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Boyden Brook Road Decommission, Watershed Restoration, and Trail Relocation Project

Final Environmental Assessment

Green Mountain National Forest
Rochester Ranger District
Town of Hancock
Addison County, Vermont



Boyden Brook Road and Trail Damage

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Chapter 1 – Purpose and Need

Introduction

The USDA Forest Service is proposing to implement management activities (proposed action) on the Green Mountain National Forest (GMNF) collectively named the Boyden Brook Road Decommission, Watershed Restoration, and Trail Relocation Project (Boyden Brook Project).

The proposed action includes a variety of management activities to achieve multiple resource benefits as provided by direction in the 2006 GMNF Land and Resource Management Plan. The proposal includes activities to decommission road and trail infrastructure, and improve and maintain watershed health. Although the initial proposal included activities to re-establish snowmobile recreation opportunities in response to multiple flooding events, these activities have been removed from the proposed action as a result of public response received during the preliminary environmental assessment 30-day comment period.

An interdisciplinary team (IDT) of Forest Service resource specialists prepared this environmental assessment (EA) to determine whether implementation of the Boyden Brook Project may significantly affect the quality of the human environment and thereby require the preparation of an environmental impact statement. By preparing this EA, we are fulfilling federal and agency regulations to comply with the National Environmental Policy Act (NEPA).

Project Location

The Boyden Brook Project is located on National Forest System (NFS) lands on the Rochester Ranger District within the Town of Hancock, Addison County, Vermont (see Figure 1).

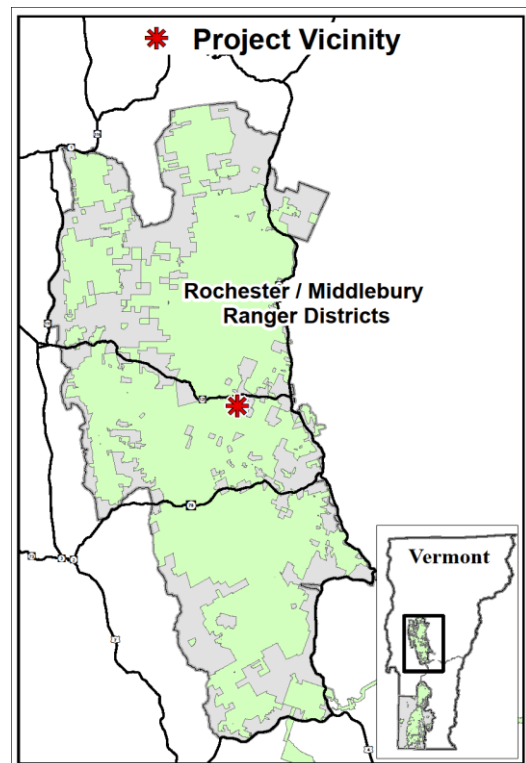
Background

The Boyden Brook Road (Forest Road (FR) 49) runs concurrently with the Boyden Brook Trail (Forest Trail (FT) 749) from the intersection with Vermont State Highway 125 (VT 125) to the southeast for 2.7 miles. See the Proposed Management Activities Map for detailed information regarding the Boyden Brook project area.

Within the past five years, the GMNF has suffered damage to watersheds and infrastructure as a result of multiple storm incidents. On August 6, 2008, a slow-moving storm produced record rainfall amounts of up to 7 inches causing flooding that damaged roads, bridges, and trails throughout the Rochester and Middlebury Ranger Districts. Likewise, Tropical Storm Irene swept through New England on August 28, 2011, bringing substantial rain over a short time period causing widespread road and trail damage in the area.

Boyden Brook and its tributaries swelled during the initial storm event, carrying wood and boulders downstream, scouring streambanks, and

Figure 1. Vicinity map



overwhelming culverts. In some places, the intensity of the rain caused extensive erosion of roads and trails, including FR 49/FT 749. The 2008 storm resulted in the closure of FR 49/FT 749 to reduce risks to public health and safety. Repair of the road and trail began in the fall of 2010 with an expected completion date of November, 2011. Initial repairs, including reconstruction of the road bed and slope, the installation of a retaining wall, and the replacement of a washed out culvert were disrupted when Tropical Storm Irene further impacted the site. Additional washouts and landslides, as well as the failure of the newly repaired slope, required the extended closure of FR 49/FT 749.

Prior to its closure, FR 49 was a dead-end road that provided access for Forest Service management activities in the Boyden Brook area. A road gate prohibited vehicle access past milepost 1.8 year-round although foot access was welcome and often used during hunting season. The road was closed to all vehicle traffic other than snowmobile use seasonally from April to December past a gate at milepost 0.1. A gate now blocks access to the road year-round at milepost 0.1.

The Forest Service maintains a snowmobile trail network to the north and south of the project area in partnership with the local Vermont Association of Snow Travelers (VAST) snowmobile club, the Route 100 Snow Travelers. Prior to its closure, the Boyden Brook Trail was managed as a groomed snowmobile trail connecting the Texas Gap Trail (FT 739) to the north with the Swan's Mill Trail (FT 764) to the south. The Texas Gap Trail runs north from VT 125 along the Texas Falls Road (FR 39). This portion of FT 739 is also closed up to the existing snowmobile parking area located approximately 0.9 north of VT 125 due to the loss of trail connectivity with FT 749. Snowmobiles traveled the shoulder along VT 125 from the northern terminus of FT 749 and crossed the highway where visibility is restricted. Snowmobiles then traveled on the plowed surface of FR 39 mixing with motorized vehicles.

The snowmobile network in the Texas Gap and Boyden Brook areas is popular with riders. Known for receiving early season snow and "holding" snow late in the season, the trail network is a destination location for snowmobile recreation opportunities. The snowmobile parking lot maintained on Texas Falls Road provides access to a large loop snowmobile trail system north of VT 125. The loop trail emanates from the Texas Falls Road (FR 39) parking lot approximately 0.9 miles from VT 125 and traveling north to the Fassett Hill Trail (FT 791), Taylor Brook Trail (FT 700), through the Granville area, and then back south along the Texas Gap Trail. The Boyden Brook Trail provided the only connection in the upper White River valley between this loop trail system to the north and the snowmobile network to the south. This connectivity enabled riders to park at Texas Gap and access services (gas and food) in the Towns of Hancock and Rochester. The connection also enabled the Route 100 Snow Travelers to continuously groom the Rochester, Hancock and Granville snowmobile trail network.

Forest Plan Direction

The Boyden Brook Project is guided by management direction provided in the 2006 GMNF Land and Resource Management Plan (Forest Plan). The Forest Plan is a programmatic document that provides the desired balance of multiple uses to meet society's needs while protecting, restoring, and enhancing our natural resources. This EA is tiered (40 CFR 1508.28) to the Record of Decision and Final Environmental Impact Statement for the Forest Plan. Information and analysis in those programmatic documents that applies to this project-level analysis is incorporated by reference into this EA.

The Boyden Brook Project is located within the Diverse Forest Use (north of VT 125), Diverse Backcountry (south of VT 125), and Ecological Special Areas (Texas Falls Area east along FR

39) Management Areas (MAs). The management emphasis and desired future condition for these MAs are provided by Forest Plan direction (Forest Plan, pp. 47-48, pp. 58-59, and pp. 94-97, respectively).

Purpose and Need for Action

The purpose and need for this proposed action is to address resource damage along washed out sections of Boyden Brook Road and Trail (FR 49 and FT 749) that resulted from the 2008 and Tropical Storm Irene storm events. Specifically, there is a desire to:

- Restore the ecological processes within the Boyden Brook drainage to improve watershed health
- Restore safe snowmobile recreation opportunities within the area

The proposal would implement key Forest-wide management goals and objectives provided by the Forest Plan:

- Goal 4: “Maintain or restore aquatic, fisheries, riparian and wetland habitats” (Forest Plan, p. 13);
- Goal 12: “Provide a diverse range of high-quality, sustainable recreation opportunities that complement those provided off National Forest System lands” (Forest Plan, p. 15);
- Goal 12, Objective 8: “Reduce the total deferred maintenance on the GMNF trail system” (Forest Plan, p. 15); and
- Goal 14: “Provide a safe, efficient, and effective Forest transportation system that meets both the needs of the Forest Service and public” (Forest Plan, p. 16).

Watershed Health

The Boyden Brook drainage contains steep embankments with areas of exposed bedrock or ledge. The site consists of numerous perennial streams and seeps that flow from the steep embankments and feed into Boyden Brook which in turn feeds the Hancock Branch tributary of the White River. The numerous drainages combined with the site’s steep terrain and shallow soils, creates slope instability throughout the drainage area.

The Boyden Brook Road was designed and built to engineering and hydraulic standards; however, these standards did not account for storms of the magnitude seen in 2008 and 2011. The road contains multiple culverts that are not large enough to allow such high water levels to flow properly. In addition, some culverts are poorly located, making it difficult for fish and other aquatic species to move upstream. There are five sections along FR 49 where road infrastructure was substantially damaged from the storm events including landslides and culvert washouts. Ongoing soil erosion and sedimentation is degrading water quality and reducing natural ecosystem functions of the Boyden Brook drainage and related watershed.

There is a desire to decommission (remove from the transportation system) FR 49 and by association FT 749, because of the extensive damage caused by the storms and the unstable soils along the roadway. Restoration work is desired to restore natural hydrology and aquatic species movement in the Boyden Brook drainage area. The high cost of work to repair FR 49 to improve storm resiliency and provide adequate aquatic organism passage, in relation to the level of use the road receives, further emphasizes the desire for decommissioning the road.

Snowmobile Recreation Opportunities

It is desired to restore the north-south connectivity in the Boyden Brook area between the Towns of Hancock, Granville and Rochester and the larger State-wide snowmobile system managed in partnership with VAST. Prior to its closure, the 3.7 mile Boyden Brook Trail (FT

749) provided a snowmobile trail connection between the loop trail system to the north and the trail system to the south. This connectivity enabled riders to park at Texas Falls Road parking area and access services such as gas and food in the Towns of Granville, Hancock and Rochester where local businesses benefited from their patronage. The closest alternate north-south trail connection between these areas exists via the Braintree Gap/Bethel snowmobile network (VAST Corridors 100 and 12) in the next valley to the east. This alternate route requires traveling approximately 45 additional miles for riders to connect from the Texas Gap Trail to the Hancock/Rochester area via the Swan's Mill Trail (FT 764). This route also travels at lower elevations and at times provides intermittent connectivity due to inconsistent snow coverage. The existing Boyden Brook Trail route runs concurrently with FR 49 that has been found to be an unstable location in terms of protection of the soil, water and aquatic resources. Recognizing the instability of the current route and the high cost for maintenance, it is desired to move FT 749 to a more sustainable location.

Prior to the closure of FT 749, continuous grooming of trails was possible between the northern and southern trail networks (see the Project Activities Map). Since its closure, grooming operations have been intermittent or suspended on portions of the trail network when the groomer could not be trailered between the severed trail segments. Currently, Fassett Hill Trail (FT 791) is a designated Class 4 snowmobile trail although portions do not meet this standard for clearing widths, and therefore prevent groomer access to maintain the trail tread. The Taylor Brook Trail (FT 700 and coinciding with FR 100) is maintained as a Class 4 trail from the intersection with Fassett Hill Road (and FT 791) east for approximately 3.2 miles where it continues northeast to the Granville area as a Class 2 snowmobile trail. Portions of the Class 2 trail section are not wide enough to enable grooming equipment access to the Texas Gap area to maintain the snowmobile trail system that is currently groomed.

