felling and prescribed fire in the non-hibernation season.

6. Potential roost trees are not limited on the WMNF.
7. Creating openings and maintaining roads and trails can enhance or maintain foraging habitat for these species.
8. The implementation of Forest Plan Standards and Guidelines (USDA Forest Service 2005b, Chapter 1, pages 20 and 21, Chapter 2, pages 24 to 26, 30 to 32, and 33 to 36) to maintain a diversity of habitat conditions well distributed across the Forest, reserve large wildlife trees, retain standing dead trees where possible, and maintain riparian habitats in areas managed for vegetation should ensure that high quality summer habitat is maintained for little brown bat to find adequate food, cover, roost sites, water, and other needs to survive and successfully reproduce on the Forest.
9. White-nose syndrome is the greatest threat to these woodland bat species. It is expected that effects from WNS may persist over the next ten years.

Northern Bog Lemming (Synaptomys borealis sphaginicola)

**Alternative 1: No Action**

The No Action Alternative would have no impact on northern bog lemming.

**Alternative 2: Proposed Action**

The Proposed Action may impact individual northern bog lemmings, but would not likely cause a trend to federal listing or loss of viability.

**Rationale**

1. Northern bog lemmings are extremely rare in New England. The likelihood of an individual occurring in the Project Area or cumulative effects analysis area is considered low.
2. Identifiable riparian habitat or wet areas are usually protected minimizing the risk of disturbing an individual northern bog lemming or associated habitat (USDA Forest Service 2005a, Chapter 2, pages 24 - 26, 30-32, NHDFL 2016).
3. The implementation of Forest Plan Standards and Guidelines (USDA Forest Service 2005a, Chapter 1, pages 20 and 21, Chapter 2, pages 33 to 36) to maintain a diversity of habitat conditions well
distributed across the Forest should ensure that adequate habitat is maintained for northern bog lemming.

4. Northern bog lemmings have persisted on the Forest over time despite habitat altering activities on the landscape (USDA Forest Service 2005b, Appendix G, Page 233). This seems to indicate that the level of activities that have occurred on the Forest have not had an adverse effect on occupancy of northern bog lemming over time.

A Mayfly (*Ameletus browni*) and a Mayfly (*Ameletus tertius*)

**Alternative 1: No Action**

The No Action Alternative would have no impact on *Ameletus browni* or *Ameletus tertius*.

**Alternative 2: Proposed Action**

The Proposed Action may impact individual *Ameletus browni* and *Ameletus tertius* but would not likely cause a trend to federal listing or loss of viability.

**Rationale**

1. *Ameletus tertius* may occur in larger perennial streams in the Project Area. *Ameletus browni* would occur in the upper faster moving, colder upper headwater streams in the Project Area.

2. The implementation of Forest Plan Standards and Guidelines (USDA Forest Service 2005a, Chapter 2, pages 24 to 26, 30 to 32) as well as meeting or exceeding State of New Hampshire BMPs (NHDFL 2016) protect perennial streams from increased stream temperature, sedimentation, and changes in pH and aluminum by maintaining a 25 foot no harvest buffer, a wider Riparian Management Zone with limited harvest, and following appropriate soil and water conservation measures.

Boreal Bedstraw (*Galium kamtchaticum*)

**Alternative 1: No Action**

The No Action Alternative would have no impact on Boreal Bedstraw.

**Alternative 2: Proposed Action**

The Proposed Action may impact individual *Boreal Bedstraw plants* but would not likely cause a trend to federal listing or loss of viability.
Rationale

1. Potentially suitable habitat does exist in certain locations in the Project Area, but this species was not discovered during recent or historical plant surveys in the Project Area (unpublished WMNF data). The potential for undiscovered individuals exists, but has been minimized by detailed botanical surveys. Forest Standards and Guidelines will provide protection to some potentially suitable habitat within the Project Area including wetlands, streams, and pond edges that could harbor undetected individuals.

2. Any potential effects of the Proposed Action on unknown individuals would not lead to a decrease in the viability of the species.

Northern Adder’s Tongue (Ophioglossum pusillum)

Alternative 1: No Action

The No Action Alternative would have no impact on Northern Adder’s Tongue.

Alternative 2: Proposed Action

The Proposed Action may impact individual Northern Adder’s Tongue plants but would not likely cause a trend to federal listing or loss of viability.

Rationale

1. Suitable habitat does exist in certain locations in the Project Area, primarily along overgrown skid trails, wildlife openings, log landings, and portions of the margins of Forest Roads. This species has never been documented from the Project Area previously and plant surveys in the Project Area did not discover any new populations (unpublished WMNF data, NHNB 2012). The potential for undiscovered individuals exists but is very small, and any potential effects of the Proposed Action would not lead to a decrease in the viability of the species.

2. Roadside ditches, log landings, and permanent wildlife openings would continue to provide suitable habitat for this species.
Mountain Sweet-Cicely (*Osmorhiza berteroi*)

**Alternative 1: No Action**

The No Action Alternative would have no impact on Mountain Sweet-Cicely.

**Alternative 2: Proposed Action**

The Proposed Action may impact individual Mountain Sweet-Cicely plants but would not likely cause a trend to federal listing or loss of viability.

**Rationale**

1. Potentially suitable habitat does exist in certain locations in the Project Area, but this species has never been documented from the Project Area historically, nor was it discovered during recent plant surveys in the Project Area (unpublished WMNF data, NHNHB 2012). The potential for undiscovered individuals exists but is very small due the small extent of suitable habitat areas. Any potential effects of the Proposed Action would not lead to a decrease in the viability of the species.

2. Unharvested areas of semi-rich hardwood forest and embedded road embankment areas would continue to exist within the Project Area and provide potentially suitable habitat for this species.

**Heritage**

The following discussion incorporates by reference the analysis and conclusions documented in the *Deer Ridge Integrated Resource Project Heritage Report* (Jordan 2016) located in the Project Record.

**Affected Environment**

Native American occupation of northern New Hampshire dates to as early as 11,500 years before present. Native inhabitants of this area utilized the landscape for various purposes, such as hunting, gathering, fishing, procurement of raw materials, or spiritual activities. Surveys for Native American sites that pre-date European contact have resulted in the identification of several dozen Native American archaeological sites within the WMNF. The precontact archaeological sites that have been identified in the WMNF are very small (usually less than 100 square meters), have a very low density of artifacts, and rarely contain diagnostic artifacts or
features. Small, single use or short-term encampments probably associated with hunting and travel are generally located on level, well drained landforms adjacent to large bodies of fresh water.

The periglacial landform feature of the highest sensitivity for precontact Native American sites near York Pond is outside the Project Area. Certain floodplain terraces of the Upper Ammonoosuc River and its West Branch will be harvested, but subsurface precontact resources are not anticipated at such a distance from the Upper Ammonoosuc’s confluence with the Connecticut River.

The shortest possible ford between the Upper Ammonoosuc River and the Androscoggin River is located upstream of this Project Area, corresponding roughly with NH state route 110A. Another potential ford location between the Upper Ammonoosuc watershed and the Androscoggin watershed via the Dead River and Mt. Jasper is located southeast of this Project Area. Locations within the Project Area considered to have potential for precontact sites where ground disturbing activities are proposed were analyzed and shovel tested, but no precontact cultural features were observed. Rootballs and gravel beds were also scanned for precontact resources in the course of pedestrian surveys. No observable precontact resources were encountered within this Project Area.

The White Mountain region was among the last areas in New England to be settled by European Americans. Villages developed during the 1800s that included clustered and dispersed farmsteads, schools, churches, cemeteries, stores, grist & lumber mills and a few small factories. The Deer Ridge Project Area, however, remained unsettled during this period; the 19th century village of Berlin was located well east of the Project Area on the Androscoggin River, and settlement in Milan was north and east of the
Project Area (Figure 7). In 1886, a member of the Appalachian Mountain Club, describing the area in the club’s Appalachia journal (as quoted in Belcher 1980: 36), observed that “search may be made in vain for any permanent human habitation.”

The Upper Ammonoosuc Logging Railroad (Figure 8) came into the Upper Ammonoosuc basin from 1892-1903, connecting to the Grand Trunk Railway in West Milan, and facilitating the extraction of large amounts of old growth spruce and other softwood (Gove 2010: 50). Logging camps are located around the fringes of the Project Area (three within the Project Area boundary, one of which is in a proposed harvest unit). After logging railroad operations ceased in the wake of large scale forest fires in 1903 that burned as much as 70% of the Upper Ammonoosuc basin, much of the railroad grade was converted into the existing York Pond Road, but intact sections remain in parts of the Project Area (Belcher 1980).

The Project Area and surrounding land was acquired in 1919 by the U.S. Forest Service, and the first buildings associated with the Berlin Fish Hatchery were constructed in 1921. Water impoundments and ditches associated with the fish hatchery in the Project Area were built in the 1920s (Figure 9), and expanded in the 1930s with the arrival of the Civilian Conservation Corps at nearby Camp Kilkenny. The Berlin Fish Hatchery has since been operated by the New Hampshire Fish and Game Department under a lease from the U.S. Forest Service. Many of the early fish hatchery structures are no longer utilized, but remain evident on the ground surface in proposed project activity areas (Figure 10). Structures that are currently in use by the fish hatchery are present in the Project Area.

Figure 8. Detail of Project Area from the Bill Gove logging railroad map collection, showing the Upper Ammonoosuc Logging Railroad (1892-1903).
and may be historic, but are outside any proposed activity areas and were not inventoried in detail. Forest Service activity since acquisition of these lands has concentrated on timber harvests, recreational enhancements, and wildlife habitat management.

**Environmental Consequences**

The analysis area for direct, indirect, and cumulative effects for cultural resources is limited to the Project Area. As project activities are confined to this area, there is no potential to affect cultural sites beyond the project boundary. The timeframe for direct effects is the duration of the project, and 1-2 years after implementation for indirect effects to account for the regrowth of vegetation. The timeframe for cumulative effects is 30 years before and after 2016 to account for past and potential future timber harvest. Identified sites within proposed project activity areas that are potentially eligible for inclusion in the National Register of Historic Places include abandoned sections of railroad grade of the Upper Ammonoosuc Logging Railroad and associated features, old bridge abutments, a logging camp site, and fish hatchery infrastructure including abandoned ditches and water control structures.
Alternative 1: No Action

Under this alternative, no action will take place and there will be no direct, indirect, or cumulative effects to cultural resources.

Alternative 2: Proposed Action

Under this alternative, potential direct effects include the loss of information due to the physical disturbance of buried archaeological deposits, and the destruction of historic features on the ground surface during project activities. Mitigation measures and design features have been developed to avoid or minimize these effects: All identified cultural sites have been marked as heritage reserve areas and will be avoided during harvest. Linear features, such as the railroad grade and fish hatchery ditches, will be avoided to the extent possible, and crossed or breached by log skidders when necessary only at right angles, utilizing existing breaches and over snow or other cushioning with minimal disturbance so that the intensity of direct effect to these features will be negligible, and they will remain intact as visible linear features on the ground surface. Indirect effects could include increased visibility and exposure to vandalism of archaeological sites due to the removal of surrounding vegetation, but this effect would be temporary (1-2 years), and buffers are included in heritage reserve areas to minimize site visibility. Cumulative effects might include the crossing of historic linear features in new locations during recurrent timber operations if care is not taken to re-use existing crossings, resulting in multiple breaches and gradual deterioration of the overall integrity of the features. Past timber harvests in the temporal scope (specifically York Pond Timber Sale; Hatchery Timber Sale; and Fishway Timber Sale) included measures to avoid and minimize disturbance of linear features, and it is anticipated that future projects will utilize similar design features. With these protective measures in place, direct effects are minimal and indirect effects are temporary, so there are no cumulative effects.

A Cultural Resources Reconnaissance Report (CRRR No. 2016-02-03) with a determination of “No Effect” was submitted to the New Hampshire State Historic Preservation Office, which concurred with the determination on May 3, 2016. (See signed New Hampshire Division of Historic Resources Request for Project Review form in the Project Record.)
Climate change

The proposed mitigation measures listed in Chapter two of this EA are developed so that there will be minimal direct effects from project activities. With minimal direct effects from this project, the project will neither reduce nor increase the risks of climate change affecting cultural resources during project work or within one to two years after project implementation.

Non-Native and Invasive Species (NNIS)

The following discussion incorporates by reference the analysis and conclusions documented in the Deer Ridge Integrated Resource Project Non-native Invasive Species Report (Sperduto 2016) including the risk assessment for the Deer Ridge Project. These documents are in the Project Record.

Affected Environment

NNIS plants exist in small numbers within the Project Area in Compartments 10 and 23. The Kilkenny Region is less densely occupied by invasive species in general compared to many other areas of the Forest. Additional infestations certainly exist off National Forest land as plantings in residential settings, and along roadsides and in private openings. No data exist on the number, composition or size of these infestations in WMNF databases; limited data exist for roadside areas immediately adjacent to the WMNF boundaries. Anecdotal information in the form of casual observation indicates that the level of infestation in this rural vicinity is relatively low, and apparently lower than areas on the southern, western, and eastern sides of the Forest.

There are two invasive species within the Project Area that the WMNF actively controls (Japanese knotweed, knapweed). The Japanese knotweed occurs at two sites in close proximity to one another along Bog Loop Rd., and the knapweed is nearby. There are five additional species that are not actively controlled at this time (one occurrence of each). Two of these species (coltsfoot, reed canary grass) are well established species regionally, but have limited and uncertain impact on natural systems in northern New England, and are generally not considered a high priority for treatment given the more critical threats presented by other species. Three other species are under consideration for future control efforts (cypress spurge, false spiraea, and Scot’s pine), although they are not presently on state Prohibited or Restricted species lists. All infestations are
small for the particular species (less than 0.1 acres each). The Japanese knotweed in the Project Area is one of the regularly treated infestations on the WMNF.

The exact mode of arrival for each of these infestations within the Project Area is difficult to determine. A combination of mostly off-Forest sources are likely, including: old homesteads within and outside the Project Area; contaminated fill material; mechanical sources (e.g., mowers and vehicles); and transportation by birds (particularly berry-producing species). The known infestations were discovered through a combination of botanical surveys in support of this project, and prior survey reports from WMNF staff and partners. These documented locations and other site-specific field reviews were used to evaluate the likelihood of NNIS spreading into the Project Area and the environmental consequences of their potential establishment.

The control of NNIS infestations within the Project Area will be carried out under the authorization of the WMNF Forest-wide Invasive Plant Control Project Environmental Assessment signed in 2007 (USDA Forest Service, 2007a). Treatment of these infestations is not being analyzed in the Deer Ridge Project.

**NNIS and Potentially Invasive Species Known to Occur within the Deer Ridge Project Area**

**Coltsfoot** (*Tussilago farfara*): Coltsfoot is a member of the Aster family (Asteraceae). The flowers of this species strongly resemble those of dandelion and it is one of the earliest blooming plants in the spring. The large deltoid shaped leaves arise after the flowers. This species is ubiquitous on the WMNF along stream banks, in seeps and along roadway edges. Its impact on native plants and native plant habitats is somewhat in question. Widespread control of this species on the WMNF is not feasible; however site specific control efforts are desirable when specific resources are threatened by this species. There are several occurrences of this species along roads within the Project Area.

**False spiraea** (*Sorbaria sorbifolia*): False spiraea is a member of the Rose family. It is found along roadsides, fields, abandoned homesteads, and forest borders. It is found in all New England states, but is not currently on the New Hampshire list of Prohibited or Restricted species. There are some
indications on the National Forest that it can spread locally and aggressively. There is one location on the Forest within the Project Area.

**Japanese knotweed** (*Polygonum cuspidatum*) – Priority Control Target: This member of the buckwheat family is a creeping perennial with bamboo-like stems and creamy white flowers. The creeping rhizomes spread rapidly, and new plant colonies can grow from small fragments carried downstream. The roots provide poor erosion control making this plant a threat to riparian areas. This species is the most abundant NNIS on the WMNF and in the surrounding landscapes. It primarily occupies roadsides, and river and stream banks. It occurs at two proximal locations along the Bog Loop Road near the Fish Hatchery.

**Knapweeds** (*Centaurea biebersteinii* and *C. jacea*) – Priority Control Target: Spotted and brown knapweeds are species found along roadsides and in openings across the forest and in the surrounding landscape. It crowds out native forbs and can contribute to erosion due to its poor root system. Treatment priority is given to this species due to its currently limited distribution on the Forest. There is one small occurrence of knapweed on the dam at base of No. 9 Brook (Compartment 23, Stand 57).

**Reed Canary Grass** (*Phalaris arundinacea*): Highly aggressive, vegetatively spreading perennial grass invades wetlands, roadsides, and open lands. It is ubiquitous on the WMNF and in New England, and widely dispersed due to its use in conservation seed mix. It is suspected to have both native and non-native gene strains. Widespread control of this species on the WMNF is not feasible nor is it a priority for most conservation purposes. However, site specific control efforts may be desirable when specific resources are threatened by this species. There is one documented occurrence within the Project Area in an old log landing (Compartment 10, Stand 95).

**Scot’s Pine** (*Pinus sylvestris*): Scot’s (or Scotch) Pine is a member of the Pine family. It is a Eurasian species that has been widely planted in North America. There are indications that it has the capacity to spread and reproduce in northern New Hampshire, and has been mechanically controlled in one location on the Forest to prevent further spread. It is not clear how aggressive or widespread the species will be in the future, but it should be controlled in locations where it has the capacity to spread. It occurs in a small gravel pit and former shooting range.
Spurges (*Euphorbia esula* and *E. cyparissias*): Of these two species, only Cypress Spurge (*E. cyparissias*) has been documented on the WMNF. Both are highly invasive in other parts of the northeast and several infestations of both species have been identified from the local area. Due to their current limited distribution these species would be targeted for early detection and rapid eradication efforts whenever located. The species are similar in appearance and habitat preference in the eastern United States with leafy spurge being slightly larger and ranging into drier conditions. Both have very deep roots (15 feet), are allelopathic, crowd out native plants, and are unpalatable as wildlife forage. One occurrence of Cypress spurge is present near the junction of Forest Roads 13 (York Pond Road) and 225 (Number 9 Brook).

The desired condition for the Project Area is to maintain the area as free of NNIS that pose a risk to natural ecosystem function. This includes control of known populations within the Project Area; prevention of any new infestations of NNIS via project activities; and an overall decrease of NNIS within the Project Area.

**Environmental Consequences**

**Spatial and Temporal Context for Effects Analysis**

The Analysis Area for direct and indirect effects on non-native invasive plants is the Deer Ridge Project Area, and adjacent areas of Milan and Berlin, NH, because this is where vehicles and equipment associated with the proposed project actions would have access to and operate on the ground. These vehicles and equipment, as well as gravel, seed, and mulch brought into the Project Area from off site are the most likely entry for non-native invasive species. Newly created openings, parking areas, roads, and log landings are also potential entry sites.

The analysis area for cumulative effects of non-native invasive species is the lands within the South Pond South HMU and the adjacent public and private land in the Towns of Berlin and Milan, New Hampshire. The private property includes a mix of upland hardwoods, softwoods, mixed-woods intermixed with wetlands, perennial and intermittent streams, and residential development. The temporal scope for cumulative effects of non-native invasive species is the past sixteen and future fourteen years (2001-2030). This considers temporary ground disturbing activity by project activities (anything over ten years would have re-established a canopy and/or re-vegetated areas of soil disturbance making it highly unlikely that
new infestations would be introduced by wildlife or human activity.) This time frame also allows consideration of the Forest-wide invasive plant inventory conducted by the New England Wild Flower Society 2001 – 2004 (USDA Forest Service 2010a) that covered 220,000 acres across the National Forest and adjacent lands, including portions of the Cumulative Effects Analysis Area (USDA Forest Service, 2005b, Chap. 3-154-155).

**Cumulative Effects Analysis**

Invasive plant control activities on the WMNF will continue under the authority of the 2007 WMNF Forest-wide Invasive Plant Control Project EA, or anticipated revision to this document. Any existing or future infestation occurring within the lifetime of that decision will continue to be treated.

Winter sports activities (cross country skiing, snowmobiling, etc), summer sports activities (hiking, ATV use, mountain biking, etc), and on-going maintenance in support of these activities will continue and could cause the introduction of NNIS plants, regardless of whether or not these activities are permitted within a given area.

Road maintenance and improvement will continue to take place on state and local highways within the analysis area. These activities also could inadvertently cause the introduction of NNIS plant material to areas adjacent to the Project Area.

**Alternative 1: No Action**

**Direct and Indirect Effects**

Under Alternative 1 there would be no direct effects to NNIS plants. Under Alternative 1 recreation use and management of openings, roads, and trails would continue at historic levels. These activities may spread NNIS into currently unoccupied habitat. The current areas with infestations of invasive plants would receive treatments to control these species under the 2007 WMNF Forest-wide Invasive Plant Control Project (USDA Forest Service, 2007a). Until such time that existing infestations are completely eradicated they would continue to persist and potentially spread vegetatively and via seed, and compete with native species for space, sunlight, water, and nutrients.

There would be a slightly reduced risk of introduction of new NNIS plants into the Project Area due to the lack of other project activities (road building, timber harvest, trail construction, etc). The reduction of risk is
minimal due to the enforcement of Forest Plan Standards and Guidelines, as well as timber sale contracting clauses related to equipment inspection and cleaning and the use of weed-free materials (fill, gravel, and seed mixes).

**Cumulative Effects**

There are known locations of NNIS within the cumulative effects analysis area. There is a greater likelihood of introducing and/or spreading NNIS within this area as a result of activities on private lands than on National Forest system lands. The Forest-wide NNIS inventory (New England Wildflower Society 2001 - 2004) found that two-thirds of the invasive plant occurrences were found on private land outside the National Forest, and almost half of all occurrences were intentionally planted (USDA Forest Service, 2005b, pp 3-154 and 3-155). Despite the enactment of the New Hampshire Invasive Species law (State of New Hampshire 2008, State of New Hampshire 2000) under which it is now illegal to sell, propagate, distribute, or transport any portion of listed invasive plant species in the state, existing infestations and individuals of invasive plants currently existing on the landscape within the analysis area would persist.

Nationally, the rate of spread of non-native invasive plants has been estimated at three percent per year (National Invasive Species Council 2001) and at 8-12 percent per year (USDA FS 1999 Stemming the Invasive Tide). However, given the climate and landscape condition of the analysis area and the comparably low level of current infestation, it is anticipated that the rate of spread for this area would be on the lower end of the national scale. At a rate of spread of three percent per year, if no control was undertaken, these infestations would increase by roughly 50% in ten years. There are no known control projects other than those being conducted on the WMNF, which have or would take place on non-federal lands within the analysis area. It is certain that without the implementation of control efforts on state and private lands, the number of acres infested would likely grow rapidly.

Since 2007, less than one acre of NNIS control has taken place on the WMNF within the analysis area. This consists of two proximal knotweed populations on Bog Loop Road that have been periodically controlled. Control efforts have prevented these small infestations from expanding, although they have not been completely eliminated. These treatments are authorized by the 2007 WMNF Forest-wide Invasive Plant Control...
Environmental Assessment. These treatments equate to actual treatment of NNIS plant infestations within the analysis area. It is anticipated that this number will remain static or decrease in the next ten years based on ongoing control efforts on the WMNF and associated eradication of existing populations. Other infestations described in this report have not been actively controlled because they are species that are not actively controlled or are under additional consideration for potential addition to priority control efforts identified and revised annually per the Forest-Wide NNIS Control Project.

**Alternative 2: Proposed Action**

**Direct and Indirect Effects**

Direct effects are most often associated with propagules or plant parts lodged in equipment being transported to the site, or fill and seed mixes that contain NNIS propagules or plant parts be utilized during the project activities (forestry, wildlife and recreation). These direct effects are typically mitigated through the implementation of the Forest Plan Standards and Guidelines related to NNIS (USDA Forest Service. 2005a, pp 2-11-12). The most likely locations of these effects include areas of culvert replacements, road reconstruction, watershed restoration, trail relocation, the development of new of log landings, wildlife openings, haul roads, skid trails, and stands prescribed for even-aged – regeneration harvest. These effects are the greatest during and for 1-2 years after the activity takes place, when native plant species are just starting to revegetate the sites and bare mineral soil is present, and decrease dramatically in subsequent years.

In summary, due to the minor levels of infestation within the Project Area overall, direct effects will be minor and manageable in the Proposed Action. This is expected due to the mitigation and infestation prevention measures afforded by the Forest Plan Standards and Guidelines, including treatment of known infestation sites prior to project implementation to control potential for expansion.

Indirect effects are most often associated with propagules and plant parts being moved by wildlife, wind, or human activity once project activities have ceased. The indirect effects of NNIS are greatest when ground disturbing activity is combined with large areas of substantial canopy removal. This would occur primarily with even aged regeneration harvests (e.g., clearcuts and patch cuts), new log landing construction, and gravel
pit expansion proposed by this project. Foot and traffic visiting the expanded trailhead parking lot and reconstructed roadways provide new migration routes for NNIS via tire and footwear treads. These actions may allow for the introduction of new species infestations into previously un-infested locations.

If fill or gravel is utilized in any of these activities, NNIS propagules may be inadvertently introduced. The risk of this introduction is slight, because enforcement of Forest Plan Standards and Guidelines related to NNIS, as well as timber sale and other contracting clauses related to equipment inspection and cleaning. Gravel sourced from the proposed expanded pit within the Project Area would minimize this risk since no invasive species were documented in the pit during project surveys.

In summary, due to the minor levels of infestation within the Project Area overall, indirect effects will be minor and manageable in the Action Alternative. This is expected due to the mitigation and infestation prevention measures afforded by the Forest Plan Standards and Guidelines, including treatment of known infestation sites prior to project implementation to control potential for expansion.

**Cumulative Effects**

Although there are only a few documented NNIS infestations outside the Project Area (but still within the Cumulative Effects Analysis Area), it is suspected that other infestations do exist, particularly since there are greater amounts of permanent edges and fragmentation associated with developed and rural-agricultural settings around the Forest. Given this, there is a greater likelihood of introducing and/or spreading NNIS within this area as a result of activities and land uses on private lands than on National Forest lands. The forest-wide NNIS inventory (USDA Forest Service 2010a) found that two-thirds of the invasive plant occurrences were located on private land outside the National Forest, and almost half of all occurrences were intentionally planted (USDA Forest Service, 2005b, pp 3-154 and 3-155).

The greatest potential effect of the Deer Ridge Project with regard to NNIS is the potential migration and establishment of NNIS in the Project Area. This effect would add to the effects of past activities that may have caused introduction and spread of invasive plants. These activities include, but are not limited to timber management, wildlife opening management,
environmental assessment

recreation opportunity developments, and road construction both on and off the National Forest and residential development and traditional agriculture on private lands. Information on the NNIS introductions resulting from these past events is not available. However, the current distribution of invasive plants both on and off the National Forest strongly supports this assumption.

Any effects of the Deer Ridge Project would be additive to the effects of any past activities within the cumulative effects boundary. Foreseeable management actions and projects over the next ten to fifteen years include ongoing wildlife opening and orchard maintenance, road maintenance, and on-going maintenance of hiking and snowmobile trails, continued use of the area for recreational uses, and ongoing NNIS treatment. Roads and skid trail trails associated with the timber management activities may open up new travel routes for mountain bikes, hiking and horseback riding, thereby increasing the potential for NNIS migration. These risks would continue once measures to mitigate any direct and indirect effects of the project cease. The same types of activities that may have caused past invasions on private land will likely continue to spread NNIS.

Most project activities (transportation, forestry, recreation, etc.) would have negligible effects on NNIS in the analysis area. The application of the 2005 Forest Plan Standards and Guidelines related to NNIS dramatically reduces but does not eliminate the possibility of introducing NNIS into the analysis area. Cumulative effects under the action alternative likely would be measurable, but cannot be accurately quantified due to the percentage of private land holdings within and adjacent to the analysis area.

All activities proposed as part of the action alternative (Alternative 2) in the Deer Ridge Project (roads, forestry, watershed, etc.) would have negligible effects on NNIS in the analysis area. The application of the 2005 Forest Plan Standards and Guidelines related to NNIS dramatically reduces, but does not eliminate, the possibility of introducing NNIS into the analysis area. It is possible that new infestations of NNIS could be introduced into the analysis area on non-federal land via fill, soil, wood chips, mulch, tourist traffic, and vehicle and equipment use. Other past, present and reasonably foreseeable actions are not anticipated to impact the status of NNIS plants within the analysis area because of the low level of current infestation and the locations of these activities in areas currently free of NNIS.
Climate change may have some effects on the distribution and abundance of NNIS in the longer term. A recent literature review conducted by WMNF Resource Specialists documented potential impacts to botanical resources (Mattrick 2009). This literature summary looked at a small, but wide ranging portion of the available literature on the effect of a changing climate on native plants, natural communities, rare plant species, and invasive plant species. In the study of plants and climate change, NNIS are little studied at present and what information can be gathered must be extrapolated from other studies. Additional information can be gathered from various sources such as the Invasive Plant Atlas of New England, which maintains an on-line database of NNIS locations throughout the region (IPANE 2012). Although several invasive plant species appear to be spreading northward, there does not seem to be any correlation to these expansions and climate change. These expansions appear to be due to mechanical transport by humans, wildlife activity, and other natural dispersal mechanisms. At this time, based upon the recent literature review, available data, and project surveys, there do not appear to be any definitive effects on NNIS from climate change within the cumulative effects analysis time-frame.

Recreation

The following discussion incorporates by reference the analysis and conclusions documented in the Deer Ridge Integrated Resource Project Recreation Resources Report (Pellerin 2016b) located in the Project Record.

Affected Environment

Recreation resources within the Deer Ridge Project Area include the trailheads and portions of the Mill Brook, York Pond, and Unknown Pond hiking trails (less than 1 mile total length) and segments of the Rocky Pond Snowmobile (less than .25 miles in length). In addition to hiking and snowmobiling, there are dispersed recreation opportunities such as hunting, fishing, dispersed camping, bicycling, cross-country skiing, snowshoeing, driving for pleasure, and walking on forest roads and trails that are within and immediately adjacent to the Project Area (Figure 11). The primary public access road to the Project Area is York Pond Rd. (Forest Road 13). The Berlin Fish Hatchery and Barry Conservation 4-H Camp, both authorized through special use permits issued by the WMNF, and operated by the State of New Hampshire Fish & Game and the University
of New Hampshire Cooperative Extension, are located within and adjacent to the Project Area. Another Forest Service permitted special use within and adjacent to the Project Area is the Northern New Hampshire Bird Dog Club’s field trial walking course network.

The northwestern portion of the Project Area contains 390 acres of the 2005 Kilkenny Inventoried Roadless Area (IRA) consisting mainly of hardwood stands. Effects to the 2005 Forest Plan Inventoried Area are addressed in the Roadless Report (Project Record). There are no Congressionally-designated Wilderness Areas within or adjacent to the Project Area. Portions of the Upper Ammonoosuc River and the West Branch of the Upper Ammonoosuc River are within or adjacent to the Deer Ridge Project Area and are identified as potentially eligible for Wild and Scenic River designation (USDA Forest Service, 2005a, Appendix C). Effects to the eligibility of these rivers are described in the Wild and Scenic River Report (Project Record).

The Deer Ridge Project Area has been managed for multiple uses since inception as a National Forest including the coexistence of recreation, wildlife habitat, and vegetation management. Evidence of past timber management activities is apparent in existing skid trails, forest roads, and in the current vegetation types and stand ages. Over the last several decades foresters have managed timber stands using even-aged and selective treatments. Thus, the Project Area contains a diversity of tree species and stand ages, understory conditions, and habitat for a wide variety of native wildlife species. Existing hiking and snowmobile trails within the Project Area use portions of skid trails and forest roads. Abandoned fish hatchery raceways and evidence of abandoned logging camps are found within the Project Area and are remnants of wildlife and forest management that precedes National Forest ownership.

The Forest Service describes recreation settings on National Forest lands according to the Recreation Opportunity Spectrum (ROS). ROS considers physical, social, and managerial settings to describe the range of opportunities available to visitors for different kinds of recreation experiences. Settings are grouped into five classes: Primitive, Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Natural, and Rural (Forest Plan, 2005a, p 1-10 and Map 1-11; USDA Forest Service 2005b, p. 3-307 and Appendix H). The Project Area includes Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Natural, and Rural.
Deer Ridge Integrated Resource Project

Table 8. Acres and Class Descriptions for those ROS Classes Located in the Deer Ridge Project Area. Provides a summary of the distribution of each ROS class found in the Project Area as well as a description of the class characteristics.

There are no project activities proposed within areas managed as Semi-Primitive Non-Motorized.

<table>
<thead>
<tr>
<th>ROS Class</th>
<th>Acres in Project Area</th>
<th>Setting Characterization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-Primitive Non-Motorized</td>
<td>59</td>
<td>The area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed with minimum on-site controls and restrictions may be present, but are subtle because of some high use areas these characteristics cannot always be met, but they do represent a goal. Public motorized use is not permitted. In some management areas, the ROS objective may change from semi-primitive non-motorized to semi-primitive motorized on a seasonal basis.</td>
</tr>
<tr>
<td>Semi-Primitive Motorized</td>
<td>1576</td>
<td>It is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Motorized use may be evident.</td>
</tr>
<tr>
<td>Roaded Natural</td>
<td>2036</td>
<td>Area is characterized by predominantly natural-appearing environments with moderate evidences of the sights and sounds of human activity. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.</td>
</tr>
<tr>
<td>Rural</td>
<td>116</td>
<td>This is characterized by a substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of human activity are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate densities are provided far away from developed sites. Facilities for intensified motorized use and parking are available.</td>
</tr>
</tbody>
</table>

**Hiking Trails**

Summer and fall are the primary hiking seasons for this area along with some use occurring on a couple of hiking trails during the winter. Use levels are low to moderate on all hiking trails in the Project Area compared
Environmental Assessment

to other locations on the National Forest. Table 9 provides a brief description of these hiking trails including use levels.

**Trailheads**

The Unknown Pond Trailhead parking area located off of York Pond Rd. is used year round and is located within the Project Area. It is often at capacity on summer and fall weekends as the parking area was initially designed to accommodate 11 people at one time, or 3 vehicles. Overtime, the lot has increased, likely in part due to people parking along the edges.

Table 9. Hiking Trail Use and Description.

<table>
<thead>
<tr>
<th>Trail Name</th>
<th>Use Level*</th>
<th>Length (miles)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>York Pond</td>
<td>Low</td>
<td>2.5</td>
<td>Accessed from York Pond Rd., this trail receives moderate use during the summer and fall seasons with little to no use during the winter. This trail runs from York Pond Rd. to the Kilkenny Ridge Trail. The trailhead parking area is kept plowed throughout the winter. The trailhead parking lot and the first 100 yards of York Pond Trail are located within the Project Area.</td>
</tr>
<tr>
<td>Bunnell Notch</td>
<td>Moderate</td>
<td>2.9</td>
<td>This trail is accessed from the York Pond Trail at 0.2 miles from the trailhead at York Pond Rd. This trail receives moderate use during the summer and fall seasons. During the winter, the trail receives low use as the trail provides the most popular winter access to Mt. Cabot. This trail is not within the Project Area, however the trailhead parking lot used to access the trail is.</td>
</tr>
<tr>
<td>Unknown Pond</td>
<td>Moderate</td>
<td>5.5</td>
<td>This trail connects the southern trailhead at York Pond Rd. to the northern trailhead at Mill Brook Rd. and receives moderate use during the summer and fall seasons with low use during the winter. The southern trailhead parking area is kept plowed throughout the winter. This trailhead parking area and the first 0.5 miles of the Unknown Pond Trail are within the Project Area.</td>
</tr>
<tr>
<td>Mill Brook</td>
<td>Low</td>
<td>3.6</td>
<td>Accessed at the Berlin Fish Hatchery off of York Pond Rd., this trail receives low use during the summer and fall seasons with little to no use during the winter. Mill Brook Trail connects to the Kilkenny Ridge Trail and provides access to Roger’s Ledge and Roger’s Ledge Tentsite. The first 0.2 mile of this trail is within the Project Area.</td>
</tr>
</tbody>
</table>

*Use level is people per day (ppd) during peak use (e.g. school vacation weeks, holiday weekends). Range of use level: Low = 0–6 ppd; Moderate = 7–25 ppd; High = 26–50 ppd; Very High = 51+ ppd. ([http://apps.fs.fed.us/nrm/nvum/design/A09022.aspx/Round4/UseLevels](http://apps.fs.fed.us/nrm/nvum/design/A09022.aspx/Round4/UseLevels)).

The current condition of the parking lot is determined to hold between 4-8 vehicles, or about 3,600 sq. ft., depending on vehicle size and parking...
arrangement. Vehicles continue to park along the edges of the parking lot and along the roadside as the trailhead gets more use than can be accommodated by its size and configuration. At times, vehicles have been forced to park along the access road to the parking area as well as out onto York Pond Rd., leaving little room for other vehicles to maneuver or pass by. The parking area is not well designed for traffic flow, does not accommodate current use levels, and has raised concerns about visitor safety and experience.

The York Pond Trailhead parking area, serving both York Pond Trail and Bunnell Notch Trail users, is used year round and is also located within the Project Area. This parking area accommodates 2 or 3 vehicles dependent upon vehicle size and parking arrangement. At times, visitors will park at the Unknown Pond Trailhead and walk the short distance along York Pond Rd. to this trailhead. Project activities are not proposed within this parking area.

The Mill Brook Trailhead parking is located at the Berlin Fish Hatchery and is within the Project Area. There are no proposed project activities within this parking area.

**Snowmobile Trails**

Rocky Pond Snowmobile Trail, also known as State Primary Trail (PT) 109, is partially located within the Deer Ridge Project Area. This trail receives low weekday and moderate to high weekend use during the snowmobile season. PT 109 travels on and off public lands and provides primary access between Berlin and the Stark/Groveton area. PT 109 begins at Jericho State Park in Berlin and runs generally north through the WMNF to where it intersects PT 117 in the southern part of the Nash Stream Forest just north of Route 110 in Stark. PT 109 has a total length of 15 miles, of which 6.4 miles are on the WMNF. A total of 1,200 feet of this trail is within the Project Area. PT 109 connects to and uses parts of roads on and off the Forest that have been used concurrently in the past by snowmobiles and log trucks, meaning they are periodically plowed for access and hauling for timber harvest while they remain open for snowmobiling. This is the case for many snowmobile trails located in the northern part of the state.

**Other Dispersed Recreation Opportunities**

Dispersed camping is allowed throughout the Project Area with few exceptions, however, there are no known established dispersed campsites
within the Project Area. There are a handful of popular campsites adjacent to the Project Area. These are located along Forest Road 15 (Bog Dam Loop Rd.) near its two intersections with York Pond Rd. and on the south side of York Pond Rd. between the intersections with FR 15. Forest orders prohibit camping within ¼ mile of all developed trailheads.

Forest roads and trails provide opportunities for walking, mountain biking, snowshoeing, and cross-country skiing throughout the Project Area and such activities are characterized by low use levels. Fishing for cold water species is popular in spots along the Upper Ammonoosuc River and the West Branch of the Upper Ammonoosuc where they flow adjacent to the Project Area. Hunting opportunities for whitetail deer, black bear, moose and small game are present. Other forms of recreation such as swimming, wildlife watching, and driving for pleasure occur with low use levels. While recreation use is relative low compared to other areas on the WMNF, local and regional visitors value the area for its scenic beauty, quiet setting and variety of recreational opportunities.

**Barry Conservation 4-H Camp**

The camp has been operated under Forest Service special use permit by the University of New Hampshire Cooperative Extension 4-H in partnership with New Hampshire Fish and Game since 1984. The camp introduces New Hampshire children ages 8 through 17 to outdoor life and activities such as shooting sports, hunter education, fishing, hiking, swimming, canoeing, archery, wilderness survival skills, and outdoor adventure. The camp typically runs from late June through the early August. The camp is located at the Berlin Fish Hatchery off of York Pond Rd. and consists of a shooting sports range, six bunkhouses and one building containing bathrooms and kitchen/dining hall. Campers utilize other facilities located at the hatchery for some of their programs.

**Northern New Hampshire Bird Dog Club Field Trials**

The club has been permitted to conduct field trials in the Kilkenny area since 1992. In an ongoing field trial, a pair of dogs follows a 60-minute walking course with their handlers and a judge. The dogs are required to locate and point ruffed grouse and American woodcock. The club maintains these courses by hand brushing to maintain the approximately three foot-wide walking courses that generally follow old skid trails and roads. Maintenance is performed on an annual basis and is done in such a
manner as to minimize visibility of the trail to the casual eye. A maximum of six events are held between September 1 and mid-November on weekends. Up to 20 pairs of dogs compete during events with as many as 30 people attending an event. There currently are 9 designated walking courses of approximately 3 miles in length each, mainly in the vicinity of Bog Dam Loop Rd. (FR 15). One course is within the Project Area running for 2 miles between Betty Brook Rd. (FR 202) and Fifield Brook Rd. (FR 105).

Figure 11. Recreational opportunities within and adjacent to the Deer Ridge Project Area.
Environmental Consequences
Spatial and Temporal Context

The analysis area for direct and indirect effects is defined as the Deer Ridge Project Area and the time frame is 10 years. The analysis area and time duration were selected because once management actions cease, so do the majority of the effects on recreation.

The cumulative effects analysis area is the South Pond South HMU, One Mile Lonesome HMU, and the portion of the Starr King HMU east of the Kilkenny Ridge Trail where it runs from Unknown Pond south to its intersection with the Landing Camp HMU. This boundary was chosen because it includes all of the activities occurring within the Project Area and in addition it captures a sample of the entire range of recreation opportunities that are offered in the Kilkenny area of the WMNF. There has not been any vegetation management during the past ten years within the cumulative effects area. The time frame is ten years in the past and twenty years into the future (2006-2031) including ongoing activities. This time period was chosen because the anticipated completion of timber harvesting is 2021, and timber harvest may be recognizable to visitors for up to ten years after which time these areas quickly revert to a naturally-appearing forest cover (USDA 2005b, p 3-447). Projects included in Appendix C of this EA were considered for this cumulative effects analysis.

**Alternative 1: No Action**

**Direct, Indirect, and Cumulative Effects**

Alternative 1 would not alter current recreation opportunities and there would be no changes to ROS classifications. If this alternative is selected none of the project activities would be implemented. Because there are no direct or indirect effects, there would be no cumulative effects.

**Alternative 2: Proposed Action**

**Direct and Indirect Effects**

The Project Area contains area contains 2,373 acres of which 992 acres of timber are proposed for silvicultural treatment under Alternative 2. Harvest activities have historically occurred throughout the Project Area. Therefore, the long-term trail-based recreation experience is not expected to change as a result of vegetation management. Harvest activity would take place during the summer and winter. Some short term exposure to noise and truck traffic for the duration of the harvest activities is expected
under this alternative. These effects are direct and temporary in nature, ceasing at the close of operations. Effects of harvest disturbance are further minimized through the use of the design features listed above.

Hiking Trails

The first 0.5 mile of the Unknown Pond Trail trailhead and its trailhead parking lot are within the Project Area. For the majority of its first 0.5 mile from the trailhead the trail is within a proposed harvest area (stand 56). A landing is proposed adjacent to the trail the area directly behind the trailhead parking lot. This portion of the trail along with the trailhead would be directly impacted by timber harvest activities. The prescription for stand 56 is overstory removal and harvest would take place during the winter season. Noise and visual intrusions from harvest operations may be observed by hikers but all harvest activity will occur during the winter when foot travel is at its lowest use levels. Hikers would be exposed to noise from logging equipment, slash would be visible when looking into the harvest area, and equipment may be crossing the trail.

The first 100 yards of the York Pond Trail and its trailhead parking area are within stand 55. A landing is proposed adjacent to the trail just before it leaves the Project Area to the southwest of the parking area. This segment of trail as well as the parking area would be directly impacted by proposed harvest operations. This segment of trail is located on an existing roadbed and would be used as a haul road from the landing. The prescription for stand 55 is group selection and harvest would take place during the late summer or winter seasons. Noise and visual intrusions from timber harvest activities may be observed by hikers. This would more likely be the case for a late summer harvest than if harvest occurs in this stand during the winter when foot travel is at its lowest use levels. Hikers would be exposed to noise from logging equipment, slash would be visible when looking into the harvest area, and equipment may be crossing the trail.

The Bunnell Notch Trail is not located in the Project Area, however this trail is accessed from the York Pond trail 0.2 miles from the trailhead parking area. Users of the Bunnell Notch Trail would be exposed to the same noise and visuals that occur during harvest as hikers on the York Pond Trail.

Less than 0.25 miles of the Mill Brook Trail travels within two proposed harvest areas (stands 40 and 43) starting from the Berlin Fish Hatchery.
Given this is a low use trail and that it does not travel directly through any proposed harvest areas, this section of trail would be minimally impacted by harvest operations. The two stands are proposed for shelterwood preparatory and patchcut harvest during the summer or winter seasons. Some noise and limited visual intrusions from harvest operations may be observed at a distance by hikers.

Snowmobile Trails

Approximately 1200 feet of the Rocky Pond Snowmobile Trail (State Primary Trail 109) travels within or adjacent to stand 28. A landing is proposed adjacent to the trail about 375 feet north of York Pond Rd. and this segment of PT 109 may be used to haul logs from a portion of this stand. The prescription for stand 28 calls for group selection during the winter season. Snowmobilers would be exposed to noise from logging equipment, slash would be visible when looking into the harvest area, and equipment may be crossing the trail. This portion of trail would be directly impacted by timber harvest activities to a greater degree if used as a haul road. Design features indicate weekday use of the trail to haul logs, and trail use by snowmobiles is lowest during weekdays. In addition, the stand area that would be accessed from the trail and the landing is small in size, thus requiring a minimal amount of time needed to use the trail for hauling logs. Some noise and visual intrusions from timber harvest operations may be observed by snowmobilers, along with some disturbance of the groomed trail surface for a short distance as a result of log hauling traffic. In consideration for visitor safety, the trail may be temporarily closed during active harvest operations if sale administrators or the District Ranger determine that harvest activities or equipment pose a safety hazard to the public. Recreationists would be alerted to logging operations by signs in the Project Area as well as web postings on the Forest website.

Trailheads

To access stands 56, 57, and 58 a landing is proposed in stand 56 directly to the north of the Unknown Pond trailhead parking lot and adjacent to the Unknown Pond Trail. The trailhead along with a portion of the trail would be directly impacted by timber harvest activities. The prescription for stand 56 is overstory removal and harvest would take place during the winter season. Noise and visual intrusions from harvest operations may be observed by hikers but all harvest activity will occur during the winter
when hiker traffic is at its lowest use levels. Hikers would be exposed to noise from logging equipment, slash would be visible when looking into the harvest area, and equipment may be crossing the trail or parking area. The driveway leading into the trailhead would be used for log hauling on weekdays during the winter when foot travel is at its lowest use level. In consideration for visitor safety, the trailhead may be temporarily closed during active harvest operations if sale administrators or the District Ranger determine that harvest activities or equipment pose a safety hazard to the public. Recreationists would be alerted to logging operations by signs in the Project Area as well as web postings on the Forest website. Following harvest activities, a portion of this landing would be used to expand the parking lot. This would be accomplished by adding gravel and delineating the parking area by placing barrier rocks along its perimeter. This would increase the size of the parking area from approximately 3,600 ft² to 6,500 ft², which would provide parking for up to 15 vehicles and would alleviate visitor safety and experience concerns with the current parking lot alignment.

The York Pond Trailhead parking area and the first 100 yards of the York Pond Trail are within stand 55. A landing is proposed adjacent to the trail just before it leaves the Project Area to the southwest of the parking area. The parking area as well as this short segment of trail would be directly impacted by proposed harvest operations. This segment of trail along with the trailhead parking area are located on an existing roadbed that would be used as a haul road from the landing. The prescription for stand 55 is group selection and harvest would take place during the late summer or winter seasons. Noise and visual intrusions from timber harvest activities may be observed by hikers. In consideration for visitor safety, the trailhead may be temporarily closed during active harvest operations if sale administrators or the District Ranger determine that harvest activities or equipment pose a safety hazard to the public. Recreationists would be alerted to logging operations by signs in the Project Area as well as web postings on the Forest website. This would more likely be the case for a late summer harvest than if harvest occurs in this stand during the winter when hiker traffic is at its lowest use levels. Hikers would be exposed to noise from logging equipment, slash would be visible when looking into the harvest area, and equipment may be crossing the trail.
The Mill Brook Trailhead parking area located at the Berlin Fish Hatchery receives low use and is not located within any proposed harvest areas. The trailhead would be minimally impacted by harvest operations as it is in the vicinity of two stands (stands 40 and 43) proposed for shelterwood preparatory and patchcut harvest during the summer or winter seasons. Some noise and limited visual intrusions from harvest operations may be observed at a distance by hikers.

Other Dispersed Recreation Opportunities

Timber harvest would affect other recreation activities in similar ways to the effects on trails. The sights and sounds of traffic and harvest activity could be evident to visitors engaging in biking, skiing, snowshoeing, cross-country skiing, fishing, walking, or driving for pleasure, and access to certain areas could be limited during harvest. Because timber harvest activities will be restricted to summer or winter in the vast majority of the proposed stand treatment areas of the project, the impacts to visitors in other seasons would be limited to those associated with the visual effects not associated with active operations.

The Project Area is regularly used by hunters. The effect of proposed harvest on hunting depends on the timing of logging. If harvest occurs during hunting seasons, increased activity in the area could temporarily displace animals (see Wildlife Resource report) and reduce the quality of the hunting experience. The hunting seasons set by the State of New Hampshire for some species may overlap with the late summer season of harvest prescribed in some of the proposed stand treatment areas. A total area of 706 acres may be harvested during late summer season, constituting less than 1/3 of the overall Project Area. As result there would be minimal impact on the overall opportunities for hunting during the majority of open seasons. Once harvest is complete hunting opportunities would likely improve in harvested stands. When stands are young they provide additional habitat and browse for game species, and this habitat change could improve hunting opportunities in the area for a few years following harvest operations.

Barry Conservation 4-H Camp

The Barry Conservation 4-H Camp is located at the Berlin Fish Hatchery near the north end of York Pond. The camp’s season of operation is generally from the last week in June through mid-August. The camp is
located within stand 43 of the Project Area and stands 40 and 44 are in the general vicinity (0.15 mi). The proposed prescriptions for these 3 stands are shelterwood (late summer/winter), patchcut (summer/winter), and group selection (late summer/winter). A landing is proposed at the camp’s shooting range. The effect of the proposed harvest on the camp depends on the timing of logging operations. Summer season harvest could potentially overlap with the camp operational period, which would have direct impacts on the camp. These impacts would be similar to the noise and visual effects on trails and trailheads, the only difference being the closure of the shooting range to allow for the landing at that location as well as to ensure the safety of the harvest operations. If the harvest were to occur during the latter period of the late summer season or during the winter season when the camp is not in operation, the majority of impacts to the camp would be eliminated. Once harvest is complete effects will cease with the exception of scenery modifications that may be noticeable from the camp for up to ten years.

Northern New Hampshire Bird Dog Club Field Trials

The Deer Mountain walking course travels for approximately 2 miles through the Project Area between Betty Brook Rd. and Fifield Brook Rd. The club has been permitted to conduct a maximum of six events on designated walking courses between September 1 and mid-November on weekends. The course weaves through stands 32, 32b, 33, 34, 37, 38b, and 39. Prescriptions for these stands include individual tree and group selection. Season of harvest for all stands listed above is winter except for stand 38b which is late summer or winter. Stand 38b is 77 acres in size, of which 12 acres will be treated. Two landings are proposed adjacent to the walking course. The course also intersects both Fifield Brook Rd. and Betty Brook Rd. These roads would be used to access these stands in addition to several others and would be used as haul roads. Impacts on the club’s field trials from winter harvest would be limited to those associated with the visual effects and not associated with active operations. Late summer harvest operations in stand 38b or other stands that are accessed by Fifield Brook Rd. or Betty Brook Rd. would have a direct impact on the club’s field trials along the Deer Mountain walking course through that area should both activities coincide. Increased logging activity could temporarily displace grouse and woodcock. Dogs and handlers would be exposed to noise from logging equipment, slash would be visible when looking into
the harvest area, and equipment may be crossing the course. The club’s eight other field trial walking courses in the Kilkenny area are distant enough from the Project Area that they would not be impacted by harvest activities.

ROS Classification

The Rural ROS Class makes up a total of 116 acres adjacent to York Pond within the Project Area. The action alternative proposes harvest from stands within the area classified as Rural. Rural ROS Class is characterized by a substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of human activity are readily evident, and the interaction between users is often moderate to high. Proposed activities associated with Alternative 2 are consistent with recreation experiences currently provided in this area and no changes in ROS Class would result.

The Roaded Natural ROS Class makes up the largest percentage of the Project Area with a total of 2,036 acres. Project activities in these areas are consistent with the Roaded Natural ROS Class where resource management activities including utilization such as timber harvest and landscape modifications are moderately evident but harmonize with the environment. The design features associated with the action alternative serve to mute the effects of these management activities on recreation opportunities. These areas currently display evidence of past management activities such as timber harvest. Interaction between users will remain low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities, including the expansion of the Unknown Pond Trailhead parking lot. The actions associated with Alternative 2 are consistent with the recreation experiences currently provided in these areas and no changes to the ROS class would result.

The Semi-Primitive Motorized (SPM) ROS Class makes up a total of 1,576 acres within the Project Area. A variety of activities are proposed within areas classified as SPM. The action alternative includes classifying two segments of unauthorized inventory road totaling approximately 0.9 mile within the area classified as SPM. Proximity to roads is one of the key criteria for determination of meeting semi-primitive qualifications. Given
these roads already exist on the ground and classification of these two roads would only require a database change, there would be no change in this existing SPM inconsistency. Management actions designed to improve the long-term health of ecosystems can occur within the SPM class though they should be designed to minimize impacts on the natural-appearing environment. In those areas seen from travel ways a natural-appearing landscape should dominate the physical environment with only subtle or minor evidence of human-caused modifications. Other areas within the SPM classified area may have moderate evidence of alterations. The variety of silvicultural prescriptions and the design features incorporated should assist in harmonizing these modifications with the environment during and immediately following harvest activities. It is anticipated that within a decade the treatments would be largely unnoticeable as a result of a variety of factors including natural terrain features and the treatments’ relative positions on the landscape. Rapid growth of vegetation in harvest areas would reduce visibility of harvest activities from roads and trails. In many locations the uneven stand boundaries along roads and trails would leave uncut trees between the unit boundaries and travel way corridors further muting the effects.

The Semi-Primitive Non-Motorized (SPNM) ROS Class makes up a total of 59 acres within the Project Area. There are no proposed activities within the area classified as SPNM, thus no change in ROS Class would result.

**Cumulative Effects to Recreation**

Of the relevant actions in the analysis area, all have had a benign or positive effect on recreation resources.

**Trails**

Several projects have taken place on the trail system to improve conditions for hikers and snowmobile riders. The Mill Brook and Bunnell Notch trails have been the recent focus for project work addressing resource issues in partnership with the Student Conservation Association and AmeriCorps. Ultimately, these trails projects improve trail conditions, reduce resource impacts, and enhance visitor experience. Rocky Pond Snowmobile Trail and Kilkenny Snowmobile Trail (Corridor 11) in particular play a critical role in a regional network of snowmobile trails in the southern half of Coos County. The New Hampshire Trails Bureau and the White Mountain Ridge Runners have partnered with the WMNF and will continue to work
together to maintain the snowmobile trails and improve water crossings when conditions require. Several new stream crossings have been replaced in the past decade to address site specific concerns. The cumulative effect is a longer snowmobile season requiring less maintenance.

Recreation and vegetation management activities have historically co-existed in the Project Area. Harvest activities have a direct short-term impact on recreation resources when trails are closed or visitors are exposed to noise and visuals from logging operations. Once the direct effects cease the area’s recreation resources and opportunities are often improved. The expansion of the Unknown Pond Trailhead parking lot would result in a positive long-term effect by creating a parking lot with an updated design by improving traffic flow and better accommodating use levels to reduce hazards and improve visitor safety. Overall the impact of vegetation management within the Project Area in combination with past, present, and foreseeable future actions would have a positive cumulative effect on the trail system.

Other Recreation Activities, Bird Dog Club Field Trials, Barry Conservation Camp

The cumulative effects of the Proposed Action combined with past, present, foreseeable future actions in the Project Area would be improved opportunities for hunting, fishing and wildlife viewing. These and other dispersed recreation activities along with the Bird Dog Club’s Field Trials and Barry Conservation Camp may be affected in the short-term by the sights and sounds of management activities but these same management actions would enhance future recreation opportunities.

ROS Classification

All project activities are consistent with the ROS classification for the areas where they are proposed. While timber harvest and prescribed fire activities may have short-term direct effects on visitor experience, the landscape modifications quickly revert to natural appearances. The variety in vegetative cover adds diversity to the landscape and supports opportunities to see a wider range of species. Well-planned silvicultural treatments and the inclusion of design features in the action alternative help mitigate the potential impacts to ROS classifications. The biggest concerns with ROS class inconsistencies are generated from road construction and landscape modification. Proximity to roads is one of the
key criteria for semi-primitive classification. Because Alternative 2 doesn’t propose any change in road miles, there would not be any increased or decreased inconsistencies within areas managed as Semi-Primitive Motorized. Alternative 2, when combined with past, present, or reasonably foreseeable future actions, would not generate a change in ROS classification.

**Climate Change**

Climate change will affect recreation within the analysis period (2006-2031). Recreation dependent on snow-cover will be the most impacted. Incremental changes within the analysis period will likely be small and will be subject to short-term climate patterns, which produce year-to-year variability. A report addressing the anticipated effects of climate change on the Project Area, including recreational opportunities is available in the Project Record (Simmons 2016). The Proposed Action is not expected to add to the projected impacts of climate change on recreation.

**Scenery**


**Affected Environment**

The Project Area is encompassed by mountainsides and bottomlands within the watersheds that are a mosaic of color, form and texture. A blanket of softwood trees covers most of the highest elevations. Draping over the slopes and extending into the lower elevations are swaths of softwood trees, hardwood trees, or a mixture of the two. Other features include occasional granite outcrops interspersed throughout the upper elevations, bottomland water features, low meadows and meadow-like openings created by past agricultural activities including large amounts of timber harvest.
On the whole from a distance, the viewed area appears blended and continuous, but upon close inspection it contains many outlines, traces, texture and color changes and shadows of past openings created from agricultural activities. The mosaic pattern of color and vegetative texture stems from the underlying geology and soils that determine forest types as well as the history of forest agriculture upon these slopes and lowlands. More recent clearcuts and group selection treatments remain noticeable on the landscape. Older harvests may not be as evident to the casual observer from a distance, but they are visible to those who know what to look for or those that are spending more time observing the landscape or are simply closer in proximity.

One viewpoint was selected for detailed analysis for this project (Figure 12): Roger’s Ledge (Allen 2016). The viewpoint is elevated, stationary and superior and provides the best direct view while also representing the area of the highest visitor use. The elevated superior viewpoint atop the rocky outcrops of Roger’s Ledge affords both middle ground, more intense views, as well as the deeper, wider and distant perspective of background views to the South-Southeast, encompassing much of the Project Area and
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beyond to the surrounding mountain slopes and low lands. There are however sections of the Project Area that are not visible due to topographical influences. Due to the mountains and angle at which the units fall on the landscape, only two of the even age regeneration harvest units for analysis are visible from here.

The chosen viewpoint provides the best perspective of the Project Area and is from an area considered to be of higher visitation by the general public as well as recreationalists and tourist (Figure 13).

A multiple step modeling effort was used to evaluate which of the proposed openings created by regeneration type treatments or those that visually mimic them (clearcuts, patch clearcuts, improvement cuts, overstory removal and seed tree) would fall within the visible area of the viewpoint. Group Selection treatments were considered holistically as they relate to the other treatments visual effects, but were not individually analyzed in this project. The past group selection units visible will be in their 20th year of regrowth by the time any action would be taken as a result of this Proposed Action and considered of reasonable regrowth from the casual observers perspective. The proposed group selection areas are going to be designed to be in accordance with the suggestions of the Forest Plan.

With the data sorted and assembled, the views were modeled to determine how the landscape would appear following proposed treatments in each action alternative.

Figure 13. Roger’s Ledge – Looking South-Southeast - Overview of Project Area.
Due to modeling limitations, the foreground vegetation’s shadowing is not taken into consideration by the model. Therefore the model results depicts more canopy opening (an illusion of more bare ground being visible) than would ever actually be visible unless viewed directly down and into an opening (such as from an aircraft). Also, when mapping products and or models are created from different sources of information occasionally differences in results of feature’s visibility are found. If differences are noted between models created of different sources of imagery, the analysis is concluded based upon the feature(s) depicted with the greatest visibility.

For a more in depth understanding of the process of scenery analysis, as well as how it relates to the Forest Plan, including a summary of its direction, please refer to the Scenery Management Process Document located within the Project Record.

**Environmental Consequences**

**Spatial and Temporal Boundaries for Analysis**

The analysis area for the direct and indirect effects is the portion of the Project Area that is visible from the viewpoint because this is the zone within which the proposed vegetative management activities would alter the scenery; but it does extend to encompass the extents of viewshed from the viewpoint’s vantage point. The timeframe for effects is 30 years into the future.

The analysis area for cumulative effects is the viewshed from the viewpoint and the timeframe is from 30 years ago to 30 years in the future.

This timeframe for effects allows all of the harvested openings to fully restock, develop a full canopy of vegetation, and reach a height with enough spread and density to allow the shadow and textural differences to begin to blend with the adjacent surroundings as seen from a typical viewing distance by the casual observer. This distance is dependent upon the viewpoint, topography, season and weather conditions, etc., but typically ranges between 0 – 8 miles. In this Project Area, visibility of units within 0-6.5 miles are of the highest concern to the casual observer, due to their increased potential for visibility of detail and reference of scale related to their actual size.

The visibility of any opening would be greatest for the first five years, as species grow, the color and texture begin to return. The shadow lines and lighting differences would be evident depending on the time of day,
weather and season for much longer into the future than would the color and texture. The casual observer would probably stop noticing the opening as an individual and distinct feature approximately 20 years after regeneration.

This has been verified with personal interviews of visitors at Mt. Washington, Iron Mountain, and Attitash Ski Area during 2003 to 2006, and from the University of New Hampshire trail and Sugar Hill Overlook in 2008 during research for the Kanc 7 Management Project. Subsequently the same types of personal interviews were done during the field work for the 4 Ponds Management Project, Crawford Management Project as well as this one. None of the interviewed visitors considered the 30-year-old visible openings as unnatural, despite the changed color, texture, and shadows; nor could they explain what they were viewing once the texture and shadow change was pointed out, other than it was different. The keen observer’s eye may notice a shadow created by the difference in height between the top of canopy of the newly grown (15-20 yr old) vegetation and the far edge of the previously existing (taller) timber. Sun angles, cloud effects (shadows) or certain kinds of weather conditions may fade these shadow “lines” and as a result openings are generally unnoticeable to the casual observer. Aside from shadow, variation in the newer texture and or its color may also be more apparent to some viewers than others. Most of the openings appear more organic in shape and blend in within the context of their surroundings.

Alternative 1: No Action

**Direct and Indirect Effects**

Under Alternative 1 there would be no change from the present condition and therefore no visible change to the landscape within the Project Area, or no effects.

Natural occurring changes and disturbances to the Project Area would continue to occur. Unmanaged stands would continue to be prone to mortality in dominate trees due to lighting strike, further storm damage or pathogens. Small-scale, localized high-intensity disturbance, such as multiple tree-fall gaps associated with a microburst wind events, ice storm, or pockets of insect or disease mortality could potentially create openings, would continue to create shadow and color as well as texture changes to the landscape.
Cumulative Effects

There would be no cumulative effects to scenery under Alternative 1 because there would be no direct or indirect effects.

Alternatives 2: Proposed Action

**Alternatives 2**

*Direct and Indirect Effects*

The types of impacts described above would be true for the Proposed Action (Alternative 2) from the analyzed viewpoint. Alternatives 2 has many openings (nearly all) on hillsides that would not be particularly visible due to their angle of repose, elevation on the slope, and proximity to topographic features blocking them from view (Figure 14 and Figure 15).

Roger’s Ledge provides a viewshed exposing only two close proximity units (13 and 14). Each unit that is touching or in near proximity to another plays into the intensity of the visibility of the other. The overall visibility of even the smaller feature visible with open acres is increased due to the mass of units together on the hillsides. A smaller unit would have faded or been less likely to be immediately recognized had they not been part of the cluster. These units happen to be in the middle ground at a distance of two miles and will be very evident.

Leading edge vegetation will block some of the visible units open acres as well as topographic features in the foreground.

It should be noted that in the winter, all stands, regardless of Alternative or viewshed or distance, will be much more evident with snow highlighting the opening until the forest regeneration develops sufficient canopy to begin blending with the surrounding landscape. Even without snow, the openings may become more evident once the canopy has lost its leaves, due to the shadow and texture being accentuated as limited color exists to blend the eyes focus.

The action alternative proposes prescribed burning of Permanent Wildlife Openings. The Visual quality impacts from prescribed burning of wildlife areas should be minimal because the burns are expected to be ground level disturbances. During most of the year, observers at the analyzed viewpoint would not be viewing the charred ground or the bases of trees; they most likely will be seeing canopy, texture and color of brush or snow. For the first 3-5 years following the burning activity, the burned areas could show
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visible differences in color, texture and lighting in comparison to unburned surrounding areas, especially during spring and fall when neither leaves nor snow are present. After a few years, regeneration of ground cover would begin to cover the blackened surfaces and the visual impacts would begin to fade.

