

Chapter 3 - Environmental Consequences

This chapter: (1) summarizes the existing condition of physical, biological, and social resources in the Timberline project area; and (2) explains how they may be affected by the Timberline alternatives. Where appropriate, the analysis tiers to the Final Environmental Impact Statement for Forest Plan Revision (FEIS) for the 2006 Land and Resource Management Plan of the Monongahela National Forest, which describes the general effects activities on Monongahela National Forest System lands may have on vegetation, wildlife, water, soils, recreation, etc. (FEIS, pp. 3-1 through 3-497).

This chapter describes the direct, indirect, and cumulative environmental consequences of implementing proposed alternatives (40 CFR 1508.7-1508.8). Direct effects are those environmental consequences that are caused by the action and occur at the same time and place. Indirect effects are the environmental consequences that are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Cumulative effects are the consequences to the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes the other actions. The methodologies used to evaluate effects are briefly mentioned in each section. More details are documented in individual resource reports in the project file.

3.1 Past, Present, and Reasonably Foreseeable Future Actions

Table 3.1 displays known past, present, and reasonably foreseeable future actions on federal and non-federal lands within and near the Timberline project area that may contribute cumulatively to the direct and indirect effects of proposed Timberline activities. More information about these activities is available in the project record.

Table 3.1. Past, present, and reasonably foreseeable future actions considered in the Timberline project analysis

	Activity	Location	Years Implemented	Acres or Miles Affected	Past	Present	Reasonably Foreseeable
Activities on National Forest System (NFS) Lands							
1.	Timber harvest prior to federal ownership	Within the project area	Turn of the 20 th Century	Exact figure unknown	Y	N	N
2.	Recreation on NFS lands (e.g., hunting, fishing, hiking, camping, wildlife viewing, driving for pleasure, scenery and wildlife viewing, gathering forest products, downhill skiing, cross country skiing, mountain biking, backpacking)	Entire watershed	All	All	Y	Y	Y

	Activity	Location	Years Implemented	Acres or Miles Affected	Past	Present	Reasonably Foreseeable
3.	Connector trail maintenance	See map	Since 1986	Approx 189 feet	Y	Y	Y
4.	Road construction and maintenance	road formerly known as Forest Road 80, now abandoned	pre-1986	Approx 4,000 feet on NFS lands	Y	N	N
5.	Timberline Resort – SUP for use and maintenance of Salamander Run.	See map	1986 to present	Approx 5 acres	Y	Y	Y
Activities on Private Lands							
1.	Private logging				Y	N	N
2.	Herbicide application	On private utility rights-of-way	unknown	unknown	Y	Y	Y
3.	Timberline Resort – Development, use, and maintenance of buildings, ski lifts, water/snow making system, ski runs	On private Timberline land	1986 to present	unknown	Y	Y	Y
4.	Housing development	On private lands in watershed	unknown	unknown	Y	Y	Y

In the future, additional development and disturbances may occur, such as timber sales on private lands and housing construction. However, the Forest is not aware of any specific plans or the extent of such activities.

3.2 Air

Resource Impacts Addressed

The Clean Air Act (CAA), as amended in 1977 and 1990, sets the standards for air quality in the United States. One important aspect of air quality regulations is the National Ambient Air Quality Standards (NAAQS). Primary NAAQS are set based on criteria deemed adequate for the protection of human health and have been developed for six specific pollutants called “Criteria” pollutants. The responsibility to ensure these standards are met or “attained” in WV has been delegated to the West Virginia Department of Environmental Protection.

However, it is the responsibility of the Monongahela National Forest (MNF) to ensure that management activities do not significantly contribute to a violation of the NAAQS or hinder the state’s progress towards meeting its air quality goals. Emissions from timber harvest activities are a concern only to the extent that they would contribute to the total “criteria” pollutant load.

Environmental Consequences

There would be no effect to air quality from either alternative. In Alternative 2, this is due to the lack of activities that would result in air pollutant emissions (i.e. their snow machines are hooked up to the grid, not diesel or gas powered).

Cumulative Impacts

There would be no cumulative impacts from either alternative because there are no environmental consequences to air quality from either alternative.

Irreversible or Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitments of air resources as a result of either of the alternatives.

Consistency with the Forest Plan, Laws, Regulations, and Handbooks

Direction in the Forest Plan requires that the Forest conduct all management activities in a manner that is consistent with applicable state and federal air quality regulations. Proposed activities would not contribute to a violation of the NAAQS, or hinder a state's progress towards meeting its air quality goals.

3.3 Soils/Geology

Scope of the Analysis

The scope of this analysis is the permit use area as defined within the application submitted by Timberline Ski Resort, and also includes adjacent areas outside of the permit area, areas which are similar in landform and soils to Timberline Ski Resort under USFS management. The proposed permit activities are analyzed for a period of ten years. Management effects over the last three decades are also considered in the effects section.

Methodology

The methodology for analysis is based on several references. Methods for soil sampling are standardized by the USDA Natural Resource Conservation Service (USDA-NRCS) Soil Survey Division Staff (1993). Soils will be sampled using their methods as described in the Soil Survey Manual (1993). The soils data used for analysis are a combination of existing soil survey information from the Soil Survey Tucker County, Part of Northern Randolph County 1967, and updated information provided by the USDA- NRCS (2008). References to the MNF Land Management Plan Standards and Guides are used to provide direction for implementation of the permit and mitigation to soil disturbance and effects from management activities being proposed.

Existing Condition

The existing soil resource condition is documented in the 1967 Tucker County Soil Survey, USDA Soil Conservation Service (now known as the USDA Natural Resource Conservation Service – Soil Survey Staff). A copy of this soil map is located in the project file. Currently, the

soil survey for this county is being updated, and the completion of the update is anticipated in 2010. In January, 2008 a request was made for NRCS to review the soil survey in the permit area. Below are listed several points made by NRCS about the soils in a letter dated February 26, 2008 from James Bell, Soil Survey Project Leader, Eastern Allegheny Plateau and Mountain Region (MLRA 127).

- A special investigation of the soil map unit RS – Rubble Land will begin in the summer of 2008 by USDA-NRCS. This map unit was correlated as a miscellaneous area in 1965 and is not linked to any physical or chemical data. It is noted that this map unit is found in a sensitive part of the permit area.
- The primary soil series mapped in the permit area is Dekalb. The central concept of the Dekalb series is a moderately deep soil (20 to 40 inches) formed in residuum weathered from acid sandstone. Investigations in recent years indicate that soils formed in similar parent materials and under similar vegetation often have spodic horizons, and in many areas these horizons are diagnostic and will have bearing on the classification of the soil. The unique chemistry of spodic materials has a direct bearing on the soil buffering capacity and how soils respond to various amendments, and thus would be an important feature to describe and characterize in the permit area.
- In addition, recent investigations of the frigid-mesic soil temperature boundary in Tucker County indicate that the permit area is in the area where the soils would be expected to fall into the frigid temperature class. The soils in the Soil Survey Geographic Database (USDA-NRCS <http://soils.usda.gov/survey/geography/ssurgo/>) SSURGO database all carry mesic temperature regimes.

NRCS has made a recommendation to conduct a special investigation to classify and characterize the soils in the study area to modern standards. They will start the investigation in the spring of 2008 in cooperation with the USFS.

Acid Deposition

Although the focus of air resource management has been to understand how air pollution is affecting resources in Class I areas, other areas of the Forest are equally vulnerable. The Monongahela National Forest has been, and continues to be, the recipient of some of the highest sulfate and nitrate deposition in the nation, mainly due to its location downwind of many old coal-fired power plants that have had minimal or no pollution control required.

Historically high sulfate (SO_4^{2-}) deposition from sources in the Ohio River Valley has contributed to acidification of streams and could affect soil quality and productivity on parts of the Forest. In fact, research scientists have found evidence of nutrient depletion occurring in certain soils on the Forest, including those soils that form from the geologic parent material located in the permit area (Jenkins 2002, Sponaugle 2005). Sulfates are also primary contributors to visibility impairment or regional haze. Sulfates are formed from emissions of sulfur dioxide from power plants and industrial sources. The Forest lies downwind of Ohio, Pennsylvania, Indiana, and Illinois; states that continue to produce the highest sulfur dioxide emissions in the nation, in spite of significant reductions made during the 1990s. The combination of high emissions and limited buffering capacity of certain geology and soil types found on the Forest, has led to increased acidity in stream water and possible nutrient depletion in soils.

The soil series found in the Timberline Resort project area are all derived primarily from the Pottsville geology. The geochemistry of the Pottsville geologic formation, which underlies the resort, shows that there are very little weatherable minerals present that can contribute alkalinity to the soil system (West Virginia Geological Survey report, Tucker County 1923), thereby buffering the acidic inputs from deposition. This is evident in the stream chemistry (refer to the Forest Wide Stream Chemistry Monitoring Results) and anecdotal soil chemistry (USAFS/NRCS soil sample analyses for the Red Spruce Monitoring Project 2006, National Soil Survey Center, Lincoln NE, Laboratory Database, 2007 – located on line at <http://ssldata.nrcs.usda.gov/querypage.asp>).

Over time, soils would continue to acidify naturally, but the rates of acidification are accelerated due to the continued inputs of the deposition. However, management of the trail systems could alter this chemistry over time, too. The changes in the chemistry ultimately could affect terrestrial organisms and viability of red spruce ecosystems.

Direct/Indirect Environmental Consequences by Alternative

Alternative 1 – No Action

The No Action alternative proposes closing the area of the permit to special use by Timberline Ski Resort. In the existing condition, it is hypothesized that the effects of historic snowmaking and snow additions to the soil surface may have changed soil chemistry substantially. The pH of the water used to make snow at the resort is approximately 7.0. This pH is neutral and is far more alkaline than would be expected for soil water found within the soil profile. The additions of the human-made snow most likely have had an effect in changing soil chemistry over time in the permit area. In addition to changes in pH, it is expected that historical snow making activities have also added nutrients to the soil in the area where snow is made (see Table 3.2), and potentially downslope where runoff may be seeping into the soil.

Table 3.2 displays the water chemistry of samples taken from: 1) the pond supplying the water to make the snow; 2) the water from the pond plus the addition of Snomax®; and 3) the water plus Snomax® exiting the guns spraying the mixture on the slope. The results of the water chemistry were unexpected given the geology of the slope and the water chemistry of streams in area. After a review of the geology layer, it is suggested that the source of the water is from a combination of ground water coming up from the Greenbrier Limestone Formation and springs delivering subsurface flow from the Mauch Chunk red shale which is also known to have higher levels of alkaline minerals than acid sandstones that underlay the sideslopes.

Table 3.2. Water chemistry results from samples taken from water source for snow making at Timberline Ski Resort

Source of Sample	pH	Cond	ANC	Cl	NO3-N	SO4	NH3-N	Ca	Mg	Na	K
		uS/cm	ueq/L	mg/L							
Water w/ Snomax® Sprayed from Gun	7.04	44.6	320.74	1.02	0.32	6.63	0.00	11.17	0.96	0.83	0.40
Water w/ Snomax®	7.01	42.1	294.50	0.95	0.30	6.79	0.00	9.40	0.92	0.83	0.40
Water from Pond	7.15	44.6	389.16	1.59	0.38	7.39	0.00	9.79	0.87	1.00	0.43

The nutrient of primary interest is calcium. This traditional agricultural amendment, often found in the form of CaCO_3 , is known to increase the base saturation of soils, cation exchange capacity of soils, and may have caused other changes to the soil. In a traditional agricultural setting, these changes would all be viewed as positive. However, this may not be true for the soils within the permit area, depending upon the degree of change over time. If the No Action alternative were implemented, then the addition of the snow from snow making sources would stop and only natural snow and precipitation would fall onto the site, which is acidic. Leaching of soil nutrients would continue to occur; however, the length of time it would take to leach out nutrients from historic management is not known.

Alternative 2 – Proposed Action

It is difficult to determine the soil chemical effects or outcomes of an additional 10 years of use of this area by Timberline without knowing baseline soil chemistry data and the historic changes. It is hypothesized that the soil would continue to become more alkaline until it reaches a chemical equilibrium, both with the annual additions of nutrients and the influxes of acid anions from the atmosphere; though this would probably be a slow process. Direct effects to soil chemistry as increases of pH, base saturation, total and exchangeable calcium, and cation ion exchange capacity are possible. In addition, other soil properties, such as texture, may also change. Indirect effects to other resources could be a result of the direct effects to changes in soil chemistry.

The downhill slope is used for downhill and cross country skiing, mountain biking, hiking, and horseback riding. No motorized vehicle use takes place on the ski slope except for maintenance and administrative use. These activities on the existing trail system and non-system trail may cause soil erosion. Planting red spruce seedlings would result in minimal soil disturbance.