Ungroomed trail portions can become unsafe for travel when the trail surface is not maintained to standard and hazards are not removed, such as blown down trees. There is a desire to restore trail connectivity to allow grooming access between the north and south trail systems to provide safer recreation opportunities on NFS and adjacent private lands. Groomed trails increase rider safety by providing ongoing maintenance reviews, ensuring removal of trail obstructions (such as fallen trees), ensuring updated signage, and maintaining a more consistent trail surface.

There is also a desire to address the public safety issue associated with the snowmobile trail crossing of VT 125. The Forest Service has long attempted to find alternative routes to improve the safety of the trail connection between the Boyden Brook (FT 749) and Texas Gap (FT 739) Trails. In the Engineering Report for Motorized Mixed Use (Kamb, 2009), FT 739 was identified as having a highway crossing and motorized mixed use inconsistent with State and local laws. The current route requires cars and snowmobiles to share VT 125 and the Texas Falls Road (FR 39) to milepost 0.9 at the snowmobile parking area. Snowmobiles travel the narrow shoulder along VT 125 and cross the highway where visibility is restricted before turning onto the plowed surface of FR 39 with motorized vehicles. State law prohibits snowmobiles on highways being maintained for use by automobiles during the snow season; unless they are not closer than five feet from the plowed portion of the highway, are crossing at 90 degrees to the direction of the highway, or if the highway has been opened to snowmobile travel by the local governing body (Vermont Statutes Title 23, Chapter 29, Subchapter 01, part 3206). Hancock does not have a local ordinance in place opening FR 39 to snowmobile traffic. The engineering report concluded that mitigation was necessary to reduce the level of risk associated with the probability and severity of crashes. Due to private landowner access restrictions as well as steep, challenging terrain and adjacent wilderness boundaries, a solution was never found to address the safety concerns associated with the unsafe highway crossing and mixed motorized

use.

Public Involvement

Formal public involvement for the Boyden Brook Project was initiated by the public distribution of the Scoping Notice document dated March 21, 2013 that was sent to a list of individuals, organizations, towns and agencies that were identified to be either interested in or affected by the proposed action. The scoping information was made available at this same time on the GMNF website at:

http://data.ecosystem-management.org/nepaweb/nepa_project_exp.php?project=41633

The project was also listed in the quarterly GMNF Schedule of Proposed Actions beginning in April 2013.

A total of 15 comment responses were received for the proposal as described in the March 2013 scoping document. How the comments were categorized into issues and used to prepare the Boyden Brook Project preliminary EA can be found in the *Boyden Brook Road Decommission, Watershed Restoration, and Trail Relocation Project Scoping Comments: Content Analysis and Response to Comments* document dated April 2014.

The *Boyden Brook Road Decommission, Watershed Restoration, and Trail Relocation Project Preliminary EA* was publicly distributed to a list of individuals, organizations, towns and agencies for a 30-day notice and comment period from May 2 to June 2, 2014. Just two comment responses were received. Review and consideration of these comments were an important basis for preparing the Boyden Brook Project Final EA.

CFR 218 Pre-Decisional Objection Process

Recent rulemaking in 2013 replaced the post-decisional appeals process in place since 2003 (36 CFR 215) with a pre-decisional objection process (36 CFR 218) for EA level NEPA decisions. Rather than being able to file an “appeal” and seek higher-level administrative review of unresolved concerns after a project decision has been made, those who are eligible will now be able to file an “objection” and seek that review while the project decision is still in draft status.

The 36 CFR 218 regulations state that in order to be eligible to object under the Objections process, you will need to submit timely “specific written comments” (36 CFR 218.2) during any period “designated for public comment” (36 CFR 218.5(a)). The following public opportunities to submit written comments have been provided for this project:

- 1) Scoping Period: Comments submitted during the scoping period through April 20, 2013 initiated by the March 21, 2013 Scoping Notice have helped determine issues specific to the proposed project that were used to focus the environmental analysis for the resources of concern. The analysis has been documented in the preliminary EA.
- 2) 30-Day Notice and Comment Period: Comments submitted during the formal 30-day notice and comment period for the preliminary EA (May 2 to June 2, 2014) were used to identify additional issues with the proposal or associated environmental analysis. Resulting changes to the analysis have been documented in this final EA. The 30-day notice and comment period was triggered by the publication of a legal notice in our newspaper of record, the *Rutland Herald*, on May 1, 2014.

Issues

An issue is defined as a disagreement or dispute regarding anticipated resource effects resulting from implementing the proposed action. Issues are usually identified based on comments from the public or other agencies. Occasionally issues arise within the Forest Service IDT if the concerns of all resources cannot be addressed in the proposal. For purposes of developing this EA, issues have been separated into two categories:

- 1) ***Issues that remain unresolved and need to be addressed with the development of an alternative(s) and/or mitigation measure(s).*** Alternatives provide a clear difference in environmental effects associated with the unresolved issue. Unresolved issues meet the intent of the Council for Environmental Quality (CEQ) NEPA regulations at 40 CFR 1500.1(b) and 1500.4(g). These issues help to focus the environmental effects analysis on the relevant resources of concern in the EA.
- 2) ***Issues that are not addressed in the environmental analysis or are only briefly discussed.*** The CEQ NEPA regulations at 40 CFR 1501.7(a)(3) allow for issues to not be included in the analysis or can be briefly discussed if they are: a) outside the scope of the proposed action; b) already decided by law, regulation, Forest Plan, or other higher level decision; c) irrelevant to the decision to be made; or d) conjectural and not supported by scientific or factual evidence.

Issue statements have been developed from public comments that describe a clear cause and effect relationship between the proposed management activities and some resource consequence. There was only one unresolved issue that was identified from public comments received during the initial scoping period that has been addressed with the development of mitigation measures (see Chapter 2):

Private Land Access: Decommissioning FR 49 will block vehicular access to the private land inholding located south of the existing closure gate.

An additional unresolved issue was identified from public comments received during the Boyden Brook Project preliminary EA 30-day comment period:

Trail Relocation and Bridge Crossing on Private Land: The trail and associated bridge cannot be constructed on the private land along VT 125 as proposed, because of landowner concerns associated with stream bank unsustainability, damage to property during construction, tax and personal injury liability, and removal of trees.

This issue has been addressed by removing the relocation of the Boyden Brook Trail (FT 749) from the proposed action at this time and will not be addressed in this EA (see Chapter 2).

Decision Framework

The District Ranger for the Rochester and Middlebury Ranger Districts is the Responsible Official for decisions to be made for the Boyden Brook Project. The main decision to be made by the Responsible Official is whether to implement management activities as proposed (proposed action) or an alternative. The Responsible Official will review the anticipated effects of the alternatives as provided in this EA and supporting documentation prior to making a decision.

If comments meeting the requirements for objection standing are received, the Responsible Official will publicly distribute the Final EA and a Draft DN and FONSI during a 45-day objection period. Anyone who submitted timely specific written comments during the designated opportunities for public comment will be eligible to file objections. Assuming objections are resolved, the Responsible Official will be able to sign the Final DN and FONSI and then implementation may begin.

Chapter 2 – Description of Alternatives

Alternative development was considered by the Forest Service IDT and the Responsible Official to address the unresolved issues discussed in Chapter 1 (Private Land Access; and Trail Relocation and Bridge Crossing on Private Land). These issues have been addressed with mitigation measures and/or changes to the proposed action thus there have been no other action alternatives developed for this EA.

This chapter provides the description of the two alternatives that have been carried forward for detailed analysis: 1) No Action; and 2) Proposed Action.

No Action

The no action alternative provides a baseline to compare the environmental effects from the proposed action alternative. There would be no implementation of any of the management activities associated with the proposed action under this alternative.

Proposed Action

The activities under this alternative are proposed to meet the purpose and need for the Boyden Brook Project as provided in the March 2013 Scoping Notice document. The following modifications to the proposed action have been made to address unresolved issues discussed in Chapter 1:

- Private Land Access – Mitigation measures have been incorporated into the proposed action to address public comments related to private land access along Boyden Brook Road (FR 49) south of the existing closure gate.
- Trail Relocation and Bridge Crossing on Private Land – All activities proposed to relocate the Boyden Brook Trail (FT 749) on NFS and non-NFS lands have been removed from the proposed action as a result of private landowner concerns and subsequent decision to not allow the trail and bridge crossing at Hancock Branch to be located on their property along VT 125. Additionally, the improvements to FT 700 are no longer necessary because they were designed to be dependent on the re-establishment of the north-south trail corridor as described in Chapter 1.

The loss of this segment of trail that includes the bridge crossing of Hancock Branch renders the entire trail relocation as proposed to be no longer possible. The limited opportunities to provide safe crossings of VT 125, steep and wet terrain in this area, and multiple landowner concurrence that is needed have prevented a suitable alternate route to be identified at this time. Although the local VAST club members have found a tentative alternative trail location further east of the original proposed route, the detailed information needed for it to be considered a sustainable route over the long-term has not yet been available. If this route or any other alternative trail location is found to be satisfactory to all jurisdictional parties (Forest Service, VT Department of Transportation, Town of Hancock, and private landowners), the proposal will be considered and analyzed as a separate project.

The activities to be removed from the proposed action include the following:

- Relocate FT 749 to a more sustainable route east of its current location requiring 0.6 mile on NFS lands and 1.3 miles on private lands for a total of 1.9 miles.
- Complete trail improvements to 1.5 miles of the Taylor Brook Trail (FT 700) to bring

it to a Class 4 trail standard.

Management activities included in the proposed action would be anticipated for implementation beginning in late spring 2015. All activities are designed to be consistent with Forest Plan Forest-wide and Management Area Standards and Guidelines (S&Gs) while moving the existing resource conditions towards the goals, objectives and desired future conditions provided in the Forest Plan. Mitigation measures have also been developed as part of the proposed action alternative to address resource concerns associated with the proposal (Appendix A). Refer to the Proposed Management Activities Map for specific locations of proposed activities.

In summary, the proposed action would include the following activities (all mile lengths are approximated):

- Conduct restoration activities to address five sections along Boyden Brook Road and Trail (FR 49/FT 749) within the Boyden Brook drainage to improve the ecological processes of the watershed resource.
- Decommission (removal from the transportation system) 2.6 miles of FR 49, beginning at the existing gate at milepost 0.1.
- Provide private land access along the road for 0.1 mile south of the existing gate (from milepost 0.1 to milepost 0.2) through a special use permit.
- Decommission 2.4 miles of FT 749 from a location north of Swan's Mill Trail (FT 764) to VT 125.
- Decommission 0.8 miles of Texas Gap Trail (FT 739) between VT 125 and the Texas Falls Picnic Site toilets.