- 2 Units are visible totaling 21 Acres of which there are ~14 Visible Acres
- Incorporation of Design Features (causes a reduction in treated acres – totaling 21 Acres) and leaving ~10 Visible Acres
- 2 Units are of a Middle ground Distance Zone (reaching to 2 miles)
- Observer is close enough to see color, texture, lines and shadows of past timber harvest units on landscape.
- 265 acres of group selection treatments (most of the acres would not be visible)

Figure 14. ALT 2 - Aerial Overview of Harvest Unit Locations – Model Image.
**Cumulative Effects**

No future harvests are currently proposed in the analysis area. Some of the openings created by previous harvesting activities implemented within the Project Area over the past 30 years are still visible from the viewpoints analyzed (Figure 16). Larger openings from past harvests are marginally evident when viewed from distances of over three miles. The last of the majority of harvested visible units will be at least 20 year old soon. The casual observer most likely would visually pass over most of these features as they would be less evident. The closer larger openings are still evident as a change in color, texture and shadow.

Any of this evidence would be seen if visible from the Roger’s Ledge Viewpoint. There are 3 past harvest clearcut units within the vicinity of the proposed Project Area that have some residual visibility (Table 10. Acres of past harvest activity within Deer Ridge Project Area (Past 30 Years) that may have some residual visibility.). Due to their age, their traces would be at the point at which they may not be noticed immediately with a quick glance but would be seen by the casual observer if they gave some attention to the landscape. These units are highlighted for analysis purposes in Figure 16. The closest of the old units are in the same general area as proposed units 13 and 14. They are clearcuts and are within approximately 2 miles from the viewpoint. Two of them date to 1998 from the Round Mountain Project. They are 12 acres and 23 acres in size. The most recently
harvested unit is from 2004 and is in the same general vicinity and is a 17 acre clearcut from the Fogg Brook Project.

Figure 16. ALT 2 – Roger’s Ledge Viewshed of Harvest Units Visible w/ Old Regen Harvest Units Highlighted – (shown to demonstrate proximity and potential visibility) – Model Image.

Table 10. Acres of past harvest activity within Deer Ridge Project Area (Past 30 Years) that may have some residual visibility.

<table>
<thead>
<tr>
<th>Cut</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearcuts</td>
<td>98</td>
</tr>
<tr>
<td>Patch Clearcuts</td>
<td>32</td>
</tr>
<tr>
<td>Seed Tree</td>
<td>15</td>
</tr>
</tbody>
</table>

It would be the most readily apparent. The proposed units mentioned will most likely highlight the past units that have remaining visibility.

The other units remaining to the south would be fractionally visible if one looked hard enough for them. Due to their distance, age and the direction and angle it drapes on the landscape it is doubtful they would be readily noticed. Being the landscape is more of a bottomland in that area, they may also be seen as past cultural agriculture uses of the landscape. Again, these units can be seen as the light blue highlighted shapes in Figure 16. ALT 2 – Roger’s Ledge Viewshed of Harvest Units Visible w/ Old Regen Harvest Units Highlighted – (shown to demonstrate proximity and potential visibility) – Model Image.
Although the visibility of these openings has faded over time, there are some of the newer and closer units that could be highlighted by proposed harvest activities, as noted above. The combination could potentially attract more attention from visitors and further detract from scenic quality due to perceived unnatural appearances of the treated areas. This cumulative effect would diminish within approximately 15 years (based upon distances) as regeneration makes new openings less obvious.

The maximum viewshed acres of the viewpoint is approximately 11,830 National Forest acres (Figure 17). The entire viewshed boundary for Roger’s Ledge contains approximately 30,120 acres in total (Figure 18).

The greatest amount of even-aged regeneration treatments proposed within the viewshed in this project totals 376.25 acres; or approximately 3.2% of the WMNF viewshed, or just over 1.2% of the total viewshed boundary. The amount of stands in this viewshed treated with regeneration treatments within the past 30 years is not enough in
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combination with the proposed, that it would surpass the 9% threshold for cumulative effects.

The approximate combined acres that is all past units, and this proposal is a maximum of approximately 521 or approximately 4.4% of the WMNF viewshed boundary. That is inclusive of all of the old even age regen units acres and proposed acres that are not visible.

No visible past or proposed future burns effecting the upper bowls or canopy occur within the analysis area, so no cumulative effects from that activity would be anticipated under the action alternative.

Other private and State lands although present, were not considered as they did not make up much of the overall visible cumulative effects boundary with large visible disturbances and therefore nothing of note was outstanding to effect the overall viewed landscape nor needing to be considered further.

Figure 18. ALT 2 – Deer Ridge Scenery Management Cumulative Effects and Ownership Area Map.
Compliance with Forest Plan and Other Laws, Regulations & Policies

The Forest Plan includes guidelines for scenery management in MA 2.1 that should be met by projects that include timber harvest. As acknowledged in the Forest Plan (p. 2-3), some projects may not be consistent with all guidelines, though a rationale for the deviation must be provided. Most projects that propose timber harvest struggle to balance the need for regeneration age habitat and habitat diversity with the thresholds identified in some of the scenery management guidelines. Through the incorporation of design features, accentuating the standard reserve areas required, the project will be in compliance. This section looks at each applicable guideline and how well is it met by the action alternatives.

MA 2.1 Scenery Management G-1

The maximum viewshed acres of the viewpoint is approximately 11,830 National Forest acres. The entire viewshed boundary for Roger’s Ledge contains approximately 30,120 acres in total. The greatest amount of even-aged regeneration treatments proposed within the viewshed in this project totals 376.25 acres; or approximately 3.2% of the WMNF viewshed, or just over 1.2% of the total viewshed boundary. The amount of stands in this viewshed treated with regeneration treatments within the past 30 years is not enough in combination with the proposed, that it would surpass the 9% threshold for cumulative effects.

The approximate acres that would be visible is a maximum of 14 or less than 0.001% of the WMNF viewshed acres.

Therefore, the action alternative would meet this guideline.

MA 2.1 Scenery Management G-3

There are no units proposed for harvest, visible in the action alternative that have acres completely within a “high” scenic integrity objective.

The units are all in compliance.

MA 2.1 Scenery Management G-4 and G-5

These two guidelines together address how to be consistent with the “moderate” scenic integrity objective.

The project interdisciplinary team discussed each stand proposed for even-aged regeneration harvest that would be visible from a viewpoint. For each visible unit the team reached one of three conclusions: less than 10 acres of
opening would be visible so the unit would be consistent with these guidelines, a well-placed reserve area would block enough of the opening from view to allow the proposed harvest to be consistent with these guidelines, or the harvest would not be consistent with these guidelines (see Project Record for any details).

It was decided to utilize designed reserve areas and they would be placed in the specific locations necessary to reduce visible acres enough to achieve compliance with Forest Plan scenery management guidelines. When feasible, computer modeling or other adaptive management techniques could be utilized to determine locations for reserve areas that would reduce visible acres and achieve compliance with scenery management guidelines. Scenery Management design features could be incorporated during implementation when reserve locations with desirable characteristic that benefit wildlife, watershed or other resources are not present within the unit. These other resource design features can take precedence over scenery management needs, unless stated otherwise by the decision maker.

Design features for reductions of scenic effects, would be incorporated during implementation. Design features will be implemented to strategically place reserve areas where needed (see Chapter 2).

To reduce impacts to scenery, the units 13 and 14 (acting as a combined unit) will receive enhanced reserve areas (based on status order noted above) placed to block some of the opening from visibility. These units would be obvious to most observers from the viewpoint for probably 20 years as the canopy regains enough height to begin to blend with its surroundings.

With the implementation including the design features proposed in Chapter 2 under Scenery, the action alternative would meet this guideline and the Action Alternative would be in compliance.

**MA 2.1 Scenery Management G-7**

The action Alternative is projected to be in compliance with the guidelines for group selection as per the Forester. The groups will be designed and implemented in random, none recognizable or eye catching patterns and within the size and context of the surrounding landscape, therefore meeting the guidelines.
Alternatives 1 and 2

Climate Change

As the environment evolves with changes of the climate over time, the resulting evolution of the flora in the region would not result in a drastic or possibly even any noticeable difference to the scenery of the Forest in general. Differences may eventually be noticed in mass of color, shading or texture as species change in dominance. However the canopy would remain intact barring any catastrophic events and the overall perceived landscape would not be much, if any different.

Summary

Alternative 1 would be consistent with all scenery management direction in the Forest Plan. The Proposed Action (Alternative 2) would also be consistent with scenery management direction in the Forest Plan.

Socio-economics and Environmental Justice

The following discussion incorporates by reference the analysis and conclusions documented in the Deer Ridge Project Socioeconomic Report (Jaworski 2016) located in the Project Record. The socioeconomic specialist report analyzes how the Proposed Actions would affect quality of life, environmental justice, and economic efficiency (Table 11). The proposed project would occur on approximately 3,800 acres in Coos County, New Hampshire near the townships of Berlin and Milan. The socioeconomic analysis addresses these communities, using county data for context and comparison.

Affected Environment

Social and Economic Conditions

Coos County is the northernmost county in New Hampshire, bordering Vermont, Maine, and Quebec, Canada. Coos County is rural and contains more federally-administered public lands than any other county in New Hampshire (USDA Economic Research Service 2013 and DOI 2015). Coos County is home to 32,202 people (United States Census Bureau 2015). The county is much less densely populated than the state overall, with approximately 18 people per square mile compared to 148 people per square mile in New Hampshire (United States Census Bureau 2015). Low population density contributes to the rural character of the Project Area.
The towns of Berlin and Milan are both within Coos County. Berlin is home to 9,710 people. Milan is home to 1,307 people (United States Census Bureau 2015).

Table 11. Resource indicators and measures for the existing condition.

<table>
<thead>
<tr>
<th>Resource Element</th>
<th>Resource Indicator (Quantify if possible)</th>
<th>Measure (Quantify if possible)</th>
<th>Existing Condition (Alternative 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of life</td>
<td>Population density</td>
<td>People per square mile of land</td>
<td>18 people/square mile</td>
</tr>
<tr>
<td>Quality of life</td>
<td>Values, beliefs, and attitudes</td>
<td>Qualitative description</td>
<td>Public values ecological integrity and recreation opportunities</td>
</tr>
<tr>
<td>Environmental justice</td>
<td>Poverty</td>
<td>Share of population living below the poverty line</td>
<td>Meaningfully greater than the share of people living in poverty statewide</td>
</tr>
<tr>
<td>Environmental justice</td>
<td>Race and ethnicity</td>
<td>Share of population identifying other than “white alone”</td>
<td>Not meaningfully greater than the share of people identifying as a racial or ethnic minority statewide</td>
</tr>
<tr>
<td>Economic benefit</td>
<td>Economic efficiency</td>
<td>Present net value</td>
<td>No costs or benefits associated with the Deer Ridge project</td>
</tr>
</tbody>
</table>

Coos County has a large share of employment in natural resource-related sectors, particularly those tied to forestry and recreation. The commercial logging sector employs approximately 310 people. Sawmills in the county employ approximately 165 people. Wood manufacturing sectors, including paper mills and prefabricated wood building manufacturing, employ approximately 140 people (IMPLAN 2014). Recreation-related sectors, such as accommodation and food services, are among the largest
in terms of employment in the county. Hotels and motels account for approximately 470 jobs. Restaurants account for approximately 1,050 jobs (IMPLAN 2014). Forest Service management actions may affect economic activity in forestry, recreation, and other natural resource-related sectors. Therefore, these data indicate that Forest Service management actions have the potential to affect the social and economic well-being of individuals who live and work near the Project Area.

Values, Beliefs, and Attitudes

An assessment of values, beliefs, and attitudes provides insight into the relationship between the public and forest management. Members of the public submitted scoping comments on the Deer Ridge project. These comments were evaluated to identify values, beliefs, and attitudes related to public land management and the proposed project activities. The majority of values, beliefs, and attitudes identified in the public comments are related to the preservation of ecological integrity or improving recreation opportunities. These topics are addressed in detail in the recreation and wildlife specialist reports and in the Response to Comments report (Appendix F).

A number of commenters value the protection of wildlife habitat. However, among comments that reveal this value, there is variation in whether commenters believe that the Deer Ridge project will contribute to the protection of wildlife habitat. One public comment states that, “one of the purposes for this logging project are to ‘salvage ice damaged trees,’ yet those damaged trees are what the woodpeckers and other creatures like bats need…they don’t need them cut down.” In contrast, another commenter notes that, “It is my opinion that this project will yield tangible benefits for wildlife habitat in the Kilkenny area…This project offers opportunities for regenerating aspen, specifically in stands 39a and 39. Aspen is an important forest wildlife habitat type that is in relatively short supply in the Kilkenny forest.” While these commenters profess similar values, they have differing beliefs about the relationship between the proposed management actions and the protection of wildlife habitat.

Another public concern related to ecological integrity is climate change. One commenter believes that attempts to improve forest resilience to climate change may be feckless due to the extent of current warming. That
same commenter argues that the Deer Ridge project may contribute to additional temperature increases based on a belief that “the trees from Deer Ridge [may] be taken next door to the biomass plant in Berlin to be chipped up and burned releasing all that stored carbon and adding to an already overheated atmosphere.” The commenter instead favors leaving trees in place to “get bigger and bigger since they are the only thing we have to sequester carbon.”

Concerns about the interaction of the Deer Ridge projects with other activities both on and off National Forest System lands were identified. In particular, one commenter argues that the project may have unintended consequences on the health and character or forests in the region: “A quick look at a Global Forest Watch Map shows that much of North NH and ME are being converted into one giant clearcut, with a lot of that being within the Jericho State Park right next to the Deer Ridge Project. The WMNF needs to look outside its’ boundaries to see how much of New England is being clearcut and maybe start to realize that the only place trees are allowed to get to ‘maturity’ is within its’ borders.” Similarly, a comment argues that the having multiple similar projects implemented in both spatial and temporal proximity (Albany South and Deer Ridge projects) will make it difficult for the Forest Service to “to ensure that all these logging projects are all being implemented properly and no damage is happening to our National Forest.”

Some commenters were chiefly concerned with proposed recreation management changes, emphasizing the value of designating all-terrain vehicle (ATV) trails on the forest. A comment noted that “ATV riders believe that these great lands throughout the WMNF, especially the land situated in Coos County, have more than enough land to provide for all recreational interests.” The same letter described the importance of ATVs in securing equal opportunities to participate in outdoor recreation: “Many ATV riders are elderly or have limited abilities to hike and climb our NH Mountains. ATVs afford them the opportunity to view and experience the great backwoods and wildlife of northern NH.”

**Environmental Justice**

Coos County has relatively few individuals who identify as racial or ethnic minorities. Approximately 96 percent of the population in the county
identifies as white, not Hispanic/Latino (United States Census Bureau 2015). Therefore, the county is somewhat less racially and ethnically diverse than New Hampshire as a whole (United States Census Bureau 2015). An estimated 8.9 percent of New Hampshire residents live in poverty. In contrast, more than 13 percent of Coos County residents live in poverty. Young people are particularly likely to experience poverty, with more than one-fifth of children under the age of 18 living in poverty in Coos County (United States Census Bureau 2015). Therefore, Coos County, New Hampshire is determined to contain an environmental justice population due to meaningfully greater rates of poverty than the state overall. The environmental consequences analysis considers the potential for Forest Service management actions to disproportionately and adversely affect low-income individuals.

**Environmental Consequences**

**Alternative 1: No Action**

**Direct and Indirect Effects**

The cost of project planning and environmental analysis would be approximately $170,850 under all alternatives. The no action alternative would not generate revenue. Therefore, the net present value of the No Action Alternative is $(170,850). The No Action Alternative would not affect quality of life or environmental justice because no activities would be implemented.

**Cumulative Effects**

**Spatial and Temporal Context for Effects Analysis**

The spatial boundaries for analyzing the cumulative effects to social and economic conditions are the towns of Berlin and Milan in Coos County, New Hampshire. Individuals who reside in these communities are most likely to be affected by the Deer Ridge project as well as past, present, and reasonably foreseeable activities relevant to the cumulative effects analysis. The temporal scope extends from present through project completion, which is expected in 2022. The social and economic consequences are expected to occur within this period.
Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

The only social and economic consequence of Alternative 1 is the $170,850 cost of project planning and environmental analysis. No past, present, or reasonably foreseeable future activities would affect this cost. Therefore, there are no cumulative effects to social and economic conditions under Alternative 1.

**Alternative 2: Proposed Action**

**Direct and Indirect Effects**

**Economic Efficiency**

Alternative 2 would generate approximately $875,000 (present value benefits) in stumpage receipts over the 6-year project period. Project costs – such as environmental analysis and project planning, timber sale preparation and administration, prescribed burning, and road maintenance – would total approximately $549,000 (present value costs). Therefore, the net present value of activities under Alternative 2 would be approximately $326,000. The benefits would be 1.6 times greater than the costs of the project. However, the economic efficiency analysis considers only monetary costs and benefits. Other specialists’ reports describe how ecological and resource conditions would be affected by the proposed activities; many of these changes cannot be captured in monetary terms. Therefore, the economic efficiency analysis should be viewed as a partial measure of project costs and benefits.

**Quality of Life**

The values, beliefs, and attitudes discussion above indicates that members of the public particularly value ecological integrity for wildlife habitat and recreation opportunities in the Deer Ridge Project Area. These topics are addressed in detail in the recreation and wildlife reports.

**Environmental Justice**

As described in the affected environment analysis, Coos County residents are more likely to live in poverty than residents of New Hampshire overall. Therefore, the Deer Ridge project is analyzed for potential environmental justice consequences. None of the proposed activities are expected to disproportionately and adversely affect low-income individuals. Indeed,
the proposed silvicultural treatments under Alternative 2 may increase employment opportunities in forest product-related sectors in the county. Therefore, the proposed activities have the potential to improve earnings among low-income individuals.

**Cumulative Effects**

Spatial and Temporal Context for Effects Analysis

The spatial and temporal boundaries for effects analysis are the same as identified under Alternative 1.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

None of the past, present, or reasonably foreseeable activities would affect economic efficiency, because none of the activities would affect the costs or revenues associated with the Deer Ridge project.

Since there are no direct or indirect effects to environmental justice, there would be no environmental justice cumulative effects.

Cumulative effects related to quality of life resulting from effects to wildlife habitat and recreation opportunities are addressed in the wildlife and recreation specialist reports, respectively.

**Summary of Environmental Effects**

Table 12 provides a comparison of the No-Action Alternative to the Proposed Action. The No-Action alternative (Alternative 1) has a negative net present value because it entails the cost of this environmental analysis, but would not result in the implementation of any activities that produce merchantable forest products. The Proposed Action (Alternative 2) has a positive net present value, indicating that the monetary benefits of the Deer Ridge project exceed the monetary costs. However, the net present value calculations do not include non-monetary values (e.g., ecological and recreational values). As such, the net present value should only be viewed as a partial measure of project value.

Coos County, New Hampshire has a meaningfully greater rate of poverty than the state overall. However, neither of the alternatives are expected to disproportionately and adversely affect low-income individuals.

Public comments reveal concerns about ecological integrity and recreation opportunities in the Deer Ridge Project Area. Other specialist reports
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address recreation opportunities and ecological integrity. Therefore, these reports also provide information relevant to quality of life.

Table 12. Summary comparison of effects to social and economic resources.

<table>
<thead>
<tr>
<th>Resource Element</th>
<th>Indicator/Measure</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic efficiency</td>
<td>Net present value</td>
<td>$(170,850)</td>
<td>$326,000</td>
</tr>
<tr>
<td>Qualitative description</td>
<td>Effects to ecological integrity and recreation opportunities</td>
<td>No effects to quality of life</td>
<td>See recreation and wildlife specialist reports</td>
</tr>
<tr>
<td>Environmental justice</td>
<td>Potential for disproportionately adverse effects to low-income</td>
<td>No disproportionately</td>
<td>No disproportionately adverse effects to low-income individuals. Potential to benefit from economic activity in forest product sectors.</td>
</tr>
<tr>
<td></td>
<td>individuals in Coos County</td>
<td>adversely adverse effects to low-income individuals</td>
<td></td>
</tr>
</tbody>
</table>

Soil

The following discussion incorporates by reference the analysis and conclusions documented in the Deer Ridge Integrated Vegetation Management Report (Colter 2016) located in the Project Record.

Affected Environment

Existing Condition

The Deer Ridge Project Area has soils common to the WMNF: shallow to ledge to moderately deep, well- and moderately-well drained, fine sandy loams on 0 to 35 percent slopes. The Project Area is too low on the landscape and gentle in slope to have dry debris slides that would lead to mass movement of shallow gravelly soils. It is low enough on the landscape to have deep soil slumps; however, field review of the units proposed indicates that this potential soil hazard does not exist here (Colter 2015). These soils are productive in growing Northern Hardwood Species along with Red Spruce and Balsam Fir. These soils also currently support a vast road and trail (snowmobile and hiking) network while also supporting recreational camping opportunities.

The Project Area proposed for activities is a mix of northern hardwood and softwood Ecological Land Types. Ecological Land Typing is useful for making management decisions about which treatment method of
harvesting to use (even- or uneven-aged management) and in which seasons harvesting should occur to minimize soil disturbance. Land use records indicate the Project Area was a mixture of heavily and lightly culled (meaning a portion of trees were removed from the area, some areas more so than were others), including softwoods. Since those early times, there have been conventional, bole-only harvests in this vicinity (the tops and limbs of the trees having been left in the forest), which means that approximately 35 percent of the calcium that could be taken from the forest through harvesting has been left on-site. Atmospheric deposition may remove calcium from the soil irrespective of timber harvesting. The most recent small watershed studies suggest that the cumulative loss of calcium due to atmospheric deposition, considering the buffering effect of mineral weathering, is about four percent over 120 years. (USDA Forest Service 2005b, p 3-24). Given the cumulative effects time period for soil nutrients (66 years in the past) it is possible that up to three percent of the total soil calcium may have been removed during that time due to atmospheric deposition, and another less than one percent due to early harvesting methods (Fay 2003). Atmospheric deposition may continue to deplete soil calcium. Although a quick review of the literature seems to show that soil and streams are recovering from the possible impacts of acid deposition (USDA Forest Service 2005b, p. 3-26), therefore, an estimated four percent soil calcium may have been lost over the past 120 years (USDA Forest Service 2005b, p. 3-24).

Existing soil productivity, based on field examinations of a number of the representative stands, indicates that the stands previously harvested to regenerate new forest have met agency requirements for adequate stocking of forest regeneration at three and five years post-harvest (see Project Record). This is consistent with forest wide re-stocking surveys, which assess all clearcut and selection harvests on a variety of soils, aspects, and topographic positions. This is important because restocking is the first step in the re-accumulation of biomass, which is the measurement used by the Forest Service to assure that soil nutrient cycling is not impaired leading to a loss of long-term soil productivity. It is also indicative that the forest response to harvest treatment is consistent with the expectations of silvicultural guides referenced in the Forest Plan. This also supports the notion the effects from acid deposition are not currently affecting the Project Area.
The Project Area also supports an existing extensive skid trail and landing network that supported various summer and winter timber operations. Field examinations of a number of the representative stands have also showed there to be minimal erosion and compaction and nutrient loss within the stands to be harvested (Colter 2015). This is important to show that previous harvesting has not impacted the existing sites to a detrimental condition and that the inherent capacity of the soil to support the growth of specified plants, plant communities, or sequences of plant communities still exists. Localized soil displacement (erosion) related to ongoing maintenance of Forest Service System roads, recreational trails, private roads would also continue within the Project Area.

**Desired Condition**

The Forest Plan desired condition is to protect the long-term sustainability of the soil resource with an emphasis on maintaining appropriate soil nutrients and to ensure soils are stabilized around management activities. The desired soil conditions are tiered to the Forest Plan Standards and Guidelines and the Forest Service Soil Quality Standards (USDA Forest Service Manual, Supplement R9 RO 2550-2012-1). Implementation of soil quality standards and relevant Best Management Practices to all phases of project implementation would ensure that long-term soil productivity is maintained in this area.

**Environmental Consequences**

**Methodology**

Potential resource indicators of soil productivity were assessed in the Project Area to determine if they would continue to meet the regional and Forest Plan Soil Quality Standards. The resource indicators for soil productivity are soil displacement (erosion), compaction, and impaired soil nutrient cycling. The shovel test method and ocular measurements were used to assess these indicators (Gen. Tech. Report WO-82b, September, 2009). These indictors have the potential to cause detrimental effects to soil productivity in this Project Area based on the literature. They can cause: sheet, rills and gulling of the soil due to erosion, increased bulk density restricting roots and water infiltration due to soil compaction, and loss of litter layer and biomass accumulation from impaired soil nutrient cycling. All of these indictors can mean a loss of the inherent capacity of the soil to support the growth of specified plants, plant communities, or sequences of
plant communities. The best available science was used to address the findings on the landscape.

The rationale for field examinations of a number of the representative treatment areas, rather than all treatment areas within the Project Area was based on discussions as an interdisciplinary team and with individual team members to determine to identify concerns and recommendations. The Ecological Land Type layer of the soils mapped in this area, a slope layer, area photos, GIS, LiDAR, and the specialist’s professional judgement from looking at representative treatment areas on this project were all taken into account. These resources were used, because they are the best science available to the specialist and gave the most accurate information of the Project Area to pinpoint looking at the treatment areas that might have slope issues, wetness issues, and regeneration issues which could cause the measures linking to the indicators of soil displacement (erosion), compaction and impaired soil nutrient cycling. The specific soil tests listed above were chosen, because they are proven tests for this area and allowed in the regional soil quality standards (Gen. Tech. Report WO-82b, September, 2009). Over the past two years considerable time has been spent on the Deer Ridge Project looking at soil productivity. During these site visits by soil scientists, a number of activities have taken place and been recorded (Project Record). Monitoring has been evaluated to look at the previous treatment areas with similar treatments as proposed in this project across the forest for soil productivity. Potential effects of this proposed project were reviewed in consultation with the other members of the interdisciplinary team.

Spatial and Temporal Context for Effects Analysis

**Soil Erosion and Compaction:** The analysis area for direct and indirect effects to soil productivity as measured by the indicators of soil displacement (erosion) and soil compaction is the Project Area proposed for treatment as part of the Deer Ridge Project. The area has been selected because the expected effects are limited to the area within the proposed treatment area. Under Alternative 2 the stand analysis area totals approximately 2,380 acres. Part of analyzing the direct and indirect effects on soil productivity is to consider how the soils have responded to the indicators of soil displacement (erosion) and compaction in the past.

The analysis area for cumulative effects of soil erosion and compaction on soil productivity is the Headwaters Upper Ammonoosuc and Higgins...
Deer Ridge Integrated Resource Project

Brook- Upper Ammonoosuc watersheds which totals approximately 39,700 acres. This area was chosen to adequately analyze the cumulative effect of past, present, and reasonably foreseeable future actions, along with the Proposed Action. Effects of project activities would be expected to be masked by dilution further downstream, as these water bodies mix with much larger ones. This area was chosen to adequately analyze the cumulative effect of activities on soil erosion and compaction in other parts of the watersheds along with the proposed activities. This watershed scale is not so large that it spatially dilutes the cumulative sum of the effects on soil displacement (erosion) and soil compaction, nor is it so small that it fails to identify and consider current and potential use on both National Forest and private lands relative to the proposed project.

The temporal scope for cumulative effects on soil displacement (erosion) and soil compaction is ten years in the past and ten years beyond the implementation of the project. This period was chosen to incorporate the time it has been shown in literature for soils to shows little effects from the previous timber harvesting operations on National Forest lands within the analysis area (the last timber sale was in the late 1980’s). It takes into consideration present effects on soil resources resulting from any past soil disturbing actions, to allow time for the proposed activities to occur and be completed, and to consider any other foreseeable soil disturbing activities. This timeframe allows consideration of multiple uses, and provides enough time for the expected recovery of soil productivity from soil displacement (erosion) and soil compaction resulting from timber harvesting, as well as the projected recovery time of the other activities proposed and from future activities. Evidence of erosion and compaction beyond the expected timeframe would imply that the soil is not recovering as expected, and effects from this and future activities could be additive and cumulative.

**Soil Nutrient Cycling:** The analysis area for direct, indirect and cumulative effects on soil productivity from impaired soil nutrient cycling is the location of the actual proposed activities since site-specific impacts related to soil or forest productivity are not likely to extend further. For Alternative 2, the stand analysis area totals approximately 2,380 acres. The temporal scope for cumulative effects on soil productivity is from early harvesting and associated activities known approximately in the early 1900s to ten years into the future, which is the reasonable planning horizon
for a future harvest. Early harvesting is considered because land use may affect soil nutrients, including soil calcium (Hornbeck 1990). Future harvesting and acidic deposition are considered for the same reason. The actually percent of total calcium loss takes into account calcium depletion for the last 66 years, foreseeable calcium depletion over the next 10 years, previous harvests, and proposed harvest.

**Connected Actions, Past, Present, and Reasonably Foreseeable Future Activities Relevant to Cumulative Effects Analysis**

**Reasonably Foreseeable Future Projects (10 years):** Management activities in the next ten years include ongoing maintenance of permanent wildlife openings through prescribed fire or mechanical methods, road maintenance, ongoing invasive plant eradication, and ongoing maintenance of trails and backcountry campsites.

**Alternative 1: No Action**

Direct, Indirect, and Cumulative Effects

**Soil Erosion and Compaction:** In the absence of activities such as timber harvesting and road and trail building, no increase in soil displacement (erosion) or soil compaction is expected with Alternative 1. No indirect effects to soil displacement (erosion) or compaction are expected from Alternative 1.

**Soil Nutrient Cycling:** Alternative 1 would have no direct impact on long-term soil nutrient cycling. The indirect impact of no proposed activities includes no possible changes in soil loss and biomass accumulation from the proposed activities leading to impaired soil nutrient cycling. No indirect effects to impaired soil nutrient cycling are expected from Alternative 1.

Because there are no direct or indirect effects, there are no cumulative effects from this project expected from soil displacement (erosion), compaction and impaired soil nutrient cycling.

**Alternative 2: Proposed Action**

**Direct Effects**

**Soil Erosion and Compaction**

**Road Maintenance and Reconstruction:** Approximately 8.5 miles of existing road are proposed for maintenance and reconstruction activities in Alternative 2. Maintenance would improve drainage and surfacing on
the roads, and may involve cleaning culverts, blading of the road surface, and road resurfacing. Although road maintenance may initially cause ground disturbance, improving and maintaining roads to their level of anticipated use could prevent future soil erosion. Research has shown that maintenance, such as resurfacing roads with a layer of gravel, reduces sediment losses (NCASI 2000). Road resurfacing and replacing culverts would help maintain the road and prevent future soil erosion problems (Moll et al. 1997). This is also true for access to log landings. Established roads are not included in soil productivity but they are included to protect adjacent soil from impacts.

**Timber Harvesting:** The majority of the activity area is gently to moderately sloped, and harvesting would occur on slopes suitable for timber management. The lengths of these slopes are short enough to limit potential for notable soil erosion. The combination of moderately-sloped terrain with post-harvesting measures in accordance with Forest Plan Standards and Guidelines and Best Management Practices, such as soil stabilization and waterbars, should prevent soil erosion and promote revegetation (NHDES 2016, MFS 2005, 2006 and 2012; Stafford, et al. 1996). Some stands would be harvested only in the winter months, while some stands have the option of summer winter harvesting based on the soils or other resource needs (refer to the Vegetation report for the specific units). With frozen soils, proper skid trail location, and careful closeout at the end of operations, minimum surface soil erosion or soil compaction is likely to occur (NHDES 2016; MFS 2005, 2006 and 2012; Stafford et al. 1996). Frozen operations should produce very little compaction since operations would not have direct contact with mineral soil, and any effects from compaction should disappear by the second winter (NCASI, 2004). Harvesting and skidding on stands during summer would most likely expose mineral soil, particularly on the main skid trails, and it is likely there would be site-specific instances of surface soil erosion and compaction from loss of organic cover. Alternative 2 has approximately 257 acres planned for potential summer/winter harvesting. Planned layout and management of approximately 29 miles of skid trails, utilizing breaks in terrain, and avoiding steep slopes where feasible, and limiting operations to dry soil conditions (Best Management Practices) would largely minimize or avoid detrimental soil erosion. Vegetation management guideline G-5 (Forest Plan p. 2-30) states, “Where exposure of mineral soil is expected, skid trails
should generally be located on grades of less than 20 percent, with only short steeper pitches.” Given that slopes in the Project Area can be up to 35%, there may be instances where skids trails will need to be on grades exceeding 20% for more than a short pitch. If so, those skid trails would not be consistent with this guideline. Detrimental effects to soil productivity would be avoided in the Project Area, even if skid trails in summer/winter units are inconsistent with the guideline, if the soil and water design features are followed. Some temporary compaction would be expected on main skid trails, but this would be minimized by design features, and the soils should recover from compaction within three to six years of the end of operations (Donnelly et al. 1991, NCASI, 2004). No detrimental soil displacement (erosion) or soil compaction anticipated with this project.

**Log Landings:** Twenty five existing log landings are proposed for use during harvesting in Alternative 2. The log landings are well placed on gentle terrain. The combination of careful site selection and management of the log yard during use would limit the extent of erosion and prevent long-term soil erosion impacts even though truck traffic and skidder operation would churn the soil surface and expose mineral soil leading to on-site soil erosion within the boundary of the log yard.

Alternative 2 proposes three new log landings; all would be approximately 0.75 acres each. The log landings are well placed on gentle terrain. The combination of careful site selection and management of the log yard during use would limit the extent of erosion and prevent long-term soil erosion impacts even though truck traffic and skidder operation would churn the soil surface and expose mineral soil leading to on-site soil erosion within the boundary of the log yard. No detrimental soil displacement (erosion) or soil compaction anticipated with this project.

**Expand Unknown Pond Trailhead Parking Lot:** Alternative 2 proposes to expand one trailhead parking lot totaling approximately 1.0 acre. The site would be constructed during timber operations because the site would be on a log landing during dry soil conditions. During construction, soil would be compacted, graded, sloped, and vegetation removed as needed. This would expose the previously protected soil to rainfall, and the top, organic-rich layer of soil could more easily erode away from the site versus before the soil disturbing construction activities, decreasing soil productivity temporary by soil compaction while construction activities are taking place, however, following Forest Plan direction and Best
Management Practices related to surface erosion control and soil compaction, timing the construction activities, and controlling site drainage should effectively prevent soil erosion and protect the soil adjacent to the construction site and restore soil productivity to the construction site. However, as long as the parking lot exists for use, soil under the parking lot would be detrimentally impacted by soil compaction from parking use and thus taking out soil productivity. Soil detrimental effects are anticipated with this project as long as the site is utilized due to soil compaction.

**Expand Fifield Brook Road Gravel Pit Site:** Alternative 2 proposes to expand one gravel pit site totaling approximately 1 acre. The site would be constructed during dry soil conditions. During construction, operations would consist of harvesting trees and scraping off and stockpiling top soil off of the undistributed area of the site. The topsoil would be seeded for stabilization and to prevent establishment of non-native invasive plant species. The excavated material would be crushed, screened, possibly mixed with other materials to obtain a consistent product, and stockpiled for road maintenance or later use. Equipment would consist of a crusher, loader, dozer, grader, dump trucks and a water tender (for dust abatement in needed). This equipment would be needed only when the pit is in operation. Soil productivity would be temporarily decreased by soil compaction and displacement while construction activities are taking place, however, this site would have a Gravel Pit Management Plan. It would detail the efficient and orderly removal of material and measures for rehabilitation including following Forest Plan direction and Best Management Practices related to surface erosion control, timing the construction activities, and controlling site drainage should effectively prevent soil erosion and protect the soil adjacent to the construction site. Between uses, the site would be closed and rehabilitation would take place (i.e seed ing, erosion control, and slope reshaping). Once the resource is exhausted, the area would be reclaimed by re-sloping the pit walls, redistributing the topsoil, seeding, and if necessary re-planting trees. Loss of soil productivity would be expected during the time of gravel pit operations till the closer and rehabilitation of the site

**Permanent Wildlife Openings and Fire Line Construction:** Approximately 33 acres are proposed in Alternative 2 for permanent wildlife openings through the expansion of three existing openings. The
openings are well placed because of their gentle terrain and well-drained soils. Trees would be removed to allow grasses and plants to develop the site. A stumping operation to take the stumps out would churn the soil surface and temporary expose mineral soil leading to on-site soil erosion within the boundary of the opening. However, the combination of careful site selection and management of the opening during use would limit the extent of erosion and compaction to the site and prevent long-term soil erosion impacts to adjacent soil. After a period of three to five years the openings would be mowed or burned depending on the time of year to keep the vegetation lush for the animals to feed on and to keep trees from growing and taking over the site. Neither process would produce erosion or compaction impacts because the soil would not be devoid of ground cover. Prescribed burning would occur either in late spring, when the snow cover has melted, or in late summer or early fall, when soil temperatures have cooled. While some surface soil organic matter may be lost, past forest monitoring indicates that prescribed burning does not affect rainfall infiltration rates. This is because most of the site would continue to remain covered by organic matter, and mineral soil aggregation would not be changed including after multiple years of burning. The magnitude of the potential effects after prescribed fire is less than those of wildfires, since the prescribed fire is typically of a lower severity (Landsburg and Tiedemann 2000). Based on past monitoring, the fires on this forest do not get hot enough to burn all of the surface organic material. A fire line totaling approximately combined 1.3 acres would be constructed around the perimeter of the permanent wildlife openings, consisting of a breakup of the organic matter layer. However, the fire line would be designed to have minimal impact, and no erosion is expected. No detrimental soil displacement (erosion) or soil compaction anticipated with this project.

Soil Nutrient Cycling

**Timber Harvesting:** The direct effect of timber harvesting on soil nutrient cycling is the removal of calcium through the removal of forest products (tree boles). In general, harvesting that removes only the bole of a tree, removes only a portion of the calcium in the tree. Tree species vary in the amount and distribution of calcium. Sugar maple is one of the most calcium rich trees, and the tops, limbs, and leaves equal about 35 percent of the calcium within a tree (USDA Forest Service 2005b, p. 3-17). Whole-tree harvesting removes calcium that would otherwise be recycled to the
forest floor. Whole-tree clearcut harvesting removes the most calcium from a site (USDA Forest Service 2005b, pp 3-18, 3-19, 3-27).

The effects of the action alternative on calcium removal is summarized in Table 13. The table is organized by harvesting activity, including even-aged management such as clearcut, patch cut, seed tree cut, shelterwood cuts and thinning and uneven management such as group selection, single tree and improvement cuts. The quantity of calcium removed by harvesting varies by area and by harvest method. Clearcutting, for example, removes about 350 Kg/ha of calcium when bole-only harvest is used, and 539 Kg/ha when a whole-tree harvest is used. The other methods, such as a thinning or selective harvesting, remove about 75 percent less, or 88 Kg/ha with bole-only and 134 Kg/ha when whole-tree harvest is used. Proposed harvesting in the Dear Ridge Project is bole-only tree harvesting. The other harvest methods result in approximately 25 percent of the calcium removed during even-aged harvesting because only a portion of the proposed stand is actually harvested. For example, thinning removes the trees from approximately 25 percent of an acre because about 70 percent of the stand’s basal area is left after the thinning. These estimates of calcium removed in forest products indicates that, in general, clearcuts have a greater potential direct impact on calcium removed, especially if whole-tree harvesting is used, compared to bole-only clearcut harvesting or selective or thinning harvesting. Thinning and selective harvesting have less impact than clearcutting. However, over time, even-aged harvesting removes the same amount of woody material as uneven-age harvesting methods. So, the impact of calcium removal of even- and uneven-aged harvesting methods is nearly the same over time when based on a 120 year rotation.

Bole-only, clearcut harvesting would remove an estimated 2 percent of the calcium from a site, and a whole-tree clearcut harvest would remove approximately 4 percent of the total calcium that resides in the soil. The other bole-only harvesting methods would remove up to 1 percent of the total calcium that resides in the soil. (USDA Forest Service 2005b, 3-19). Based on these measurements and since this is a bole-only harvest the harvest activities in Alternative 2 has the potential to add new harvesting impacts with the removal of trees and their biomass. Alternative 2 proposes 490 acres of even age, bole-only tree harvesting and 1823 acres uneven age. Modeling of soil exchangeable calcium and base saturation for
a northern hardwood forest at the Hubbard Brook Experimental Forest, located on the WMNF, has shown little long-term effect on these factors as a result of timber harvesting. Changes in exchangeable soil calcium and soil base saturation from 1850 to 2000 acres were nearly the same with and without forest harvesting (USDA Forest Service 2005b, pp 3-23 to 3-25). Consequently, no detrimental impaired soil nutrient cycling effects are anticipated as a result of Alternative 2.

Table 13. Estimated cumulative effect on total calcium removal (loss) by harvest practice.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Estimated Ca loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Action with One Previous Bole-only Clearcut Harvest</td>
<td>5.5%</td>
</tr>
<tr>
<td>Bole-only Clearcut and One Previous Bole-only Clearcut Harvest</td>
<td>8.7%</td>
</tr>
<tr>
<td>Bole-only Thin and One Previous Bole-only Clearcut Harvest</td>
<td>5.6%</td>
</tr>
<tr>
<td>Bole-only Uneven-Age and One Previous Bole-only Clearcut Harvest</td>
<td>6.3%</td>
</tr>
</tbody>
</table>

**Expand Unknown Pond Trailhead Parking Lot:** Alternative 2 proposes to expand one parking lot totaling approximately 1.0 acre. The parking lot would be constructed during dry soil conditions on a log landing after timber harvest is completed. During construction, soil would be compacted, graded, sloped, and vegetation removed as needed. This would expose the previously protected soil to rainfall, and the top, organic-rich layer of soil could more easily erode away from the site versus before the soil disturbing construction activities, decreasing soil productivity temporary by soil compaction while construction activities are taking place, however, following Forest Plan direction and Best Management Practices related to surface erosion control and soil compaction, timing the construction activities, and controlling site drainage should effectively prevent soil erosion and protect the soil adjacent to the construction site and restore soil productivity to the construction site. However, as long as the parking site exists for use, the soil nutrients currently existing in the soil would still be available when the sites are returned to production, but while the sites are utilized as parking sites no new soil nutrients are expected to accumulate because of the lack of vegetation on the parking lot. Impaired soil nutrient cycling would occur while the parking sites are utilized. This impact would consist of the soil not being allowed to collect
nutrients by vegetation not being on the parking lot to complete the soil nutrient cycle.

**Log Landings:** Twenty five existing log landings are proposed for use during harvesting in Alternative 2. The log landings are well placed on gentle terrain. The combination of careful site selection and management of the log yard during use would limit the extent of erosion and prevent long-term soil erosion impacts even though truck traffic and skidder operation would churn the soil surface and expose mineral soil leading to on-site soil erosion within the boundary of the log yard. No detrimental impaired soil nutrient cycling is anticipated.

Alternative 2 propose three new log landings all would be about 0.75 acres in size. The log landings are well placed because of their gentle terrain. The combination of careful site selection and management of the log yard during use would limit the extent of erosion and prevent long-term soil erosion impacts even though truck traffic and skidder operation would churn the soil surface and expose mineral soil leading to on-site soil erosion within the boundary of the log yard. No detrimental impaired soil nutrient cycling is anticipated.

**Expand Fifield Brook Road Gravel Pit Site:** Alternative 2 proposes to expand one existing gravel pit by approximately 1 acre. The site would be constructed during dry soil conditions. During construction, Operations would consist of harvesting trees and scraping off and stockpiling top soil off of the undistributed area of the site. The topsoil would be seeded for stabilization and to prevent establishment of non-native invasive plant species. The excavated material would be crushed, screened, possibly mixed with other materials to obtain a consistent product, and stockpiled for road maintenance or later use. Equipment would consist of a crusher, loader, dozer, grader, dump trucks and a water tender (for dust abatement in needed). This equipment would only be needed when the pit was in operation. Soil productivity would be temporary decreased by soil compaction and displacement while construction activities are taking place. However, this site would have a Gravel Pit Management Plan which would detail the efficient and orderly removal of material and measures for rehabilitation including following Forest Plan direction and Best Management Practices related to surface erosion control, timing the construction activities, and controlling site drainage should effectively prevent soil erosion and protect the soil adjacent to the construction site.
Between uses, the site would be closed and rehabilitation would take place (i.e. seeding, erosion control, and slope reshaping). Once the resource is exhausted, the area would be reclaimed by re-sloping the pit walls, redistributing the topsoil, seeding, and if necessary re-planting trees. Detrimental effects to impaired soil nutrient cycling is expected with this activity during the time of gravel pit operations till the closer and rehabilitation of the site.

**Permanent Wildlife Openings / Fire Line Construction:** Approximately 33 acres are proposed in Alternative 2 for permanent wildlife openings through the expansion of three existing openings. The openings are well placed because of their gentle terrain and well-drained soils. Trees would be removed to allow grasses and plants to develop the site. No detrimental effects to impaired soil nutrient cycling would be expected with this activity. After a period of three to five years the openings would be mowed or burned depending on the time of year to keep the vegetation lush for the animals to feed on and to keep trees from growing and taking over the site neither process would produce erosion or compaction impacts because the soil will not be devoid of ground cover. Prescribed burning would occur either in late spring, when the snow cover has melted, or in late summer or early fall, when soil temperatures have cooled. While some surface soil organic matter may be lost, past forest monitoring indicates that prescribed burning does not affect rainfall infiltration rates. This is because most of the site would continue to remain covered by organic matter, and mineral soil aggregation would not be changed including after multiple years of burning. The magnitude of the potential effects after prescribed fire is less than those of wildfires, since the prescribed fire is typically of a lower severity (Landsburg and Tiedemann 2000). Based on past monitoring, some surface soil organic matter would be lost due to burning, but some nutrients (calcium) are not affected. For example, soil calcium would not be reduced by burning, but it could be removed from a site by erosion. Some soil nitrogen would be lost when the organic matter burns, but nitrogen is not considered to be a limiting factor in plant growth on the WMNF so no detrimental effect to impaired soil nutrient cycling is expected with prescribed burning even after multiple years of prescribed burning.

A fire line totaling approximately combined 1.3 acres would be constructed around the perimeter of the permanent wildlife openings,
consisting of a breakup of the organic matter layer. However, the fire line would be designed to have minimal impact. No detrimental effect to impaired soil nutrient cycling is expected with this project.

**Indirect Effects**

**Soil Erosion and Compaction**

Indirect effects of non-detrimental soil erosion or compaction are based on the rate and success of revegetation of skid trails, log landings, watershed restoration and road decommissioning. New construction activities of roads and camp sites are not analyzed as part of this because all of the effects from this activity were described in the direct effects. Studies in Maine and Vermont found that soil compaction on log landings and skid trails from winter harvesting lasts two to three years after operations cease (Donnelly et al. 1991; Holman et al. 1978, NCASI, 2004, USFS, 2009). Restocking surveys and field reviews on the WMNF indicate that skid trails and log landings are revegetating and naturally. Well-distributed rainfall, abundant seed sources, and favorable seedbeds all contribute to this rapid revegetation. Log landings typically revegetate first with raspberries and other herbaceous species and then with forest tree species. Skid trails typically revegetate with forest tree species because the trails are narrow enough that sunlight is limited, so herbaceous plants do not generally revegetate these locations.

Indirect detrimental effects from soil erosion and compactions are expected from Alternative 2 on approximately 2.0 acres. This is the soil that sits directly under the proposed hiking trail and parking sites. This soil would be displaced, compacted and would not produce plants until the gravel pit or parking lot was decommissioned.

**Soil Nutrient Cycling**

The indirect effect of non-detrimental impaired soil nutrient cycling on the Proposed Action includes possible changes in available (exchangeable) soil calcium, and base saturation that are attributed to forest harvesting, skid trails, log landings, watershed restoration and road decommissioning. No impact is expected on soil productivity related to the timber harvesting program across the WMNF during the next two decades based on actual on-site measurements at Hubbard Brook Experimental Forest — over a period of fifteen years at sixty soil pits — soil exchangeable calcium was not lost due to forest harvest (USDA Forest Service 2005b, p 3-20).
Indirect non-detrimental effects from impaired soil nutrient cycling are not expected under Alternative 2 from the above mentioned activities.

Indirect detrimental effects from impaired soil nutrient cycling are expected under Alternative 2 on approximately 2.0 acres. This is the soil that sits directly under the proposed hiking trail and parking sites. This soil would not produce plants and other microorganisms that allow the soil to cycle nutrients until the gravel pit or parking lot was decommissioned.

Table 14. Ground Disturbing Activities for Alternative 2.

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>Soil Displacement (Erosion) Non-detrimental and detrimental</th>
<th>Soil Compaction Non-detrimental and detrimental</th>
<th>Non-Impaired and Impaired Nutrient Cycling</th>
<th>Detrimental Effect On Soil Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 Existing and 3 New Landings (acres)¹ Total 28 landings</td>
<td>21</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvest Acres</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parking Lot Construction (acres)</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Wildlife Opening (acres)</td>
<td>33</td>
<td>33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravel Pit Construction (acres)</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Skid Trails (miles/acre)²</td>
<td>29.0/69.6</td>
<td>29.0/69.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Line Construction (acres)²</td>
<td>1.3</td>
<td>1.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Disturbed Acres</td>
<td>126.9</td>
<td>126.9</td>
<td>1032.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

¹ Landing size = 0.75 acres
² 1 mile of road/skid trail/ski trail at an average disturbance of 20' = 2.4 acres of disturbance/mile

**Summary of Direct and Indirect Effects**

The Deer Ridge project would result in a short-term increase in the amount of non-detrimental soil displacement (erosion) in the analysis area. Table
14 shows soil disturbance under Alternative 2 on approximately 126.9 acres, or 5.3 percent of the approximately 2,380-acre stand analysis area. The Deer Ridge project would result in a short-term increase in the amount of non-detrimental soil compaction in the analysis area. Table 14 shows soil disturbance under Alternative 2 on approximately 126.9 acres, or 5.3 percent of the approximately 2,380-acre stand analysis area.

The Deer Ridge project would result in a short-term increase in the amount of non-detrimental soil nutrient cycling from the timber harvesting with the most nutrients taken from Alternative 2. Table 14 shows soil disturbance under Alternative 2 on approximately 1032 acres, or 43 percent of the approximately 2,380-acre stand analysis area.

The Deer Ridge project would result in an increase in the amount of detrimental soil productivity in the analysis area. Table 14 shows soil productivity disturbance under Alternative 2 on approximately 2.0 acres, or 0.08 percent of the approximately 2,380-acre stand analysis area.

**Cumulative Effects**

**Soil Erosion and Compaction**

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

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

The cumulative effects watershed is the Headwaters Upper Ammonoosuc and Higgins Brook- Upper Ammonoosuc watersheds, which totals approximately 39,662 acres. This area was chosen to adequately analyze
the cumulative effect of activities on soil erosion and compaction in other parts of the watersheds along with the proposed activities. Effects of project activities would be expected to be masked by dilution further downstream, as these water bodies mixes with much larger ones. The Forest Service currently owns approximately 39,340 acres or 99.0 percent of the watershed of which will have approximately 1323.8 acres of disturbance while the privately-owned lands within the watersheds total approximately 322 acres or 1.0 percent of the watershed of which approximately 322.0 acres have known disturbance activities. Table 15 shows Alternative 2 (1323.8 acres combined non detrimental and detrimental soil displacement, soil compaction and impaired soil nutrient cycling) would impact the most acres in the cumulative effects watershed with a combined FS and estimated private land disturbance of approximately 1645.8 acres or 4.1 percent of the 39,662 cumulative effects watershed.

Soil Nutrient Cycling

The cumulative effects are the impact of the Proposed Action, combined with the effects of past, present, and foreseeable future actions, which in this case includes consideration of early land use (forestry, agriculture), long-term changes in atmospheric deposition (sulfate, nitrate, particulate matter), and future land uses (USDA Forest Service 2005b, p 3-18). The effects of atmospheric deposition would be the same as in Alternative 1.

Table 15. Direct, Indirect, and Cumulative effects of Alternative 2.

<table>
<thead>
<tr>
<th>Activity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct/Indirect Effects Proposed</strong></td>
<td></td>
</tr>
<tr>
<td>Soil Displacement (acres)</td>
<td>126.9</td>
</tr>
<tr>
<td>Soil Compaction (acres)</td>
<td>126.9</td>
</tr>
<tr>
<td>Soil Nutrient Cycling (acres)</td>
<td>1032.0</td>
</tr>
<tr>
<td><strong>Cumulative Effects</strong></td>
<td></td>
</tr>
<tr>
<td>Wildlife Opening Maintenance (acres)</td>
<td>38.0</td>
</tr>
</tbody>
</table>
### Activity

<table>
<thead>
<tr>
<th>Activity</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Past Project Landings and Skid Trails (estimated acres)</td>
<td>56.3</td>
</tr>
<tr>
<td>Godfrey Dam Pipeline Replacement (acres)</td>
<td>6.0</td>
</tr>
<tr>
<td>Culvert Replacement (acres)</td>
<td>1.6</td>
</tr>
<tr>
<td>Trail Repair and Relocation (acres)</td>
<td>1.1</td>
</tr>
<tr>
<td>Hatchery Removal of Underground Storage Tanks (acres)</td>
<td>1.0</td>
</tr>
<tr>
<td>Hatchery Septic Improvement (acres)</td>
<td>1.0</td>
</tr>
<tr>
<td>Barry Conservation Camp Enhancement (acres)</td>
<td>1.0</td>
</tr>
<tr>
<td>Disturbance from Cumulative Effects (acres) (Road Maintenance Not Countered in Disturbance)</td>
<td>106.0</td>
</tr>
<tr>
<td>All Disturbance (Combined Proposed and Cumulative Effects) (acres)</td>
<td>1391.8</td>
</tr>
<tr>
<td>Total % of FS Owned Land (34,857 acres) and Activities in the Cumulative Effects Area</td>
<td>4.0%</td>
</tr>
<tr>
<td>Total % FS Disturbed of 39,700 acres of Cumulative Effects Area (acres)</td>
<td>3.5%</td>
</tr>
<tr>
<td>Private Land with Estimated Known Disturbance Building Activities (acres)</td>
<td>484.0</td>
</tr>
<tr>
<td>All Estimated Known Private Land Disturbance (acres)</td>
<td>484.0</td>
</tr>
<tr>
<td>Total % of Private Owned Land (484 acres) and Estimated Activities in the Cumulative Effects Area (39,700)</td>
<td>1.2%</td>
</tr>
<tr>
<td>All Disturbance (Estimated Known Private Land and FS Activities) (Acres/ % of 39,700 acres of Cumulative Effects Area)</td>
<td>1875.8 / 4.7%</td>
</tr>
</tbody>
</table>

* Landing size = 0.75 acres

1 mile of road/skid trail/ski trail at an average disturbance with of 20’ = 2.4 acres of disturbance/mile
Summary of Effects for Soil Productivity

Soil Displacement (Erosion) and Compaction and Nutrient cycling

The Soil Quality Standards for the Eastern Region of the Forest Service are designed to allow non-detrimental soil disturbance (exposure of mineral soil, compaction and nutrient cycling) and provide the context to determine how the potential soil property change may affect ecosystem composition, processes and function (productivity). (USDA Forest Service Manual, Supplement R9RO 2550-2012-1).

The Deer Ridge project would result in a short-term increase in the amount of non-detrimental soil displacement (erosion) in the analysis area. Table 14 shows soil disturbance under Alternative 2 on approximately 126.9 acres, or 5.3 percent of the approximately 2,380-acre stand analysis area. However, by following the recommended Best Management Practices and design features related to this project and prior monitoring of like projects no detrimental effects are anticipated within these acres as a result of this project.

The Deer Ridge project would result in a short-term increase in the amount of non-detrimental soil compaction in the analysis area. Table 14 shows soil disturbance under Alternative 2 on approximately 126.9 acres, or 5.3 percent of the approximately 2,380-acre stand analysis area. However, by following the recommended Best Management Practices and design features related to this project and prior monitoring of like projects no detrimental effects are anticipated within these acres as a result of this project.

The Deer Ridge project would result in a short-term increase in the amount of non-detrimental soil nutrient cycling from the timber harvesting with the most nutrients taken from Alternative 2. Table 14 shows soil disturbance under Alternative 2 on approximately 1032 acres, or 43 percent of the approximately 2,380-acre stand analysis area. However, by following the recommended Best Management Practices and design features related to this project and prior monitoring of like projects no detrimental effects are anticipated within these acres as a result of this project.

The Deer Ridge project would result in some amount of detrimental soil productivity in the analysis area. Table 14 shows detrimental soil productivity disturbance under Alternative 2 on approximately 2.0 acres,
Climate change

Climate change was researched and analyzed in regards to soil productivity. Changes within the analysis periods of soil displacement (erosion), soil compaction and soil nutrient cycling will likely be small and will be subject to short-term climate patterns which produce year-to-year variability. Because effects of most of the Proposed Action in this project are a non-detritmental effects, a consideration of trends that have been observed over the last century will be given more weight than models that generally predict conditions at the middle or end of the century. These trends include fewer days of snow cover, more frequent large rain events, a greater proportion of precipitation falling as rain, and a slight overall increase in annual precipitation. A summary of climate trends for the Project Area is in Appendix E of this Environmental Assessment.

With warming temperature, across the Northeastern region of the US predicted in the next 85 years, there will be fewer days of the year with
suitable conditions for winter timber harvest and snowmobiling. The current and projected rate is not sufficient to make activities on frozen ground infeasible during the analysis period. Both recreation and timber harvest activities can be timed to take advantage of variations in weather across years or months. Where winter harvest is specified, the timber sale administrator monitors conditions on the ground to determine whether it is sufficiently frozen for harvest to occur. Warming temperature trends may shorten the season of harvest in some years, but will not change the requirement that winter harvest requires frozen conditions. In terms of during the current cumulative effects time period, current monitoring on winter timber sales has documented that soil and water conservation Best Management Practices have been applied, that temporary disturbance is in compliance with Forest Plan guidance, and that soil quality has not been degraded by forestry activities (USDA Forest Service 2013, 2012, 2011, 2010a).

Biogeochemical cycling, the movement of elements through the soils, plants, waters and atmosphere is a fundamental part of any ecosystem. When looking out to 85 years in the future, evidence collected at a number of research sites around the Northeast indicates that climate change will alter biogeochemical cycling with potentially profound effects on forest productivity, water quality and other ecosystem services. Studies conducted at the Hubbard Brook Experimental Forest on the WMNF, among other locations, suggest that as climate warms through the end of the century greenhouse gases will be released from soils, the availability of important nutrients will change and the water quality in sensitive watersheds will decrease (Campbell, et al., 2009) even as net primary productivity is modeled to increase. The authors noted that their model simulations and analysis have limitations, particularly of the feedback loops between processes operating in the environment. They were confident that their results indicated the direction and magnitude of change expected by the end of the century for the models and emission scenarios they ran. Other impacts to biogeochemical cycling are highlighted in a later study that removed snow cover from forested sites to measure the possible effects of soil freezing on calcium cycling in sugar maples. This study (Comerford, et al., 2013) confirms other work on soil freezing as a cause of soil acidification that leads to soil cation imbalances (between calcium, a necessary plant nutrient, and aluminum a known
Deer Ridge Integrated Resource Project

phytotoxin). The authors found evidence that increased soil freezing due to a reduced snowpack could exacerbate soil cation imbalances already caused by acidic deposition, and have widespread implications for forest health in the northeastern US. In terms of during the current cumulative effects time period, current monitoring on winter timber sales has documented that soil and water conservation Best Management Practices have been applied, that temporary disturbance is in compliance with Forest Plan guidance, and that soil quality has not been degraded by forestry activities (USDA Forest Service 2013, 2012, 2011, 2010a).

Transportation

The following discussion incorporates by reference the analysis and conclusions documented in the Deer Ridge Integrated Resource Management Project Transportation Report (Wigler 2016a) located in the Project Record. The project specific travel analysis conducted for the Deer Ridge Project Area integrated the recommendations developed through the Forest Travel Analysis Process (USDA Forest Service 2015).

Affected Environment

Within the Deer Ridge Project Area, there is an established system of State and Forest roads that provide access for resource management such as timber harvesting, facilities maintenance, watershed restoration and wildlife habitat maintenance and access to the Barry Conservation Camp and the Berlin Fish Hatchery. Roads also provide access to recreational areas for hiking, mountain biking, camping, hunting, bird dogging and fishing. Public use of the roads within the Project Area is light to moderate, even during the peak summer season.

Forest Service managed roads (also known as classified and system roads) are those currently included in the national forest transportation system and are maintained and used according to their assigned maintenance levels. Vehicle traffic on the majority of roads in the Project Area is restricted to administrative use. The remaining road are open to public and administrative use when conditions allow (e.g., some are seasonal roads). Open and closed roads are not currently suitable for logging truck traffic and would require maintenance or reconstruction prior to the start of logging operations.

Unauthorized routes (also known as unclassified and non-system roads) are historic roads, some constructed prior to national forest ownership, that
are not currently included in the national forest transportation system database. These roads are not currently managed or maintained for vehicle access.

Of the 15.2 miles of roads (classified and unauthorized) within the South Pond South HMU, 8.4 miles are a Maintenance Level (ML) 1 or 2. These roads are either closed to vehicle traffic (ML 1) or managed for high clearance vehicles (ML 2). They usually receive maintenance when work is required to correct or prevent resource damage or to meet recreational or administrative needs. The York Pond Road is 5.7 miles of paved road and is classified as a ML 5. ML 5 provides a high degree of user comfort and convenience. There is a portion of the Fifield Brook Road totaling 1.1 miles that is classified as a ML 3. ML 3 is maintained for prudent drivers in a standard passenger vehicles. Forest funds allow annual maintenance on approximately 10-15% of ML 2 roads and approximately 20-25% of ML 3-5 roads.

All road miles are estimates based on current data in the White Mountain Forest’s Geographical Information System (GIS) and the Forest infrastructure database (INFRA). Some adjustment of estimated miles may occur in order to protect resources, reconcile GIS and INFRA mileage differences, and provide for the application of sound engineering judgment when implementing the proposed road projects on the ground.

**Environmental Consequences**

**Analysis Area and Timeframe**

The analysis area for direct and indirect effects on transportation is the Management Area 2.1 lands within the Deer Ridge Project Area. This area was chosen because it contains the transportation system that will be utilized for this project. The temporal scope for direct and indirect effects is the next ten years because all proposed activities would be completed during this time period.

The Deer Ridge Project Area is the cumulative effects roads boundary for transportation for the same reason as direct and indirect effects. The temporal scope would be 10 years in the past and 10 years in the future. It is reasonable to expect that project activities would be completed within 10 years. Past projects include road maintenance, culvert replacement, and construction of a bridge on York Pond Road. Foreseeable future projects include road maintenance and hazard tree removal.
Alternative 1: No Action

Direct, Indirect, and Cumulative Effects

Under the No Action Alternative (Alternative 1) would result in no road reconstruction or road maintenance associated with vegetation management. Gravel would still be in demand across the Project Area for maintenance of the current transportation system. The 15.2 miles of existing roads (Forest and unauthorized) would be maintained at current levels and roadside vegetation management would continue. No unauthorized roads would be added to the Forest transportation system database, no roads would be removed from the database, and maintenance levels would remain unchanged. The public would continue to use the current road system and have motorized access throughout the Project Area. There would be no public displacement due to road/trail reconstruction or restoration work. The Forest Service would continue to utilize private sources to supply gravel for on-going and emergency road maintenance.

The No Action Alternative would have no direct, indirect, or cumulative effects on the transportation system.

Alternative 2: Proposed Action

Direct and Indirect Effects

Road Conditions

The roads necessary for implementing this project are already in place, but many of them will need maintenance and/or reconstruction in order to support timber harvest. Motorized travel within the Deer Ridge Project Area would have improved sight distances and be more efficient as a result of road reconstruction and restoration on Forest Service roads.

Alternative 2 proposes to change the ML of York Pond Road, Fifield Brook Road, and York Pond Spur X to better match the current management and use of these roads. The classification changes would not result in the actual condition of the road changing. Approximately 4.3 miles of York Pond Road are currently classified as ML 5 and would be changed to ML 4, which is assigned to roads that provide a moderate degree of user comfort and convenience at moderate speeds. The first 1.1 miles of FR 105 (Fifield Brook Road) and 0.14 miles of FR 8010 (York Pond Spur X) would be changed from ML 3 to ML 2. These sections of road are currently accessible by high clearance vehicles.
Unauthorized roads that already exist on the ground, that are necessary for long-term management of the Project Area, would be added to the Forest Roads database as Forest Service roads. A total of 1.54 miles of unauthorized roads and 0.7 miles of previously unmapped roads to be added to the database as authorized Forest Roads with a ML of 1. These roads have a defined roadbed and have been used for past management access and would continue to be needed for long-term forest management. Roads that are less 0.1 miles in length are considered driveways as opposed to system roads. The Proposed Action would result in three driveways (totaling 0.24 miles) being removed from the Forest Road System database with no “on-the ground” disturbance, thus there would be no direct or indirect effects from this action.

The intent of road reconstruction is to provide long-term access into an area with the least amount of disturbance possible. Temporary bridges would be installed over Fogg and Fifield Brooks. These bridges would be removed after implementation of this project. The potential effects of road reconstruction, including temporary bridge placement, on soil and water are addressed in the Soils and Water Resource Reports (see Project Record). Other effects include temporary increases in noise and traffic, and temporary displacement of users due to reconstruction activities.

**Public Safety and Access**

Reconstructed and restored roads would be safely used by Forest Service personnel to accomplish resource work and would also shorten seasonal access restrictions because of the improved surface condition and drainage. Pre-haul maintenance activities would stabilize the road surface and minimize disturbance to surrounding resources. Periodic road maintenance extends the useful life of the road, reduces surface erosion and wear and tear on vehicles, and provides a safe roadway for traveling.