The consequences of having grassed pathways in the permit area may be substantial changes in soil chemistry, transitioning from extremely acidic conditions to less acidic conditions.

Cumulative Impacts

Cumulative effects to the soil resource are numerous but difficult to quantify. This area has been logged, burned, disturbed, planted with vegetative communities that are not native to the ecosystem, irrigated with man made snow that has a water chemistry much different than the native soil water chemistry, and receives acid deposition with elevated levels of NO_x and SO_x compounds. The cumulative effect of all of these actions may have resulted in substantial changes both chemically and physically to the soil resource. Soil quality and productivity have been altered, but to what end in that the management objective and use of the soil resource is being currently met. The soil resource is stable and supports vegetation on a ski slope. This is an acceptable use of the soil resource; ultimately the cumulative effects may be playing a role in affecting other resources.

Irreversible or Irrecoverable Commitment of Resources

Approximately 5 acres of the soil resource have been irreversibly altered to either the native condition or the condition that exists under the current natural vegetative cover of red spruce and hardwoods for use in the Timberline SUP.

Consistency with the Forest Plan, Laws, Regulations, and Handbooks

The proposed activities are consistent with the MNF Forest Plan (2006), Forest Service Handbook 2509.15 - Soil Quality Standard, the NFMA (as amended), and the Clean Water Act.

3.4 Aquatics

Analysis Area

Proposed activities on NFS lands would be confined to extreme headwater locations along the divide between two sub-watersheds (6th level Hydrologic Unit Codes – HUCs) in Tucker County, West Virginia. The upper-most half of the 2,700 feet-long Salamander Ski Trail occurring on NFS lands and all 4,000 feet of that abandoned road that occurs on NFS lands are located within the Stonecoal Run drainage of the Red Creek sub-watershed (HUC 050200040402). The lower half of the Salamander Run ski trail on NFS lands and all 189 feet of the connector trail appear to occur within the Yoakum Run drainage of the Upper Blackwater River sub-watershed (HUC 050200040201). This area of NFS land was used to analyze potential direct and indirect effects to aquatic and riparian resources associated with the Timberline SUP proposal.

Activities being proposed on NFS lands for the Timberline SUP are connected to similar activities on portions of privately owned land within the Stonecoal Run and Yoakum Run drainages. These and other activities that would likely occur within the Stonecoal Run and Yoakum Run drainages during the analysis period were considered for cumulative effects analysis. The Stonecoal Run and Yoakum Run drainages were selected as the cumulative effects area because proposed project activities are restricted to these watersheds and anticipated direct and indirect effects associated with the proposal would not reasonably be expected to be detectable beyond these watersheds.

Methodology

An assessment of watershed conditions was recently conducted for both the Red Creek sub-watershed and the Blackwater River watershed as part of the forest plan revision process for the Monongahela National Forest. These assessments, in combination with information collected by interdisciplinary team members during site investigations, information from literature reviews, and information readily available from other databases (such as geographic information systems and historic survey records), form the basis of the aquatic and riparian resources analysis and conclusions.

In addition, water samples were collected at various stages of Timberline's water irrigation and snowmaking operations to assess the potential for snowmaking operations at Timberline to influence soil chemistry and terrestrial habitat conditions within the snowmaking zone. Samples of untreated source water were collected from a water source reservoir in Yoakum Run. Samples of irrigation water that had been treated with Snomax® were collected prior to its distribution to snowmaking spray guns and as the Snomax® treated water exited spray guns located along the ski slopes. Water samples were delivered to the Fernow Timber and Watershed Lab (USDA

Forest Service, Northern Research Station) in Parsons, WV and analyzed for pH, conductivity, acid neutralizing capacity (ANC), and base cations and anions.

The analysis for aquatic and riparian resources generally considers long-term effects to approximate a 10 year period and short-term effects to be less than 5 years.

Existing Condition

Proposed activities on NFS lands within the Red Creek sub-watershed are located in the headwaters of Stonecoal Run, a tributary to Red Creek. The Stonecoal Run drainage is overwhelmingly comprised of NFS lands designated as Wilderness, and therefore stream and riparian resources in this drainage are now influenced principally by natural process. However, data from water chemistry monitoring in upper and lower Stonecoal Run indicate that this aquatic system is chronically acidic (see Table 3.3). Water chemistry data from Stonecoal Run shows a range of spring and fall pH values that remain below 4.5 and ANC values that are negative. These values for pH and ANC suggest that aquatic fauna is severely limited, if not absent from Stonecoal Run.

Table 3.3. Stream pH and Acid Neutralizing Capacity (ANC) in upper and lower Stonecoal Run as a result of water chemistry monitoring during 2001, 2002, 2005, 2006, and 2007

Parameter	Sample Period	Upper Stonecoal Run	Lower Stonecoal Run
Stream pH	Fall 2001	4.28	4.46
	Spring 2002	4.04	4.13
	Spring 2005	4.15	4.25
	Spring 2006	4.08	4.23
	Fall 2006	4.13	4.21
	Spring 2007	4.24	4.30
	Fall 2007	4.32	4.31
Stream ANC	Fall 2001	-61.3	-35.2
	Spring 2002	-107.9	-83.8
	Spring 2005	-68.3	-36.9
	Spring 2006	-66.0	-52.3
	Fall 2006	-87.5	-63.5
	Spring 2007	-55.91	-48.0
	Fall 2007	-93.3	-105.4

Other streams within the Red Creek sub-watershed are inhabited by 13 fish species representing Cyprinidae (minnow), Catostomidae (sucker), Salmonidae (trout), Cottidae (sculpin), and Ictaluridae (catfish) fish families. One fish species inhabiting the Red Creek watershed, pearl dace (*Margariscus margarita*), is on the Regional Forester's sensitive species list. Though no fish population surveys were specifically conducted for this project proposal, pearl dace have previously been documented in Red Creek at locations that are no closer than approximately 5 stream miles from the proposed project area. This suggests pearl dace occur beyond the limits of anticipated direct, indirect, or cumulative effects associated with this project proposal.

Differences in the occurrence of aquatic biota in Stonecoal Run and Red Creek can largely be explained by the relative composition and location of surficial geology associated with their respective watershed areas. Surficial geology is one of the primary determinants for stream water chemistry and is an important consideration when assessing biological potential for aquatic ecosystems on the Forest. Surficial geology across the Forest has been classified as high, moderate, and low acid sensitivity by Forest Geologists. Geologic formations classified as high acid sensitivity contribute little alkalinity or acid neutralizing capacity to streams. Conversely, geologic formations classified as low acid sensitivity have a greater capacity to neutralize sources of acid inputs, such as acid rain.

Surficial geology within the Stonecoal Run watershed consists of various strata that represent high, moderate, and low acid sensitive classifications (Figure 2 in the Aquatics Report in the project record). High acid sensitive geology in Stonecoal Run consists of the Pottsville Group and it occupies the upper and much of the lower half of the watershed area. Moderate acid sensitive geology in Stonecoal Run consists of the Allegheny Formation, and it also occupies the upper and middle portion of the watershed. Low acid sensitive geology consists of the Conemaugh Group, and it occupies some of the upper half of the drainage area and a small area near the mouth. Though these and other geologic formations also occur in the Red Creek watershed, there is a much greater expression, and therefore influence, of surficial geology that is rated low for acid sensitivity.

Proposed activities on NFS lands within the Upper Blackwater River sub-watershed are located in the headwaters of Yoakum Run. Yoakum Run is a tributary to the Blackwater River and is almost exclusively comprised of privately owned land. Activities that are connected to Timberline's proposed operations on NFS lands occur down slope in Yoakum Run on privately owned land. The Blackwater River watershed is inhabited by 23 fish species representing Cyprinidae (minnow), Catostomidae (sucker), Salmonidae (trout), Centrarchidae (bass), and Percidae (perch) fish families. One fish species inhabiting the Blackwater River watershed, redbreast dace (*Clinostomus elongatus*), is on the Regional Forester's sensitive species list.

A 1987 stream survey conducted by West Virginia Division of Natural Resources about 1.4 miles upstream from the mouth of Yoakum Run found 4 fish species, including brook trout (*Salvelinus fontinalis*). Recorded comments from this survey state that stream siltation had increased extensively in this stream. Though no specific fish population surveys were conducted for this project proposal, redbreast dace have historically been documented in Blackwater River no closer than 2 stream miles from the proposed project area. This suggests redbreast dace likely occur beyond the limits of direct effects associated with this project proposal but potentially occur within the cumulative effects area for this proposal.

Data for surface water chemistry in Yoakum Run is limited to samples collected during March 2008 from a water source reservoir in Yoakum Run and the irrigation system used for snowmaking operations at Timberline (see Table 3.2). Results from these samples indicate that surface water in the Yoakum Run reservoir is circum-neutral and well-buffered against acid inputs. A review of surficial geology in the Yoakum Run drainage suggests the low acid sensitive geology (Greenbrier Group and Mauch Chunk Group) that occupies much of the middle portion of drainage is effectively buffering surface water in the vicinity of the water source reservoir despite the headwaters of Yoakum Run being composed of high acid sensitive geology (Pottsville Group). Based on evidence from forest-wide water chemistry monitoring that shows strong associations between stream water chemistry and acid sensitivity classification

for surficial geology, it is likely that streams in the headwater area of Yoakum Run possess considerably lower pH, conductivity, and ANC values than those revealed in the reservoir water sample.

Direct/Indirect Environmental Consequences by Alternative

Effects Common to All Alternatives

Given the headwater location of the proposed project, floodplains are expected to be nearly non-existent within the project area and limited to very narrow strips along the small, headwater channels within the cumulative effects area. Also, information obtained from the US Fish and Wildlife Service National Wetlands Inventory indicates that no wetlands occur within the project area (map in project file). Direct effects to floodplains and wetlands are not expected as a result of this project proposal. Potential indirect and cumulative effects to floodplains and wetlands would be expected to be negligible if they occur. Municipal watersheds do not exist within the project area, so no effects would be expected for municipal water facilities.

Alternative 1 – No Action

Direct and Indirect Effects

The No Action alternative would likely result in an over-all reduction of stream sedimentation from sources on NFS lands over the long-term. Short-term sediment production to streams would be possible during the extraction of the existing irrigation infrastructure and subsequent rehabilitation of the disturbed area on NFS land. The extent and duration of potential sediment effects to streams from these activities would not be expected to exceed that which would likely continue to occur from activities on NFS lands under Alternative 2.

It is not known if Timberline would consider constructing new ski runs on private lands to replace opportunities lost on NFS lands under the No Action alternative. If new ski runs were constructed on private land as a consequence of selecting the No Action alternative, it would likely increase over-all sediment production to streams in the Yoakum Run drainage beyond that which would be expected under Alternative 2. However, it is not practical to assess and discuss the significance of this particular potential to increase sediment production to streams in Yoakum Run since there is no information to support such an analysis. Based on information that is currently available, it is assumed that future development of ski runs on privately owned land and associated risks for increased stream sedimentation would not occur.

Under the No Action alternative, winter in-stream flows in Yoakum Run may return to a more natural flow regime if there is a reduced need for snowmaking operations. This effect is not expected to substantially alter the suitability of in-stream habitat conditions because snowmaking operations merely redistribute impounded water from the Yoakum Run drainage onto its slopes in the form of snow. Since the quantity of water yield to Yoakum Run is not changed by an inter-basin transfer of water, effects to the stream hydrograph, and therefore aquatic habitat suitability, are likely limited to alterations in the timing and frequency of high and low flow periods.

Cumulative Effects

Cumulative effects of the No Action alternative would not be expected to deviate substantially from conditions that exist today. As such, cumulative effects associated with Alternative 1 would be expected to result in the following determinations for Regional Forester's sensitive fish species.

- redbreast dace (*Clinostomus elongatus*) - may impact individuals but not likely to cause a trend to federal listing or a loss of viability
- pearl dace (*Margariscus margarita*) - no impacts

Alternative 2 – Proposed Action

Direct and Indirect Effects

This alternative seeks to continue operations and activities on NFS lands that have been ongoing for approximately 20 years. Direct effects of authorizing the SUP on NFS lands is believed to present relatively minor risks for aquatic and riparian resources. The primary aquatic resource issue related to this proposal would appear to involve a continuation of the current capacity for elevated stream sedimentation resulting from surface erosion along the existing trail system.

Although there is a well-established footprint for the trails used in conjunction with the various recreational operations, and this proposal does not include a request to expand operations beyond current facilities on NFS lands, there would likely be an on-going challenge to minimize potential impacts associated with the existing footprint. Limiting stream sedimentation to acceptable levels could prove particularly difficult if trail conditions are not properly managed and maintained to accommodate anticipated use.