Boyden Brook Road/Trail Decommission and Watershed Restoration

The proposed action would decommission FR 49, beginning at the existing road gate at mile post 0.1 to its southern terminus. Decommissioning of the road would result in the administrative removal of approximately 2.6 miles of road from the National Forest transportation system. The road would be physically closed to all vehicle access except for 0.1 mile just south of the existing gate to allow for private inholding access that would be authorized with a special use permit. Restoration activities would mitigate future resource damage. A 2.4 mile portion of the Boyden Brook Trail (FT 749) would also be decommissioned in this vicinity from a location north of its intersection with the Swan's Mill Trail (FT 764) to VT 125.

Restoration activities within the Boyden Brook drainage would be conducted along five sections of damaged roadway to improve the ecological processes of the watershed resource (see Project Activities Map inset). Streams and drainages that cross the damaged sections of road would be restored to a more natural gradient and form. All culverts along and crossing the road would be removed. Stream banks, altered to support culvert placement, would be restored to more natural locations and stabilized. Road decommissioning and watershed restoration activities would be conducted using machinery conducive to this level of work. The proposal includes the following activities:

- Remove existing culverts from the road template. There are currently 34 culverts, ranging in size from 18 inches to 6 feet in diameter, which would be pulled from under the road bed and disposed of off-site.
- Excavation of rolling dip drainage structures along the road bed to mitigate future erosion problems that could lead to soil loss and sedimentation of the Boyden Brook and associated streams and drainages.
- Install grade control structures within the stream channel, adjacent to where major

washouts have occurred, to prevent stream head cutting and sedimentation within the Boyden Brook. These activities could include the construction of boulder stream vanes, the reshaping of stream banks, and the placement of large woody debris (LWD) to shield the bottom toe of the slopes adjacent to where culverts would be removed.

- Retention of the first approximate 0.1 mile of FR 49 on the National Forest transportation system beginning at the intersection of FR 49 with VT 125 to the existing road gate.
- Provide reasonable access to a private land inholding that would be authorized through a special use permit along a 0.1 mile section of the road just south from the existing gate. Although remaining open to private vehicular use, this portion of the road would no longer be part of the National Forest transportation system and would be maintained by the private landowner. The road would be blocked with a boulder barrier just south of where the private land access route diverts to the west. The boulders would have a natural appearance that blends into the surrounding landscape.
- Scarification of approximately 2.5 miles of road surface to encourage revegetation in areas that are not already naturally revegetating. Scarification would begin south of the gate at milepost 0.2.
- Plant native shrubs and trees as specified in a silvicultural prescription to enhance revegetation for approximately 1.0 mile of road, starting south of the gate at milepost 0.2. From approximate milepost 1.1 to milepost 2.7, the road/trail tread would not be seeded except through natural processes.
- Remove the existing steel gate at milepost 1.8.
- Retain the existing gate at milepost 0.1.

Two existing Rights-Of-Way (ROWs) that cross private land along FR 49 currently provide public access to NFS land in the Boyden Brook area. The Forest Service would retain these easements to provide access for potential future management needs. The first ROW begins at VT 125 and travels 200 feet south on FR 49. The second ROW travels approximately 1,617 feet across the private parcel located at the southern end of FR 49.

The proposed action includes the decommissioning of approximately 2.4 miles of the existing FT 749 from a location north of its intersection with Swan's Mill Trail (FT 764) to VT 125. Approximately 0.8 mile of the Texas Gap Trail (FT 739) would also be decommissioned from VT 125 to the Texas Falls Picnic Site toilets located to the north on Texas Falls Road (FR 39). The trail decommissioning would eliminate the unsafe crossing point along VT 125 that is not in accordance with Vermont Statutes for motor vehicles (Title 23, Chapter 29, Subchapter 01, part 3206). It would also eliminate most mixed motorized use of vehicle and snowmobile traffic along VT 125 and FR 39 (short section of FT 39 would still share FR 39 between the Texas Falls Picnic Area toilets and the snowmobile parking lot to the north).

Alternatives Considered but Eliminated from Detailed Study

The Forest Service IDT and Responsible Official discussed the project proposal and considered the following alternatives while developing the proposed action or in response to public comments received during the scoping process. None of these are included for detailed analysis in the Final EA.

1) Reconstruction of Boyden Brook Road and Trail within the Existing Footprint

This alternative would reconstruct damaged sections of the 2.7 mile stretch of FR 49/FT 749 back to standard in the original location. The five damaged road sections that consist of landslides and culvert blowouts, as well as erosion/gullying to the road surface throughout its

length, would be repaired within the existing road template. This alternative was identified as neither ecologically or economically feasible and would not provide a sustainable travel route given probable future storm events, soil types, and road location (Kamb 2014). The site's terrain, topography and hydrology, in addition to the potentially negative ecological effects associated with possible future road washouts, outweighed any benefits associated with repairing the infrastructure in its current location.

2) Various Boyden Brook Trail Relocation Routes

Several routes were considered that could serve as potential snowmobile trail relocations including Option 1) a route west of FR 49/FT 749 along an existing skid trail footprint and onto private land; and Option 2) a route directly adjacent to the eastern side of FR 49/FT 749 along an existing skid trail footprint entirely on NFS land. These potential routes are located within direct proximity to the Boyden Brook drainage and would consist of a combination of newly established routes as well as the use of portions of the existing FR 49/FT 749 infrastructure (see Options 1 and 2, Proposed Management Activities Map inset). It was determined that these routes were not ecologically or economically feasible due to steep and wet ground conditions. The stream bank adjacent to the section of existing trail that would remain in use under these alternative routes is unstable and would be subject to risk from future flooding. The connectivity to trails north of VT 125 would also not be possible due to private landowners in the area not willing to grant permission to allow the trail access.

3) Improve Fassett Hill Trail Instead of Taylor Brook Trail

This alternative would make improvements to the Fassett Hill Trail (FT 791) to enable groomer access to the Texas Gap area but would not make improvements to the Taylor Brook Trail (FT 700). Although FT 791 is designated as a Class 4 snowmobile trail, portions of the trail do not meet Class 4 standards for clearing width, thus preventing groomer access to maintain the trail tread. It was determined that improving FT 791 was less desirable than improving FT 700 for several reasons. The Fassett Hill Trail would require more ground disturbing activities to widen the trail tread. This trail travels through wet areas where two bridges would need to be replaced and ground disturbance would be required to place new abutments. Additionally, FT 791 is much narrower than FT 700 and a larger number of trees would need to be removed to widen the tread. Finally, the FT 791 travels on and off NFS land where multiple private land owners would need to agree to any trail improvements.

4) Relocate a Segment of FT 749 to avoid the Apple Orchard

This alternative was considered as a result of public comments received during the initial scoping process regarding concern for impacts to deer habitat and hunting opportunities in and around the wildlife opening (and associated apple orchard) north of VT 125. It would avoid locating the proposed snowmobile trail reroute through the area of concern following an old skid trail running north to FR 100 for approximately 0.4 mile (see Option 3, Proposed Management Activities Map). This alternative route crosses wet, rough and steep ground that would require substantial trail improvements such as excavation and placement of culverts. It would also open another travel corridor in this area of the Forest. Following a field review by a biologist from the Vermont Fish and Wildlife Department, it was found that there would be no adverse effect to deer winter habitat from the original proposed reroute (Buck 2013). The biologist also determined that the alternative route would have an undesirable effect to deer winter habitat from the opening of additional forest cover in the area.

5) Relocate FT 749 as Proposed in the Preliminary EA

The original proposal as provided in the preliminary EA included the relocation of Boyden Brook Trail (FT 749) from its current location that connects to the Texas Gap Trail (FT 739) to a new location that would connect to the Taylor Brook Trail (FT 700). This relocation of FT 749 would follow a more sustainable route east of its current location. The snowmobile trail relocation, totaling approximately 1.9 miles would be on both NFS land and private property (0.6 mile on NFS land, 1.3 miles on private land) and would result in a net reduction of approximately 1.6 miles from the existing state-wide snowmobile trail system. To allow continuous grooming opportunity along the trail corridor the proposal also included the improvement of approximately 1.5 miles of Taylor Brook Trail (FT 700) to a Class 2 standard from the terminus of FR 100 north to private land.

This trail relocation is not possible because it crosses private land whose owners do not want the trail crossing their property. This particular trail segment is essential to the entire relocation as proposed, because it provides a safe crossing of VT 125 and includes a bridge across Hancock Branch. It also is essential to navigate the steep and wet ground conditions in this area. Their decision to not allow the trail to cross their property is based on concerns associated with stream bank instability, damage to property during construction, tax and personal injury liability, and unwanted removal of trees. For this reason, this alternative (see Option 4, Proposed Management Activities Map) has been dropped from further consideration.

The limited opportunities to provide safe crossings of VT 125, steep and wet terrain in this area, and multiple landowner concurrence that is needed have prevented a suitable alternate route to be identified at this time. Although the local VAST club members have found a tentative alternative trail location across NFS and private lands further east of the original proposed route, the detailed information needed for it to be considered a sustainable route over the long-term has not yet been available. If this route or any other alternative trail location is found to be satisfactory to all jurisdictional parties (Forest Service, VT Department of Transportation, Town of Hancock, and private landowners), the proposal will be considered and analyzed as a separate project.

Chapter 3 - Affected Environment and Environmental Effects

This chapter discloses the direct, indirect, and cumulative environmental resource effects from the no action and proposed action alternatives as described in Chapter 2. It consists of a description of the existing condition ("affected environment") for the relevant resource areas associated with public concerns as well as those associated with law or regulation such as the Endangered Species Act, Wilderness Act, and laws related to heritage and cultural site protection. It then discloses the environmental resource effects for each alternative.

The relevant resources that have effects disclosed in this EA that have been summarized from specialist reports located in the project record include:

- Wildlife
- Recreation (Snowmobile Trail Opportunity and Public Access)
- Soil and Wetlands
- Aquatic Resources (Water and Fisheries)
- Threatened, Endangered and Sensitive Species (Wildlife and Plants)
- Congressionally Designated Areas
- Heritage

The effects disclosure for resources that have no or minimal impact from the alternatives are not included in this EA, but are provided in specialist reports located in the project record (D. Burbank 2013, Deller 2013c, Marks 2013, T. Ketcham 2013, and Kamb 2014). They include:

- General Vegetation
- Natural Areas
- Non-Native Invasive Plants
- Visual Quality
- Resource Management Access
- Transportation (Roads) System

Wildlife

Unless otherwise indicated, the effects disclosed for wildlife is summarized from the Wildlife Specialist Report (M. Burbank 2013a).

Affected Environment

Habitat along the Boyden Brook Road/Boyden Brook Trail (FR 49/FT 749) is nearly all forested. Most of the forest stands along the road corridor are northern hardwood dominated by sugar maple, American beech, and yellow birch, with lesser amounts of paper birch. Stands of red spruce and balsam fir can be found at lower elevations along the streams draining into the Hancock Branch. Some sections of Boyden Brook also have pockets of Eastern hemlock, Eastern white pine and red pine. Human activity in the general area has been limited by the damage to the road and trail. Access to the area since the road was closed has been by foot, skis or snowshoes.

