United States Department of Agriculture

Forest Service

Southwestern Region

Environmental Assessment for North America Ski Trails at Taos Ski Valley

Carson National Forest

Questa Ranger District

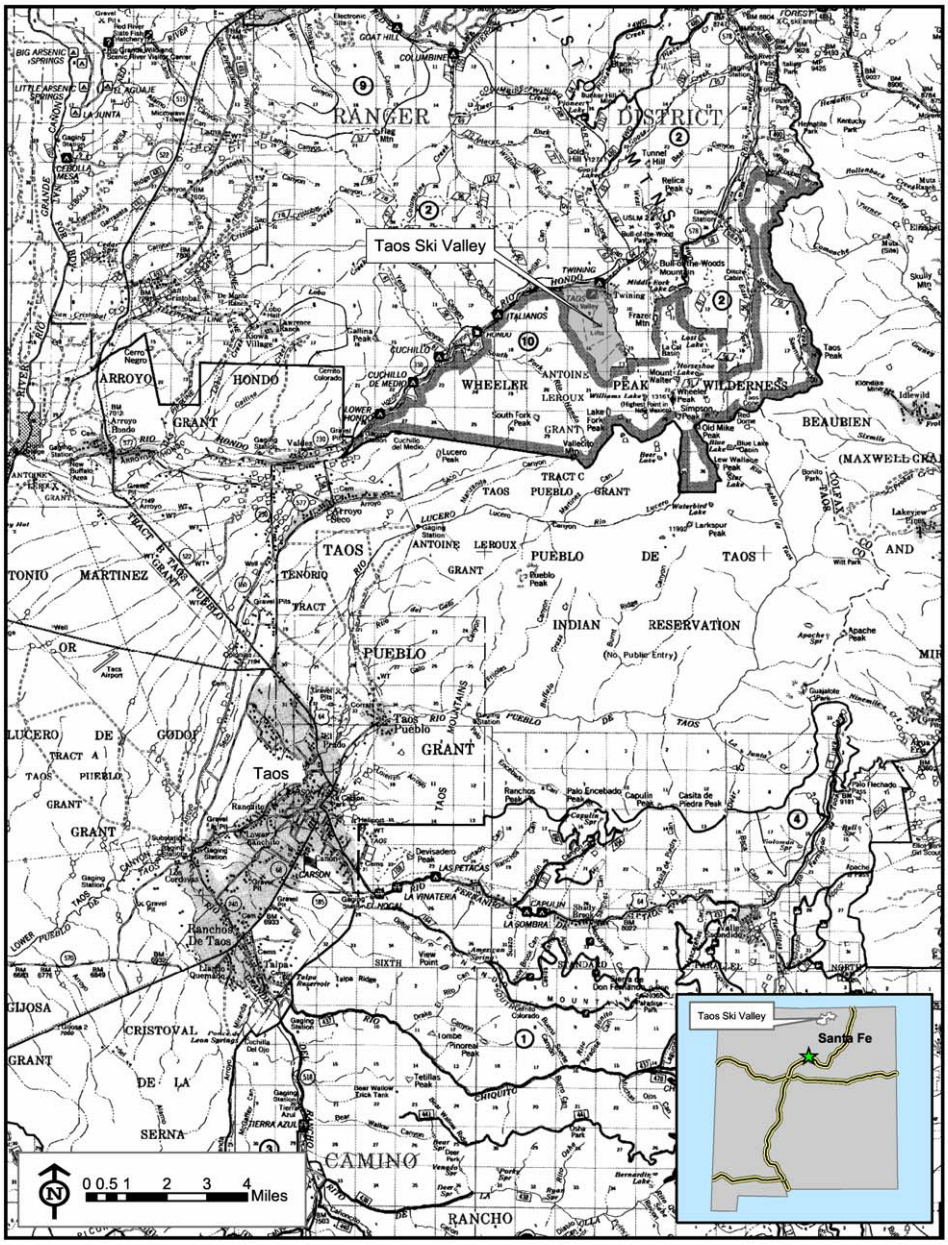

Figure 1. Location map for the Proposed North America Trails, Taos Ski Valley

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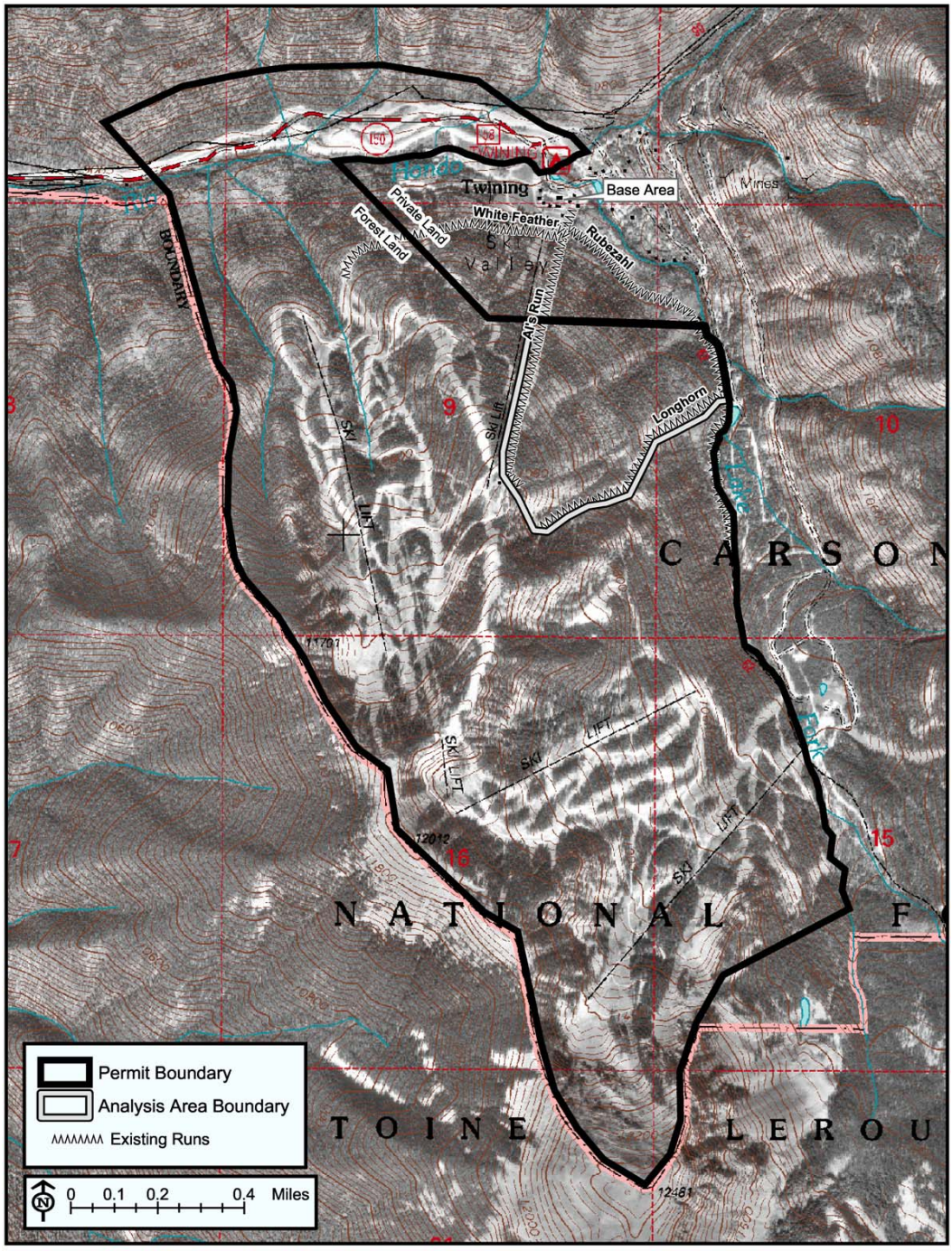