The increase in parking spaces at the Unknown Pond trailhead would reduce the amount of overflow parking along the York Pond Road thus improving safety for hikers and recreational drivers who won’t have to maneuver around parked vehicles on a narrow roadway. During harvest operations, the parking lot would likely be closed and hikers would need to park at the York Pond trailhead and walk approximately 1,800 feet to access Unknown Pond trail. Harvesting would occur during the winter when lower recreational use is anticipated and would not occur on weekends to minimize disturbance to hikers.
The first 300 feet of the Rocky Pond snowmobile trail may be needed as a temporary haul road. The trail is very narrow and dual use is not likely. Hauling would not be permitted on weekends or holidays and signs would be posted warning snowmobilers of harvesting activities. If possible, we would try to harvest the area around the snowmobile trail during frozen-ground, snow-free conditions to eliminate dual use. Snowmobilers would hear logging noise as they pass through the Project Area.

The relationship between the road system and the fuels program is related to the capabilities and response to a fire through the ease of accessing a unit, the type of equipment that can be used, and the type of treatment that can be accomplished. Improving roads and access would reduce the hiking distance by wildland firefighters to a fire, thus limiting the spread of fire and resource damage and improve public safety. Along with using roads to access fires, roads increase safety when used as escape routes.

During project implementation, there would be a greater amount of traffic, including large vehicle traffic, on roads within the Project Area. Some of this increase in traffic would occur while the Barry Conservation Camp was in operation. Increased traffic would also have a minor effect on people accessing the fish hatchery.

**Access for Current and Future Management**

Following project implementation, there would be no permanent road access changes as a result of harvest activity; roads that were closed to public vehicle traffic prior to implementation would be closed upon completion of projects. These roads however, may be used by Forest Service personnel for administrative use (i.e. maintain road surface and permanent wildlife openings, and conduct stand exams and reforestation surveys).

There is no indication that proposed reconstruction or maintenance would alter the amount of public motorized use. These roads already exist on the landscape and once the timber harvest and other projects are complete, road access would revert to pre-harvest conditions.

Road access may be restricted during active timber sale. Signs would be placed on motorized roads and designated trails to warn the public of harvesting activities in the area. Specific speed limits may also be imposed on selected roads.
Gravel Pit Development

There is a demand for gravel in the Project Area for reconstruction and maintenance of roads and culverts. Gravel supplied by the development of an on-Forest pit would be used to improve WMNF roads and would not be for commercial use. Without gravel and general maintenance, roads tend to deteriorate over time and become rough and at times potentially hazardous. A centrally-located gravel pit would also allow Forest road crews to respond more quickly to emergency road repair. The proposed gravel source is well situated off a main access road behind a closed gate.

Gravel extraction has occurred at this site for many years but not within the past couple years. It is estimated that about 2,500 cubic yards are needed for this project. An additional amount may be extracted and stockpiled for future road repair and maintenance. The site has the capacity to produce a minimum of 10,000 cubic yards. During development, extraction and delivery, equipment such as a crusher, dump trucks and loaders would occupy the gravel site. The Fifield Brook Road may be closed to vehicles during surfacing activity for safety reasons. Trees will be removed from about one acre of land during the expansion phase. When gravel extraction is completed the area would be rehabilitated, which would include replacing topsoil and planting trees or other vegetation.

Cumulative Effects

Forest Service roads would be improved to comply with Forest Plan Standards and Guidelines, BMPs and Project design features. Measures currently employed and found in the Forest Plan Standards and Guidelines, such as re-vegetation of disturbed soils or ground operating restrictions, would continue to be implemented to ensure that the integrity of the roads is maintained. Roads that were used in the past would likely be used again. In addition to the annual road budget, road maintenance deposits collected through commercial activities (such as timber harvesting) could be used for surface blading and roadside mowing and limbing. Periodic road maintenance activities would continue to provide a safe and efficient transportation system within the Deer Ridge Project Area.

Gravel for future construction projects such as road reconstruction and maintenance could be supplied from this gravel pit with minimal impact since the site would be developed and have a stockpile of available
material. It is apparent that there is a continued need for gravel in the Kilkenny area and it is important to have a source close to the end use area to eliminate the high cost of hauling it from off-Forest sites.

In summary, the Forest transportation system within the Project Area would be in better condition: more resilient to storms and runoff, further maintained in accordance with Best Management Practices, and with closer resemblance to the minimum road system identified in the Deer Ridge travel analysis. The number of trips and loads per day would increase temporarily on local roads for the life of each Forest Service timber sale harvest in a manner that is consistent with historical harvest and trucking activities in the area.

**Climate Change**

There are many uncertainties in characterizing climate-related risks, concerning both climate (the frequency, severity, and timeframe of future weather events) and the effects of climate events on infrastructure. Climate scenarios are predicting increased temperatures, shorter winters and more frequent intense rain events in the Northeast. Shorter winters and more intense rain events could tax drainage structures potentially increasing the frequency and magnitude of damage to roads. Exposure to flooding and extreme snow events could also shorten the life expectancy of roads, requiring more frequent maintenance, repairs, and rebuilding. Should more precipitation fall as rain rather than snow in winter and spring, there will be an increased risk of landslides, slope failures, and floods from the runoff, causing road washouts and closures as well as the need for road repair and reconstruction (Meyer et al., 2013).

With these predicted outcomes, continued road maintenance and reconstruction would improve transportation resiliency in the face of changing environmental conditions. Improving road and drainage structures ensures that our roads can better withstand environmental impacts allowing them to remain operational through extreme weather events that otherwise would result in failure. It would also improve safety for travelers, and protect the large investments made in transportation system infrastructure. Roads in good condition with proper drainage should be able to withstand projected changes in environmental conditions. These predictions also re-inforce the need to have an on-site gravel supply to rapidly respond to emergency road repairs and not rely
on commercial sources that may be taxed with multiple requests from private and state entities.

**Vegetation**

The following discussion incorporates by reference the analysis and conclusions documented in the *Deer Ridge Integrated Resource Management Project Vegetation Resource Report* (Wigler 2016b) located in the Project Record.

**Affected Environment for Vegetation**

**Existing Condition**

Forested stands in MA 2.1 have been managed since the 19th century to maintain proper stocking and maximum growing conditions for production of high quality saw timber and wildlife habitat. These practices along with natural disturbance have created the forest conditions we have today. To access these lands for timber, other resource management, public use and enjoyment, the South Pond South HMU has an extensive system of forest and town roads, skid trails and log landings.

Forested lands are dominated by northern hardwoods stands with a smaller component of mixedwoods, spruce-fir and Norway spruce forest types. A small portion contains non-forested areas which include grassy and shrubby openings, ponds, wetlands and rock outcrops. This patchwork of vegetation is a result of landforms, soils, plant succession, disturbances and forest management practices.

Stand conditions range from well stocked pole-sized stands to mature stands where mortality from old age, insects, wind throw, ice storm and disease is taking its toll. Structural diversity is limited by the predominance of mature forest stands (between 60 and 120 years old) which accounts for more than 84% of all forested stands in MA 2.1. Young pole size stands account for 16% of the age class and there are no regeneration age stands (0 to 9 years old) within the HMU. Age class structure goals and objectives in the Forest Plan (Forest Plan, p.1-20) indicates a need for new regenerating stands along with older stands of all habitat types.

Stands identified for treatments (South Pond South HMU stand exams 2011, 2014 and 2015, Project Record) have a stand condition where they are either overstocked; have a preponderance of low quality trees; have high risk conditions due to weather, insect and disease impacts; have a well-
developed softwood under/midstory; or could contribute towards meeting HMU age class objectives for the regenerating age class.

The January 1998 ice storm severely damaged over 100,000 acres on the Forest of which 3,000 were on the Androscoggin district. In 2004, two salvage sales harvested approximately 393 acres of the most severely damaged trees. The rest of the areas damaged by the ice storm remains untouched.

The three Norway spruce stands within the Project Area have high stocking densities that greatly limit the amount of sunlight reaching the forest floor. This has inhibited the establishment of native tree and shrub species, and the growth of young trees and vegetation within small canopy gaps. These high stocking rates also stress mature trees as they vie for limited nutrients, moisture and growing space.

**Environmental Consequences**

**Analysis Methods**

Effects in the Deer Ridge Project Area are analyzed in terms of forest health and productivity. This refers to the mix of stand conditions such as age, density, diversity, and land suitability that contribute to the stand’s susceptibility to damage and disease and its ability to thrive with optimum growth. Measuring effects to forest health and productivity is a qualitative prediction based on the typical vegetative responses of various silvicultural treatments, other proposed activities, or natural forces.

Choosing the optimum harvest method for regenerating a particular stand is influenced by the silvicultural requirements of the species on the site, existing stand conditions, issues raised during the analysis, prior experiences in the area, and direction from the Forest Plan. The methodology for determining optimality follows. First, a silvicultural treatment is assigned to each stand after a field examination by professional foresters. These professionals are knowledgeable of field conditions, local resources, and the response of various types of timber stands to silvicultural treatments. This initial stand prescription is based primarily on the biological requirements of the stand in the context of the objectives of Management Area (MA) 2.1 lands as set forth in the Forest Plan. Stand prescriptions are then subject to interdisciplinary analysis, and may be modified after special consideration is given to wildlife habitat needs as guided by the HMU objectives for the area. The Interdisciplinary
Team (IDT) also considers issues raised by the public during scoping and other site specific resource considerations. In some cases, stand prescriptions may be modified in order to address site specific resource concerns such as visual quality, wildlife or water quality. Regardless of the alternative types of actions proposed in the analysis, the proposed harvest method for each stand is always sufficient to ensure adequate regeneration stocking of the stand (USDA Forest Service 1993, 2000, 2008a and 2009a; district stocking surveys 2007, 2008, 2009, 2010, 2011, 2012, 2013 and 2014; Deer Ridge stand exams 20011, 2013, 2014 and 2015; Project Record).

The rationale for applying silvicultural treatments on the WMNF is based largely on classic research conducted by Hubbard Brook Experimental Station and the Northeastern Research Station. Much of the research is documented in the Silvicultural Guide for Northern Hardwood Types in the Northeast (Leak et al. 1987) and Silvicultural Guide for Paper Birch in the Northeast (revised) (Safford 1983). Silvicultural prescriptions were also based on field review, past land management practices, review of current literature, scientific research from research institutions and discussions with university researchers.

Spatial and Temporal Context for Effects Analysis

The Analysis Area for direct and indirect effects on timber resources is MA 2.1 lands within Compartments 9, 10 and 23 of the South Pond South HMU. The analysis area encompasses 6,289 acres of which 84% are in closed canopy forest of mature age class with even-aged and uneven-aged stands. The amount of closed and open canopy helps describe the structural diversity in the Analysis Area. This area was chosen because it contains similar, local vegetative conditions that are suitable for timber harvest and it shows how the actions will help meet the objectives of the Forest Plan.

The temporal scope for direct and indirect effects is 0-3 years post treatment. Three years was used in order to be consistent with age class distribution and allow adequate time for past regeneration harvest and reforestation activities to be completed.

**Alternative 1: No Action**

Direct and Indirect Effects

Under the No Action Alternative, all stands in the Project Area would continue to grow and mature; however the opportunity to enhance growth, yield and forest health would be foregone and no forest products would
be available to local markets. Some trees would die from natural forces related to size, competition, or age stress. Continuous growth of overstory and mid-canopy tree crowns would further increase ground shade allowing more shade-tolerant trees to replace shade intolerant and intermediate shade tolerant species. Over a long period of decades, the stand would begin to resemble a climax vegetation type. There would be a species shift from stands that may contain paper birch, ash, and aspen, to stands dominated by beech, red and sugar maple, yellow birch and spruce. Natural disturbances such as wind, rain, and ice events would influence succession by temporarily providing smaller forest openings encouraging establishment of less, shade-tolerant species.

Under this alternative, there would be no creation of regeneration-age aspen-paper birch or northern hardwoods; it would not improve the age class distribution for these forest types; it would not move the HMU toward composition and age class objectives for aspen-paper birch and northern hardwoods; nor would it improve wildlife habitat by creating early successional habitat.

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

Specifically for aspen-paper birch, if this alternative is implemented, the distribution, abundance, and overall condition of the aspen-paper birch component in the Project Area would continue to decline over time. As most stands with aspen-paper birch are over 60 years old, most of these aspen-paper birch trees are also at least that age, and likely older. Over the next few years, the mature aspen trees, aspen clones and paper birch scattered throughout the analysis area and in the proposed harvest units would continue to age and decline. Most aspen and paper birch trees do not survive past 100 years, particularly in the East (Perala 1990; Myking et. al. 2011, Safford, 1983). The ability of these trees to root-sucker and produce seeds depends to a large extent on their level of deterioration; clones that are deteriorating produce few suckers (Perala 1990) and mature paper birch after age 90 have declining vigor and seed production. While aspen
does produce abundant seed, regeneration via seed has low levels of success; highest regeneration success results from root-suckering (Perala 1990). As paper birch, aspen and clones die off, there would be fewer vigorous older trees left to respond to any disturbance and thus, very limited opportunity for aspen-paper birch regeneration. Within 40-60 years, there will be few if any opportunities to enhance this habitat and meet the Forest Plan objectives for aspen/birch habitat in this area.

Untreated stands with small-diameter beech in the midstory will likely become infected with beech bark disease as they age and subsequently incur early mortality. Once these infected trees die, they sprout numerous shoots from the roots which perpetuate the disease, leading to unhealthy and unproductive stands. These numerous sprouts create dense stand conditions that crowd out other species from regenerating. Over time there would be a loss of species and age-class diversity within these stands (i.e. mixedwoods) as they gradually convert to northern hardwood stands with the main tree component being beech.

Not allowing salvage of severely damaged trees would further reduce their product quality and may increase the risk of insect or disease. There would not be any residual tree damage or compaction to understory vegetation and soil from harvesting activities. Visually, only natural disturbance would alter the landscape and may include small blow down patches created by weakened trees falling down. As severely damaged trees die over time, there will be a larger proportion of standing snags within stands that incurred ice storm damage.

High stocking densities of the Norway spruce plantations would limit opportunities to introduce structural and species diversity into the mid canopy and understory. High stocking rates will continue to stress residual trees due to overcrowding and competition of nutrients and water.

No trees would be cut nor vegetation disturbed for the expansion of three permanent wildlife openings, a gravel pit and parking area, nor for road reconstruction/restoration.

The forests of this area are expected to undergo numerous changes in response to the changing climate. With this alternative, there are no opportunities to enhance ecosystem integrity through diversification of age classes, forest structure and forest types; perpetuating vulnerable species such aspen-paper birch and spruce-fir, and increasing forest
productivity. The No Action alternative will continue the trends associated natural forest succession. The eventual loss of aspen- paper birch and spruce-fir due to succession and habitat conversion may reduce the ability of this northern species to adapt to climate change in this landscape, and may accelerate its potential shift of these species out of the White Mountains north into Canada.

This alternative would not meet the Forest Plan objective of “providing high quality sawtimber and other timber products on a sustained-yield basis (Forest Plan 2005a, p.3-3). It would not provide wood products such as pulp, sawtimber or firewood for use in homes, business and mills to support local economies in New Hampshire and Maine.

**Alternative 2: Proposed Action**

**Direct and Indirect Effects**

Implementing the Proposed Action would maintain and create a mosaic of vegetative conditions and improve species composition by increasing the amount of aspen-birch, and softwoods, which is a desired future condition established by the Forest Plan. It would also diversify and increase native species in Norway spruce plantations. Much of the vegetation in the Deer Ridge Project Area has been actively managed, most recently in the early 2000’s, using a variety of harvest methods.

**Even-Aged Management**

**Clearcutting** (>10 acres) is the optimal method for converting mature, poor quality, damaged stands to healthy new stands of regeneration-age trees. It also creates conditions where sunlight reaches the forest floor causing hardwood seeds to germinate and seedlings to grow rapidly. Clearcutting also stimulates the germination of raspberries, blackberries, pin cherry, and various forbs and grasses whose seeds respond to the abundance of light and warming of the forest floor. Monitoring of past clearcut harvest units on similar sites has shown rapid establishment of hardwood and softwood regeneration within three to five years (stocking surveys 2007, 2008, 2009, 2010, 2011, 2012, 2013 and 2014). Through monitoring efforts we have found a higher percentage of softwood species becoming established on mixedwood/softwood ELT sites where the pre-harvest stand conditions were predominately more hardwood species. Thus moving us toward our goal of having forest types be consistent with land capability. Herbaceous cover would increase significantly following
harvest and remain a significant component of these sites until the canopy of the new trees begins to close.

Structural diversity would decrease initially because treatments such as clearcut tend to simplify stand structure. However, these effects would be mitigated by retaining 5% of the clearcut in mature habitat as per the Forest Plan.

Aspen-paper birch: aspen paper-birch stands are an important habitat for wildlife and an element of habitat diversity. These species regenerate well in large openings created either by natural disturbances (i.e. wind or ice storms or fire) or through timber harvesting. Without disturbance, these short-lived species drop out of the stand to become replaced by beech, birch, maple, and spruce. Two mature aspen-paper birch stands (6 and 39a) are proposed for clearcutting to perpetuate these species in the future.

Paper birch and aspen are two species that are likely to experience substantial declines as a result of climate change effects. As a result, the ability to maintain and regenerate aspen and paper birch over the long term is a concern. To maintain and perpetuate these species on the landscape, we are proposing to harvest mature stands and replace them with vigorous young aspen-paper birch stands that will thrive while climatic conditions are favorable.

For these two stands, logging is proposed for the winter months while all of the tree’s energy reserves are stored in their root systems. This will increase the vigor and abundance of the regenerating sprouts. Because of aspen’s strong affinity to light and the reduced vegetative competition from clearcutting and its strong root-suckering response to cutting, this method is the most effective management approach to creating stands of aspen (Perala 1990). Also younger aspen could be successful to withstand warmer climates.

Northern Hardwoods: Harvesting poor quality stands (2a, 5, 26a, 32a, 48 and 58) that were affected by ice damage, and have declining growth would create 136 acres of early successional habitat. The time is optimal to harvest these stands to provide regeneration forest habitat while salvaging timber value and promoting new stands of vigorous growing trees that effectively use the site.

Permanent Wildlife Openings (PWOs): Expansion of the three permanent wildlife openings (PWOs) would convert tree production areas to a
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shrubby, herbaceous habitat condition. These areas would be maintained by prescribed burning, or mechanical treatment every 3 to 5 years to discourage growth of woody vegetation and favor herbaceous plant species such as goldenrod and raspberries (Figure 19).

Figure 19. Fifield Brook Permanent Wildlife Opening.

**Patchcutting:** Patch clearcuts result in openings between two and ten acres, which would be large enough to facilitate the regeneration and establishment of the same diversity of tree species observed in a clearcut. The reduced size of openings created by patch cuts would influence the light environment through increased shading of the treated area. Also, due to the lack of reserve areas, the age structure in a patch cut would be more simplified than a clearcut. Differences in species diversity would be negligible compared to the regeneration response in a clearcut.

Patch cutting coupled with sufficient logging disturbance has proved to be an effective way to replace understories of beech and other less valuable species with a new stand containing a high proportion of yellow and paper birch in mixture with other deciduous species. Unless present as well-developed advanced regeneration, sugar maple is seldom common in the new stands produced by small patch cutting. However, when these early successional stands reach 40-50 years of age, understories dominated by
sugar maple and with lesser proportions of beech frequently develop, possibly due to the rich leaf-fall, lower proportions of beech litter, and/or changed light conditions. Although small patch cutting may not immediately regenerate abundant sugar maple, it appears as though this technique may help over time to maintain sugar maple as a significant component of northern hardwood forests (Leak 2005).

**Aspen-Paper Birch:** Stands (35 and 43) are proposed for patch. These stands are still healthy and will produce viable seeds and vigorous root suckers and clones ensuring that they remain a present forest type into the future.

**Northern hardwood:** Stands 18 and 19 were heavily damaged in the 1998 ice storm and only the most severely damaged trees (>75% crown damage) were harvested in 2004. Many of the residual trees have significant crown damage and harvesting small patches will release young seedlings in the mid and understory while capturing economic value before trees succumb to mortality. Patches also create browse for deer and moose.

A direct effect of clearcutting in northern hardwood is the promotion of stump sprouts in species such as aspen and red maple. According to a study on four sites in New England, *Whole-tree Clearcutting in New England: Manager’s Guide to Impacts on Soils, Streams, and Regeneration* (Pierce et al. 1993), stump sprouting and germination of new seedlings began in the first growing season after harvest. Within five years after cutting, young, dense stands were established on all four sites.

Changes in micro-climate conditions in the perimeter of stands adjacent to even-aged regeneration cuts (i.e. increased sunlight, lower humidity, and increased evapo-transpiration) would occur. Indirectly, the increase in sunlight would likely result in increased growth rates of trees bordering clearcuts and patchcuts. However, the increase in sunlight could also potentially result in degradation of tree quality due to increased potential for epicormic branch development and sun scald. The increase in exposure to wind could indirectly increase the potential for wind damage or windthrow along perimeters of adjacent stands. These effects would likely vary by site, landform, topography, slope, aspect, elevation, size, and shape of unit. Trees in stands near the perimeter of large forest openings are generally more likely to experience windthrow compared to other treatments due to greater exposure. Some residual tree damage would most likely occur during harvesting operations from tree felling and from
skidding of trees to landings. There would be limited mortality or damage to some trees as a result of stress, heat, and equipment scraping the boles of trees. This would be reduced by logging in the winter rather than in the summer.

Field visits to old clearcuts within the Project Area and throughout the District show that tree mortality resulting from wind damage adjacent to clearcuts is negligible.

The effects of creating regeneration on structural diversity are small but notable. It would provide 226 acres of regenerating early successional forest habitat or almost four percent of the analysis area (6,120 acres). The 226 acres of regeneration-age trees would be distributed across twelve separate areas and add structural diversity across the landscape which would persist into the future, until either additional management or natural disturbance creates the next new patches of regenerating habitat.

The effects of harvesting will be apparent with logging slash, skid trails and log landings clearly visible throughout the harvesting area.

**Shelterwood Preparatory Cut:** The dense overstory of two Norway spruce stands (stands 38a and 40) is prohibiting growth and establishment of young softwoods, northern hardwoods and native shrubs in the understory. A shelterwood cut would reduce the overstory trees by 30-35% to allow sunlight to reach forest floor and accelerate growth on existing young spruce seedling. This will allow them to move into the midstory while establishing new seedlings in the understory. The thinning of overstory trees would also reduce stress on residual trees as a result of fewer trees competing for nutrients and moisture. Stands would still remain in a high-canopy forested condition. An increase in species diversity and improved growing conditions will make these single specie stands more resilient to disease and insects and better adaptable to changes in climate.

Creating multiple age classes of diverse species within these dense plantations will help increase structural diversity and buffer any vulnerability to stressors to a single age class. Also harvesting non-native Norway spruce would lead to establishment of native species in the understory and over time convert the stand to a more natural forest community type. Adding structural diversity and restoring native
vegetation to these stands will help reduce the vulnerability of these stands to climate changes.

**Overstory Removal:** Mature trees would be harvested while protecting and releasing young established northern hardwoods and spruce-fir in the midstory so it is “free to grow” (Figure 20). A direct effect of this treatment is increased sunlight to smaller trees in the mid/understory (Figure 21). An indirect effect would be the expected increase in growth rates (diameter and height) of the smaller trees following the overstory removal. This would be due to reduced competition for light and other resources following the treatment.

![Figure 20. An overstory removal in Stand ID 14 would harvest mature softwood trees to release advanced regeneration in the understory.](image)

**Spruce-fir:** Stands 13, 14 and 15 are mature softwood stands with a dense understory of healthy advanced softwood regeneration. The mature spruce-fir trees have sparse crowns caused by high stocking densities. Over time, trees have blown over or died resulting in canopy gaps which has allowed a young vibrant understory of young softwood trees to develop. Removal of most of the mature trees through overstory harvest would encourage successful tree regeneration and growth on young saplings, and improved stand health leading to increase resiliency to insects, disease, and other stressors associated with climate change.

**Northern Hardwoods:** Stand 51 incurred crown and bole damage from the 1998 ice storm and past logging. The stocking density is relatively low which allowed a prolific midstory of intermediate shade tolerant pole-size
trees (i.e. sugar and red maple and yellow birch) to develop. Removing overtopping low quality trees would capture economic value, improve stand health, and allow young vigorous trees to thrive and reach their full growth potential.

Figure 21. The overstory removal proposed for Stand ID 51 will release young yellow birch, and other hardwood species in the midstory.

Uneven-aged Management

**Group Selection:** Group selection removes trees in small groups that vary in size (Figure 22). These various sizes influence light dynamics allowing different species to regenerate in the openings. Small group sizes (1/4 -2/3 acre) tend to regenerate a good mixture of shade intolerant, intermediate shade tolerant and shade tolerant species (Lamson and Leak 2000). Larger groups tend to have more shade intolerant species. Approximately 15-20% of the stand would be harvested in groups that range in size from 1/4 of an acre up to 2 acres. Along with group removal, in stands with high stocking densities or where short lived species such as balsam fir and paper birch are in decline, we would simultaneously treat the remaining stand by removing individual trees between groups to reduce over-crowding and capture economic value. This tending between groups also has the effect of changing understory light conditions to recruit advanced regeneration of shade-tolerant species (Nyland, 2002). This treatment will create greater structure diversity uniformly distributed throughout the stand. Group placement would be adjacent to existing softwood/mixedwood advanced regeneration to promote growth on these young trees and within areas of
poor quality trees to promote northern hardwood regeneration. This would result in the future stand having a greater softwood component than presently exists. Treatment would also likely decrease each unit’s susceptibility to insects and disease. Non-commercial treatment would follow in selected stands to remove undesirable saplings to release regeneration-age softwoods and hardwoods. Herbaceous cover would also increase following harvest and remain a component until the canopy of the new trees closes. Group selection would continue to be practiced in these stands in future management entries.

Trees around the perimeter of groups would expand their crowns and also begin to occupy a portion of the groups within this five-year period. Over time, this treatment would lead to complex vertical and horizontal vegetative structure.

Figure 22. Group selection proposed in Stand ID 3 would remove overtopping mature trees and release young softwoods in the understory.

**Salvage:** The intent of the salvage prescription cut for stand 27 is to remove only severely damaged, high-risk trees while they still retain merchantable value. This treatment would release intermediate shade tolerant species in the mid and understory and improve growth on residual trees. The end result is to have a healthy and productive stand which is less susceptible to insect and diseases and the effects from a changing climate.

**Individual Tree Selection:** Trees would generally be thinned from below, saving the largest, most vigorous trees. However, some dominant and codominant trees would be removed in order to progress toward an uneven-
aged distribution of residual trees. The overall objective is to maintain the existing forest type for the next rotation period, while at the same time introducing within-stand diversity and multi-aged forest communities in the ecosystem. This treatment would result in improving tree quality and growth of most residual trees while reducing the amount of mortality expected to occur in the absence of treatment. About 1/3 of the stocking would be removed to provide additional sunlight and space to residual mature trees and promote growth on trees within the midstory. The result is a stand of well-spaced trees with a understory of tree regeneration and other woody plants. Over time, residual tree growth and in-growth returns the stand to full stocking.

Due to the greater density of residual trees, there would be less room for logging equipment to maneuver. Residual tree damage resulting from felling and skidding of trees would thus likely be greater in units proposed for single-tree selection. However, residual tree damage that could occur indirectly from wind following implementation would likely be low as a result of the small gaps created from this treatment. Similar to other treatments, there would likely be some incidental damage to trees outside of units proposed for single-tree selection due to skidding of trees from units to landings. Ultimately, this treatment would likely decrease susceptibility to insects and disease because the potential adverse effect of residual tree damage would be minor compared to the increase in growth and quality of residual trees.

**Group and Single Tree Selection:** Direct and indirect effects pertaining to this treatment are in accordance with those outlined in the two preceding subsections titled Group Selection and Single Tree Selection. A maximum of 17% of the stand is proposed for group selection while single-tree would occur throughout the remainder of the treated area. Groups would be placed in areas where desired advanced regeneration could be released and areas of ice storm damage.

**Pre-commercial Treatment:** Within selected stands, pre-commercial treatments would remove a portion of the dense midstory (consisting mostly of beech, stripped maple and red maple saplings) within harvested groups and clearcuts to increased light at the forest floor and reduce the amount of competing vegetation (Figure 23). This treatment would increase the likelihood of regenerating a diversity of tree species while also meeting wildlife objectives pertaining to successional habitat.
Research found that mechanical controls (removing beech saplings with brush and chain saws) limited stump sprouting and suckering, and led to the development of desirable advanced hardwood seedlings beneath the overstory (Smallidge and Nyland 2009).

![Figure 23. The young stripped maple saplings in Stand ID 26a would be cut after harvest to create open growing conditions for regeneration of shade intolerant species.](image)

**Forest Health and Productivity**

There is evidence of insect and fungus infestations within stands that contain spruce-fir, sugar maple, aspen, and beech. These agents suppress growth, reduce stand vigor and health, impact tree quality and eventually lead to tree mortality.

Spruce and balsam fir are shallow rooted and as they age they weaken and become more susceptible to wind damage and wind throw, which is evident in some of the proposed stands. Damaged trees would be removed through timber harvest to improve stand health and capture economic value. Removal of damaged trees not only increases growth on residual healthy tree, but also can reduce incidence of rot.

The majority of the beech within all of the proposed stands suffers from beech bark disease (*Nectria ditissima*). This disease affects the quality and quantity of beech sawlogs and reduces beechnut production, limiting its contributions as a wildlife food source (Smallidge and Nyland 2009). To improve the health of these stands, some diseased trees will be removed.
and disease-resistant beech trees would be retained for the propagation of genetically resistant offspring. This would increase the level of resistance in the Forest and lead to a healthier beech population in the future (Burns and Houston 1987).

Many of the mature aspen show signs of a fungus commonly called conk rot which appears in the upper bole of the tree at the base of limbs. Since the rot appears in the upper portion of the tree, there may still be sawlog quality logs within the lower portion. Now is an opportune time to harvest aspen in proposed stands to obtain economic value of this species while regenerating aspen through root suckers while it is still vigorous.

Indirect effects may include an increased risk of windthrow in the partially cut stands, and to trees adjacent to clearcuts, patch clearcuts and group selection areas. Trees exposed to the wind on wet sites are susceptible to windthrow until crowns expand to fill the canopy and the roots become windfirm. Some residual tree damage would occur from harvesting operations, but skid trails are planned adjacent to trees marked for removal in order to provide adequate working space for logging equipment. Mortality of stressed trees due to insect, disease and/or damage may be increased.

Harvesting in the fall may damage portions of the understory due to repeated passes of logging equipment. To minimize disturbance, pre-existing skid trails would be used as much as possible where it is favorable to do so, and new trails would be laid out and approved prior to operation to reduce the area affected.

Winter harvesting over a snow pack can minimize damage to understory vegetation from repeated passes of logging equipment. Regardless of season of operation, existing skid trail locations would be used where feasible, and new trails would be laid out prior to operations, limiting the area affected by harvest operations and minimizing impacts to the harvest area. All skid trails would be located, developed and utilized in accordance with Forest Plan Standards and Guidelines and New Hampshire’s Best Management Practices (BMPs).

For all treatment areas, the overall health and vigor of new stands would be improved by the removal of declining and diseased timber, introduction of native species into non-native Norway spruce stands and an increase in
sunlight and growing space for the new seedlings. Over time, this would result vigorous and healthy stands.

**Effects of Operating Season**

Effects pertaining to the operating season include damage to residual trees from logging operations (direct effect), scarification (soil disturbance) on the forest floor and the expected vegetation response (indirect effect). Note: no harvesting is proposed in the spring or fall when wet conditions could result in adverse effects to soil, water, and vegetation.

Stands proposed for late summer harvesting would occur when the sap has ceased to flow and tree bark tightens. When tree bark is tight, trees are less susceptible to sloughing caused by rubbing or bumping by equipment or falling timber. Harvesting in late summer or fall facilitates the direct effect of maximizing scarification of the forest floor. Treatments that would create relatively large openings would facilitate more extensive, and less intensive, soil scarification because harvesting equipment would not be limited to travel on skid trails throughout the opening. In contrast, treatments that would create small openings would facilitate less extensive, and more intensive, soil scarification. Plant species whose seeds benefit from direct contact with mineral soil (i.e. paper birch and aspen) are thereby likely to regenerate throughout the residual stand following a harvesting operation conducted in the late summer or fall.

Summer is assigned when operations on bare ground are required to create a seedbed necessary to establish regeneration of particular tree species, or where harvest prescriptions would remove all trees from a site, such as clearcuts patch cuts and overstory removals (there are few residual trees so there is low potential for bark damage), and where soils can support equipment without adverse effects.

In contrast, a winter operating season is generally planned for units where frozen soil is necessary to support timber harvesting equipment, or when silvicultural conditions would benefit from harvesting operations occurring on a snowpack, such as an overstory removal or an established softwood understory, where protection of existing tree seedlings and saplings is the objective. Snow can help to buffer or protect existing tree seedlings and saplings. Timber harvesting occurring on snowpack and frozen ground conditions reduces the amount of disturbance to soil and understory vegetation.
Operations are allowed when site conditions are considered normal for the season, i.e. winter harvest would require weather suitable for freezing skid trails and landings or frozen ground; fall and summer would require unsaturated soil conditions. Operations may also be limited to protect nesting wildlife. As in the past, harvesting operations will be overseen by the Timber Sale Administrator who has the authority to cease operations at any time to protect resources.

**Permanent Wildlife Opening Maintenance**

Expansion and construction of the permanent wildlife openings would convert 33 acres of forested land into a non-forested condition consisting of shrubs, grasses, forbs and berry bushes. Regular maintenance of these sites will discourage growth of woody vegetation and favor herbaceous plant species such as goldenrod and raspberries. The direct and indirect effects of removing this land from timber production would be the lack of opportunity to maintain a forested environment; however these areas provide a diversity of herbaceous species and tree seedlings valuable for wildlife.

**Prescribed Fire**

Prescribed burning of the permanent wildlife openings would establish herbaceous and shrub diversity, and structure and discourage regeneration of tree species. An indirect effect from this activity is that the bark of some of the trees along the edge of the opening may be scorched. This has not been a significant problem in the past and precautions are taken to prevent tree damage.

**Cumulative Effects to Vegetation**

Cumulative effects analysis includes all past, present and reasonably foreseeable future projects that have sufficient information to identify specific actions. The cumulative effects analysis is the South Pond South HMU which geographically bounds the Project Area and the effects are localized to this area. The habitat objectives for the South Pond South HMU provide a measurable assessment of how the Proposed Action contributes to the Forest goals and objectives as defined in the 2005 Forest Plan.

There has not been any past vegetation management during the past ten years within the cumulative effects area. We did consider adjacent private lands bordering the HMU (west of the Upper Ammonoosuc River) and
determined that there were no past or current management activities adjacent to the analysis area that would affect specific HMU objectives. The temporal bound for vegetation management activities is ten years in the past and fourteen years into the future (2006-2030). This time period was chosen for the following reasons: 1) treatment effects tend to become less apparent as stands continue to grow and change and 2) the anticipated completion of timber harvesting is 2021 and then nine years after that since any even-aged regeneration treatment would still be classified as regeneration age (0-9 years). Past, Present and Reasonably Foreseeable Future Activities presented in Appendix C of this EA were considered for this cumulative effects analysis.

**Alternative 1: No Action**

This alternative will not contribute incrementally to the effects of timber harvest or land clearing over the 24-year period from 2006-2030. Without proposed timber harvest, stands would move toward older age classes and structural conditions and early successional species such as aspen and paper birch would be replaced by later climax species such as beech, and red maple. Shade tolerant species such as beech and red maple will shade out these species and reduce biological diversity on the Forest. Diversity may be enhanced by natural disturbance such as a weather event, fire, disease or an infestation that can create forest openings and provide some limited opportunities for shade-intolerant plant species. However on National Forest lands, regenerating and young stands will age and grow closer to the surrounding canopy of mature stands. Sunlight to the forest floor will diminish and so will shade-intolerant species. Mature stands of the short-lived (50-60 years) paper birch and aspen community types will continue to age toward mortality, many to be replaced by shade-tolerant species now growing in the understory of these stands. Non-native Norway spruce stands will slowly diversify to natural forest types as natural events create small canopy gaps. The remaining trees will continue to be stressed leading to a loss of productivity and vigor, and declining health.

**Alternative 2: Proposed Action**

The cumulative effects would be the same as the direct and indirect effects. The effects of Alternatives 2 are consistent with those anticipated and analyzed in the FEIS (USDA Forest Service 2005b). Even-aged harvests and
the additional acres of permanent wildlife openings would have the effect of reducing the acres in closed-canopy forest and contributing to age class and species diversity in the forested landscape. Approximately 4% of MA 2.1 within South Pond South HMU and lands and 3% of the total HMU would be converted from closed canopy northern hardwood forest to open-canopy northern hardwood forest.

The majority of the northern hardwood and softwood stands are at least 80 to 90 years old and growth is slowing. By harvesting with a variety of treatments now, younger, more rapidly growing trees will be released and therefore the average future growth per acre would increase (USDA Forest Service 2005b). The result of removing diseased, damaged and low quality trees would be a healthy, vigorous future forest that increases in value over time due to higher quality residual overstory and understory trees.

Thinning and selection harvests have the potential to create more stand structure, and can actually accelerate the progression of a stand to have more mature forest characteristics while clearcuts would initially simplify stand structure.

Overall, lands within the analysis area would remain predominantly forested with a range of age classes and a diverse composition of tree and herbaceous species. Stand conditions after the proposed timber harvest would result in a healthier and more vigorous stands through the removal of high risk, low quality trees, diseased trees. Regarding species composition, there would be a more natural species mix within the three Norway spruce stands. Herbaceous understories would respond favorably to regeneration and group selection harvests, and prescribed burning activities.

The cumulative effects area would remain in a vegetative/forested condition with a diversity of timber types, stand structure and age classes spaced across the landscape. Additional vegetation management is not anticipated on FS land within the cumulative effects analysis area in the next fourteen years aside from minor tree removal for routine road and trail maintenance, and the expansion of Barry Camp’s archery range.

All temporary roads needed to access harvest units would be reseeded and allowed to return to a more natural state once harvest activities are completed.
The cumulative effects of ongoing maintenance of the three permanent wildlife openings would be the same as direct and indirect effects. The loss of mature habitat (33 acres) as it is converted to shrubby, grassy habitat represents 0.2% of the South Pond South HMU.

**Climate Change**

Management for ecological diversity is fundamental to building resilience within ecosystems, which in turn will be critical to mitigating potential impacts of climatic change. The Proposed Action identifies specific actions to enhance compositional and structural diversity within the analysis area, consistent with objectives of the Forest Plan. Through silvicultural techniques, our goal is to maintain healthy and productive forest ecosystems in the face of progressive climate change. Because the effects of climate change are uncertain and each species will react differently, it is wise to maintain species, age classes and habitat diversity to help buffer stands against the susceptibility of individual components to changes in climate (Swanston and Janowiak, 2012). Also improvements to forest health and increased stand productivity by selectively removing suppressed, damaged, diseased and poor quality trees would improve the ability of stands to resist biological stressors (Spittlehouse and Stewart, 2003).

Within the cumulative effects time period described in Simmons 2016, the area could experience an increase in temperature above the baseline period of between +2.5°F – 3.5°F for both scenarios (B1 & A2) for the period 2021-2050 compared to the baseline period of 1980 – 1999. Precipitation increases for this period will likely be within the normal variation of precipitation and a slight increase in rain events greater than 1”. Other climactic phenomenon (i.e. number of freeze free days, minimum low temperature, and amount of snow cover) are expected to decrease in severity or frequency but remain within the normal variation seen in the baseline period.

Within the WMNF, boreal species such as aspen, paper birch, red spruce and balsam fir are the most vulnerable to climatic changes because they are location on the southern range of their habitat (USDA Climate Change Tree Atlas). These species do range further south into New York and Pennsylvania. The annual mean temperature for New York is 46.5°F, Pennsylvania is 48.8°F and New Hampshire is 43.8°F (National Climatic Data Center (NOAA)). Should annual mean temperature rise by
approximately 2.5 to 3.5°F by year 2030, paper birch, aspen spruce and balsam fir should still remain on the landscape though perhaps not growing at optimum conditions. Right now, there is no evidence that spruce, fir, aspen and paper birch are declining in the South Pond South HMU. What is important is that these communities as well as northern hardwoods are kept as healthy as possible to facilitate migration either northward or to higher elevations (Perschel 2007).

Between 1895 and 2011, temperatures rose by almost 2°F (http://www3.epa.gov/climatechange/impacts/northeast.html). By looking at current forest communities distributed around the Forest, and reviewing literature about the effects climate change has on the health and productivity of New England forests, there is no evidence to date of forest vegetation changes (growth, decline or species composition), except those related to normal succession patterns (Leak 2009, Leak and Yamasaki 2010). Forest-wide stocking survey monitoring reports and District stocking surveys from 1999 to 2014 show that all surveyed stands (over 16,385 acres) were adequately restocked with the same species mix post-harvest as compared to pre-harvest (Monitoring Reports 1999-2014).

By managing vegetation to provide both healthy and diverse ecosystems and a sustainable yield of forest products, silvicultural treatment should improve forest resiliency to better withstand stressors such as climate change. Diversification of stand age and structure, and restoration of native species in Norway spruce plantations through timber harvest will enhance the ability of forests to adapt to climate change and its effects (Saxby et al. 2013).

**Water**

The following discussion incorporates by reference the analysis and conclusions documented in the *Deer Ridge Integrated Project Water Resources Report* (Roberts 2016) located in the Project Record.

**Affected Environment**

**Existing Condition**

The Deer Ridge Project Area is located in the towns of Milan and Berlin in Coos County, New Hampshire. The Project Area is approximately 3,788 acres, located in the Middle Tributaries (HUC 010801010702) and the Headwater Branches (HUC 010801010701) of the Upper Ammonoosuc River watersheds. The Middle Tributaries watershed is approximately
12,756 acres (19.9 sq. mi.) and the Headwater Branches watershed is approximately 27,004 acres (42.2 sq. mi.). While the Middle Tributaries and Headwater Branches drain directly into the Upper Ammonoosuc River, they ultimately drain into the Connecticut River upstream from its confluence with the Israel River.

Perennial streams in and adjacent to the Project Area include the Upper Ammonoosuc River, the West Branch Upper Ammonoosuc River, Fifield Brook, Fogg Brook, York Brook, Number Nine Brook, Betty Brook, five tributaries to the Upper Ammonoosuc River, two tributaries to the West Branch Upper Ammonoosuc River, nine tributaries to Fifield Brook, two tributaries to Fogg Brook, one tributary to Number Nine Brook, and one tributary to York Pond (Figure 24. Streams in the Deer Ridge Project direct and indirect effects analysis area. Names have been assigned to unnamed streams for this analysis. (See Project Record for spatial information of all tributaries).)

Figure 24. Streams in the Deer Ridge Project direct and indirect effects analysis area. Names have been assigned to unnamed streams for this analysis. (See Project Record for spatial information of all tributaries).
Deer Ridge Integrated Resource Project

streams for this analysis. (See Project Record for spatial information of all tributaries). Unnamed and in some cases unmapped perennial streams have been named and their subwatersheds were delineated for purpose of this analysis. There are approximately 56 acres of wetlands within Project Area subwatersheds, as well as seeps and vernal pools. One pond is located just outside of the Project Area, York Pond, which is approximately 21.8 acres. See Figure 1, Arias and Hermandorfer 2014, and the Deer Ridge Project Record for locations of these water features.

Certain water bodies are subject to additional protection under the Forest Plan or state law based on their size or stream order. In the 2005 Forest Plan, the Upper Ammonoosuc River is listed as a 4th order stream below Keenan Brook and a 3rd order stream beginning just south of the 528m bridge (p. H-3). The classification system currently used by the State of New Hampshire differs slightly from that used in the Forest Plan, though also recognizes the Upper Ammonoosuc River below Keenan Brook as a 4th order stream. Therefore, this water body receives additional protection under New Hampshire Basal Area Law and the Comprehensive Shoreland Water Quality Act.

Water quantity in streams in the Deer Ridge Project Area is directly related to the amount of precipitation that occurs throughout the year. At Hubbard Brook, an experimental Forest within the WMNF, 62 percent of approximately 130 cm of precipitation becomes streamflow (Likens and Bormann, 1995, p. 16) and most of the rest is lost to evapotranspiration. The research at Hubbard Brook is in a forested environment similar to the environment found in the Deer Ridge Project Area. Therefore, the results of this research can be applied to the Proposed Action and the alternatives.

Basic water quality data and water samples were collected from streams in or near the Project Area (Table 16 Selected water quality parameters for streams in the Deer Ridge Project Area.). Streams were monitored on two dates in 2015. A complete record of sampling locations and dates is in the Deer Ridge Project Record.

<table>
<thead>
<tr>
<th>Stream</th>
<th>pH</th>
<th>Alkalinity (mg/L)</th>
<th>Turbidity (NTU)</th>
<th>Specific conductance (uS)</th>
<th>Total Al (ug/L)</th>
<th>IMAI (ug/L)</th>
<th>DOC (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold Brook</td>
<td>6.6</td>
<td>7.9</td>
<td>0.1</td>
<td>29</td>
<td>74</td>
<td>12</td>
<td>2.5</td>
</tr>
<tr>
<td>Fogg Brook</td>
<td>6.3</td>
<td>6.0</td>
<td>0.1</td>
<td>22</td>
<td>115</td>
<td>19</td>
<td>2.9</td>
</tr>
</tbody>
</table>
The pH values range from acidic (less than the New Hampshire water quality standard of 6.5) to slightly above acidic. Streams in the Project Area are well buffered, with average pH levels ranging from 5.9 to 6.6. Aluminum (Al) can be mobilized under acidic conditions, and certain forms are harmful to aquatic life. Total aluminum values in some waters within the analysis area exceed New Hampshire’s chronic toxicity standard for aquatic life, which is 87 parts per billion (ppb). Concentrations of inorganic monomeric aluminum (IMAl) are far below toxicity thresholds. Low pH and high aluminum concentrations are typical across the Forest (Hornbeck et al. 2001), and may be due to naturally low buffering capacity in the soil and bedrock of these watersheds, naturally occurring organic acids, and human-caused acid deposition effects. However, most of the Project Area lies within watersheds that are better buffered from these effects relative to other sites across the Forest.

As the low turbidity values in Table 16 indicate, streams in the Project Area are generally free of suspended sediment. Values are slightly higher than the average during high flow periods. Sedimentation is generally limited to a localized area near a disturbance source.

Within the project analysis area, York Pond and York Pond Beach are listed as impaired on New Hampshire’s 303(d) list due to Cyanobacteria hepatotoxic microcystins, while York Pond has an additional impairment due to Chlorophyll-A (NHDES 2012). All freshwaters in New Hampshire have an impaired Fish Consumption Use due to mercury from atmospheric deposition; these waters are listed in Category 4A due to development of a Regional Mercury Total Maximum Daily Load for New England states in 2007 (NHDES 2012). Otherwise, these waters meet State Water Quality Standards related to the use of aquatic life, such as fish and macroinvertebrates.

Human alterations to the watershed include a network of roads and trails, which have associated stream crossing structures (bridges and culverts). A fish hatchery is in operation adjacent to York Pond. A dam exists on the outlet of York Pond and a series of runways and check dams on York Brook exist which are associated with the fish hatchery. Another dam exists on the Upper Ammonoosuc River, in the project cumulative effects area,
above the confluence with the West branch Upper Ammonoosuc River that bounds the immediate Project Area.

The project analysis area is part of two public water supply watersheds. One of which encompasses a very large area of which the Deer Ridge Project Area is only a very small portion. The other, which is entirely within the project cumulative effects analysis area (though outside the immediate Project Area), is an active public water supply with surface water intake. There is also one active and one inactive non-community, water supply well associated with a camp and campground, respectively, within the direct and indirect effect analysis area (NHDES 2014).

**Environmental Consequences**

**Resource Indicators and Measures**

Table 17 Resource indicators and measures for assessing effects to water resources.

<table>
<thead>
<tr>
<th>Resource Element</th>
<th>Resource Indicator</th>
<th>Measure</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water quantity</td>
<td>Stream flow does not significantly increase or decrease due to management activities</td>
<td>Basal area removed does not exceed 25% of a watershed</td>
<td>Hornbeck et al. 1993</td>
</tr>
<tr>
<td>Water quantity</td>
<td>Concentration of surface runoff is minimized</td>
<td>Percent of watershed with mineral soil disturbance (comparative)*</td>
<td>Aust and Blinn 2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BMPs for drainage are considered and incorporated into proposal (qualitative)</td>
<td>Stafford et al. 1996, Croke and Hairsine 2006, MFS 2010</td>
</tr>
<tr>
<td>Water quantity and water quality</td>
<td>Channel capacity, shape and velocity; sediment and phosphorus inputs</td>
<td>Number of stream crossings (comparative)</td>
<td>MFS 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capacity of stream crossings to withstand high flows</td>
<td>2005 Forest Plan, Water Resources, Stream Crossings G-3 (p.2-31)</td>
</tr>
<tr>
<td>Water quantity and water quality</td>
<td>Change in runoff and peak flows; sediment, nutrient, dissolved oxygen impacts</td>
<td>Impervious cover does not exceed 10% of cumulative effects area watersheds</td>
<td>Center for Watershed Protection 2003; Morse and Kahl 2003</td>
</tr>
<tr>
<td>Water quality</td>
<td>Chemical changes (pH, aluminum, nitrate) are below thresholds harmful to aquatic life and human uses</td>
<td>Basal area removed does not exceed 25% of a watershed</td>
<td>Siemion et al. 2011; Wang et al. 2006; Baldigo et al. 2005; Lawrence and Driscoll 1988</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No more than 15% of a watershed harvested with even age regeneration</td>
<td>2005 Forest Plan Vegetation Guideline G-1 (p. 2-29)</td>
</tr>
</tbody>
</table>
Environmental Assessment

<table>
<thead>
<tr>
<th>Resource Element</th>
<th>Resource Indicator</th>
<th>Measure</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water quality</td>
<td>Water quality impacts are limited to temporary, short-term changes</td>
<td>BMP's for sedimentation and/or spill prevention are incorporated into proposal where ground disturbance and/or chemical use occurs (qualitative)</td>
<td>MFS 2010; 2005 Forest Plan, Water Resources, Soil and Water Conservation S-2</td>
</tr>
</tbody>
</table>

*comparative indicators do not have a defined threshold based on literature, so analysis will focus on comparisons among alternatives, including the no action alternative, and outcomes of similar activities in other areas.

**Environmental Consequences**

This analysis considers effects of the project on water quantity and quality. Activities like those occurring in the Project Area have been known to affect water resources in the ways described below. The indicators and measures used to assess the effects of the alternatives on water resources are presented in Table 17.

**Water Quantity**

The evaluation of water quantity includes the assessment of activities that affect the quantity, timing, duration, or direction of water flowing through the watershed. It also includes the related property of channel function. Stream channels adjust their shape based on flow (volume of water over time) and sediment load (including particles from silt to boulders). If stream flow increases over historic levels, it will tend to carry more sediment and scour the stream bottom and banks. If stream flow decreases, the stream will tend to deposit sediment. Thus, changes in water quantity affect the ability of channels to adjust to transport water and sediment without becoming highly unstable.

Research has shown that removal of vegetation through timber harvesting can alter evapotranspiration rates. These altered evapotranspiration rates result in changes in streamflow. The magnitude of this change depends on the extent of change in the vegetation (Hornbeck et al. 1997). Research at Hubbard Brook indicates that when reductions in basal area reach 25 percent of the watershed, a measurable response in annual water yield may be seen (Hornbeck et al. 1993). Most of the increase in water yield occurs during summer low flow periods, and effects dissipate within a decade (Hornbeck et al. 1997; Hornbeck et al. 1993). Removal of less than 25 percent of the basal area in a watershed is a surrogate measure for thresholds of effects of vegetation management on water quantity. Percent
basal area removal is calculated for subwatersheds of perennial streams draining at least 200 acres in size using information from stand exams and silvicultural prescriptions. Since only merchantable timber is considered in these exams, the estimates may be higher than the actual percentage of basal area removed, particularly when the prescription is intended to release understory growth.

Transportation systems associated with vegetation and wildlife management, recreation and watershed improvement can affect hydrology. Roads and some skid trails have the potential to directly affect hydrology by changing the direction of flow, intercepting surface or ground water or concentrating flow in areas such as ditches (Gucinski et al. 2001). Compacted surfaces such as roads, trails, parking lots and roofs reduce infiltration of water into the soil, which increases runoff in that area. The effect of increased runoff and decreased infiltration is that water entering the Project Area (precipitation) passes out of it more quickly as surface water, rather than being stored in soil or groundwater. These impacts are permanent in the case of permanent infrastructure. In areas that are allowed to revegetate, such as skid trails and landings, soil and litter layers recover much of their permeability within a period of about 5 years (Croke and Hairsine 2006). General harvest activities outside skid trails are less likely to concentrate flows, since any changes in soil permeability are patchy (Croke and Hairsine 2006). When concentrated flows can be dispersed into vegetated areas in small quantities, the forest floor has the ability to reduce the velocity and allow it to filter into the soil (Stuart and Edwards 2006, MFS 2010). Thus, the amount of mineral soil disturbance in the analysis area will be a measure of potential hydrologic impacts. General harvest will not be included in this indicator based on the literature cited above.

Transportation systems with minimum impacts are designed to avoid concentrating large volumes of water through proper location and spacing of drainage features (e.g. ditch relief culverts, water bars, drainage dips) by keeping this infrastructure a sufficient distance from water bodies to allow infiltration, and by maintaining an intact forest floor as a “filter area” around water bodies (Stafford et al. 1996, Croke and Hairsine 2006, MFS 2010). Supplemental BMPs such as rock aprons, slash filters, settling basins or seeding can assist in slowing or dispersing concentrated flows, thus reducing their ability to erode new channels (MFS 2010). This analysis will
qualitatively evaluate whether Best Management Practices to minimize hydrologic impacts are incorporated into the proposal.

Activities that may affect channel function by changing water volume, velocity, or channel and floodplain characteristics will be evaluated based on potential to change the stream flow-sediment balance. Since stream crossing structures such as bridges, culverts and fords are particularly prone to changing stream shape, velocity and sediment loads, the number of stream crossings will be one surrogate measure for impacts on channel function. Since both permanent and temporary structures would be used, the number of permanent crossing structures is particularly important to the long-term function of channels.

The amount of impervious cover in the watershed is a surrogate measure for cumulative effects of existing and proposed infrastructure on water quantity. Impervious surfaces such as roads, parking lots, trails and rooftops affect water quantity by increasing runoff and peak flows, particularly if the watershed exceeds 10 percent impervious cover (Center for Watershed Protection 2003). In this assessment, skid trails (with 3 or more passes) and landings are conservatively counted as impervious surfaces, though the majority of these areas are expected to revegetate and have hydrology at least partially restored. This measure is used for cumulative effects only, since meaningful results must consider all impervious surfaces in the watershed, even if they are not related to the project proposal. Preliminary screening indicates the undeveloped subwatersheds on the Forest would not approach this threshold, so this analysis will be performed at the cumulative effects watershed scale.

Since none of the alternatives propose to withdraw water, other changes in water quantity will not be analyzed.

**Water Quality**

There are two primary aspects of water quality that may be affected by proposed activities in the Project Area. There may be effects on water chemistry from changes that occur in streams after vegetation is removed or pollutants are introduced. The second aspect is sedimentation related to the roads, skid trails, and other disturbed surfaces that cause erosion and subsequent transport of sediment into water bodies. The potential for temperature change in Project Area streams is discussed in Chapter 3 of this EA under Aquatic Habitat and Fisheries.
Research at Hubbard Brook has indicated that intensive forest harvesting practices, such as whole-tree harvest of an entire watershed, have the potential to lower the pH in water (Lawrence and Driscoll 1988). This is a concern in areas already affected by acid deposition. Acidity has been shown to mobilize chemicals such as nitrate and inorganic aluminum in the soils, which then enter stream water (Lawrence and Driscoll 1988). Inorganic monomeric aluminum is of particular concern, since it is harmful to aquatic life at sufficient concentrations (Baldigo et al. 2005). Since the pH of the sampled streams in the Project Area indicates they are already slightly acidic (below a neutral pH of 7), further decreases in pH are a concern. Though most studies focus on a higher level of basal area removal than that proposed in this project, a compilation of research on water quality effects of timber harvesting in the northeastern U.S. showed no change in downstream water chemistry when as much as 15 to 19% of the basal area within a watershed was removed (Martin et al. 1986; Wang et al. 2006; Baldigo et al. 2005; Lawrence and Driscoll, 1988). A recent study compiling results from five watersheds in the Catskills indicated that keeping basal area removal below the 40 to 68% threshold would be expected to avoid detrimental effects to aquatic life or human health in that region (Siemion et al. 2011), which is generally more acid-sensitive than the White Mountains. Based on the relatively high buffering capacity and presence of organic matter in the analysis area relative to other portions of the White Mountains, a 25 percent threshold for basal area removal was selected to evaluate cumulative effects of acid deposition and harvest on water chemistry. This is a conservative value that can be applied to Project Area watersheds with confidence that no detrimental effect on water quality will occur. It is likely that more harvest could occur in a watershed without impairing water quality, but further research is needed to determine the precise relationship between watershed characteristics, vegetation removal, and water chemistry effects (McHale et al. 2008). Percent basal area removal is calculated for subwatersheds of perennial streams draining at least 200 acres in size using information from stand exams and silvicultural prescriptions. Monitoring and research projects are underway in portions of the WMNF with past or future harvest to better define these thresholds.

Due to the well-drained, coarse-textured soil types, erosion and sediment yields are low in much of New England (Martin et al. 1994). Typical
background sediment yields reported for undisturbed forests range from 40 to 150 kilograms/hectare/year (Martin et al. 2000). Impacts of forest management on sedimentation are difficult to quantify due to the high level of variability in erosion and sedimentation rates, but such impacts have been documented in some areas (Binkley and Brown 1993). Most forestry-related sedimentation and increases in stream turbidity are associated with transportation systems (Martin et al. 1994). Additional sediment sources are other activities that expose mineral soil, such as construction of trails or firelines, or stumping wildlife openings. The magnitude of effects caused by sediment transport is related to area of bare soil (Aust and Blinn 2004). Areas that lack vegetation and have disturbed soils become the source for sediment transport, particularly near stream crossings. Therefore, area of soil disturbance, relative to watershed area, will be used as an indicator of potential sediment transport.

The 2005 Forest Plan EIS states that impacts to water quality are minimized through the use of Standards and Guidelines and Best Management Practices. These include the use of riparian buffers, watersheds being only partially harvested and staggering harvest activities (p. 3-51). Riparian buffers are considered one of the most effective factors for preventing nutrients (particularly phosphorus) and sediment from reaching water resource features (Gilliam 1994). Riparian buffers are vegetated areas adjacent to water bodies that are managed “to protect the functions and values of the water body and its associated riparian area from the impact of site-level activities” (Blinn and Kilgore 2004). Riparian buffers protect streams from sediment and associated nutrients through a rough, porous forest floor and litter layer (Croke and Hairsine 2006; Stuart and Edwards 2006), therefore protecting these functions is an essential characteristic of a buffer. A consistent pattern across studies of buffer effectiveness is that harvest units were less likely to cause sedimentation than the associated transportation system or fire breaks, and impacts were often traceable to specific features (e.g. waterbar outlets or stream crossings) where BMP implementation needed improvement (Stafford et al. 1996; Aust and Blinn 2004; Litschert and MacDonald 2009; Lakel et al. 2010; Terrell et al. 2011). While riparian buffers can effectively capture diffuse flow, they are only the last line of containment for sediment transport. A growing body of literature shows that interconnected features such as headwater streams, wetlands, springs, and seeps exert an important influence on water quality
and quantity (EPA 2015). Given the wide dispersal of these features, watershed-wide application of BMPs is essential to minimize disturbance and connectivity of disturbed areas to drainage networks (Litschert and MacDonald 2009; Croke and Hairsine 2006). Soil should be contained close to the disturbance source and only rarely reach the buffer zone. Application of BMPs to prevent sedimentation and chemical pollution will be qualitatively considered to the extent they can be assessed at this phase of the project.

The Maine Forest Service has evaluated BMP effectiveness at randomly selected sites throughout the state since 2000. The most recent assessment found that in 2010 and 2011, no sediment entered a waterbody at 90 percent of evaluation points, an improvement from 83 percent in 2005 (MFS 2012). They found that appropriately applied BMPs prevented soil deposition into water bodies at 81 percent of crossing structures and 92 percent of approaches; BMPs were appropriately applied at 93 percent of the crossings and approaches they evaluated (MFS 2012). Outcomes on the National Forest are likely to be somewhat better than these results, due to consistent review by a timber sale administrator, advance planning, and Forest Plan requirements that are more stringent than state BMPs (e.g. stream or pond management zones wider than NH filter areas). Because stream crossings and their approaches were the most common sources of sediment entering water (MFS 2009), the number of stream crossings will also be an indicator of potential sedimentation. Because there is no absolute threshold for number of stream crossings, it will be used to compare relative risk of various alternatives.

As stated previously, impervious cover is associated with increased runoff, which may lead to higher sediment loads, decreased dissolved oxygen and increased nitrogen and phosphorus (Morse and Kahl 2003). Research in Maine indicates watersheds with less than 10 percent disturbed area are unlikely to have water quality impaired by impervious surfaces (Morse and Kahl 2003), so this threshold will be used as an indicator of cumulative effects on water quality.

**Incomplete and Unavailable Information**

Water quality data are not available for every water body in the Project Area. Representative streams have been selected to represent different watershed characteristics and sizes. These sites provide a reasonable
representation because they are distributed among the major watersheds in the Project Area.

Geographic data (including streams and water bodies) have varying levels of accuracy depending on the method used to collect data. For example, handheld GPS devices used in mapping have an accuracy of approximately 15 to 20 feet, depending on conditions. Existing shapefiles for streams, water bodies and wetlands were based on USGS topographic maps accurate at the 1:24,000 scale and may be based on remotely sensed data such as aerial photos, but were field verified in critical locations. Standards and Guidelines, BMPs and design features are applied based on distances on the ground, so accuracy of mapping does not affect the level of protection afforded by these measures.

Treatments such as road locations, skid trail locations, harvested areas and prescribed burn units are subject to further refinement during the implementation process. Due to sideboards that place limits on activity in water bodies or riparian areas, assumptions related to roads and skid trails are reasonably likely to be consistent with this analysis. Analysis of harvest areas includes the maximum area that could be harvested, so the assumptions in this analysis represent the maximum potential effect of these activities.

**Spatial and Temporal Context for Effects Analysis**

The analysis area for direct and indirect effects on water resources is the subwatersheds of the Middle Tributaries and Headwater Branches of the Upper Ammonoosuc River drainages that contain project activities, totaling approximately 16,213 acres. While the focus of this analysis is streams within the 3,788-acre Project Area, lands outside this boundary will be included to analyze complete watersheds. This area was chosen because it includes all streams draining the Project Area. The analysis period for direct and indirect effects is 10 years in the past and 20 years in the future, because water quality and quantity effects from vegetation management and temporary disturbance would be expected to subside in this period (Hornbeck et al. 1993; Martin et al. 2000).

The analysis area for cumulative effects on water resources includes the entire Middle Tributaries (HUC 010801010702) and the Headwater Branches (HUC 010801010701) of the Upper Ammonoosuc River watersheds which totals approximately 39,700 acres (62 square miles). This
area was chosen to adequately analyze the cumulative effect of activities in other parts of the Middle Tributaries and Headwater Branches (Upper Ammonoosuc River) watersheds along with the proposed activities. Effects of project activities would be expected to be masked by dilution further downstream, as these water bodies mix with much larger ones. The analysis period for cumulative effects is 10 years in the past and 20 years into the future (2006-2036), because water quality and quantity effects from vegetation management would be expected to subside within ten years of implementation due to vegetation regrowth (Hornbeck et al. 1993; Martin et al. 2000). Project activities are expected to be implemented in ten years or less. The Proposed Action could contribute to cumulative effects of watershed development, but trends should become apparent within this timeframe.

**Cumulative Effects Analysis**

Past, present and reasonably foreseeable activities between 2006 and 2036 within the cumulative effects analysis area were reviewed. Management activities in the past ten years and next twenty years include ongoing maintenance of permanent wildlife openings through prescribed fire or mechanical methods including perimeter fire line maintenance (approximately 35 acres annually), Godfrey Dam operation and maintenance, Berlin Fish hatchery/NH Fish and Game operation and maintenance, Barry Conservation Camp operation and maintenance, hiking and snowmobile trail maintenance, dispersed campsites maintenance, hazard tree removal, road maintenance, invasive plant eradication, and activates on private land and a small portion of the Jericho State Park that fall within the cumulative effects area (Non-National Forest land accounts for approximately 12% of the entire cumulative effects area). Other specific projects can be found in Appendix F of this EA.

**Alternative 1: No Action**

**Direct and Indirect Effects**

**Water Quantity**

Direct and indirect effects on water quantity from implementation of Alternative 1 would mainly continue along current trends. Current and ongoing management activities would continue, consistent the Forest Plan; but no new management activities would be initiated as a result of this proposal.
Effects on water quantity and channel function in Project Area streams would be absent as a result of Alternative 1. Water quantity would remain similar to the present state.

**Water Quality**

Direct and indirect effects on water quality from implementation of Alternative 1 would mainly continue along current trends. Ongoing Forest activities would not change water quality or impact existing uses through the use of New Hampshire Best Management Practices, Forest Plan Standards and Guidelines, and site specific Soil and Water Conservation Practices.

Under Alternative 1, sedimentation from disturbance along roads and trails would continue at present levels, which have not resulted in water quality impairment.

Water quality in Project Area streams would be unlikely to be affected by other aspects of Alternative 1 and would remain similar to the present state.