Forest Plan requirements would be employed for the control of potential soil erosion. The soil resources report also contains recommendations that would help limit the potential for adverse effects to aquatic resources from sediment production.

Limited water quality data previously collected during snowmaking operations to monitor potential effects of Snomax® on stream water chemistry has not indicated a reason for concern. However, future monitoring may help identify potential effects to soil water chemistry as a result of applying irrigation water with circum-neutral pH onto slopes with soils that tend to inherently be more acidic. These potential effects to soil chemistry associated with snowmaking operations are not expected to pose a concern for in-stream conditions.

Cumulative Impacts

Cumulative effects of the Proposed Action alternative would not be expected to deviate substantially from conditions that exist today. This is because the proposed actions are a continuation of the current conditions, which have been on-going for approximately 20 years. As such, cumulative effects associated with Alternative 2 would be expected to result in the following determinations for Regional Forester's sensitive fish species.

- redbreast dace (*Clinostomus elongatus*) - may impact individuals but not likely to cause a trend to federal listing or a loss of viability
- pearl dace (*Margariscus margarita*) - no impacts

Irreversible or Irretrievable Commitment of Resources

It is expected that there would be no irreversible or irretrievable commitments of aquatic or riparian resources as a result of either of the alternatives analyzed.

Consistency with the Forest Plan, Laws, Regulations, and Handbooks

The alternatives that were analyzed are consistent with the Forest Plan, laws, regulations, and handbook direction pertaining to aquatic and riparian resources management.

3.5 Wildlife – Threatened and Endangered Species

Methodology

The Timberline Biological Assessment & Evaluation (BA/BE) (Evans 2008) documents the review of office records and field site visits, and the analysis of the effects of implementing the proposed action of the Timberline SUP authorization on endangered, threatened and sensitive species. The BA/BE was written utilizing the results of botanical surveys, site checks to determine habitat type, consulting existing threatened, endangered, and sensitive (TES) species area records, and discussions with the West Virginia Field Office of U.S. Fish and Wildlife Service (USFWS), West Virginia Division of Natural Resources (WVDNR), and Dr. Thomas Pauley of Marshall University.

Existing Condition and Direct/Indirect Environmental Consequences by Species

Potential impacts to Threatened and Endangered species (Table 3.4 for wildlife species and Table 3.5 for plant species) have been analyzed in the Timberline Biological Assessment & Evaluation (Evans 2008). Currently, there are no species proposed for listing on the MNF or any proposed critical habitat.

Table 3.4. Effects for threatened and endangered wildlife species

Species	Effects for Alternatives 1 and 2
Virginia big-eared bat (<i>Corynorhinus townsendii virginianus</i>)	No Effect
Indiana bat (<i>Myotis sodalis</i>)	No Effect
Northern flying squirrel (<i>Glaucomys sabrinus fuscus</i>)	May Affect
Cheat Mountain salamander (<i>Plethodon nettingi</i>)	May Affect

3.5.1 Virginia Big-eared Bat

The project area falls outside of any Virginia big-eared bat foraging range as it is over 7 miles to the nearest Virginia big-eared bat hibernacula. Specific Virginia big-eared bat life history and habitat requirements can be found in the Final Environmental Impact Statement (MNF 2006) for the Forest Plan.

The project area is not within primary foraging area. There would be no trees cut; therefore there would be no effects to Virginia big-eared bats or primary habitat.

3.5.2 Indiana Bat

The project area falls outside of any Indiana bat primary range as it is over 10 miles to the nearest Indiana bat hibernacula. Likewise, no maternity sites occur in this area, the closest being over 10 miles away. Specific Indiana bat life history and habitat requirements can be found in the Final Environmental Impact Statement (MNF 2006) for the Forest Plan.

The project area is not within primary foraging area. There would be no trees harvested; therefore there would be no effects to Indiana bats.

3.5.3 Northern Flying Squirrel and its Habitat

The northern flying squirrel is a nocturnal species that inhabits disjunction “islands” of high-elevation forest in the central Appalachians of eastern West Virginia and western Virginia (Menzel et al. 2004). The West Virginia subspecies of the northern flying squirrel occurs in a very small range that appears to have been isolated by habitat changes since the last ice age (USFWS 2001).

Throughout their range, northern flying squirrels use both tree cavities and leaf nests (Menzel et al. 2004). The squirrels apparently subsist on lichens and fungi, but also eat seeds, buds, fruit, staminate cones, and insects (USFWS 2001). Fecal samples indicate the most common foods eaten were lichens, fungi (mostly underground/hypogeous), pollen, and insects (Stihler 1994b).

In the central Appalachians, northern flying squirrels commonly prefer conifer/hardwood ecotones or mosaics dominated by red spruce and fir with hemlock, beech, yellow birch, sugar or red maple, and black cherry associates. Northern flying squirrels have also been captured in northern hardwoods with a conifer understory (Stihler et al. 1995). Northern flying squirrels have been captured in stands of various ages, understories, densities, and species composition, but most have been in moist forests with some widely-spaced, mature trees, abundant standing and downed snags (USFWS 2001), usually with some conifer (spruce, hemlock, fir) present (Stihler 1994c). These habitats seem well suited to the squirrel’s gliding locomotion, cavity nest requirements, and reliance on wood-borne fungi and lichens for food (USFWS 2001).

Ford et al. (in press) reports “The discovery of additional populations of the Virginia northern flying squirrel on both public and private forest lands in the mid-1990s indicates that the subspecies is more widely distributed than formerly thought (Odom et al. 2001). These new records helped initiate comprehensive home range, habitat use, and food-habits research that provided many additional insights into the subspecies’ biology (Ford et al. 2004, Menzel et al. 2004, Menzel et al. 2006b, Mitchell 2001, Reynolds et al. 1999). The current distribution of the Virginia northern flying squirrel in West Virginia lies mainly within the Monongahela National Forest, Canaan Valley National Wildlife Refuge, three areas managed by West Virginia Division of Natural Resources, and a small number of corporate ownerships in Grant, Greenbrier, Pendleton, Pocahontas, Randolph, Tucker, and Webster counties. In Virginia, the subspecies is restricted to western Highland County on the George Washington National Forest and surrounding private land along the West Virginia boundary (Stihler et al. 1995, Menzel et al. 2006a).”

Regionally, the probability of Virginia northern flying squirrel occurrence is greatest at elevations above 1,000 m and in older, second-growth forest stands dominated by montane conifers such as red spruce, Norway spruce (*Picea abies*) or eastern hemlock (Ford et al. 2004, Menzel et al. 2006a). Radio-telemetry work by Menzel et al. (2006b) confirmed that Virginia northern flying squirrel use of stands containing spruce is disproportionately high relative to the availability of these stands in the local landscape. The subspecies occupies and uses northern hardwood forest communities adjacent to stands with a montane conifer component, as most extant red spruce stands are fragmented and contained wholly within a northern hardwood forest matrix. Additionally, snags and live trees with cavities suitable for day-dens probably are more abundant in northern hardwood forests currently than in many red spruce-dominated stands as the region's forests continue to recover from past disturbance (Menzel et al. 2004)."

Northern flying squirrel (NFS) at Timberline

The Monongahela National Forest is believed to contain most of the range-wide habitat for the West Virginia northern flying squirrel (USFWS 2006). Suitable habitat is managed under Forest-wide direction that largely protects it from negative impacts. Suitable habitat is identified and mapped consistent with the Guidelines for Habitat Identification and Management found in the updated *Appalachian Northern Flying Squirrels Recovery Plan* (USFWS 2001). At the Forest-wide level, suitable habitat is identified and mapped based on the MNF's stand inventory forest type and plot data. A map of suitable habitat is collaboratively produced between the MNF, USFWS, and WVDNR. The map is reviewed and refined at the project level based on aerial or satellite imagery supplemented with field reconnaissance. All capture locations are included in suitable habitat. All mapped suitable habitat is assumed to be occupied by NFS.

Northern flying squirrel nest box monitoring was completed in 1988 and 1989 by E. Michael, WV University. No captures were recorded during these efforts. Craig Stihler, WVDNR completed trapping and nest box checks in 1991, 2003, and 2004. Four NFS were captured during these efforts. Jennifer Menzel, WVU PhD candidate also radio collared a NFS within Canaan Valley Refuge and tracked its movements to areas close to Timberline.

Salamander Run falls within MNF's NFS occupied habitat. As such, NFS is assumed present in the project area.

Alternative 1 – No Action – Direct, Indirect, & Cumulative Effects

Activity: Downhill skiing would not take place on the Salamander Run slope. There would be no snowmaking on Salamander Run. Snow making equipment would be removed, so some ground disturbance and surface rehabilitation would take place. Downhill skiing and associated activities would continue on remaining slopes owned by Timberline resort.

Direct Effect on NFS: No downhill skiing activity on the slope during the winter would result in an infinitesimally small chance encounter between squirrels and humans. Removal of snowmaking equipment and associated surface rehabilitation would have no direct effects on NFS as these activities would take place during daylight hours and NFS are almost exclusively nocturnal.

Indirect Effect on NFS: Noise created by skiers, snow-makers and snow-groomers would be even less than what is identified in the proposed action. Over time, early successional

vegetation would be established on the slope and eventually, tree species would grow, diminishing the currently open slope condition, reducing any squirrels risk of predation.

Activity: Cross country skiing activity may take place on the existing connector trail and the abandoned road during daylight hours potentially from November thru April (weather dependant).

Direct Effect on NFS: It is possible that cross country skiing would take place on the slope as long as it provides suitable cross county skiing conditions. Timberline resort would not have authorization to improve this area for cross country skiing. Therefore as long as conditions are suitable, direct affects would be the same as identified in the proposed action.

Indirect Effect on NFS: It is possible that cross country skiing would take place on the slope as long as it provides suitable cross county skiing conditions. Timberline resort would not have authorization to improve this area for cross country skiing. Therefore as long as conditions are suitable, indirect affects would be the same as identified in the proposed action.

Activity: Mountain biking activity takes place on Salamander Run, the connector trail, and the abandoned road during daylight hours from May thru November (weather dependant).

Direct Effect on NFS: It is possible that mountain bike users would still use all three trails as long as conditions are suitable. Therefore, direct affects would be the same as identified in the proposed action.

Indirect Effect on NFS: It is possible that mountain bike users would still use all three trails as long as conditions are suitable. Timberline would not have authorization to improve this area for mountain biking. Therefore as long as conditions are suitable, indirect affects would be the same as identified in the proposed action.

Activity: Hiking activity takes place on Salamander Run, the connector trail, and the abandoned road. This activity potentially takes place year around.

Direct Effect on NFS: It is expected that hikers would still be using existing the slope, connector trail, and abandoned road during daylight hours. NFS are nocturnal and the chance of direct encounters between a hiker and a NFS are so slim as to be considered discountable.

Indirect Effect on NFS: The human disturbance created from individuals walking along these areas would be discountable to a nesting squirrel.

Activity: CMS monitoring may or may not continue in the No Action alternative.

Direct and Indirect Effects on NFS: This activity or lack of activity would have no direct or indirect effects on NFS.

Activity: Spruce planting would not take place in the no action alternative.

Direct and Indirect Effects on NFS: This lack of activity would have no direct or indirect effects on NFS.

Activity: Timberline would not install and annually maintain additional snow/wind fences throughout the wooded area.

Direct and Indirect Effects on NFS: This lack of activity would have no direct or indirect effects on NFS.

Activity: Timberline would not install cover boards throughout the wooded area within the apex of Salamander Run.

Direct and Indirect Effects on NFS: This lack of activity would have no direct or indirect effects on NFS.

Cumulative Effects

The extremely small number of acres affected by implementing the No Action alternative would create a negligible difference in the overall number of acres of disturbed or altered spruce habitat. The point can be made that reductions in any disturbed suitable habitat is beneficial, however, Timberline does not have any provisions in place to protect northern flying squirrel habitat from further residential or recreational development.

Alternative 2 – Proposed Action – Direct, Indirect, & Cumulative Effects

Activity: Downhill skiing takes place on an existing ski slope during day and evening hours potentially from November thru April (weather dependant).

Direct Effect on NFS: Downhill skiers stay within the designated maintained ski slope area. Skiing would take place daily from November thru April usually from 8 AM thru 9 PM. Night skiing is available from Thursday thru Saturday from 4:30 – 9:00 PM, during which the slope is well lit, mimicking diurnal conditions. NFS are nocturnal therefore the chance of direct encounters between a skier and a NFS are so slim as to be considered discountable.