Figure 2. Proposed North America Trails Analysis Area

Chapter 1. Purpose and Need

This environmental assessment (EA) is being prepared to analyze the effects of constructing two trails in the area known as “North America,” at Taos Ski Valley, on the Questa Ranger District, Carson National Forest. An interdisciplinary analysis on the proposed action is documented in a project record. An index for the project record is presented in appendix A. Source documents from the project record are referenced throughout this environmental assessment by showing the document number in brackets [#]. This EA summarizes the project record to make the analysis results as clear as possible. This site-specific analysis is tiered to the Final Environmental Impact Statement (FEIS) for the Proposed Taos Ski Valley Inc, Master Development Plan and the Record of Decision (ROD). [2, 3] This analysis is also tiered to the FEIS and ROD for the Carson National Forest Land and Resource Management Plan (hereby Carson Forest Plan) [5] and complies with the Carson forest plan [6], which requires management “in accordance with the direction in the Master Development Plan...” [3, p. 16-4]

Background

Taos Ski Valley (TSV) is a downhill ski area located in the Sangre de Cristo Mountains, where the old Twining Mining District used to be. It is about 20 miles northeast of Taos, New Mexico, at the terminus of State Road 150, on the Rio Hondo, in Taos County (figure 1). TSV is a destination resort, founded in 1956 by Ernie Blake. Today the resort is operated by a limited family partnership led by the Blake family, but still remains true to the original vision of its founder. The ski experience attracts many returning national and international guests who are attracted to the challenging and uncrowded terrain, as well as, the Southwestern culture and weather. Providing a high quality skiing experience requires a large economic investment, making a family owned resort, such as Taos Ski Valley, increasingly rare in the ski industry.

About 90% of TSV is located within the Carson National Forest and is managed through a Special Use Permit issued to Taos Ski Valley, Inc. The Special Use Permit authorizes TSV, Inc. to use approximately 1,270 acres to construct, operate, and maintain a winter sports resort. [11] The terms identified in the 1981 decision for the TSV Master Development Plan limits skiers per day to 4,800. [3]

Over one million visitors used the Carson National Forest in 2003-2004. [64] Almost half of these visitors (48%) reported their primary activity while on the National Forest was downhill skiing. Taos Ski Valley is one of three downhill ski areas on the Carson National Forest. During the 2003-2004 Season, TSV reported 224,565 skier visits, suggesting downhill skiing at TSV accounts for about one quarter of all the Carson’s recreation visits.[64]

Analysis Area Description

The analysis area for the proposed action is the “North America” area, about 109 acres on the northeast corner of the permit area, between Al’s Run and Longhorn ski trails, and is bounded at the lower end by Rubezahl Trail, also known as, “The Return Trail” (figure 2). The analysis area lies on a 55% slope, facing northeast, and ranges from 9,500 to 11,000 feet in elevation. It is in the spruce-fir vegetation type, composed primarily of Engelmann spruce, mixed with subalpine (corkbark) fir, Douglas-fir, and aspen. Fed by several natural springs, an intermittent stream flows down the slope. Because the stream does not flow on a regular basis, it does not support areas of

riparian vegetation. The lower 38 acres of the analysis area are on private land belonging to TSV, Inc. (figure 2).

Purpose and Need for Action

In a limited sector of resorts, the winter sports industry has experienced some new growth over the last five years. [64] This pattern of growth is occurring at smaller resorts, such as Taos Ski Valley, and is thought to be due to specialization, where the area can focus and promote its own unique advantages. Adding distinct, new skiing terrain would help the ski area accommodate a market preference for more interesting challenges and a less congested experience. In order to retain its market share of skiers, Taos Ski Valley, Inc. is seeking to implement additional elements of its 1981 Master Development Plan (MDP). [2]

The 1981 Taos Ski Valley MDP decision was based on improving public safety by reducing skier conflicts. Planning more ski runs on the back-side would help relieve congestion. The 1981 objective of providing a safe skiing experience still applies today. Challenging terrain is an attraction at TSV, yet almost all of the most difficult runs on the front-side feed into lower White Feather, a narrow catwalk, which serves to bring all front-side skiers back to the main base area. Adding ski terrain that does not feed into White Feather would improve skier safety by redistributing some of the expert skiers (figure 2).

Proposed Action

The Forest Service proposes to authorize TSV, Inc. to thin an approximate 2,800 foot long by 290 foot wide area (~19 acres) for glade skiing and clear a 3,100 foot long by 110 foot wide (~8 acres) parallel trail (figure 3). These trails would be in the area known as “North America,” between Longhorn and Al’s Run. The lower 3 acres of the gladed run would be on private land. A detailed description of the proposed action (alternative 2) is found in Chapter 2. Mitigation measures and best management practices would be applied during and after implementation to protect natural resource values. To assure proper application, these practices would be monitored. See chapter 2 for a list mitigation measures and their associated effectiveness and Appendix A for best management practices.