Effects Analysis

Direct and Indirect Effects

The direct and indirect analysis area for wildlife is the corridor of forest habitat along FR 49/FT 749 south of VT 125 within the Boyden Brook drainage. The time period considered for potential effects is a 5-year period into the future since that is the predicted threshold for all potential effects from activities within the area to occur.

No Action:

If this project is not implemented, wildlife would not be subjected to any disturbance of road decommissioning and restoration activities. Without road restoration, however, sections of existing road bed would continue sloughing and eroding into Boyden Brook which would be detrimental to riparian habitats at point sources and downstream (see Aquatic Resources section). Use of the area by hikers, skiers and snowshoers would likely continue at current low levels.

Proposed Action:

There would be temporary disturbance or displacement of wildlife during restoration activities but would be contained almost entirely within the road prism. The most intense project activity would be focused at several sites of major damage along the road. Changes or impacts to the forest canopy or to existing habitat conditions along the road corridor would be ephemeral and negligible during road decommissioning and watershed restoration activities, and likelihood of direct harm or injury to wildlife species is unlikely. Once road decommissioning and watershed restoration activities are completed, overall habitat conditions would be largely unchanged relative to pre-tropical storm Irene conditions, except that in some areas drainage and stream bank stability would be improved. Reduced sloughing and eroding of soil and other materials into Boyden Brook would be beneficial for riparian and aquatic habitats at point sources and downstream (see Aquatic Resources section). Any changes in use of the project area by hikers, skiers, and snowshoers would be negligible, and thus effects associated to wildlife would likewise be minimal.

Cumulative Effects

The cumulative effects analysis area is the same as the area defined for the direct and indirect effects but also includes NFS and non-NFS lands. The time period considered for effects is five years into the future since that is the predicted threshold for all potential effects associated with restoration activities within the area to occur.

Considering the minimal amount and short duration of disturbance to wildlife from the proposed action coupled with the small amount of other management of forested area within closed proximity of the analysis area, the cumulative effects for wildlife is also expected to be minimal and short-term.

Recreation (Snowmobile Trail Opportunity and Public Access)

Unless otherwise indicated, the effects disclosed for recreation is summarized from the Recreation Specialist Report (Knox 2013).

Affected Environment

Prior to their closure following the 2008 flooding event, the Boyden Brook Road (FT 49) and Trail (FT 749) were dual use, providing wheeled motor vehicle administrative road access from

April through December and providing snowmobile trail access during the winter season. During the non-winter months, a variety of recreationists (including hunters and hikers) used this trail. During the winter months, the trail was managed for snowmobiling but also received occasional cross country ski and snowshoe use.

The Forest Service maintains a snowmobile trail network totaling 13.5 miles in the Boyden Brook Project area in partnership with the local Vermont Association of Snow Travelers (VAST) club, the Route 100 Snow Travelers. Prior to its closure, FT 749 was an integral part of the larger NFS and state-wide snowmobile trail network. Of particular importance, FT 749 was a groomed snowmobile trail that connected to a loop trail system to the north consisting of Texas Gap Trail (FT 739), Fassett Hill Trail (FT 791), and Taylor Brook Trail (FT 700), and Swan's Mill Trail (FT 764) to the south.

A snowmobile parking lot is maintained on Texas Falls Road (FR 39) to provide access to the loop snowmobile trail system emanating from the Texas Falls Road snowmobile parking lot and traveling north to the FT 791 and FT 700, through the Granville area, and back again along the Texas Gap Trail (FT 739). The Boyden Brook Trail provided the only connection in the White River valley between this loop trail system to the north and the snowmobile network to the south. This connectivity enabled riders to park in the Texas Gap area and access services (gas and food) in the Towns of Granville, Hancock and Rochester. The connection also enabled the Route 100 Snow Travelers to continuously groom the Rochester, Hancock and Granville snowmobile trail network. The only alternative north-south snowmobile trail connectivity in this area of the state is located in the next valley to the east where VAST Corridor 12 runs from the Braintree to Bethel areas. This route is accessed by VAST Corridor 100 from the trail system north of VT 125 and requires approximately 45 additional miles for riders from the Granville area to access trails in Rochester and Hancock via VAST Corridor 125 and Swan's Mill Trail (FT 764).

The Forest Service has long attempted to find alternative routes to improve the safety of the trail connection between the Boyden Brook and Texas Gap Trails. Part of the connection between FT 749 and FT 739 along the Texas Falls Road (FR 39) consists of a VT 125 crossing. This route requires cars and snowmobiles to share VT 125 at the crossing and highway shoulder, and FR 39 to milepost 0.9. The highway crossing and motorized mixed use is inconsistent with State and local laws (Kamb 2009). Snowmobiles travel the narrow shoulder along VT 125 and cross the highway where visibility is restricted before turning onto the plowed surface of FR 39 with motorized vehicles. The Forest Service has concluded that mitigation is necessary to reduce the level of risk associated with the probability and severity of crashes at this site. Due to private landowner access restrictions as well as steep, challenging terrain and adjacent wilderness boundaries, a solution has never been found to mitigate the safety concerns associated with the mixed motorized use.

Prior to flood damage, the Boyden Brook Trail, which was formerly a truck road used to haul timber out of the Boyden Brook and Piper Brook drainages, provided a scenic foot travel route along Boyden Brook. Hikers followed the trail along a steady but moderate incline, typically for an out-and-back hiking opportunity. The small parking area located at the base of Boyden Brook Road was not plowed for winter parking. As such, little evidence of cross country skiing or snowshoeing existed with the exception of occasional use from locals within walking access to the trail. The trail received limited hiking use as well, as evidenced by the infrequency of vehicles parking at the small parking lot. It is not uncommon; however, to see summer or autumn trail users on the larger winter trail system to the north of VT 125 (Texas Gap, Fassett Hill, and Taylor Brook Trails), particularly as hunting access routes. The snowmobile trail network serves as access to the general forest area for hunting, viewing nature and gathering

forest products (such as berries). Although the trails are not managed for non-winter use, hiking is allowed on all trails within the project area.

Effects Analysis

Direct and Indirect Effects

The analysis area for direct effects on recreation is the Boyden Brook Project area because it includes the proposed trail decommissioning activities. The analysis area for indirect effects expands to the next valley to the east along VAST Corridors 100 and 12, because these trails provide the only existing north-south trail connection between the Texas Gap and Swan's Mill Trails outside of the project area. The time period for determining effects is 20 years into the future, because that captures a generation of users that would experience the changes resulting from the decommissioning of FT 745 and the permanent loss of the north-south trail corridor in this area.

No Action:

There would be no restoration activities along FR 49 and FT 749 and the road/trail would remain closed for managed snowmobile use. Existing safety concerns for hikers using the damaged route would increase as Boyden Brook continues to erode its banks where the banks are in close proximity to the trail. Over time, due to this erosion, user created foot trails may emerge to bypass around washed out trail sections. Failure to address the trailside bank erosion and washed out water crossings would degrade the already impaired experience for the majority of users who are using the trail for foot access.

Snowmobile trail connectivity would not be restored between the Granville, Rochester and Hancock areas via the Boyden Brook Trail and riders would need to travel approximately 45 miles (one-way) via the Braintree/Bethel trail network as an alternate route. This extended reroute would limit access to services (food and gas) for users parking at the Texas Gap area and utilizing the snowmobile system to the north. Access to the trail system south of VT 125 would not be available to users parking at the Texas Falls parking lot. Traffic on FR 39 would continue to be mixed motorized use for the length of the road and the snowmobile trail corridor would continue to violate the State of Vermont statutes for safe snowmobile operation.

Proposed Action:

This alternative would decommission approximately 2.4 miles of FT 749 as part of the restoration activities along the road/trail corridor. Public safety risks associated with hikers using the damaged portions of the road/trail would be reduced accordingly. Although activities would eliminate failing trail infrastructure and eroding trail segments, it would not reconnect the snowmobile trail system and grooming opportunities north and south of VT 125. Same as the no action alternative, riders would need to travel approximately 45 miles (one-way) via the Braintree/Bethel trail network as an alternate route limiting access to services (food and gas) for users parking at the Texas Gap area and utilizing the snowmobile system to the north.

The proposed action would also decommission a portion of the Texas Gap Trail (FT 739) from VT 125 to the Texas Falls Picnic Site toilets located on Texas Falls Road (FR 39) approximately 0.8 miles to the north. The decommissioning of FT 739 in this location would formally eliminate the dangerous crossing point along VT 125 that is not in accordance with Vermont Statutes for motor vehicles. Additionally, this decommissioning would reduce mixed motorized use of vehicle and snowmobile traffic along VT 125 and Texas Gap Road. The snowmobile trail along FR 39 would not be decommissioned between the Texas Falls Road snowmobile parking lot and the Texas Falls Picnic Site toilets that remain open for winter use. The trail would no longer

travel past the Texas Falls Observation Area or Nature Trail and thus users would not be able to ride snowmobiles to view the scenic cascades of Texas Falls.

The decommissioning of FR 49 and FT 749 along Boyden Brook would eliminate the scenic foot travel route that currently exists within this drainage. People who used the road to hike or for access to hunt in the Piper and Boyden Brook drainage areas would find travel more difficult upon removal of the large number of culverts along damaged portions of the route.

Cumulative Effects

The analysis area for cumulative effects on recreation is the snowmobile trail network in the Towns of Hancock, Granville and Rochester. These Towns include additional snowmobile trails that are potentially impacted by the proposed action. The time period considered for cumulative effects on recreation resources is ten years past and twenty years in the future. This timeframe provides enough time for the expected responses in recreational uses resulting from trail decommissioning and associated use patterns. Management activities considered for the cumulative effects analysis include the closure of the Baker Brook Trail (FT 795) and Rice Tract Trail (FT 794) to snowmobile use and general snowmobile trends in the area (USDA Forest Service 2010a and 2010b). Because the proposed action does not change trails managed for hiking, horseback riding, or mountain biking, and does not impact developed or dispersed camping opportunities, there is no cumulative effect associated with these recreation resources. The decommissioning of the Baker Brook and Rice Tract Trails reduces overall snowmobile trail system miles in the area north of VT 125 by 2.0 miles. Given the alternative snowmobile trail routes available in the area, there would be no negative cumulative impact from their closure.

In regards to the relocation of FT 749 as a foreseeable future action (possibly within the next year), there would be no substantial or adverse cumulative effect on the recreation resource. Any cumulative impact would be positive as the relocated Boyden Brook Trail would provide alternative snowmobile access means and reconnect the north-south snowmobile trail corridor that has been closed since 2008.

Soil and Wetlands

Unless otherwise indicated, the effects disclosed for the soil and wetlands resource are summarized from the Ecological & Soil Resources Report (D. Burbank 2013).

Affected Environment

The Boyden Brook drainage basin is deeply incised with steep banks and areas of exposed bedrock. It is fed by numerous small perennial streams, seeps, and springs. The Boyden Brook Road (FR 49) follows the east side of Boyden Brook closely for about a half mile, then crosses and follows the west side of the brook for approximately 0.8 mile before crossing its two branches and moving away to the east. This road, when constructed, required the placement of 34 culverts in the stretch proposed for decommissioning, indicating the frequency of small crossings and the level of dissection within this small drainage basin and the adjacent Piper Brook drainage.