**Cumulative Effects**

**Water Quantity and Quality**

Impervious surfaces would cover an estimated 507 acres or 1.3 percent of the Cumulative Effects Area as a result of existing cover plus any reasonably foreseeable activities. Approximately 56.3 of these acres are due to skid trails, landings or temporary roads for timber harvest, much of which would return to a more natural state in the future. An additional 3,463 acres of impervious cover would need to be developed to reach the 10 percent threshold for water quantity impacts.

Cumulative effects on water quantity, quality and stream stability were analyzed in relation to climate change. A summary of past and projected climate trends through the year 2100 is in the Project Record. Effects of these trends related to water quality and quantity were summarized by Johnson and Roberts (2015) and in a climate change specialist report; both can be found in the Deer Ridge Project Record.

A trend toward higher annual precipitation and increasing variability since 1970 has been observed for this region (Kunkel et al. 2013). Though extreme precipitation events vary greatly on a decadal scale, frequency indicators have been high since the 1990s, and heavy rainfall events (greater than 1
inch) are expected to increase by mid-century (Kunkel et al. 2013). More frequent large rainstorms could exacerbate instability around crossing structures during high flows. Existing roads and trails would have an increased risk of drainage features overtopping and making the travel corridor part of the stream network. This would be addressed to some extent through routine maintenance on system roads and trails, but would be a continued risk on abandoned roads and skid trails that are a legacy of past activities.

Effects of climate change on water quality may include increased episodic acidification of streamwater during storm events, though acidity may be lower during snowmelt (Rustad et al. 2012). Since no direct or indirect effects on water chemistry due to vegetation removal would occur under Alternative 1, no cumulative effect would occur.

Since no other direct and indirect effects on water quantity or quality are anticipated under Alternative 1, no cumulative effect on water resources would occur in relation to these indicators.

Alternative 1 complies with the Forest Plan and other relevant laws, regulations, policies, and plans related to water resources.

**Alternative 2: Proposed Action**

**Alternatives 2 - Direct and Indirect Effects**

**Water Quantity**

**Vegetation management and wildlife habitat improvement**

Timber management or any other vegetation removal can increase water quantity in streams due to reduced uptake of water by living plants. The potential for this direct effect was evaluated using the threshold of 25 percent basal area removal in a watershed, which has been found to be appropriate for this area (Hornbeck et al. 1993). The greatest amount removed in any watershed would be 16 percent under Alternative 2 (Table 18 Percentage of basal area removed by watershed).

Table 18 Percentage of basal area removed by watershed

<table>
<thead>
<tr>
<th>Subwatershed Number</th>
<th>Subwatershed Name</th>
<th>Watershed Acres</th>
<th>% Basal Area Removed, Alt 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>121</td>
<td>Number 9 Brook Upper</td>
<td>741</td>
<td>5%</td>
</tr>
<tr>
<td>121-122</td>
<td>Number 9 Brook</td>
<td>824</td>
<td>7%</td>
</tr>
<tr>
<td>131</td>
<td>York Brook Trib 2</td>
<td>548</td>
<td>1%</td>
</tr>
<tr>
<td>Subwatershed Number&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Subwatershed Name</td>
<td>Watershed Acres</td>
<td>% Basal Area Removed, Alt&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------------</td>
<td>-----------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>132</td>
<td>York Brook Headwaters</td>
<td>1634</td>
<td>0%</td>
</tr>
<tr>
<td>133</td>
<td>York Pond Trib 8</td>
<td>254</td>
<td>16%</td>
</tr>
<tr>
<td>133-134</td>
<td>York Pond Watershed</td>
<td>394</td>
<td>15%</td>
</tr>
<tr>
<td>131-135</td>
<td>York Brook</td>
<td>2646</td>
<td>3%</td>
</tr>
<tr>
<td>101</td>
<td>Headwaters West Branch Upper Ammo</td>
<td>1908</td>
<td>0%</td>
</tr>
<tr>
<td>102</td>
<td>Big Trib W Branch Upper Ammo</td>
<td>2184</td>
<td>0%</td>
</tr>
<tr>
<td>111</td>
<td>Unknown Brook</td>
<td>1154</td>
<td>1%</td>
</tr>
<tr>
<td>101-102, 111, 121-122, 131-135, 181</td>
<td>West Branch Upper Ammo</td>
<td>9988</td>
<td>3%</td>
</tr>
<tr>
<td>101-102, 111, 121-122, 131-135, 181</td>
<td>Headwaters Upper Ammo</td>
<td>26976</td>
<td>1%</td>
</tr>
<tr>
<td>211</td>
<td>Upper Ammo Trib 2a</td>
<td>521</td>
<td>16%</td>
</tr>
<tr>
<td>212</td>
<td>Betty Brook</td>
<td>579</td>
<td>11%</td>
</tr>
<tr>
<td>211-212</td>
<td>Betty Brook</td>
<td>1101</td>
<td>13%</td>
</tr>
<tr>
<td>231</td>
<td>Fogg Brook Headwaters</td>
<td>350</td>
<td>11%</td>
</tr>
<tr>
<td>231-232</td>
<td>Fogg Brook</td>
<td>790</td>
<td>14%</td>
</tr>
<tr>
<td>241</td>
<td>Fifield Brook Trib 32</td>
<td>500</td>
<td>9%</td>
</tr>
<tr>
<td>242</td>
<td>Fifield Brook Headwaters</td>
<td>968</td>
<td>2%</td>
</tr>
<tr>
<td>241-242</td>
<td>Fifield Brook Upper</td>
<td>1468</td>
<td>4%</td>
</tr>
<tr>
<td>241-243</td>
<td>Fifield Brook</td>
<td>2036</td>
<td>5%</td>
</tr>
<tr>
<td>251</td>
<td>Upper Ammo Trib 6</td>
<td>200</td>
<td>6%</td>
</tr>
</tbody>
</table>

<sup>1</sup>Calculations are presented for complete subwatersheds only.
Based on this analysis and best available science, any localized increase in water tables and headwater stream flow would be virtually undetectable in the mainstem of first order or larger perennial streams. This increase would mainly occur during low flow periods and would dissipate within about 3 to 5 years due to vegetation regrowth (Hornbeck et al. 1993). Therefore, no detrimental direct or indirect effect on water quantity or channel function is expected from vegetation management under this alternative. A map of subwatersheds used in analysis and detailed calculations are in the Deer Ridge Project Record. The use of landings and access driveways will be analyzed in the Transportation section.

Recreation, public access and transportation system improvements

Recreation and transportation system work differs by alternative and includes the following activities: road maintenance and reconstruction, landing restoration, construction, and use, temporary bridge installation, use, and removal, skid trail use, and trailhead parking lot expansion. The amount of soil-disturbing work under each Alternative is summarized in Table 19. Potential mineral soil disturbance by alternative. Potential mineral soil disturbance would increase from 6.8 acres under Alternative 1 to 146.7 acres under Alternative 2. This estimated potential disturbance is conservatively high, since road maintenance/reconstruction would occur on existing road templates. Alternative 2 would disturb 0.9% of the 16,213-acre analysis area, compared to 0.04% for routine maintenance of open roads (both seasonal and year round) under Alternative 1. No detrimental effect on water quantity or channel function would be expected related to overall level of disturbance under any action alternative.

Recreation and public access

Alternative 2 proposes to expand the Unknown Pond Trailhead parking lot to approximately 6,500 ft². This project would result in permanent soil disturbance in this area (see Soil section of this EA). This area is over 100 feet from water bodies and outside floodplains, so no detectable direct or indirect effects on runoff are expected. As mentioned in the Project Design Features section, ground-disturbing activity for parking area construction will be done during appropriate seasons and conditions to prevent excessive erosion and sedimentation. Temporary and permanent erosion
control will be used on disturbed areas in accordance with State BMPs (NH DRED 2004, NHDES 2008) until the ground has stabilized.

Table 19. Potential mineral soil disturbance by alternative

<table>
<thead>
<tr>
<th>Ground Disturbing Activity</th>
<th>Alt 1</th>
<th>Alt 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 Existing and 3 New Landings (acres)</td>
<td>0.0</td>
<td>21</td>
</tr>
<tr>
<td>Trailhead Parking Lot Expansion (acres)</td>
<td>0.0</td>
<td>0.25</td>
</tr>
<tr>
<td>Permanent Wildlife Opening (WLO) Expansion (acres)</td>
<td>0.0</td>
<td>33</td>
</tr>
<tr>
<td>Fire Line Construction around WLO (acres)</td>
<td>0.0</td>
<td>1.25</td>
</tr>
<tr>
<td>Skid Trails (acres)</td>
<td>0.0</td>
<td>69.6</td>
</tr>
<tr>
<td>Gravel Pit Expansion (acres)</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total new ground disturbance</strong></td>
<td>0.0</td>
<td>126.1</td>
</tr>
<tr>
<td>Road Maintenance and Reconstruction (acres)²</td>
<td>6.7</td>
<td>20.4</td>
</tr>
<tr>
<td><strong>Potential short-term increase/long-term decrease in disturbance</strong></td>
<td>6.7</td>
<td>20.4</td>
</tr>
<tr>
<td><strong>Total Potentially Disturbed Acres</strong></td>
<td>6.7</td>
<td>146.5</td>
</tr>
<tr>
<td><strong>Total % of 16,213-acre Analysis Area Disturbed</strong></td>
<td>0.04%</td>
<td>0.9%</td>
</tr>
</tbody>
</table>

¹Average landings size = 0.75 acres

²1 mile of road/skid trail at an average disturbance width of 20’ = 2.4 acres of disturbance/mile

**Landings and Transportation**

The Action Alternative includes use of 28 landings, each approximately 0.75 acres in size. Three new landings would be established under this alternative. The remaining landings would be in locations used previously. Based on observations of landings used in the past, these areas would revegetate within a few years of close out, promoting normal hydrologic function. Because of the landing locations, reuse of previously disturbed areas, and temporary nature of disturbance, no direct or indirect effects on water quantity would be expected.

Roads and some skid trails have the potential to affect hydrology by changing the direction of flow, intercepting surface or ground water or concentrating flow in areas such as ditches (Gucinski et al. 2001). Because road templates are already in place, little or no hydrologic alteration would be expected from bringing them up to necessary standards. Establishment of new skid trails would have the opportunity to change the direction of flow or concentrate flow in some instances. Design features (including Forest Plan Standards and Guidelines and State Best Management Practices) to minimize effects on hydrology would include limiting slope
of roads and skid trails, constructing cross drainage at specified intervals, dispersing water bar or ditch relief outflow to vegetated areas, and leaving a buffer between roads or skid trails and streams. These practices reduce concentration of flow, formation of gullies and impacts to riparian areas. Based on project monitoring, hydrologic effects due to skid trail construction, which accounts for most of the acreage disturbed, would be expected to be minimal and dissipate further within a few years as skid trails revegetate (USDA Forest Service 2010b).

Under the Alternative 2, existing road beds would be maintained or reconstructed. It is assumed that maintenance of roads open to the public, both seasonally and year round, would also occur under the No Action Alternative. Because maintenance would occur in an existing footprint and would maintain or upgrade drainage features, no negative effect on hydrology would occur from road maintenance and reconstruction. Therefore, under Alternative 2, road and skid trails would not be expected to directly or indirectly affect water quantity or channel function to a measurable extent.

Stream crossings

The transportation system proposed for use involves 14 perennial stream crossings on haul roads and 17 perennial stream crossings on primary skid trails (Table 20). There would be 1 road crossing and approximately 13 main skid trail crossings on intermittent streams. The number of permanent stream crossings on roads would not change. Temporary crossing structures would follow Forest Plan Standards and Guidelines and State BMPs for stream crossings (NHDES 2016).

Gravel Pit Expansion

Expansion of the Fifield Brook Road Gravel Pit by 1.0 acre is proposed in Alternative 2. The pit is currently about 0.5 acres in size and is not vegetated. The expansion would have the capacity to produce a minimum of 10,000 cubic yards of material. Site work would include removing trees and top soil at the expanded site location and then excavating approximately 8-12 feet down. The proposed expansion area is greater than 100 feet away from any perennial streams. Excavation would not occur within 5 feet of the water table and no pumping would occur, minimizing the probability of impacting groundwater flow to nearby water bodies (Green et al. 2005). Due to the well-drained nature of the
gravel deposit and surrounding soils, overland flow outside compacted areas would likely be minimal. Dispersing road and processing area drainage through a well-vegetated area would avoid gully formation and channelized flow. Reshaping the land surface, compacting soil, and removing well-drained material may affect the hydrology of the area by reducing groundwater recharge, decreasing infiltration and increasing runoff. Because of the small size of the area affected and the location away from perennial streams and water bodies, only small localized changes in the timing or direction of flow would be expected, with no significant impacts to water bodies.

Table 20. Number of stream crossings by type

<table>
<thead>
<tr>
<th>Crossing Type</th>
<th>Alt 1</th>
<th>Alt 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent Road crossings- perennial streams</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Permanent Road crossings- intermittent streams</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Temporary road crossings- perennial streams</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Temporary road crossings- intermittent streams</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Temporary skid crossings- perennial streams</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Temporary skid crossings- intermittent streams</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total permanent</strong></td>
<td><strong>11</strong></td>
<td><strong>11</strong></td>
</tr>
<tr>
<td><strong>Total temporary</strong></td>
<td><strong>0</strong></td>
<td><strong>34</strong></td>
</tr>
</tbody>
</table>

**Permanent Wildlife Openings and Fire Line Construction**

Expansion of three existing permanent wildlife openings (PWOs) is proposed in Alternative 2, equaling approximately 33 acres. Trees and stumps would be removed to allow early successional grasses and shrubs to dominate the sites. Fire line construction, the permanent removal of topsoil and exposure of mineral soil, would occur along the boundary of the expansion areas to allow for PWO maintenance through prescribed burning on a 3-5 year rotation. This project would result in temporary and permanent soil disturbance in this area (see Soil section of this EA). The existing PWOs and the proposed expansion areas are located on relatively flat terrain with well-drained soils minimizing the amount of soil
displacement that would occur when mineral soil is exposed during stumping and fire line construction. PWO expansion areas and associated fire lines would not be located within 100 feet of a perennial stream or the high water mark of a pond. Therefore, erosion would be minimal, temporary and localized and would not lead to sedimentation of any nearby waterbodies. Dispersing disturbed area drainage through a well-vegetated areas would avoid gully formation and channelized flow. Effects from stumping that would expose mineral soil would be temporary, while creation of the surrounding fire line would be permanent. Because of the small size of the fire line area, gentle topography, well drained soils and the location away from perennial streams and water bodies, only small localized changes in the timing or direction of flow would be expected, with no significant impacts to water bodies.

Water Quality

**Vegetation management and wildlife habitat improvement**

As described in the Affected Environment section, there is a high level of confidence that no effect on water chemistry would occur if 25 percent or less of the basal area is removed from a watershed. All subwatersheds are below this threshold under the Alternative 2. These treatments are also consistent with Forest Plan Vegetation Guideline G-1 limitations on even age management in a watershed. Based on the literature cited in the methodology section, no detrimental direct or indirect effect on water chemistry would be expected due to timber management. At smaller scales such as intermittent streams, changes in water chemistry such as an increase in nitrate or dissolved base cation concentrations could occur, but would be far below thresholds for negative impacts and would abate within a few seasons as vegetation regrows (Binkley and Brown 1993, Clinton 2011, Martin et al. 2000).

Research on timber management effects indicates that riparian buffers are effective in preventing sediment and associated pollutants from reaching streams (Clinton 2011, Chase et al. 1995, Binkley and Brown 1993). In addition to State of New Hampshire basal area law and Best Management Practices, Forest Plan Guidelines G-1 and G-2 for Riparian and Aquatic Habitats (pp. 2-24, 2-25 and 2-26) would be implemented to protect water quality. These measures are summarized in Table 21and described in more detail in the Design Features section of this report and the Forest Plan.
Table 21. Riparian Management Zone descriptions for various water body types.

<table>
<thead>
<tr>
<th>Stream reach</th>
<th>Stream order</th>
<th>Riparian Management Zone width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Ammonoosuc River below Keenan Brook</td>
<td>4</td>
<td>600 ft: 25 foot no cut, plus 575 foot uneven age management</td>
</tr>
<tr>
<td>Mapped perennial streams</td>
<td>1 or 2</td>
<td>100 ft: 25 foot no cut, plus 75 foot uneven age management</td>
</tr>
<tr>
<td>Previously unmapped perennial streams: West Branch Upper Ammo T1, York Pond T8a, West Branch Upper Ammo T4, Betty Brook, Upper Ammo T2a, Upper Ammo T2b, Upper Ammo T13, Fogg Brook T112a, Fogg Brook T76a, Fifield Brook T32, Fifield Brook T33a, Fifield Brook T38a, Upper Ammo T6a, Upper Ammo T6, Fifield Brook T56a, Fifield Brook T56b, Fifield Brook T56c, Fifield Brook T32, Fifield Brook T32b, Fifield Brook T32c</td>
<td>1</td>
<td>100 ft: 25 foot no cut, plus 75 foot uneven age management</td>
</tr>
<tr>
<td>All other identified perennial streams</td>
<td>1</td>
<td>100 ft: 25 foot no cut, plus 75 foot uneven age management</td>
</tr>
<tr>
<td>Intermittent stream York Pond T8b in unit 48</td>
<td>0</td>
<td>50 ft: No even-age regeneration treatments shall occur within 50 feet of bank</td>
</tr>
<tr>
<td>Intermittent stream Fogg Brook upstream in unit 19</td>
<td>0</td>
<td>25 ft: No even-age regeneration treatments shall occur within 25 feet of bank</td>
</tr>
<tr>
<td>Intermittent Streams Upper Ammo T87a in unit 35, Fogg Brook T9a in unit 20a, Upper Ammo T59a in unit 26a, and Upper Ammo T6a in unit 2a</td>
<td>0</td>
<td>25 ft: No heavy equipment shall operate within 25 feet of top of bank aside from a designated crossing with proper mitigations</td>
</tr>
<tr>
<td>All other intermittent streams</td>
<td>0</td>
<td>Riparian management zone with minimal soil disturbance meeting NH BMPs; leave bank-stabilizing vegetation</td>
</tr>
<tr>
<td>1.7 acre stream-wetland complex around Upper Ammo T47a in unit 5 (mapped in Project Record)</td>
<td>0</td>
<td>No even-age regeneration treatments shall occur within the 1.7 acre stream-wetland complex</td>
</tr>
<tr>
<td>All ponds, lakes, identified natural vernal pools</td>
<td>N/A</td>
<td>100 ft uneven-age management only</td>
</tr>
<tr>
<td>Other identifies wetlands, springs, ephemeral flow areas</td>
<td>N/A</td>
<td>No ground disturbance aside from unavoidable crossings; comply with NH BMPs</td>
</tr>
</tbody>
</table>

Intermittent streams are protected from sedimentation by NH BMPs limiting ground disturbance within filter areas. Forest Plan Guideline G-15
for Riparian and Aquatic Habitats (Forest Plan, p.2-26), which prescribes no harvest of trees that directly stabilize banks, would reduce sedimentation by preventing bank erosion. Because of the well-drained soils in the Project Area, sediment input related directly to forest harvest is unlikely (see Soil section of this EA). The risk of sedimentation caused directly by harvest is also mitigated by the use of season of harvest prescriptions and Best Management Practices that minimize exposure of mineral soil, particularly near water bodies. A review of ten years of water monitoring data did not find sediment or turbidity concerns in managed watersheds (USDA Forest Service 2010b). The limited extent of basal area removal proposed under Alternative 2 (Table 18) also indicates that much riparian cover would remain in headwater areas where intermittent streams occur.

Known wetlands and springs have also been mapped to prevent equipment from disturbing these areas in accordance with the Forest Plan (Riparian and Aquatic Habitats G-7, p.2-25; Water Resources G-2 and G-3, p. 2-32). Ponds and vernal pools have a 100-foot riparian management zone to prevent excessive ground disturbance or loss of organic matter inputs in these areas.

Therefore, no detrimental direct or indirect effect on sediment is expected from timber harvest proposed in Alternatives 2. The effects from transportation systems associated with harvest are considered in a separate section of this report.

See the Aquatic Habitats and Fisheries section of this EA for a discussion of stream temperature changes and their influence on aquatic species.

**Recreation, public access and transportation system improvements**

Under Alternative 2, there is a small chance of leakage or spills of lubricants or fuel from vehicles or construction equipment. The risk to water resources is minimized by implementation of riparian buffers, locating roads and landings away from riparian areas, and using construction BMPs. Work would follow all applicable Forest Plan Standards and Guidelines (2005) and State of New Hampshire BMPs for road maintenance and reconstruction (NH DOT 2001, NH DRED 2004). Therefore, no detrimental direct or indirect effect on water chemistry is expected from transportation activities.
Most forestry-related sedimentation and increases in stream turbidity are associated with transportation systems (Martin et al. 1994). The magnitude of effects caused by sediment transport is related to area of disturbance (Gucinski et al. 2001). Areas which lack vegetation and have disturbed soils become the source for sediment transport, particularly near stream crossings. The area of disturbance associated with transportation systems and trails is shown in Table 19. The area of disturbance under Alternative 2 is greater than the No Action Alternative. Since the level of disturbance is small relative to the analysis area watershed, no indirect effect on sedimentation is expected in relation to the overall level of disturbance (see Soil section of this EA). The activities listed in pose varying levels of short- and long-term risk of direct effects on sedimentation based on design and proximity to stream networks, which are discussed in the following paragraphs.

Recreation and Public Access

Alternative 2 proposes to expand the Unknown Pond Trailhead parking lot to approximately 6,500 ft². This project would result in permanent soil disturbance in this area. Erosion and chemical (fuel and oil) transport from this area could increase. Design features are in place requiring appropriate timing of projects to minimize erosion and implementation of Best Management Practices during construction (NHDES 2008). This areas is over 100 feet from water bodies and outside floodplains, so no detectable direct and indirect effects on runoff is expected. New permanent facilities should not be located within 100 feet of a perennial stream or the high water mark of a pond. If they need to be located within 100 feet, additional measures to prevent direct runoff into surface waters and to minimize sedimentation would be taken in accordance with the Forest Plan guideline (Forest Plan, Riparian and Aquatic Habitats, G-6, p. 2-25). Therefore, the increased risk of sediment or chemicals reaching water bodies is negligible.

Landings and Transportation

Twenty-eight landings are proposed under Alternative 2. Landing locations are generally over 100 feet from perennial streams in well-drained areas. If any landing (new or existing) extends to the area within 100 feet of a stream, measures to minimize sedimentation will be taken in consultation with soil and/or water specialists to avoid sedimentation and meet Forest Plan guidelines (Forest Plan 2005, p. 2-25). These measures may include keeping landings off slopes leading directly to stream banks.
and erosion control measures such as silt fence, hay bales and slash filters. The proposed log landing locations are in gently sloping topographic settings unlikely to cause undue erosion and sedimentation. Review of landings used in past sales as well as forest wide monitoring indicated that with careful site selection and application of BMPs, sedimentation was prevented and sites revegetated within a few years (USDA Forest Service 2013, 2011, 2010).

The 20.4 acres of proposed road maintenance/reconstruction would improve drainage and surfacing on the roads, and may involve cleaning and right sizing culverts, blading of the road surface, and road resurfacing. While road improvements and increased use may mobilize sediment on a short-term basis, activities such as resurfacing and improving drainage reduce sediment loss (NCASI 2000). Skid trails account for the greatest amount of potential soil disturbance. New skid roads would not be located within the stream or pond riparian management zone (within 50 feet of the bank, or a greater distance in high slope areas), as defined in Forest Plan, Riparian and Aquatic Habitat guideline G-5 (p. 2-25), except in the immediate vicinity of stream crossings. If skid roads must be in the stream management zone, additional sedimentation measures must be taken. State BMPs such as water bars, ditches with cross drainage, erosion barriers, properly sized stream crossings and slope limitations would be used to prevent water from draining down skid trails and carrying sediment to streams (see Soil section of this EA for further description of Best Management Practices). Skid trails would be expected to revegetate within 2 to 3 years and have no more than a temporary impact. Because of application of Forest Plan guidelines and State Best Management Practices, direct and indirect effects on sedimentation due to skid trails would be expected to be negligible in all areas except stream crossings under both alternatives. Skid trail monitoring in recent years has not found sediment from skid trails reaching streams, with the exception of stream crossings as discussed below (USDA Forest Service 2013).

**Stream crossings**

The transportation system proposed for use involves 14 perennial stream crossings on haul roads and 17 perennial stream crossings on primary skid trails (Table 20). There would be 1 road crossings and approximately 13 main skid trail crossings on intermittent streams. Eleven of the 15 haul road crossings are already in place on roads open to motorized vehicles. Within
the proposed transportation system, stream crossings have higher potential than other road segments for effects on sedimentation (MFS 2009). Several factors contribute to minimizing this effect. Some of the proposed roads and skid trails are on existing footprints with appropriate crossing locations in place. Temporary crossing structures would follow Forest Plan Standards and Guidelines and State BMPs for stream crossings (NHDES 2016). These measures include keeping road and skid trail stream crossings as close to perpendicular to streams as possible and at designated locations. This would keep the stream bed and banks intact and minimize sediment input. Following harvest, temporary crossing structures would be removed, with stream banks restored (graded and seeded) as necessary.

The effectiveness of Maine’s Water Quality Best Management Practices for forestry has been monitored and documented, with particular consideration given to transportation systems. Monitoring in 2008 indicated that “of the 615 opportunities to observe soil conditions, 87 percent showed no sediment reached the waterbody” (p. 2), and most cases of sedimentation were “trace” or “minor” (MFS 2009). The 2005 Forest Plan Standards and Guidelines require larger Riparian Management Zones (pp. 2-24 and 2-25) than the Maine Best Management Practice “filter areas” (MFS 2010). Given the additional design features in place, direct effects on sedimentation from transportation systems would not be expected to exceed a few instances of trace sediment input on a temporary basis. An increase in short-term, localized sediment inputs may occur under any alternative, but in the case of road maintenance, would decrease long-term sediment inputs. This would be in compliance with the Forest Plan, which allows effects of limited extent and duration that do not permanently degrade water quality, if all appropriate measures have been taken to minimize effects.

**Gravel Pit Expansion**

Expansion of the Fifield Brook Road Gravel Pit is proposed in Alternative 2. The expansion area would be 1 acre in size and adjacent to an existing gravel pit. The expansion would have the capacity to produce a minimum of 10,000 cubic yards of material. Site work would include removing trees and top soil at the expanded site location and then excavating approximately 8-12 feet down, and would stay above the water table.

This site would have a Gravel Pit Management Plan which would detail the efficient and orderly removal of material and measures for
Deer Ridge Integrated Resource Project

rehabilitation. Once the resource is exhausted, the area would be reclaimed by re-sloping the pit walls, redistributing the topsoil, seeding, and if necessary re-planting trees.

**Permanent Wildlife Openings and Fire Line Construction**

Expansion of three existing permanent wildlife openings (PWOs) is proposed in Alternative 2, equaling approximately 33 acres. Trees and stumps would be removed to allow early successional grasses and shrubs to dominate the sites. Fire line construction, the permanent removal of topsoil and exposure of mineral soil, would occur along the boundary of the expansion areas to allow for PWO maintenance through prescribed burning on a 3-5 year rotation. The new PWO area would not be located within 100 feet of a perennial stream or the high water mark of a pond. Therefore, the increased risk of sediment or changes to water chemistry is negligible. Ground-disturbing activity for the expansions would be done during appropriate seasons and conditions to prevent excessive erosion. Temporary and permanent erosion control would be used on disturbed areas, if necessary, in accordance with State BMPs (NH DRED 2004, NHDES 2008) until the ground has stabilized. Table 22 provides a summary of the direct and indirect effects of the alternatives.

Table 22. Summary of direct and indirect effects

<table>
<thead>
<tr>
<th>Resource Element</th>
<th>Resource Indicator</th>
<th>Measure</th>
<th>Alt 1</th>
<th>Alt 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water quantity</td>
<td>Stream flow does not significantly increase or decrease due to management activities</td>
<td>Basal area removed does not exceed 25% of a watershed</td>
<td>Does not exceed 25% threshold; no additional harvest</td>
<td>Does not exceed 25% threshold; greatest % removal is 16%</td>
</tr>
<tr>
<td>Water quantity</td>
<td>Concentration of surface runoff is minimized</td>
<td>Percent of watershed with mineral soil disturbance (comparative)</td>
<td>Approximately 0.04% (6.7 acres) of analysis area disturbed</td>
<td>Approximately 0.9% (146.7 acres) of analysis area disturbed</td>
</tr>
<tr>
<td></td>
<td>BMPs for drainage are considered and incorporated into proposal (qualitative)</td>
<td>BMPs followed except areas of deferred road and trail maintenance</td>
<td>BMPs followed except areas of deferred trail maintenance</td>
<td></td>
</tr>
</tbody>
</table>
### Resource Element | Resource Indicator | Measure | Alt 1 | Alt 2
--- | --- | --- | --- | ---
Water quantity and water quality | Channel capacity, shape and velocity; sediment and phosphorus inputs | Number of stream crossings | 11 permanent; 0 temporary on project roads | 11 permanent; 34 temporary on project roads
 | Capacity of stream crossings to withstand high flows | Same as present | Same as present
Water quality | Chemical changes (pH, aluminum, nitrate) are below thresholds harmful to aquatic life and human uses | Basal area removed does not exceed 25% of a watershed | Does not exceed 25% threshold; no additional harvest | Does not exceed 25% threshold; greatest % removal is 16%
 | No more than 15% harvested with even age regeneration | No watershed exceeds 15% threshold | No watershed exceeds 15% threshold
Water quality | Water quality impacts are limited to temporary, short-term changes | BMPs for sedimentation and/or spill prevention are incorporated into proposal where ground disturbance and/or chemical use occurs (qualitative) | N/A due to lack of new activities | BMPs adequately considered based on design features and location of activities

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**Alternative 2 - Cumulative Effects**

**Water Quantity and Water Quality**

**Vegetation Management and Wildlife Habitat Improvement**

Timber management activities proposed in Alternative 2 would not be expected to have a detrimental cumulative effect on water quantity. Basal area removal from past and ongoing timber harvests in the cumulative effects watersheds since 2005 was analyzed in combination with the Action Alternative. Based on studies at Hubbard Brook, any effects on water quantity would subside within seven to nine years after harvest as vegetation regrows (Hornbeck et al. 1993). Based on harvest proposals in this project and known past harvest in the cumulative effects area, basal area removal in the cumulative effects area as a whole would be no more than 3.1 percent under Alternative 2, compared to 1.1 percent under the No Action Alternative, far below the threshold for effects on water quantity.
Recreation, Public Access and Transportation System Improvements

The road, trail and access work proposed in Alternative 2 would not be expected to have a measurable, detrimental effect to water quantity or quality in itself. The contribution of this work to total impervious cover was analyzed for potential cumulative effects. Impervious cover affects water quantity by increasing runoff and peak flows, particularly if the watershed exceeds 10 percent impervious cover (Center for Watershed Protection 2003). This level of impervious cover may also be accompanied by decreased dissolved oxygen and increased nitrogen and phosphorus (Morse and Kahl 2003). Considering the estimated existing impervious surface in conjunction with the Action Alternative, total impervious cover in the cumulative effects area was estimated at 1.6 percent under Alternative 2. This is a small increase over the 1.3 percent impervious cover estimated for the No Action Alternative. Furthermore, these are high estimates, since landings and skid trails are expected to be minimally compacted and return to a vegetated state within a few years (see Soil section of this EA). A conservative 5 percent impervious value was applied to non-National Forest lands, exact information was not available. An additional 3,336.8 acres (69% of non-NFS land) would need to be permanently developed to reach this threshold. Since impervious cover would be far below the 10 percent threshold under Alternative 2, no cumulative effects on water quantity or quality are expected. Calculations of impervious cover are in the Deer Ridge Project Record.

The potential for cumulative effects on sedimentation and turbidity due to ground disturbance were evaluated, including past, present and foreseeable future activities known to cause ground disturbance. Ground-disturbing activities on private land were estimated for this analysis (see Soil section of this EA). Approximately 734 acres (1.8 percent) of the cumulative effects area would be disturbed in Alternative 2. This is a small increase in ground disturbance relative to the 594 acres (1.5 percent) under the No Action Alternative; therefore water quantity and quality would be expected to continue along current trends. No cumulative effect on sedimentation would be expected due to design features such as riparian buffers, location of landings and skid trails away from water and appropriate season of operation (see Soil section of this EA and Direct and Indirect Effects analysis in this report). Additionally, more than half of the acreage disturbed in Alternative 2 is due to landings, skid trails, and a
conservative estimate of soil disturbance from timber harvest on private land; soil would remain stable or become revegetated within a few years over these portions (USDA Forest Service 2010b).

Stream crossings have been discussed in the Direct and Indirect Effects analysis, and changes in water quantity or quality are likely to be small compared to background variability. Because new skid trail and haul road stream crossings would be temporary and follow applicable BMPs, no cumulative effect on water quantity or quality is expected from these crossings.

**Climate Change and Large-Scale Disturbance**

As described in the cumulative effects analysis for the No Action Alternative, climate change will affect hydrology within the analysis period. Incremental changes within the analysis period will likely be small and will be subject to short-term climate patterns which produce year-to-year variability. Because effects of most actions are temporary, a consideration of trends that have been observed over the last century will be given more weight than models that generally predict conditions at the middle or end of the century. These trends include fewer days of snow cover, more frequent large rain events, a greater proportion of precipitation falling as rain, and a slight overall increase in annual precipitation. A summary of climate trends for water resources on the WMNF is in the Project Record; recently published summaries of climate trends for the Northeast and northern New Hampshire are also considered (Rustad et al. 2012, NECIA 2006, Wake et al. 2014).

With warming temperature, snow-cover days (SCD) have decreased by 1.5 days per decade in Northern New Hampshire and by 3.6 days per decade across the Northeastern region (Wake et al. 2014, Burakowski et al. 2008). Small decreases in snowpack depth have also been observed at many weather stations, and are projected to continue (Johnson and Roberts 2015). This trend means that on average there will be fewer days of the year with suitable conditions for winter timber harvest. The current and projected rate is not sufficient to make activities on frozen ground infeasible during the analysis period. Both recreation and timber harvest activities can be timed to take advantage of variations in weather across years or months. Where winter harvest is specified, the timber sale administrator monitors conditions on the ground to determine whether it is sufficiently frozen for harvest to occur. Warming temperature trends may shorten the season of
harvest in some years, but will not change the requirement that winter harvest requires frozen conditions. Recent monitoring on winter timber sales has documented that soil and water conservation BMPs have been applied, that temporary disturbance is in compliance with Forest Plan guidance, and that water quality has not been degraded by forestry activities (USDA Forest Service 2012a, 2011, 2010). Therefore, no detrimental cumulative effect on water resources is expected.

The frequency of intense rain events is expected to increase due to climate change. Based on weather records since 1960, storms that delivered more than 1 inch of precipitation in 24 hours increased at all four northern New Hampshire stations, while 4-inch precipitation events increased at two stations (Wake et al. 2014). This increasing trend is projected to continue (Kunkel et al. 2013). This means that relatively high flow events may occur more often on average than they have in the past. It is unclear whether the magnitude of peak flows would increase during the analysis period. Changes in timing and reduction in snowpack have led to a lower peak flow associated with snowmelt at some sites (Campbell et al. 2011, Rustad et al. 2012), a trend that is projected to continue. The activities proposed in Alternative 2 are not expected to have a cumulative effect on water quantity when considered in light of climate change because they are not expected to measurably increase streamflow or runoff. During large storm events, areas of exposed soil without BMPs are at risk of causing sedimentation. The trend of increasing storm events would increase this risk during the analysis period. Based on monitoring of recent storms, the largest sediment impacts happened on legacy roads and trails located in floodplains or with inadequate drainage, leading to issues such as road and culvert washouts (USDA Forest Service 2012a). The Forest Plan, prescribed BMPs, and design of the Proposed Action address intense rain events by prescribing proper stream crossing size, minimizing permanent crossing structures, locating transportation systems away from water, protecting streambank stability, and requiring erosion control measures during and after operations. Forest monitoring indicates that application of such measures led to little or no sedimentation in active project areas after intense storms with up to a 100-year recurrence interval (USDA Forest Service 2012a, Johnson 2012). Though short-term, localized sediment inputs may increase due to disturbance from the action alternative, it is unlikely they would be sufficiently large to have a detrimental effect in
combination with the slightly higher frequency of intense rain events. Because weather and climate vary on the scale of days to decades, regular project management already includes measures to prepare for storm events and stop work in unsuitable conditions. The addition of new, permanent infrastructure that would concentrate flows in compacted areas or stream crossing structures is minimal for this project.

In spite of historic increases in overall precipitation, significant increases in annual streamflow have generally not been documented (Johnson and Roberts 2015). In the future, some models indicate that increased evaporation and reduced snowpack may lead to reduced summer streamflow in the region (Campbell et al. 2011), which could have detrimental effects. No measurable change in summer stream flow is expected at the cumulative effects area scale due to the Action Alternative. If any effect on water quantity occurs due to vegetation removal for project activities, it would tend to locally increase base flows during the growing season by reducing transpiration. Since this trend is the opposite of what projected climate change would cause, no cumulative effect would occur.

**Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans**

Direct, indirect, and cumulative effects of Alternative 2 on water quantity and quality comply with the Forest Plan in that they fall within limits of temporary and short-term degradation allowed only after all practical means of minimizing such degradation are implemented. Forest Plan Standards and Guidelines related to water resources have been incorporated as design features. Streams are expected to remain in Proper Functioning Condition or improve due to restoration projects.

The proposed activities would comply with State of New Hampshire water quality standards for Outstanding Resource Waters in that no more than temporary and short-term changes in water quality would occur. Waters in the analysis area would continue to support designated uses. Where water quality is currently not meeting State standards, the proposed activities are not expected to cause further degradation.

These activities are not expected to affect public or private water supplies. The project analysis area is part of two public water supply watersheds. One of which encompasses a very large area of which the Deer Ridge Project Area is only a very small portion. The other, which is entirely
within the project cumulative effects analysis area (though outside the direct and indirect effects analysis area), is an active public water supply with surface water intake. There is also one active and one inactive non-community, water supply well associated with a camp and campground, respectively, within the direct and indirect effect analysis area (NHDES 2014). The proposed activities would not change water quantity to an extent that would affect instream flows or water supplies. Mobilization of detrimental amounts of chemicals to groundwater or surface water would be prevented by application of BMPs and locating disturbance away from surface water. The proposed activities involve little or no use of toxic chemicals. Log landings, where petroleum products may occur, would be located outside of any wellhead protection areas. Servicing of vehicles using petroleum products, hydraulic fluid, etc. must also be done in compliance with appropriate state BMPs for spill prevention and waste disposal.

This project would not have detrimental impacts on floodplains. The minimal amount of new infrastructure proposed would be outside of floodplains (Table 21).

**Wildlife**

The following discussion incorporates by reference the analysis and conclusions documented in the *Deer Ridge Integrated Resource Project Wildlife Report and Summary of Biological Evaluation for Federally Threatened and Endangered Species (TES) and Regional Forester Sensitive Species (RFSS)* (Rowse 2016) located in the Project Record.

**Measuring Effects to Wildlife Habitat and Species and Special Habitat Features**

There are many elements used to assess the effects of proposed activities on wildlife species and habitat and special habitat features (Table 23). Many of these elements are discussed in the Forest Plan (USDA Forest Service 2005a) and the FEIS (USDA Forest Service 2005b), others are the result of internal concerns of resource specialists, external concerns brought forward by the public or other resource agencies, or from meeting policy from USDA Forest Service, or legal direction such as the Endangered Species Act.
Table 23. Indicators used to measure effects to wildlife habitat and species, and special habitat features

<table>
<thead>
<tr>
<th>Resource Element</th>
<th>Resource Indicator</th>
<th>Measure (Quantify if possible)</th>
<th>Reason for Resource Element</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species/Individuals</td>
<td>Direct disturbance from project activities</td>
<td>Qualitative expectations based on activity and operating seasons.</td>
<td>Internal Issue</td>
<td>Forest Plan USDA Forest Service 2005a, Chapter 1, page 8, Chapter 2, pp 33-36.</td>
</tr>
<tr>
<td>HMU Objectives for Habitat Diversity</td>
<td>Habitat Types and Age Classes</td>
<td>Acres of habitat change short and long term. Effects to wildlife species.</td>
<td>Purpose and Need</td>
<td>Forest Plan USDA Forest Service 2005a, Chapter 1, pp. 20 - 21</td>
</tr>
<tr>
<td>Management Indicator Species (MIS)</td>
<td>Changes in Indicator Habitat.</td>
<td>Potential changes to species presence and abundance due to project activities and operating seasons.</td>
<td>Purpose and Need</td>
<td>Forest Plan USDA Forest Service 2005c, Chapter 3, pp 166-187</td>
</tr>
<tr>
<td>Dead and Down Wood</td>
<td>Reduction in dead and down wood</td>
<td>Acres of clearcuts and patch cuts</td>
<td>Internal Issue</td>
<td>Forest Plan USDA Forest Service 2005a, Chapter 2, pp 35-36.</td>
</tr>
<tr>
<td>Natural Communities</td>
<td>Hydrology</td>
<td>Extent which these features are maintained.</td>
<td>Internal Issue</td>
<td>Forest Plan USDA Forest Service 2005a, Chapter 2, pp13, 32.</td>
</tr>
<tr>
<td>Vernal Pools</td>
<td>Hydrology and shading.</td>
<td>Extent which these features are maintained.</td>
<td>Internal Issue</td>
<td>Forest Plan Standards and Guidelines. USDA Forest Service 2005a, Chapter 2, pp. 24-26.</td>
</tr>
</tbody>
</table>

**Affected Environment for Wildlife**

Regional literature and experts indicate that maintaining populations of wildlife and plant species native to northern New England means providing a wide variety of habitats across the landscape, including various forest types, age classes, and non-forested openings. All of these forest habitat types (softwood, northern hardwood etc.) and structural characteristics (mature forest, brushy openings etc.) provide essential habitat for various wildlife species in New England (DeGraaf and Yamasaki 2001). The Forest Plan established Forest-wide habitat composition and age-class goals and objectives that provide habitat diversity (USDA Forest Service 2005a, p. 1-20 to 21). These goals and objectives are based on an interdisciplinary discussion about the natural history and habitat requirements of the wildlife species that inhabit the Forest and the land capability and disturbance patterns that influence forest habitat across the Forest. A detailed description of wildlife natural
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history (DeGraaf and Yamasaki 2001) and the ecological perspective used during Forest Plan Revision to develop habitat goals and objectives is available in WMNF Ecological Approach (USDA Forest Service 2002a) and the FEIS (USDA Forest Service 2005b, p. 3-73 to 112, 3-166 to 207).

More specifically the objectives of wildlife habitat management across the Forest are to:

- Manage forest composition for the broad habitat types of northern hardwood, mixed hardwood-softwood, and spruce-fir forest, consistent with ecological land type capability.
- Maintain less common habitat types, such as aspen-birch, and oak-pine, where ecologically feasible and desirable to provide for native and desired non-native wildlife and plant species.
- Maintain high quality mature forest and old forest habitats on a majority of the forest
- Provide regeneration age forest and open habitats to sustain biological diversity and support species that prefer those habitats.

The WMNF is zoned into different Management Areas (USDA Forest Service 2005a, Preface, pp. 4-5). The WMNF uses Habitat Management Units (HMUs) as a tool to ensure that there is a connection between landscape-levels goals and objectives and project-level ecological conditions during project development (USDA Forest Service 2002b). Input from internal and external forestry and wildlife experts supported the HMU approach as a reasonable way to help the forest achieve our habitat objectives. A more detailed discussion of the role of Habitat Management Units in achieving the desired future condition is available in the “Terrestrial Habitat Management Document” (USDA Forest Service 2002b).

The Best Available Science was used in the 2005 Forest Plan to develop goals, objectives, standards, and guidelines to manage wildlife species and their habitats. Dividing the Forest into discrete Habitat Management Units allows management activities to more effectively provide a range of habitat types and forest age classes across the Forest as mandated by the Forest Plan. The analysis presented here tiers to the Record of Decision for the Forest Plan, it’s FEIS and supporting documents and incorporates them by reference (USDA Forest Service 2002b, USDA Forest Service 2005a, USDA Forest Service 2005b, USDA Forest Service 2005c pp. 3-73 to 3-112, and 2-165 to 3-207). Additionally current literature, site specific monitoring and
field reviews (cited throughout this report) also were used to assess effects to wildlife in the Project Area. The rationale that describes how HMU boundaries are delineated is described in USDA Forest Service 2002b.

**South Pond South HMU**

The Project Area is the area within the South Pond South HMU where there are proposed activities. The South Pond South HMU (Figure 25) contains approximately 9,000 acres with approximately 6,300 acres in Management Area 2.1 (General Forest Management) and approximately 2,700 acres in Management Areas that are not open to timber harvest (MA 6.1 Semi-Primitive Recreation; approximately 500 acres and MA 6.2 Semi-Primitive Non-Motorized Recreation; approximately 2200 acres).
The most abundant habitat type in the South Pond South HMU is mature northern hardwoods followed by mature spruce/fir, aspen/birch, spruce/fir, and mixedwood (Figure 26 and Figure 27) (Rowse 2015). Analysis of the South Pond South HMU indicates approximately 80% of the 2.1 land in the HMU is in the mature age class. There is an opportunity for old forest to develop on lands in MA 2.1 that are unsuitable for timber harvest (steep & rocky) (approximately 800 acres) and on lands outside MA 2.1. At the landscape level, this habitat is left to the natural process of forest succession for development of old-growth characteristics available to wildlife species that use cavities, snags, downed large woody material, fungi, moss, lichens, insects, and closed canopy with sparse under-story conditions. None of the mature habitat in the South Pond South HMU is old growth forest as defined in USDA Forest Service 2005a, Glossary, Page 21.

**Figure 2. Existing Habitat in MA 2.1 - 6289 acres**

Approximately six hundred acres of aspen-birch habitat is present in the MA 2.1 lands of the HMU. There is a particular concern that aspen-birch will be lost on the WMNF landscape if it is not regenerated during the first decade of the Forest Plan (2005-2015) (USDA Forest Service 2005b, USDA Forest Service 2002b, page 5). This was identified as a concern during Forest Plan Revision. Aspen-birch is a pioneer type that regenerates from large natural or man-made disturbances (Perala 1977, Safford and Jacobs 1983).
Currently there are three permanent wildlife openings in the South Pond South HMU that are maintained in an open condition using prescribed fire and/or mechanical treatment.

Some peaks are present in the HMU including Round and Deer Mountains and Deer Ridge. The Project Area is entirely within the South Pond South Habitat Management Unit (Figure 25), which encompasses several streams including No. Nine, Cold Brook, Fogg, and Fifield Brooks. The Project Area includes several smaller ponds associated with the York Pond Fish Hatchery, and scattered smaller wetlands. York Pond is adjacent to the Project Area. The Project Area also includes a number of Forest Roads, portions of the Mill Brook and Unknown Pond hiking trails, and the Rocky Pond Snowmobile Trail. The York Pond Fish Hatchery and the Barry Conservation Camp are the main structures in the Project Area.

A preliminary review of the South Pond South HMU historical records, vegetation databases and maps found differences between the current distribution and the desired condition of forest types and age classes within Management Area 2.1 (Table 24). Within this HMU, there is a lack of regeneration forest habitat for all habitat types (where most trees are 0-9 years old with less than 30 square feet of basal area in the mature overstory), an adequate amount of young habitat, and an abundance of mature habitat when considering desired habitat (Table 24). These data also provide information on land capability in the South Pond South HMU. This analysis found that approximately 50 percent of the area would favor
northern hardwoods, 30 percent of the area would favor mixedwood, and 18% of the area would favor softwoods. There is an abundance of northern hardwood forest growing on soils that favor mixedwood (Rowse 2015). The Forest Plan indicates that we should strive to have habitat type match land capability on a majority of our lands to provide a diversity of habitats across the Forest, including various forest types, age classes, and non-forested habitats (USDA Forest Service 2005a, pp. 1-20 to 1-21).

Potential habitat objectives were developed for South Pond South HMU based on ecological site characteristics (Rowse 2015). Table 24 displays existing habitat condition and potential natural vegetation. The greatest disparity in this HMU is the lack of existing mixedwood habitat versus the potential ecological site conditions that favor mixedwood habitat. Many sites that have a potential to grow mixedwood habitat are currently northern hardwood.
Table 24. South Pond South HMU habitat condition and Forest Plan proposed objectives by habitat type (Compartments 9, 10, 23)

<table>
<thead>
<tr>
<th>Habitat Type</th>
<th>Current Condition (Approx. Acres)</th>
<th>Current Condition (Total Acres)</th>
<th>Potential Acres</th>
<th>Regeneration Acres</th>
<th>Young Acres</th>
<th>Mature Acres</th>
<th>MA 2.1 lands unsuitable for harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E</td>
<td>E</td>
<td>P</td>
<td>E</td>
<td>D</td>
<td>E</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>920 (34%)</td>
<td>3719 (59%)</td>
<td>2602 (41%)</td>
<td>0</td>
<td>148-186 (4-5%)</td>
<td>656 (18%)</td>
<td>557-744 (15-20%)</td>
</tr>
<tr>
<td>Hardwood</td>
<td>178 (6%)</td>
<td>590 (9%)</td>
<td>1839 (29%)</td>
<td>0</td>
<td>6 (1%)</td>
<td>41 (7%)</td>
<td>29 (5%)</td>
</tr>
<tr>
<td>Mixedwood</td>
<td>249 (9%)</td>
<td>1213 (19%)</td>
<td>1118 (18%)</td>
<td>0</td>
<td>12-24 (1-2%)</td>
<td>90 (7%)</td>
<td>36-73 (3-6%)</td>
</tr>
<tr>
<td>Spruce-Fir</td>
<td>1376 (50%)</td>
<td>597 (9%)</td>
<td>597 (9%)</td>
<td>0</td>
<td>72-90 (12-15%)</td>
<td>197 (33%)</td>
<td>215-269 (36-45%)</td>
</tr>
<tr>
<td>Aspen-birch</td>
<td>0</td>
<td>13 managed (&lt;1%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wildlife Opening</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-forest</td>
<td>0</td>
<td>157 (2%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>2725 (approx.)</td>
<td>6289</td>
<td>0</td>
<td>238-306</td>
<td>984</td>
<td>837-1115</td>
<td>5135 (3878-4223)</td>
</tr>
</tbody>
</table>

E = existing acres. D = desired acres based on Forest Plan objectives as well as regeneration objectives described on Pages 7 and 8 of this report. P = Potential Natural Vegetation acres based on ecological land types (described in USDA Forest Service 2002a (revised 2007). Current condition data was derived from HMU_analysis_tool.mdb. This program relies on data stored in the Forest’s FS.Veg Spatial database, which was updated with information gathered during stand examinations and field reviews in the Project Area prior to running the program. See footnotes.

Footnotes for Table 24.
1. Age classes for habitat types are defined in Appendix D of the Forest Plan (USDA Forest Service 2005a). There is no real objective for young age class, although it is listed with other age classes. It is the result of even-aged harvests and is included to display an age class distribution that totals close to 100 percent.
2. Existing and Desired age class objectives are based on existing acres.
3. Most acres outside of MA 2.1 are mature forest, regardless of type, though natural disturbance may result in small amounts of regeneration and young age forest.
4. Unsuitable for harvest = MA 2.1 forest land not managed for timber production because of various reasons (see USDA Forest Service 2005a, Glossary, page 33). Acres of land unsuitable for harvest are shown in separate column for clarity, but also are included in the age break out to the left.
5. Managed wildlife openings (maintained in an open condition every three to five years by prescribed fire, mowing, or hand brushing) in South Pond South HMU include: 10/67 Fifield Brook WLO - 6 acs, 10/86 Lower Betty Brook - 2 acs, 10/111 Upper Betty Brook - 5 acs
The desired condition for this HMU (Rowse 2015) is to increase regeneration forest habitat, increase the quality of permanent wildlife openings where possible, maintain mature habitat, increase mixedwood habitat where ecologically feasible, and maintain or slightly increase aspen-birch across the landscape (Rowse 2015). Field reviews in the Deer Ridge Project Area (area in the South Pond South HMU where proposed activities would occur) found habitat conditions where silvicultural treatments harvest could be used to meet some of the desired habitat goals for the South Pond South HMU including (1) increasing regeneration forest habitat, (2) managing for aspen/birch (3) matching habitat types to land capability, (3) maintaining mature habitat, and (5) increasing the size of existing permanent wildlife openings.

Management Indicator Species (MIS)

The WMNF uses Management Indicator Species (MIS) to track five of the major habitats outlined in the HMU. MIS were chosen to evaluate how wildlife are affected by timber harvest. MIS populations are tracked forest wide. These species, their corresponding habitats, forest-wide monitoring and population trends are discussed in detail in the FEIS (USDA Forest Service 2005b, Chapter 3, pages 166-187). The most recent population trends are considered in forest monitoring report (USDA Forest Service 2012a). Table 25 discloses the WMNF MIS that have potential to and/or have documented occurrence within suitable habitat of the Project Area at various time of the year.

Measuring Effects to Wildlife

The relevant elements of wildlife and habitat (Table 23) for the Deer Ridge project are:

1. HMU objectives – effects measured by changes in habitat types and age classes.
2. Species/individuals – effects are qualitative expectations based on activity and operating seasons.

Although MIS trends and changes to MIS habitats are noted in this analysis, conclusions regarding harvest effects on wildlife habitat are based on Forest-level monitoring of management indicator species. Project level discussions in this document are tiered to the FEIS (USDA Forest Service 2005b).
Table 25. Potential WMNF MIS in the South Pond South Project Area

<table>
<thead>
<tr>
<th>MIS</th>
<th>Representative Habitat</th>
<th>Population trends for Maine and New Hampshire</th>
<th>Probability of Occurrence in the South Pond South Project Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chestnut-sided warbler</td>
<td>Regeneration-age northern hardwood (NH) (predominantly sapling stages of NH but could include some scattered softwood)</td>
<td>BBS shows a significant decline population in New Hampshire and Maine. Forest monitoring shows a significant decline. Hunt et al. (2011) shows a declining population in NH.</td>
<td>No regeneration-age hardwood habitat occurs in MA 2.1 lands in the Project Area. Chestnut-sided warblers have been detected during routine field visits in permanent wildlife openings and in other small patches of disturbance habitat.</td>
</tr>
<tr>
<td>Scarlet Tanager</td>
<td>Mature hardwoods (predominantly NH but could include mixedwood)</td>
<td>BBS shows a declining population in New Hampshire and Maine. This was significant for New Hampshire. Forest monitoring shows a significant decline. Hunt et al. (2011) shows a declining population in NH.</td>
<td>Approximately 3,500 acres of representative habitat occurs in MA 2.1 lands in the Project Area. Scarlet tanagers have been detected in and adjacent to the Project Area during routine field visits.</td>
</tr>
<tr>
<td>Magnolia Warbler</td>
<td>Regeneration-age softwood (predominantly spruce-fir but could include some hardwoods)</td>
<td>BBS shows stable populations in New Hampshire and Maine. Forest monitoring shows a stable trend. Hunt et al. (2011) shows a stable population in NH.</td>
<td>Magnolia warblers have been observed adjacent to the Project Area and are likely present in the Project Area.</td>
</tr>
<tr>
<td>Blackburnian Warbler</td>
<td>Mature softwood (predominantly spruce-fir but could include some hardwoods)</td>
<td>BBS shows a declining population in Maine and New Hampshire. Forest monitoring shows no significant statistical trend. Visual monitoring of Forest data indicates a stable trend. Hunt et al. (2011) shows a stable population in NH.</td>
<td>Approximately 1,100 acres of representative habitat occurs in MA 2.1 lands in the Project Area, with additional inclusions of spruce-fir in other habitat types. Blackburnian warblers have been detected in and adjacent to the Project Area during routine field visits.</td>
</tr>
<tr>
<td>Ruffed Grouse</td>
<td>All ages of Aspen-Birch</td>
<td>BBS shows a declining population in New Hampshire and Maine. Forest monitoring does not indicate a statistically significant trend. Hunt et al. (2011) shows a declining population in NH.</td>
<td>Approximately 600 acres of representative habitat occurs in MA 2.1 land in the Project Area. Ruffed grouse have been detected in and adjacent to the Project Area during routine field visits.</td>
</tr>
</tbody>
</table>


Direct and Indirect Effects for Wildlife Habitat and Species

The area analyzed for direct and indirect effects on wildlife is the Project Area. It includes stands proposed for harvest, road reconstruction and
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maintenance, skid trail and landing construction and reconstruction; gravel pit expansion, recreation projects to expand a hiking trail parking lot; and installation of fire lines and proposed prescribed fire to maintain permanent wildlife openings. This encompasses approximately 2400 acres in the HMU.

The temporal scope for direct effects on wildlife is the time period that encompasses active harvest operations and connected actions because this is when wildlife species would most likely be affected by the proposed activities. The analysis timeframe for direct and indirect effects on wildlife is seven to ten years, because this is when species might be impacted by proposed activities and because this is the timespan for regeneration habitat after it is created by timber harvest. Long-term goals to convert habitats (i.e., hardwoods to softwood) would take several decades.

Alternative 1: No Action

There would be no direct, indirect, or cumulative effects to wildlife species or habitat as no timber harvest or other proposed activities would occur that would cause openings in the forest canopy, tree removal, residual tree damage, snow or soil compaction, prescribed fire, noise from heavy equipment, or increased human use.

Wildlife Habitat

A mixture of young and mature northern hardwoods, and mature mixedwood and spruce/fir intermixed with aspen-birch would continue to dominate the South Pond South HMU with no regeneration habitat (Table 24). Habitat diversity would not be increased in the South Pond South HMU with regeneration harvests, or increased mixedwood and aspen habitat. Only natural processes would influence changes in existing habitat conditions. Over time the Forest would mature. Forest openings would result from mortality of individual trees or disturbance from other natural events (e.g. storm, fire, infestation). Dead or down wood or small groups of trees may continue to fall to the ground and open limited portions of forest floor to sunlight and regeneration. Patches of mature aspen-birch that are present would start to die-out over time. As aspen-birch die out spruce-fir or hardwoods depending on soil type would start to dominate these sites. The existing three wildlife openings in the South Pond South HMU would continue to be maintained every 3 to 5 years with prescribed fire or mechanical treatments. The chance to expand these openings and
increase their quality would be lost. These areas would continue to provide habitat for species that favor openings for all or part of the year including chestnut-sided warbler, mourning warbler, and common yellowthroat.

The ability to meet HMU goals outlined in the Forest Plan (USDA Forest Service, 2005a, Chapter 1, pages 20-21) and discussed in the South Pond South HMU Rationale (Rowse 2015) is somewhat uncertain in the reasonably foreseeable future. With no silvicultural treatments, this alternative would not make progress toward the desired condition in habitat or age class diversity, the Forest is well below Forest Plan objectives.

Management Indicator Species

With no silvicultural treatments, this Alternative would favor wildlife species associated with mature northern hardwoods, mixedwood, and spruce/fir including MIS scarlet tanager and Blackburnian warbler (Table 25). Numbers of these species would be expected to be maintained and potentially increase if forests continue to mature in this HMU.

There would be no regeneration forest habitat created by the proposed clearcuts for species that favor aspen-birch or northern hardwood such as chestnut-sided warbler and ruffed grouse (MIS for these forest types). Species associated with aspen-birch, including ruffed grouse (MIS), and species associated with forest regeneration habitat include chestnut-sided warbler (MIS) and magnolia warbler (MIS) would remain stable or decline in the South Pond South HMU. Existing permanent wildlife openings would continue to provide some regeneration habitat for these species (Table 25).

Numbers of individuals or species may fluctuate in the Project Area; however, no population is expected to change to the extent the population trend of that species would be altered within its range.

Transportation Systems and Gravel Pit Expansion

No roads would be reconstructed and landings, or skid trails would be constructed or reconstructed. No temporary bridges would be installed. There would be no change to public access to the Project Area and no effects to wildlife from increased human presence.
Prescribed Fire

Wildlife Openings: The existing permanent wildlife openings would continue to be maintained every three to five years using hand brushing and/or prescribed fire. Since these openings would not be expanded there would not an increase in the amount of acres being treated with hand brushing or prescribed fire or installation of new fire lines. As a result, there would not be increased disturbance to wildlife. There would be no opportunity to increase the size of the existing permanent wildlife openings. An indirect effect is that there would be less scrub shrub habitat for wildlife. This would not meet the Forest Plan goal of providing open habitats for species that prefer this type of habitat (USDA Forest Service 2005a, Chapter 1, page 20). The existing openings would continue to provide a source of scrub/shrub habitat and soft mast such as raspberries over the years.

Recreation

There would not be any disturbance of habitat where the parking area would be expanded. The amount of habitat disturbed is estimated to be approximately one quarter of an acre so any effects would be relatively minor. Any disturbance to wildlife or attracting nuisance wildlife at the existing parking area would continue.

Alternative 2: Proposed Action

Direct Effects to Species/Individuals

Active timber harvest operations, operating seasons and other actions under the Proposed Action including road reconstruction, skid trail and landing construction and reconstruction, temporary bridge installation, non-commercial harvest of residual trees, parking lot expansion, gravel pit expansion, installation of fire lines, and prescribed burning of expanded permanent wildlife openings could have direct effects to wildlife species and habitat. When operations are active, negative effects could include displacing wildlife, including nesting birds or altering travel corridors or mobility of some species, including amphibians, small and large mammals. Beneficial effects of harvesting could include increased mobility for some species on snow compacted by skidder traffic and additional browse for wildlife from residual treetops.

In clearcut and patch-cut units site conditions would be hotter and drier for about 2 to 4 years after cutting (Fay et al. 1994). This could adversely
affect some species of amphibians, such as red-backed salamander (DeMaynadier and Hunter 1998) and small mammals after harvests are completed. Individual salamanders in large unshaded openings may be more vulnerable to predation, they may burrow underground to escape the increase in temperature, or they may avoid the opening. This would be partially mitigated by leaving reserve patches of trees (USDA Forest Service 2005a, Chapter 2, Pages 35-36, Wildlife Reserve Trees S-1).

Reptiles such as snakes would find warmer conditions favorable. Increased browse and soft mast (berries) in clearcuts would attract species within a few years after harvest. There would likely be an increase in insects, small mammals, certain species of birds, and mammals such as fox, white-tailed deer, black bear, and moose would inhabit these areas for all or part of the year (Costello et al. 2000, Fuller and DeStefano 2003, King et al. 2001, Thompson et al. 2001) (Table 26).

Table 26. Harvest treatments (acres) proposed under Alternative 2.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearcut/Patchcut</td>
<td>226</td>
</tr>
<tr>
<td>PWO Expansion</td>
<td>33</td>
</tr>
<tr>
<td>Group Selection (Net Acres)</td>
<td>1566 (264)</td>
</tr>
<tr>
<td>Individual Tree Selection</td>
<td>10</td>
</tr>
<tr>
<td>Individual Tree /Group Selection</td>
<td>155</td>
</tr>
<tr>
<td>Overstory Removal</td>
<td>116</td>
</tr>
<tr>
<td>Shelterwood Prep</td>
<td>95</td>
</tr>
<tr>
<td>Salvage</td>
<td>93</td>
</tr>
<tr>
<td>Total Acres (Net Acres)</td>
<td>2373 (992)</td>
</tr>
<tr>
<td>Release Treatments</td>
<td>540</td>
</tr>
</tbody>
</table>

TOTAL = total area treated. Net Acres = total areas where trees will be harvested. For example, in group selection may harvest a 100 Acre stand but total acres in groups may only be 20 acres

Partial cuts (group selection, individual tree selection, salvage and shelterwood prep) proposed under the Proposed Action would create disturbance, open the canopy to partial sunlight, and release the understory in northern hardwood, aspen/birch, mixedwood, and spruce-fir. Most treated stands would still be favored by wildlife species associated with mature age class however there would be less species associated with closed canopy forest under this regime and more species that favor partial canopy closure (DeGraaf et al. 2006, Pages 64-67). Increased understory vegetation would provide more nesting habitat for
certain bird species, increase hiding cover for some species of wildlife, and increase browse availability for wildlife that forage on young saplings or soft mast such as raspberries. Larger group cuts up to 2 acres used to regenerate northern hardwoods would result in small patches of regeneration habitat intermixed with patches of mature habitat. While these patches might be used by bird species that favor regeneration habitat, some research has shown that small patches of regeneration habitat do not provide quality habitat for this group of species (King et al 2001, King and DeGraaf 2004). Group selection also might increase edge habitat within mature forest resulting in higher predation rates on nests of forest birds (King et al. 1998, 2001).

Dense midstory and understory trees may inhibit regeneration of other tree species in the Project Area. These trees would be cut following implementation of the commercial harvest in all even-aged regeneration and group selection harvests and one shelterwood harvest. Release treatments would be implemented using hand labor (chainsaws and brush saws). These treatments would likely take place during the summer and early fall. Herbaceous and shrubby understory would be affected by these treatments by increased light in the stand but they would not be targeted for cutting. Effects would include disturbing or displacing wildlife that use mid and understory trees for nesting, roosting, foraging or altering travel corridors and mobility of some species such as amphibians, small mammals, and large mammals. Wildlife would be most vulnerable during the nesting season when young are immobile. Most individuals that are mobile would only be temporarily displaced and either return to the stand or seek an area that better meets their habitat needs. The increase in small-diameter slash on the forest floor may temporarily benefit species such as rodents, amphibians, and some nesting birds by providing cover as well as increasing available browse for species such as white-tailed deer, moose, and snowshoe hare.