Forest Plan Consistency

The proposed action follows the intent of the TSV MDP “to construct two new trails in the Longhorn area” [3, p. iv]. The TSV permit area is within Carson Forest Plan Management Area 16 -- Recreation Sites. The purpose and need for the proposed action meets the vision for Management Area 16, by "filling the needs of the users," and the proposed action is consistent with Management Area 16 prescriptions to "administer the existing ski areas in accordance with the direction in the Master Development Plan for each area." [3, p. 16. Recreation Sites – 4] This proposal is in concert with the goals and objectives outlined in the Carson Forest Plan [6], and would help move the analysis area towards desired conditions described in the plan.

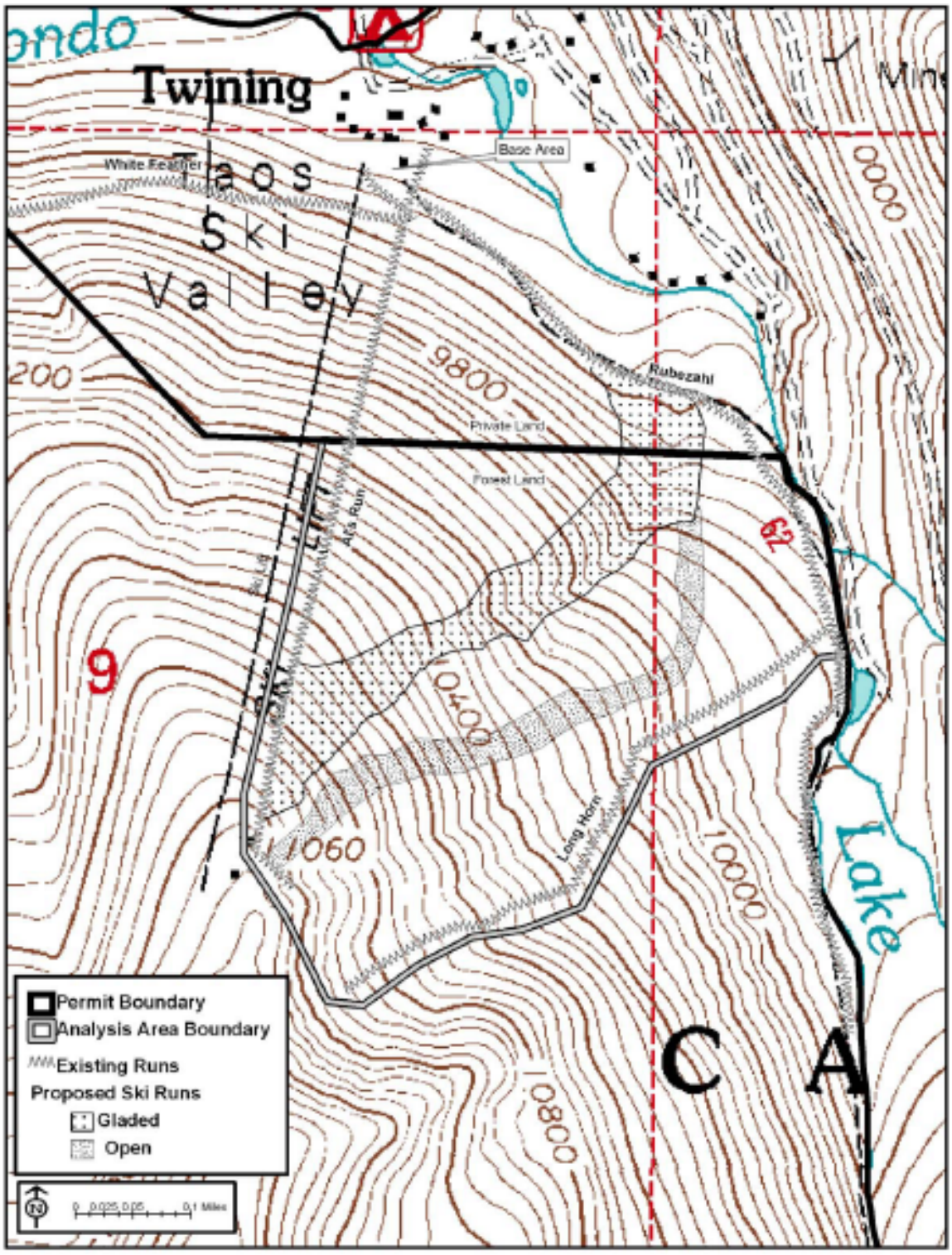

Figure 3. Proposed action

Decision Framework

Given the purpose and need, the Forest Supervisor (responsible official) for the Carson National Forest will decide whether to approve the proposed action as described, as modified by an alternative, or not to proceed at all. The responsible official will also decide what mitigation measures and monitoring requirements will be applied.

Public Involvement

The proposed action has been listed in the quarterly Carson National Forest NEPA Schedule of Proposed Actions since July 2005. [13]The SOPA can be found on the Carson National Forest's website – www.fed.us/r3/carson/ (select "Project and Plans").

Public Scoping

In September 2006, a letter was mailed to 30 individuals and groups with information on the proposed project and sought public comment. [25, 26] Eight letters responding to the proposal were received. [27-31, 33, 34, 37] The range of comments included concerns on the effects on old growth, removing trees at high elevations, visual quality, Native American sacred areas, riparian and natural spring areas, water quality and flow, wildlife (including, management indicator species), soils, and downstream villages. Consideration of scoping comments is included in the project record. [53]

Tribal Contact and Consultation

Consultation with Taos Pueblo began in October 2005, with contact between the Questa District Ranger and War Chief's Office, followed by an October 11, 2005 on site visit to discuss and resolve concerns about affects to water quality. On September 29, 2006, a scoping letter was mailed to 36 representatives of 17 Native American tribes and pueblos. [25, 26] With the exception of a response from the Jicarilla Apache Nation stating they have no objection, but would like to be notified immediately in the event of an inadvertent discovery of human remains, no additional comments have been received to date. [54]