Indirect Effect on NFS: Additional lights and noise created by skiers, snow-makers and snow groomers, may indirectly affect any squirrels nesting adjacent to the slope, however based on research done by Ford et al. (in press) around Snowshoe Mountain Resort (SMR) in 2003, captures occurred less than 25m (82 feet) from the slope and displayed foraging activity bouts when grooming machines were active on the site. Slope width may impact foraging activity, however given current research information; Salamander Run does not exceed a width creating a physical or behavioral barrier to movement. At Snowshoe Mountain, Ford et al. (in press) found the majority of ski runs where Northern flying squirrels were tracked were 35m (115 feet) wide or less. Ski run width at SMR apparently did not impede movement of male Virginia northern flying squirrels and forest patch size and configuration surrounding the ski runs were still sufficient to support squirrel presence, including reproductively successful females (BHE Environmental Inc. 2005). Whether or not these openings present barriers to foraging and dispersal or reduce foraging efficiency, large amounts of linear edge or cleared area undoubtedly increase the risk of predation for northern flying squirrels.

Activity: Cross country skiing activity may take place on the existing connector trail and the abandoned road during daylight hours potentially from November to April (weather dependant).

Direct Effect on NFS: Cross country skiers usually stay on designated trails. Skiing could take place daily from November thru April from 8 AM until dark. NFS are nocturnal and the chance of direct encounters between a skier and a NFS are so slim as to be considered discountable.

Indirect Effect on NFS: Cross country ski trails are essentially the same as hiking trails. There is very little maintenance involved therefore, no trees and only an occasional overhead

limb maybe cut for safety reasons. Ford et al. (in press) tracked a female NFS at Canaan Valley Refuge in 2003. This squirrel occupied an area adjacent to frequently used cross-country ski trails and was within visual and auditory range of a nearby downhill ski slope that was illuminated for night use further acknowledging little effects of cross country skiing activities on NFS.

Activity: Mountain biking activity takes place on Salamander Run, the connector trail, and the abandoned road during daylight hours from May thru November (weather dependant).

Direct Effect on NFS: Mountain bike users would be using the above listed trails during daylight hours. NFS are nocturnal and the chance of direct encounters between a mountain biker and a NFS are so slim as to be considered discountable.

Indirect Effect on NFS: Mountain bike users would be using the above listed trails during daylight hours and unless riders are taking a break, changing a tire or fall off, they would be continually moving along the trail. NFS are nocturnal creatures and human disturbance caused by traveling down a trail would be discountable to a nesting squirrel. There would be no cutting of trees associated with mountain bike use on these three areas and all operation and maintenance would be approved by the Forest Service prior to implementation.

Activity: Hiking activity takes place on Salamander Run, the connector trail, and the abandoned road. This activity potentially takes place year around.

Direct Effect on NFS: Hikers would be using existing trails during daylight hours. NFS are nocturnal and the chance of direct encounters between a hiker and a NFS are so slim as to be considered discountable.

Indirect Effect on NFS: The human disturbance created from individuals walking along these areas is discountable to a nesting squirrel.

Activity: Cheat Mountain salamander population monitoring would continue annually.

Direct Effect on NFS: None

Indirect Effect on NFS: None

Activity: Timberline would plant additional spruce (i.e. red spruce, but not Norway spruce) and hardwood trees throughout the wooded area.

Direct Effect on NFS: None

Indirect Effect on NFS: Additional tree planting around the slopes perimeter may provide higher quality NFS habitat in the future. Efforts to increase the extent of red spruce-dominated forests and their structural complexity (Carey 2001, 2003) could improve West Virginia northern flying squirrel habitat and increase connectivity between occupied patches (Browne et al. 1999, Menzel et al. 2006a, Rentch et al. 2007, Schuler et al. 2002). Also, red spruce forests contain higher abundances of hypogeous fungi than do northern hardwoods (Bird and McCleneghan 2005, Loeb et al. 2000) due to ectomycorrhizal associations between fungi and host tree species and the moist, shaded conditions with abundant coarse woody debris. These fungi constitute a major diet component for northern flying squirrels in the Appalachians (Mitchell 2001) and elsewhere (Lehmkuhl et al. 2004, Meyer et al. 2005b). Although minimal in affects, forests dominated by red spruce may support fewer competitors, such as southern flying squirrels that require cacheable high-energy foods, such

as acorns, during the winter (Holloway and Malcolm 2007b, Stapp 1992), thereby enhancing northern flying squirrel viability.

Activity: Timberline would install and annually maintain additional snow/wind fences throughout the wooded area.

Direct Effect on NFS: None

Indirect Effect on NFS: Additional ground litter (LWD, leaf) may increase fungi growth increasing potential food source.

Activity: Timberline would install cover boards throughout the wooded area within the apex of Salamander Run.

Direct Effect on NFS: None

Indirect Effect on NFS: None

Cumulative Effects

Although most deleterious forest harvesting activities have ceased where Northern flying squirrels occur and delisting is possible, serious issues to the subspecies' conservation remain. These are believed to include habitat impacts from forest health issues, atmospheric acid deposition, and climate change, as well as parasite-mediated competition with southern flying squirrels (*G. volans*) (Arbogast et al. 2005, Mielkl et al. 1986, Pagels et al. 1990, Pauli et al. 2004, Weigl 1978, Wiegl 2007). However, residential and recreational development often associated with the ski industry is causing drastic habitat degradation in some localized areas via permanent forest clearing (Schuler et al. 2002). Though generally small in extent relative to the entire distribution, such development on private lands in occupied habitat still requires effort to minimize impacts and conduct mitigation measures.

Although the Monongahela National Forest contains a large expanse of occupied northern flying squirrel habitat, private land suitable for northern flying squirrels does exist. Vacation homes, utility rights-of-ways, gas pipelines, roads, and possibly even wind farm development could occur in high elevation spruce habitat resulting in an overall decline of suitable squirrel habitat. It is possible that Timberline could expand their operations either for snow skiing or vacation homes and affect the overall quality and quantity of spruce habitat in this project area. However, the Forest Service and the adjacent Fish and Wildlife Refuge lands would be protected from further development.

3.5.4 Cheat Mountain Salamander and its Habitat

On September 28, 1989 the U.S. Fish and Wildlife Service determined that the Cheat Mountain salamander (CMS), *Plethodon nettingi* Green 1938, was in threatened Status (Federal Register, Vol. 53, No. 188:37814-37818). A Cheat Mountain Salamander Recovery Plan was released on July 25, 1991 by the USFWS.

The Cheat Mountain salamander is a woodland species found only in West Virginia. While it appears to prefer red spruce forests, it has been found in hardwood stands some distance from spruce stands which, historically, may have been spruce stands. Historically, the range of CMS was likely more extensive than it is today. CMS is now a relict species of approximately 80 disjunct populations (Pauley in press). Their range is presently known to occur in five counties:

Randolph, Pendleton, Pocahontas, Tucker, and the most western edge of Grant County (Pauley, in press).

Cheat Mountain salamanders largely occur in coniferous and mixed conifer-deciduous forest stands with a bryophyte (*Bazzania* spp)-dominated forest floor at elevations above 2,000 feet, in or under logs, under rocks and mosses, and where critical temperatures, humidity, and moisture regimes meet their close tolerance needs. Pauley (1980b) found CMS to occur not only in red spruce forests, but also in northern hardwoods stands dominated by red maple, yellow birch, black cherry, and other hardwoods with little or no conifer component. Rock outcrops, emergent rocks, boulder fields, Bryophytes, and/or downed logs are usually present.

Surface activity and abundance of Cheat Mountain salamanders are influenced by environmental conditions (Santiago 1999). Depending on soil temperature, CMS retreat to underground refugia in mid October and emerge from winter refugia at the end of March (AmphibiaWeb, 2008)

Because *P. nettingi* is lung-less and respire through the skin and lining of the mouth, it is restricted to moist cool habitats. For this reason, relative humidity and soil temperature are critical for it to survive. Salamanders have preferred temperature ranges that minimize dehydration (Spotila 1972). Because of these physiological requirements, CMS survival requires microhabitats with high relative humidity or moisture (Feder 1983, Feder and Pough 1975) and acceptable temperatures. Foraging and mating, thus, are inhibited or enhanced by these external conditions (Keen 1984). Foraging on the forest floor, and occasionally on tree trunks, is done at dusk (Green and Pauley 1987) when relative humidity is high. On dry nights, they do not leave their moist retreats to forage (Spotila 1972). Eggs have been found in and under rotting logs, and under rocks (Brooks 1948, Green and Pauley 1987).

Vegetative structure affects salamander populations. Moist old growth stands have greater abundance and species richness than dry old growth or younger stands of various moisture levels (Welsh and Lind 1988), probably due to the complex structure of older stands and resulting amenable microclimates. Old stands provide dense litter layers, abundant woody debris, and stratified canopies, which all enhance moisture retention (Petranka et al. 1994) and limit moisture and temperature variations in the forest floor.

Home ranges tend to be very small (Marvin 2001), on the order of a few meters to a few dozen meters in diameter. These salamanders rarely successfully traverse inhospitable habitats such as roadways, rivers and lakes, or open, dry sites. These areas pose formidable impediments to movement and generally function as barriers, with the effect increasing with size. Populations have been fragmented by habitat modifications such as timbering, mining, recreational development, and road construction. Habitat alterations may favor the encroachment of mountain dusky and redback salamanders, which may subsequently out-compete the Cheat Mountain salamander for food and microhabitat (West Virginia Division of Natural Resources web site, 1998).

Pauley and Watson (2003) found that CMS abundance increased with distance from forest opening edge created by forest regeneration areas, ski trails, and roads. Because extant CMS populations are small and geographically isolated, loss of genetic diversity also is thought to threaten the species (USFWS 1991).

Cheat Mountain Salamander Habitat at Timberline and Adjacent Forest Service land

Habitat assessment was completed for potential Cheat Mountain salamander sites on Forest Service and adjacent Timberline land by Dr. Tom Pauley in December 2007. Recommendations for additional inventories and conservation measures have been identified in that report.

In general, the area surrounding Timberline's ski lift terminus is classic *P. nettingi* habitat. This potential habitat continues down-slope to the north and northeast and crosses onto Forest Service land. There is additional potential habitat located on Timberline property between Salamander Run and adjacent ski slopes to the west.

Summary of the CMS Monitoring Study

The study area is within the Monongahela National Forest adjacent to the Salamander Run ski slope. Monitoring data is collected on 42 study sites located along four parallel transects in the forested area between the hairpin turn of Salamander Run, two transects are located on the ridge and two are on the side-slope.

The monitoring study of the CMS on National Forest at Timberline has taken place annually since 1986. Study results as of 2007 indicate 881 Cheat Mountain Salamanders observations. Salamander gender was recorded starting in 1990. Since then, 805 Cheat Mountain salamanders have been observed including 277 males, 301 females, 124 sub-adults, and 58 juveniles (45 escaped before gender could be determined). Complete monitoring report results can be found in the project file, Elkins, WV.

Alternative 1 – No Action – Direct, Indirect, & Cumulative Effects

Activity: Downhill skiing would not take place on the Salamander Run slope. There would be no snowmaking on Salamander Run. Snowmaking equipment would be removed, so some ground disturbance and surface rehabilitation would take place. Downhill skiing and associated activities would continue on remaining slopes owned by Timberline Resort.

Direct Effect on CMS: During winter, CMS are well below the ground surface; therefore, there would be no direct effects to salamanders from not skiing, not making snow, or not maintaining the slope. Snow making equipment is located along the slope perimeter and would be removed under this activity. Soil disturbance from this activity would have no affect on CMS because this area's microclimate is not suitable CMS habitat.

Indirect Effect on CMS: Eventually, with no maintenance or downhill ski use, the slope would re-vegetate. Although this area would still be extremely compacted, making it less accessible for salamander movement, eventually trees would grow up, creating shade and woody cover objects available for salamander use.

Activity: Cross country skiing activity would take place on existing connector trail and the abandoned road during daylight hours, potentially from November through April (weather dependant).

Direct Effect on CMS: It is possible that cross country skiing would take place on the slope as long as it provides suitable cross county skiing conditions. As long as conditions are suitable, direct affects would be the same as the proposed action.

Indirect Effect on CMS: Timberline resort would not have authorization to improve this area for cross country skiing. Therefore, as long as conditions are suitable, it is possible that cross country skiing activity would take place. Depending upon amount of use, even this winter activity could hamper natural revegetation of the area; however, indirect effects would be considered minimal and discountable.

Activity: Mountain biking activity would take place on Salamander Run, the connector trail, and the abandoned road during daylight hours from May through November (weather dependant).