Slopes in the Boyden Brook basin are predominantly more than 30 percent, with several large areas greater than 40 percent. The adjacent Piper Brook drainage basin, through which the last approximately 0.9 mile of FR 49 would be decommissioned, has similar but less steep terrain; slopes in this basin are generally less than 30 percent, with some areas of 30 to 40 percent along the upper western sideslope of the basin in the vicinity of the road.

Based on Natural Resource Conservation Service (NRCS) soil maps and ecological land type

(ELT) maps, soils in the project area are generally loamy, and well-drained to moderately well-drained, but are predominantly underlain by a hardpan at around two feet deep. Dominant soils in the project area include the Berkshire, Tunbridge, and Lyman series, which are primarily well-drained without a hardpan; and Peru, Colonel, and Cabot series, which are moderately to poorly drained, with a hardpan. On average, NRCS soil erosion hazard ratings for the project area are low on slope gradients of less than 15 percent, moderate on slopes of 15 to 30 percent and high on slopes over 30 percent. A high erosion hazard indicates that soil conservation measures commonly used in mountainous terrain are essential to keep erosion at low levels. An example of such measures is the use of drainage control structures such as dips and water bars.

Erosion is active along many parts of FR 49 due to the previous two storm events and the loss of functioning culverts due to these events. There are at least two observable slides that are adding sediment to Boyden Brook and have not been stabilized. Head-cutting is occurring along several parts of the road; these head-cuts are actively eroding, allowing water to flow down the road and contributing to instability of the road surface and sediment into the stream. The first mile of the road was most recently graveled; this gravel represents a higher proportion of the sediment being added to the stream from erosion in this section of road. Most of the road damage is associated with the portion of the road on Peru soils, i.e. the section associated with Boyden Brook below the forks.

No Class 1 or 2 wetlands or state-significant wetlands are documented in the project area either by the National Wetlands Inventory (NWI) or by the State of Vermont. Small areas of wetlands do occur in the project area, usually less than an acre in size, generally in association with areas of Cabot soils or in concave microsites on Peru soils. While no wetlands are documented from the areas associated with the project, there are areas of moderately well-drained to somewhat poorly-drained soils in some places.

Effects Analysis

The Forest Plan defines soil productivity as the inherent capacity of the soil to support the growth of specified plants, plant communities, or sequences of plant communities (Forest Plan, p. 156). A productive soil is able to help support a healthy and growing forest. Soil may also play a role in buffering the impacts of other environmental concerns, such as changes in stream chemistry, which may originate from acid deposition. Forest Plan standards and guidelines, and the Forest Service Soil Quality Standards (SQS) (USDA Forest Service 2012a) further specify desired soil resource conditions. Implementation of SQS and relevant VT Acceptable Management Practices (AMPs) to all phases of the project help to ensure that long-term soil productivity is maintained. Relevant Forest Service National Best Management Practices for erosion control and road decommissioning would also be implemented (USDA Forest Service 2012b).

Desired soil conditions are represented in this analysis by indicators associated with long-term soil productivity: soil erosion and compaction. Soil erosion can affect soil productivity by loss of organic matter that harbors nutrients and helps maintain soil aeration; it can also lead to stream sedimentation. Compaction reduces soil productivity by reducing the air pockets in the soil which can be occupied by air and water, which reduces the soils ability to absorb water and leads to water run-off and erosion. Reduced air space also leads to reduced ability of soil microorganisms to process soil organic matter and release nutrients, leading to loss of nutrients like nitrogen from the soil. Compaction can include the formation of ruts, which can have detrimental impacts on site productivity by channeling overland water flow and enhancing water puddling, decreasing infiltration and gaseous exchange.

In general, forest roads and trails are a concern because they represent areas of compacted soils that are exposed to the elements, leading to excessive concentration of water on the road surface which may lead to erosion and stream sedimentation.

Direct and Indirect Effects

The direct and indirect effects analysis area for the soil and wetlands resource includes those areas where soils and vegetation could be impacted by disturbance. For this analysis, disturbance consists of where soils are actively eroding or sliding, or are excavated, moved, mixed, compacted, or organic matter is lost. Spatially, the analysis area is approximately 30 acres. This area includes the watershed improvement activities to close and restore FR 49/FT 749, and install erosion and sediment control structures such as rolling dips, within an approximately 30-foot wide corridor assumed to represent the zone of most likely impact, as well the Boyden Brook riparian zone where FR 49/FT 749 passes through or along the edge of this zone.

The analysis area does not include the portion of FT 739 that would be decommissioned because that action does not disturb soil or vegetation, and so would not have direct or indirect effects on the soil or wetlands resource. The time period for considering effects is 10 years, the approximate time within which this project is likely to be implemented and direct and indirect effects to have become fully apparent.

The following table displays the extent of soil disturbance expected as a result of each alternative.

Soil Disturbance by Alternative for the Boyden Brook Project over the next 10 years.				
Disturbance Type	No Action		Proposed Action	
	acres	%	acres	%
Analysis area	30	100	30	100
Existing soil disturbance ¹	12	25	12	25
Potential soil disturbance due to non-project erosion/compaction ²	30	62	3	6
Assumptions: ¹ Calculated as the Boyden Brook Road (FR 49) to the end of the proposed decommissioned section, with a 30-foot corridor, and including major washouts and slides along FR 49 that extend beyond the corridor. ² For the no action alternative, calculated as Boyden Brook road/trail 30-foot corridor and the zone of steep slopes between the road and Boyden Brook from VT 125 south to the forks, where erosion and mass wasting are ongoing; for the proposed action, calculated as the existing major washouts and slides along FR 49 that extend beyond the road corridor.				

No Action:

This alternative would have no soil-disturbing restoration activities along FR 49. However, this road was heavily impacted by Tropical Storm Irene and a previous flood event, leading to extensive and ongoing erosion. Soil erosion and mass wasting is likely to continue due to the steep slopes and erosive soils, exacerbated by the failing road. The soils from the intersection with VT 125 south to the forks of Boyden Brook have a high erosion hazard, as slopes are generally in excess of 30 percent, and so the road is likely to continue to erode and slide downslope toward the brook, particularly in areas in and adjacent to existing slides and washouts. Culverts still in place are likely to become plugged over time, leading to additional washouts and slides. Even with these highly erosive soils, the level of erosion here is outside of what would be expected under natural disturbances regimes because it is exacerbated by the

presence of a compacted road surface undergoing active erosion and bisected by numerous culverts in various states of effectiveness. Existing soil compaction would remain and erosion would be expected to continue along the road and between the road and Boyden Brook. The greatest negative effects would be in the section of FR 49 from milepost 0.1 up to the Boyden Brook forks at around 1.3 miles.

This alternative does not propose any road decommissioning, so FR 49 would remain closed, but the roadbed at the junction with VT 125 would continue to invite users, and maps would continue to show this road as a way into the Forest in this area. With continued (although limited) use of the analysis area, there would be additional impacts to soil productivity as users sought out alternate routes around the affected sections of the road bed. This would likely lead to a decrease in soil cover, and increase in soil compaction, soil erosion and stream sedimentation from unmanaged user created trails.

There would be no direct or indirect adverse effects for wetlands given that no wetlands are known to exist in proximity of the sites proposed for restoration activities.

Proposed Action:

Soil erosion, compaction, and mass wasting all work against the natural tendency of vegetation in the ecosystems of the analysis area to quickly recolonize disturbed soils. The scarification work proposed along FR 49 would likely reduce existing compaction and facilitate revegetation in areas not undergoing erosion. Repair of the ongoing erosion along the road through the use of drainage control structures, and removal of culverts along with the conversion of these areas to rolling dips and wetlands, would also enhance the ability of this roadbed to revegetate. Some areas of erosion and mass wasting outside the road prism are too dangerous for machinery to access and repair, and so those areas would remain less productive and subject to additional erosion until they stabilize naturally. In addition, there are some portions of the roadbed with slopes in excess of 20 percent where the underlying compaction of soils make them vulnerable to erosion from heavy rain events simply due to exposed bare soils. Natural vegetation would take longer to establish in these areas, although improving the erosion hazard upslope of these sites along the road may help them to stabilize more quickly. Planting is proposed for the first mile of road, where the gravel is the thickest and where revegetation may take the longest. This should also facilitate rapid revegetation of this part of the road.

There would be no direct or indirect adverse effects for wetlands given that no wetlands are known to exist in proximity of the sites proposed for restoration activities.

Cumulative Effects

The cumulative effects analysis area for the soil and wetlands resource is the upper White River watershed north of Hancock, known as the White River Headwaters subwatershed, including both NFS and privately-owned lands. This analysis area is comprised of approximately 36,364 acres, of which approximately 23,063 acres are NFS lands. Of these NFS lands, approximately 11,891 acres (52 percent) are managed as Wilderness. The analysis area includes around 51 miles of roads and trails, comprising around 200 acres, or less than one percent of the area (USDA Forest Service 2010a and 2010b). Based on the most recent National Land Cover Database (NLCD; Fry et. al. 2011), approximately 2,200 acres of the analysis area is non-forested and not wetland (six percent of the area); of these acres about 600 are in agriculture and about 900 acres are developed, the rest being vegetated with shrubs or herbs. Of the 900 acres of developed land, 849 acres are considered open, representing lawns, greens, and other vegetated parts of developed areas. The cumulative effects of past, present and foreseeable future soil disturbing activities within the analysis area will be evaluated using a time period of 20 years into the past and future.

Past public (federal, state, town) actions within the analysis area that had effects on soil resources include 11 past timber sales on federal lands, amounting to almost 1,900 acres of harvesting through 2007, road repair work along VT 125, VT 100, Texas Falls Road (FR 39), and other public roads after the 2008 and 2011 flood events, and routine road and trail maintenance work. Approximately 300 acres of timber harvesting have occurred on private lands within the analysis area through 2007. Cumulatively this past harvesting represents approximately six percent of the analysis area. Ongoing activities include year-round recreational use, repairs of VT 125 and other roads in response to the 2011 flood event, and routine road and trail maintenance. Foreseeable future actions in this area include a continuation of the ongoing activities, as well as timber harvesting (1,645 acres), aquatic habitat improvements, road and trail decommissioning, road/parking area improvements, and other activities associated with the Upper White River Integrated Resource Project (USDA Forest Service 2010a and 2010b). Foreseeable future actions also include the potential relocation of FT 749 across NFS and private land to reestablish the north-south snowmobile trail corridor closed since 2008.

The cumulative effects analysis is summarized for both alternatives because at the watershed scale their effects are indistinguishable. We expect cumulative losses in soil productivity to be small in the analysis area, within the analysis timeframe, for several reasons. Over half of NFS lands within the analysis area are in designated Wilderness, where little to no soil-disturbing activities have happened, or will happen within the timeframe of this analysis. In these areas, natural processes that build soil fertility, such as the buildup of nutrient and organic matter, are proceeding unhindered.