Forest Service 30-Day Comment Period on Proposed Action

The Forest Service appeal regulations at 36 CFR 215 require a 30-day notice of comment period for a proposed action before a Forest Service decision can be made on an EA. A description of the proposed action was mailed to 28 individuals, groups, and government agencies on April 17, 2007. [41] A legal notice of the opportunity to comment on the proposed action was published in The Taos News on May 10, 2007. [45]

Six comment letters were received. [42-44, 46-47, 49] A content analysis of the comment letters was conducted, along with consideration of the comments, which can be found in the project record. [53]

Issues

Comments received during scoping and the 30-day comment period were examined for significant issues. The Forest Service separates the issues into two groups: significant issues and non-significant issues. Significant issues were defined as those directly or indirectly caused by

implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council for Environmental Quality (CEQ) NEPA regulations require the following delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A list of issues from comments during scoping and the 30-day comment period, and reasons regarding their categorization as non-significant may be found at #53 in the project record.

Among the topics raised during scoping and the 30-day comment period, the Forest Service identified the following significant issues:

Significant Issue #1: Removal of vegetation may cause erosion and sediment deposits by increasing storm water run-off. Encouraging revegetation through mitigation measures, such as timing of implementation and revegetation, would limit these effects. Impacts to soil productivity will be an indicator of this effect.

Significant Issue #2: Red squirrel middens may be adversely affected by tree removal. A buffer around any middens in the gladed area would reduce any effects. The number of middens affected will be an indicator of this effect.

Significant Issue #3: Black bear maternity sites may be disturbed by construction activities. Delaying all activity in the affected area until after June 1 would eliminate effects to maternity sites. The number of maternity sites affected will be the indicator of this effect.

Significant Issue #4: Ski runs can affect the natural appearance of landscapes, making ski areas not meet established visual quality objectives (VQO). Careful trail design can make ski runs natural-appearing. Whether the VQO is adversely affected will be the indicator of this effect.