Direct Effect on CMS: Cheat Mountain salamanders are not found on Salamander Run itself in the summer, as it is too open, there is not adequate cover, ground temperatures are too high, and depth of surface compaction is too great. Therefore, mountain bike activities taking place on Salamander Run would have no direct effect on CMS. There is a discountable possibility that a mountain bike rider could run over a CMS on the connector trail or the abandoned road if the salamander was on the trail or road surface.

Indirect Effect on CMS: With lack of maintenance, Salamander Run's open nature would eventually be replaced with successional vegetation. It is reasonable to assume that mountain bike use would continue on Salamander Run even if it is no longer used as a ski slope until such time as conditions are not suitable for mountain biking. Based on the slope's current compaction level, any possible compaction caused by mountain bikes would be insignificant. Indirect effects of mountain bike use on the connector trail and the abandoned road would be the same as those identified in the proposed action.

Activity: Hiking activities would take place on Salamander Run, the connector trail, and the abandoned road. These activities could potentially take place year around.

Direct Effect on CMS: Cheat Mountain salamanders are not found on the actual Salamander Run itself, as it is too open, there is not adequate ground cover, ground temperatures are too high, and depth of surface compaction is too great. Eventually, as this slope vegetates, the slope width would decrease, further reducing any possibility that a hiker could trample a CMS on the connector trail or the abandoned road if the salamander was on the trail or road surface.

Indirect Effect on CMS: Hikers may remove essential dead, fallen trees and woody debris from the trail or road surface, altering microhabitats essential to forest floor amphibians. Indirect effects are the same as those identified in the proposed action.

Activity: Cheat Mountain salamander population monitoring may or may not continue annually.

Direct and Indirect Effects on CMS: Whether or not we continue monitoring CMS, this activity would have no direct or indirect effects on CMS.

Activity: Timberline would not plant additional spruce (i.e. red spruce, but not Norway spruce) and hardwood trees throughout the wooded area.

Direct and Indirect Effects on CMS: This lack of activity would have no direct or indirect effects on CMS.

Activity: Timberline would not install and annually maintain additional leaf fences, and potentially place additional leaf litter throughout the wooded area.

Direct and Indirect Effects on CMS: This lack of activity would have no direct or indirect effects on CMS.

Activity: Timberline would not install native species cover slabs throughout the known CMS wooded area.

Direct and Indirect Effects on CMS: This lack of activity would have no direct or indirect effects on CMS.

Cumulative Effects

Environmental and biological data collected in the project site since 1986 demonstrate that the Salamander Run ski slope at Timberline is negatively impacting the Cheat Mountain Salamander population on NFS land. It is uncertain, however, if, or how long, it would take for Salamander Run to revert back to suitable Cheat Mountain salamander habitat if the No Action alternative was selected. This Cheat Mountain salamander population could be located on the suitable habitat periphery of this population location. Removal of the slope from downhill skiing also does not preclude suitable Cheat Mountain salamander habitat on private land from continued development.

Alternative 2 – Proposed Action – Direct, Indirect, & Cumulative Effects

There are four primary activities (hiking, mountain biking, cross country skiing and downhill skiing) taking place at three locations (Salamander Run, connector trail, and the abandoned road) under this permit. Activities are seasonal and weather dependant.

Activity: Downhill skiing can take place on the existing ski slope daily from 8 AM to 9 PM from November thru April (weather dependant). Night skiing is available on Thursday thru Saturdays from 4:30pm-9:00pm. Snow making begins as early as November however does not take place after March 15. The ridge has an eastern aspect and the slope faces north.

Direct Effect on CMS: During winter, CMS are well below the ground surface, therefore there are no direct effects to salamanders from downhill skiing activity.

Timberline currently uses the additive Snomax® when making snow. The following information regarding Snomax® comes directly from a draft literature review completed by BHE Environmental, Inc in 2003. Impacts from direct exposure to this sterile, mutated form of the ice nucleating bacterium *Pseudomonas syringae* (Wallis et al. 1988), is dependant on timing and duration of application. Ice-nucleating activity may be prolonged beneath snow and salamanders may be exposed to Snomax® within their hibernacula by leaching of Snomax® laden water. Several tests have been conducted on the survival rate and ice nucleating activity of *P. syringae* in snow, soil, and water. Very little to no live *P. syringae* remained post experiments, however data suggests that the ice-nucleating activity of Snomax® may persist as long as two months (Wallis et al. 1988, Goodnow et al. 1990). Water applied during snowmaking in late autumn and spring could make contact with salamanders if salamanders are on the surface. No information has been located to assess the direct effect dripping Snomax® water would have on CMS. Timberline ceases snowmaking activities in March, and although it is possible that CMS could surface prior to that, the probability of that happening is low.

Indirect Effect on CMS: The creation and continued maintenance of the ski slope has altered the microclimate of the adjacent wooded area and also altered soil and vegetation on the slope itself. This is evidenced by data collected during the long-term monitoring study by Dr. Tom Pauley. Environmental data collected included air temperature, soil temperature and moisture, relative humidity at ground level, and light (foot candles) that penetrated the canopy. In 1992, litter weight and moisture were added and light measurements were discontinued because of inconsistent data that resulted from passing clouds and moving leaves. Maintaining the existing ski slope has created adverse environmental factors (increased ground temperature, higher air temperature, lower relative humidity, lower soil and litter moistures in the impact sites, competitive pressure for food and habitat and less than optimal available nesting sites). Microclimate changes have created conditions deleterious to the Cheat Mountain salamander. Changes in habitat can also increase competition from other salamanders, specifically, the Eastern red-backed salamander, a major competitor of the Cheat Mountain salamander. Red-backed salamanders, the most common woodland salamanders in the northeastern United States, consume the same types and sizes of prey items as Cheat Mountain salamanders and nest in the same habitats (Green and Pauley 1987).

Changes in forest canopy change ground vegetation. The salamander monitoring area is covered with hay-scented fern, which inhibits the growth of other plant species by preventing light from reaching the forest floor (Drew 1990; Horsley 1993). An increase in fern density is also associated with decreases in herbaceous plant diversity (Rooney and Dress 1997). Effects of fern on *P. nettingi* are not known, however personal observations by Dr. Pauley over several years of study suggest that salamanders, including *P. nettingi*, are less abundant in habitats associated with fern. Fern rhizoids tend to fill interstitial spaces between soil particles and between the soils and cover objects. This space under woody debris is often utilized by fern rhizoids to the possible exclusion of salamanders. Changes in the ground layer plant community may influence the invertebrate populations that salamanders utilize as food sources.

Indirect effects of Snomax® could result from impacts to salamander forage species, or plant species upon which salamander forage species depend. The ice-nucleating protein of Snomax® has been shown to cause mortalities within at least four insect orders (Coleoptera, Hemiptera, Hymenoptera and Lepidoptera). Ingestion of topical treatment with *P. syringae* increases the super-cooling point of these insects, thereby increasing the temperature at which the insects freeze. Strong-Gunderson et al. 1994 noted *P. syringae* lowered the super-cooling point whether the bacterium was alive or dead, or in dry powder or aqueous suspensions. Topical application appears to result in greater variability in super-cooling elevation than ingestion (Strong-Gunderson et al. 1992). Additionally, insects retained ingested bacteria in the gut even after purging in preparation for winter (Costanzo et al. 1998). Regardless of the type of exposure, super-cooling points remain elevated for at least 3 days after treatment (Strong-Gunderson et al. 1992). Assuming that the bacterium utilized in Snomax® would have the same effects on ants and beetles on and near areas treated at Timberline, effects to CMS need to be considered. Green and Pauley (1987) found the diet of CMS consists of mites, springtails, beetles, flies, ants and other miscellaneous prey, and there is a possibility Snomax® application could decrease prey abundance for the Cheat Mountain salamander.

Activity: Cross country skiing activity takes place on the existing connector trail and abandoned road during daylight hours potentially from November thru April (weather dependant).

Direct Effect on CMS: During winter, CMS are well below ground surface therefore there is no direct effect from cross country skiing activities on either area.

Indirect Effect on CMS: Timberline does not “groom” cross country trails and there is essentially no maintenance done to these trails specific to cross country skiing. The connector trail goes thru a closed canopy area and the trail surface consists of bare soil or leaf litter. There are no rocks or woody debris on the connector trail surface. The abandoned road is grass covered with some surface water ponding. Canopy closure runs from open to 100 percent closed. No maintenance takes place on this “road”.

Activity: Mountain biking activity takes place on Salamander Run, the connector trail, and the abandoned road during daylight hours from May thru November (weather dependant).

Direct Effect on CMS: Cheat Mountain salamanders are not found on the actual Salamander Run ski slope itself in the summer as it is too open, there are not adequate cover objects, ground temperatures are too high, and depth of surface compaction is too great. Therefore, mountain bike activities taking place on Salamander Run would have no direct effect on CMS. There is a discountable possibility that a mountain bike rider could run over a CMS on the connector trail or abandoned road if the salamander was on the trail or road surface.

Indirect Effect on CMS: Mountain bike users may inadvertently move dead, fallen trees and woody debris from the trail or road surface, altering microhabitats essential to forest floor amphibians. There is no authorized trail maintenance for Timberline in this permit. Bicycle use may create ruts, which over time can compact soil making it harder for subterranean salamander movement, increase erosion, which removes any leaf litter and ground cover accumulation, and provide distribution of non-native invasive plants, which may prevent native vegetation establishment.

Activity: Hiking activity takes place on Salamander Run, the connector trail, and the abandoned road. This activity potentially takes place year around.

Direct Effect on CMS: Cheat Mountain salamanders are not found on the actual Salamander Run ski slope itself as it is too open, there is not adequate ground cover objects, ground temperatures are too high, and depth of surface compaction is too great. There is a discountable possibility that a hiker could trample a CMS on the connector trail or the abandoned road if the salamander was on the trail or road surface.

Indirect Effect on CMS: Hikers may remove essential dead, fallen trees and woody debris from the trail or road surface, altering microhabitats essential to forest floor amphibians. There is no authorized trail maintenance for Timberline in this permit. Foot traffic may create ruts, which over time can compact soil making it harder for subterranean salamander movement, increase erosion, which removes any leaf litter and ground cover accumulation, and provide distribution of non-native invasive plants, which may prevent native vegetation establishment.

Activity: Cheat Mountain salamander population monitoring would continue annually.

Direct Effect on CMS: Monitoring of the Cheat Mountain salamander population began in August of 1986 and has continued through 2007 (Pauley records in project file). Data collected on the salamanders includes species identification, adult gender, and female reproductive status. Scientific collection can harm salamanders in particular; contact with the tail should be avoided because tails break off easily when handled. Tail loss may have negative effects on survivorship, reproduction and dominance interactions with conspecifics.

Amphibians dry rapidly during handling and a damp sponge is placed in the plastic box with the salamander to minimize drying. Reproductive status is determined by examining the condition of the male cloaca. Adult females are recorded as gravid (with mature follicles) or non-gravid. Mature follicles can easily be observed through the wall of the abdomen. Salamanders are maintained in captivity as briefly as possible to minimize human exposure. Although there is some risk to individuals, all protocol has been approved by USFWS and extreme care is taken to prevent harm or harassment to the CMS. Dr. Pauley does have an approved scientific collection permit authorized thru the WVDNR and USFWS.

Indirect Effect on CMS: Extreme caution is used when monitoring this population to ensure minimum impact occurs to cover objects, microclimate, and any CMS individuals. Monitoring protocol for this project has been approved by USFWS.

Activity: Timberline would plant additional spruce (i.e. red spruce, but not Norway spruce) and hardwood trees throughout the wooded area.

Direct Effect on CMS: Salamanders could be impaled by the shovels when holes are dug.

Indirect Effect on CMS: The placement of spruce trees along the edge of the slope would eventually create shade, provide additional cover objects, and provide a windbreak helping to keep the ground from drying out quite so quickly. Trees should be strategically placed to shade edges of the population to prevent direct ground drying. This project would enhance the microclimate within occupied CMS habitat. The trees used would be harvested from the local area in places where the trees would eventually be disturbed in some manor (example thru utility way clearing).

Activity: Timberline would install and annually maintain additional snow/wind fences and potentially place additional leaf litter throughout the wooded area.

Direct Effect on CMS: Salamanders could be impaled by the shovels when leaf fence is installed.

Indirect Effect on CMS: Leaf litter serves a refugium and shelter for salamanders protecting them from predators and desiccation. Hatchlings spend their first year or two in litter instead of seeking refuge under logs and rocks. For a population of salamanders to remain healthy, there must be a rich layer of leaf litter. To increase litter density, leaves would be retained on site instead of being blown away by the construction of fence barriers. In winter, this fence would serve as a snow brake, catching and holding snow which would slowly melt, hydrating the soil. This project would enhance the microclimate within occupied CMS habitat.