The impacts to soil productivity associated with either alternative amount to around 30 acres, or 0.08 percent of the cumulative effects analysis area. The removal of 2.6 miles of road, through either abandonment or decommissioning and restoration, accounts for only about 9 acres. Roads, trails, and low/medium intensity development within the analysis area represent only around 250 acres or 0.7 percent of the analysis area. Either alternative would have barely detectable overall impacts to soil productivity when compared to current impacts to soil productivity related to development in the analysis area, which themselves are quite small.

Around 10 percent of the analysis area has been or will be impacted by timber harvesting. Poorly implemented timber harvest has the potential to degrade long-term soil productivity. This can happen if Acceptable Management Practices (AMPs) are not implemented, and erosion and compaction occur that lead to losses in soil nutrients. On NFS lands harvesting is done following AMPs, in addition to other measures that minimize erosion and compaction. AMPs, at least the most critical ones, are usually implemented on private lands. Recent monitoring by the Forest Service on the GMNF has shown that Forest Plan standards and guidelines, and AMPs are implemented most of the time, and that measures are effective in keeping erosion, compaction, and impacts to wetlands at low levels (UVM 2010). Given the small scale of the potential soil productivity impacts associated with both alternatives, and their limited duration, the cumulative effects of adding soil productivity impacts from either alternative to the impacts associated with timber harvesting are negligible.

Since there would be no direct or indirect adverse effects for the wetland resource, there would be no cumulative effects anticipated.

Aquatic Resources (Water and Fisheries)

Aquatic resources include water and fisheries for the purposes of this analysis. Unless

otherwise indicated, the effects disclosed for aquatic resources are summarized from the Hydrology, Aquatic Species and Habitat Report (N. Ketcham 2014).

Affected Environment

The project area is entirely within the White River Headwaters subwatershed, the upstream-most subwatershed of the Upper White River Watershed, and is associated with tributaries of the Robbins and Hancock Branches of the White River, as well as of the White River itself. South of VT 125, Boyden Brook feeds Robbins Branch, and its drainage basin is associated with the first approximately 1.7 miles of Boyden Brook Road and FT 749. Piper Brook, which is east of Boyden Brook, feeds Hancock Branch, and its drainage basin is associated with the remaining 0.9 mile of FR 49/FT 749.

The Hancock Branch is the largest stream in the project area, it holds eastern brook trout, and has been stocked with Atlantic salmon fry in past years as part of the Atlantic salmon reintroduction program. Boyden and Piper Brooks are both fish bearing streams, holding eastern brook trout.

Heavily damaged by flood flows in 2008, FR 49 was made completely impassable by vehicles due to slope failures and extensive and continuing erosion. In 2011, the FR 49 roadbed and cut-and-fill slopes were again severely impacted by floodwaters caused by Tropical Storm Irene, exacerbating the already existing erosion problems, and creating new slumps and culvert failures, none of which have been repaired. The road surface, as well as the cut and fill slopes of FR 49 are sending sediment into Boyden Brook, due to water flowing down the road bed, as well as from overland flow over flood-destabilized cut-and-fill slopes and slumps along the banks.

A culvert that failed during the 2008 flood event still is lying in the bottom of the Boyden Brook channel, fully exposed, with all the supporting soil and rock having been driven downstream. There is water flowing under, around, and through the culvert, and it is blocking fish migration up or down stream, due to splitting the flow, making the water too shallow for fish to pass through. The FR 49 roadbed does not have enough water bars or rolling dips, and there are many areas devoid of slope-stabilizing vegetation. As a result, the natural hydrology of the area is interrupted and water is being directed down the roadway. During rain events, even of events of low intensity, accelerated erosion of the road surface and its cut and fill slopes is occurring and delivering sediment to Boyden Brook.

Effects Analysis

Eastern brook trout require cool, clean water with frequent pools where they can rest and feed, and seek shelter from predators. Brook trout also need streams with clean gravels in the substrate in which to spawn, for the eggs to mature, and for the fry remain in, until no longer dependent on their yolk sacs for nutrients. When sediment fills the spaces between the gravel in the substrate, that area becomes unusable for spawning, and existing eggs or fry in the gravels get suffocated, resulting in the loss that year class population (Meehan 1994), and possibly the local population. Sedimentation of streams also negatively affects aquatic insects that fish rely on for food, by suffocating the insects and/or their eggs. The existing road and slope failures associated with FR49/FT749 are continuing to affect the substrate of Boyden Brook.

Erosion and sedimentation can degrade water and aquatic habitat quality through increases in turbidity of the water and a change in stream bed materials. Other changes in water quality, such as phosphorus loading, may be tied to sedimentation. Roads may also affect streambank

stability, particularly in the vicinity of stream crossings. Roads and other impervious surfaces can also affect water quantity by increasing and channelizing runoff in a watershed.

Direct and Indirect Effects

The direct and indirect analysis area for aquatic resources is the portion of the White River Headwaters subwatershed that encompasses the entire project area, inclusive of all the streams within drainages associated with, and downstream from, proposed activities. The downstream boundary of the analysis area is the confluence of Hancock Branch with the mainstem of the White River. The analysis area includes all named and unnamed tributaries to the mainstem of the White River, Hancock Branch and Boyden Brook. Because of the direction of water flow, the areas upstream of project sites would not be affected by restoration activities, and are therefore not included as part of the analysis area. The time period considered for long-term effects is five years. For short-term effects, the time period is one year.

No Action:

Under the no action alternative, erosion of the exposed culvert crossing, road bed, cut and fill slopes, and stream banks along FR 49 would be expected to continue. Maintenance of this road cannot be performed at this time thus it is very likely that existing relief culverts would become plugged with debris, and the roadbed would fail, perhaps in more than one place, causing many more slumping of soil and debris into Boyden Brook. This would continue to affect spawning and rearing opportunities as well as water quality in Boyden Brook. Depending on the intensity of storm events, road bed material and streambank sediment could be carried out of Boyden Brook to the Hancock Branch, and perhaps to the mainstem White River.

Sediment loads and turbidity may be higher now than historical levels due to Tropical Storm Irene impacts and other recent high water events, but over a very long time disturbed areas would revegetate and eventually stabilize. Stream reaches that are currently unstable would gradually shift to a more stable condition that may differ greatly from the channel's historic morphology.

Aquatic species movement up and down Boyden Brook, particularly those of fish, is impaired by the large culvert that was left exposed and lying in the channel by the receding waters of Tropical Storm Irene. Water flow is being directed through, around, and under the culvert, but none of the routes are navigable by fish, due to low flow rates. Erosion would continue at the washed out culvert crossing and would continue to erode and deliver sediment to Boyden Brook. The amount of sediment that could be delivered from the unstable slopes and banks would be dependent on the size of the rain event. Stream connectivity would continue to be fragmented because the exposed culvert would remain in place, limiting the ability of eastern brook trout and other aquatic species to move upstream and downstream to different habitat units.

Proposed Action:

Forest Plan direction, and relevant Forest Service National Best Management Practices ((USDA Forest Service 2012b) and VT AMPs would all act to reduce or eliminate the potential for soil erosion and sediment delivery to Boyden Brook during project implementation. This would include such things as using sediment fences to prevent delivery to streams, soil and water conservation practices, and other methods identified in the stream alteration permit required by the State of Vermont.

Under the proposed action, the FR 49 road tread would be scarified to create a better bed for seeding, and allow surface flows to enter the ground, rather than going overland and collecting sediment along the way, then delivering it to Boyden Brook. Rolling dips would be established

where culverts would be removed, and waterbars installed where needed between rolling dips. The dips would be constructed to allow channel-forming (bankfull) flows and flood flows to pass unimpeded, thereby preventing continuous scouring and changes in channel shape, and thus removing the potential for the damaging effects of plugged culverts and associated road failure. Waterbars would be placed where necessary to direct water off the road surface, and reduce the possibility of accelerated erosion, by reducing the length of free-flowing runs along the road bed.

Cut and fill slopes and slumps would be stabilized by reducing the angle of the slopes, seeding, installing rip-rap (if necessary), and by putting sediment interception trees placed perpendicular to cut and fill slopes and slumps. Trees would be felled across the road bed to perform the same purpose where a rolling dip or waterbar would not function correctly. These trees would be in full contact with the ground, hold soil in place close to its original source, and would prevent the soil from being delivered to Boyden Brook. All these activities would assist in restoring a more natural hydrologic regime to the area.

In the short-term, proposed road decommissioning activities would cause soil disturbance and small amounts of erosion which would likely be localized to areas near stream crossings and adjacent to the failing cut and fill slopes and slumps. The small amount of sediment that may be delivered to Boyden Brook from road decommissioning would be expected to remain in the Boyden Brook drainage. The road stabilization, sediment interceptors, and drainage features would help improve the local hydrology. They would also protect the road surface, and prevent cut and fill slopes and slumps from further damage by future heavy rain events.

Proposed activities would likely cause some minor, short-term negative direct effects to aquatic life due to the minor sedimentation and turbidity into Boyden Brook during implementation. Following Forest Plan direction, BMPs and conditions given in the State stream alteration permit would minimize, if not eliminate, these effects. Aquatic organism passage would be restored and maintained in Boyden Brook, because the impeded washed out culvert would be removed. The substrate in the channel bottom at the culvert location would have stone similar in size to that in Boyden Brook. This would reconnect stream habitat to fish species of Boyden Brook and increase available habitat for other aquatic species. Eastern brook trout habitat would improve as a result of the free movement of individuals into spawning and nursery habitat.

Removal of all culverts in FR49 would eliminate the possibility of plugged culverts leading to further failure of road sections and stream banks, and would improve passage of sediment and wood in future storm events. While overall in the project area sedimentation may occur and cause disturbance to fish and aquatic life in the short-term, this effect would not have any measureable impact on the sustainability of local populations and would improve in the long-term.

Cumulative Effects

The cumulative effects analysis area for the aquatic resources is the same area as the direct and indirect effects analysis area, inclusive of the rest of the White River Headwaters subwatershed on both NFS and non-NFS lands. This includes all named and unnamed tributaries to Boyden Brook, Hancock Branch, and the mainstem of the White River upstream and downstream of sites proposed for restoration and trail relocation activities. The downstream boundary of the analysis area is the confluence of Hancock Branch with the mainstem of the White River. This analysis area is used to acknowledge any potential changes resulting from the project to the subwatershed where the proposed activities are located. The time period considered for cumulative effects is ten years in the past and ten years beyond the proposed action.

Past public (federal, state, town) actions within the analysis area that had effects on aquatic resources include 11 past timber sales on NFS lands, amounting to almost 1,900 acres of harvesting through 2007, road repair work along VT 125, VT 100, Texas Falls Road (FR 39), and other public roads after the 2008 and 2011 flood events, and routine road and trail maintenance work. Approximately 300 acres of timber harvesting have occurred on private lands within the analysis area through 2007. Cumulatively this past harvesting represents approximately six percent of the analysis area.

On-going activities include year-round recreational use, on-going repairs of VT 125 and other roads in response to the 2011 flood event, and routine road and trail maintenance.

Foreseeable future actions in this area include a continuation of the on-going activities, as well as timber harvesting (1,645 acres), aquatic habitat improvements, road and trail decommissioning, road/parking area improvements, and other activities associated with the Upper White River Integrated Resource Project (USDA Forest Service 2010a and 2010b). Foreseeable future actions also include the potential relocation of FT 749 across NFS and private land to reestablish the north-south snowmobile trail corridor closed since 2008.