Operating Seasons
The season in which a unit is harvested may directly affect wildlife, especially if harvest occurs during critical times in the life cycle of a species. Table 27. Proposed acres of harvest by season shows the acres of harvest by operating season. Breeding, young rearing, feeding, and winter survival are critical times for wildlife. Individuals could potentially be displaced or die during any season of operation. Early summer harvest (June-August)
could affect species that use trees for nesting, roosting, cover, and foraging such as breeding birds, bats, and ground dwelling animals (mammals, amphibians, and reptiles). Individuals would be most vulnerable when young are immobile and cannot move away from an area. Late summer harvest (August-October) would affect fewer nesting species but could potentially affect autumn breeding species, including some amphibians, species that feed on fall mast (acorns and beechnuts) such as black bear, roosting bats although many leave their summer roosts and start to swarm near winter hibernacula, and small ground-dwelling mammals. Certain species could be affected by winter harvest (December-March). Some species, including owls, breed in winter. White-tailed deer gather, or “yard”, in areas of lowland conifers in the winter, where cover and warmer temperatures provide protection from the elements, and where they would also be vulnerable to disturbance during this time of year. Increased browse from harvested tops may actually provide an additional food source for deer in winter. Species which use cavities in winter, such as chickadees and nuthatches; or species which den, such as squirrels and raccoons, could be affected if roost or cavity trees were harvested. Raptors start to breed in February and March, with young fledging in June and July (Society for the Protection of New Hampshire Forests (Bennett 2010), so they could be affected by both winter and early summer harvest. Implementation would occur over a span of ten years. These effects would only occur on a small portion of the Project Area during any given season.

Table 27. Proposed acres of harvest by season.

<table>
<thead>
<tr>
<th>Total Acres (Net Acres)</th>
<th>Alt. 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer/Winter (Final Harvest)</td>
<td>152</td>
</tr>
<tr>
<td>Late Summer/Winter</td>
<td>664   (268)</td>
</tr>
<tr>
<td>Winter Only</td>
<td>1255  (349)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2,373 (992)</td>
</tr>
</tbody>
</table>

TOTAL = total area of disturbance. Net Acres = total acres where trees will be harvested. Acres are approximate.
*Operating Season: Operations could begin early or extend beyond the normal season if ground conditions and bark conditions allow (i.e., ground is dry or frozen or bark is tightened).
S = summer harvest is typically 6/30 – 10/15
LS = late summer harvest is typically 8/15 - 10/15
W = winter harvest is typically 12/15 - 3/30
Dead and Down Wood

The increase in slash on the ground during active harvest operations would provide hiding cover and browse for some species of wildlife although it might inhibit the movement of some larger species of wildlife.

In stands with proposed clearcuts and patch cuts (Figure 5 and Table 26. Harvest treatments (acres) proposed under Alternative 2), there would be a lower recruitment of large dead and down wood (>11” DBH) between 10 and 60 years (Fay et al. 1994). This could result in a decrease in the number of wildlife trees present in clearcut units during this time frame. (Table 26). This effect would be minor as Forest Plan Standards and Guidelines (USDA Forest Service 2005a, Chapter 2, Pages 35-36) require that reserve areas with snags, wildlife cavity trees, and downed logs be retained in clearcuts. Moreover, residual trees in all other harvest units would continue to supply a component of standing and down woody material as trees die, branches break, and annual litter builds up on the ground. There should be an adequate amount of dead and down wood available to wildlife species upon completion of timber harvesting activities under the Proposed Action. A recent review of reserve areas in clearcuts found that the Forest is doing a good to excellent job of identifying reserve areas that contain “quality wildlife features” such as multiple snags and large wildlife trees (USDA Forest Service 2011, pages 25-27).

Whole tree harvesting would not be allowed under any of the Proposed Action. Trees would be dragged to the landing, limbed, and the tops dragged back in the woods. Unless tops are placed along skid trails and compacted, they would provide a one-time input of treetops and branches for species such as moose and white-tailed deer that would make use of this browse during the winter months.

Wildlife Openings

The wildlife openings would be maintained in the future every 3 to 5 years by prescribed fire or mechanical equipment such as chain saws and/or brush saws. A prescribed burn plan would be developed for these areas that would include site-specific mitigation measures for resource protection, fire management, and safety of firefighters. Installation of fire lines using heavy equipment may cause some temporary disturbance to wildlife. This disturbance would be of short duration. Prescribed fire may cause some local reduction of individuals in an area in the spring (March
to May) and/or fall (September to November) with the most effect on species that are not mobile (Lyon et al. 2000, Anderson 1994). Direct effects of prescribed fire in the expanded wildlife openings may vary for different species and conditions (Anderson 1994 (modified in 2001)). In the spring, burning usually occurs before most wildlife species start to nest in these areas. In general, while some evidence of vertebrate mortality has been reported, the most common opinion is that vertebrates are rarely killed in fires (Lyon et al. 2000). Small mammals and amphibians may be able to find refuge in a burrow or leave the area since the duration of the burn is short. Research indicates that a one or two successive prescribed fires might not cause significant harm to woodland salamanders, however salamanders might be affected if successive multiple fires occurred across a landscape (Ford et al. 2010). Wildlife species would likely return to these sites upon completion of the work.

Prescribed fire and mechanical treatments would cause a temporary loss of understory which would result in a temporary loss of habitat for wildlife species associated with understory vegetation (including regenerating forest, shrub layers, herbaceous ground vegetation, and soft mast). However herbaceous and shrubby vegetation would grow back quickly providing this habitat condition until the site is burned or mechanically treated again. Fire may improve habitat for some wildlife, for instance, a recent study found that nocturnal insect prey abundance increased in the growing season after fire in mixed-oak forest. Some wildlife openings have residual trees left in them. Fire also may increase the number of snags in an area that are in a more open condition and have better solar gain (Dickinson et al 2010).

**Transportation Systems and Gravel Pit Expansion**

Road reconstruction and maintenance, bridge installments, skid trail and landing construction and reconstruction, and gravel pit expansion may cause some disturbance of wildlife. Most likely any wildlife in the area would temporarily move away from a work site. While large species would likely vacate the area temporarily, small species may burrow or hide and be directly impacted during reconstruction or construction. Benefits could offset some of the disturbance from the presence of people and heavy equipment. Use of roads, skid trails, and landings could increase mobility for some species on snow compacted by skidders and other heavy equipment. Many larger animals including moose, white-tailed deer,
Deer Ridge Integrated Resource Project

coyotes, and fox will travel along roads and trails to access parts of their territories. Some species of bats utilize roads and trails as travel ways. Northern goshawks and other raptors often nest adjacent to roads, trails, or openings. Wildlife will forage on vegetation and soft mast such as raspberries along the sides of roads, skid trails, or in landings. All roads on national forest lands that are currently barricaded would remain so after completion of Proposed Action and temporary bridges would be removed so any disturbance of wildlife from increased human presence in the area would be temporary. These impacts would likely affect a small number of individuals (Table 28).

Table 28. Proposed changes to the transportation system.

<table>
<thead>
<tr>
<th>Total</th>
<th>Alternative 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Maintenance (miles)</td>
<td>3.4</td>
</tr>
<tr>
<td>Road reconstruction (miles)</td>
<td>5.1</td>
</tr>
<tr>
<td>Temporary Bridge Installments</td>
<td>2</td>
</tr>
<tr>
<td>Landings (total at approx. 0.5 ac each)</td>
<td>25 Exist, 3 New</td>
</tr>
<tr>
<td>Skid Trails (miles)</td>
<td>29</td>
</tr>
<tr>
<td>Gravel Pit Expansion (acres)</td>
<td>1</td>
</tr>
</tbody>
</table>

Recreation

Direct effects of increasing the size of the parking lot would cause some minor disturbance of wildlife species in the vicinity of the work from increased noise and human presence during construction activities. There would be no indirect effects from reconfiguration of the parking area as human use would not change from what currently exists. Any wildlife nuisance problems from leaving food and garbage at the parking area would continue as daytime use would not likely change.

Indirect Effects to Wildlife Habitat

The Proposed Action would increase habitat diversity for wildlife in the Project Area (Table 29). Greater habitat diversity increases the number of wildlife species using the Project Area (DeGraaf et al. 2006). Mature and young northern hardwoods, mature mixedwood, spruce/fir would continue to dominate the Project Area. Some of the objectives for providing wildlife habitat diversity, including establishing regeneration forest habitat, maintaining aspen-birch, maintaining mature habitat, and favoring mixedwood on mixedwood sites would be met. Clearcuts and patch cuts would create regeneration forest habitat. Habitat diversity
would be enhanced as even-aged regeneration harvests increase the horizontal patchiness of the forest. Partial cuts (all but clearcut, patch cut, overstory removal) would create disturbance, open the canopy to partial sunlight, and release the understory. Proposed non-commercial treatments in clearcuts and patch cuts after commercial timber harvest would create the structural conditions favored by wildlife species that favor open habitats and displace species favoring mature habitats.

Approximately 75% of lands in the HMU would still remain in a mature condition under the Proposed Action while approximately 4% would be in regeneration habitat. There would be a long term goal to increase mixedwood habitat types under the Proposed Action.

**Scrub/Shrub or Regeneration Forest Habitat**

The South Pond South HMU objective is to increase regeneration age class by approximately 300 acres while maintaining most of the habitat in the MA 2.1 portion of the HMU in an older age class (Rowse and Williams 2015). Regeneration age class has a structural condition that is used by wildlife species that prefer scrub/shrub habitat (Schlossberg and King 2007). It can occur from natural disturbance on the landscape but most often this type of habitat is created by human activities such as logging (Schlossberg and King 2007). Clearcut and patch cuts would create habitat structure (defined as regeneration forest habitat in Forest Plan glossary (USDA Forest Service 2005a, Glossary, page 23) that is similar to what is created by natural disturbance factors in the Northeast such as wind and disease. Even some of the larger group cuts will provide an element of this habitat type that will be used by wildlife that favors this structural condition. There is currently very little regeneration age class in this HMU. This habitat condition is ephemeral on the landscape as forests in the Northeast regenerate quickly and within a decade or so the structural characteristics favorable to this suite of species no longer exist.
Table 29. Effects of the Proposed Action (Alternative 2) on the South Pond South HMU

<table>
<thead>
<tr>
<th>Forest Type</th>
<th>Total Acres in other MAs</th>
<th>Total Acres in MA 2.1</th>
<th>REGENERATION ACRES</th>
<th>YOUNG ACRES</th>
<th>MATURE ACRES</th>
<th>Unsuitable for harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Change from Action Alternative</td>
<td>Changes from Action Alternative</td>
<td>Changes from Action Alternative</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>E</td>
<td>P</td>
<td>E</td>
<td>D</td>
<td>Alt 2</td>
</tr>
<tr>
<td>NH</td>
<td>920</td>
<td>3719</td>
<td>2602</td>
<td>0</td>
<td>186</td>
<td>179</td>
</tr>
<tr>
<td>Mxd</td>
<td>178</td>
<td>590</td>
<td>1839</td>
<td>0</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>S/F</td>
<td>249</td>
<td>1213</td>
<td>1118</td>
<td>0</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>Asp/Bir</td>
<td>1376</td>
<td>597</td>
<td>597</td>
<td>0</td>
<td>90</td>
<td>47</td>
</tr>
<tr>
<td>Non-forest</td>
<td>0</td>
<td>157</td>
<td>157</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>WLO</td>
<td>0</td>
<td>13</td>
<td>46</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2725</td>
<td>6289</td>
<td>0</td>
<td>306</td>
<td>226</td>
<td></td>
</tr>
</tbody>
</table>

NH = Northern Hardwood  Mxd = Mixedwood  S/F = Spruce/Fir  Asp/Bir = Aspen/Birch  WLO = Managed Wildlife Opening

Disclaimer: numbers are estimated as exact future amounts cannot be guaranteed.

E=existing habitat, D=desired habitat P=potential habitat.

Desired acres based on existing habitat not potential habitat (Rowse 2015) Age class (defined in USDA Forest Service 2005b, Appendix D).

Unsuitable for harvest (USDA Forest Service 2005b, Glossary, page 33). Other = Areas not forested or identified as non-opening such as wetlands or rock.

Increases in mature habitat for mixedwood is a long term conversion from one habitat to another based on ecological capability (Rowse 2015).

Wildlife Openings will be expanded from 13 acres to 46 acres (Fifield Brook WLO 6 acres to 26 acres, Lower Betty WLO 2 acres to 6 acres, Upper Betty WLO 5 acres to 15 acres).
The Proposed Action would create approximately 226 acres of regeneration forest habitat across all habitats (Table 29). The regeneration forest habitat would benefit early wildlife species that favor this habitat condition for approximately ten years post-harvest. Clearcuts intermixed with mature stands would increase horizontal diversity or habitat patchiness in the Project Area. Clearcuts are 11 to 30 acres in size. Patch cuts are openings 2 to 10 acres in size. Larger size openings would benefit a greater number of species that prefer scrub/shrub habitat (King 1998, Chandler R. 2006). Within a few years after a clearcut or patch cut harvest, many species are attracted to the area due to an increased amount of browse from grasses, soft mast such as raspberries, and young saplings. There would likely be an increase in small mammals and insects in these areas which would provide a food source for birds and mammals (Costello et al. 2000, King et al. 2001, Thompson et al. 2001).

Chestnut-sided warbler, the MIS for northern hardwoods and mixedwood regeneration habitat, and ruffed grouse, the MIS for all ages of aspen habitat, would benefit from an increase in this habitat type. Forest-wide bird surveys and Regional breeding bird survey data indicate chestnut-sided and ruffed grouse are declining (Table 25, USDA Forest Service 2005b, Chapter 3, page 170-171, USDA Forest Service 2008, 2012a). Approximately 150 species will use regeneration habitat for all or part of their life cycle (DeGraaf and Yamasaki 2001, DeGraaf et al. 2006). Changes in land use patterns across the Northeast have greatly reduced the availability of this habitat resulting in declines in scrub/shrub birds that require this habitat structure for suitable nesting habitat including brown thrasher, chestnut-sided warbler, and magnolia warbler (Schlossberg and King 2007). The loss of young forest or scrub shrub habitat across the landscape is of great concern (Wildlife Management Institute 2014). Numerous scientific studies in the Northeast have found that a wide variety of wildlife use this type of habitat structure for all or part of their life (Chandler C. 2006, Chandler R. 2006, Chandler et al. 2009, Dettmers 2003, DeGraaf and Yamasaki 2001, DeGraaf and Yamasaki 2003, Fuller and DeStefano 2003, King et al. 2001, Litvaitis 2001, Smetzer et al. 2014, Schlossberg and King 2007, Thompson et al. 2001). The proposed increase in regeneration age habitat at the project scale would not be dramatic enough to change population trends at a landscape scale but might help slow regional declines.
This type of habitat also is important to birds that use mature habitat. Research has found that many newly fledged birds will use these areas during the fall to feed on fruit and insects in order to suitably prepare for migration. The abundant supply of food in these areas may increase post-fledging survival (Chandler C. et al. 2012, Vitz and Rodewald 2006).

Many of the proposed even-aged harvests that create this habitat condition have a dense residual understory of striped maple and beech. Residual understory saplings (trees less than 5 inch dbh) would be cut after commercial harvest is completed in these areas. Without this work, many of these areas would have structural characteristics favored by species that use young stands and not meet the wildlife habitat goal of increasing regeneration or scrub/shrub habitat. There already is sufficient young habitat in the South Pond South HMU (Table 24).

**Northern Hardwoods Habitat**

Northern hardwoods is the most abundant habitat in the HMU. Currently there are approximately 3700 acres of existing northern hardwood in MA 2.1 of the HMU, of which approximately 600 acres are young and 3100 acres are mature (Table 29). One objective for northern hardwoods is to diversify age class structure by increasing regeneration habitat while maintaining increasing young and reducing mature habitat (Rowse 2015). This alternative would increase regeneration habitat type by approximately 179 acres while maintaining approximately 666 acres of young northern hardwoods and 2600 acres of mature northern hardwoods across the landscape on MA 2.1 lands of the HMU (Table 29). The effects of creating regeneration habitat on wildlife are addressed under the section above on scrub-shrub habitat.

There would be a decline in mature northern hardwoods under the Proposed Action but this habitat would still be abundant with approximately 2600 acres present on the landscape in MA 2.1 which would still exceed the desired level of mature northern hardwood in the HMU (Table 29). Both untreated mature stands and stands treated with uneven-aged (group selection, individual tree selection) or intermediate harvests (shelterwood prep, salvage) would continue to provide habitat conditions for wildlife that favor mature habitat (DeGraaf et al 2006, page 99). The Proposed Action proposes approximately 2035 total acres (730 net acres) of uneven-age and intermediate cuts (Table 26).
Scarlet tanager, the MIS for mature northern hardwood and mixedwood, would favor this habitat. Up to 150 species of wildlife will use mature northern hardwoods for all or part of their life cycle with slightly lower number of wildlife species using young stands (DeGraaf and Yamasaki 2001, DeGraaf et al. 2006, Page 100 plus Appendices). Regional population trends for scarlet tanagers have declined over the past four decades with populations declining in some years and increasing in others (USDA Forest Service 2005b, Chapter 3, Page 172). Forest-wide bird surveys and Regional breeding bird survey data indicate scarlet tanagers are declining (3, USDA Forest Service 2005c, Chapter 3, page 170-171, USDA Forest Service 2008a, 2012a). It seems that this species should be staying stable or increasing as mature forest habitat (primarily northern hardwoods and mixedwood) dominates the landscape across the WMNF (USDA Forest Service 2012a). Some explanations might include unusually high numbers of scarlet tanagers reported in the early 1990s are biasing the trend data, habitat fragmentation in other places may be affecting populations levels, or winter habitat in Central America and northern South America might be declining (USDA Forest Service 2012a). Ongoing monitoring of bird populations on the WMNF and across New England will determine if this trend persists. One bird species that has shown a significant increasing trend is the pileated woodpecker which needs large decaying trees to provide wood-boring insect prey (USDA Forest Service 2012a). This trend is consistent with a forest that is maturing over time.

While both untreated and treated stands would generally have structural characteristics that would support wildlife species that favor mature habitat, there would be some differences in treated stands compared to areas with no treatment. These changes in structure (canopy closure, understory composition) would provide some habitat features favored by some wildlife species and not by others (DeGraaf and Yamasaki 2001). Any treatment would create disturbance and open the canopy to partial sunlight. There would be minor changes to shading of the forest floor. Group selection would increase light to the forest floor more than individual tree selection. Over time wildlife diversity may increase in stands where there is a mixed shrub and tree layer, retention of mature trees in the overstory, and increased slash on the ground (DeGraaf et al. 2006). The result would be to diversify stand structure and increase understory vegetation and browse availability for wildlife. The increased
light to the ground may increase the shrub layer in the understory favoring other species of wildlife. Mast trees such as beech would be able to develop larger crowns. Shelterwood prep and salvage harvests proposed would maintain habitat for some wildlife species that favor mature northern hardwoods but this type of harvest generally creates habitat structure that is more open. However, structural conditions favored by some wildlife that prefers regeneration habitat also may be created in these harvest units (King and DeGraaf 2000). As a result, not all species that use mature or regeneration habitat would use these areas after harvest. They would contain a mix of some species from either age class.

There would be a slight increase in young hardwoods from the Proposed Action (Table 29). The number of wildlife species using young stands is less than found in regeneration stands as the shrub layer from the regeneration age class dies off as the trees grow bigger and create more shading or in mature habitat where there is an increase in snags as older trees starting to die. However up to 125 species of wildlife will use young hardwoods for all or part of their life cycle ((DeGraaf and Yamasaki 2001, DeGraaf et al. 2006, page 113 plus Appendices) including veery and American redstart (DeGraaf et al. 2006).

**Aspen/Birch**

Currently there are approximately 597 acres of existing aspen-birch in this HMU of which 400 acres are mature and 197 acres are in the young age class. The South Pond South HMU objective is to maintain or slightly increase aspen/birch across the MA 2.1 landscape (Rowse 2015). Field reviews of the Project Area found some opportunities to regenerate existing aspen to maintain this habitat type in the HMU. There is a particular concern that aspen-birch will be lost across the Forest if it is not regenerated during the first decade of the Forest Plan (USDA Forest service 2005c, USDA Forest Service 2002b). Aspen is a pioneer type that regenerates from large natural or man-made disturbances (Perala 1977, Safford and Jacobs 1983). The Forest Plan recommended increasing aspen regeneration during the first decade after the Plan “to allow the Forest to regenerate higher levels of aspen-birch before it degenerates further.” (USDA Forest Service 2002b).

The Proposed Action would regenerate approximately 47 acres of aspen from mature aspen and young spruce/fir and mature hardwood with an aspen component. Approximately, 197 acres of young and 397 acres of
mature aspen-birch would be maintained across the landscape. Additionally, small inclusions of aspen-birch would be maintained in some northern hardwood, mixedwood, and softwood stands as a within-stand feature using group selection. Some of the older aspen-birch in areas that are not treated would likely succeed to northern hardwoods or softwood as the aspen trees start to die.

Ruffed grouse, the MIS for all ages of aspen-birch, would benefit from these treatments as they would diversify the age structure as well as maintain this habitat in the HMU into the future. Regional breeding bird survey data show a decline in ruffed grouse populations to the north of the Forest and an increase to the south (Table 25, USDA Forest Service 2005b, Chapter 3, Page 174-174). Breeding bird survey data collected across the Forest show a declining population trend for ruffed grouse across the Forest (USDA Forest Service 2008). Early-successional aspen-birch is used by approximately 150 wildlife species while approximately 125 wildlife species use mature aspen-birch for all or part of their life cycle (DeGraaf and Yamasaki 2001, DeGraaf et al. 2006 p. 94 plus Appendices). Aspen-birch provides valuable habitat: the high stem densities of aspen-birch regeneration provide protection while mature aspen-birch buds and catkins are an important food source for may wildlife species including ruffed grouse (MIS) (DeGraaf et al. 2006, Page 95). The benefits to wildlife of creating regeneration habitat from clearcutting are addressed under the section above on scrub-shrub habitat.

**Mixedwood and Softwood**

There are approximately 600 acres of mixedwood and 1200 acres of spruce-fir within the MA 2.1 lands of the South Pond South HMU. One goal in the South Pond South HMU Rationale (Rowse and Williams 2015) is to manage habitat based on the soil condition or ecological capability. Mixedwood habitat is lacking in the South Pond South HMU.

Approximately 100 acres of mixedwood and 500 acres of spruce/fir would be treated under the Proposed Action with uneven-aged or intermediate treatment, with a goal of maintaining spruce/fir and mixedwood on the landscape in MA 2. Approximately 118 acres of northern hardwoods with an ecological tendency to mixedwood would be treated to convert to mixedwood habitat. The 34 acres of overstory removal treatments in spruce/fir and 49 acres in a northern hardwood under the Proposed Action would release softwood understory.
Overall, these harvest treatments would result in a slight decrease in mature spruce/fir, an increase in mature mixedwood over time, as well as slight increase in young mixedwood and spruce/fir (Table 29). Habitat conversion from northern hardwoods to mixedwood is a long term goal so these areas would continue to provide mature and young northern hardwood habitat for the temporary scope of this project.

Wildlife species preferring mixedwood and spruce-fir would be favored by these treatments. Mature mixedwood and softwood are an essential habitat component for a wide variety of wildlife species for food and cover for all or part of the year including blackburnian warbler (MIS for mature spruce/fir), golden-crowned kinglet, purple finch, deer mice, snowshoe hare, and American marten (DeGraaf et al. 2006, Yamasaki et al. 1999). Overstory removal treatments to increase softwood undergrowth would favor species associated with this habitat feature. Up to 100 species of wildlife will use young softwoods for all or part of their life cycle ((DeGraaf and Yamasaki 2001, DeGraaf et al. 2006, page 113 plus Appendices) including snowshoe hare and magnolia warbler, the MIS, for regenerating softwoods.

While both untreated and treated stands would generally have structural characteristics that would support wildlife species that favor mixedwood and softwood habitat, there would be some differences in treated stands compared to areas with no treatment. All of the treatments would create disturbance and open the canopy to sunlight. There would be changes to shading on the forest floor. Many of the stands are being treated with group selection which will create openings up to 2 acres in size although they are generally smaller in softwood and mixedwood stands. The results of these treatments will be multi-structured stands with increased understory vegetation and browse availability for wildlife. These changes in structure (canopy closure, understory composition) would provide some habitat features favored by some wildlife species and not by others (DeGraaf and Yamasaki 2001).

**Comparison Summary of Wildlife Habitat and MIS**

The No Action Alternative allows existing mature forests to continue with natural succession to climax forest types, but would not increase habitat diversity over the next 10 years without a natural disturbance. The Proposed Action would move the HMU towards the desired habitat condition for wildlife habitat (Rowse and Williams 2015, Table 29).
Approximately 75% of lands in the HMU would still remain in a mature condition under the Proposed Action while approximately 4% would be in northern hardwood and aspen regeneration habitat. Mixedwood would increase over the long term under the Proposed Action. This would contribute to the overall habitat objectives described in the South Pond South HMU Rationale (Rowse and Williams 2015) as well as the overall wildlife goals described in the Forest Plan (USDA Forest Service 2005a 1-20 to 1-22).

Desired habitat goals for wildlife are based on conditions in the HMU and are adjusted based on Ecological Land Types (ELTs) and have the goal of providing a diversity of habitat conditions for wildlife species that inhabit the Forest (USDA Forest Service 2005a, pg. Chapter 1, pages 20 to 21). The HMU habitat goals help ensure the larger wildlife habitat management goals are being achieved over the course of the Forest Plan. When vegetative management activities fall within the desired future condition (DFC) for a given HMU, the effect cumulatively is that the given HMU contributes to the larger wildlife habitat goals for the National Forest. Non-managed National Forest system lands within the HMU boundaries and status of adjoining HMUs are considered when analyzing cumulative effects to determine if natural events or activities are taking place that may affect wildlife habitat.

**Cumulative Effects on Wildlife and Wildlife Habitat**

The Analysis Area for cumulative effects for Wildlife species encompasses National Forest lands within the South Pond South HMU (Compartments 9, 10, and 23) (Figure 28. Cumulative effects analysis area.). The HMU encompasses approximately 9,000 acres with 2,700 acres in MA 2.1 (where vegetation management can occur) and 6,300 acres in other MAs where vegetation management is prohibited. This area was chosen because the habitat objectives for the South Pond South HMU provides a measurable assessment of how the Proposed Action contributes to the habitat objectives of the WMNF, as defined in the 2005 Forest Plan. This area was chosen because it is large enough to cover the home ranges of both wildlife and plant species as well as addressing habitat connectivity and travel and migration corridors of some of the species discussed in this document. This area also considers habitat diversity at the landscape level as well as considering recent or proposed projects in the vicinity of the Project Area that may affect habitat diversity. We considered adjacent private land to
this HMU and determined that there were no management activities in this area that would affect specific HMU objectives. Oftentimes the cumulative effects analysis area exceeds what is necessary for a species that has a limited home range or very specific habitat criteria. However, it encompasses effects on species with smaller home ranges as well as species that occupy larger areas in a wider array of habitat types.

The temporal scope for cumulative effects for Wildlife species is ten years in the past and fourteen years in the future (2006 to 2030) because this time period encompasses active harvest operations and connected actions as well as reasonably foreseeable actions that have or will occur concurrently in the cumulative effects analysis area. It also includes the time when regeneration harvests from this project would move into the young age class. Projects included in Appendix C of this EA were considered for this cumulative effects analysis.

**Past, Present, and Reasonably Foreseeable Projects in the South Pond South Habitat Management Unit (HMU)**

Within the past ten years, there have been no timber harvests in this HMU and, aside from the Proposed Action, none are planned in the reasonably foreseeable future. A variety of other projects have or will occur in the HMU during the time period 2006 to 2033 (Appendix C).

**Wildlife Habitat and MIS**

Mature and young northern hardwoods and mature spruce/fir are the major habitat types in the cumulative effects area. Some of the objectives for providing wildlife habitat diversity on the WMNF would be met with the future harvest planned in the Deer Ridge Project Area including establishing regeneration forest habitat, increasing mixedwood, maintaining aspen-birch, expanding existing permanent wildlife openings and favoring habitats based on ecological capability. There has been no other harvesting in the cumulative effects area in the past ten years and no other harvesting is planned beyond the Proposed Action so there would be no cumulative effects from other harvesting in the HMU.
Figure 28. Cumulative effects analysis area.
The proposed regeneration habitat created in the Deer Ridge Project Area will not fully meet the HMU objectives (Table 29). While each HMU has habitat diversity goals, they are designed as a tool to achieve a Forestwide habitat composition goal (Rowse 2015, USDA Forest Service 2005a, pages 20-22). Forestwide, goals for regeneration habitat continue to be well below the desired Forest Plan objectives (USDA Forest Service 2012a, page 11). The proposed harvests in the Deer Ridge Project would create scrub/shrub habitat on the Forest providing habitat for an array of wildlife species including chestnut-sided warbler, some of which, have very narrow habitat preferences for this structural condition. Since this habitat is ephemeral across the landscape and loses its benefits after 10 to 20 years (DeGraaf et al. 2006, pages 20-21) it is important to continue to create this habitat across the landscape over time.

Overall, mature northern hardwood habitat would continue to be abundant in the cumulative effects area landscape (Table 29). The South Pond South HMU would still have approximately 75% or greater of mature habitat in the managed portion of the HMU as well as mature habitat on the non-managed lands. The amount of mature habitat on the Forest is increasing (USDA Forest Service 2012a, page 11).

Overall, there will be an adequate amount of mature northern hardwood habitat retained in the cumulative effects analysis area for the large number of wildlife species associated with this type including scarlet tanager, the MIS for mature northern hardwoods (DeGraaf et al. 2006). Maintaining or increasing uncommon habitat types is an important Forest Plan goal for wildlife (USDA Forest Service 2005a, Chapter 1, page 20). The Deer Ridge Project has some opportunities to increase aspen-birch habitat (Rowse and Williams 2015). Aspen also occurs on the other Forest Service lands included in the cumulative effects area. Some of it is young and will be present on the landscape in the future. Aspen-birch on lands outside of MA 2.1 is older and likely will succeed to either northern hardwood or softwood habitat over time.

One of the goals on Forest Service land is to manage habitat based on ecological capability (USDA Forest Service 2005a, Chapter 3, Page 78). An analysis of the Deer Ridge Project resulted in long term goals of converting northern hardwood to mixedwood (Rowse 2015). These are long term goals that will be achieved beyond the temporal scope of this analysis. There is an array of habitat types on the other Forest Service lands in the
cumulative effects area. Any disturbance to these lands that might affect habitat condition would only occur from natural disturbances such as wind events. The goal to increase mixedwood habitat in this HMU would benefit wildlife across the cumulative effects area by providing a diverse array of habitat conditions across the landscape.

Summary for Wildlife Habitat and MIS
While populations of MIS may change within the cumulative effects area from harvesting, these actions implemented under the Deer Ridge Proposed Action would contribute to habitat diversity and benefit the MIS on the Forest. Any changes in population levels would not cause changes in population trends within the WMNF or the New England Region.

Transportation
The transportation corridor that has been established over the years on national forest lands may have resulted in some increased human presence to the area which might have affected wildlife movements. Ongoing road maintenance, hazard tree removal, invasive plant removal along roadways, and replacement of the bridge near the York Pond Fish Hatchery may have resulted in some minor disturbance to wildlife during implementation. The additional effects of the other projects in the Deer Ridge Project Area as well as those described for the Proposed Action would not likely result in long term increased human use in the area and therefore would have minimal effect on wildlife. It is unlikely that ongoing work on the transportation system in combination with other ongoing projects in the HMU would have a cumulative effect on wildlife species and associated habitat in the cumulative effects area.

Recreation and Facilities
Ongoing trail maintenance in the HMU including work on the Mill Brook Trail and the dog trial trails, hazard tree removal, removal of the underground storage tanks as the Fish Hatchery, and proposed improvements to the Barry Conservation Camp may have or will cause minor disturbance to wildlife during implementation. These projects would not change existing habitat conditions or increase human use in the HMU. It is unlikely that the proposed expansion of the parking area in combination with other ongoing projects in the HMU would have a cumulative effect on wildlife species and associated habitat in the cumulative effects area.
Prescribed Fire

Ongoing maintenance of three existing permanent wildlife openings in South Pond South HMU would continue using prescribed fire or mechanical treatments every three to five years. The effects of prescribed fire in these areas would be the same as described under the direct and indirect effects. There is no other ongoing prescribed fire in the HMU. As with other treatments in the cumulative effects area, these treatments in the HMU would maintain or encourage certain desired habitat features on the landscape including openings similar to effects in the Project Area. It is unlikely that the additional acres of prescribed fire under the Proposed Action would have a cumulative effect on wildlife or wildlife habitat as the percent of habitat affected in the cumulative effects area would be less than 1% of the HMU.

Species and Habitats of Concern

Three types of habitat are considered: natural communities, vernal pools, and bear-clawed beech trees. There are no documented deer wintering areas in the Project Area. The Project Area and temporal scope for direct and indirect effects is the same as for Wildlife and is described on page 6 of this report.

The Analysis Area for cumulative effects and temporal scope is the same as for Wildlife and is described on page 18 of this report.

Measuring Effects to Species and Habitats of Concern

The relevant elements of Species and Habitat of Concern (Table 23) for the South Pond South project are:

Habitats of concern – effects measured by changes to habitat or wildlife species.

Natural Communities

Affected Environment

Conserving natural communities is considered one way to maintain biodiversity across the WMNF (U.S. Forest Service 2005a, Chapter 3, Page 293). The Forest Plan identifies four outstanding natural communities; montane circumneutral cliffs and associated talus slopes, old growth enriched upland forest, northern white cedar – hemlock swamp, northern white cedar seepage forest, and pitch pine – scrub oak woodland in need of special consideration. No natural communities occur in the Project Area.
but there is one exemplary natural community (northern white cedar seepage forest) and one State listed exemplary community (medium level fen system) adjacent to the Project Area. Both of these communities are within the York Pond watershed.

Direct and Indirect Effects

**Alternative 1: No Action**

Any changes to outstanding or exemplary natural communities in the Project Area would result from natural processes only.

**Alternative 2: Proposed Action**

It is unlikely that the level of harvesting and connected actions (road, landing, and skid trail reconstruction) would affect the fen or seepage swamp adjacent to the Project Area. Forest Plan Standards and Guidelines to protect outstanding natural communities (USDA Forest Service 2005a, Chapter 2, page 13) and watersheds (USDA Forest Service 2005a, Chapter 2, Page 29) should ensure that these two communities are not impacted. An analysis of the effects of the Proposed Action on the York Pond watershed indicates that there would not be an increase maximum flows or a reduction of minimum flows beyond the natural range of variability. Moreover, deeper groundwater sources which are important to the hydrology of the fen and seepage swamps should remain stable (see Water Resources Section). There should be no impacts to the seepage swamp or fen from the Proposed Action.

Cumulative Effects

None of the past, present, or future actions in the cumulative effects area are in the vicinity of these two natural communities. It is unlikely that the Proposed Action in combination with other actions in the cumulative effects area would have a cumulative effects on the seepage swamp and fen.

**Vernal Pools**

**Affected Environment**

Vernal pools are valuable habitat to certain species of amphibians and reptiles (Calhoun and deMaynadier 2004). Vernal pools most likely would form in low lying areas with compacted sediments or underlying ledge where drainage is poor. A hydrology and soils survey of the Project Area did not identify any vernal pools (Arias and Hermandorfer 2014). During
field visits by White Mountain staff, two vernal pools were identified in the Project Area. Surveys have been conducted for these vernal pools to determine if it met the criteria for a vernal pool as defined by the WMNF (USDA Forest Service 2005a, Glossary, Administrative Correction 11). A vernal pool is defined in the Forest Plan as a naturally occurring depression without an inlet or outlet and is fishless. Vernal pools are confirmed by evidence of breeding activity of the following indicator species: wood frog, spotted salamander, Jefferson salamander, or blue-spotted salamander. Presence of fairy shrimp also confirms a vernal pool.

Direct and Indirect Effects

**Alternative 1: No Action**

Any changes to vernal pools in the Project Area would result from natural processes only. The vernal pool would continue to provide habitat for amphibians and reptiles.

**Alternative 2: Proposed Action**

There is a possibility that timber harvest and connected actions including skid trail layout, landing construction could impact unidentified vernal pools by skidding through or dropping slash in or near these areas which could change the hydrologic characteristics of these areas (Flatebo et al. 1999).

Known vernal pools that occur near any proposed project would be protected with project design features. Any new vernal pools discovered during project operations would be protected. Forest Plan direction requires a protective buffer that prohibits harvest within 25 feet and limits harvest for another 75 feet around all identified naturally-occurring vernal pools. Additional design features prohibit alternation of vernal pools from skidding or landing and road construction, and slash must not be left in vernal pools. Timber harvest, skid trail layout, landing construction, and trail relocations could impact unidentified vernal pools by skidding through or dropping slash in or near these areas which could change the hydrologic characteristics of these areas (Flatebo et al. 1999).

There is a possibility that timber harvest and connected actions including skid trail layout, landing construction could impact unidentified vernal pools by skidding through or dropping slash in or near these areas which could change the hydrologic characteristics of these areas (Flatebo et al. 1999).
The proposed parking lot expansion, gravel pit expansion, and maintenance of permanent wildlife openings would have no effect on vernal pools since none exist in these areas.

Cumulative Effects

Forest Plan Standards and Guidelines an design features would protect known vernal pools in the Project Area. Ongoing maintenance of trails and other recreation sites, wildlife openings, and infrastructure would not affect vernal pools because none occur in the vicinity of the known vernal pool. No other past or future actions have or will occur on other Forest Service lands that might affect vernal pools in the CEA. Given the low potential for both direct impacts from the proposed action and impacts from past, on-going, and future activities, the potential for cumulative effects is low.

Bear-clawed Beech Trees

Affected Environment

Black bear forage in a variety of habitats to obtain a source of green vegetation in the spring, berries and insects during the summer, and hard mast, such as acorns or beechnuts, during the fall (Rogers and Allen 1987). Beech is the primary tree species that produces hard mast in the Project Area. Many other species also rely on hard mast as a high quality food source (DeGraaf et al. 2006, Page 83). Concentrations of bear-clawed beech are considered an important habitat feature for black bear and other species that rely on hard mast as a high-quality food source.

There is a high concentration of bear clawed beech trees in one portion of the Project Area. Scattered bear-clawed beech trees also occur throughout the Project Area. The area with the high concentration of bear-clawed beech trees has been reserved from harvest or any other connected actions.

Direct and Indirect Effects

**Alternative 1: No Action**

Alternative 1 would have no direct or indirect effects on bear-clawed beech trees.

**Alternative 2: Proposed Action**

The Proposed Action could directly affect bears feeding in beech trees during the fall. The reserve area would protect the highest concentration of bear-clawed beech trees in the Project Area. Most of the areas where
bear-clawed beech have been observed would have a winter harvest season. However, there are a few scattered areas where bear-clawed beech is present that might be harvested during the late summer (8/1 – 10/15). Most likely, some individuals would move to adjacent hardwood stands in the area until harvesting activities end.

This Alternative could result in a slight reduction in fall foraging habitat from the removal or loss of some bear-clawed beech trees from proposed timber harvest and connected actions including road reconstruction, and construction and reconstruction of landings and skid trails. Reserving scattered bear-clawed beech trees would minimize this effect. The abundance of mature northern hardwoods habitat in the South Pond South HMU outside of proposed harvest areas make it likely that beech trees are widespread throughout the HMU, so no measurable effects to this habitat is anticipated. Harvesting in hardwood areas may release young beech in the understory or encourage beech regeneration which would provide for a future generation of beech in the Project Area.

Cumulative Effects

South Pond South HMU has an abundance of mature northern hardwoods and mixedwood, which will continue to provide a source of hard mast for wildlife including black bear. Cumulatively, past, present and future timber harvest may have resulted or could result in some loss of bear-clawed beech trees within this HMU. Project design features on national forest lands would reserve bear-clawed beech trees where possible and promote future mast bearing trees. The Proposed Action in combination with other projects in the cumulative effects area should not cause cumulative effects to bear-clawed beech trees. See Table 30 for a summary of effects of the alternatives on wildlife habitat and species.

**Climate Change**

The analysis area and temporal scope used in the “Climate Change - Summary Report of Local Climate Trends and Modeled Expected Changes in Future Local Climate” (Simmons 2016) is the Deer Ridge Project Area over the next 74 years (to 2100). The cumulative effects temporal scope for wildlife resources is ten years in the past and fourteen years in the future (2006 to 2033) because this time period encompasses active harvest operations and connected actions as well as reasonably foreseeable future actions that have or will occur concurrently in the cumulative effects
analysis area. It also includes the timeframe when any regeneration harvests would move into a young age class.

Within the cumulative effects period and as described in the Climate Change Specialist report (pp 3-4) we could expect to see an increase in temperature above the baseline period of between +2.5°F – 3.5°F for both scenarios (B1 & A2) for the period 2021-2050 compared to the baseline period of 1980 – 1999. Precipitation increases for this period will likely be within the normal variation of precipitation and a slight increase in rain events greater than 1”. Other climactic phenomenon (e.g. # of freeze free days, minimum low temperature, amount of snow cover) are expected to decrease in severity or frequency but remain within the normal variation seen in the baseline period.
## Summary of Indicators and Measures by Alternative for Wildlife Habitat and Species, and Special Habitats

Table 30. Summary of indicators and measures by action alternative for wildlife habitat and species, and special habitats.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Alternative 1 (No Action)</th>
<th>Alternatives 2 (Proposed Action)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMU Habitat Diversity</td>
<td>No direct effects. Adds adverse indirect and cumulative effects to existing lack of habitat type diversity, creation of aspen/birch habitat, and age class diversity among habitat types. Maintains the most mature age-class habitat.</td>
<td>Direct effects from tree felling and transportation system. Some direct effects from prescribed fire and recreation projects. Some summer direct effects. Most winter direct effects. Creates habitat and age class diversity. Increase in 0 to 9 yr old regen age class (adds 259 ac (includes 33 ac of PWO expansion) via CC and patch cuts). Creates 179 ac of HWD regen and 47 ac of asp/bir regen. Increase overall young by 76 ac (10 acs hwd, 4 ac mxwd, 17 ac spruce/fir. Expands three permanent wildlife openings). Short term. Overall decrease in mature habitat by 329 ac. Long term goals. Decrease in mature hwd by 410 ac, mature spruce/fir by 54 ac, mature asp/bir by 3 ac. Increase in mature mixedwood by 138 ac.</td>
</tr>
<tr>
<td>Acres of Habitat and Age Class Change</td>
<td>Does not meet the Purpose and Need and would not move the forest towards the desired future condition for age class or habitat diversity on MA 2.1 lands in the HMU or Forest as outlined in the Forest Plan.</td>
<td>Best Meets the Purpose and Need and moves the Forest closer to the desired future condition for regeneration age class and habitat diversity on MA 2.1 lands for the Forest outlined in the Forest Plan. Mature habitat still abundant (75% of MA 2.1 lands).</td>
</tr>
<tr>
<td>MIS</td>
<td>Adds cumulative effect to existing decline in chestnut-sided warbler and ruffed grouse habitat and population. In the near term, would not adversely affect population trends or viability of WMNF MIS in the Forest-wide planning area.</td>
<td>Increase in habitat for chestnut-sided warbler and ruffled grouse. Slight decrease in habitat for blackburnian warbler. Most decrease in habitat for scarlet tanager. Would alter habitat for some MIS but not affect population trends or viability of WMNF MIS within the Forest-wide planning area.</td>
</tr>
<tr>
<td>Dead and Down Wood</td>
<td>Dead and down wood would occur as a result of natural processes. Larger trees might result in larger dead and down wood on ground over time.</td>
<td>Forest Plan Standard and Guidelines require reserve areas in clearcuts with snags, cavity trees and retained down wood. Residual trees left in other harvest units would continue to provide a supply of dead and downed wood.</td>
</tr>
<tr>
<td>Natural Communities</td>
<td>No effects on natural communities.</td>
<td>No effects on natural communities. Forest Plan Standards and Guidelines should protect York Pond watershed maintaining suitable flows to natural communities adjacent the Project Area.</td>
</tr>
<tr>
<td>Vernal Pools</td>
<td>No effects on vernal pools.</td>
<td>Known vernal pools would be protected based on guidance from Forest Plan.</td>
</tr>
<tr>
<td>Mast</td>
<td>No direct effects on bear-clawed beech trees.</td>
<td>Special management area for bear-clawed beech trees reserved. Design feature to protect individual bear clawed beech trees.</td>
</tr>
</tbody>
</table>
An analysis of the interaction of effects from the Deer Ridge Project with climate change trends that may occur within the temporal scope of the Project used the following resource indicators because they provide a measurable assessment of change and/or they represent various habitat conditions, they may be sensitive to management actions, and/or they may be sensitive to climate change.

Habitat Types Tracked in the Habitat Management Unit (hardwood, mixedwood, spruce-fir, aspen-birch).

- Important Habitats (natural communities, vernal pools, bear clawed beech).
- WMNF Management Indicators Species.
- Moose Populations Trends in NH.

Deer Ridge Project and Climate Change: A complete description of the climate change affected environment and trends can be found in the detailed climate change specialist report located in the Project Record. This Report considers how the No Action and the Proposed Action may interact with modelled climate change. Table 31 shows how climate change influences may or may not intersect the Deer Ridge Project effects/outcomes or vice versa.

In summary, the WMNF uses sustainable ecosystem management practices to provide a diversity of habitats across the Forest landscape for the array of wildlife species that occur on the Forest (USDA Forest Service 2005a, Chapter 1, pages 20-21). Current scientific information (Matthews et al. 2011, Rustad et al. 2012, Whitman et al. 2014), within the temporal scope of the Deer Ridge Project cumulative effects timeframe (2006 to 2033), indicates that climate change is not expected to substantially affect wildlife resources, and there would not likely be any substantive changes to wildlife habitats or species’ populations from climate change within the Deer Ridge Project Area. The only exception is moose whose populations are already declining from increased winter tick in New Hampshire. However, literature review indicates that climate change will influence the vegetation composition and wildlife species assemblage and distribution across the landscape including in the Deer Ridge Project Area over the longer climate change timeframe (2100). Diversifying stand structure and increasing regeneration under the Proposed Action may allow habitats to remain intact over a longer timeframe from the predicted effects of climate change.
Deer Ridge Integrated Resource Project

Table 31. Interaction of the Deer Ridge Project Effects on Wildlife Resources and Special Habitats Compared to Expected Climate Change Trajectory to 2033 (Project Period of Proposed Action).

<table>
<thead>
<tr>
<th>Habitat Types</th>
<th>Expected changes in the Project Area due to modeled climate change up to year 2033</th>
<th>Alternative 2 (Proposed Action) Interactions between Project Effects and Modelled Climate Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardwood</strong></td>
<td>Climate change effects between the present and 2033 are expected to be minimal as resident species will still be within their climatic envelope. Some increases in extreme events (ice, heavy precipitation, heat wave or drought) may affect individuals on marginal sites or they may be affected by insect/disease or invasive species. Climate change is predicted to result in changes in suitable habitat conditions for some tree species in northern hardwoods habitat in the long term (2100).</td>
<td>Under the Proposed Action, there would be an increase in regeneration and young age class and a decrease the amount of mature northern hardwoods in the Project Area. Uneven-age and intermediate treatments would diversify stand structure in mature habitat. Diversifying stand structure and increasing regeneration may add resilience to the habitat from other effects (disease &amp; insects) and maintain this habitat in the Project Area over a longer timeframe. Project effects would likely have an overall positive effect by maintaining this habitat on the landscape for a longer period than might otherwise be the case.</td>
</tr>
<tr>
<td><strong>Mixedwood</strong></td>
<td>Climate change effects between present and 2033 are expected to be minimal as most species will still be in their climatic envelope. Some increases in extreme events (ice, heavy precipitation, heat wave or drought) may affect individuals on marginal sites or they may be affected by insect/disease or invasive species. Climate change is predicted to result in a change in suitable habitat for some tree species in mixedwood in the long term with the softwood component of this community being at risk (2100).</td>
<td>Under the Proposed Action, there would be increase the amount of mixedwood habitat in the Project Area over the long term due to habitat conversion. Uneven-age and intermediate treatments would diversify mature mixedwood habitats. Diversifying stand structure and increasing regeneration especially of softwood species may add resilience to the habitat from other effects (disease and insects) and may maintain this habitat in the Project Area over a longer timeframe. Project effects would likely have an overall positive effect by maintaining this habitat on the landscape for a longer period than might otherwise be the case.</td>
</tr>
<tr>
<td><strong>Spruce-fir</strong></td>
<td>Climate change effects between present and 2033 are expected to be minimal as most species will still be in their climatic envelope. Some increases in extreme events (ice, heavy precipitation, heat wave or drought) may affect individuals on marginal sites or they may be affected by insect/disease or invasive species. Optimum conditions for this balsam fir are shifting northward as the climate warms and, while individuals will remain present on the landscape for many decades, the window of opportunity to regenerate this species on sites suitable for its growth is closing resulting in some changes to species composition. Climate change is predicted to result in the disappearance of suitable habitat for this community in the long-term (2100).</td>
<td>The Proposed Action would diversify age class by releasing existing young spruce/fir in the Project Area. Uneven-age and intermediate treatments would diversify stand structure in mature habitat. Increasing and/or releasing softwood regeneration would maintain this habitat in the Project Area over a longer timeframe and help slow the disappearance of softwood habitat due to climate change. Without the proposed project actions there may not be an opportunity to recruit a young age class of spruce fir beyond 2030. Project effects would likely have an overall positive effect by maintaining this habitat on the landscape for a longer period than might otherwise be the case.</td>
</tr>
</tbody>
</table>
### Habitat Types

<table>
<thead>
<tr>
<th>Habitat Types</th>
<th>Expected changes in the Project Area due to modeled climate change up to year 2033</th>
<th>Alternative 2 (Proposed Action) Interactions between Project Effects and Modelled Climate Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aspen-Birch</strong></td>
<td>Climate change effects between present and 2033 are expected to be minimal as aspen and paper birch will still be in their climatic envelope. Some increases in extreme events (ice, heavy precipitation, heat wave or drought) may affect individuals on marginal sites or they may be affected by insect/disease or invasive species. Climate change is predicted to reduce aspen-birch habitat in the long-term (2100).</td>
<td>Under the Proposed Action, there would be an increase in regeneration and an increase in the amount of aspen-birch in the Project Area through habitat conversion or by regenerating small inclusions of aspen/birch within other habitat types. Increasing regeneration, converting other habitats to aspen-birch and maintaining pockets of aspen-birch as a within stand feature would maintain this habitat in the Project Area over a longer timeframe. Project effects would likely have an overall positive effect by maintaining this habitat on the landscape for a longer period than might otherwise be the case.</td>
</tr>
<tr>
<td><strong>Natural Communities (Northern White Cedar Seepage Forest and Medium Level Fen)</strong></td>
<td>There might be a slight increase in rainfall events during the project period (2033). Climate change is predicted to increase rainfall and the number of heavy rain events in the long-term (2100).</td>
<td>Forest Plan Standards and Guidelines should protect the York Pond watershed and maintain surface and groundwater flows needed to maintain these wetlands that occur adjacent to the Project Area. The small increase in rain events within the analysis period (2033) would ensure that flows to surface waters are adequate during this period of time. Since Forest Plan Standards and Guidelines will protect this resource from project effects there is no interaction with projected climate change.</td>
</tr>
<tr>
<td><strong>Vernal Pools</strong></td>
<td>There might be a slight increase in rainfall events during the project period (2033). Climate change is predicted to increase rainfall and the number of heavy rain events in the long-term (2100).</td>
<td>Forest Plan Standard and Guidelines would maintain buffers around any known vernal pools, protecting cover and hydrologic characteristics of these features. The small increase in rain events during the analysis period (2033) would ensure that flows to surface waters are adequate during this period of time. Since Forest Plan Standards and Guidelines will protect vernal pools from project effects there is no interaction with projected climate change.</td>
</tr>
<tr>
<td><strong>Mast Areas</strong></td>
<td>American beech is the primary hard mast species in the Project Area. Climate change effects between the present and 2033 are expected to be minimal as beech will still be within their climatic envelope. Increasing in extreme events could result in more damage to mature trees in the future. Climate change is predicted to reduce beech on the landscape including within the Project Area in the long-term (2100) as conditions become more favorable for species like oak and pine. Oak could become an alternate source of hard mast for wildlife in the future.</td>
<td>The Proposed Action would maintain a no-harvest buffer around an area with a heavy concentration of bear-clawed beech. Since the reserve area would protect this resource from project effects there is no interaction with projected climate change. Design features also protect bear-clawed beech as a within stand feature in proposed harvest units. This ensures this habitat component is maintained in the Project Area. Regeneration harvests and uneven-aged and intermediate harvest in other northern hardwood stands would ensure that a component of beech is regenerated in the Project Area as a future source of hard mast for wildlife. Project effects would likely have an overall positive effect by maintaining this habitat feature on the landscape for a longer period than might otherwise be the case.</td>
</tr>
<tr>
<td><strong>WMNF MIS</strong></td>
<td>The Proposed Action would increase habitat diversity in the Project Area maintaining habitat for WMNF MIS bird species. MIS that favor mature</td>
<td></td>
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### Habitat Types

<table>
<thead>
<tr>
<th>Habitat Types</th>
<th>Expected changes in the Project Area due to modeled climate change up to year 2033</th>
<th>Alternative 2 (Proposed Action) Interactions between Project Effects and Modeled Climate Change</th>
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<tbody>
<tr>
<td></td>
<td>Climate change effects to WMNF MIS (scarlet tanager, blackburnian warbler, chestnut-sided warbler, magnolia warbler, ruffed grouse) between present and 2033 are expected to be minimal as there will be little change to existing habitat condition. Slight increases in heavy rainfall events might have some local impact on bird populations. Climate change is predicted to change bird distribution and in the long-term (2100).</td>
<td>hardwood (scarlet tanager) and mature spruce/fir (blackburnian warbler) habitat would have a slight reduction in habitat but would be within or above HMU goals while MIS that favor regeneration age class (chestnut-sided and magnolia warbler) and aspen birch (ruffed grouse) would benefit from the Proposed Action. The increases in regeneration and habitat diversity would maintain a variety of habitat on the landscape over a longer time frame. Project effects would likely have an overall positive effect by maintaining these species on the landscape for a longer period than might otherwise be the case.</td>
</tr>
<tr>
<td><strong>Moose Population</strong></td>
<td>Changes in temperature and snow pack are already affecting moose populations due to increase susceptibility to winter tick and brain worm. Climate change is predicted to increase stress to moose as winter ticks increase and animals are subject to heat stress in the summer resulting in a decrease in the moose population over the long term (2100).</td>
<td>The Proposed Action would increase regeneration in the Project Area (browse for moose) while perpetuating softwood and mixedwood habitat that moose use as cover. While cover would be reduced in some areas harvested, there would be sufficient undisturbed habitat to allow moose to find the necessary cover and shade to manage heat stress. Increasing regeneration would provide moose access to an increased food source which would be beneficial to their health. Project effects would likely have an overall positive effect by maintaining some habitat features for this moose on the landscape for a longer period than might otherwise be the case.</td>
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<tr>
<td><strong>Trends in NH</strong></td>
<td></td>
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</table>

Other Agencies Consulted

New Hampshire State Historic Preservation Office
U.S. Fish and Wildlife Service

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Glossary

Age Class: A distinct aggregation of trees originating from a single natural disturbance or regeneration cutting.

Aspen-birch habitat: Forest habitat in which the canopy is comprised almost entirely of aspen species or paper birch. For implementation purposes, this habitat includes forest types 91-95 in our database, but stand conditions, not typing in CDS should be relied on to define habitat.

Attainment: Any area (other than an area identified in clause (i)) that meets the national primary or secondary ambient air quality standard for the pollutant.

Clearcutting: The removal in a single cut of the entire standing crop of trees. It prepares the area for rapid seed germination and growth of a new even-aged stand. A variation of clearcutting, known as “clearcutting with reserves,” may be conducted. This practice involves retaining reserve trees or groups of reserve trees to attain resource goals other than regeneration.

Capability: The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils, and geology, as well as the application of management practices, such as silviculture or protection from fire, insects, and disease.

Commercial Thinning: Thinning operation where the material cut can be sold on the market as opposed to a pre-commercial thinning.

Crown: The part of a tree or woody plant bearing live branches and foliage.

Early-successional Forest Habitat: Forest habitat that is comprised primarily of tree species that require an open canopy and high levels of light and that typically colonize an area after stand-replacing disturbance (e.g. aspen-birch forest).

Early Successional Species: Those plant or animal species characteristic of early forest successional stages.

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

Even-Aged Management: A timber management system that results in the creation of stands in which trees of essentially the same age grow together. Cutting methods producing even-aged stands are clear cut, shelterwood, or seed tree.
Even-Aged Regeneration Harvest: Cutting method that produces even-aged stands; clearcut, shelterwood, or seed tree.

Forest Land: Land that is at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest use.

Forest Transportation Facility: A classified road, designated trail, or designated airfield, including bridges, culverts, parking lots, log transfer facilities, safety devices and other transportation network appurtenances under Forest Service jurisdiction that is wholly or partially within or adjacent to National Forest System lands (36 CFR 212.1).

Group Selection: The uneven-aged-cutting method that describes the silvicultural system in which trees are removed periodically in small groups, resulting in openings that do not exceed an acre or two in size. This leads to the formation of an uneven-aged stand, in the form of a mosaic of age class groups in the same stand. It may be applied in combination with single-tree selection.

Habitat Management Unit (HMU): A block of Forest land in which habitat composition and age class objectives will be established to help ensure that habitats are well distributed across the Forest and provide a framework for analyzing project impacts to wildlife habitat at a local scale. Blocks vary in size from about 6,000-49,000 acres, and contain a variety of habitat types and land in a mix of Management Areas.

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

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

Mean Fire Return Interval (MFRI): Quantifies the average period between fires under the presumed historical fire regime

Mixedwood Forest Habitat: Also referred to as hardwood-softwood forest habitat. Forest habitat in which the canopy is comprised of a mix of northern hardwoods, hemlock, pine, spruce,
or fir. Typically this is a northern hardwood stand with at least 25% made up of softwood species. For implementation purposes, this habitat is usually typed as forest type 87 in the CDS database, but stand conditions, not typing in CDS should be relied on to define habitat.

**Multiple Use:** Managing National Forest resources in a manner to best meet the needs of the American people, recognizing that not all uses can occur on all acres and that changing needs and conditions over time will change the combination and intensity of use. Productivity of the land and sustainability of ecosystems is maintained, and the interrelationships among resources and the effects of use are monitored and evaluated. Multiple use management does not necessarily prescribe the combination of uses that will give the greatest dollar return or the greatest unit output.

**National Forest System (NFS) Road:** A classified forest road under the jurisdiction of the Forest Service. The term “National Forest System road” is synonymous with, and replaces, the term “forest development road” as used in 23 U.S.C. 205.

**Native Species:** A species or genotype that is naturally found in local ecosystems.

**Natural Community:** A system of interacting plants and their common environment, recurring across the landscape, where the effects of human intervention are minimal.

**Non-attainment:** Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.

**Non-Forest Land:** Lands never having or incapable of having 10 percent or more of the area occupied by forest trees, or lands previously having such cover and currently developed for non-forest use.

**Northern Hardwood Forest Habitat:** Forest habitat in which the canopy is comprised almost entirely of deciduous hardwood trees, such as sugar maple, American beech, yellow birch, etc. For implementation purposes, this habitat includes forest types 76, 81-86, 88-89 in our CDS database, but stand conditions, not typing in CDS should be relied on to define habitat.

**Not Appropriate Forest Land:** Lands not selected for timber production in the Forest Plan due to: (a) the multiple use objectives preclude timber production; (b) other management objectives limit timber production activities to the point where management requirements set forth in 36 CFR 219.27 cannot be met; and (c) the lands are not cost efficient over the planning horizon in meeting Forest objectives that include timber production. Lands not appropriate for timber production shall be designated as unsuitable in the Forest Plan.
Old Forest Habitat: Desired habitat conditions start with those for mature forest and can include greater size, decadence, structural complexity, etc. No harvest will occur in stands identified to provide old forest habitat.

Patch Cutting: A term used to describe a cutting system used in even-aged management. It defines a clearcut 2 to 10 acres in size.

People At One Time (PAOT): A recreation capacity determination expressed in number of people.

Prescribed Fire: Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements (where applicable) must be met prior to ignition.

Regeneration Forest Habitat: Forest in which almost all the trees are 0-9 years old with less than 30 square feet of basal area in a mature overstory. Can be created through natural disturbance (e.g. wind, fire) or the following silvicultural treatments: clearcutting, seed tree harvest, and shelterwood harvest to 30 basal area or less or with removal harvest within 10 years of original harvest.

Road: A motor vehicle travel corridor over 50 inches wide, unless designated and managed as a trail. A road may be classified, unclassified or temporary.

Road Decommissioning: Activities that result in the stabilization and restoration of unneeded roads to a more natural state (36 CFR 212.1; FSM 7703). Activities used to decommission a road include, but are not limited to: reestablishing former drainage patterns, stabilizing slopes, restoring vegetation, blocking the entrance to the road, installing waterbars, removing culverts, reestablishing drainage-ways, removing unstable fills, pulling back road shoulders, scattering slash on the roadbed, completely eliminating the roadbed by restoring natural contours and slopes, or other methods designed to meet the specific conditions associated with the unneeded road (FSM 7712). One or many of the methods described may be used as deemed necessary. Decommissioning removes the road from the transportation system.

Road Improvement: Activity that results in an increase of an existing road’s traffic service level, expansion of its capacity, or change in its original design function.

Road Maintenance: The ongoing upkeep of a road necessary to regain or restore the road to the approved road management objective (FSM 7712.3).

Road Realignment: Activity that results in a new location of an existing road or portions of an existing road and treatment of the old roadway (36 CFR 212.1).

Road Reconstruction: Activity that results in the improvement or realignment of an existing classified road as defined.
Road, Classified: Road wholly or partially within or adjacent to National Forest System lands that are determined to be needed for long term motor vehicle access, including state roads, county roads, privately owned roads, National Forest System roads, and other roads authorized by the Forest Service.

Road Operation Maintenance Level (ROML): The level of service provided by, and maintenance required for, a specific road (FSH 7709.58).

**Level 1 (Closed for more than 1 year):** Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. Roads receiving maintenance Level 1 may be of any type, class, or construction standard, and may be managed at any other maintenance level while they are open for traffic. While being maintained at Level 1, they are closed to vehicular traffic, but may be open and suitable for non-motorized uses.

**Level 2 (High-clearance vehicles):** Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or specialized uses. Log haul may occur at this level.

**Level 3 (Passenger vehicles-surface not smooth):** Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material.

**Level 4 (Passenger vehicles-smooth surface):** Assigned to roads that provide a moderate degree of user comfort and convenience at moderate traffic speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated.

**Level 5 (Passenger vehicles-dust free; possibly paved):** Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated.

Road, Unclassified: Roads on National Forest System lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travel corridors, and off-road vehicle tracks that have not been designated and managed as a trail. Includes those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization (36 CFR 212.1).
Roads, Objective Maintenance Level: The maintenance level to be assigned at a future date considering future road management objectives, traffic needs, budget constraints, and environmental concerns.

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

Scoping: Includes internal and public involvement to determine the range of issues to be addressed in an environmental analysis.

Shade Intolerant: Those trees that need full or near full sunlight to regenerate and grow.

Shade Tolerant: Those trees that can regenerate and grow in shade or varying degrees of sunlight.

Shelterwood Cutting: The even-aged cutting method that describes the silvicultural system which provides a source of seed and/or protection for regeneration. The old crop (the shelterwood) is removed in two or more successive cuttings. The first cutting is ordinarily the seed cutting (a regeneration cut) though it may be preceded by a preparatory cutting, and the last cut is usually the removal cut.

Single Tree Selection Cutting: An uneven-aged cutting method where individual trees are selected and cut in a stand while maintaining a prescribed number of trees in each diameter class.

Stand: A community of naturally or artificially established trees of any age sufficiently uniform in composition constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities, thereby forming a silvicultural or management entity.

Unclassifiable: Any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

Uneven-Aged Management: The application of a combination of actions needed to maintain continuous high forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameters or age classes to provide a sustained yield of forest products. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within a stand, thereby maintaining a planned distribution of size classes. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection.

Unsuitable Forest Land: Forest land that is not managed for timber production because (a) the land has been withdrawn by Congress, the Secretary, or the Chief; (b) the land is not producing or capable of producing crops of industrial wood; (c) technology is not available to prevent irreversible damage to soils, productivity, or watershed conditions;
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(d) there is no reasonable assurance that lands can be adequately restocked within 5 years after final harvest, based on existing technology and knowledge, as reflected in current research and experience; (e) there is at present, a lack of adequate information to respond to timber management activities; or (f) timber management is inconsistent with or not cost efficient in meeting the management requirements and multiple use objectives specified in the Forest Plan.