Activity: Timberline would install native species cover boards throughout the known CMS wooded area.

Direct Effect on CMS: None

Indirect Effect on CMS: The CMS colony does not have large amounts of woody debris providing surface cover to amphibian populations. Because the speed of natural woody debris recruitment is variable, adding cover boards from native species would provide additional area for CMS to forage, find refuge, and hibernate. Cover boards would be from the same tree species found in this habitat. Hemlock, walnut, locust species would not be used as these trees contain toxins which could negatively affect CMS. This project would enhance the microclimate within occupied CMS habitat.

Cumulative Effects

There is no way of knowing the Timberline CMS population size prior to ski slope development. Environmental and biological data collected in the project site since 1986 demonstrate that the Salamander Run ski slope at Timberline Four Season Resort is negatively impacting the Cheat Mountain Salamander population on NFS land. The latest information indicates 881 Cheat Mountain salamander observances. Individual yearly population information can be found in the project folder. A recent status report on CMS has just been completed (Pauley, in project record).

Cheat Mountain salamanders are endemic to only five counties in the Allegheny Mountains of eastern West Virginia (Pauley 2007 in press). Over 1,300 sites have been surveyed, of which only 80 contained *P.nettingi*. Since 1976, of the 80 populations that are known to support *P.nettingi*, one population (White Top) and possibly two others (Bald Knob and Mozark Mountain) have been extirpated and two have been reduced in size (Barton Knob and Thorny Flat). Strip mine activities destroyed the population at White Top and reduced the population at Barton Knob. Clearcuts and forest fires most likely terminated the populations at Bald Knob and Mozark Mountain and reduced the size of the Thorny Flat population (Pauley, in press). Approximately 60 of the 80 populations are on federal or state owned land, which provides them protection, but nearly all of these populations are impacted by roads, trails, ski slopes, or timber harvest activities. The remaining 20 sites on private land are vulnerable to timber harvesting, power lines, gas lines, and road and residential home development.

These human disturbances and also competitive stress from eastern red-back salamander and Allegheny mountain dusky salamander, many of the disjunct populations could be imperiled (Pauley, in press).

On National Forest land, proposed future activities within the project boundary may include outfitter guide permits and trail maintenance activities. The outfitter guide permits could involve hiking, hunting, fishing, mountain biking, horseback riding, etc. Additionally, there could be trail maintenance and possibly a small parking area along the abandoned road.

There is no argument that the ski slope has altered the landscape in the project area, and would continue to do so regardless of the authorization of this permit. It is not known if decommissioning of this slope would ensure further colonization and improvement of Cheat Mountain salamanders.

Irreversible or Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitments of wildlife, specifically threatened, endangered or proposed wildlife resources as a result of either of the alternatives.

Consistency with the Forest Plan, Laws, Regulations, and Handbooks

Alternative 2 includes the following contemporaneous, project-specific amendment for authorizing a special use permit in TEP species habitat:

Allow authorization of a special use permit for Timberline Four Seasons Resort Management Company, Inc. to continue use and maintenance of a portion of Salamander Run, a portion of the abandoned road, and a non-system connector trail on NFS lands that may result in adverse effects to a TEP species (Cheat Mountain salamander) and its habitat.

This amendment would make the project consistent with Forest Plan direction for TEP species. This amendment process is consistent with Forest Service Handbook direction at FSH 1909.12(25.4), and agency regulations at 36 CFR 219.6(a)(2), 36 CFR 219.8(e)(3), and 36 CFR 219.13(a)(1).

Both alternatives would be consistent with State and local environmental protection laws, regulations and ordinances, and with Forest Service Handbook and Manual direction.

3.6 Wildlife – Regional Forester Sensitive Species for R 9

Conclusions made in the Likelihood of Occurrence table (LOO in the project record) dictate the level of analysis needed for each sensitive species. Any Region 9 Sensitive Species (R9SS) determined not to occur or unlikely to occur in the project area due to lack of habitat is not carried in further analysis. Effects analysis is completed for all sensitive species that occur or could possibly occur within the project area.

Evaluated Species Survey Information

Species information was collected from WV Natural Heritage Program database, district records, Combined Data System information, Ecological Classification System database and predictive vegetation associations, soil maps, Geographical Information System library, research literature, field surveys, and personal communication with specialists to determine each species' occurrence or likelihood of occurrence in this project area. All specialists' reports, maps, and survey information are located in the Timberline project file at the Supervisors Office, Elkins WV.

With the exception of the species addressed below, the project area is not expected to contain individuals or habitat for species identified on the R9SS list. Therefore, it is reasonable to anticipate "no impacts" to those R9 sensitive species as a result of direct, indirect, or cumulative effects associated with this project.

Effects to Southern rock vole and Allegheny woodrat have been combined.

Southern Rock Vole (*Microtus chrotorrhinus carolinensis*)

This high elevation species is associated with rocky, boulder-strewn areas in coniferous, deciduous and mixed deciduous-coniferous forests. The primary food source is Bunchberry (*Cornus canadensis*). This species is active year-round and does not hibernate or undergo torpor. It is diurnal and is most active during the morning hours. It breeds from early spring to late

autumn, with a gestation period of about 20 days. Lifespan is usually no more than a year at best.

Allegheny Woodrat (*Neotoma magister*)

The Allegheny woodrat is the only member of the genus *Neotoma* living in the mountains of the eastern United States. Most zoologists recognize two species, *N. floridana* and *N. magister*, with the Allegheny woodrat being *N. magister*. The habitat of the Allegheny woodrat includes extensive rocky areas, caves, crevices, cliffs, and riverbanks with rocks and boulders. It is found throughout most of West Virginia in proper habitat. It is opportunistic and may build nests in abandoned buildings. The woodrat is primarily a vegetarian, with a diet consisting of berries, leaves of herbaceous plants, and nuts. It will also take insects. In the fall, the woodrat collects leafy twigs, branches of trees or shrubs, and puffballs or other mushrooms. The woodrat is nocturnal and remains active throughout the year. It does not hibernate or undergo torpor.

Southern Rock Vole (SRV) and Allegheny woodrat (AWR) habitat at Timberline

There are no known populations for these species in the project area. Salamander Run, the connector trail, and the abandoned road proper do not provide habitat for SRV or AWR, however the adjacent wooded land both on Timberline and Forest Service is considered potential habitat for both.

Alternative 2 – Proposed Action – Direct, Indirect, & Cumulative Effects

There are four primary activities (hiking, mountain biking, cross country skiing and downhill skiing) occurring at three locations (Salamander Run, the connector trail, and the abandoned road) under this permit. Activities are seasonal and weather dependant.

Activity: Downhill skiing can take place on the existing ski slope daily from 8 AM to dark from November thru April (weather dependant). Lighted night skiing is available on Thursday thru Saturdays from 4:30 PM-9:00 PM. Snow making begins as early as November however does not take place after March 15. The ridge has an eastern aspect and the slope faces north.

Direct Effect: Downhill skiing takes place on Salamander Run; therefore, there would be no affects to SRV or AWR due to this activity. Snowmaking takes place November – March, when conditions are conducive. Timberline uses the additive Snomax® in the snow making process. Snow making guns are located on the inside edge of Salamander Run and the majority of snow from snowmaking lands on the slope itself with residual snow blowing up to 50 feet into the adjacent woods on both sides of the ski run. Southern rock voles and Allegheny woodrats are active thru the winter, and potential habitat for both may occur within the reaches of the man-made snow. It is possible that man-made snow could reach a SRV or AWR directly or fall on its habitat. No information could be located to assess the risks snow with this additive would have on small mammal species. Given the short lifespan of SRV, and the limited time a SRV may be “snowed” upon, Snomax® additive would have no direct impact on SRV. Similarly, Snomax® would have no direct impact on AWR.

Indirect Effect: SRV and AWR are almost entirely vegetarian. Snomax® may affect vegetation by prohibiting ice-nucleators in the plant cells, thereby allowing the plant to super cool, causing injury to the cells. The degree of this occurring on the small area where snow

could accumulate and have any affect on foraging availability of the AWR or SRV is discountable.

Activity: Cross country skiing activity takes place on existing connector trail and the abandoned road during daylight hours potentially from November thru April (weather dependant).

Direct Effect: Cross country skiers usually stay on designated trails. Skiing could take place daily from November thru April from daylight until dark. SRV are diurnal but secretive, therefore the chance of direct encounters between a skier and a SRV are so slim as to be considered discountable. AWR are solitary and nocturnal, therefore the chance of direct encounter between a skier and an AWR are so slim as to be considered discountable.

Indirect Effect: SRV and AWR habitat is associated with rocky, boulder piled, riparian areas, usually not used by cross country skiers. If winter skiing does take place within AWR/SRV habitat, the activity itself would not disturb ground vegetation; therefore, affects to this habitat would be considered discountable.

Activity: Mountain biking activity takes place on Salamander Run, the connector trail, and the abandoned road during daylight hours from May thru November (weather dependant).

Direct Effect: Mountain bike users usually stay on designated trails. Biking could take place daily from May thru November from daylight until dark. SRV are diurnal but secretive, therefore the chance of direct encounters between a mountain biker and a SRV are so slim as to be considered discountable. AWR are solitary and nocturnal, therefore the chance of direct encounter between a biker and an AWR are so slim as to be considered discountable.

Indirect Effect: SRV and AWR habitat is associated with rocky, boulder strewn riparian areas. These areas are not located near the areas identified by Timberline for Mountain bike use, therefore affects to this habitat would be considered discountable.

Activity: Hiking activity takes place on Salamander Run, the connector trail, and the abandoned road. This activity potentially takes place year around.

Direct Effect: Hikers usually stay on designated trails however walking cross-country is always a possibility. Hiking could take place daily year around usually from daylight till dark. SRV are diurnal but secretive, therefore the chance of direct encounters between a hiker and a SRV are so slim as to be considered discountable. AWR are solitary and nocturnal, therefore the chance of direct encounter between a biker and an AWR are so slim as to be considered discountable.

Indirect Effect: SRV and AWR habitat is associated with rocky, boulder strewn riparian areas. These areas are not located near Salamander Run, the connector trail, or the abandoned road, however riparian areas are found traversing the wooded areas surrounding these three areas. Hikers walking off trails and within the riparian areas would not present any adverse affects to SRV or AWR habitat.

Activity: Cheat Mountain salamander population monitoring would continue annually.

Direct Effect: None

Indirect Effect: None

Activity: Timberline would plant additional spruce (i.e. red spruce, but not Norway spruce) and hardwood trees throughout the wooded area.

Direct Effect: None

Indirect Effect: None

Activity: Timberline would install and annually maintain additional snow/wind fences and potentially place additional leave litter throughout the wooded area.

Direct Effect: None

Indirect Effect: None

Activity: Timberline would install native species cover boards throughout the wooded area.

Direct Effect: None

Indirect Effect: None

Timber rattlesnake (*Crotalus horridus*)

In West Virginia, *C. horridus*, inhabits wooded hills and mountains from the eastern panhandle through the Alleghenies south to Mingo and Mercer Counties. Summer temperatures and the length of the growing season (mean daily 54 degree isotherms) limit the TRS range (Martin 1992). Their active season averages about 5 months. They enter hibernation in October and emerge in late April to early May. Most rattlesnakes over winter in permanent dens provided by rock crevices in ledges, talus, in sinkholes and sphagnum bogs. In the Appalachian Mountains, maturity is often delayed (first reproduction occurs at an average age of 8 years) with reproductive intervals averaging 3 years. Mating occurs from July to September and birthing occurs the following year from August to October (Martin 1992). Winter denning can last as long as 7 months, however sporadic basking is likely during mild periods in the winter when temperatures exceed 60 degrees F. Even near the northern range limits there are likely to be some snakes on the surface 2 to 3 weeks before general emergence when snakes leave the dens. Timing of emergence depends on internal den temperatures and closely correlates the blooming of redbud, dogwood and leafing of oaks. In the higher elevations, first emergence does not usually occur before April 20 and general emergence is in mid-May (Martin 1992). Rattlesnakes feed on suitable sized small mammals (mice and chipmunks) and birds.

Human encounters may take place with mountain bikers and hikers during the summer.

Timber rattlesnake (TRS) at Timberline

Although there have been no recorded observations of this species on the ski slope itself, the project area does provide suitable habitat. The ski slope may provide basking and hunting areas for rattlesnakes.

Alternative 2 – Proposed Action – Direct, Indirect, & Cumulative Effects

There are four primary activities (hiking, mountain biking, cross country skiing and downhill skiing) taking place at three locations (Salamander Run, connector trail, and the abandoned road) under this permit. Activities are seasonal and weather dependant.