On-going activities on NFS lands such as logging operations have many requirements for soil protection and reduction or elimination of sediment travel to streams, or alteration of local hydrology. Trail and road maintenance may temporarily disturb soil, but have been found to reduce sedimentation over the long-term (NCASI 2000). Therefore, these activities would not result in any adverse cumulative effect for water quality or fish habitat under either alternative.

Not all repairs to damaged infrastructure from Tropical Storm Irene have been completed. Where public funding is being used for repairs, undersized culverts are being replaced with larger culverts that are suitable for 100 year flood events and sized to move both water and woody debris, and also are designed for passage of aquatic species; or are being replaced with bridges. Therefore, these activities would not result in any adverse cumulative effects for water quality or fish habitat under either alternative.

On-going activities on private lands in the analysis area are much harder to predict. The Hancock Branch, the mainstem of the White River, and tributaries to both were straightened, rip-rapped and/or otherwise altered following Tropical Storm Irene. These changes cause higher water velocity in flood events which usually results in greater damage downstream. Also there are likely under-size culverts that have been installed that would fail in a large flood event, or perhaps even during a normal bankfull flow event, that would bring more sediment into the Hancock Branch, the White River or their tributaries.

In some places, agriculture activities extend to field edges directly to the banks of streams and rivers in the analysis area. This practice can result in unstable banks that regularly shed sediment in to the streams during normal spring run-off, as well as other types of high water events, though how much and how often is unknown.

Threatened, Endangered and Sensitive Species (Wildlife and Plants)

Unless otherwise indicated, the effects disclosed for threatened, endangered and sensitive (TES) species are summarized from the Biological Evaluations prepared for wildlife and plants (M. Burbank 2015, M. Burbank 2013b, and Deller 2013a), the Wildlife Report (M. Burbank 2013a), and TES Plants Report (Deller 2013b).

The Endangered Species Act (ESA) requires that federal activities do not jeopardize the continued existence of any species federally listed or proposed as threatened or endangered, or result in adverse modification to such species' designated critical habitat. In accordance with Section 7(c) of this Act, a report of the listed and proposed, threatened or endangered species that may be present in the project area was reviewed.

Forest Service Manual 2670.22 provides direction to implement management practices to ensure species do not become threatened and maintain viable species populations distributed throughout their range on NFS lands. This analysis includes potential effects to sensitive species for which the Regional Forester has identified population viability is a concern. These species are listed as Regional Forester's Sensitive Species (RFSS).

Affected Environment

Wildlife

The affected environment for threatened and endangered animals includes the existing FR 49/FT 749 corridors and an adjacent buffer of 330 feet.

The likelihood for occurrence for threatened or endangered species (eastern cougar, gray wolf, and Canada lynx) in the project area or on the GMNF is low. The GMNF has only historic occurrence records for these species and their occurrence on the GMNF in the near future is unlikely. The GMNF has current occurrence records for the endangered Indiana bat. The likelihood of occurrence for Indiana bats at the project site is low, as it is more than five miles from the nearest known Indiana bat hibernaculum and is at an elevation of over 1,400 feet. The project area does not include potential or critical habitat for any of these species.

On April 2, 2015, the U.S. Fish and Wildlife Service (USFWS) published a Final Rule listing the northern long-eared bat (*Myotis septentrionalis*) as Threatened, with an Interim 4(d) Rule exempting some forest management practices from take prohibitions (80 FR 17974). Northern long-eared bats (NLEB) do occur on the GMNF, and the likelihood of occurrence for NLEB in the project area is moderate. Trees that may be potential roost trees for NLEB could be within the project area. There are no known NLEB maternity roost trees in the area, and although the likelihood of actual roost trees being removed is low, it cannot be dismissed entirely.

The project area has not been surveyed for all RFSS, but project activities are not likely to have an impact on the specialized types of habitats required by most of these species: e.g., open water, riparian, and other wetland habitats; high elevation spruce-fir; or rocky cliffs and outcrops.

Three species of woodland bats are RFSS that occur on and near the GMNF and could occur in the project area: little brown bat (*Myotis lucifugus*), eastern small-footed bat (*Myotis leibii*), and tri-colored bat (*Perimyotis subflavus*). Although the project area is determined to be outside of the 5 miles radius of known bat hibernaculum, it does include suitable habitat for these three RFSS bats. White nose syndrome (WNS) is pervasive in Vermont and much of the Northeast, and all three bat species are affected by the disease. During recent years, little brown bats have suffered unprecedented population declines in Vermont, with estimates loss ranging from 75 to 99 percent (Darling and Smith 2011). The impact of WNS on eastern small-footed bats and tri-colored bats is not known, but these bats were rare or uncommon in Vermont prior to the onset of the disease. The current low abundance of these three species in Vermont implies that the likelihood of these bats occurring in the project areas is low, but it cannot be ruled out. It is noted that the USFWS is assessing whether ESA listing is warranted for the little brown bat (*Myotis lucifugus*).

Plants

There are no federally listed plant species on the GMNF. Habitat for plants listed as RFSS within the project area includes stands of hemlock, sugar maple-beech-yellow birch (in some places with some soil enrichment), sugar maple-beech-yellow birch/red spruce, maintained wildlife openings, and moist springy places along brooks along sites proposed for restoration and trail work. Although no plants listed as RFSS are known to occur in the project area, there is a slight potential for the following RFSS in the following habitats:

- Summer sedge (*Carex aestivalis*), large yellow lady's slippers (*Cypripedium parviflorum* var. *pu-bescens*), butternut (*Juglans cinerea*), and ginseng (*Panax quinquefolius*) in rich northern hard-woods (sugar maple-beech/yellow birch stands)
- Bog chickweed (*Stellaria alsine*) in moist springy places
- Round-leaved orchis (*Platanthera orbiculata*) in mixed woods (sugar maple-beech-yellow birch/red spruce stands)

Effects Analysis

Direct and Indirect Effects

Wildlife

The direct and indirect analysis area for TES is where restoration and trail activities are proposed and a buffer area defined as 330 feet where the sights and sounds of project work could affect wildlife. The time period considered for effects is five years into the future since that is the predicted threshold for all potential effects for proposed activities within the analysis area to occur.

Plants

The analysis area for plants listed as RFSS is the project area, since that is where effects, such as trampling or cutting of vegetation could occur during project implementation. The time period considered for effects is during the implementation of the project.

No Action:

Wildlife and Plants

No direct or indirect effects would be expected associated with wildlife and plant T&E, or species listed as RFSS.

Proposed Action:

Wildlife

The Boyden Brook Project would have “no effect” on eastern cougar, gray wolf, Canada lynx, or Indiana bat.

The removal of culverts and contouring of the slope associated with the road decommissioning and watershed restoration activities would result in the removal of an estimated 30 trees of various species and diameters during the summer months. It is also anticipated that some additional trees would not survive; these trees may remain as standing snags or they may fall after culverts are pulled. Until work is begun, the actual trees at risk to root damage and instability can only be estimated. The plan is to impact the existing vegetation as little as possible but it cannot be stated that no trees would be damaged or tipped over. Consequently, the Forest Service has determined that this project “may effect but not likely to adversely effect” northern long-eared bats. The Boyden Brook Project would qualify for the 4(d) exemption of incidental take for NLEB as a “limited tree removal projects, provided these activities protect

known maternity roosts and hibernacula.” Review of the project through informal consultation with the USFWS would be required prior to project initiation. Any modifications to the project and/or new mitigations developed to address NLEB as a result of consultation would be required as part of the project decision.

There would be no anticipated effect for any of the following RFSS or their preferred habitats, because project activities are not likely to have an impact on the specialized types of habitats they require: common loon (*Gavia immer*), bald eagle (*Haliaeetus leucocephalus*), American peregrine falcon (*Falco peregrinus anatum*), sedge wren (*Cistothorus platensis*), Bicknell's thrush (*Catharus bicknelli*), rusty blackbird (*Euphagus carolinus*), Jefferson salamander (*Ambystoma jeffersonianum*), blue-spotted salamander (*Ambystoma laterale*), four-toed salamander (*Hemidactylium scutatum*), wood turtle (*Glyptemys insculpta*), West Virginia white (*Pieris virginiensis*), and southern pygmy clubtail (*Lanthus vernalis*).

There is a minimal likelihood that project activities would impact individual little brown bats, eastern small-footed bats, or tri-colored bats, but it would not be likely to cause a trend towards federal listing or loss of viability for any of these species within the project area. Project review would be required and new mitigation measures may be necessary if the little brown bat is federally-listed as threatened or endangered before the Boyden Brook Project is completed.

Plants

No changes to suitable habitat for plant listed RFSS would be expected. There would be a slight risk to round-leaved orchis in the mixed woods, bog chickweed in moist, springy places, and a few RFSS that are associated with rich woods: summer sedge, large yellow lady's slipper, butternut, and ginseng. Risk of harm to these species would be minimal. The only risk would be damage to individual plants, if they occur there, because of trampling or vegetation cutting during implementation. Although there may be effects for individual plants, these effects would not likely contribute to a trend towards federal listing or loss of viability.

Cumulative Effects

Wildlife

The cumulative effects analysis area for TES is the same as the area defined for the direct and indirect effects, but also includes NFS and non-NFS lands beyond the project area to cover the normal movement of these species. The time period considered for effects is ten years into the future since that is the predicted threshold for all potential effects from activities within the area to occur. The ten-year time frame reflects the anticipated trends and changes in overall composition and age class composition that may occur within the analysis area.

The actions considered for cumulative effects consist of forest and vegetation management activities included in the Upper White River Integrated Resource Project, trail construction, and general road and trail maintenance that involves tree cutting. There would be no measureable cumulative effects associated with T&E species and most RFSS since there would either be no direct or indirect effects or they would be negligible for these species as previously disclosed. The current low abundance of the three RFSS bat species in Vermont implies that the likelihood of these bats occurring in the project areas is low. Cumulative effects from current and future activities would not be anticipated to cause a trend towards listing or loss of viability.

Plants

Because FSM 2670.22 directs us to prevent the loss of viability of species on NFS lands, the analysis area for cumulative effects for plants listed as RFSS is the entire GMNF. Since our determination of viability concerns for RFSS was derived from data gathered during Forest Plan revision, and this data was through 2005 (with some updates since then), the time period for this

analysis is from that date forward to the end of the planning period, at which time viability will be reassessed for RFSS. Other activities that could result in cumulative effects include logging or habitat maintenance, road or trail maintenance/construction, and habitat conversion or land development, any time they occur at other known sites for this species.

Currently no activities are known on NFS lands that are causing direct or indirect effects to any of these species, and so no cumulative effects are expected. We have no way of knowing if these or other activities are occurring or are planned to occur at other sites for these species on land under other ownership.

Congressionally Designated Areas

Congressionally designated areas include wilderness, inventoried roadless areas, and eligible wild, scenic and recreational rivers for the purposes of this analysis. Unless otherwise indicated, the effects disclosed for these resources are summarized from the Wilderness Report (Wright 2013).