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

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

<table>
<thead>
<tr>
<th>Stand ID</th>
<th>Forest Type</th>
<th>Stand Acres</th>
<th>Treated Acres</th>
<th>Harvest Prescription</th>
<th>Season of Harvest*</th>
<th>Site Prep</th>
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<tr>
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<td>Hardwood-Hemlock</td>
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<td>3</td>
<td>Patchcut</td>
<td>W</td>
<td>3</td>
</tr>
<tr>
<td>36</td>
<td>Mixedwood</td>
<td>11</td>
<td>2</td>
<td>Group Selection</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Norway Spruce</td>
<td>53</td>
<td>8</td>
<td>Group Selection</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>38a and 38b</td>
<td>Norway Spruce</td>
<td>84</td>
<td>84</td>
<td>Shelterwood Preparatory Cut</td>
<td>LS/W</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>77</td>
<td>12</td>
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<tr>
<td>39 and 39a</td>
<td>Hardwood/Aspen</td>
<td>44</td>
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<td>Group Selection</td>
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<td>9</td>
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<tr>
<td></td>
<td></td>
<td>18</td>
<td>18</td>
<td>Clearcut for aspen</td>
<td>W</td>
<td>18</td>
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<td>40</td>
<td>Norway Spruce</td>
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<td>11</td>
<td>Shelterwood Preparatory Cut</td>
<td>LS/W</td>
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<tr>
<td>41</td>
<td>Spruce-fir</td>
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<td>42</td>
<td>Spruce-fir</td>
<td>25</td>
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<td>LS/W</td>
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## Environmental Assessment

<table>
<thead>
<tr>
<th>Stand ID</th>
<th>Forest Type</th>
<th>Stand Acres</th>
<th>Treated Acres</th>
<th>Harvest Prescription</th>
<th>Season of Harvest*</th>
<th>Site Prep</th>
</tr>
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<tbody>
<tr>
<td>43</td>
<td>Hardwood/Paper Birch</td>
<td>9</td>
<td>9</td>
<td>Patchcut for paper birch</td>
<td>S/W</td>
<td>9</td>
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<td>44</td>
<td>Hardwood</td>
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<td>LS/W</td>
<td>2</td>
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<tr>
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<td>Hardwood</td>
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<td>LS/W</td>
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<td>46</td>
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<td>54</td>
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<td>Group Selection</td>
<td>W</td>
<td>9</td>
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<tr>
<td>47</td>
<td>Hardwood</td>
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<td>Group Selection</td>
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<td>48</td>
<td>Hardwood</td>
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<td>30</td>
<td>Clearcut</td>
<td>S/W</td>
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<td>Hardwood</td>
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<td>LS/W</td>
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</tr>
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<td>Hardwood</td>
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<td>2</td>
<td>Group Selection</td>
<td>LS/W</td>
<td>2</td>
</tr>
<tr>
<td>51</td>
<td>Hardwood</td>
<td>33</td>
<td>33</td>
<td>Overstory Removal</td>
<td>LS/W</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Hardwood</td>
<td>10</td>
<td>2</td>
<td>Group Selection</td>
<td>LS/W</td>
<td>2</td>
</tr>
<tr>
<td>53</td>
<td>Hardwood</td>
<td>41</td>
<td>7</td>
<td>Group Selection</td>
<td>LS/W</td>
<td>7</td>
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<td>Hardwood</td>
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<td>16</td>
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<td>LS/W</td>
<td>16</td>
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<td>55</td>
<td>Hardwood</td>
<td>79</td>
<td>13</td>
<td>Group Selection</td>
<td>LS/W</td>
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<td>56</td>
<td>Hardwood</td>
<td>49</td>
<td>49</td>
<td>Overstory Removal</td>
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<td>57</td>
<td>Hardwood</td>
<td>26</td>
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<td>Group Selection</td>
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<td>5</td>
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<td>58</td>
<td>Hardwood</td>
<td>16</td>
<td>16</td>
<td>Clearcut</td>
<td>W</td>
<td>16</td>
</tr>
<tr>
<td>59</td>
<td>Hardwood</td>
<td>10</td>
<td>10</td>
<td>Clearcut (PWO)</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>2373</strong></td>
<td><strong>992</strong></td>
<td></td>
<td></td>
<td><strong>540</strong></td>
</tr>
</tbody>
</table>

*Season of Harvest: Harvest could begin early or extend beyond the normal season if ground and bark conditions allow (i.e., ground is dry or frozen and bark has tightened for the summer).

S = summer harvest is typically 6/30 - 10/15

LS = late-summer harvest is typically 8/1 - 10/15

W = winter harvest is typically 12/15 - 3/30
## Appendix B - Table of Current and Proposed Transportation Actions

<table>
<thead>
<tr>
<th>Route ID</th>
<th>Route Name</th>
<th>Length (Miles)</th>
<th>Current Classification</th>
<th>Recommended Classification</th>
<th>Current Maintenance Level</th>
<th>Alternative 2: Proposed Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>York Pond</td>
<td>5.7</td>
<td>NFS Road</td>
<td>NFS Road</td>
<td>5</td>
<td>Change to ML 4</td>
</tr>
<tr>
<td>105</td>
<td>Fifield Brook</td>
<td>2.1</td>
<td>NFS Road</td>
<td>NFS Road</td>
<td>3 (first 1.1 miles) and 1 (remainder)</td>
<td>Restoration and Reconstruction</td>
</tr>
<tr>
<td>105A</td>
<td>Fifield Brook Spur A</td>
<td>0.45</td>
<td>NFS Road</td>
<td>NFS Road</td>
<td>1</td>
<td>Maintenance and Reconstruction (bridge installation)</td>
</tr>
<tr>
<td>105B</td>
<td>Fifield Brook Spur B</td>
<td>0.15</td>
<td>NFS Road</td>
<td>NFS Road</td>
<td>1</td>
<td>Maintenance</td>
</tr>
<tr>
<td>202</td>
<td>Betty Brook</td>
<td>1.2</td>
<td>NFS Road</td>
<td>NFS Road</td>
<td>1</td>
<td>Change first 0.76 miles to ML 2. Maintenance</td>
</tr>
<tr>
<td>222</td>
<td>Hatchery</td>
<td>.31</td>
<td>NFS Road</td>
<td>NFS Road</td>
<td>1</td>
<td>Maintenance</td>
</tr>
<tr>
<td>225</td>
<td>No. 9 Brook</td>
<td>1.1</td>
<td>NFS Road</td>
<td>NFS Road</td>
<td>1</td>
<td>Maintenance</td>
</tr>
<tr>
<td>2217</td>
<td>Unauthorized Inv: 2217</td>
<td>0.25</td>
<td>Unauthorized</td>
<td>NFS Road</td>
<td>1</td>
<td>Maintenance and Reconstruction</td>
</tr>
<tr>
<td>2219</td>
<td>Unauthorized Inv: 2219</td>
<td>0.42</td>
<td>Unauthorized</td>
<td>NFS Road</td>
<td>1</td>
<td>Maintenance and Reconstruction</td>
</tr>
<tr>
<td>2220</td>
<td>Unauthorized Inv: 2220</td>
<td>0.5</td>
<td>Unauthorized</td>
<td>NFS Road</td>
<td>1</td>
<td>This road is not required for this project</td>
</tr>
<tr>
<td>2221*</td>
<td>Unauthorized Inv: 2221</td>
<td>0.10</td>
<td>Unauthorized</td>
<td>No classification</td>
<td>NA</td>
<td>Remove from Forest Roads database</td>
</tr>
<tr>
<td>2273*</td>
<td>Unauthorized</td>
<td>0.07</td>
<td>Unauthorized</td>
<td>No</td>
<td>NA</td>
<td>Remove from Forest Roads database</td>
</tr>
<tr>
<td>Route ID</td>
<td>Route Name</td>
<td>Length (Miles)</td>
<td>Current Classification</td>
<td>Recommended Classification</td>
<td>Current Maintenance Level</td>
<td>Alternative 2: Proposed Action</td>
</tr>
<tr>
<td>---------</td>
<td>------------------</td>
<td>----------------</td>
<td>------------------------</td>
<td>-----------------------------</td>
<td>---------------------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>Inv: 2273</td>
<td>classification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Forest Roads database</td>
</tr>
<tr>
<td>2276*</td>
<td>Unauthorized Inv: 2276</td>
<td>0.07</td>
<td>Unauthorized</td>
<td>No classification</td>
<td>NA</td>
<td>Remove from Forest Roads database</td>
</tr>
<tr>
<td>2288</td>
<td>Unauthorized Inv: 2288</td>
<td>0.22</td>
<td>Unauthorized</td>
<td>NFS Road</td>
<td>1</td>
<td>This road is not required for this project</td>
</tr>
<tr>
<td>8010</td>
<td>York Pond Spur X</td>
<td>0.14</td>
<td>NFS Road</td>
<td>NFS Road</td>
<td>3</td>
<td>Change to ML 2. Maintenance</td>
</tr>
<tr>
<td>U-0015</td>
<td>Unauthorized Inv: U-0015</td>
<td>0.12</td>
<td>Unauthorized</td>
<td>NFS Road</td>
<td>1</td>
<td>Maintenance and Reconstruction</td>
</tr>
<tr>
<td>105X**</td>
<td>Unauthorized Inv: 105X</td>
<td>0.4</td>
<td>None</td>
<td>NFS Road</td>
<td>1</td>
<td>Maintenance</td>
</tr>
<tr>
<td>105XX**</td>
<td>Unauthorized Inv: 105XX</td>
<td>0.3</td>
<td>None</td>
<td>NFS Road</td>
<td>1</td>
<td>Maintenance</td>
</tr>
</tbody>
</table>

*Roads less than 500 feet (approximately 0.1 miles) that lead to a landing are considered part of a landing and would be removed from the Forest Road database.

**Roads missed during previous road inventory and exist on the ground. Formerly used as haul roads and will be added to Forest Road Database.

The Proposed Action concurs with the recommendations developed as a result of the White Mountain National Forest Travel Analysis Process. The one exception is FR 2276 which the Travel Analysis recommended to keep. Given the short length of FR2276, it is proposed to be removed from the Forest Road database.
Appendix C - Past, Present, and Reasonably Foreseeable Future Actions

Activities within the South Pond South Habitat Management Unit

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Cumulative Effects Area Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent Wildlife Opening (PWO) Maintenance</td>
<td>Three PWOs totally 13 acres are being maintained in an open condition using prescribed fire and hand brushing every three to five years. Existing fire lines around the openings are maintained through hand brushing.</td>
<td>Past, Present, Future</td>
</tr>
<tr>
<td>Mill Brook Trail Maintenance (3.8 miles)</td>
<td>In 2014, trail maintenance repaired drainages, removed and constructed bog bridges, and relocated trail sections. Approximately 15 trees were cut for bog bridges. A 75 feet section of trail will be relocated in 2016.</td>
<td>Past, Present and Future</td>
</tr>
<tr>
<td>Barry Conservation Camp</td>
<td>Proposed projects at the site include expansion of the archery area and dining hall, repairs to drainage around structures, and construction of portable structures at the shooting range. About 15 trees (both commercial and non-commercial) may be harvested to accomplish this work.</td>
<td>Future</td>
</tr>
<tr>
<td>Trail and Road Maintenance</td>
<td>Repairs and improvements would address resource and safety issues such as water crossings, surface erosion and sedimentation, removal of down and hazard trees, and trail relocations.</td>
<td>Past, Present, Future</td>
</tr>
<tr>
<td>Hazard Tree Removal</td>
<td>Removal of trees that pose a safety hazard</td>
<td>Past, Present, Future</td>
</tr>
<tr>
<td>Invasive Species Control</td>
<td>Treatment of invasive plants at the Berlin Fish Hatchery and shooting range.</td>
<td>Past, Present, Future</td>
</tr>
<tr>
<td>Maintenance of dog trial trails</td>
<td>Hand brushing of two miles of trails.</td>
<td>Past, Present, Future</td>
</tr>
<tr>
<td>Removal of underground storage</td>
<td>Removal of heating tanks to eliminate risk of potential spills and leaks.</td>
<td>Past - completed in 2014</td>
</tr>
</tbody>
</table>
Environmental Assessment

<table>
<thead>
<tr>
<th>tanks at Berlin Fish Hatchery</th>
<th>Removal of in-stream structure for improved fish passage and protection to roadway.</th>
<th>Past - completed 2012-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal of culvert and installation of bridge on York Pond road (in front of Berlin Fish Hatchery)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Activities within the HUC12 Middle Tributaries and Headwater Branches of the Upper Ammonoosuc River Watersheds (used for Water, Soil, and Aquatic Habitat and Fisheries Resources)**

**Past (2006-present)**

- Mill Brook Trail Maintenance including drainage repair and removal/reconstruction of bog bridges (2014)
- Berlin Fish Hatchery/NH Fish and Game removal of underground storage tanks (2012-2013) and wellspring repair and replacement (~2009)
- York Pond Road culvert removal and installation of bridge (in front of Hatchery), 2012-2013
- Bunnell Notch Trail, short trail relocation with improvements to drainage (2015)
- Pond of Safety, short trail relocation/redesign (~300’) and shoreline stabilization (~12’) (2015)
- Godfrey Dam/Berlin Water Works pipeline repair/replacement (~2013), facility improvements including a concrete building for electrical upgrade and solar power (~2010), and repair of dam and drainage after storm damage (~2011)
- Culvert Removed on Higgins Brook
- Culvert Replacement on Bend Brook and two Unnamed tributaries of the Upper Ammonoosuc River
- Timber harvest in the Lower Loop TS, Higgins Brook TS, and the Four Quarts TS:
Future (present-2036)

Barry Conservation Camp, expansion of the archery area and dining hall, repairs to drainage around structures, and construction of portable structures at the shooting range (2017-8)

Berlin Fish Hatchery/NH Fish and Game removal of underground storage tanks, 2017-2018

Mill Brook Trail relocation (~75')

Land Acquisition- the Forest Service is expected to purchase Lot 441 (consisting of three parcels) totaling 676 acres of land to the east and west of South Pond South HMU. Of this, a 549 acre parcel is directly west and north of Compartment 9

Culvert Replacement on Stony Brook, Spruce Brook, and EB Upper Ammo (unnamed in NHD) culvert replacement (scheduled for 2016)

Culvert Replacement on 8 unnamed tributaries to the Upper Ammo River

Berlin Fish Hatchery/NH Fish and Game septic improvement work (2017)
Environmental Assessment

**Ongoing**

Permanent Wildlife Opening (PWO) Maintenance, including existing fire lines around the openings (burning and/or mowing, every 3-5 years)

Godfrey Dam operation and maintenance

Berlin Fish Hatchery/NH Fish and Game operation and maintenance

Barry Conservation Camp operation and maintenance

No. NH Bird Dog Club annual dog trial trails maintenance (hand brushing trails)

Hiking and Snowmobile trail maintenance

Dispersed campsites maintenance

Road maintenance including grading, ditch work, small culvert replacements, and other ad-hoc repairs

Hazard Tree Removal

Invasive Species Control

Activities on Private Land and a small portion Jericho State Park (Non-NFS land accounts for approx. 12.2% of entire cumulative effects area)
Appendix D - Highlighted Forest Plan Standards and Guidelines and Best Management Practices

Air Quality

- Air Quality Related Values (AQRVs), such as aquatic biota, vegetation, and water quality should be protected to the extent possible from adverse impacts related to air quality within the WMNF (Forest Plan, Air Quality, G-1, p. 2-4).
- Best available smoke management practices should be used to assure that prescribed fire will not result in adverse effects on public health and safety, or visibility in Class I air sheds (Forest Plan, Wildland Fire, G-4, p. 2-33).
- The Great Gulf and Presidential Range/Dry River Wilderness Class I Air sheds should be managed to protect air quality related values (AQRVs) such as visibility, vegetation, and water quality (Forest Plan, Air Quality, G-1, p. 3-12).
- The IMPROVE (Interagency Monitoring of Protected Visual Environments) site at Camp Dodge, or similar substitute technology, should be maintained to monitor air quality in Class I Wilderness in the WMNF (Forest Plan, Air Quality, G-1, p. 3-12).

Aquatic Habitats, Fisheries, and Water Resources

- Uneven-aged silvicultural practices should be used within the Riparian Management Zone (RMZ) along all perennial streams, lakes, ponds, and vernal pools. Cuts should be designed to maintain continuous forest canopy for the protection and maintenance of water quality, dead wood recruitment, hydrologic function, wildlife habitat, and scenic values. Regeneration group cuts should be limited to less than one acre in size. Exceptions may apply in areas deemed important for maintaining beaver colonies. In the absence of on-the-ground riparian mapping, width of RMZs should be defined as in Table 2-01 of the Forest Plan (Forest Plan, Riparian and Aquatic Habitats, G-2, p. 2-25, pp. 2-24 and 2-25).
• Tree cutting and harvest should not occur within 25 feet of the bank of mapped perennial streams, the high water mark of a pond, or a identified natural vernal pool, unless prescribed to benefit hydrological or ecological function of the associated stream, pond, or riparian area. Exceptions to this include tree removals needed to clear a designated stream crossing, maintaining an existing road or previously cleared skid road that cannot be relocated, or protecting human safety or infrastructure. Trees (greater than 4 inch DBH) cut or moved in this zone should be placed in a fashion that benefits riparian functions or aquatic habitats when possible. (Forest Plan, Riparian and Aquatic Habitats, G-1, p. 2-25, pp. 2-24). Mapped perennial streams include those identified as perennial on USGS topographic maps.

• Specific protection measures will be prescribed on a site-by-site basis for intermittent and ephemeral streams. These streams should not be permanently filled or relocated because of skidding operations. Sites where temporary water diversions or channel fill is necessary will be functionally restored after project completion. (Forest Plan, Riparian and Aquatic Habitats, G-9, p. 2-25). See project-specific design features section for these protection measures.

• Trees that directly provide structure to the streambanks and channels of intermittent streams should be retained (Forest Plan, Riparian and Aquatic Habitats, G-15, p. 2-26).

• New skid roads, classified roads, trails, and walk-in campsites should not be located within the stream or pond management zone, which is a minimum of 50 feet in width. The width of the zone increases 20 feet in width with each increase of 10 percent in side slope. If any of the above need to be located within the zone,
additional measures to minimize sedimentation should be taken. (Forest Plan, Riparian and Aquatic Habitat G-5, p. 2-25).

- New timber log landings, developed campsites, and permanent facilities should not be located within 100 feet of a perennial stream or the high water mark of a pond. If they need to be located within 100 feet, additional measures to prevent direct runoff into surface waters and to minimize sedimentation should be taken. (Forest Plan, Riparian and Aquatic Habitats G-6, p. 2-25).

- Existing roads, facilities, campsites, or trails within 100 feet of perennial streams or ponds should be considered for relocation as part of normal project planning, except when doing so would result in greater overall impact to the land or water resource. (Forest Plan, Riparian and Aquatic Habitats G-7, p. 2-25).

- Permitted construction activities in streams identified as having a fisheries value should not occur during the egg incubation period of October through April in areas where potential sedimentation would be detrimental to egg survival.

- Vegetation Management Standards and Guidelines
- State of New Hampshire BMP must be met or exceeded. (Forest Plan, Vegetation Management S-4, p. 2-29).

- No more than 15 percent of the area of watersheds of first and second order perennial streams should be treated with even-age regeneration methods in a five year period (Forest Plan, Vegetation Management G-1, p. 2-29).

- Effective, proven methods (e.g., silt fencing) to reduce concentrated runoff and erosion from construction activities must be used (Forest Plan, Water Resources S-3, p. 2-30).

- Where used, sediment traps must be maintained until disturbed sites and/or cut and fill slopes are stabilized (Forest Plan, Water Resources S-4, p. 2-30).

- New or reconstructed features (e.g., ditches and water bars) intended to capture runoff water should be designed to drain into areas suitable for trapping sediment and not directly into streams, wetlands or vernal pools. (Forest Plan, Water Resources G-1, p. 2-31).

- Fords must not be used on perennial streams, except on a temporary basis during construction, unless approved for
administrative use at designated locations with appropriate mitigations (Forest Plan, Water Resources S-6, p. 2-30).

- Permanent stream crossings must be designed to pass the bankfull discharge unimpeded (Forest Plan, Water Resources S-5, p. 2-31).
- Temporary stream crossings on perennial streams should be designed to withstand at least a 25-year flood and pass bankfull flows (Forest Plan, Water Resources G-5, p. 2-31).
- Locate roads, landings and skid trails to minimize the number of stream crossings needed and maximize the harvest area accessed by each crossing. (UNH Cooperative Extension 2005, p. 38).
- Minimize disturbance to the stream banks, channel and streambed during installation, use and removal of stream crossings (UNH Cooperative Extension 2005, p. 42).
- Stabilize stream crossing approaches with brush or similar materials, before and during operations. Maintain approaches in a stable condition through close out (UNH Cooperative Extension 2005, p. 42).
- Trail grades approaching stream crossings shall be broken and surface water dispersed so it will not reach the water course. Silt fencing, hay bale erosion checks or water diversions shall be used to prevent soil from skid trails from entering streams and other surface waters (NHDFL 2004, p. 19).

**Recreation**

- Trailheads and trailhead parking lots serve as primary access to the trail system and backcountry sites. The Forest Service should determine the appropriate levels of development (e.g., paved or gravel, size, toilets provided/not provided) based on the objectives of the backcountry areas and the facilities served by the trails (Forest Plan, G-1, p. 2-28).
- G-2 Trailhead parking lots should not be constructed, improved, or expanded solely to accommodate increased recreation use (Forest Plan, G-1, p. 2-28).
- Summer motorized trail use is prohibited (Forest Plan, S-1, p. 2-19).
Soils

The following soil conservation practices are emphasized for this project (USDA Forest Service, 2005a, Forest-wide, Water Resources, Soil & Water Conservation Practices, S-1, p 2-30 and, Forest-wide, Vegetation Management Practices, G-5, p 2-30). These Standards and Guidelines (NH BMP, 2016, Maine Forest Service, Department of Conservation, 2012) are expected to be effective in meeting soil quality standards (USDA Forest Service, 2005b, pp 3-54):

- Where exposure of mineral soil is expected, skid trails should generally be located on grades of less than 20 percent, with only short steeper pitches (G-5), (Oregon State University Ext 1983; NH BMP, 2016, Maine Forest Service, Department of Conservation, 2012). Limiting locations for skid trails (pitch) insures that the potential for erosion is reduced.
- To limit the area subject to soil compaction, log landings would be the minimum size necessary to meet the requirements of the equipment, the quantity, and type of forest products, and safety (Oregon State University Ext, 1983; Martin, 1988; Maine Forest Service, Department of Conservation, 2012; NH BMP, 2016). This limitation of the size of the landing minimizes the area on which soil disturbance and compaction would occur.
- Upon completion of operations at a landing, the area of disturbance would be bladed and stabilized as needed to prevent erosion before the site can revegetate and to accelerate recovery from temporary soil compaction (NH BMP, 2016, Maine Forest Service, Department of Conservation, 2012. Even though these surfaces are nearly flat, this action insures that runoff from the landing would not erode soils.
- The operating period of timber sale activities are limited to specific season of harvest and/or ground conditions specified in the timber sale contract to minimize adverse soil and water environmental effects. This would be monitored by the Timber Sale Administrator. This insures that erosion and compaction would be minimized and contained within the immediate area, and no long-term soil productivity effects would occur.
- Skidding patterns are designed to fit the terrain to control the volume, velocity, concentration, and direction of runoff water in a
manner that would minimize erosion and sedimentation. These measures work because they control the volume, velocity, concentration, and direction of runoff in a manner that minimizes erosion and sedimentation. This preventative practice would be achieved by minimizing the length of skid trails, locating the skid trails in advance, adding drainage features such as waterbars, and designing skid trails to cross streams at right angles (Oregon State University Ext 1983, Woodland Workbook on Designated Skid Trails to Minimize Soil Compaction; Martin, 1988, Maine Forest Service, Department of Conservation, 2012, NH BMP, 2016). This would be implemented by the Timber Sale Administrator.

- Whole harvested trees may be skidded to landings; some tops and limbs would be scattered on landings and skid trails (where needed) to reduce compaction and erosion during and after operations, during snow-free season and otherwise as needed; and remaining tops and limbs would be returned and scattered on all harvested stands to retain soil nutrients (USDA Forest Service, 2005a, Forest-wide, Vegetation Management, exceeds G-5, p 2-30 and Water Resources, exceeds S-1, p 2-30). This design feature works because placing logging slash in the skid trails reduces compaction (Martin, 1988). Slash collected on the skid trail would cushion the effects of compaction (Oregon State University Extension Service, 1983). Operating on a cushion of slash or over snow minimizes compaction. A surface layer of two inches or greater of slash would provide protection from compaction (Poff 1996).

- Upon completion of harvesting operations, skid trails would be closed, and bare ground seeded as needed in areas where soil erosion potential occurs (NH BMP, 2016, Maine Forest Service, Department of Conservation, 2012). The Timber Sale Administrator would designate the areas of disturbed soils that must be treated and monitor effectiveness of the treatment. Water-barring and seeding needed sections of skid trails has proven to work on the WMNF, and in other places implementing New Hampshire BMP (see NCASI 2000 Handbook of Control and Mitigation Measures for Silvicultural Operations).
Appendix E - Climate Change and Carbon Dynamics

This report summarizes recent trends in the local climate, discusses broadly the modeled expected changes in future climate for the Northeastern United States including the White Mountain Region of New Hampshire and Maine and discusses the expected effects of modeled climate change on many of the Project Area resources where there is a nexus with climate change. The discussion of the effects of the proposed project activities and how they may interact with the projected changes in climate on the resources in the Project Area is separately addressed in each resource section of the NEPA documentation.

Climate Change Effects on Project Area Resources

The scope of this review of climate change effects on Project Area resources is generally the Project Area over the next 85 years (to 2100). The geographical boundary of effects to resources may vary based on the available peer reviewed science which may further be limited to State, regional or even hemispheric scales depending on the modeling selected by the researchers. The timeframe chosen aligns with many of the typical projections of climate change for the remainder of the 21st Century. Where a more near term estimate of climate change effects is required estimates are made based on time periods frequently modeled in the peer reviewed scientific literature. Time frames beyond 2100 are not well represented in the available literature.

Existing Conditions

The current climate of the White Mountain region in Northern New Hampshire and Western Maine is generally characterized as a humid continental climate, where winters are long, cold and heavy snow is common (most locations receive 60 to 120 inches (1,500 to 3,000 mm) of snow annually). The summer months are moderately warm, though summer is rather short and rainfall is spread through the year. New Hampshire is divided into 2 main climate divisions by the National Oceanic and Atmospheric Administration which reflects the differences between the warmer coastal zone and the colder northern interior. The Project Area for the Deer Ridge project lies in New Hampshire Climate Division 1 which includes the northern part of the state. This division has a long term average annual temperature of 39.6° F with average annual precipitation 43.92 inches for the period 1895 -2014 (National Climatic
Data Center - NOAA, 2015). Between 1895 and 2015, mean annual temperatures fluctuated from year to year by several degrees across this climate division with an average increase in overall warmth of .2°F per decade for the entire period. The more recent period 1970-2014 shows an average increase in temperature of .6°F per decade indicating that the rate of warming has increased in the last half century. Trends in precipitation over the past century have been more pronounced with an average decadal increase in average annual precipitation of .62” over the period 1895 to 2014. The latter half of the period, 1970 to 2014, shows an increase of 1.07” per decade.

NOAA Technical Report NESDIS 142-1 “Regional Climate Trends and Scenarios for the U.S. National Climate Assessment, Part 1 Climate of the Northeast U.S.” (Kunkel, et al., 2013) makes the following points about recent climate trends in the region (West Virginia to Maine):

- Temperatures have generally remained above the 1901-1960 average over the past 30 years. Warming has been more pronounced during the winter and spring seasons with trends upward and statistically significant for each season as well as the year as a whole.
- Annual precipitation shows a clear shift towards greater variability and higher totals since 1970. Precipitation trends are statistically significant for fall and for the year as a whole.
- The frequency of extreme cold events was high early in the record (1901 – 1960) and has been less than average since a peak in the 1970’s and 80’s. Since 1985 the cold wave index has averaged about 30% below the long-term average.
- Since the late 1980’s the frequency of heat waves has been similar to that of the first half of the 20th century.
- There is substantial decadal-scale variability in the number of extreme precipitation events since about 1935. The index has been quite high since the 1990’s with the highest value occurring in 2008.
- The design flooding events (50 and 100 years) are occurring more frequently. The expected 100 year event based on 1950-1979 data now occurs with an average return interval of 60 years when data from 1978-2007 is considered.
- There has been a generally increasing trend in the length of the freeze-free season since the mid-1980’s. The average freeze-free
season length during 1991-2010 was about 10 days longer than during 1961-1990.

- Over the last 30 years, the spring center-of-volume dates (a measure of the seasonality of river flow volume) have come 1-2 weeks earlier on average.
- Overall warming is further evidenced by later ice-in dates on northeastern lakes and decreases in average snow depth.

**Predicted Future Conditions**

Information on predicted conditions is based on the results of the substantial modelling efforts supporting the International Panel on Climate Change (IPCC) and national efforts such as the US National Climate Assessment. Because these modeling efforts are widely documented in the available scientific peer reviewed literature that information is not reproduced here. Users of the summary provided below are encouraged to refer to NOAA Technical Report NESDIS 142-1 (Kunkel, et al., 2013) for a succinct discussion of their modeling and then to follow their cited reference materials as necessary. Users should keep in mind that the results discussed below are from groups of models that are only representations (each with their own biases) of the complex processes operating on the planet. In some cases these global models are statistically downscaled or used to provide inputs to regional climate models. Inputs to these models concerning potential increases in CO2 and other greenhouse gases (as well as other forcing factors) are based on IPCC emission scenarios that provide internally consistent “storylines” about possible future social, economic, technological and demographic developments. For the work cited below from the NESDIS 142-1 report the modeled emission scenarios are the A2 scenario (GHG emissions steadily rising throughout the 21st century resulting in estimated CO2 concentrations above 800 ppm) and the B1 scenario (GHG emissions level off by mid-century and top out at approximately 500 ppm). Other scientific literature may also include the A1FI scenario which models a much higher CO2 level of 1370 ppm at the end of the century. The very latest work on climate modeling supporting the work of the IPCC has changed from the scenario based approach to a new methodology (Wayne, 2015) which uses representation concentration pathways to provide various time-dependent projections of atmospheric greenhouse gas (GHG) concentrations. As this work has not been widely assimilated into the ecological scientific
literature at this time the scenario approach will be relied upon for future predictions of regional and Project Area climate unless otherwise noted below. Also, unless otherwise noted, the results of the modeling describing estimated future conditions is a multi-model mean resulting from the output of up to 15 different climate models.

NOAA Technical Report NESDIS 142-1 (Kunkel, et al., 2013) makes the following key points about the results from their review of future climate simulations (West Virginia to Maine) over the reference period of 1970-1999:

- Models indicate an increase in temperature for all three future periods, with little spatial variation across the region though warming tends to be slightly larger in the northern portion of the area. Temperature changes are statistically significant for all three time periods (2021-2050, 2041-2070, 2070-2099) and both emission scenarios (A2 & B1).
  - Simulated temperature changes are similar in value for both A2 and B1 for the near future (2021 – 2050), whereas late in the 21st century (2070 – 2099) the high (A2) emissions scenario indicates nearly twice the amount of warming. Projected changes from the baseline period for the Project Area are:
    - +2.5°F – 3.5°F for both scenarios for the period 2021-2050;
    - +3.5°F – 4.5°F for B1 and +4.5°F – 5.5°F for A2 in the period 2041-2070; and
    - +4.5°F – 5.5°F for B1 and +7.5°F – 8.5°F for A2 in the period 2070-2099.
  - The range of model simulated temperature change is substantial, indicating substantial uncertainty in the magnitude of warming associated with each scenario. However, in each model the warming is unequivocal and large compared to historic variations.
  - The freeze-free season is simulated to lengthen by approximately 25-29 days for the area (Project Area) for the period 2041-2070 (A2).
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- Decreases in the number of days with a minimum temperature below 32oF are 21-23 days for the area (Project Area) for the period 2041-2070 (A2).
- Decreases in the number of days with a minimum temperature below 10oF are largest in the northern portion of the area (Project Area) estimated at an annual decrease of 24 days for the period 2041-2070 (A2).
  - The modeling of precipitation changes in the region is not as unequivocal as for temperature nor is it as strong statistically with indications that for some models in some time periods the estimated precipitation is within the range of normal variation. However, in the Project Area there is strong agreement across all models that precipitation will increase.

- For the Project Area both scenarios show that precipitation increases for the early period (2021-2050) will likely be within the normal variation of precipitation.
- In the Project Area modelled results indicate that for both scenarios there is a statistically significant chance that precipitation will increase 3-6% over the baseline period (1.2 to 2.4 inches) for the middle period and perhaps as much as 6-9% in the later period under the A2 scenario (2.4 to 3.6 inches).
- Simulated seasonal changes are mostly upward in winter, spring and fall and downward in summer. However the range around the multi-model mean is large indicating greater uncertainty about seasonal precipitation shifts. The strongest signal for the Project Area of these seasonal shifts is during the period 2070-2099 under the A2 scenario.
- The increase in the number of days with precipitation totals >1 inch is expected to be by 9-11 days for the Project Area for the period 2041-2070 (A2). There are also projections that the frequency of events greater than 1” will also increase for this period in the Project Area and across the region.

More recent work using the Climate Model Intercomparison Project 5 (CMIP5) modeling supports the previous work of Kunkle who used CMIP3 data. The authors of this study (Wuebbles, et al., 2014) note that the CMIP5
modeling predicts, by the end of this century, a 50% increase in the annual fraction of precipitation falling in the heaviest events for the mid–low scenario (RCP4.5 approximately equivalent to B1), while a 90% increase is projected for the higher scenario (RCP8.5 approximately equivalent to A1F1). The authors also note that at the end of this century, under the RCP8.5 scenario, the current 20-yr event is projected to occur about 3 – 4 times more frequently for areas of the northeastern US. The National Weather Service estimated that the 24 hour event with a return interval of 25 years was between 5 and 6 inches for the Project Area (Hershfield, 1961). This projection would result in the 20 year storm becoming approximately the 5 year storm by 2100.

Modeling of snowfall and snowpack by other researchers supports Kunkel’s general conclusions but provides a more detailed look at the potential variability of this type of weather. The authors of this study (Notaro, Lorenz, Hoving, & Schumer, 2014) predict that for both the middle and late 21st Century and both emission scenarios (A2 & B1), the entire region is expected to experience reduced annual snowfall and a shift toward less snow and more rain compared to the period 1980 - 2000. In the vicinity of the Project Area these reductions in mean snow depth are on the order of 20-40% mid-century and greater than 80% by the late period (2080-2100). Reductions of similar magnitude are modeled for the number of days with snow >1cm (.4”) on the ground. The authors note that their study provides support for intensified snowstorms during this century. Heavy daily snow events are projected to increase in frequency, particularly across the upper Great Plains and Great Lakes and most notably for low-warming scenarios.

**Direct and Indirect Effects of Climate Change on Project Area Resources**

*Changing Climate, Changing Forests* (Rustad, et al., 2012) summarized projected climate-induced impacts over the next century on a wide variety of forest resources. This summary included work on selected tree species or species groups based on changes in habitat conditions as well as changes to biogeochemical cycling, wildlife and nuisance species. Drawing on the work of a large body of peer reviewed literature the authors succinctly highlight both the findings and the uncertainties uncovered in this scientific work. Most of this remaining section of the report draws from *Changing Climate, Changing Forests* to illustrate the estimated effects of
climate change to Northeastern forests that are representative of the resources in the Project Area.

Biogeochemical cycling, the movement of elements through the soils, plants, waters and atmosphere is a fundamental part of any ecosystem. The evidence collected at a number of research sites around the Northeast indicates that climate change will alter biogeochemical cycling with potentially profound effects on forest productivity, water quality and other ecosystem services. Extensive work at Hubbard Brook Experimental Forest (Groffman, et al., 2001) documents the important role snow plays in biogeochemical cycling in the northern hardwood forest. The authors discuss how reductions in snow cover may lead to increases in soil freezing, i.e. colder soils in a warmer world. Soil freezing is known to stress fine roots and soil microbial populations. Increases in freeze events may affect root and microbial mortality, the cycling and loss of nutrients, the chemistry of drainage waters and soil-atmosphere trace gas fluxes. Over the long-term, differential resistance to freezing stress may be a key regulator of species composition in northern forests under a warmer climate condition. Other impacts to biogeochemical cycling are highlighted in a later study that removed snow cover from forested sites to measure the possible effects of soil freezing on calcium cycling in sugar maples. This study (Comerford, et al., 2013) confirms other work on soil freezing as a cause of soil acidification that leads to soil cation imbalances (between calcium, a necessary plant nutrient, and aluminum a known phytotoxin). The authors found evidence that increased soil freezing due to a reduced snowpack could exacerbate soil cation imbalances already caused by acidic deposition, and have widespread implications for forest health in the northeastern US. It is likely that these changes will occur intermittently through the mid-century period as the extent and depth of snow cover begins to vary more widely as the climate continues to warm.

Other work suggest that as climate warms through the end of the century (2100) greenhouse gases will be released from soils, the availability of important nutrients will change and the water quality in sensitive watersheds will decrease (Campbell, et al., 2009) even as net primary productivity is modeled to increase. The authors noted in their article that their model simulations and analysis have limitations, particularly of the feedback loops between processes operating in the environment. They were confident that their results indicated the direction and magnitude of
change expected by the end of the century for the models and emission scenarios they used.

*Changing climate, Changing Forests* (Rustad, et al., 2012) summarized projected climate-induced impacts over the next century on selected tree species or species groups based on changes in habitat conditions, the “climatic envelope” approach. This approach can be used to project shifting conditions for both plants and animals. Current modeling studies project that the climatic envelope of the dominant tree species in the Northeast region are likely to undergo dramatic range shifts as both temperature and precipitation change in response to increases in GHG. The inference is that as the climatic envelope for each individual species shifts the forests communities we see around us now that are at the southern edge of their range (northern hardwood, spruce-fir) will be more stressed under higher temperatures and greater precipitation and that species at the northern edge of their range (oaks and pines) will be more competitive. Because not every species in the current assemblages has the same climatic envelope we can anticipate that the present forest community will disassemble and transition to a new and potentially novel community types through the end of the century and beyond. (Iverson, Prasad, Matthews, & Peters, 2008). Projections suggest that the suitable habitat (climatic envelope) for spruce-fir forests may virtually disappear from the Northeast in the next 100 years, and that the climactic envelope for the northern hardwood trees that currently dominate the region is likely to be replaced by conditions better suited to oak forests (Rustad, et al., 2012). It is important to reiterate that these are projections of climate suitability for individual species and not for the presence or absence of a particular species as tree species migrate slowly (Mohan, Cox, & Iverson, 2009). The expectation is that there will still be individuals of the current dominant species, in particular of the more long lived species, on the local landscape at the end of the century but that they will be more stressed and less competitive than they are at present. Competition stress may express itself in several ways including the ability to successfully regenerate or increased susceptibility to insects, pests and disease (Iverson, Prasad, Matthews, & Peters, 2008). Some species, such as eastern hemlock, are susceptible to specific pests such as the hemlock wooly adelgid (HWA) which have been unable to penetrate the White Mountain area due to cold temperatures. HWA experiences 90% mortality when temperatures reach 5oF (Ward,
Montgomery, Cheah, Onken, & Cowles, 2004) and so could be expected to expand northwards as extreme winter temperatures occur less often. Species at the southern edge of their range, such as paper and yellow birch, red spruce and sugar maple may be more susceptible to winter freeze-thaw events or general freezing of the soil due to reductions in snow cover (Mohan, Cox, & Iverson, 2009).

Along with the effects on the dominant vegetation type there are expected to be similar changes to vegetation in the understory as well. A study of the ability of understory vegetation to react to stressors such as changes in light levels, drought or waterlogging indicates that just a small percentage of northern hemisphere species (<10% of those studied) were tolerant to two or more stressors (Niinemets & Valladares, 2006). In a survey of climate change vulnerability in Maine (Whitman, 2013) observed that plant species that were at the southern extent of their range or which were found in fragmented habitats such as wetlands or alpine areas, were likely to be the most vulnerable to the effects of climate change. Another suite of largely unpredictable changes involve phenology, in which the timing of key life stages shifts with changes in climate. Not all interacting species will shift at the same rate – if they shift at all – and the resulting “phenological mismatches” have the potential to disrupt reproduction, predator/prey cycles, and ecological interactions such as pollination (New Hampshire Fish & Game Department, 2015). There is some evidence that this is already occurring between some pollinators and their related plant species (Kudo, 2013) though none are currently documented for the Project Area. It should be noted that there is limited research available on the possible effect of climate change on individual species of understory plants or their pollinators in the Northeastern US.

Climate affects wildlife through changes in the quality and distribution of habitat, the availability of food, the abundance of parasites and diseases, and the incidence of stress from heat and drought. Specialist species and animals whose populations are already declining due to other stressors will be most vulnerable. Species at the southern edge of their range, with restricted ranges, species restricted to a single habitat, and species with small isolated populations will be particularly at risk, and are most likely to be affected by the smallest amount of change (Whitman, 2013). In recent decades, climate change has already affected the distribution and abundance of many species. For example, detailed historical information
indicates that the ranges of many bird species are already changing and that there will be substantial gains and losses in the future, predominantly among migratory bird species, under both high (A2) and low (B1) emissions scenarios (Rustad, et al., 2012).

Changes in habitat suitability for many bird species of interest in the Project Area have also been modeled under a range of climate change scenarios. The mean centers of the suitable habitats for 147 species are projected to move, on average, between 98 and 203 km to the north-northeast by the end of the century, depending on the climate change scenario (Matthews, Iverson, Prasad, & Peters, 2011). A separate study that modeled projected change in suitable habitat under four climate change scenarios indicated the potential for relatively large changes in the bird community throughout the Northeast (Rodenhouse, et al., 2008) with the largest changes occurring under the higher emission scenarios (A1FI). Any given location could be expected to simultaneously gain and lose bird species as ranges, breeding and wintering grounds fluctuate. Areas where habitat may be suitable for the largest increases in bird richness included Maine and New Hampshire, while large losses of species richness were expected to occur in the southern New England States and New York. The abundance of Neotropical and temperate migrants, that compose the majority of birds breeding in the Northeast, may undergo major change with either high or low emissions scenarios. For these two groups of migrants under both high emission scenarios (A1FI and A2), over 44% of the species are projected to decline and an additional 33% are projected to increase in incidence by more than 25% as a result of climate change. If these changes are realized, they would constitute a dramatic alteration of the composition of bird communities throughout the region. Temperate migrants show the potential for the greatest overall losses in incidence as a result of shifting habitat. This is in part due to a greater proportion of losses compared to gains, while the Neotropical migrants show substantial losses of current occupants as well as substantial gains of more southern species moving north (Rodenhouse, et al., 2008).

In addition to birds climate change is also expected to impact other fauna including mammals, amphibians, reptiles and insects. The most sensitive species to climate change are habitat restricted species such as those living or breeding at high elevations, inhabiting small isolated patches of habitat such as bogs; or dependent upon disturbance regimes (fire), or
hydroperiods (vernal pools). Also at risk are highly specialized species dependent upon a single host plant species or whose population may already be in decline or threatened from some other disturbance such as pests, disease or other environmental stressors (Rodenhouse, Chritenson, Parry, & Green, 2009). Many of these species are already listed as threatened or endangered by the State of New Hampshire (New Hampshire Fish & Game Department, 2015) (New Hampshire Natural Heritage Bureau, 2013). One of the mammals of concern in the area of the project includes moose which currently suffer not only from higher levels of heat stress in the summer but from winter tick infestations that are more prevalent due to the currently warmer minimum winter temperatures (New Hampshire Fish & Game Department, 2015). Amphibians are also expected to be increasingly vulnerable to climate change. Researchers (Rodenhouse, Chritenson, Parry, & Green, 2009) postulate that vernal pools, a key breeding habitat, may be present for shorter periods of time due to reductions in snow pack, shifts in the timing of precipitation and increased evaporation from higher temperatures. The shortening of the pool hydroperiod would likely affect population dynamics negatively by increasing competition, decreasing size at metamorphosis and stranding pre-metamorphic larvae. Insects are expected to change geographic distribution, and exhibit altered phenology, physiology and life history in response to climate change.

Aquatic habitats are vulnerable from changes in both temperature and precipitation. Some of the vulnerabilities are due to an expected increase in the intensity and frequency of flooding events which will cause habitat damage and direct mortality to aquatic species, in particular freshwater mussels. This impact would be disproportionately larger in developed watersheds where human infrastructure (dams and culverts) exacerbates flood damage and limits recolonization. Higher temperatures are expected to cause the distribution of species dependent on cold water to shift north and to higher elevations while warm water species colonize streams that are no longer cold enough to support species like brook trout.

Groundwater resources that may support cold water streams will be stressed by an increase in evapotranspiration due to climate change. In larger cold water streams this increase, in combination with water withdrawal for human consumption, may lower summer base flows in
some watersheds, causing many perennial streams to become intermittent (New Hampshire Fish & Game Department, 2015).

Climate change is also expected to have effects on aspects of the human environment. While there is extensive literature on this subject this discussion is limited to four aspects, winter recreation, Timber harvest, infrastructure and heritage resources.

Winter recreation within the Project Area is primarily focused on over snow travel in the form of snowmobiling and cross-country skiing. Over snow travel is highly dependent on natural snow conditions and because of its extensive nature is unable to take advantage of the type of snow making that occurs in alpine winter recreation. In the one substantial analysis of the potential effect of climate change on snowmobiling (McBoyle, Scott, & Jones, 2007) in North America the authors examined the data from 13 sites across Canada including locations in the Prairies, Ontario, Quebec, and the Atlantic Provinces. Estimating that the minimum snow depth for reliability was 15 cm (6”) in smooth terrain and 30 cm (12”) in rough terrain they made projections for each of the sites using a low emission (B2) and high emission (A1) for two time periods the 2020’s (2010 – 2039) and the 2050’s (2040 – 2069). By calculating against the base period (1961 – 1990) the authors estimate that the number of days with reliable snow cover for snowmobiling in the 2020’s would be reduced from an average 68 days in Sherbrooke, QC by 42% (to 39 days) under the low emission scenario (B2) and as much as 58 % (to 29 days) under the high emission scenario (A1). By 2050 the estimates were 47% and 95% reductions (to 37 and 3 days) respectively. As Sherbrooke, QC is 99 miles north of the Project Area it would be reasonable to assume that the actual number of days of reliable snow for snowmobiling in the Project Area will be less than these estimates. The authors conclude that by 2050 the effect of climate change on snowmobiling will be devastating under the high emission scenario and that in all actuality the likelihood of extreme events (warmer than average winters, multiple rain on snow events) which they did not model will render the activity unreliable much earlier.

In the Northeastern States timber harvest occurs seasonally when the ground is either dry enough or sufficiently snow covered or frozen to support vehicle operations. Both of these conditions will likely be affected by changes in climate. Summer and fall harvests are dependent on a sufficient period to dry out roads and the forest floor to minimize rutting
by equipment. With the models indicating the potential for drier summer and fall conditions this may allow for the expansion of logging operations during this season onto ground that has been historically too wet to log during this time of the year. Conversely the reduction in snowfall and more frequent rain on snow events predicted for mid-century may make winter logging more difficult or less predictable as the necessary cold temperatures and snow cover become less reliable. Research examining changes in winter harvest practices in Wisconsin (Rittenhouse, 2015) show how even the current changes in snow and frozen ground conditions can have significant implications for timber harvest during the winter months with evidence that warmer, less snow covered conditions lead to changes in harvest practices.

Also of interest is the effect of climate change on the built environment which in the Project Area is limited to trails and roads and their associated structures such as drainage and bridges. As noted above (Kunkel, et al., 2013), the design the design flooding events (50 and 100 years) are occurring more frequently with the expected 100 year event now occurring with an average return interval of 60 years. The effect of the future modeled changes in the overall precipitation regime will expose the built environment to additional rainfall and runoff that further exceeds current design specifications. Crossings on streams will see water levels now associated with the 100 year flood (1% return frequency) more often. The gravel and native materials that surface most roads and trails in the area will be subject to extreme events more frequently resulting in greater erosion requiring additional maintenance. Reductions in protective snow cover and more frequent freeze thaw cycles and the greater likelihood of winter rain events when protective vegetation is absent will also increase the exposure of roads and trails to the erosive effects of extreme precipitation.

Heritage resources are vulnerable in many of the same ways that natural resources are vulnerable though the specific mechanisms that impact heritage resources are different. The environment is the greatest threat to fragile site materials such as wood and stone masonry. Water, wind, soil chemistry, floods, extreme temperatures, fluctuations in humidity, and freeze/thaw and wet/dry cycling are the primary threats to these resources. Predicted climatic changes include changes in the frequency, duration, and intensity of all of the above, and these changes, where they occur, will
impacts and preservation (National Park Service, 2010). As a local example, higher flood flows at stream crossings have potential to compromise the structural integrity of historically significant stone masonry culverts. This issue was highlighted to National Forest managers when several historical masonry culverts were at risk after Tropical Storm Irene passed over the WMNF in 2011.

**Interactions with Project Related Disturbance**

In general, the disturbance from the proposed activities at the project scale could interact with the larger disturbance generated by anthropogenic climate change in many ways though the details will vary by the resource. Some of the possible types of interaction could include:

- Some of the effects of the project generated disturbance are so minimal, possibly because of mitigations included in the project design, that there will be no interaction at all with modeled climate change.
- The effects of the project generated disturbance will likely fall within the range of natural disturbance over a short time horizon and is therefore not likely to interact in a meaningful way with the effect climate change will have on the particular resource.
- The effect of the project generated disturbance temporarily increases resistance or resilience to the modeled effects of climate change to a resource. This allows a species or community to remain on the landscape in a healthier condition or for a longer period of time than would be expected without the project disturbance.
- The effect of the project generated disturbance interacts with the modeled effects of climate change to a resource in a way that accelerates the changes expected from climate change alone. These changes might be either desirable (e.g. assisted migration) or undesirable (e.g. extirpation of a species from the area).

**Climate Change Summary**

Climate change has been and will be a driver of change on the landscape. The measured changes in trends over the last few decades have already begun to affect some Project Area resources. The modeled changes available in the peer reviewed literature indicate, depending on many factors, that most, if not all of the natural and human resources in the Project Area are likely to eventually see some effect. The scope, timing and
magnitude of the effects to an individual species or resource cannot be predicted with complete accuracy. This is because of the inherent uncertainties in the models used, the natural variability operating in ecosystems and the lack of modeling for many factors and their interrelationships.

**Carbon Dynamics Summary**

An analysis was conducted to evaluate the relationship between carbon storage and uptake and the proposed activities in the Deer Ridge Integrated Resource project (Simmons 2016). There is a strong scientific understanding of carbon flux, however, it is not possible to measure accurately or precisely at the project scale, due to the nature of the activities and uncertainties associated with the models that are used to estimate it. Any changes in carbon flux resulting from proposed activities would be temporary, as there would be no change in land use. The area would remain in a forested condition, with only the stand structure, species mixes and age classes changing.

The full analysis, which is available in the Deer Ridge Project Record, describes the science behind carbon storage and uptake and models for estimating flux. It provides a general contextual setting for the scale of effects from this project in relation to emissions from other activities currently occurring in New Hampshire, and a basic quantification of the carbon flux at the project level and larger scales. The bottom-line results from that analysis are provided below.

The estimated release of CO2 equivalents from this project is approximately 39,000 Metric Tons (MT). As discussed previously, it is impossible to quantify all of the uncertainties that surround the estimates. It should be reiterated that this is a point estimate and any release would be spread over several years if not decades as carbon moves between the various ecosystem pools before being released to the atmosphere. Some carbon, converted into harvested wood products or entering the soil pool, may not reach the atmosphere for a very long time if ever.

The impacts of the Proposed Action on global carbon sequestration and atmospheric concentrations of CO2 are very small. The short-term reduction in carbon stocks and sequestration rates resulting from the proposed project are imperceptibly small on global and national scales, as are the potential long-term benefits in terms of carbon storage. This project
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may release approximately 39,000 MT of CO2 equivalents over a period of 8 to 10 years (and possibly longer). If the entire estimated amount was to be released in one year it would be only 0.000024% of the total carbon stored in US Forests.

References


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<td>I do not support this plan at all.</td>
<td>Personal values and opinion - identifying a preference for an alternative.</td>
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<td>Attachment 1: Timber Harvest</td>
<td>See “Response to Opposing Views”</td>
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<td>Attachment 5: Insect Activity</td>
<td>See “Response to Opposing Views”</td>
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<td>Attachment 8: Post-fire Effects</td>
<td>The Opposing Views Attachment #8 is primarily about post-fire effects on landscapes, although some of the items also mention natural disturbance in general. The Purpose and Need of the Deer Ridge Integrated Resource Project does not include addressing any post-fire landscapes, nor does the Project Area include any fire-dependent forest types. Therefore, the information in Opposing Views Attachment #8 is not applicable to the Deer Ridge Integrated Resource Project. The WMNF does understand the ability of fire to create and maintain wildlife habitat and the proposed action includes using prescribed fire to expand and maintain permanent wildlife openings. The Forest also understands the importance of snags and other dead and downed wood features as wildlife habitat. The Forest Plan includes standards and guidelines for maintaining Wildlife Reserve Trees including retaining existing snags and hollow logs (Forest Plan p. 2-35 to 2-36). The WMNF does understand the role natural disturbance plays in northeastern forest ecosystems. Natural disturbances in the forest types found in the Project Area are typically small-scale disturbance such as those that create small canopy openings (Seymore et al. 2002). The ice storm of 1998 affected more than 15,650 million acres of northern hardwoods and spruce-hardwood forest in northern New England and New York. Over 100,000 acres were impacted on the WMNF including 3,000 acres on the Androscoggin Ranger District. Although this storm was not a stand replacing event, it did create a patch dynamics within forested stands. Crown damaged trees from the 1998 ice storm are distributed throughout the entire project area, but the damage was most severe and extensive in stand ID 27. For this stand, a salvage harvest would remove trees with physical damage or defects from all age and size classes that likely would not survive to the next harvest rotation (20-25 years). This treatment would maintain an uneven-aged stand condition while simultaneously encouraging species regeneration. Over time, this will produce a stand with greater species and age class diversity as more sunlight penetrates to the forest floor. In other areas where there are small pockets of ice damaged trees on the landscape, group selection treatments will remove areas of trees ranging in size from .5 acres to 2 acres to mimic natural patch stand dynamics. These patches will create a new age class of shade intolerant and intermediate shade tolerant species that will add species diversity to the stand as a whole.</td>
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<td>Attachment 10: Polling Results / Economics</td>
<td>Whether or not the American people want the trees in their national forests harvested is a national policy matter beyond the scope of the Deer Ridge Integrated Resource Project. One of the polls that is of Canadian residents and their views on designation of wilderness in Nova Scotia. The Opposing Views #10 also contains a section on economics. There are two press releases discussing a report released by the Outdoor Industry Association discussing the economics of recreation in two western states. Four opinion pieces address the economics of logging and/or recreation on national forests in general. One opinion piece is opposing logging on land surrounding a reservoir in Northampton, MA. None of the polls or other documents included in this opposing views document are relevant to the Deer Ridge Integrated Resource Project.</td>
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<td>Attachment 14: Dead and Dying Trees</td>
<td>See &quot;Response to Opposing Views&quot;</td>
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<td>Attachment 15: Forest Service Leaders / Best Available Science</td>
<td>The vast majority of references included in Opposing Views Attachment #15 are statements provided by USDA and U.S. Forest Service leaders, and others affirming the Forest Services’ commitment to using the Best Science Available in their decision making. The excerpts also include opinion pieces regarding the need to continue to develop science to inform management. The WMNF followed Department and Agency direction by using the Best Science Available to develop the Deer Ridge Integrated Resource Project and to analyze the effects of the alternatives as is well documented in the EA and the Project Record. Thus, there are no opposing views in Attachment #15 to be addressed by the Deer Ridge Integrated Resource Project related to this topic. Additionally, the use of Best Science Available is well documented in the WMNF Forest Plan, FEIS, ROD, and Project Record which the Deer Ridge Integrated Resource Project tiers to. There is one opposing view provided by the commenter that is a finding from the U.S. 9th Circuit Court of Appeals related to the failure of a Final EIS to disclose opposing scientific views. The relationship of this court decision to the Deer Ridge Integrated Resource Project is not apparent.</td>
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<td>Attachment 17: Mountain Pine Beetle / Lodgepole Pine</td>
<td>Opposing Views #17 addresses mountain pine beetle activity in Western lodgepole pine forests. The references are all related to western forests and whether or not bark beetle outbreaks increase the risk, spread, and/or intensity of fires. The forest types, ecosystems, and fire regimes are very different from those found in the Deer Ridge project area. The Purpose and Need of the Deer Ridge Integrated Resource Project does not include addressing stands impacted by heavy bark beetle infestations, nor does the Purpose and Need include reducing the risk of fire due to large-scale tree mortality caused by insects. Therefore, this Opposing Views Attachment #17 is irrelevant to the Deer Ridge Integrated Resource Project.</td>
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<td>Attachment 19: Clearcutting</td>
<td>See &quot;Response to Opposing Views&quot;</td>
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<td>This pre-decisional EA smoothes-over and minimizes the &quot;environmental damage from logging&quot; that will be caused by the Deer Ridge timber sale.&quot;</td>
<td>The potential effects of the proposed timber harvest on resources is disclosed in Chapter 3 of the EA.</td>
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<td>Your References section excludes science literature authored by independent scientists describing the adverse effects to the natural resources in your project area. This leaves the door open for you to take actions that will harm the amenity resources of the project area that are so important to the American public who recreate in the White Mountain National Forest. By ignoring best independent science describing natural resource harm you risk taking action that does not “avoid or minimize any possible adverse effects of their actions upon the quality of the human environment” and does not “avoid or minimize adverse effects of these actions upon the quality of the human environment.” Request for changes to be made to the final NEPA document: Include applicable science literature in the References section. Each research conclusion quote contained in the Opposing Views Attachments contains links to the source literature for the quote. I will expect to see the source literature in the References section and cited in the body of the final EA.</td>
<td>See “Response to Opposing Views” and responses to Letter 2 Comments 3, 4, 6, and 7.</td>
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<td>The Deer Ridge pre-decisional EA at page 239 tells the public your NNIS control methods are based on the WMNF Forest-wide Invasive Plant Control Project EA, 2007. My how special. All herbicides are toxic to fish and mammals (including humans). One herbicide chemical has been known to cause cancer among the many other afflictions. Incredibly, you fail to disclose the herbicides you will apply. Who are you? Your Invasive Plant Control Project EA allows the use of herbicides that contain glyphosate so I’ll assume you plan to spew this poison on NNIS.</td>
<td>Comments related to how NNIS are treated on the WMNF are outside the scope of the Deer Ridge project. Treatment of NNIS was addressed in the WMNF Forest-wide Invasive Plant Control Project EA and Decision Notice.</td>
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<td>Here are videos of clearcutting. Is it so important to regenerate shade intolerant conifer tree species that you feel justified by backhanding the public and rejecting the more visually acceptable shelterwood Rx? It’s really all about volume isn’t it? A competent recreation specialist would not allow this. <a href="http://www.bing.com/videos/search?q=clearcutting+forests&amp;qpvt=Clear+Cutting+Forests&amp;FORM=VDRE">http://www.bing.com/videos/search?q=clearcutting+forests&amp;qpvt=Clear+Cutting+Forests&amp;FORM=VDRE</a></td>
<td>We are not proposing any clearcut harvest in softwood stands. Three softwood stands (stand IDs 13, 14 and 15) are proposed for an overstory removal to release dense regeneration-age and young softwoods growing beneath the canopy and provide “free to grow” conditions. Two Norway spruce stands (Stand ID 38a and 40) are proposed for shelterwood preparatory treatments to improve growing conditions on residual trees while also initiating regeneration of native northern hardwoods trees and vegetation in the understory. These stands would be maintained in the mature age-class. The remainder of the softwood and Norway spruce stands will be treated with uneven-aged group selection treatments, harvesting small patches (approximately .25 acres), these stands would also be maintained in a mature age class. None of our treatments are based on obtaining the greatest volume, it’s about ensuring the softwood community type remains on the landscape in varying age and size classes. This community type is a very important ecosystem component because it provides a food source for birds and small mammals such as chipmunks, wintering areas for snowshoe hare, deer and moose and cover for birds. Up to 100 wildlife species use softwoods for all or part of their life cycle (DeGraaf and Yamasaki, 2001).</td>
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<td>Responsible Officials defend clearcutting by telling the public it’s the optimum method to regenerate shade intolerant tree species. Optimum silvicultural RXs should be used in private-industrial tree farms because the trees are growing to produce a profit. Our national forests are not tree farms even on “suitable” land. The public does not want their precious national forests used to generate corporate profit. Why is the Deer Ridge sale different?</td>
<td>Forest Plan goals are to provide optimal growing conditions to produce healthy, viable forests that provide habitat for wildlife and generate income for the American public both now and in the future. Aspen and paper birch are pioneer or early successional species, intolerant of shade and competition from older trees, woody shrubs, and herbaceous species. They require large openings and full sunlight for successful regeneration which is the reason why clearcutting is the optimum method for regenerating these species. Without clearcutting, paper birch/aspen would fall out of the stand and with no viable seed source, this community forest type would be lost on the forest (USDA Forest Service 2007). Early successional aspen-birch is used by approximately 150 wildlife species and approximately 125 wildlife species use mature aspen-birch for all or part of their life cycle (DeGraaf and Yamasaki, 2001). As professional public land managers, it is our duty to the American public and the inhabitants that live on these lands to</td>
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<td>The American public has been clear. They do not want their forests clearcut at any location for any reason. The majority of USFS employees were trained to be foresters. Foresters hired by the USFS defy the will of the public by practicing their trade on public land rather than tree farms. They reject Pinchot’s wise words “the greatest good for the most number of people.” There is no “timber famine just around the corner” in America as the USFS has been saying for many decades. Does it serve the public to abuse their land? If you contracted with a landscaping company to work improving your property and they did exactly what you didn’t want what would you do?</td>
<td>Clearcutting is one of the most publically maligned and misunderstood forest regeneration treatments. For the northeast and specifically for the WMNF it is the only way to grow trees that require full sunlight to reproduce, such as aspen, paper birch and black cherry and the fastest way to provide/create shrubland habitat. Natural processes involve disturbance and clearcutting is a way to mimic nature. On the WMNF, the maximum size of clearcutting is 30 acres which mimics natural disturbance for this region. When done sustainably, timber harvest creates a balanced distribution of different age classes and species mix and within ten years, these sites are lush with new tree and vegetative species and teeming with bird and mammals. The Forest Service employs over 34,250 employees in many diverse fields such natural resource management (i.e. botanist, soil scientist, wildlife biologist, hydrologist, fisheries biologist), recreation, landscape architecture, land surveying, special use administrators, public affairs, engineering, law enforcement, scientists, firefighters, administration, budget analyst, archeologists and visitor information services. So to say that the majority of the USFS employees are trained foresters is not accurate. Specifically on the White Mountain National Forest, only 10% of the employees are foresters. Foresters here have worked for various federal, state and private land management organizations as well as the Peace Corps, military, private consulting companies, private land management companies and/or have been self-employment. National Forests are not tree farms because they are not managed solely for timber production, rather they are managed by the Multiple Use-Sustained Yield Act of 1960 (or MUSYA) (Public Law 86-517) which authorizes and directs the Secretary of Agriculture to develop and administer the renewable resources of timber, range, water, recreation and wildlife on the national forests for multiple use and sustained yield of the products and services. The commenter has a singular view of tree farming, inferring that these lands are primarily managed for maximum revenue. Privately owned woodlands in reality are very important for providing clean water and air, wildlife habitat, recreational activities, and producing the jobs, wood, and paper products. Lands designated under the American Tree Farm system are expected to follow the 2015-2020 Standards of Sustainability which ensures that sustainable forest management is practiced on private lands designated as tree farms. These</td>
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<td>Will you be proud to pockmark and disfigure the public’s land with ugly visual scars? Does it make you feel powerful? How will you justify your actions when recreationists come to your office complaining about clearcuts?</td>
<td>Personal value or opinion</td>
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Standards are: 1) Commitment to Practicing Sustainable Forestry; 2) Compliance with all relevant federal, state, and local laws, regulations, and ordinances; 3) Reforestation and Afforestation; 4) Maintain or enhance the environment and ecosystems; 5) Fish, Wildlife, Biodiversity, and Forest Health Forest-management activities contribute to the conservation of biodiversity; 6) Forest Aesthetics Forest-management activities recognize the value of forest aesthetics; 7) Protect Special Sites and; 8) Product harvests and other management activities are conducted in accordance with the landowner’s objectives and consider other forest values.
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<td>Eliminate ALL proposed clearcut units. Use a partial cut and consider restoring the area to what it was before it was logged by planting the same on-site species. Failure to do this will violate 40 CFR 1500.2(e) and (f) because it did not “identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment,” or “use all practicable means, consistent with the requirements of the Act and other essential considerations of national policy, to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions upon the quality of the human environment.” Also, you will violate: • NEPA Sec. 101(b)(2) because the Responsible Official does not “assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;” • NEPA Sec. 101(c) because “The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.”</td>
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<td>You prescribe shelterwood as a way to regenerate these forested areas. You fail to include information required by NFMA: Request for changes to be made to the final NEPA document: • provide data and text demonstrating that soil, slope, or other watershed conditions will not be irreversibly damaged by shelterwood silvicultural prescriptions. • provide data and text demonstrating that shelterwood silvicultural prescriptions are appropriate to meet the objectives and requirements of the relevant land management plan. Failure to do so will violate NFMA Section 6 (E)(i) and (iii) as well as NFMA Section 6 (F)(i).</td>
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Clearcutting is the optimal method for converting mature, poor quality, damaged stands to healthy new stands of regeneration-age trees. It is also a very effective silvicultural treatment for regenerating species that are shade intolerant such as paper birch and aspen and semi-shade tolerant species such as sugar maple and yellow birch. Aspen paper-birch community types are an important habitat for wildlife and provides habitat diversity. These species regenerate well in large openings created either by natural disturbances (i.e. wind, ice storms, fire) or through timber harvesting. Without disturbance, these short-lived species drop out of the stand to become replaced by beech, birch, maple, and spruce. Once a stand is harvested, the additional sunlight stimulates germination of raspberries, blackberries, pin cherry and various forbs and grasses which are important food sources for large and small mammals and birds. It also creates a stand structure used by wildlife species that prefer scrub habitat. This habitat is ephemeral on the landscape as forest in the northeast regenerate quickly and within a decade these structural characteristics no longer exist. Partial cutting would not achieve our wildlife habitat goals of creating early successional habitat nor provide conditions to create and maintain aspen and paper birch communities on the landscape. Stocking surveys on the WMNF show that after three years following a harvest, stands fully regenerate to native hardwood and softwood species and there is no need to plant seedlings.