Activity: Downhill skiing can take place on the existing ski slope daily from 8 AM to 9 PM from November thru April (weather dependant). Night skiing is available on Thursday thru Saturdays from 4:30 PM to 9:00 PM. Snow making begins as early as November, however it does not take place after March 15. The ridge has an eastern aspect and the slope faces north.

Direct Effect on TRS: None

Indirect Effect on TRS: None

Activity: Cross country skiing activity takes place on the existing connector trail and the abandoned road during daylight hours potentially from November thru April (weather dependant).

Direct Effect on TRS: None

Indirect Effect on TRS: None

Activity: Mountain biking activity takes place on Salamander Run, the connector trail, and the abandoned road during daylight hours from May thru November (weather dependant).

Direct Effect on TRS: There are no confirmed sitings or den locations within the project area, or on the three specific areas identified for activity. However, rattlesnakes can occur in such a wide variety of habitats, their presence in any of these areas is not uncommon or unexpected. It is possible that a TRS could be basking in an open area anywhere along these three areas. If a bike rider sees the basking snake, they could opt to run over the snake, get off their bikes and investigate, or ride by without stopping. If a bike rider runs over a TRS, the probability of it seriously harming the snake is possible. Likewise, if a bike rider decides to get off the bike and proceeds to harm or harass the snake, this would cause negative affects to the snake. Riding by a basking snake should not cause any detrimental affects the TRS.

Indirect Effect on TRS: Constant harassment can prevent wildlife species from occupying a particular area. However, there are no known TRS dens in this area, so the probability of this activity indirectly affecting local TRS is discountable.

Activity: Hiking activity takes place on Salamander Run, the connector trail, and the abandoned road. This activity potentially takes place year around.

Direct Effect on TRS: There are no confirmed sitings or den locations within the project area, or on the three specific areas identified for activity however, rattlesnakes can occur in such a wide variety of habitats, their presence in any of these areas is not uncommon or unexpected. It is possible that a TRS could be basking in an open area anywhere along these three areas. If a hiker sees the basking snake, they could opt to investigate, kill, or ignore the individual. Hiking by a basking snake should not cause any detrimental affects the TRS.

Indirect Effect on TRS: Constant harassment can prevent wildlife species from occupying a particular area. However, there are no known TRS dens in this area, so the probability of this activity indirectly affecting local TRS is discountable.

Activity: Cheat Mountain salamander population monitoring would continue annually.

Direct Effect on TRS: None

Indirect Effect on TRS: None

Activity: Timberline would plant additional spruce (i.e. red spruce, but not Norway spruce) and hardwood trees throughout the wooded area.

Direct Effect on TRS: None

Indirect Effect on TRS: This action may improve overall woodland habitat quality where trees are planted. Any positive factors that might increase small mammal production could benefit TRS populations by increasing available food sources.

Activity: Timberline would install and annually maintain additional snow/wind fences and potentially place additional leaf litter throughout the wooded area.

Direct Effect on TRS: None

Indirect Effect on TRS: This action may improve overall woodland habitat quality. Any positive factors that increase small mammal production could benefit TRS populations by increasing available food sources.

Activity: Timberline would install native species cover boards throughout the wooded area.

Direct Effect on TRS: None

Indirect Effect on TRS: None

Cumulative Effects

On National Forest land, the proposed future activities within the project boundary may include outfitter guide permits and trail maintenance activities. The outfitter guide permits could involve hiking, hunting, fishing, mountain biking, horseback riding, etc. Additionally, there could be trail maintenance and possibly a small parking area along the abandoned road.

Although the ski slope has altered the landscape in the project area, it is not expected that the continued implementation of the Timberline permit would have a measurable impact, either positive or negative, to the cumulative effects associated with past, present and reasonably foreseeable future actions both on and off Forest on those sensitive species identified in this report.

Irreversible or Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitments of R9 regional sensitive wildlife species resources as a result of either of the alternatives.

Consistency with the Forest Plan, Laws, Regulations, and Handbooks

This alternative would be consistent with the Forest Plan. It would also be consistent with State and local environmental protection laws, regulations and ordinances, and with Forest Service Handbook and Manual direction.

3.7 Botany and NNIS (Non-Native Invasive Species)

Methodology

The Timberline Biological Assessment & Evaluation (BA/BE) (Evans 2008) documents the review of office records and field site visits, and the analysis of the effects of implementing the proposed action of the Timberline SUP authorization on endangered, threatened and sensitive species. The BA/BE was written utilizing the results of botanical surveys, site checks to determine habitat type, consulting existing threatened, endangered, and sensitive (TES) species area records, and discussions with the West Virginia Field Office of U.S. Fish and Wildlife Service (USFWS), and Virginia Division of Natural Resources (WVDNR).

Direct/Indirect Environmental Consequences

Neither alternative will affect any plant species listed as threatened or endangered under the Endangered Species Act. No critical habitat has been designated and no species are proposed for listing (Timberline Biological Assessment, 2008, Evans). Table 3.5 lists the plant species listed and the effects determinations for both alternatives.

Table 3.5. Effects for threatened and endangered botany species

Species	Effects for Alternatives 1 and 2
Virginia spiraea (<i>Spiraea virginiana</i>)	No Effect
Small-whorled pogonia (<i>Isotria medeoloides</i>)	No Effect
Shale barren rockcress (<i>Arabis serotina</i>)	No Effect
Running buffalo clover (<i>Trifolium stoloniferum</i>)	No Effect

Virginia Spiraea

Virginia spiraea is known to exist on damp, rocky mountain riverbanks, usually at water's edge, that drain into the Ohio River basin. Only one small population occurs on the MNF, along the Greenbrier River in Greenbrier County. Twenty-six populations exist in West Virginia. Specific Virginia spiraea life history and habitat requirements can be found in the Final Environmental Impact Statement (MNF 2006) for the Forest Plan.

Potential habitat within the Timberline project area does not exist. Therefore, there would be no effect to this species.

Small Whorled Pogonia

The small whorled pogonia prefers dry, deciduous woods with acidic soil. Tree species commonly associated with this species include white oak (*Quercus alba*), white pine (*Pinus strobus*), flowering dogwood (*Cornus florida*), and witch hazel (*Hamamelis virginiana*). Small whorled pogonia has been found on one site in Greenbrier County, WV. Specific small whorled pogonia life history and habitat requirements can be found in the Final Environmental Impact Statement (MNF 2006) for the Forest Plan.

Potential habitat within the Timberline project area does not exist. Therefore, there would be no effect to this species.

Shale Barren Rock Cress

There would be no effect due to lack of habitat within or near the project area.

Running Buffalo Clover

There would be no effect due to lack of habitat within or near the project area.

Alternative 1 – No Action

The No Action alternative would result in the removal of snowmaking equipment and the cessation of ski slope maintenance. Snow making equipment currently is in disturbed locations that are very unlikely to support threatened, endangered, or sensitive plants. Therefore, the disturbance associated with removing the equipment would not affect TES plants. The abandoned ski slope would be reclaimed by forest vegetation over time.

Non-native invasive plants could invade the ski slope after maintenance ends. The likelihood of such an invasion cannot be evaluated due to the lack of an invasive plant inventory in the area. Conversely, the cessation of maintenance would remove a potential source of invasive plants, which currently could be brought on to the site by maintenance equipment.

Alternative 2 – Proposed Action

Proposed new ground or vegetation disturbance in previously undisturbed areas is limited to snow/wind fences and logs placed for Cheat Mountain salamander protection. The areas where these fences and logs would be placed have not been surveyed for TES plants, but disturbance would be minimal and is unlikely to have substantial effects on any TES plants that might occur.

Existing disturbed areas, although they have not been surveyed, are unlikely to support TES plants. Activities would continue within the same scale and scope as activities that have taken place on the site for the last 18 years. Therefore, any impacts likely have already occurred, and there is little or no chance to impact any TES plants that might occur near the activity sites. Snomax® could come into contact with native vegetation along the ski run, but available information suggests that typical use of Snomax® does not harm vegetation. Also, Snomax® has been in use at the site since 1992, so any effects due to its use likely have already occurred.

Maintenance equipment, seeding/mulching, and horse use could introduce or spread non-native invasive plant species (NNIS). However, the design features (Table 2.2) and mitigation measures (Table 2.3) in Chapter 2 should reduce the risk of ecosystem disruption due to invasive plants. Mountain bikes are not likely to introduce new NNIS because their use is limited to the Timberline compound.

Cumulative Impacts

Because the proposed action would have little or no direct and indirect impact, it would not make a measurable contribution to cumulative impacts.

Irreversible or Irretrievable Commitment of Resources

Because effects would be minimal or nonexistent, the proposed action would not involve any irreversible or irretrievable commitment of resources.

Consistency with the Forest Plan, Laws, Regulations, and Handbooks

The proposed action would have little or no potential to impact TES plants. Therefore, it would be consistent with Forest Plan direction for the protection of these species. The design criteria, mitigation measures, and monitoring would ensure compliance with Forest Plan direction for NNIS.

3.8 Heritage Resources

Direct/Indirect Environmental Consequences by Alternative

No heritage resources are located within or adjacent to the area of potential effects of both the No Action alternative (Alternative 1) and the Proposed Action (Alternative 2). Therefore, there would be no direct or indirect effects to heritage resources as a result of implementing either alternative. The West Virginia State Historic Preservation Office has been consulted regarding this project.

Cumulative Impacts

Because there are no direct or indirect effects, there are no cumulative effects.

Irreversible or Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitments of resources with either alternative.

Consistency with the Forest Plan, Laws, Regulations, and Handbooks

Forest Goal HR01 provides for the identification and management of cultural resources on the Forest, as does direction in Heritage Resources Standards HR04, HR05. Executive Order 11593, promulgated in 1971, instructs that all archaeological resources on Federal land are to be evaluated, while the 1988 amendment to the Archaeological Resources Protection Act (16 USC 470 mm) instructs federal land-managing agencies to develop and implement a plan for archaeological survey and evaluation.

3.9 Recreation

Existing Condition - Resource Impacts or Issue Addressed

This section describes the existing condition of the recreation, wilderness, trails, and scenery resources that may be affected by activities proposed in this project area.

Recreation opportunities within and around the Timberline project area consist primarily of dispersed recreation activities, including downhill skiing, cross-country skiing, mountain biking, hiking, backpacking, wildlife and scenery viewing, horseback riding, and hunting. A majority of the recreation use within the project area is focused on downhill and cross-country skiing.

According to the 2004 National Visitor Use Monitoring Report from USDA Forest Service, the 2003 visitor surveys conducted on the MNF estimated that downhill skiing represents 10 percent of the primary activity that MNF visitors participated in during 2003. Downhill skiing also represents 8.06 percent of the use of facilities and specially designated areas on the MNF. Timberline is the only commercial downhill skiing area authorized on the forest.

Recreation use within the area is high during the winter months and low during the spring, summer, and fall seasons. During the spring, summer, and fall seasons, skiing is replaced mainly with hiking and mountain biking, although in the past, some permitted horseback riding did take place.

Developed Sites

There are no Forest Service developed campgrounds, picnic areas, or swimming areas located within the analysis area.

Timberline is based on approximately 100 acres of terrain and includes approximately 37 downhill ski trails and three lifts. It claims to have the longest ski run in the south, Salamander Run. The resort holds events year round and serves as a base for recreational activities. A chairlift is operated during the summer as a scenic ride and has views of surrounding NFS land.

Recreation Special Uses

There are various outfitter/guide permits that use Dolly Sods North and the Dolly Sods Wilderness areas near Timberline.

The MNF has authorized recreation events in the nearby Dolly Sods North area, and some events actually cross the non-system trail connector, the abandoned road, and in some cases, even cross Timberline property (with permission from Timberline). Past events have included mountain biking, horseback riding, and horseback riding outfitter guide permits, but none are authorized at this time.

Wild and Scenic River Study

The Wild and Scenic River Study completed by the Monongahela National Forest in 1995 did not identify any eligible segments of any rivers for potential designation as a wild and scenic river.

Wilderness

There are no federally designated wildernesses within the Timber project area. However, Dolly Sods Wilderness and the proposed wilderness - Dolly Sods North - are located adjacent to

Timberline. Dolly Sods Wilderness was designated by Congress in January, 1975 and was well established before the initial SUP was requested by Timberline. Dolly Sods Wilderness includes approximately 10,215 acres.

Although Dolly Sods North is not congressionally designed wilderness at this time, it is being considered under a proposed wilderness bill and was included in the 2006 Inventoried Roadless Area review.

Trails

There are no system trails within the analysis area; however, a small connector trail runs from the Timberline property to the abandoned road and neighboring trail systems within the Dolly Sods Wilderness and the Dolly Sods North backcountry area.