Significant Issue #5: Woody debris (slash) from tree cutting can attract insects and lead to an infestation of the adjacent forest. Slash treatments and controls can protect forest health. Impacts to forest health will be the indicator of this effect.

Significant Issue #6: Tree removal may affect water quantity or quality in the springs and the intermittent stream in the project area. There are no springs or streams in the cleared run and springs in the gladed run will be avoided by relocating the ski lines, where possible. Mitigations will be included when this cannot be avoided for skier safety. Impacts to water quality or quantity will be a measure of this effect.

Significant Issue #7: Burning slash piles may affect visual quality from the nearby Wheeler Peak Wilderness Area and air quality within the Village of Taos Ski Valley. Careful burn planning and following State and Federal air quality standards can minimize the short-term impacts of smoke dispersal. Whether air quality will be adversely affected will be the indicator of this effect.

Significant Issue #8: While some of the mitigation measures will help to protect soils and wildlife habitat, making both trails gladed runs may reduce overall impacts more effectively. An alternative that would glade both trails was developed to address this significant issue (see Chapter 2). The environmental effects of the proposed action (alternative 2) and this alternative (alternative 3) are discussed and compared in Chapter 3.

Chapter 2. Alternatives

This chapter describes and compares the alternatives considered for the proposed North America Ski Trails at Taos Ski Valley. This section also presents the alternatives in comparative form, defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative (i.e., its location, glading or not) and some of the information is based upon the environmental, social, and economic effects of implementing each alternative (i.e., visual quality, skier safety).

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by the National Environmental Policy Act (NEPA) to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the proposed action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the need for improving skier safety and accommodating a market preference for a less congested experience at Taos Ski Valley. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

An Alternative to Retain All Snags, Large Downed Trees, and Logs

An alternative was considered that would create ski runs while retaining all snags, large down trees, and decayed logs. Large downed material and standing dead trees can pose a hazard to skiers. By designating trails with obvious hazards could put skiers at risk. This alternative failed to meet the purpose and need of providing a safe skiing opportunity on designated trails.

An Alternative to Reclaim Riparian Vegetation

An alternative was considered to narrow the Rubezahl Trail to reclaim a riparian area along the Upper Rio Hondo. The proposed action's purpose and need is to provide additional ski runs that exit onto Rubezahl, to reduce congestion along Lower White Feather Trail. The proposal would not affect riparian vegetation along the Upper Rio Hondo. Since reclaiming riparian vegetation does not meet the purpose and need of the proposed action, it is outside the scope of the analysis and eliminated from detailed study. In addition, the portion of Rubezahl Trail where this proposed alternative would affect is on private land and not within the authority of the Forest Service.

An Alternative to Regenerate Aspen

An alternative was considered to include aspen regeneration, as a part of ski trail development. This alternative also failed to meet the purpose and need of the proposed action, because new aspen growth eventually would be incompatible with the need for openings to provide a safe skiing opportunity.

Alternatives Considered in Detail

Alternatives are used to evaluate different ways to resolve significant issues brought forth by the public during scoping (see Chapter 1) and to satisfy the purpose and need for action. For this

analysis, three alternatives are considered in detail – the no action, the proposed action, and an alternative to address significant issue #8. The purpose and need for the proposed action, along with the significant issues serve as the objectives and framework around which alternatives are developed. In this analysis, the seven significant issues identified at the end of chapter 1 can be addressed through applying mitigation measures. Therefore, the proposed action described in chapter 1 includes mitigation measures to address the significant issues that surfaced during the analysis process. These mitigation measures are also applied to alternative 3.

Alternative 1, No Action Alternative

This alternative is the "no action" alternative and is required by the Council on Environmental Quality for the implementation of NEPA (40 CFR Part 1502.14d). The no action alternative is the point of reference for evaluating action alternatives. Under this alternative, no new trails would be constructed in the North America area of Taos Ski Valley. This alternative would not address the purpose and need of the proposed action or implement a portion of the ski area's master development plan.

Alternative 2, Proposed Action

This alternative is the proposed action as described in chapter 1. It also includes mitigation measures to address all of the significant issues identified during scoping (see below). [53] This alternative would authorize Taos Ski Valley, Inc. to thin primarily Engelmann spruce trees in an approximate 2,800 foot long by 290 foot wide area (~19 acres) for glade skiing and clear all trees in a 3,100 foot long by 110 foot wide (~8 acres) parallel trail (figure 3). These trails would be in the area known as "North America," between Longhorn and Al's Run. The lower portions of both proposed runs would be on private land. This alternative does not include any snowmaking facilities.