Shelterwood preparatory cuts are proposed in two very dense, overstocked Norway Spruce. These non-native species were planted in the 1930’s by the Civilian Conservation Corps and the goal through silvicultural treatments is to slowly convert them back to native hardwood and softwood species consistent with the ecological land type capability for the site. A preparatory cut is the first step in a shelterwood system and our main objective is to reduce the overstory stocking by 30-35%. This would lessen the stress on residual trees as fewer trees compete for nutrients and moisture. Poorer quality trees would be removed to release healthier trees. The added sunlight reaching the forest floor would accelerate growth on existing young seedlings while creating new seedlings as well. Shelterwoods are even-aged treatments often done in plantations where all the trees are one age-class and stocking rates are high. Shelterwoods are multi-entry treatments that over time lead to a new stand, but for this proposal we are just in the first stage of treatment. After harvest, these stands will continue to be in the mature age class. The shelterwood treatments are located on relatively flat slopes (under 15%) which is typically the type of ground conditions used for establishing plantations. These treatments are located in the subwatershed of the Headwaters of the Upper Ammonoosuc River; within this subwatershed only 1% of the basal area is proposed for harvest, the threshold is 25%. See Chapter 3 of the EA for additional information on the potential effects of the Proposed Action to water and soil.
Your References section does not contain this important literature or comparable literature, therefore your migratory bird discussions are based on unsubstantiated speculation. The public expects more from a professional wildlife biologist.


Memorandum of Understanding between the U.S. Department of Agriculture, Forest Service and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds. (December 08, 2008).

Simply listing the migratory bird species protected under the Treaty is not enough. You haven’t even done this. The Treaty requires you to present believable, peer-reviewed information showing why the proposed timber sale activities will not harm these birds or their habitat in any way. Request for changes to be made to the final NEPA document: Identify the birds that exist in and near the project area that are protected under the Migratory Bird Treaty Act and discuss how these birds will be protected during burning and timber harvest operations. The Act makes no allowance to consciously harm these birds for any reason.

The goal of the WMNF is to maintain a diversity of habitat conditions for the full array of wildlife species that inhabit the Forest during all or part of the year including migratory birds (Forest Plan Chapter 1, pp. 20-21, Chapter 2, pp. 13-16, 33-36). The effects of this project on wildlife species and habitat, including migratory birds, are discussed in EA, pp. 196-238 and the Wildlife Report (Deer Ridge Wildlife Report, Project File). Project Design Features to minimize potential adverse effects to riparian and aquatic habitat and wildlife are listed on pp. 33-34 of the EA.

DeGraaf and Rappole (1995) summarizes information about the distribution and breeding habitat requirements of migratory birds in North and South America including descriptions of their natural history. We use a more focused reference written by DeGraaf and Yamasaki 2001 which provides similar information on all New England Wildlife including migratory birds EA (cited on pp. 197-198).

The Migratory Bird Treaty Act (MBTA) implements the United States' obligations under international treaties and agreements regarding migratory bird protection. Section 703 of the Act makes it unlawful to “kill” or “take” a migratory bird, nest, or egg except as permitted under applicable regulations. There are no regulations governing take of migratory birds that is incidental to National Forest wildlife habitat modification. See 50 C.F.R. Part 21. A memorandum of understanding between the USDA Forest Service and US Fish and Wildlife Service was created to promote the conservation of migratory birds (December 8, 2008) Project File. In the MOU, both Parties “mutually agree that it is important to: 1) focus on bird populations; 2) focus on habitat restoration and enhancement where actions can benefit specific ecosystems and migratory birds dependent upon them; 3) recognize that actions taken to benefit some migratory bird populations may adversely affect other migratory bird populations; and 4) recognize that actions that may provide long-term benefits to migratory birds may have short-term impacts on individual birds.” (FS Agreement # 08-MU-1113-2400-264).

The WMNF uses Management Indicator Species (MIS) to track how major habitat types are affected by timber harvest. The effects of this project on those species is in the EA pp. 204-228. This decision is consistent with this Act and Executive Order 13186 regarding the responsibilities of Federal agencies to protect migratory birds. As required by the Memorandum of Understanding between the Forest Service and U.S. Fish & Wildlife Service to promote the conservation of migratory birds, the EA evaluates the likely effects to migratory birds known to nest and breed on the White Mountain National Forest using Management Indicator Species. Four of the five MIS that were evaluated in this project are migratory birds. These type and age groupings represent the broad spectrum of habitat used by the forest bird community. Effects to MIS are discussed in the EA, pp. 204-228. The project is designed to enhance the habitat diversity that supports an array of migratory birds on the Forest. Application of Forest Plan
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| 2         | 19          | Clearly you aren’t concerned about how your precious volume removal “treatments” (a.k.a. logging) will adversely affect the aquatic resources in and downstream from the sale area. Why? The pre-decisional EA fails to describe the process of comparing measurable stream data (i.e. temperature, turbidity etc.) taken during monitoring field trips while logging is occurring with the same data taken before logging. You know what such before and after stream data comparisons will show. A competent hydrologist and/or fisheries biologist would have insisted on this.  

Request for changes to be made to the final NEPA document: Include the measured results of recent stream surveys and display a stream monitoring schedule to be completed during and immediately following sale closure.  

Failure to disclose recent stream survey data violates 40 CFR 1500.1(b) because environmental information (stream survey data) is not available to public officials and citizens before decisions are made and before actions are taken. Also without stream survey data it will not be possible to accurately analyze the environmental damage that occurs because of the timber sale’s effects to streams because the Responsible Official will not know if or the magnitude of the effect without before data. | Any stream data collected before forest stands are harvested is generally included in specialists’ reports. Water temperature data collected at some of the streams within the Deer Ridge Project Area is included in the Riparian and Aquatic Habitats specialist report. It is generally expected that some minor short term impacts may occur during and after a timber sale, but it is also known that these impacts are highly localized, of short duration, and will not cause irreversible damage to aquatic habitats or aquatic species as discussed in both the Watershed specialist report and the Riparian and Aquatics Habitats Report. The potential effects of the Proposed Action on water quality and quantity, and fisheries and aquatic habitats is disclosed in Chapter 3 of the EA. |
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<td>From “The Economic Impact of Preserving Washington’s Roadless National Forests” by Thomas Michael Power, Ph.D., Professor of Economics, University of Montana, June 13, 2000. <a href="http://www.ketlerange.org/power/powerreport.htm">http://www.ketlerange.org/power/powerreport.htm</a> Dr Power makes the following conclusions from his research findings: “Even within relatively isolated areas, such as the northeastern tier of counties, there was considerable economic vitality despite the declines in federal timber harvests.” “The relatively high unemployment rates in many of the eastern Washington counties adjacent to National Forests cannot be attributed to the decline in federal harvests. Those counties had even higher unemployment rates at the time of peak harvests in the late 1980s.” Please describe why Dr. Power’s research does not apply to the White Mountain National Forest.</td>
<td>The referenced report is about economic change in rural Washington counties and its relationship to federal forest management. The economic analysis for the Deer Ridge project assesses the economic efficiency of the project. The economic analysis in the EA (EA, pg. 111-112) finds that the benefits of the project (stumpage receipts) exceed the Forest Service’s costs of project implementation. The referenced report does not provide data or information relevant to evaluating the economic efficiency of the Deer Ridge project.</td>
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<td>From: EcoNorthwest, “Seeing Forests for their Green: Economic Benefits of Forest Protection, Recreation, and Restoration”, August 13, 2000. <a href="http://ecowww.com/our-work/publications/seeing-forests-for-their-green-benefits-of-forest-protection-recre/">http://ecowww.com/our-work/publications/seeing-forests-for-their-green-benefits-of-forest-protection-recre/</a> Mr. Niemi and Ms. Fifield (the authors of this paper) conclude: “Despite years of rhetoric and misinformation, national and regional economies are not dependent on logging National Forests.” Please describe why their research findings do not apply to the White Mountain National Forest.</td>
<td>The referenced report argues that timber harvesting is a relatively small part of the economy and that forests are important for non-timber purposes, including recreation, water, fish and wildlife habitat, and carbon sequestration. This report does not provide information that alters or challenges the findings presented in the EA. The Deer Ridge project would support multiple use management on the White Mountain National Forest to provide for recreation, water, fish and wildlife, as well as timber (EA, pp. 4-15).</td>
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<td>From: Logging expansion won’t help rural communities Portland Oregonian online, June 29, 2014 <a href="http://www.oregonlive.com/opinion/index.ssf/2014/06/logging_expansion_wont_help_ru.html">http://www.oregonlive.com/opinion/index.ssf/2014/06/logging_expansion_wont_help_ru.html</a> Why do you reject the findings and conclusions of Undersecretary of Agriculture Jim Lyons who states “recreation revenues from national forests significantly exceed timber revenues.” Elsewhere in these comments are the results of public survey information indicating the public is less likely to recreate near areas that have been logged, thus logging diminishes recreation revenue. Since recreationists avoid areas that have been logged the many “ma and pa” businesses that depend on recreation are harmed. How do you justify harming the revenues of motels, gas stations, restaurants etc. to increase the profits of a very large corporation? Please describe why Undersecretary Lyons’ conclusions about community stability do not apply to the White Mountain National Forest.</td>
<td>See Response to Letter 5, Comment 43</td>
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<td>You reject the research conclusions of 241 Ph.D. scientists quoted in Opposing Views Attachment #1 who demonstrate how logging-related harm (and in a few cases destruction) is inflicted on multiple natural resources in and near the sale area. Incredibly, you rely on the advice of 3 or 4 timber employees financially motivated to sell timber. You know the log for community stability P&amp;N statement appears in at least 80% of all timber sale NEPA documents. This has become the commonly used excuse by USFS line-officers to sell unneeded timber sales and you use it here. Every one to three years all the HMUs on the district are evaluated to determine which has the greatest inconsistency between current wildlife habitat conditions and desired wildlife habitat conditions established by the Forest Plan. After the HMUs are ranked and one is selected, an interdisciplinary team is formed consisting of a district recreation specialist, a district fire specialist, the district wildlife biologist, a district forester, the Forest hydrologist, the Forest botanist, the Forest fisheries biologist, the Forest soil scientist, the Forest ecologist, the Forest engineer, the Forest archeologist and the Forest landscape architect for their input on additional projects to improve other resource issues. All decisions are accomplished through an interdisciplinary team with everyone having equal voice. No one on the team has any reason to be financially motivated, management activities are guided by the goals of the Forest Plan which permits timber harvesting to provide a sustainable yield of forest products (FP, pg. 1-7) while providing a diversity of habitats across the Forest including various forest types, age classes and non-forested habitats (FP pg. 1-20).</td>
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<td>If you were really concerned about local community stability and local job creation you would offer this sale as an SBA sale to prevent a large timber corporation from logging it using their own labor. This would prevent the logs from being hauled many miles to be processed at a mill far removed from the small communities you claim need economic help. Of course your motivation to sell this timber sale has nothing to do with community stability. We both know “local community stability” and “local job creation” is part of the USFS dishonest script to trick the public into accepting tragic timber sales.</td>
<td>The decision to offer a timber sale as a small business set-aside is outside the scope of the Deer Ridge EA. Forest Service directives governing timber sale programs with the Small Business Administration are contained in Forest Service Handbook 2409.18, Chapter 90. The Forest Supervisor is responsible for conducting analyses of market areas to determine if set-aside programs should be triggered, consulting with the Small Business Administration, and announce timber sales that are to be set aside for small businesses. These determinations would occur separate from the selection of an alternative in the Deer Ridge EA.</td>
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<td>Request for changes to be made to the final NEPA document: Either: 1) remove the following statement from the P&amp;N: “Provide sustainable forest products” 2) offer the sale as an SBA sale and say so in the final NEPA document, 3) include the text or links to the text of the following papers (referenced above) in an Appendix to the NEPA document. Failure to do so will violate 40 CFR 1500.1(b) because environmental information is not available to citizens before decisions are made.</td>
<td>The full statement in the draft Deer Ridge EA is “Manage vegetation using an ecological approach to provide healthy ecosystems and a sustainable yield of high quality forest products with special emphasis on sawtimber and veneer.” This is a Forest Plan goal and the purpose of this project is to meet Forest Plan goals. See also response to Letter 2 comment 24.</td>
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<td>The USFS fails to tell (hides from) the public scientific information showing that many natural resources in the forest not only benefit from tree mortality caused by natural disturbance events, but depend on these natural disturbance events occurring to function properly. This does not serve the public.</td>
<td>We agree that natural disturbance benefits wildlife and vegetation by creating snags and pockets of down trees. Because natural disturbance is unpredictable and often localized, group selections and patch cuts treatments would mimics these natural occurrences and would be distributed across the landscape to create stand diversity. Small openings allow new age classes to develop in the understory as well as release existing understory vegetation overtopped by trees. A 1998 ice storm affected over 3,000 acres on the Androscoggin District, many of these damaged trees still remain on the landscape either as wildlife trees or snags. The EA discusses the effects of timber harvest to dead and down wood (EA, p211) and the No Action alternative for each resources addresses discusses, where relevant, natural processes that will continue to occur.</td>
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<td>The forest is infinitely more than conifer trees. A properly functioning forest contains some decadent, dying, unhealthy trees. A logged forest differs dramatically from a natural forest. A healthy, natural forest has an abundance of dead trees. All healthy groups of living things have unhealthy and dying individuals. Ranger Barnhart, why do you propose to disrupt this magnificent process for volume?</td>
<td>The WMNF is a diverse array of northern hardwood, softwood and mixedwood stands. There will always be unhealthy, dead and dying trees within our stands due to natural weather events (i.e. snow, wind and ice), insect infestations (i.e. sugar maple borer), and fungi. The majority of beech trees within the WMNF are infected with beech bark disease which causes significant mortality and defect. Beech infected with the scale reach mortality levels of 50% in 5 years. There is no known cure for this disease and it continues to persist within our stands due to natural propagation of stump sprouts and root suckers. In 1998 an ice storm damaged over 100,000 acres on the Forest of which 3,000 were on the district. Stand 27 was hardest hit within the project area with over half the trees incurring severe crown damage. The salvage harvest would remove 25-30% of these damaged trees, leaving some to serve as wildlife trees and future snags. Aside from this, Forest Inventory and Analysis (FIA) calculated over 36,801,274 stand dead snags (&gt; 5” at dbh) on forested lands in Coos County. See Chapter 3 p. 212 for additional information on the effects of the Proposed Action on dead and downed wood.</td>
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<td>Please see Attachments #5, #8 and #14. This will bring you up to speed on the science of forest ecology. Also please include these 3 attachments as an Appendix to the final EA. The American public expects agency employees to provide them with complete information. As it stands now, the pre-decisional EA withholds information describing the importance of natural disturbance events to the proper functioning of many forest resources.</td>
<td>See “Response to Opposing Views”</td>
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<td>Request for changes to be made to the final NEPA document: Remove all text from the NEPA document that infers action should be taken as part of the Deer Ridge timber sale to reduce the occurrence of natural disturbance events (fire, insect activity, disease etc.). Failure to clearly describe the adverse effects of eliminating natural disturbance events to species that depend on such events occurring in light of the science contained in Opposing Views Attachments #5, #8, #14 and #17 will violate 40 CFR 1500.1(c), 40 CFR 1500.1(c) and 40 CFR 1500.2(f) because the proposed logging will not “protect, restore, and enhance the quality of the human environment.”</td>
<td>There is no wording in the Deer Ridge EA that states we would reduce the occurrence of natural disturbance. Insects, disease, ice, wind disturbance (including hurricanes and ice storms) will continue to occur regardless of this project. In fact, group selection and patch cuts would closely mimic these natural small-scale disturbances in eastern forests. The “No Action” alternative addresses natural occurring events and the effects on the forested landscape.</td>
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<td>Pretending to pass a project through the NEPA process with only 1 action alternative (the Proposed Action) makes a mockery of the National Environmental Policy Act. A “do it” or “don’t do it” NEPA analysis is not a NEPA analysis but a justification of the Proposed Action. There are alternatives to any planned action. Request to develop a “no new roads” action alternative in detail. You know there is more than 1 way to satisfy your P&amp;N, therefore it’s not unreasonable to develop a 2nd action alternative.</td>
<td>The commenter requests that we propose a “No new roads” alternative. The proposed action doesn’t include any new road construction.</td>
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<td>Address range of alternatives, alternatives considered but dismissed. Request for changes to be made to the final NEPA document: Analyze at least 1 citizen generated alternative to the Proposed Action in detail. Failure to analyze a 2nd action alternative in detail violates: 40 CFR §1506.1 (a)(2) Limitations on actions during NEPA process because not analyzing a “Reasonable” alternative in detail makes it impossible to choose that alternative, therefore analyzing only 1 action alternative in detail “limits the choice of reasonable alternatives.” 40 CFR §1506.2 (e) --- Policy “(e) Use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment.”</td>
<td>See response to Letter 2 Comment 30 and Comment 33.</td>
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<td>Please don’t omit meaningful responses by claiming the opposing views are opinions. Why? A viewpoint is a synonym of opinion. They are supposed to be opinions. As the law states below, there is only 1 way the Responsible Official may decline to respond. He or she must describe why an opposing viewpoint is irresponsible. Request for changes to be made to the final NEPA document: Include responses to 1) each opposing view quote contained in the Opposing Views Attachments, and 2) each regular comment labeled Comment.</td>
<td>See “Response to Opposing Views” and responses to Letter 2 Comments 3, 4, 6, and 7.</td>
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<td>You have approved a Purpose &amp; Need statement written by your obedient IDT that is so restrictive and narrow it gives you justification to reject all alternatives suggested by your public constituents that do not include logging. You dispose of these &quot;reasonable&quot; alternatives by placing them in the &quot;Alternatives considered but eliminated from detailed study&quot; category. This assures your Proposed Action that you selected for implementation before you scoped the project would have no competition for selection. Clearly you failed to &quot;consider&quot; the alternatives selected by the public as required by law. Request for changes to be made to the final NEPA document: Include a new (expanded) Purpose &amp; Need that allows reasonable alternatives to the Proposed Action to be analyzed in detail. This Purpose &amp; Need must describe goals that can be achieved at different levels by different actions ... specifically actions that don't include timber harvest. If this cannot be done, the timber harvest P&amp;N goal must be eliminated.</td>
<td>NEPA grants the agencies wide discretion on determining the purpose and need for action. Forest Service Handbook 1909.15 (Ch. 10 Sec. 11.21) states that [a] well-defined &quot;need&quot; or &quot;purpose and need&quot; statement narrows the range of alternatives that may need to be considered. The EA (pp. 4-15) clearly describes the purpose and need for the project (36 CFR 220.7(b)(1)), provides a clear and direct link to the Forest Plan, and outlines how the need for each project was developed by comparing current conditions to the desired conditions specified in the Forest Plan. The Forest Plan was developed with extensive public involvement and includes the designation of lands in MA 2.1 General Forest Management where timber harvest can be used to manage for desired conditions. The Draft Decision Notice and Finding of No Significant Impact (DDN FONSI) (pp. 2-7) reiterates the clear connection between the purpose and need of the proposed actions and the Forest Plan. In addition, the EA and DDN outlines the 12 facets of the Project’s purpose and need. The Forest Service engaged the public early in the planning process to assist in the identification of real issues related to the proposed action (40 CFR 1500.5(d)). This project was listed on the quarterly WMNF Schedule of Proposed Actions (SOPA) beginning in April 2015. The SOPA is mailed to approximately 300 individuals and organizations. Public scoping was conducted from October 1-30, 2015. The Public Involvement sections of the EA (p. 16) and the DDN FONSI (pp. 17-18) indicate that the Forest Service made a diligent effort to engage the public pursuant to 40 CFR 1506.6(a). Public involvement included sending a scoping package to over 50 individuals, groups, and agencies and that the scoping package was also available on line. In addition, a press release announcing the public scoping was published in the Berlin Daily Sun and the New Hampshire Union Leader. The EA (pp. 17-35) clearly outlines the process used for developing alternatives for this project and the rational for determining which alternatives were analyzed in detail and which were considered but not analyzed in detail, and how this process complied with applicable laws and regulations. All scoping comments were considered by the interdisciplinary team and the team determined that there were no unresolved issues about effects and that no issues were raised from scoping that would necessitate the development of an alternative that needed to be analyzed in detail. The regulation at 36 CFR 220.7b(j)(2) states that an Environmental Assessment (EA) &quot;shall briefly describe the proposed action and alternative(s) that meet the need for action. No specific number of alternatives is required or prescribed. (i) When there are no unresolved conflicts concerning alternative uses of available resources (NEPA, section 102(2)(E)), the EA need only analyze the proposed action and proceed without consideration of additional alternatives. The process followed by the Forest Service in developing the Deer Ridge project is clearly presented within the Final EA and the DDN and FONSI shows compliance with 40 CFR 1500.2(e) and with NEPA.</td>
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<td>The Deer Ridge timber sale will cause major damage to non-vegetative natural resources described by experts in the Opposing Viewpoint Attachments. Forging ahead with the timber sale with full knowledge of the likely resource damage that the sale will cause indicates 1) weighing the relative value of the natural resources in the area against timber outputs has not been done, and 2) they have not been “harmoniously coordinated.” Also, since outdoor recreation, watershed, wildlife and fish are adversely affected by the sale, you obviously consider timber more important that these 4 other resources.</td>
<td>See “Response to Opposing Views” and responses to Letter 2 Comments 3, 4, 6, and 7, Letter 2 Comment 33, Letter 5 Comment 2, and Letter 3a Comment 36.</td>
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<td>The vast majority of available literature written by independent scientists unaffiliated with the USDA that discusses logging and forest road construction describes the natural resource destruction and adverse effects of these 2 actions. You exclude this science from your References section that describes how logging activities harm (and sometimes destroy) proper natural resource functioning. You select references that support logging and road building because including a representative sample of available logging-related effects science would clearly explain why logging the Stoney timber sale is a mistake.</td>
<td>See “Response to Opposing Views” and responses to Letter 2 Comments 3, 4, 6, and 7.</td>
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<td>There are no documents listed in your References section that describe the likely or potential natural resource harm, damage and impairment that might occur by logging 1.7 square miles that are part of the Proposed Action. A WEB search of the words TIMBER ADVERSE EFFECTS LOGGING gets 2,330,000 hits. See for yourself: <a href="http://www.bing.com/search?q=timber%20adverse%20effects%20logging&amp;qs=n&amp;form=QBRE&amp;pq=timber%20adverse%20effects%20loggin&amp;c=0-23&amp;sp=1&amp;k=">http://www.bing.com/search?q=timber%20adverse%20effects%20logging&amp;qs=n&amp;form=QBRE&amp;pq=timber%20adverse%20effects%20loggin&amp;c=0-23&amp;sp=1&amp;k=</a> &amp;cid=e4548830f3cf4a71c3919ee83fa9c</td>
<td>See response to Letter 2 Comment 33 and Comment 34, response to “Opposing Views Attachments” and responses to Letter 2 Comments 3, 4, 6, and 7.</td>
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<td>Request for changes to be made to the final NEPA document: Include some source documents from the Opposing Views Attachments in the references section of the final EA. Also, cite some the specific quotes related to the issue that are presented in the source literature in the Opposing Views Attachments.</td>
<td>With the exception of two acres, stands within the Deer Ridge project area will continue to remain in a forested condition, whether it is in the regeneration-age class, young age class or mature age class. The exception is that one acre of forested land would be developed for the expansion of a gravel site and one acre of forest would be developed for the expansion of the trailhead parking lot.</td>
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<td>The Deer Ridge sale will take away more undeveloped national forest acres from the legacy the unborn kids of the future. Which is most important: the future kids of America seeking solitude and quietness, or another summer home and yacht for the CEO of the timber extraction corporation that purchases this timber sale? Do the IDT members have the courage to ask themselves why the USFS defies the wishes of the American public by logging and road building the precious national forest land? How can an agency mandated to serve the public do so by taking action the public does not want or like? There is a reason the USFS euphemizes the word logging. They think using the terms “timber harvest” will trick the public into believing that ravaging the forest with skidders, tractors, chainsaws and poison herbicides is what should be done to “manage” the forest.</td>
<td>The EA pp. 78-94 presented the effects of the project on Recreation and Scenery resources. The Deer Ridge Integrated Resource Project Recreation Resources Report (Pellerin 2016b) discusses design features for the project to mitigate impacts to recreation resources based on Forest-wide guidelines for vegetation management which can be found in the WMNF Forest Plan. These design features are modifications of timber prescriptions to protect trail, scenery and recreation related values. Several design features are included in the project to address potential impacts to recreation and scenery including uncut visual buffer zones, slash disposal, trail signs, tree marking, skid trail locations, and allowed days of the week for log hauling (EA p. 31-33). The recreation cumulative effects analysis area includes lands within the Kilkenney area of the WMNF where a number of other projects were taken into consideration for the analysis. The rational for establishing the cumulative effects area and timeframe is included in the EA p. 85. For more information on how the Forest determines the Cumulative Effects area and timeframe, see Letter 3a Comment 36.</td>
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4 | 2 | It is my strong feeling that most (not all) hikers prefer a natural-appearing forest along the trails, and do not like to view clearcuts, patch (“group selection”) cuts, slash, stumps, brightly colored paint markings, flagging and skid roads adjacent to trails (or in the case of skid roads, running across trails). The visual aesthetics of logged areas beside trails are, quite simply, unappealing, giving the woods the look of an industrial forest. This is corroborated in the FEIS for the Forest Plan (page 3-451): “The benefits of high quality scenery found on the WMNF are numerous despite the fact that a dollar value is seldom assigned. ‘Research has shown that high quality scenery, especially that related to natural appearing forest, enhances people’s lives and benefits society...’ The scenic attributes of the White Mountains are also central to the tourism industry important to the state of New Hampshire.” [Italics mine.]

The study conducted by the Forest Service in the late 1990s, The perceived scenic effects of clearcutting in the White Mountains of New Hampshire, USA, by JF Palmer, states that:

“This study evaluates the scenic impacts of simulated alternative clearcutting management systems for the White Mountain National Forest. Alternatives represented an unharvested view, and views with removal of 1-5% of the timber every 12 years using either scattered or concentrated clearcut units of 5, 15 and 30 acres in two viewsheds. A random sample of local citizens, four groups of opinion leaders, and US Forest Service employees evaluated these alternatives. Each factor accounts for significant differences in scenic value. All groups rated the scenic value of unharvested scenes very high. All groups find a large drop in scenic value with the introduction of even the least intense harvesting activity. All groups indicated a statistically significant decrease in visual quality as the intensity of harvesting increases.”

Although this study related to clearcuts seen in viewsheds, I would contend that similar results would be obtained for clearcuts/overstory removal/patch cuts beside trails.

With specific reference to the Deer Ridge project, I feel that the impacts of this project on the Unknown Pond Trail and York Pond Trail are excessive and unnecessary. If the Forest Service is serious about minimizing the impacts of timber harvesting on recreation, then why are harvest units planned right along and across these trail corridors?

We appreciate your opinion and agree that scenic quality is important. Being that national forests are managed for multiple-use, some level of activity is expected in areas designated by the Forest Plan for General Forest Management including timber harvesting. To mitigate impacts to the hiker’s experience, design features will be included that will protect trail, scenery, and recreation values. The design feature would include an irregular buffer (setback) between the trail and the proposed treatment. This buffer would be based upon the density of the forest in the areas affected as well as the prescription proposed. It should be noted that some prescriptions in specific areas along the trail’s edge may allow for views and viewsheds that previously would not have been possible. Some prescriptions along trails improve the diversity of the look and feel of the forest being experienced, instead of being homogeneous, while moving along the trail. Based on your comments, a visual buffer on all hiking trails within the project area will be extended 100 feet on both sides of the trail and only light harvesting would occur within this area, mostly removal of high-risk trees. Harvested trees would be marked with paint facing away from the trail. A specific provision would be included in the timber sale contract designating a slash disposal zone (100’) on both sides of the trail and state that all slash would be removed within 50 feet of the trail and then lopped to within three feet of the ground for another 50 feet. Forests on the WMNF revegetate very quickly and within two years most of stumps and slash would be hidden by new vegetation.

4 | 3 | And why was there no alternative other than “No Action?”

See response to Letter 2 Comment 33.

4 | 4 | I believe that two of the Forest-Wide Management Guidelines from the current Forest Plan (or LMRP) should be more fully incorporated into a revised Proposed Action for this project: Recreation Guideline G-2, Page 2-19: “Use should be managed to prevent negative impact to natural and cultural resources, and to the recreation experience.” While this guideline specifically refers to management of recreation use, would it not apply to other uses that affect the recreation experience? Vegetation Management Guideline G-2, page 2-29: “Timber management prescriptions adjacent to trail corridors should be modified to protect trail- and recreation-related values (e.g. uncut zones, slash disposal, trail relocation, and/or use of uneven-aged management).”

[Italics mine.] This guideline, in particular, seems to have been bypassed in designing the Proposed Action. Leaving adequate uncut zones along trails is clearly an option to be considered under the Forest Plan, and I believe it should be applied wherever possible. The proposed 20-foot buffer and 50-foot slash disposal in the recreation mitigation measures of the Proposed Action are woefully inadequate to preserve the scenic integrity of a hiking trail. It would not seem difficult to design harvests to allow a buffer of at least 150 feet, and preferably more, as recommended in the “Good Forestry in the Granite State” publication.

See response to Letter 4 Comment 2.

4 | 5 | In addition to the negative effects on the scenery along the sections of these two trails that pass through proposed harvest areas, there is the significant issue of closing the trails at times during harvest operations in Stands 55 and 56. This is especially significant for the section of York Pond Trail that goes through Stand 55, which is the start of what is by far the most popular route to Mt. Cabot, the northernmost 4000-foot peak in the Whites. Over the last several years the AMC 4000-Footer Committee (of which I am a member) has seen a major increase in the number of hikers climbing the 4000-foot peaks in both summer/fall and winter. There are now more than 12,000 members of the 4000-Footer Club. There are currently two 4000-Footer Facebook pages, each with more than 9,000 members. It is likely that climbing Mt. Cabot will continue to increase in popularity.

There are no design features which call for the closing of any of the trails within the project area. The driveway leading into the Unknown Pond trailhead and the York Pond trailhead would be used for log hauling on weekdays when foot travel is at its lowest use level. In consideration for visitor safety, either trailhead may be temporarily closed as a last resort during active harvest operations if sale administrators or the District Ranger determine that harvest activities or equipment pose a safety hazard to the public. Visitors may park at the Unknown Pond trailhead if the York Pond trailhead is closed and walk the short distance to access the York Pond Trail/Bun nell Notch Trail from there. Likewise, if the Unknown Pond trailhead is closed, visitors may park at the York Pond trailhead.
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<td>I would dispute the statement made on p. 88 of the EA that the York Pond Trail receives “little to no use during the winter.” That may be true for the section of the trail leading to Willard Notch, but the first 0.2 mile receives considerable use as the only practical approach to Mt. Cabot during winter. Winter hiking use of this trail has unquestionably seen a significant increase in recent years, and will probably continue to increase as more hikers attempt to hike the 4000-footers in winter.</td>
<td>To access the Unknown Pond trailhead. In addition to posting project information within the project area and on the WMNF website, information would be shared with the AMC, RMC, and the White Mountain Ridge Runners snowmobile club to assist with informing the public. See also response to Letter 4, Comment 6.</td>
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<td>Stand 55 is also proposed for late summer harvesting, when even more hikers would be seeking to use the York Pond Trail to access Mt. Cabot and other destinations in the Kilkenny area, such as Mt. Weeks and Terrace Mountain. Though there is more usage on weekends, many hikers – myself included – hike midweek, so any closure will have a significant impact, even more so since this trailhead is a very long drive for most hikers, and most hikers would not be aware of the closure ahead of time, no matter whether it is posted on the WMNF website. I believe that closing this trail at any time for the purpose of harvesting a mere 13 acres out of a total of 992 treated acres in the project is a significant and unacceptable impact on Recreation. There is much more to be lost in Recreation values than is to be gained from this small area of proposed harvest. Recreation values should outweigh timber for Stand 55. I urge you to drop Stand 55 from the Proposed Action.</td>
<td>The first 0.2 miles of the York Pond Trail does receive more use than the rest of the trail due to hikers using that short distance to access the Bunnell Notch Trail, but when looking at the trail as a whole and as compared to the rest of the trails on the WMNF as stated in the Recreation Resources Report, the trail receives very low use during the winter. We agree that winter use has increased over the years due to this being the preferred access route to Mt. Cabot since the closure of the Mt. Cabot Trail. The prescription for stand 55 is group selection and harvest would take place during the late summer or winter seasons. Whether if late summer or winter harvest occurs there are no design features which call for the closing any of the trails within the project area. The York Pond trailhead would be used for log hauling on weekdays when foot travel is at its lowest use level. In consideration for visitor safety, the trailhead may be temporarily closed as a last resort during active harvest operations if sale administrators or the District Ranger determine that harvest activities or equipment pose a safety hazard to the public. Visitors may park at the Unknown Pond trailhead if the York Pond trailhead is closed and walk the short distance to access the York Pond Trail/Bunnell Notch Trail from there. In addition to posting project information with in the project area and on the WMNF website, information would be shared with the AMC, RMC, and the White Mountain Ridge Runners snowmobile club to assist with informing the public.</td>
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<td>With respect to Stand 56 and the Unknown Pond Trail, I believe the small part of the stand south of the trail should be dropped from the project, and the boundary of the stand on the north and east sides of the trail should be moved back at least 150-200 feet from the trail corridor. (This recommended buffer would also apply to Stand 57; it is hard to tell from the map what the current buffer distance is.) It will also eliminate the need to have skid trails crossing the hiking trail, and presumably would eliminate the need to close the trail during harvest. This simple modification would mitigate much of the negative impact on the trail and would require a minimal reduction of harvested timber.</td>
<td>See response to Letter 4 Comment 2 and Comment 5.</td>
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<td>I believe the Forest Service has an obligation to minimize the impacts of this project on these two hiking trails, and could easily do so by eliminating Stand 55 from the Proposed Action, and by moving the boundary of Stand 56 as suggested above. To repeat my main point, the negative effects on these trails far outweigh the benefits of harvesting a relatively small amount of timber from these areas. The important issue of hiker/skier safety can also be addressed by these modifications, making it unnecessary to close the trails to public use. I challenge the Forest Service to present a convincing argument for why these modifications couldn’t be done within the confines of the project objectives. To this observer the location of harvest units right on the trails seems totally unnecessary.</td>
<td>See response to Letter 4 Comment 2 and Comment 5.</td>
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<td>One final thought: Hikers are constantly urged (and rightly so) by the WMNF to “leave no trace” along the trails. I strongly feel that the WMNF timber harvest program should be at least held to the standard of “leave as little trace as possible” and should take great care to minimize effects to the trails. And what kind of example does it set for hikers when they see garish paint blazing, slash and stumps as they walk through the Forest? Were hikers to do that kind of thing it would be rightly criticized as littering the forest. From the Forest Service, it sends a message of, “Do as I say, not as I do.”</td>
<td>See response to Letter 4 Comment 2.</td>
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<td>the ONLY Alternative that makes any sense to be selected is Alternative 1, the No Action Alternative and abandon this Project.</td>
<td>Personal values and opinion - identifying a preference for an alternative.</td>
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<td>the USFS should do a full EIS for the Deer Ridge Project to ensure that they have analyzed these projects in full and that it makes sense to proceed with logging much of the South Pond HMU.</td>
<td>Forest staff with expertise in a wide array of resources reviewed extensive scientific literature, talked with agency representatives, explored the project area, and reviewed public comments submitted during the scoping and 30-day comment periods. Based on the information they gathered, they evaluated the potential for each alternative to affect the many resources in the area, including all of those that are of concern to supporters of Alternative 1. Resource specialists considered the modifications to Alternative 2 that were suggested by individuals and organizations. Suggestions made during the 30-day comment period are addressed specifically elsewhere in this response to comments. Environmental impact statements must be prepared for major actions significantly affecting the human environment [42 U.S.C. 4332(C)]. In determining whether actions are significant, the Council on Environmental Quality regulations direct agencies to consider both the context and intensity of their actions [40 C.F.R. 1508.27]. In terms of context, the CEQ regulations state that “significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole.” [40 C.F.R. 1508.27(a)]. The proposed activities in the Deer Ridge Project Area are site specific actions, therefore, their significance is assessed on the basis of local or site specific effects, which are analyzed and disclosed in Chapter 3 of the EA. The final Deer Ridge EA and associated documents describe the potential for effects, both negative and beneficial, to resources in the area from the activities proposed in the action alternative. The EA does not try to “justify” any particular actions; nor does it decide whether the identified effects will be significant. The District Ranger considers information in the EA and project record, including all public comments, and decides which of the alternatives best meets the agency’s mission in this area. The Draft Decision Notice and Finding of No Significant Impact explains why she selected that alternative and why she believes, based on all the information she considered, that the effects of that alternative will not be significant.</td>
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<td>South Pond HMU/South Pond South HMU? I guess there must be a South Pond North HMU? A large portion of the Deer Ridge Project is within what was called the South Pond HMU during the NEPA process for the North Kilkenny Project. The USFS just arbitrarily decided to split the South Pond HMU in half with zero justification, just like they did with the Albany HMU... There was no Supplemental EA done for the North Kilkenny Project to account for the decrease in acreage for the HMU. As far as I can tell the USFS didn’t even do a “rationale document” for splitting the South Pond HMU in half...just one day you decided that you wanted to stuff more logging projects in HMUs that had just been defined and set up by the Forest Plan.</td>
<td>Yes, there is a South Pond North HMU. See response to Letter 3a, Comment 35.</td>
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<td>NEPA regulations at 40 CFR ss1502.4(a) state, “Proposals or parts of proposals which are related to each other closely enough to be in effect, a single action, shall be evaluated in a single impact statement.” NEPA regulations at 40 CFR ss1508.25 state: To determine the scope of EIS, agencies shall consider similar actions, cumulative actions and impacts. I think this regulation fits the issue perfectly for the North Kilkenny/Deer Ridge Projects. The USFS broke up these 2 projects in order to not have to do an EIS. You should have done an EIS back in 2009 for the 2 projects. I request that the outcome of this EA is that you need to do an EIS for the combined North Kilkenny/Deer Ridge Project.</td>
<td>The Decision Notice for the North Kilkenny Vegetation Management project was signed in 2007, eight years before the Deer Ridge project was initiated in spring 2015. The potential direct, indirect, and cumulative effects of the North Kilkenny Vegetation Management project were adequately analyzed and disclosed in the EA that supported that decision as does the Deer Ridge EA. The Draft Decision Notice / Finding of No Significant Impact for the Deer Ridge project provides the rational for why the District Ranger believes that the project meets law, policy, regulation, and the Forest Plan including why she believes that the project will not have a significant impact on the human environment. See also response to Letter 5 Comment 2 and Letter 3a comment 36.</td>
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<td>When I received the 5 Year Timber Sale Schedule from Roger Boyer it did show that the WMNF is already planning for 3 timber sales from the Deer Ridge Project, even before the 30 Day Comment Period has expired, this plan was dated 5/2/2016!! So I guess you’re just going through the NEPA process for Deer Ridge because you have to since you’ve already made the decision...</td>
<td>The 5-Year Timber Sale Schedule is a planning document used to track upcoming timber sale activity by district and it is updated regularly as District priorities change. The plan is developed by Forest Management staff to track timber sale scheduling and estimated harvest volume and is a tool to ensure that we meet the vegetation management goal of providing a sustainable yield of high quality forest products (WMNF, 2005a, p 1-17). This document is only for planning purposes and harvesting will not occur until the environmental review process is completed.</td>
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<td>How are all these timber sales going to be monitored? The Andro district will be doing timber sales in the same time period as Albany South, Four Ponds and now Deer Hill...that alone should trigger the need for an EIS. The answer to my question said you were going to use foresters from other districts...do they have the same authority as TSAs? Can they stop a timber harvest if they feel resource damage is occurring? Don’t those foresters have their own work coming up with more logging projects on their own districts? Why not slow down all the logging instead and protect the WMNF?</td>
<td>Timber Sale Administrators (TSA) from other districts have the same authority as the TSA from the Androscoggin District. Foresters or other staff with written delegated authority as Harvest Inspectors (HI) have the authority to suspend operations on a timber sale if there is an immediate threat to life or resources. See also response to Letter 5 Comment 2 and Comment 15.</td>
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<td>I think the EPA said it best in “Consideration Of Cumulative Impacts In EPA Review of NEPA Documents” page 12 -13 “The identification of future actions is also important. According to the response for question 18 of the &quot;Forty Most Asked Questions concerning CEQ's NEPA Regulations&quot; (CEQ, 1981), the NEPA document &quot;must identify all the indirect effects that are known, and make a good faith effort to explain the effects that are not known but are ‘reasonably foreseeable.’ The critical question is ‘What future actions are reasonably foreseeable?’ Court decisions on this topic have generally concluded that reasonably foreseeable future actions need to be considered even if they are not specific proposals. The criterion for excluding future actions is whether they are ‘speculative.’ The NEPA document should include discussion of future actions to be taken by the action agency. The analysis should also incorporate information based on the planning documents of other federal agencies, and state and local governments. For example, projects included in a 5-year budget cycle might be considered likely to occur while those only occurring in 10-25 year strategic planning would be less likely and perhaps even speculative. For private actions, the analysis should use regional and local planning documents. In the absence of these plans (and to refine expectations where activities have diverged from the plans), the analysis should refer to projected development trends. In all of these cases, the best information should be used to develop scenarios that predict which future actions might reasonably be expected as a result of the proposal.” I have asked for a copy of the WMNF 5-year Plans from 2007 and 2010. I have not yet received them and will be submitting a FOIA if I don’t receive them soon.</td>
<td>See response Letter 3a comment 36 and Letter 5 Comment 5.</td>
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<td>This needs an EIS for proper analysis, which should have been done years ago when North Kilkenny was first brought up.</td>
<td>See response to Letter 5 Comment 2 and Letter 5 Comment 4.</td>
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<td>Why did the USFS not have an Alternative that proposed no logging in the Inventoried Roadless Area? I believe this is the first logging project that contains acreage in the IRA yet failed to have an Alternative that won’t log in the IRA. I believe this is a really important omission especially given the fact that you’ve already hammered hundreds of acres of the Kilkenny IRA with the Mill Brook Project. I request that you redo the EA adding an Alternative that proposes No Logging in the IRA and rerelease the EA for more Public comment.</td>
<td>The potential cumulative effects of the Proposed Action in combination with past, present, and reasonably foreseeable future actions in the Kilkenny inventoried roadless area, including the Mill Brook Project, were analyzed and disclosed in the Roadless Report (Pellerin 2016a) and summarized in the EA (pp. 37-38). See also response to Letter 3b Comment 46.</td>
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<td>I believe the 2005 Forest Plan was the first WMNF Forest Plan to include 25 foot buffers on perennial streams. Has the USFS done any studies showing that these stream buffers are working? Wouldn’t the requirement that the WMNF use “Best Available Science” behoove you to do some studies on all of the logging projects that you now have ongoing throughout all parts of the Forest to show that the 25 foot buffer is sufficient? You measure stream temperatures and other variables BEFORE logging, what about measuring these same things AFTER logging to show that the 25 foot buffer on perennials (and nothing on Intermittents and Ephemeral streams) is working? I have asked for this information in the past on my comments on various timber harvests but haven’t received it or been shown any studies proving that the 25 foot buffer is sufficient. I was told in an aside by Mark Prout that he just chose 25 feet out of the air, if that is not the case what studies have you used to show that 25 feet is sufficient?</td>
<td>The 25’ no cut zone was not added to Forest Plan Standards and Guidelines in 2005 for the purpose of protecting stream temperatures. It was created to ensure a source of large diameter trees to provide downed wood in larger perennial streams. The number was not “chosen out of the air” by Mr. Prout as you suggest. It was based on a study in Oregon that found in riparian mature hardwood stands nearly 80% of all instream woody debris originated within 10 m of the stream (McDade et al. 1990). Given the long time period for the growth and mortality of large mature or over mature trees, it is too soon to evaluate the effect of the 25’ no cut zone. To sustain coldwater streams in the Forest, the Forest Plan guideline states &quot;uneven-aged forest management treatments should occur within 100’ of a mapped perennial stream&quot; is the strategy the WMNF uses for protecting and maintaining stream temperatures. This strategy insures large areas of riparian canopy are not removed in a short time period, which could increase the solar radiation directly to the surface of the stream. Monitoring efforts to look at the effectiveness of this guideline are currently underway. However, it must be noted, that all water temperature data that has been collected over the last ten years indicates the WMNF is dominated by coldwater streams despite a history of both unregulated logging (pre-F3 ownership) and objective-based vegetation management over the last 40 years. Fish surveys also document that domination of eastern brook trout, an indicator of coldwater streams, within nearly all rivers and brooks within M.A. 2.1 lands where tree harvesting is currently allowed. This strongly suggests that management of the WMNF continues to sustain coldwater stream habitats. Nevertheless, the WMNF has carefully considered suggestions and references provided by various commenters and prepared a more detailed response to these concerns. See the document entitled “The scientific basis for White Mountain National Forest protection of stream structure and function: response to a call for alternative stream protections” which includes a discussion of how streams are protected by implementing Forest Plan Standards and Guidelines, State Forestry Best Management Practices, Project Design Features, and project oversight.</td>
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<td>Other National Forests have much larger buffers than the inadequate buffers of the WMNF, some of them are listed below. If other NFs can have larger buffer sizes and still accomplish their goals, why can’t the WMNF?</td>
<td>There is no available examples of issues within the White Mountain National Forest to consider wider buffers. Ultimately the need for larger buffers must be based on a risk or demonstrated loss of biological integrity or an impairment of water uses or values. It remains unclear from the commenter who raises issues with stream protections on the WMNF, exactly what resources have been impaired or put at risk.</td>
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<td>The Timber Sales Management budget has increased from $907k to $1.9 million for FY16. Why has there been such an increase in this budget?</td>
<td>Appropriations for the WMNF have increased from FY 13 to FY 16 in several program areas including timber sale management, and have decreased during the same time period for other program areas. Appropriations follow a legal framework and are based on local, regional, and national policy and direction. In short, the President submits a budget request to Congress, the House and Senate to pass appropriations bills, the President signs each appropriations bill and the budget becomes law, and then each agency allocates appropriated funds based on those bills and national and regional policy. The realized increase in timber sale management appropriations “fits into the Forest Plan” by enabling the WMNF to move closer to the vegetation management and wildlife habitat management goals and objectives in the Forest Plan (Chapter 1 pp. 17, and 20-22).</td>
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<td>The Albany South Field Notes I got from Steve Bumps say on Page 6 7/26/11: “Is the WMNF wasting time trying to grow oak without chemicals” Page 7: “Is the Forest capable of growing high quality oak without heavy disturbance. Best oak sites at 4 Ponds still did not regenerate oak. Where should we be growing oak? Where should we grow oak? Research how best to establish oak.”</td>
<td>There are no oak communities in the Deer Ridge project area nor is oak regeneration part of the project’s purpose and need. A search of the draft Deer Ridge EA did not find any reference to the Four Ponds EA.</td>
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<td>Many of the logging stands in Deer Ridge are extremely steep. How are you going to be able to protect the streams and soils when you run skidders over everything? If we have a couple winters like this past one that there wasn’t much snow and we got several large rainstorms during the winter time it will be almost impossible to be able to run skidders and feller bunchers over the land without making a huge mess. What kind of mitigation measures are you going to take going up and down those slopes? In the draft EA on page 127/128 you make a broad statement with nothing to back it up “Vegetation management guideline G-5 (Forest Plan p. 2-30) states, “Where exposure of mineral soil is expected, skid trails should generally be located on grades of less than 20 percent, with only short steep pitches.” Given that slopes in the Project Area can be up to 35%, there may be instances where skids trails will need to be on grades exceeding 20% for more than a short pitch. If so, those skid trails would not be consistent with this guideline. Detrimental effects to soil productivity would be avoided in the Project Area, even if skid trails in summer/winter units are inconsistent with the guideline, if the soil and water design features are followed. Some temporary compaction would be expected on main skid trails, but this would be minimized by design features, and the soils should recover from compaction within three to six years of the end of operations (Donnelly et al. 1991, NCASI, 2004). No detrimental soil displacement (erosion) or soil compaction anticipated with this project.”</td>
<td>The mitigation to operate on these slopes to protect the soils will be operating on the soils when the soil conditions are frozen/snow covered or dry. Waterbars will be placed on these slopes at the recommended spacing based on the BMP manual established by the state of New Hampshire. The Forest Plan allows the decision maker the guidance to operate on slopes of greater than 20% slopes if mineral soil is exposed if she so chooses but to use waterbars and operate when the soils are dry to mitigate any issues. Forest Plan monitoring has shown it is possible to operate on slopes great than 20% if BMP’s are followed.</td>
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<td>For some period of time there is going to be logging on the Four Ponds Project, the Albany South Project as well as the Deer Hill Project. How is all that logging and road building going to be monitored by one TSA (and apparently fill in foresters)? When was the last time this much logging and road building occurred in one District? How well/badly was it handled? Either the Albany South or the Deer Hill Project should be abandoned.</td>
<td>As stated above, timber sale administration is our top priority and there are four additional foresters on district who can assist with harvest inspections. If needed TSAs or foresters from other districts can assist as well. After this winter, only one timber sale remains to be harvested from the Four Ponds project and it is relatively small sale at 163 acres. Aside from pre-haul maintenance, all road reconstruction is administered by the Forest Engineers. As for Deer Ridge (not Deer Hill), approximately three sales are planned from this project which would be sold over a two years period (FY 2017 and FY 2018). South Albany potentially could have five sales and will be sold over a two year time period. (FY 2018 and FY 2019). Because of markets and weather, Purchasers are never certain when they will start harvest activities, so it is impossible to know how busy a TSA will be in a given season. Also different operating seasons, means that some sales are</td>
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<td>There is really no reason to be logging. Those trees should be retained for their carbon sequestration potential. Much higher use of the trees than trying to sell them. We acknowledge the work cited by the commenter, Stephenson, N.L. et al, 2014, Rate of tree carbon accumulation increases continuously with tree size, Nature Letter, Vol 507, 90--93 (06 March 2014) doi:10.1038/nature12914, accessed 09/07/2016 URL: <a href="http://www.nature.com/nature/journal/v507/n7490/full/nature12914.html">http://www.nature.com/nature/journal/v507/n7490/full/nature12914.html</a> #ref11 and Nunery, J. S., &amp; Keeton, W. S. (2010). Forest carbon storage in the northeastern United States: Net effects of harvesting frequency, post-harvest retention, and wood products. Forest Ecology and Management, 259, 1363--1375. Retrieved from <a href="http://www.sciencedirect.com/science/article/pii/S0378112710000058">http://www.sciencedirect.com/science/article/pii/S0378112710000058</a>. We acknowledge that numerous scientific studies support the point made by the commenter that undisturbed natural forests sequester more carbon than those managed for biomass or wood products. Forests are capable of supplying multiple benefits including wood, wildlife habitat, carbon sequestration, recreation, scenic values and clean water. Not all uses can be maximized simultaneously. In order to achieve wildlife habitat goals and provide for wood products in the local economy, which are the primary purposes of the project, leaving the forest undisturbed in order to maximize carbon sequestration is not possible.</td>
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<td>Why do you only monitor “regrowth” for 3 years? As the earth continues to heat and we have more drought conditions isn’t it possible that you’ll get trees to sprout but as soon as they get a little larger will die due to drought? You should be monitoring the logging for 5, 10, 20+ years and seeing if anything is regrowing, especially what you have said would regrow in your silvicultural prescriptions. We are required by NFMA to ensure that stands are adequately stocked within 3 years. Past stocking survey data has shown that silvicultural treatments were successful in regenerating healthy, vigorous, desirable softwood and hardwood seedlings. Currently the earth’s climate is favorable for species regeneration and we have not seen any trends where regeneration is compromised by changing temperature regimes. Every one to three years stand exams are conducted on MA 2.1 lands within a HMU and each HMU is re-cruised every 15 to 20 years. Stand data collected during exams include tree species, size classes, tree condition, midstory and understory vegetation, and an assessment is made of any insect or disease problems.</td>
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<td>The WMNF uses &quot;wildlife habitat improvement&quot; as one of their main reasons for logging, yet neither before, nor after the logging does the WMNF actually do any sort of wildlife surveying to see how the logging is affecting the wildlife. Maybe they like the logging and increase in numbers or maybe they hate the logging and move somewhere else. But you don’t know because you never check. How is that fulfilling the requirement of using the Best Available Science? As you state in the draft EA have logged and disturbed tens of thousands of acres of wildlife habitat on the WMNF over a decade of time, yet you have no way to determine if this is good or bad for the wildlife. I think you need to immediately stop logging and try to determine what your constant road building and logging is doing to the wildlife. One thing I do know is that many amphibians get squashed every day on the Hut Road going into the WMNF that I walk every day...how are those going to be protected?</td>
<td>There are countless scientific papers that have been published, both locally and regionally, that document the effects of timber harvest activities on various wildlife species. We use this information to inform management decisions. It is not necessary to monitor every stand pre-and post-harvest to be able to make a reasoned conclusion about effects to many species. The WMNF is involved with ongoing wildlife surveys in countless ways including direct on the ground surveys, collaboration with our research branch or other research institutions, ongoing work at the two Experimental Forests (Hubbard Brook and Bartlett), State agencies, and other non-profits agencies. For example, we have been monitoring birds at low elevation and high elevation sites for over twenty years. We are doing acoustic bat surveys, winter track counts, vernal pool surveys, monitoring falcons, and surveying deeyards. The results of many of these surveys are summarized in our monitoring reports (USDA Forest Service 1993-2014). The amount of wildlife research and surveys on the Forest by outside groups is too numerous to list but examples include research on bird use in wildlife openings, annual reports on peregrine falcons from Audubon Society of New Hampshire, research on moose and effects of winter tick by both State wildlife agencies, and goshawk research at the Bartlett Experimental Forest. Surveys done in the Project Area include vernal pool surveys, goshawk surveys, deer wintering area surveys, acoustic bat surveys, plant surveys, invasive plant surveys as well as an analysis of habitat conditions. The results of these surveys and other supporting surveys and research are discussed in the EA, pp. 54-64, 196-238, Deer Ridge Wildlife Report and Biological Evaluation (project record).</td>
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<td>It really doesn’t make any scientific sense to base logging decisions (especially clearcutting) on birds that are only here for a few months a year and may be decreasing in numbers due to issues during migration as well on the winter habitat.</td>
<td>We value all species of wildlife that use the WMNF. One of the habitat goals of the wildlife strategy is to provide a diversity habitat (Forest Plan, p. 21) for the full array of species that occur on the Forest for all of part of their life cycle, including migratory songbirds that are only here for part of the year.</td>
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<td>As shown in the Logging section, apparently you don’t know how to grow oak trees. What happens when you cut down this very valuable food source and it doesn’t regrow? How is that “wildlife habitat improvement”?</td>
<td>See response to Letter 5, Comment 13.</td>
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<td>The loss of a single Northern Long Eared Bat could be disastrous (and maybe the last one) yet you just gloss over that fact. Why are you not logging only in the winter like on the Albany South project to protect the Northern Long Eared bat as well as the other bats that have been decimated by White Nose Syndrome????</td>
<td>The effects of the proposed activities on the bat species of concern have been analyzed in the Biological Evaluation for this project (Biological Evaluation, Project record). This information is summarized in the EA, p. 54-64. The U.S. Fish &amp; Wildlife Service has reviewed and concurred with the U.S. Forest Service’s findings regarding project effects on the Northern long-eared bat (project record).</td>
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I believe the definitions of the various stream types should be changed to be more like the definitions from the Daniel Boone NF. These are much more descriptive than the ones the WMNF uses and would possibly result in more streams being recognized as streams by all FS personnel and then protected.

Ephemeral stream - A watercourse that may or may not have a well-defined channel, and which flows only for short periods (less than 10 percent of an average year) during and following precipitation. Ephemeral stream bottoms are usually above the water table and do not contain fish or aquatic insects with larvae that have multi-year life cycles. Contrast with intermittent stream and perennial stream. Buffer of 33 feet on either side.

Intermittent stream - A stream that normally flows in response to a seasonally fluctuating water table in a well-defined channel (flowing 10-90 percent of an average year). The channel will exhibit signs of annual scour, sediment transport and other stream channel characteristics, absent perennial flows. Intermittent streams typically flow during times of elevated water table levels and may be dry during significant periods of the year, depending on precipitation cycles. Intermittent streams do not maintain fish populations or aquatic insects that have larvae with multi-year life cycles. Contrast with ephemeral stream and perennial stream. Buffer of 66 feet on either side.

Perennial stream - Any watercourse that normally flows most of the year (greater than 90 percent of an average year) in a well-defined channel, although droughts and other precipitation patterns may influence the actual duration of flow. It contains fish or aquatic insects that have larvae with multiyear life cycles, and water-dependent vegetation is typically associated with it. Contrast with ephemeral stream and intermittent stream. Buffer of 66 feet on either side.

I wonder if the USFS has done any better job of mapping streams, wetlands and vernal pools than they did on the Albany South Project? Only found 2 vernal pools in the whole Deer ridge project area? Really?

These definitions would not result in "more" streams being recognized as streams. These descriptions are in general agreement with how White Mountain National Forest staff identify streams. The Forest generally applies Forest Plan guidelines to mapped perennial streams and project design features to unmapped perennial streams. The term "unmapped" refers to not being mapped or not being mapped as a perennial by the USGS. The Forest makes a reasonable effort to locate and identify stream types within a project and provide the protections deemed adequate for streams and values within the White Mountain National Forest. The natural conditions can vary between National Forest lands based on geology, soils, hydrology, biology, and local uses of water, therefore protections need not be identical on every National Forest.

A reasonable effort has been made to correctly map and characterize water features such as streams, vernal pools, wetlands, and groundwater seeps using multiple field visits, topographic indicators, and assumptions that tend toward higher levels of protection. Some mapped streams have had the flow regime corrected from intermittent to perennial. The mapped stream network and water features presented in the EA and project file are not intended to be static, and will be revised to incorporate: any information provided by the public, information collected through future field work, and information provided by new or improved data (such as LiDAR-derived topography, stream networks, and water features) that may become available. In addition, a water features point layer was created for small wetlands, springs, seeps and wet areas for easier maintenance and reference. Extensive field work occurs post-decision in the process of defining harvest units, laying out transportation networks and planning construction activity, providing an opportunity to further refine the data.

The purposes of stream and water feature mapping are: to evaluate the general scope and nature of impacts of each alternative in environmental analysis, to facilitate project design, and to alert implementers to the presence and type of streams and water features on the ground for purposes of protection and operability. Riparian management zones, no-cut zones and other protection measures are based on the location of features on the ground, and it is not uncommon for unmapped streams and water features to be added to maps or given additional protection based on observations made after a decision (as documented in WMNF 2013, WMNF 2014).
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<td>Streams are the veins of the Forest and as such need to be protected at all costs. There have been numerous publications provided by members of the Public on the importance of streams, I like the following one from the EPA the best. The EPA’s 2015 report on the Connectivity of Streams &amp; Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence, states that the “scientific literature unequivocally demonstrates that streams, regardless of their size or frequency of flow, are connected to downstream waters and strongly influence their function” (EPA 2015).</td>
<td>Design features directly address commenter’s concerns with unmapped streams and other water features: If additional streams, wetlands or other water bodies are located or found to have a different flow regime (i.e. intermittent or perennial), design features will be applied to comply with the Forest Plan, NH BMPs, NH Basal Area Law, and any additional site-specific protection deemed necessary by a watershed specialist. (EA, p. 29). Protection will be implemented through the combination of: updating digital stream and water feature data with new information, displaying protected stream and water features on contract or project maps, and flagging streams and water features within treatment areas in the field at an appropriate time prior to the timber sale. Hydrology and soil surveys were completed in the Deer Ridge Project Area by a Forest Service contractor between October 14 and 21, 2014. The two person team was focused in identifying streams, wetlands, and vernal pools as well as a soils analysis (Arias and Hermendorfer 2014). Streams and wetlands were identified in the Project Area from this survey and are addressed in the Water section of the EA pp. 164-196. No vernal pools were identified during these surveys. We have documented four vernal pools in the Project Area during field reviews by District Staff. We recognize the importance of vernal pools. They are discussed in the EA, pp. 33, 197, 229-230, 234, and Appendix D: 1-D-2. Any new locations that are provided by the public on streams, wetlands, groundwater seeps, or vernal pools will be considered during the layout of units. Furthermore any new locations found during field activities will be evaluated and incorporated into the database.</td>
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<td>I would like to see the WMNF increase their buffer sizes to match those recommended by Trout Unlimited of a 75’ No-Cut Buffer for all perennial streams and a 25’ No-Cut Buffer for all intermittent streams in the Deer Ridge Project.</td>
<td>We agree that it is important to protect streams and watershed function. The application of design features (pp. 26-30), Standards and Guidelines, and Best Management Practices protect these important features and values. See Response to Letter 3a Comment 31.</td>
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<td>I would like to see the WMNF increase their buffer sizes to match those recommended by Trout Unlimited of a 75’ No-Cut Buffer for all perennial streams and a 25’ No-Cut Buffer for all intermittent streams in the Deer Ridge Project.</td>
<td>See response to Letter 5 Comment 21 for additional information on the Northern Long Eared bat. See response to comment 3a/31 for additional information on riparian buffers. Hydrologic function of wetlands (including connectivity) is protected by numerous Forest Plan Standards and Guidelines for Riparian and Aquatic Habitats, Transportation and Water Resources (2005 Forest Plan), prohibiting dredge, fill, fragmentation, direction of runoff into wetlands or other alteration without minimization and proper permitting. Water quality functions, such as sediment and nutrient cycles are protected through measures to protect hydrology (which also pose restrictions on equipment operations in wetlands), New Hampshire BMPs to minimize and contain erosion (State of NH 2016), project-specific design features (EA Chapter 2), and proper season of harvest.</td>
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<td>Back to the EPA report on the criticality of wetlands... The EPA report concluded that wetlands are “physically, chemically and biologically integrated with rivers via functions that improve downstream water quality”... Even when lacking obvious surface water connections, wetlands “provide physical, chemical, and biological functions that could affect the integrity of downstream waters. Some potential benefits of these wetlands are due to their isolation rather than their connectivity” (EPA, 2015). Due to the importance of wetlands I believe that the no harvest buffers on wetlands must be much larger more like 200’. As you said in the Albany South Project the Northern Long Eared bats like wetlands, they need to be protected more.</td>
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<td>According to a radio tracking study done by the VT Center for Ecostudies salamanders range much farther than the inadequate buffer sizes you have proposed for vernal pools. Faccio, S.D. 2003. Post-breeding emigration and habitat use by Jefferson and spotted salamanders in Vermont. […] According to another study by Best, Welsh (2014) “The trophic role of a forest salamander: impacts on invertebrates, leaf litter retention, and the humification process” salamanders can help increase the amount of carbon that is stored in the soil. […] Based on these studies and others that have shown how very important the critters that live in vernal pools are I request that you increase buffer sizes around vernal pools to be 175 meters across the Deer Ridge Project Area.</td>
<td>The Forest recognizes the value of vernal pools and designates a 100-foot riparian management zone (RMZ) around all naturally occurring vernal pools (Forest Plan Glossary, p. 33). Certain guidelines must be maintained with this buffer including a 25-foot no harvest zone from the high water mark of a vernal pool and the use of uneven-aged management within the remaining 75 feet of the RMZ (Forest Plan Chapter 2, pp. 24-26, 28). Contact also was made with Dr. Phillip deMaynadier, State Leader for the Reptile and Amphibian Group, MDIFW Research and Assessment Section, Bangor, Maine regarding vernal pools and buffers (P. deMaynadier, personal communication in 2013 and 2016, available in the Project File). He recommended following the “Forestry Habitat Management Guidelines (HMGs) for vernal pool wildlife” developed by the Maine Department of Inland Fisheries and Wildlife and University of Maine for candidate vernal pools (Calhoun and deMaynadier 2004). Candidate vernal pools are defined as pools with two or more of the indicator species or having 20 or more egg masses. Guidelines identify three zones including the vernal pool depression, a protection zone out to 100 feet, and an amphibian life zone from 100 to 400 feet. The first two recommended zones have similar protections as the Forest Plan. Calhoun and deMaynadier 2004 also recommended an amphibian life zone from 100 feet to 400 feet from the vernal pool. They found on average spotted and blue-spotted salamanders move 386 feet and 477 feet respectively and that light to moderate partial harvests would maintain upland habitat for pool-breeding amphibians. Based on the guidance from Calhoun and deMaynadier 2004, a design feature was added to follow the recommendations for conserving vernal pools during forest harvest operations including the designation of an amphibian life zone around designated vernal pools (EA p. 33).</td>
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<td>I am very, very concerned that there are many vernal pools out on Deer Ridge that have not been mapped.</td>
<td>See response to Letter 5 Comment 23.</td>
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<td>On page 224 of the Draft EA you state “This effect would be minor as Forest Plan Standards and Guidelines (USDA Forest Service 2005a, Chapter 2, Pages 35-36) require that reserve areas with snags, wildlife cavity trees, and downed logs be retained in clearcuts.” I have seen numerous times where snags have been cut during logging operations in clearcuts and other logging stands as well. When I asked Rick Alimi about it he said that OSHA requires the logger to cut down any snags that may be “dangerous”. So if the Forest Plan “requires” that these snags (wildlife cavity trees) be retained then why are you cutting them down?</td>
<td>There is no incentive for a Purchaser to cut a snag because it represents a cost with no benefit. The only time an operator would cut a snag is if he feels it poses a safety risk due to its proximity to an operating landing or if they are hand felling trees near a snag outside the safety of their equipment. Today, most harvest operations are moving toward mechanized equipment which allows the operators to stay within the machine’s safety cab when felling, bucking and transporting of logs, thus reducing the hazards of standing snags and the need to cut them. The Forest Plan has Reserve Tree Standards and Guidelines for stands being managed with even-aged management practices such as clearcuts and stands managed with uneven-aged management practices such as group selection. There also is direction to maintain and not damage existing standing dead and dead-and-down woody material unless poses a safety hazard or is in an area that is permanently removed from a forested condition like a parking lot (Forest Plan Chapter 2, pp. 35-36.) Snags are not marked to be cut during marking of a timber sale. However, as Rick Alimi says, sometimes snags are cut if they pose a safety hazard during active operations. They also may be cut if they</td>
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<td>The WMNF already has 600 miles of roads that you can’t take care of, why would you want to disturb those roads that are now fading into the forest to do more logging? It makes no sense given that logging roads cause sedimentation into streams.</td>
<td>System roads are established to be used as roads as such we remove culverts and establish temporary erosion structures at times when the roads are to be temporarily not used as a transportation route, however these roads are still established roads to be reopened and used when needed such as during timber harvest. In order to reduce potential impacts to resources, all applicable Forest Plan Standards and Guidelines and Forest Service and State BMPs will be followed. Design Features specific to the project are described in the EA on pp. 26-34.</td>
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<td>There is no specification that I have seen as far as a defined buffer to protect heritage sites. You should be buffering all heritage sites with at least 100 foot buffers and stay off the old railroad beds.</td>
<td>Known sites in project activity areas are flagged as reserve areas and will be avoided during project implementation. No heavy equipment or timber harvest will occur in heritage reserve areas. The WMNF uses a 50ft buffer beyond any visible cultural remains when flagging sites to avoid damage to subsurface deposits and reduce increased visibility of cultural remains as a result of timber harvest. Linear features, such as fish hatchery ditches and railroad grade, will be crossed or breached at right angles in existing breaches, and only when absolutely necessary. To avoid impacts, they will be crossed only over snow or slash cushioning to protect their integrity. If any unrecorded archaeological sites or artifacts are discovered during implementation, work will stop and a Forest Service archaeologist will be called to assess the situation and take appropriate protective measures. The above protection measures were submitted in a Cultural Resources Reconnaissance Report to the New Hampshire Division of Historical Resources (NHDHR), which serves as the NH State Historic Preservation Office. The NHDHR concurred that if these measures are implemented, the project has no potential to cause effects to cultural resources that may be eligible for the National Register of Historic Places. (See signed NHDHR Request for Project Review form in the project record.)</td>
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<td>Why has the budget for Fire increased from $467k in FY13 to over $800k today in a forest that rarely burns? Is it because the WMNF is now pushing to burn many acres in every logging project?</td>
<td>The budget for fire management is outside the scope of the Deer Ridge IRP. Prescribed fire is proposed to be used for expansion and maintenance of Permanent Wildlife Openings. See also response to Letter 5 Comment 12.</td>
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<td>I am totally against the prescribed fire that is proposed for the Deer Ridge Project. There are numerous studies coming out now showing that using prescribed fire just to use prescribed fire can have a very detrimental affect on natural communities. Considering the poor understanding of oak regeneration at present, it seems premature to prescribe fire for the purpose of oak management. See the entry from Steve Bumps above regarding oak not regenerating on the WMNF... please drop all the prescribed fire being proposed for Deer Ridge.</td>
<td>Prescribed fire is proposed for expanding and maintaining the Permanent Wildlife Openings. It is not being used as a tool to regenerate oak in the Deer Ridge project.</td>
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<td>Why was there no discussion about the fact that the USFS has 2 large logging projects right next to the Deer Ridge Project, Mill Brook and North Kilkenny in the Draft EA for Deer Ridge? Why was there no evaluation of the Cumulative effects of these two projects, along with the Jericho State Park on the Deer Ridge Project? Mill Brook was DN’d in November 2008 and no mention was made of another project, the Deer Ridge project in the Cumulative effects. North Kilkenny was DN’d sometime after that but you’ve removed the Project from your website so I can’t give an exact date. Once again there was no mention of the Deer Ridge Project in the North Kilkenny Cumulative Effects section. When was the Deer Ridge project first discussed, was this before you came out with Decision Notices on both Mill Brook and North Kilkenny?</td>
<td>The Deer Ridge project proposal was developed in Winter 2015, well after the Decision Notice for Mill Brook and North Kilkenny were signed. The Draft EA, Appendix F p. 12 provides a response as to why the Jericho State Forest was not included in the cumulative effects area. See response Letter 3a comment 36 for additional response to comments regarding cumulative effects and Letter 3b Comment 40 for a response regarding the splitting of some HMUs into smaller units.</td>
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| 5         | 35          | A scientifically sound, credible Cumulative Effects Analysis (CEA) of the cumulative effect, as defined by National Environmental Policy Act (NEPA), should be conducted not just for the Deer Ridge Project, but at the larger geographical scale to capture the effects of multiple actions to meet the intent and legal requirements of both NEPA and the National Forest Management Act (NFMA). Limiting the CEA to just this project is insufficient to determine impact over time and space. Court decisions have generally concluded that reasonably foreseeable future actions need to be considered even if they are not specific proposals. You should be looking at the effects of the Mill Brook, the North Kilkenny as well as the mess that is the Jericho State Park before you make the determination that more logging is “needed” http://bioscience.oxfordjournals.org/content/60/7/545.full
Cumulative Effects with other imminently foreseeable project activities are not and have not been properly analyzed and disclosed regarding this Deer Ridge Project. | See response to Letter 3a comment 36 and Letter 5 comment 34 |
| 5         | 36          | Furthermore, the WMNF has chosen to use Habitat Management Units for planning. Information about status and trend of wildlife habitat is important for the U.S., Forest Service to accomplish its mission and meet its legal requirements. HMUs range from roughly 6,000 to 49,000 acres in size. While the boundaries of these HMUs can change without a Forest Plan amendment or correction, they should remain fairly constant over the next 10-15 years.