Timberline Resort and Salamander Run are located next to Dolly Sods Wilderness. Snow grooming machines and over snow machines are used on Salamander Run and other trails on private land. These snow grooming machines, snowmaking guns, and over snow machines all make noise that can impact solitude.

Scope of the Analysis

The scope of the analysis will include the recreation resources within the Timberline project area and its effect on surrounding wilderness.

The spatial boundary used to evaluate direct and indirect consequences and cumulative impacts is the Timberline project area, and the area around Timberline where project noise could be heard. This area was used because it will adequately address any affects on the recreation resources.

Methodology

This section describes the process that will be used to describe how the alternatives would affect the resources and the units of measures used to measure change.

The following materials were used to evaluate the effects of alternatives on the recreation resources within the Timberline analysis area:

- The Monongahela National Forest Land and Resource Management Plan Standards and Guidelines,
- Recreation Opportunity Spectrum,
- The Wilderness Act, Public Law 88-577, September 3, 1964,
- The Eastern Wilderness Act of January 3, 1975 (Dolly Sods and Otter Creek Wilderness areas and the Cranberry Wilderness Study Area),
- Monongahela National Forest Wild and Scenic River Study Report,
- The National Wild and Scenic Rivers Act of 1968.

The units of measure which are used to analyze change are as follows:

- Distance noise from motorized snow grooming machines, snow making guns, and over snow machines would travel into the Dolly Sods Wilderness?

Direct/Indirect Environmental Consequences by Alternative

Alternative 1 – No Action

Under most proposals, the no action alternative maintains the status quo. However, in this situation, the no action alternative means that the Forest Service would not authorize, under SUP, Timberline to maintain and operate the Forest Service portion of Salamander Run as a downhill ski run, nor authorize use of the non-system connector trail, nor authorize use of the abandoned road.

Based on the methodology described above, there would be no effects to the developed recreation resource, public road access, or potential wild and scenic river values.

The direct effects of not authorizing the above requested permit would be that:

- No downhill skiing on the NFS portion of Salamander Run would take place and no downhill skiing on the MNF would take place. In other words, the MNF would stop authorizing the activity that approximately 10 percent of our visitors listed as the main activity they participated in on the MNF in fiscal year 2003. Timberline is the only location on the National Forest land where downhill skiing takes place. Downhill skiing would still take place on private land near the National Forest at Timberline, Canaan Valley, and Snowshoe Resort; however, the MNF would not count downhill skiing as part of its use numbers.
- Snow making infrastructure would be removed on the 3,000 foot NFS section of Salamander Run.
- Hiking, mountain biking, horseback riding, cross-country skiing, and hunting would still take place on surrounding NFS land; however, Timberline would not promote that use on Salamander Run, the connector trail, or the abandoned road. Visitors that ride the scenic chair lift might not know about surrounding opportunities on NFS land.
- Other recreation SUPs would not be directly affected. However, if this request is denied, other permits with similar usage may also be denied. Recreation events in the Dolly Sods North area and outfitter/guides in both Dolly Sods Wilderness and Dolly Sods North may require access from other locations.
- Noise from operating four snowmaking guns would not be heard. However, at least 50 portable snow making guns and additional permanent water sticks could still be operated on privately owned land. Noise from operating snow grooming machines and snowmobiles would not be heard from NFS land, but could be heard from use on approximately the 100 acre area that Timberline manages. The noise would be heard on the western portions of Trails 524, 511, 553, and 513. Noise from snowmaking could be heard anytime day or night between November and April when temperatures are appropriate for snowmaking. Snow grooming machines would be heard between 8:00 AM and 5:00 PM, (and to 9:00 PM when there is night skiing), but probably only for a couple hours during that time period per day. Snowmobiles for patrol and administration

purposes would be heard sporadically between 8:00 AM and 5:00 PM (and to 9:00 PM when there is night skiing). Noise from the private Timberline property would be less intense as it would be lessened by the 0.2 mile distance between the private property and the trail system and wilderness area.

- Although dispersed use could still take place on the connector trail and on the abandoned road, Timberline would not maintain either of these “trails”.
- Scenery may be slightly improved on Salamander Run over time after the snow making infrastructure is removed. However, few people overall would probably see that area.

Alternative 2 – Proposed Action

Based on the methodology described above, there would be no effects to the developed recreation resource, public road access, or potential wild and scenic river values.

General Forest Areas (Dispersed Recreation)

Downhill skiing and some cross-country skiing would be permitted on NFS lands. Mountain biking, hiking, backpacking, wildlife and scenery viewing, horseback riding, and hunting would continue to take place. Visitors to Timberline would be aware of additional recreational opportunities beyond the boundary of Timberline property.

Recreation Special Uses

Recreation SUPs for other outfitter/guides and recreation events would not be affected by this authorization. Permits for use of NFS lands are not exclusive.

However, a possible indirect effect would be that approval of this permit may result in applications for additional recreation SUPs that depend on Timberline as a base for their activities.

Wilderness

The Timberline SUP would not include any action directly in the Dolly Sods Wilderness Area. It would allow Timberline to continue to promote dispersed recreational use in and near the Dolly Sods Wilderness and Dolly Sods North backcountry area (potential wilderness). No motorized use would take place within the Congressionally Designated Wilderness Area.

The operation of the ski area has occurred under current ownership since 1986 and would continue on private land with or without the authorization of Salamander Run.

There are no buffers around Congressionally Designated Wilderness areas. However, activities outside wilderness areas should be reviewed and determination made as to whether wilderness character is preserved.

Wilderness character is defined by the following four qualities of Wilderness:

1. Untrammeled - Wilderness is essentially unhindered and free from modern human control or manipulation. Indicators of untrammeled conditions would be agency actions that control or manipulate plant communities, animal populations, soils, water-bodies, or natural disturbance processes that affect the wilderness.

2. Natural – Wilderness ecological systems are substantially free from the effects of modern civilization. Indicators would be pollutants that degrade air quality and air quality related values. Development that degrades free-flowing conditions of rivers and streams, non-indigenous species that alter natural plant and animal communities, visual air quality, indigenous ecosystems, plants and animal species that have been extirpated.
3. Undeveloped – Wilderness is essentially without permanent improvements or modern human occupation. Indicators would be physical evidence of development within the wilderness, mechanical transport and motorized equipment use authorizations, and the presence of private inholdings.
4. Possess outstanding opportunities for solitude or a primitive and unconfined type of recreation. Indicators would be remoteness, wilderness visitation, the number of recreation facilities, trail development level, and management restrictions on visitor behavior.

Authorization of a Timberline SUP would not permit any facilities/structures within the Dolly Sods Wilderness and Dolly Sods North Backcountry area (potential wilderness) and therefore would not affect the undeveloped character of the Wilderness.

Noise from operating 4 snowmaking guns on NFS land and at least 50 portable snowmaking guns and additional permanent water sticks on private land would be heard. Noise from operating snow grooming machines and snowmobiles would be heard from NFS land and would be heard from use on approximately 100 acres that Timberline manages. The noise would be heard on the western portions of Trails 524, 511, 553, and 513. Noise from snowmaking could be heard anytime day or night between November and April when temperatures are appropriate for snowmaking. Snow grooming machines would be heard between 8:00 AM and 5:00 PM, (and to 9:00 PM when there is night skiing), but probably only a couple hours during that time period per day. Snowmobiles for patrol and administration purposes would be heard sporadically between 8:00 AM and 5:00 PM (and to 9:00 PM when there is night skiing). Noise under the proposed action would be more intense than under the no action alternative because the distance between the ski slope and the wilderness trails is less than 0.05 miles. Noise would be heard for approximately the first 100 yards on any of the above listed trails. This, of course, would depend on exactly what motorized use was taking place on the ski slope and the weather conditions at the time the user passed. The noise would be limited and short term for hikers/skiers and more long term if anyone were to camp in the vicinity.

Existing outstanding opportunities for solitude in Dolly Sods Wilderness or even Dolly Sods North backcountry would not change as a result of the noise from activities on Salamander Run because these activities are the same activities that have taken place since the late 1980s and early 1990s. In addition, similar activities will continue to take place on the adjacent 100 acres of private lands, despite what the MNF authorizes on the small portion of NFS lands (approximately 5 acres).

Existing opportunities for solitude would not change from the current situation as a result of issuing this SUP. Timberline would still make the public aware of additional dispersed recreation opportunities beyond the Timberline property. Use on surrounding NFS system trails may increase slightly as a result, but would not change much from the present situation.

Better signage/brochures and more efforts to inform mountain bike users of appropriate locations to mountain bike would be a mitigation measure of this permit.

There would be no changes in the number of recreation facilities, trail development levels, or management restrictions on visitor behavior in the Wilderness as a result of this permit.

Trails

Issuing this SUP would have no significant effect on system trails as none are located within the project area.

However, by issuing Timberline a SUP, Timberline would maintain the connector trail.

Illegal mountain bike use in Dolly Sods Wilderness and any potentially designated wilderness area may take place as it does now, but with mitigation, could actually decrease.

Scenery

No changes to scenic conditions are expected from similar continued use of the area by Timberline.

Cumulative Impacts

There would be no substantial cumulative impacts as a result of implementing either alternative.

Irreversible or Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment to the recreation and trails resources within or adjacent to the project area.

Consistency with the Forest Plan, Laws, Regulations, and Handbooks

Both alternatives would be consistent with the 2006 Monongahela National Forest Land and Resource Management Plan for recreation management for MP 4.1.

There would be no conflicts between these alternatives and Federal, regional, State, and local laws.

3.10 Environmental Justice

Resource Impacts or Issues Addressed

This section describes the results of the analysis the Forest completed to assess the impacts of proposed activities on minority and low income populations per Executive Order 12898.

Existing Condition

There are no known community-identified environmental justice related issues. Recent data indicate that Tucker County, in which the Timberline project area is located, does not

demonstrate ethnic populations or income percentages greater than two times that of the State average (US Census).

Scope

The communities in Tucker County were considered in the scope of the analysis. The timeframe for the proposed Timberline project is 10 years.

Methodology

All documents and notices related to this proposed project were readily available to all segments of the public. Public involvement is described in Chapter 2. The project record contains a list of individuals, organizations, companies, and government entities contacted about this proposed project. Notices were also placed in *The Grant County Press*, the newspaper of record for this project, and in *The Elkins Inter-Mountain* newspaper.

Based on information available in 2007, statistics for the county within the Timberline project area are as follows:

Table 3.6. County population and income statistics

County	Total Acres	% MNF	Population	% Minority	% Population Below Poverty Level	Per Capita Income
Tucker	269,869	37.6	6,856	1.1 %	18.1 %	\$16,349

Direct/Indirect Environmental Consequences by Alternative

Alternative 1 – No Action

The No Action alternative could result in a slight decrease in the economic opportunities available to the local workforce. If Timberline were not allowed to use Salamander Run, their winter ski business might decrease, forcing Timberline to decrease their workforce.

Alternative 2 – Proposed Action

Public comments, Interdisciplinary Team evaluation, and available information did not identify any issues or disproportionately high or adverse human health or environmental effects on minority populations and low-income populations. The Proposed Action alternative could have a minor improvement in the economic conditions for the surrounding populations by providing jobs at the resort and in surrounding support businesses. No civil rights issues associated with the project have been identified.

3.11 Consistency with Laws and Executive Orders

Neither of the alternatives threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment. As documented in this EA or in the project file, both alternatives would be consistent with the following applicable laws and Executive Orders:

American Indian Religious Freedom Act of 1978

Antiquities Act of 1906 (16 USC 431-433)

Archaeological and Historical Conservation Act of 1974 (16 USC 469)

Archaeological Resources Protection Act of 1979 (16 USC 470)

Cave Resource Protection Act of 1988

Clean Air Act of 1977 (as amended)

Clean Water Act of 1977 (as amended)

Eastern Wilderness Act of 1975

Endangered Species Act (ESA) of 1973 (as amended)

Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (as amended)

Historic Sites Act of 1935 (16 USC 461-467)

Multiple Use Sustained Yield Act of 1960

National Environmental Policy Act of 1969, (as amended) (42 USC 4321-4347)

National Forest Management Act (NFMA) of 1976 (as amended)

National Historic Preservation Act of 1966 (16 USC 470)

Organic Act 1897

Prime Farmland Protection Act

Wild and Scenic Rivers Act of 1968, amended 1986

Forest Service Manuals such as 2361, 2520, 2670, 2620, 2760

Executive Order 11593 (cultural resources)

Executive Order 11988 (floodplains)

Executive Order 11990 (wetlands)

Executive Order 12898 (environmental justice)