Affected Environment

The Boyden Brook project area is adjacent to the Breadloaf Wilderness and Joseph Battell Wilderness which are both located to the west. The Breadloaf Wilderness roughly parallels FR 39 and FT 739 along its eastern boundary and is adjacent along VT 125 to the south. Joseph Battell Wilderness is adjacent along VT 125 to the north and FR 49 to the east. Although FR 49 is currently closed to all motorized use, vehicles using VT 125 and FR 39 create ambient background noise in some areas of the Breadloaf and Joseph Battell wilderness areas. This is accentuated along FT 739 during the winter months from snowmobile activity.

Although there are no congressionally designated inventoried roadless areas or areas regulated by the 2001 Roadless Area Conservation Rule, the project area is adjacent to the Hat Crown (RA 92020), Texas Gap (RA 92021), and Rob Ford (RA 92029) inventoried roadless areas as identified during the 2006 Forest Plan revision process (FEIS, Appendix C, pp. C-139 to C-143; C-144 to C-149; and C-193 to C-200, respectively).

The GMNF does not contain any congressionally designated Wild and Scenic Rivers, but there are many river segments that are eligible to be further considered for addition to the National Wild and Scenic River System. These river segments and their associated corridors are within the Eligible Wild, Scenic, and Recreational Rivers Management Area (Forest Plan, pp. 105 to 109). The Boyden Brook project area is located upstream from the White River which is an eligible recreational river to be considered for future inclusion in the National Wild and Scenic River System. The White River would be protected for its outstandingly remarkable values (fish, historic and scenic) on the identified river segment located on NFS land (Forest Plan, p. 107).

Effects Analysis

Direct and Indirect Effects

The direct and indirect effects analysis area for congressionally designated areas includes all of the Boyden Brook project area; the two adjacent Wilderness areas, Breadloaf and Joseph Battell; the Hat Crown, Texas Gap, and Rob Ford inventoried roadless areas (IRA); and the White River (eligible recreational river). The time period for consideration of effects is slightly beyond the duration of the restoration activities (five to seven years) to account for the short-term adverse effects to the wilderness resource during implementation and the long-term beneficial effects after activities would be completed.

No Action:

Although motorized use along VT 125, FR 39 and FT 739 would continue to create ambient background noise in some areas of the Breadloaf and Joseph Battell Wilderness areas, the effect to their wilderness character would be minimal. There would be no effects associated with the 2006 inventoried roadless areas, or the outstandingly remarkable values of the White River.

Proposed Action:

There would be short-term minimal adverse effects related to the solitude and primitive recreation in some parts of the Joseph Battell Wilderness for the duration of restoration activities along FR 49 due to noise associated with heavy equipment. The decommissioning of FR 49, FT 749 and FT 739 would slightly improve wilderness opportunities for solitude and primitive recreation by eliminating snowmobile use as a source of intrusions on the natural soundscape.

There would be no effects associated with the 2006 inventoried roadless areas, or the outstandingly remarkable values of the White River.

Cumulative Effects

The cumulative effects analysis area and time period for consideration of effects for congressionally designated areas is the same as that defined for direct and indirect effects. There would be no cumulative effects associated with wilderness character, inventoried roadless areas, and outstandingly remarkable values of the White River, since the direct and indirect effects for these resources are negligible.

Heritage

Unless otherwise indicated, the effects disclosed for the heritage and cultural resources are summarized from the Heritage/Cultural Resources Report (Lacy 2013).

Affected Environment

The Boyden Brook Road project area crosses a transportation corridor (VT 125/Hancock Branch of the White River) that has been significant through time. The main route along the valley bottom, as well as the north/south feeder streams and roads, are dotted with historic 19th and early 20th century dwellings, farms, mills, schools, cemeteries, and other sites – or their archaeological remains. There is also potential for the presence of prehistoric Native American sites in the area, especially along terraces above the river. These historic and archaeological resources have the potential to inform us about the settlement and economic history of the area. Based on examination of the Forest's Heritage site atlas and in-field reconnaissance by Forest Archaeologists, we conclude that there are no historic period archeological sites within the project's Area of Potential Effect (APE) south of VT 125. Likewise, there is very low potential for the presence of prehistoric Native American sites within this same area.

Effects Analysis

Direct and Indirect Effects

Archaeological sites are physical entities and are bounded in space. Therefore effects on them are almost always a result of an activity focused on a specific place. For this reason we use the proposed project boundary as the direct and indirect effects analysis area and APE. Ground disturbance from grading, digging, and stumping are typical potential direct effects of activities similar to those proposed. Conducting earth disturbing activities directly next to or over the

edge of a site foundation resulting in subsequent collapse or compaction, or incidental erosional deposits into a site related to nearby disturbance, are possible indirect effects. Generally speaking these effects occur at the time of project implementation and/or shortly thereafter (within one year).

No Action:

The No Action Alternative would have no effect for any heritage site.

Proposed Action:

The Proposed Action would have no effect for any heritage site.

Cumulative Effects

Since there would be no direct or indirect effects on heritage sites from either alternative, there would be no cumulative effect.

Chapter 4 - List of Preparers

The following Forest Service employees participated in development of the proposed action and/or preparation of Boyden Brook Project EA as members of the Interdisciplinary Team (IDT), or provided technical assistance and/or review of the EA.

Name	Title	Area of Responsibility
Chris Mattrick	District Ranger	Responsible official
Jay Strand	NEPA Coordinator	Interdisciplinary team (IDT) leader
Holly Knox	Trail Coordinator	Recreation
Dun Cochrane ¹	Recreation Technician	Project development
Mike Burbank	Wildlife Biologist	Wildlife and threatened, endangered and sensitive species
Diane Burbank	Forest Ecologist	Soil, ecological resources and wetlands
Donna Marks	Landscape Architect	Visual quality
Jennifer Wright	Wilderness Coordinator	Wilderness, inventoried roadless area, and recreational river eligibility
Nancy Ketcham	Fisheries Biologist	Water and fisheries
Dave Lacy ¹	Forest Archeologist	Heritage and cultural resources
Tim Watkins	Forest Archeologist	Heritage and cultural resources
Mary Beth Deller	Botanist	Threatened, endangered and sensitive species, and non-native invasive plants
John Kamb	Civil Engineer	Transportation (roads)
Tom Ketcham	Forester	Timber management

¹Retired or no longer working on the Green Mountain National Forest.

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Appendix A – Mitigation Measures

The Green Mountain National Forest Land and Resource Management Plan (Forest Plan) established Forest-wide and Management Area Standards and Guidelines (S&Gs) to mitigate potential adverse effects of management activities (Forest Plan, Chapter 2, Section 2.3; and Chapter 3). The Boyden Brook Project has been designed to be consistent with all Forest Plan S&Gs. Although S&Gs are usually implemented without any need for repetition in site-specific NEPA documents, there are occasions when their emphasis specific to a project is needed to ensure compliance with the Forest Plan. Mitigation measures have also been developed specifically for the Boyden Brook Project to address resource concerns beyond those addressed by Forest Plan S&Gs. Listed below are relevant emphasized S&Gs and mitigation measures for the proposed action alternative by resource area.

Recreation

1. Ensure snowmobile traffic cannot continue down Boyden Brook Road (FR 49) following road decommission starting at the southern terminus of the rerouted FT 749. Use boulder, gate or otherwise block entry to prevent access to the decommissioned road.

Soil, Water, Wetlands and Fisheries

1. The following important Forest Plan standards and guidelines for Soil, Water, and Riparian Area Protection and Restoration (Forest Plan, pp. 20-22) should have special emphasis:
 - a. S-2 provides for a buffer strip between management activities and streams. These strips minimize or eliminate impacts to streams and their corresponding riparian areas. While equipment may operate within the protective strip, only minor amounts of soil disturbance are allowed. On the Peru soils common along FR 49 up to the forks, operation of equipment in the buffer strip shall occur only when soils are dry.
 - b. S-3 requires that heavy construction only be allowed when soil conditions are such that compaction, rutting, and erosion will be minimal. Much of this project south of VT 125 will occur on Peru soils, which are sensitive to rutting and compaction. Construction on Peru soils along FR 49 up to the forks shall occur only during dry conditions in these areas.
 - c. S-4 requires that sites for servicing and refueling construction equipment be located outside the protective strip. If tracked equipment will stay onsite along FR 49 during restoration work, contractors shall ensure that this standard is met, given the close proximity of FR 49 to the stream.
 - d. G-6 and 7 recommend that disturbed soil areas where the risks of erosion and sedimentation are high be revegetated as soon as practical. Mulch should be used (alone) outside the growing season, with seeding to follow at the start of the next growing season. These actions will minimize the risk of erosion and stream sedimentation.
2. Follow appropriate Best Management Practices for erosion control and road decommissioning, such as BMP Fac-2 and Road-6, in the Forest Service National Core BMP Technical Guide (USDA Forest Service 2012b, pp. 41-42, 115-117).

3. All pertinent permits will be obtained prior to project implementation including but not limited to a Stream Alteration Permit required by the State of Vermont.
4. During restoration of FR 49/FT749, interception trees to help soil stabilization will be placed perpendicular to cut-and-fill slopes and slumps. These trees will be in full contact with the ground, hold soil in place close to its original source, and would prevent the soil from being delivered to Boyden Brook. Trees will be felled across the road bed to perform the same purpose where a rolling dip or waterbar would not function correctly.

Wildlife

1. The project will not be initiated until informal consultation is completed with the U.S. Fish and Wildlife Service regarding the listing of the northern long-eared bat as threatened (*Myotis septentrionalis*). Any project modifications and/or new mitigation measures resulting from consultation will be required as part of project implementation. Likewise, if the little brown bat (*Myotis lucifugus*) is federally-listed as threatened or endangered before the project is completed, review of remaining project activities will be required and the development of additional mitigation measures may be necessary.

Vegetation

2. For this project, while natural revegetation is preferred, and while planting is planned for the first mile of FR 49, there are sections of the road on very steep slopes where construction will leave a bare soil surface quite vulnerable to erosion. Where slopes are in excess of 20 percent (the fall line or the slope of the road), additional planting and seeding should be considered as part of the overall planting prescription. Follow guideline G-6 under Pests, Diseases, and Non-native Invasive Species standards and guidelines in developing the planting prescription.
3. If tree seedlings are considered for site rehabilitation after decommissioning activities, the seedlings should be naturally occurring species appropriate to the site and procured from approved nurseries.
4. Do not cut any healthy butternut trees that may be found during project implementation.

Non-Native Invasive Plants (NNIP)

1. To prevent the introduction of additional NNIP, any equipment used to implement the project should be cleaned prior to accessing the site.
2. To prevent the spread of wild chervil within the project area, equipment should either be used to implement the project in uninfested areas prior to implementing in infested areas or it should be cleaned after working in the infested area and before moving to the uninfested area. Ideally, existing wild chervil will be hand pulled prior to when the project is implemented, so that mature seed is less likely to be spread by standing plants.
3. To prevent the further establishment of honeysuckle during project implementation, ideally it will be treated where it occurs along FR 49 prior to project implementation.
4. For all re-vegetation activities, seed mixes should be of native species and mulches should be biologically inert.