As discussed earlier you took a single HMU that you had already done a timber harvest in of 1000 acres and 3.5 million board feet and split it in half yet didn’t even mention that you had done this. This arbitrary and capricious splitting of HMUs needs to be examined in an EIS both on the Deer Ridge Project as well as the Albany South Project. | See response Letter 3a Comment 35 |
| 5         | 37          | The USFS is grossly underestimating the effect of climate change during the timeframe of the Deer Ridge Project when they stated” Current scientific information (Matthews et al. 2011, Rustad et al. 2012, Whitman et al. 2014), within the temporal scope of the Deer Ridge Project cumulative effects timeframe (2006 to 2030), indicates that climate change is not expected to substantially affect wildlife resources, and there would not likely be any substantive changes to wildlife habitats or species’ populations from climate change within the Deer Ridge Project Area.”

The cumulative effects timeframe must be much further out than 2025 since you are proposing removing 12.5 million board feet of trees that will take many decades to be replaced all the while the ground (and streams) will be heating up when it wasn’t in the past due to the removal of canopy cover. | The cumulative effects analysis area for wildlife was chosen based on past, present, and reasonable foreseeable future projects that contribute cumulative effects to wildlife and wildlife habitat. Desired wildlife habitat goals also contribute to the temporal scope for the cumulative effects analysis area. The goal of the Forest Plan is to provide a diversity of habitat conditions for wildlife species that inhabit the Forest (Forest Plan, Chapter 1, pp. 20-21). One of the habitat goals of the HMU is to create regeneration forest habitat (0-9 years old with basal area less than 30%). The benefits of this habitat for certain wildlife species starts to diminish after 10 years. Because regeneration harvest is staggered over time as portions of the project area are sold and then harvested we estimate that most of the regeneration harvest would move to young growth by approximately 2033. As a result this future date for the cumulative effects timeframe will be changed and updated in the final EA. At this time there are no |
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<td>Climate change is already occurring and at a much faster rate than forecast back when the 2005 Forest Plan was being debated. The WMNF needs to address this issue immediately. Since the Deer Ridge Project proposes to remove trees that are decades old and will take many decades to replace it needs to extend the Cumulative Effects due to Climate Change out much further to maybe 2066 or later.</td>
<td>other known foreseeable future actions in the analysis area beyond what has been discussed in the EA, Appendix C.</td>
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<td>In the Draft EA on page 57 it states “Model projections of air temperature increases due to climate change could translate into an increase of 1.7° C in average stream temperature in a worst case scenario by the year 2035 (Prout 2010). None of the other past, ongoing, or future activities in the remainder of cumulative effects area would contribute to changes in thermal classes of streams.” How do you know this? What about removing the trees over the streams? That’s not increasing the temperatures in the streams? Really? What is the average temperature that the streams on other logging projects on the WMNF increase after logging? This needs to be monitored on ongoing logging projects, there are quite a few going on right now...</td>
<td>The Riparian and Aquatics Habitat report (pp. 8-9) summarize the best available science regarding fish species composition of coldwater, coolwater, and warmwater species, and the effects of various forest management treatments. The relationship between average summer water temperatures and stream fish species in the native range of brook trout is well known. Brook trout do indeed occur in streams classified as coldwater or coolwater. There is no one average temperature response for “logging”. However, the science is clear that silvicultural treatments that create an uneven-aged stand structure, and leave streamside forest canopy, do not result in substantial or long-lasting changes in stream water temperatures. See also the responses to Letter 2, Comment 19 and also Letter 5, Comment 10.</td>
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<td>The science of Climate Change is evolving more rapidly than corresponding public policy, and the risk of understating future impacts is great. With both increased temperatures and drier summers, the necessity for greater buffers for streams, wetlands, and vernal pools is paramount. With increased fall, winter, and spring precipitation and the increased likelihood of erosion from roads and stream crossings and on cleared or scarified landscapes, it is equally paramount to avoid any new even-aged management practices, to avoid steeply-sloped areas, and to minimize the number of roads.</td>
<td>There is an extensive discussion of the current state of the science surrounding climate predictions available from the Intergovernmental Panel on Climate Change (IPCC) that includes assessments of skill in making near term and decadal projections of temperature and precipitation Kirtman, B. et al, Near-term Climate Change: Projections and Predictability. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Stocker, T.F. et al (eds.)). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Based on this information as used in various downscaled studies such as Kunkle et al 2013, we believe we have an adequate understanding of the likely temperature and precipitation changes that are modeled to occur through the cumulative effects period for this project. The design features included in the project, such as BMP’s, described in the Environmental Assessment are expected to adequately mitigate sediment flows and erosion.</td>
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Hikers are going to be subject to road building and logging noise for many years.

The USFS always talks about the WMNF being a Multiple Use Forest, yet logging always seems to trump any other uses on the forest...hiking trails get shut down for logging, hikers are forced to look at stumps, ruts, clearcuts and other nasty remnants of logging, get to hear skidders, feller bunchers, etc for many years and forced to breath pollution from those same vehicles or go to a different part of the forest, at least until the USFS shows up and starts logging there.

The air pollution from the vehicles is going to be horrible. Both the noise and air quality issues require further analysis, especially since the District Ranger is going to be issuing a “Finding of No Significant Impact” I would argue that the noise and air pollution in fact are Significant Impacts.

See response to Letter 4 Comment 2 and Comment 5 regarding design features to mitigate impacts to recreation. The Deer Ridge Inventoried Roadless Areas Report states some short-term increase in noise would occur within 1 mile of management activities while active. However, noise effects would diminish rapidly due to effects of the terrain and vegetation. These impacts would be temporary, occurring only during times of actual operations for the duration of the project (2–4 years). The percent of the area affected at any one time would vary based upon season of operation and individual sale design. Project design features limit log hauling operations to weekdays. This would reduce the noise related effects on weekends.

Monitoring of the NAAQS (National Ambient Air Quality Standards) generally occurs at the state level and is enforced through EPA-approved state implementation plans. The plans typically include a collection of monitoring devices throughout the state which provide actual measurements of the concentrations in the air and identify whether an area is meeting the air quality standards. Currently the White Mountain NF is in attainment for the criteria pollutants and areas in non-attainment are a considerable distance from the project area. In addition, 2015 data from the Improve Monitor in the Great Gulf Wilderness (approximately 12 miles from the project area) shows soil (dust) is a very small contributor to particulate matter and haze. The predominant cause of haze pollution in the Mid-Atlantic/Northeast region is sulfate particles (aerosols) present in, or formed from, emissions when coal or oil is burned. The amount of pollutants added to the atmosphere by proposed activities is not expected to exceed the NAAQS for the criteria pollutants. The impact of each activity on air quality is quickly diffused due to the amounts projected over time and space within the project area.

The WMNF is spending $3-5 million or more on their timber program and getting in return, depending on the year, maybe a million dollars or so in sales. Last year 1 out of the 3 sales that were done resulted in a No Bid. The timber market right now is bad, with no market at all for softwood. Why does the WMNF insist on pumping millions of board feet into a market that doesn’t need it? In return for a couple logging jobs?

The socioeconomic analysis provides an accounting of expected costs and revenues associated with the Deer Ridge project and finds that stumpage receipts are expected to exceed the costs of project planning and implementation (EA, pp. 112-114). Additionally, as noted in the socioeconomic analysis, the benefits of the project cannot be fully accounted for in an economic efficiency analysis. The proposed action would help move the forest toward desired conditions by improving forest health and vigor, resilience to climate change, habitat diversity, and trailhead access (EA, pp. 4-15). These benefits are not monetary and cannot be captured in the economic efficiency analysis. Therefore, the difference between timber program expenditures and timber sale revenues do not provide a complete accounting of the costs and benefits of the Deer Ridge project.
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<td>How many visitors does the WMNF get now? In the 2005 Forest Plan I believe it stated 5-6 million people each year, it must be higher now. How much do those visitors bring to the WMNF and the surrounding communities? How many thousands of people have jobs because of that, certainly many more than the couple logging jobs that are created...as the WMNF continues it's program of logging every available acre that it can how soon until people get tired of seeing stumps and being inconvenienced by trail closure due to logging and go elsewhere?</td>
<td>According to the National Visitor Use Monitoring program, approximately 2.2 million people visit the White Mountain National Forest per year (USFS 2016). The recreation analysis addresses potential effects of the proposed action on recreation in the project area (EA, pp. 78-94). Some visitors may be temporarily displaced or have the quality of their recreation experience temporarily decline due to timber harvest and associated activities (EA, pp. 85-94). However, the recreation analysis finds that none of the proposed actions would affect Recreational Opportunity Spectrum (ROS) classes in the project area (EA, pp. 91-94). Additionally, the proposed action would implement recreation improvements that would positively affect visitation. In particular, the expansion of the Unknown Pond Trailhead parking lot &quot;would improve traffic flow and better accommodate use levels&quot; (EA, pp. 93). Under both the no-action and proposed action alternatives, visitors to the forest would continue to have access to diverse recreation opportunities. The potential for temporary displacement of recreation visitors from sites in the project area is not expected to measurably affect annual visitation to the White Mountain National Forest. Therefore, recreation visitors would continue to support jobs in communities near the forest. See also Response to Letter 4 Comment 5.</td>
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<td>The WMNF always states that it uses BMPs to protect the resources, yet as I have shown time and again that doesn’t actually happen on the ground. Log landings are placed too close to streams with nothing to protect the streams, skid trails are muddy and have no slash placed on them. Soil erodes off roads into streams with no sort of silt fencing helping with the erosion I have provided these issues that I have seen over and over to WMNF personnel on their logging Projects but are always blown off and told I am incorrect. I have literally thousands of pictures of damage that the USFS has allowed contractors to do to the WMNF.</td>
<td>The WMNF has a soil and water Best Management Practices (BMP) monitoring program which looks at soil movement and sedimentation on both active and completed logging sites, and currently follows a national protocol to look at a random sample of sites within one year of completed activity. These BMPs are intended to prevent degradation of all water bodies, including intermittent streams. Based on field observations, incidental sedimentation related to harvest has been consistent with effects disclosed in the water resources analysis, which are temporary and minor in comparison to background sediment transport rates. It is common for temporary erosion control measures such as silt fence to need maintenance, and timber sale administrators work with logging contractors to complete this as soon as equipment can get to the site without causing more damage. Part of effective BMP use is limiting the reliance on such temporary erosion control through good planning (UNH Cooperative Extension 2005), which is the focus of this stage of project development. Forest and state water monitoring programs do not indicate that water bodies in or downstream from harvest areas in the White Mountains have been detrimentally impacted by sediment (NH DES 2012, WMNF 2010). See the Water Resources report for a discussion of BMP effectiveness, areas of ground disturbance and water resource effects.</td>
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<td>The USFS is KILLING the Inventoried Roadless Areas on the WMNF by a &quot;death by a thousand cuts&quot; and as such needs to look at the Cumulative Effects of ALL these Projects on the Inventoried Roadless Areas on the WMNF. As part of this project you are proposing logging, moving campsites into the IRA, road building in the IRA, culvert removal, etc., all things that will affect the roadless character of this area and make it ineligible for Wilderness designation. If you are not going to select Alternative 1 please select Alternative 3.</td>
<td>No actions are proposed for areas included in the 2001 Roadless Area Conservation Rule. The proposal does include timber harvest using existing roads in a portion of lands designated by the Forest Plan as 2.1 General Forest Management within the Kilkenny inventoried roadless area. This project is not proposing to move campsites or build new roads. See also response to Letter 3b comment 46.</td>
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<td>I support Alt 1 as it provides the least risk to the ecological, scenic and recreational resources of the Ammonoosuc River Watershed.</td>
<td>Personal values and opinion - identifying a preference for an alternative.</td>
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<td>I would think the necessary Unknown Pond Trailhead parking lot expansion could be accomplished without the extraction of an estimated 12.5 million board feet of timber over a period of 5-10 years.</td>
<td>Personal values and opinion - identifying a preference for an action contained within an alternative.</td>
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<td>The Draft EA fails to document that the desired conditions of the South Pond South HMU (~9,014 acres) established by the 2005 Forest Plan require this level of extraction and a project area encompassing ~ 3778 acres.</td>
<td>The EA documents the desired conditions for the South Pond South HMU on pp. 199-204. See also the HMU report in the project record.</td>
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<td>The risks and negative effects from even-aged management practices outweigh the benefits stated in the Draft.</td>
<td>The Forest supports this project and the positive benefits that even-aged management practices (clearcutting, patch cutting, overstory removal shelterwood) would achieve. It would help meet wildlife and vegetative goals within the South Pond South HMU by: a) providing sustainable forest products to the state’s economy; b) managing habitats for consistency with ecological land types (ELTs); c) promoting forest health and vigor; d) managing stands in light of climate change predictions; e) meeting wildlife habitat diversity goals; f) maintaining early successional species (i.e. paper birch and aspen) on the landscape; and g) providing regeneration-age habitat.</td>
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<td>Take No Action is rarely (if ever) an Alternative in this District, therefore there is a deficit in the Alternatives put forward for public comment. In essence, there is no Alternative put forward other than the Proposed Action resulting in the lack of any alternatives available for public input.</td>
<td>See response to Letter 2 Comment 33.</td>
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<td>Less than 25% of the forest in NH is publicly owned, and the WMNF owns over 50% of our publicly held forest. This fact is why it is extremely important for the WMNF and specifically in this instance the Androscoggin District to, while adhering to the over decade old 2005 Forest Plan, also use Best Available Science as it is mandated to, in making absolutely sure the decisions made regarding our forest are No Regret Decisions.</td>
<td>Forest staff with expertise in a wide array of resources reviewed extensive scientific literature (Best Available Science), talked with agency representatives, explored the project area, and reviewed public comments submitted during the scoping and 30-day comment periods. Based on the information they gathered, they evaluated the potential for each alternative to affect the many resources in the area, including recreation, watershed, wildlife, and fisheries. The results of these efforts are documented in Chapter 3 of the EA and in the project record.</td>
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<td>Beginning on page 13 of the Deer Ridge Draft EA there is so much verbiage about logging and the economy, one is left to question the intent of this project. Quality saw timber can and should be provided by the private sector, not our very limited public lands. Our national forest should be protecting our watershed, our wildlife, forest related recreation, uninterrupted opportunities to fish, hunt, forage, providing the opportunity to immerse oneself in nature as well as providing important carbon storage.</td>
<td>Under the Multiple-Use Sustained-Yield Act of 1960, the Forest Service is directed to manage national forests for outdoor recreation, range, timber, watershed, and wildlife and fish purposes. The proposed action would help move the forest toward desired conditions by improving forest health and vigor, resilience to climate change, habitat diversity, and trailhead access (EA, pp. 4-15).</td>
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<td>New Hampshire tourists have money to spend in this region. In 2012/2013, the mean income of NH overnight visitors was $87k, and $82k for day visitors. It should be apparent that times have changed, the logging industry is in a documented decline and forest based tourism is becoming a larger financial factor. The only Recreation Improvement planned for this major project is a larger parking lot. While our public lands should not be used for private gain, sustainable tourism and recreation is a win-win situation both for the private and public sector. To continue to keep and grow the tourism industry, it is imperative to understand what is drawing folks to the region. They are spending their dollars for scenic vistas, peace and quiet, a place to reflect. While the visual impact is stated in the Draft to diminish over time (years, decades), visitors will not come to an area to listen to and witness increased logging operations, especially on our limited public forests.</td>
<td>See Response to Letter 5, Comment 33</td>
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<td>The WMNF Funding FY ‘13 Budget for Timber Sale Management was 907k and in FY’16 it is ~1.9million dollars. That is a dramatic increase and I am unable to find where this dramatic increase- fits into the 2005 Forest Plan. Too much emphasis is being placed on tree harvesting.</td>
<td>This comment is outside the scope of the Deer Ridge Project and is a matter of personal opinion. Appropriations for the WMNF have increased from FY 13 to FY 16 in several program areas including timber sale management, and have decreased during the same time period for other program areas. Appropriations follow a legal framework and are based on local, regional, and national policy and direction. In short, the President submits a budget request to Congress, the House and Senate to pass appropriations bills, the President signs each appropriations bill and the budget becomes law, and then each agency allocates appropriated funds based on those bills and national and regional policy. The realized increase in timber sale management appropriations “fits into the Forest Plan” by enabling the WMNF to move closer to the vegetation management and wildlife habitat management goals and objectives in the Forest Plan (Chapter 1 pp. 17 and 20-22).</td>
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<td>Having federal land is an asset. However, the protected lands do better than unprotected lands. That is, a national park is a better asset than a national forest. In the West, (the East has very little protected lands) from 1970-2014, counties with the highest share of protected federal lands on average performed better for population, employment, personal income, and per capita income and growth than those with the least protected federal lands. The WMNF is overstating the value of resource extraction and understating the immense value of resource protection.</td>
<td>Personal opinion or value. See Response to Letter 3a, Comment 7</td>
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<td>The Ammonoosuc River Watershed should not be subject to the risks associated with this project. Protection of water quality and yield and prevention of flooding and landslides call for greater attention to the negative impacts of logging and skid roads and the value of undisturbed buffer zones along streams and rivers. Conservation of forest biodiversity will often require reducing forest fragmentation by clearcuts and roads, avoiding harvest in vulnerable areas such as hardwood or old growth stands and riparian zones, and restoring natural structural complexity to cutover sites.</td>
<td>The Forest Service acknowledges that most forestry-related sedimentation is associated with transportation systems (Martin and Hornbeck, 1994). White Mountain National Forest monitoring of stream crossings by forest roads indicates that with application of best management practices, sedimentation was non-existent or fell within analyzed and disclosed limits (WMNF 2010, 2011, 2012 &amp; 2013). The EA describes effects of each alternative on soil erosion, compaction, productivity, and risk of sedimentation (EA p. 114-136). The Water Resources analysis concludes that the level of effects would “…be in compliance with the Forest Plan, which allows effects of limited extent and duration that do not permanently degrade water quality” and that long-term sedimentation would potentially be reduced by maintenance activities (EA p. 188-189). The commenter listed several actions to conserve forest biodiversity. Forested habitat on the WMNF is mostly mature and is not interrupted by human development. There could be what some call a form of fragmentation within the Deer Ridge project area over time, as regeneration harvests occur in different stands and roads are in use. However, research has found no evidence of the negative aspects of forest fragmentation exhibited in isolated forest environments in large forested areas where active timber harvesting occurs (Askins et al. 1990, Askins 1993, DeGraaf and Healy 1988, Thompson et al. 1992). Hardwood stands are not considered vulnerable in the Northern Hardwood forests of the White Mountain National Forest and there are no old growth stands within the project area. The effects of the proposed treatments upon natural structural complexity are analyzed by affected resource in Chapter 3. See response to Letter 5 Comment 23 for information on additional stream protection measures.</td>
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<td>Along with the loss of C storage from the vast amounts of tree removal and disturbed soils there will be an increased carbon footprint due to the amount of big truck trips needed to haul road building material, even if from an expanded gravel pit, as well as the hundreds of logging trips, the carbon footprint of the other large vehicles involved in the actual years of logging, and the trips from the district office during the project.</td>
<td>The contribution of logging operations is disclosed in the specialist report to the Deer Ridge Draft EA and is part of the larger estimate for the carbon release from the project. See the Carbon Dynamics Report in the project record for further discussion and appropriate references.</td>
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<td>When the Draft compares the cost/ benefit of Alternatives 1 and 2, it fails to make a true comparison. The revenue that may be generated is in a documented state of decline and, as page 145 of the Draft states – roads will need reconstruction and maintenance to support timber harvest. The WMNF Funding for road improvements and maintenance has increased exponentially: FY’15 533k, FY’16 ~2.4 million. Much of this is associated with the cost of logging projects.</td>
<td>The economic efficiency analysis incorporates the cost of road maintenance associated with proposed timber harvesting activities (EA, pp. 112-114).</td>
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<td>The impact of a changing climate in the WMNF is often mentioned in the Deer Ridge Draft, yet it has been oversimplified and not adequately addressed in the planning. This will result in a lack of protection for the watershed as well as its valuable wildlife.</td>
<td>The topic of climate change is a complex issue that includes an already large body of published work with more being released every day. That being said the number of specific studies and modeling of the types of interactions that may occur within the timeframe of the Deer Ridge project are much smaller in number with some issues, such as the expected effects of climate change on understory plants, receiving scant attention from scientists. The specialist report and its associated references are the best summation of the applicable science available at the time of this analysis. The general conclusion we can draw from the available science is that within the cumulative effects periods identified for each resource (see the EA) that the modeled change in climate (see Kunkle et al 2013) will be only slightly warmer and slightly wetter than the average from the 1901-1960 period. With this information, and in conjunction with the application of best management practices and other design features, the interaction between the project activities and the expected changing climate are minimal and generally similar to projects implemented over the last several decades.</td>
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<td>The logging/ tree selection project is worrisome for all four seasons, particularly in light of the fact our seasons are becoming less distinct.</td>
<td>The season of harvest includes 2 seasons, summer and winter. These seasons were chosen to minimize the impacts to soil and water resources. The proposed action also includes monitoring, implementation of Forest Plan Standards and Guidelines, BMPs, and project specific design features. See also response to Letter 3a, Comment 14.</td>
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<td>Long-term measurements from the White Mountain National Forest document increasing average winter air temperatures, less snow, more sleet and freezing rain, yet the Draft EA still relies on frozen ground being available as a protector of the environment/watershed. The WMNF cannot rely on frozen ground to protect the forest floor and watershed.</td>
<td>While winter conditions have changed and continue to change (Kunkle et al, 2013) we expect that there will be sufficient frozen ground and snow cover to allow this project to meet its objectives within the period that harvesting will be active. The long term outlook for changes in winter conditions is concerning but those conditions are expected to occur around mid-century (2150) or later (see Kunkle et al, 2013 and Notaro, Lorenz, Hoving, &amp; Schumer, 2014 ). Timber Sale Administrators (TSA) monitor conditions to prevent damage from occurring to Forest resources including soil, water, and vegetation. If conditions become unfavorable, then sales are suspended.</td>
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<td>The Androscoggin District is too large and includes parts of two states. One, or even several, TSOs cannot be everywhere at once and be expected to meaningfully monitor the important BMP compliance and weather conditions that vary greatly from one part of the District to the other.</td>
<td>The Androscoggin district has the smallest land base compared to the other two districts. Being in two states is irrelevant, Maine is no farther than the Kilkenny land base located in the northern portion of the district. From the District office, the furthest location is about one hour away. As for weather, there is very little variation across the district. Administering timber sale contracts is a top priority and the contract requires staff to be available to monitor harvest operations. A Plan of Operations is a contract requirement which sets forth planned periods for road construction, timber harvesting and completion of slash disposal and erosion control measures. This plan provides the District with a time table of when operations will occur to ensure that someone on staff is always available to monitor contract compliance. There are four foresters on the District who can serve as harvest inspectors to assist the Sale Administrator. Should the need exists, foresters from the other two ranger districts also work across district boundaries to assist in meeting high priority Forest needs such as timber sale administration.</td>
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<td>Best Available Science is proving there needs to be a scientifically-based divergent, improved, specific course of action that addresses these rapid changes in all seasons – that course of action is absent in the Draft. Without a new course of action, the environment and the watershed will be put at unjustified risk.</td>
<td>See response to Letter 3a, Comment 14. A separate alternative to consider the interannual variation in weather that expresses itself over the long term as climate is unnecessary as it is incorporated into each alternative analyzed. The EA Appendix E provide an adequate description of the expected changes due to a changing climate.</td>
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<td>Intense rain events aside, currently this region is in a period of abnormally dry weather. All forests are susceptible to drought. The Androscoggin District is not responding to a rapidly changing climate in this Draft EA.</td>
<td>See response to Letter 3a, Comment 14. Even though precipitation records since 1970 show an increase in precipitation and modeled future climate indicates that average annual precipitation is likely to increase in the Northeast drought will remain a concern. As described in the references (Kunkle et al, 2013) while overall precipitation is likely to increase some models show that the there will be changes in type (snow or rain), seasonality (more winter precipitation falling as rain and increasing summer drought) as well as changes in intensity (when rain does fall it will fall in larger amounts). These changes, many of which are not expected to manifest themselves fully until mid-century or later, will be of concern for projects implemented in that period. The current “abnormally dry” conditions in the project area (US Drought monitor for October 11, 2013 <a href="http://droughtmonitor.unl.edu/Home/RegionalDroughtMonitor.aspx?northeast">http://droughtmonitor.unl.edu/Home/RegionalDroughtMonitor.aspx?northeast</a>) did not exist a year ago.</td>
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<td>One of the objections of the project is to promote a mixed age forest. The problem with that is younger trees will struggle more with erratic weather patterns and climate change itself. A study(cited by the USDA FS) in the boreal forest of Canada found that younger trees are more susceptible to the impact of climate change and drought than are older forests.</td>
<td>The boreal forests of Canada are a very different ecosystem and cannot be compared to our northern hardwood stands in the northeast. These forests are located above the 50th parallel and consist of closed-crown conifer forests that have a very short growing season. The strategy on the WMNF for dealing with climate change is to have a properly functioning and healthy ecosystem. A healthy and natural ecosystem has species and structural diversity which can buffer the forest against the susceptibility of individual components. Species are vulnerable to stressers at different stages in their life cycle and maintaining multiple age classes will help increase structural diversity across the landscape, as well as buffer vulnerability to stressors of any single age class. Monocultures and even-aged stands are often more susceptible to insect pest and disease,</td>
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<td>Not mentioned in the Draft, yet equally important is the fact that tree size matters in carbon capture. A 2015 study shows that large trees capture more efficiently than smaller trees, suggesting that they have a disproportionate effect on how forests influence global climate change.</td>
<td>many of which are likely to increase in range and severity as a result of climate change (Swanston and Janowiak, 2012). We acknowledge the work cited by the commenter, Stephenson, N.L. et al, 2014, Rate of tree carbon accumulation increases continuously with tree size, Nature Letter, Vol 507, 90–93 (06 March 2014) doi:10.1038/nature12914, accessed 09/07/2016 URL:<a href="http://www.nature.com/nature/journal/v507/n7490/full/nature12914.html">http://www.nature.com/nature/journal/v507/n7490/full/nature12914.html</a> #ref11. One of the purposes of the project is to provide for both wildlife habitat (early successional habitat) and for timber products which will likely result in the removal of some older trees from the project area, particularly in the case of those old as saw timber. Carbon storage is not a purpose of the project.</td>
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<td>The WMNF Hubbard Brook Research Station mentioned in the Draft EA conducted a simulated ice storm experiment. One hypothesis was with the loss of canopy, the soils this summer will be hotter and drier. As this Deer Ridge project involves loss of canopy including in the watershed, the results should be evaluated and taken into consideration before beginning any proposed logging.</td>
<td>The water quantity section (EA pp. 185-191) discusses basal area removals within the project area subwatersheds. Using a 25% threshold the greatest amount of removal in any of the watershed would be 16%. Based on the water analysis and best available science, any localized increase in water tables and headwater stream flow would be virtually undetectable in the mainstem of first order or larger perennial streams.</td>
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<td>Forests that are naturally complex, that is, look like their natural counterparts, are healthier by most measures. They are resistant to invasion and catastrophic disturbance. They store more carbon and they provide habitat for a wider variety of species. Complexity leads to greater flexibility in the face of an uncertain climate.</td>
<td>The purpose of the Deer Ridge project includes increasing resilience and resistance of the forested ecosystem to the effects of climate change (EA pp. 8-9). There are activities in the project that will improve the overall resiliency of the area to the likely future effects of climate change. One way that resilience may be increased is by regenerating aspen and birch which are shade intolerant species and require disturbance in order to remain present on the landscape. Maintaining a variety of tree species as well as a mix of ages is expected to minimize the vulnerability of the forest to a single disease, pest or other disturbance. Additionally there are other values being addressed by the project that may be of interest to other publics. Providing local wood into the regional timber market helps to support local communities and provide jobs from other sources than recreation and tourism. Provision of wildlife habitat for species that require early successional conditions ensures their continued presence on the landscape as well. See Wilkerson, E., Grund, S., Walberg, E., 2013. Climate Change Adaptation for Forestry in New England, Manomet Center for Conservation Sciences, Plymouth, MA. Accessed 09/09/2016 at <a href="https://www.manomet.org/sites/default/files/publications_and_tools/Forestry_fact_sheets%205-13.pdf">https://www.manomet.org/sites/default/files/publications_and_tools/Forestry_fact_sheets%205-13.pdf</a>.</td>
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<td>The US Forest Service has assumed that all soil carbon pools do not change after timber harvesting. The Draft EA goes along with this assumption yet, a 2014 study by Dartmouth College (NH) provided evidence of lower carbon pools in soils of harvested forests compared to mature forests. Harvesting forests introduces substantial changes to the ecosystem, including alterations to the soil. In the Northeast, soils account for at least 50% of total ecosystem C storage. Studies have concluded that soil disturbance lasts several decades following harvest. Again, studies have shown logging destabilizes soil, yet the Draft EA would lead one to believe what impact may occur is of a very short term.</td>
<td>We acknowledge the work of Petranko et al (2016) (Petranko, C. et al 2016, Mineral soil carbon pool responses to forest clearing in Northeastern hardwood forests, Global Climate Change Biology Bioenergy, 7, 1283–1293, doi: 10.1111/gcbb.12221 accessed 09/20/201 at <a href="http://onlinelibrary.wiley.com/doi/10.1111/gcbb.12221/epdf">http://onlinelibrary.wiley.com/doi/10.1111/gcbb.12221/epdf</a>). As stated by the authors “Our study is the first to provide evidence of a regional trend of lower soil C pools in soils of harvested hardwood forests compared to mature or pristine hardwood forests. However, measuring differences in C pools across a...</td>
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<td>broad geographic area containing forests with a wide range of carbon pools returned statistically insignificant results. &quot; Additional research and corroboration is needed before we could responsibly act on these results. We continue to monitor literature on this topic for additional insights on the issues surrounding soil carbon.</td>
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The data supplied for this is article is from two major disturbances, an intense windstorm and invasive pests and pathogens. The example used in the article is a destructive hurricane that occurred in 1938 with windthrow damage of over 3 billion board feet. After the event, a large scale salvage harvest occurred that cut damaged and sound trees (leaving stands in open-canopy conditions), burned slash and scarified soils. This Deer Ridge project is not in response to an major natural event. There was an ice storm in 1998 that caused significant damage to the Forest, of which 3,000 acres were on the Androscoggin district. Most of this damage occurred at high elevations and these areas have remained in their natural condition. There is one stand (stand ID 27) that did incur significant ice damage, and the proposed harvest would remove approximately 25-35% of most severely damaged trees while retaining some damaged trees to serve as wildlife trees and future snags. After treatment this stand will remain as a mature northern hardwood stand with closed canopy. The forest structure will remain as mature, but we anticipate improved growth rates to the midstory and additional regeneration due to additional light and space, and reduced competition. As for intense pests and pathogens outbreaks, the most dominant insect infestation is beech bark disease scale which effects approximately 90% of the beech trees in the project area. There are no preemptive silvicultural treatments proposed for this projects to combat or arrest the spread of this disease. Rather smooth bark trees will be retained in stands to preserve healthy, disease resistant beech on the landscape. All the proposed stands are located on MA 2.1 lands which have the purpose of: a) providing high quality sawtimber and other timber products on a sustained yield basis; b) provide a balanced mix of habitat for wildlife species; and c) providing a full mix of recreational opportunities. The Forest Plan was developed with extensive public input and we made the commitment to the American public to follow our Forest Plan. This includes managing MA 2.1 to meet the goals and objectives outlined in the Forest Plan and to manage for desired conditions as in proposed in the Deer Ridge project. |

| 3a 25 | Resource Management should consider leaving the forest intact after weather disturbance. According to David Foster, director of the Harvard Forest and co-author of a study that researched how forests respond after weather events: "Leaving a damaged forest intact means the original conditions recover more readily. Forests have been recovering from natural processes like windstorms, fire, and ice for millions of years. What appears to us as devastation is actually, to a forest, a quite natural and important state of affairs." |

As the Draft has acknowledged, the region is experiencing extreme weather events. The silt fencing, hay bales and water diversions mentioned on page 35 of the Draft will be woefully inadequate. Based on current monitoring, implementation of Best Management Practices and Forest Plan Standards and Guidelines are effective in addressing soil related resource concerns. |

| 3a 26 | As the Draft has acknowledged, the region is experiencing extreme weather events. The silt fencing, hay bales and water diversions mentioned on page 35 of the Draft will be woefully inadequate. |

| 3a 27 | Monitoring (pages 41-43) is the responsibility of the Timber Sale Administrator. With the amount of logging occurring in the Androscoggin District, you acknowledge help may be needed and Foresters used. What isn’t stated is in what capacity will Foresters be used as aides to the TSA. It isn’t stated if they will have the ability to suspend a project. One would assume these Foresters have duties of their own. It is not stated who will assume those duties. With the ongoing, proposed and under analysis logging projects in this Forests assist the TSA on timber sales by working with the loggers on location and size of skid trails, designating timber for removal, inspecting tree stumps for marking paints, inspecting stream crossings, inspecting skid trail conditions, monitoring residual tree damage, ensuring trails and roads are clear of logging |
Androscoggin District, it would appear the District is taking on projects it is not adequately staffed for. As the monitoring budget for the WMNF continues to decrease, the District is not adequately funded and staffed to adequately and meaningfully monitor this project at the mandated level. A substantive monitoring plan absolutely must be put in place.

debris, writing inspection reports, approving equipment cleaning, ensure protection areas and reserve trees are clearly marked in the field and acknowledged, ensures operators stay within open payment units, and ensures contract provisions and BMPs are followed. The TSA, Forest Service Representative and the Contracting Officer have the authority to suspend operations for non-compliance of the contract, safety reasons or irreparable resource damage. Timber sale administration is the top priority, other duties will still be accomplished but deadlines may be adjusted. Road work and reconstruction is supervised by the Forest engineering staff. Law enforcement according to the Region 9 Timber Theft Prevention Plan is required to participate on an active timber sale inspection with the TSA once a month. We have a staff of four permanent foresters and one forest technician which is sufficient to accomplish our core job duties. Having multiple vegetation projects in various stages of planning and implementation is typical and the number of staff to accomplish this work is appropriate. We also hire one to two forestry seasonal employees to work for four to five months in the summer and fall. Timber sale compliance and monitoring of BMPs is part of the sale administrator’s job. In 2012, regional timber management staff conducted a National Forest Timber and Log Accountability Audit on the Forest. For this district, the Orchard TS (Four Ponds EA) was selected; the findings documented that “the district was paying attention to the significant aspects of their program.” In 2014, an announced Timber and Log Accountability Audit was conducted on the Forest, finding found that “timber sales are being administrated well and inspection reports show an awareness of other resource values and a willingness to protect them, especially water quality. Forest personnel are responsive to purchaser requests and readily act on them.” In regard to Law Enforcement, findings found that “ongoing LEI presence on timber sales is excellent. Conversations with LE personnel and Sale Administrators indicate good rapport with both entities and the exchange of information along with weekly dialogue is present.” We are mandated to perform stocking surveys to ensure that stands have adequately revegetated after a harvest. Stocking surveys range from 200-400 acres per year. Funds to support monitoring activities come from income generated by timber sales as well as the regional office.

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<td>According to the Draft, non native invasive species already exist, to a limited extent, in the project area in Compartments 10 and 23. What is not stated is a monitoring schedule to assure this problem is not increased by this project allowing for a proliferation of NNIS.</td>
<td>NNIS within the project area would be controlled before any ground disturbing activities associated with implementation occur in the vicinity of the NNIS. The Forest Wide Invasive Plant Control Project includes inventory, treatment prioritization, and monitoring of treatment effectiveness of previously treated areas, including assessments of whether or not follow-up treatments are required for complete control of an infestation. Botany and other WMNF staff, partners, and volunteers routinely look for and document NNIS across the Forest, including within project areas during and after implementation.</td>
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<td>The Draft, beginning on page 64, acknowledges the potential for adverse affect on a number of species: Northern Long-eared Bat (NLEB) a Threatened Species under the ESA, little brown bat, northern bog lemmings (which are rare in New England), mayfly, boreal bedstraw, northern adder’s tongue and mountain sweet-cicely. It would appear that the risks, at any level, of moving ahead with the project at its planned scale outweigh the few stated benefits.</td>
<td>The Biological Evaluation discusses habitat requirements for bat species of concern in the Project Area and the potential effects to these species (Deer Ridge BE, Project File). This information is summarized in the EA, pp. 54-64. There are no bat species that are “highly mobile” in the Project Area during the winter.</td>
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| 3a        | 30          | As stated in the Draft, White Nose Syndrome continues to have a significant effect on bats in our region, and with the little brown bat being seriously considered for endangered listing, and the Northern long-eared bat now listed as Threatened, the impact on the bats that will be displaced in the Deer Ridge Project is well researched, yet understated. FS Region 9 states regarding bat habitat requirements: In order for successful bat reproduction and survival to occur, all required habitat components must be available in relative proximity to one another. Because some bat species migrate, and others remain highly mobile during winter months, the most critical aspect of habitat interspersion, or the mix of different habitat types, is the proximity of suitable foraging habitat to roosting habitat. The highest-quality roosting habitat is of little use if there is not adequate foraging habitat within close proximity, providing a food base. Likewise, the best foraging habitat will not support bat populations if there are no nearby suitable roosting sites. Ideal interspersion of habitat components to support bat species consists of a closely-spaced complex of open water, vegetative diversity, and suitable summer and winter roosts. The goal of the WMMF is maintain a diversity of habitat conditions for the full array of wildlife species, including bats, that inhabit the Forest during all or part of the year (Forest Plan Chapter 1, pp. 20-21, Chapter 2, pp. 13-16, 33-36) in line with the goals for Region 9. (REFERENCE: One of the goals for Region 9 for wildlife is to “Restore, maintain and enhance wildlife habitats and biological diversity in an ecosystem context. http://www.fs.usda.gov/main/r9/plants-animals/wildlife”.

See response Letter 3a Comment 29 |
| 3a        | 31          | It is stated on page 59 that stream connectivity would be unchanged with this project. Page 60 states: In general, any effects to in-stream fish habitat quality due to sedimentation that occurs in one stream, in one year, will generally be localized effects, and will be undetectable in 3-5 years after project closeout or rehabilitation. In the cumulative effects analysis area, these localized effects will be distributed in space and time, so no adverse cumulative effects are expected. Those statements are an oversimplification of the importance of stream connectivity and downstream water quality in a watershed. The 2015 EPA report scientifically connecting streams and wetlands to downstream water must be taken into full consideration regarding any tree harvesting aspect of this Deer Ridge project. Not only due to this EPA Report, but for numerous quality control reasons, and to protect the native brook trout, buffers should be increased. Perennial streams should be granted 300’ buffers and intermittent streams be granted 150’ foot buffers for this project if any tree harvesting is to occur. No harm would occur, yet the potential for harm would be decreased, by increasing the buffers. My prime reason for this request is the fact that in the Draft it appears* all streams, wetlands, groundwater seeps and vernal pools may not have yet been identified. Second, it will allow some room for human error. Third, the current role and impact of climate change or a changing climate has been acknowledged, yet understated in the Draft EA.

It is unclear why you are requesting increased buffers on streams and wetlands for the reason "it appears* all streams, wetlands, groundwater seeps and vernal pools may not have yet been identified”. The WMMF makes a reasonable effort to locate all water features both mapped by USGS and other smaller features that are not mapped, during project development, and also during project implementation. Your comment is noted but these larger buffer distances are not necessary in the White Mountain National Forest with the scale of forestry that is practiced. The WMMF has carefully considered suggestions and references provided by various commenters on the Albany South Project and prepared a more detailed response to these concerns. A white paper entitled “The scientific basis for White Mountain National Forest protection of stream structure and function: response to a call for alternative stream protections” includes a discussion of how streams are protected by implementing Forest Plan Standards and Guidelines, State Forestry Best Management Practices, Project Design Features, and project oversight. In addition, a design feature has been modified to address concerns regarding the protection of any newly identified water bodies or water bodies that are determined to have different flows than what is mapped (EA pp. 27-28). |
| 3a        | 32          | Further into the Draft it is mentioned possible unknown vernal pools, unmapped streams, etc., that will need buffers or they will be adversely affected. It is extremely difficult to believe in this entire Project Area only two vernal pools exist and/ or have been identified(page 242). What isn’t clear is who will be responsible for mapping and protecting these valuable resources once, or if, they are discovered. This leads one to the conclusion much more field work needs to be done. I request all streams, wetlands, seeps and vernal pools be mapped and shared with commenters prior to any extraction. Again, it would appear too many projects are occurring, being planned and analyzed at the same time on this Androscoggin District without adequate “boots on the ground” staffing and field work.

See response to Letter 5 Comment 23. |
| 3a        | 33          | I would like to state my objection to the lack of any supporting documents and analysis available on the internet for this project. The analysis is simply the Draft EA. The supporting documents consist of the comment letter and legal notice. A project of this size in 2016, should have supporting information available on line for commenters to review. As we conclude the comment period, there is also the absence of a Reading Room for this project.

The Forest Service will provide any document in a project record to anyone who requests it to help them better understand the project and the basis of our analyses so that they can comment in a meaningful way. Almost all our documents are in electronic form and can be mailed electronically or hard copy. |
Environmental Assessment

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| 3a         | 34          | Another concern is the timeframe listed in the current (09/01/2016) SOPA for this project. A decision is expected 4/2017 and expected implementation 5/2017. http://data.ecosystem-management.org/nepaweb/current-sopa.php?forest=110922 Yet the project detail page states: Project Milestones Last Completed Milestone: Comment Period (08/08/2016) Next Milestone: Objection Period (est. 12/01/2016) (Last Updated: 08/10/2016) The current SOPA has one set of dates, the project site another. First, I'm sure the Androscoggin District recognizes the public's right to an Appeals Process which does not exist in the current SOPA, and second, confusion such as this only reinforces the opinion that the District is attempting too many projects at one time. | On Wednesday, 27 March 2013, the U.S. Forest Service finalized new regulations to change the administrative appeal process for most activities on National Forest System lands to a pre-decisional "objection" process. Opportunities for submitting objections to project proposals are offered pursuant to 36 CFR 218. Under the new rules, those opposed to the issuance of the permit or with concerns about the National Environmental Policy Act analysis must "object" immediately following publication of the draft Decision Notice (DDN) or draft Record of Decision.

For the Deer Ridge project, only individuals or entities who submit timely and specific written comments (as defined by 36 CFR 218.2) about this proposed project during a public comment period (scoping or 30-day comment period) will be eligible to file an objection. Objections must meet the requirements of 36 CFR 218.8, and be postmarked or received within 45 days of the publication of the legal notice in the New Hampshire Union Leader, Manchester, New Hampshire. As part of the objection process, the Reviewing Officer will respond to the objections raised before the District Ranger can issue her decision. Individuals contesting the agency's decision will no longer have an opportunity to "appeal" the agency's decision. Because there will be no administrative appeal opportunity, the decision will take effect immediately upon issuance.

The SOPA includes estimated timeframes for project milestones. These projections are updated as the project develops. Under the current timeline, the Decision Official expects to issue the Final EA and DDN FONSI in January 2017 commencing the 45-day Objection period. She expects to reach a decision in May 2017 with project implementation as early as June 2017. |
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<td>3a</td>
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<td>There is an important objective to address while analyzing this project. From the Forest Service Strategic Plan FY 2015-2010: Strategic Objective A. Foster resilient, adaptive ecosystems to mitigate climate change Means and Strategies: Pg 11 states: &quot;Coordinate inventory, monitoring, and assessment activities across all lands to improve our adaptive management of natural resources&quot; One would conclude that if the above is a strategic objective of the USDA Forest Service at the national level, the starting point to achieve this (pg. 11) would be at the district level. The Androscoggin District does not look beyond the border of an HMU. Worse than that, is the dividing of an HMU after a project was approved (Four Ponds, mentioned in the Deer Ridge Draft EA) to then propose another large project (Albany South) on the newly created smaller HMU. The WMNF is the only National Forest using HMUs. I cannot find anywhere in the 2005 WMNF Forest Plan a mandate for smaller HMUs or if creating smaller HMUs is even consistent with the Forest Plan. One could assume after this Deer Ridge Project is approved, this HMU could also be cut in half to accommodate another large project as there is a total of ~6,289 acres in MA 2.1. While the Draft EA states no other projects are currently planned on the South Pond South HMU, the same was stated by the Androscoggin District in the FONSI for the Four Ponds decision.</td>
<td>The goal of the White Mountain National Forest is to sustain a healthy forest and to manage for ecosystem viability within the context of New England (Forest Plan, Chapter 1, p. 3.). This follows the mission of the Forest Service which is &quot;to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations&quot; Forest Service Strategic Plan: FY 2015-2020, 2015. Every Forest has some mechanism for ensuring that landscape-level goals and objectives are met and that habitats are distributed across the Forest in a way that is ecologically appropriate. Some Forests accomplish this through extensive standards and guidelines; others divide the Forest into many small Management Areas with unique management goals and objectives; still other Forests leave it to specialists to determine the best approach during project development and then explain their rationale in each environmental analysis. The Habitat Management Unit (HMU) framework is specific to the WMNF. Input from internal and external forestry and wildlife experts (including input from research) supported the HMU approach as a reasonable way to help the Forest achieve our habitat objectives (USDA Forest Service 2002 revised 2007). While the boundaries of these HMUs can change without a Forest Plan amendment or correction, they should remain fairly constant over the next 10-15 years (USDA Forest Service 2007, Terrestrial Habitat Document). The Forest has made some changes to the size of HMUs over time but the overall habitat objectives are the same regardless of the size of an HMU (Rowse 2015). For example, the northern hardwood is approximately 3%. If an HMU had 3,000 acres of mature northern hardwoods on MA 2.1 lands and there was no regeneration habitat, the goal would be to regenerate approximately 90 acres. If the HMU had 300 acres of mature northern hardwood on MA 2.1 lands and there was no regeneration habitat, the goal would be approximately 9 acres. The goals are adjusted based on the size of the HMU. HMUs are an analysis tool for meeting Forestwide habitat objectives that include providing a diversity of habitat conditions across the Forest. Larger HMUs were originally considered a more effective planning tool, but when the Forest began developing Integrated Resource Projects, it became apparent that some of the units were too big to adequately manage. For example, the York Pond HMU contained nearly 20,000 acres of M.A. 2.1. General Forest Management lands. Seven of the ten HMUs on the Androscoggin District were realigned in 2011 so that there was approximately 5,000 to 7,000 acres of M.A. 2.1 lands within each HMU. The resulting 13 HMUs are more manageable for development of Integrated Resource Projects.</td>
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<td>The NEPA document should include discussion of future actions to be taken by the action agency. The analysis should also incorporate information based on the planning documents of other federal agencies, and state and local governments. For example, projects included in a 5-year budget cycle might be considered likely to occur while those only occurring in 10-25 year strategic planning would be less likely and perhaps even speculative. For private actions, the analysis should use regional and local planning documents. In the absence of these plans (and to refine expectations where activities have diverged from the lands), the analysis should refer to projected development trends. In all of these cases, the best information should be used to develop scenarios that predict which future actions might reasonably be expected as a result of the proposal.</td>
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The Deer Ridge analysis, as documented in the EA and each specialist report in the project record, carefully considered and disclosed the potential for effects from all past, ongoing, and reasonably foreseeable future activities within the appropriate analysis areas. As part of their analysis, each resource specialist identified the appropriate analysis area for their resource based on the type and extent of effects from Deer Ridge and those other projects. The analysis for many resources encompasses activities on lands outside the Deer Ridge project area, including activities on surrounding private and National Forest System lands.

When considering the proper scale for analyzing cumulative effects and the factors discussed in the Bioscience article cited by one commenter, it is important to note that the Deer Ridge analysis incorporates by reference the environmental analysis for the Forest Plan. That analysis effort evaluated and disclosed the trends and status for each resource, including many wildlife species of concern across the Forest and at a more regional scale where appropriate. Forest Plan direction was developed based on that status and trend information to ensure that projects implemented in accordance with the Plan would protect resources of all types into the future. Deer Ridge is designed to be consistent with the Forest Plan. Therefore it is appropriate to limit the cumulative effects analysis for all resources to a scale at which direct and indirect effects from Deer Ridge and overlapping cumulative effects from past, ongoing, and reasonably foreseeable future actions are measurable and can be meaningfully evaluated, as discussed in the Forest Service Handbook, FSH 1909.15, Chapter 10, Section 15.

Although CEQ’s question 18 refers to indirect effects associated with projects such as land exchanges, we agree that we are required to consider all reasonably foreseeable future projects when analyzing cumulative effects. Forest Service NEPA regulations (36 CFR § 220.3) define reasonably foreseeable future actions as, """those Federal or non-Federal activities not yet undertaken, for which there are existing decisions, funding, or identified proposals. Identified proposals for Forest Service actions are described as those where “The Forest Service has a goal and is actively preparing to make a decision on one or more alternative means of accomplishing that goal and the effects can be meaningfully evaluated (see 40 CFR 1508.23).” [36 CFR § 220.4(a)(1)]. The analysis for Deer Ridge considered all such projects in the analysis areas identified for each resource. The interdisciplinary team used the best available information from local towns to identify projects that are likely to occur on surrounding private lands and gather enough information about them to meaningfully evaluate the potential for cumulative effects. Appendix C of the EA identifies 27 past, ongoing, and future projects on and off the National Forest that were considered by resource specialists and the Responsible Official, including seven six reasonably foreseeable future actions."""
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<td>For the reasons stated above, I can only support Alternative 1 (with the exception of adding parking at the Unknown Pond Trailhead) at this time. More field work obviously needs to be done and the Androscoggin District needs to analyze its monitoring plan as it puts forth multiple projects.</td>
<td>Personal values and opinion - identifying a preference for an alternative.</td>
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<td>There is inadequate cumulative impact analysis: A scientifically sound, credible Cumulative Effects Analysis (CEA) of the cumulative effect, as defined by National Environmental Policy Act (NEPA), should be conducted not just for the Deer Ridge Area, but at the larger geographical scale to capture the effects of multiple actions to meet the intent and legal requirements of both NEPA and the National Forest Management Act (NFMA). Limiting the CEA to just this project is insufficient to determine impact over time and space. Court decisions have generally concluded that reasonably foreseeable future actions need to be considered even if they are not specific proposals.</td>
<td>See response Letter 3a comment 36</td>
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<td>HMUs are areas of Forest land in which habitat composition and age class objectives are established to help ensure that habitats are well-distributed across the Forest (Forest Plan, pp. 1-21, 12). The results from an analysis of the South Pond South HMU were integrated into the development of the Deer Ridge project to help ensure a connection between WMNF landscape level goals and objectives and project-level ecological conditions. (pg.12 Draft EA) Yet, Cumulative Effects with multiple other past or imminently foreseeable project activities are not and have not been properly analyzed and disclosed regarding this Deer Ridge Project.</td>
<td>The wildlife resources cumulative effects analysis area includes all National Forest system lands in the South Pond South HMU, totaling approximately 9,000 acres. This analysis area boundary was used because it: This cumulative effects analysis area is the South Pond South HMU. This area was chosen because; 1) the habitat objectives for the South Pond South HMU provides a measurable assessment of how the Proposed Action contribute to the habitat objectives of the White Mountain National Forest, as defined in the 2005 Forest Plan. It also is large enough to cover the home ranges of both wildlife and plant species as well as addressing habitat connectivity and travel and migration corridors of some of the species discussed in this document. This area also considers habitat diversity at the landscape level as well as considering recent or proposed projects in the vicinity of the Project Area that may affect habitat diversity. We considered adjacent private land to this HMU and determined that there were no management activities in this area that would affect specific HMU objectives. Oftentimes the cumulative effects analysis area exceeds what is necessary for a species that has a limited home range or very specific habitat criteria. However, it encompasses effects on species with smaller home ranges as well as species that occupy larger areas in a wider array of habitat types.</td>
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<td>Furthermore, the WMNF has chosen to use Habitat Management Units for planning. Information about status and trend of wildlife habitat is important for the U.S. Forest Service to accomplish its mission and meet its legal requirements. HMUs range from roughly 6,000 to 49,000 acres in size. While the boundaries of these HMUs can change without a Forest Plan amendment or correction, they should remain fairly constant over the next 10-15 years. There is no mention in the Draft EA that this HMU was once part of a larger HMU, and that in the past decade other projects occurred on the original HMU, specifically the Mill Brook Project and the North Kilkenny Project. Even if those projects were not part of the original HMU, they need to be discussed while analyzing this Deer Ridge Project, as do other WMNF projects in the District as well as non WMNF projects in the area.</td>
<td>See Response to Letter 3a Comment 35 and 39. The Mill Brook Timber Sale is in the Mill Brook HMU which is adjacent to the South Pond North HMU. The South Pond HMU was split into two HMUs in 2011, South Pond North and South Pond South for the reasons described in Letter 3a Comment 35. The North Kilkenny Vegetation Management Project was in the northern portion of the South Pond HMU which became South Pond North. The effects of both of these sales are analyzed in the cumulative effects analysis of the Mill Brook Vegetation Management Project and they are within the habitat goals of these HMUs (Mill Brook Wildlife Report, Project File). Neither of these sales occur in the South Pond South HMU and therefore had no effect on the proposed habitat goals in this area.</td>
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<td>The Draft EA implies in the scheme of things the Deer Ridge Project is a mere temporary drop in the bucket, yet The Forest Service states in 2013 research : “A combination of human disturbances typically operates simultaneously on a given landscape, with combined effects that can affect emphasis species and their habitats in ways that may exceed or differ from effects of the individual disturbance agents (Paine et al. 1998). As a consequence, an additional and often highly effective step in the monitoring process is to evaluate the combined effects of the individual disturbances that disturbances is important because the results can be used to further inform management direction or prompt changes in direction, owing to unexpected outcomes that are not apparent from estimating effects from individual disturbances. For each example, we also address how projected effects of climate change may be considered as an additional, interactive disturbance factor with that of the human disturbance being monitored. We introduce and highlight climate change in this manner because it potentially interacts with all other human disturbances and effects, or it can override other disturbances and effects. Thus, consideration of potential effects of climate change provides important context for all other types of human disturbance monitoring in relation to emphasis species and habitats and associated management objectives.”</td>
<td>We acknowledge the validity of the statements taken from IWO GTR89. In 2016 the White Mountain National Forest updated its monitoring guide to further improve our ability to detect important changes on the landscape. This larger landscape scale monitoring compliments project scale monitoring which seeks to understand how individual projects are implemented and the affects they might have on multiple aspects of the natural and human environment.</td>
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<td>What is being proposed in the Draft EA, the timber harvesting for any of the goals, will further harm conditions for wildlife both in the long and short term. What remains of a wildlife habitat will be much less intact. The goal of wildlife habitat improvement is to provide the habitat needs of wildlife in a given area. This reduces the land area necessary to support an individual or group and thereby increases the number of individuals the land can carry. Most frequently it is not the quantity of any one habitat component that limits wildlife numbers, but the spatial arrangement to the other requirements in the area. Larger quantities of food, cover or water may be unused by a particular animal because they are spaced too far apart from the other requirements. Wild animals must have food. But they also must have cover to escape from danger and to feel secure. If we provide food and neglect cover needs, animals may never use the food, or if they do, will be eaten themselves. A clearcut forest can provide abundant food sources for some wildlife, but it may never be used if sufficient forest is not present for escape cover. Forested corridors at least 100 yards wide through clearcuts are needed for security and will be used as travel routes that link disconnected cover blocks. If an animal spends an excessive amount of time traveling to obtain all of its life requirements, its survival is jeopardized. There is increased risk of predation.</td>
<td>All of the wildlife habitat requirements you discuss in this comment were considered when developing the goals for wildlife habitat management in the Forest Plan (Forest Plan Chapter 1, pp. 20-21, Chapter 2, pp. 13-16, 33-36). The role of the White Mountain National Forest is to maintain the ecological components of the National Forest land base within the larger New England landscape. The White Mountain National Forest developed a wildlife strategy to achieve this goals. The rationale for our habitat goals are outlined in the WMNF Ecological Approach (USDA Forest Service 2002, revised 2007). The wildlife strategy was developed based on research that indicated that a diversity of forest types and age classes is needed to provide the habitat needs for the full array of wildlife species that inhabit the White Mountain National Forest (DeGraaf and Rudis 2001). Habitat management defined in the wildlife strategy occurs on lands within the White Mountain National Forest as the U.S. Forest Service only has jurisdiction to affect forest composition and age class within this land area.</td>
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<td>There is insufficient empirical data to support analysis that there is an actual problem, other than the parking situation, and if there is, this is how it is resolved. Specific objectives, not a generic statement, should be made clear as to why this entire Project is a priority and a necessity particularly without an understanding of the successes and failures of the nearby resource management projects.</td>
<td>See response Letter 5 Comment 2.</td>
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<td>According to some field notes, the Four Ponds Project (mentioned in the Deer Ridge Draft EA) has not been successful in regenerating oak. Why plan on removing any beech, a source of food for wildlife, to grow oak when it appears that has not been successful. The Albany South IRMP Vegetation Field Notes bring up some issues not acknowledged in the Deer Ridge Draft EA - Page 6 7/26/11: “Is the WMNF wasting time trying to grow oak without chemicals” Page 7: “Is the Forest capable of growing high quality oak without heavy disturbance. Best oak sites at 4 Ponds still did not regenerate oak. Where should we be growing oak? Where should we grow oak? Research how best to establish oak.” There should be specific standards as opposed to the “desired conditions”. Let's look at the very many risks involved vs. the benefits that may be gained. Evidence has not been amassed indicating whether silvicultural projects in the area have been successful. By all appearances, the Androscoggin District is moving much too quickly in the planning of projects without the proper analysis of the success or failure of previous projects.</td>
<td>See response to Letter 5 Comment 13.</td>
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<td>Forest Service documents acknowledge the importance of the role climate change must play in forest management. There are no specifics in the Draft EA that lead one to the conclusion that the forest is being managed with climate change being such an important factor and particularly how large the impact of cumulative effects are on the managed environment.</td>
<td>The purpose of the Deer Ridge Project, including addressing a changing climate, is described throughout Chapter 1 of the EA (pp. 1-2, 4-15). This description includes the link between the Deer Ridge project and the 2005 Forest Plan. The Forest Plan provides overall direction for the management of the WMNF and ensures consistency with laws and regulations in effect at the time the plan was approved. Mitigating climate change is not one of the purposes of the 2005 Forest plan though there are aspects of the management approach that have resulted in the WMNF being an overall carbon sink while still providing multiple benefits to the local and regional economy and providing for clean water and wildlife habitat. The carbon dynamics report, contained in the project record, describes the carbon sink effect on the WMNF in greater detail.</td>
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<td>As part of the Ammonoosuc River in this project area is classified as scenic and part classified as recreational and the proposed Deer Ridge Project calls for an additional harvest of ~ 270 acres in the Kilkenny IRA, an Alternative 3 should absolutely been put forward eliminating harvesting in these areas. As stated in my original comments, Alternative 1 is just used as a baseline, and therefore only one alternative was put forth for public comment. I am requesting you eliminate harvesting in the IRA and areas of impact on the Ammonoosuc River or that you amend the Draft EA and take public comments on a third Alternative eliminating harvesting in the Kilkenny IRA and eliminating direct and indirect effects to the designated areas of the Ammonoosuc River. An alternative that would eliminate harvesting in the Kilkenny 2005 Forest Plan Inventoried area and the Upper Ammonoosuc and West Branch of the Upper Ammonoosuc River eligible Wild and Scenic River corridors were fully considered, but was not analyzed in detail. The rational for dismissing this alternative is presented in Chapter 2 of the EA (p. 36) and is addressed in the Draft Decision Notice / Finding of No Significant Impact. The District Ranger considered information in the EA and the project record, including all public comments, and determined that the analysis of effects for Alternatives 1 (No Action) and 2 (Proposed Action) provided her with enough information to decide whether to implement Alternative 2 as proposed, to modify the proposed action by eliminating harvesting in the Kilkenny inventoried roadless area and/or the eligible wild and scenic river corridors, or to not implement the project.</td>
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