Within the gladed run, thinning would not occur evenly. Instead, trees and clumps of trees would be thinned to an average spacing of 20 to 60 feet, to create ski lines running down the slope. Within these lines, most trees smaller than 7 inches would be removed and most trees larger than 15 inches would be retained. For safety, all existing hazard trees would be removed from the gladed run. Trees that have high potential to fall, due to lean angle, exposed roots, or broken crowns are considered hazard trees. The remaining areas within the gladed run would not be thinned.

Work on both the cleared and gladed trails would be performed by hand with TSV, Inc. personnel and would be accomplished gradually, over four to five years, beginning with thinning in both runs. No heavy equipment would be used. Felled trees would either be piled and burned or removed to the edge of the project area.

Alternative 3

This alternative addresses significant issue #8 (end of chapter 1) – "While some of the mitigation measures will help to protect soils and wildlife (especially black bear) habitat, making both trails gladed runs may reduce overall impacts more effectively." To address this significant issue, alternative 2 would glade both trails.

Within both gladed runs, thinning would not occur evenly. Instead, trees and clumps of trees would be thinned to an average spacing of 20 to 60 feet, to create ski lines running down the slope. Within these lines, most trees smaller than 7 inches would be removed and most trees larger than 15 inches would be retained. For safety, all existing hazard trees would be removed from the runs. Trees that have high potential to fall, due to lean angle, exposed roots, or broken crowns are considered hazard trees. The remaining areas within the gladed runs would not be thinned. This alternative does not include any snowmaking facilities

Work on both gladed trails would be performed by hand with TSV, Inc. personnel and would be accomplished gradually, over four to five years, beginning with thinning in both runs. No heavy equipment would be used. Felled trees would either be piled and burned or removed to the edge of the project area.

Mitigation Measures Common to Both Action Alternatives

As an integral part of alternative 2's and alternative 3's design, mitigation measures will be applied if either alternative is selected, to minimize or avoid impacts to natural resources. These include:

To address Significant Issue #1. The following mitigation measures are included to protect soil productivity and minimize soil erosion:

- Minimize surface disturbance by not using mechanical equipment.
- Prohibit any road construction.
- Keep slash piles less than 15 feet in diameter and 6 feet high.
- Maintain existing organic cover during thinning and slash treatment.
- Replace any disturbance to existing organic cover with slash.
- Buck cut (green) Engelmann spruce trees less than 5 inches in diameter into less than 3 foot lengths and scatter without contact to help stabilize soils. Larger Engelmann must be treated differently, as specified for Significant Issue #5, below.
- Inoculate any burned pile where organic layer is consumed with material from adjacent undisturbed organic layer.

To address Significant Issues #2 and #3. The following measures are included to protect wildlife species and habitat, particularly red squirrel and black bear:

- In gladed runs, retain standing dead and also downed trees greater than 8 inches in diameter, within a 30 foot radius around any spring, if there is not a potential hazard to skiers.
- Prior to implementation, survey the area for red squirrel activity and identify red squirrel middens. In gladed runs, protect red squirrel middens by not removing trees within a 25 foot radius and retaining large, downed logs within a 50 foot radius, if there is not a potential hazard to skiers. During the design phase of the cleared run in alternative 2, avoid red squirrel middens, if possible.
- In the gladed runs, where there are clumps of aspen, retain aspen snags greater than 10 inches in diameter, if there is not a potential hazard to skiers.
- In the gladed runs, retain 3 snags (greater than 10" in diameter) per acre, if there is not a potential hazard to skiers.

- In the gladed runs, retain down logs, if there is not a potential hazard to skiers.
- In the gladed runs, retain low-lying branches on remaining trees to provide protective habitat for marten prey species.
- Begin work on the trails after June 1 of each year. This will eliminate effects of tree felling and removal on potential black bear maternity sites.
- Move any existing large diameter downed coarse woody debris that is a safety issue to the edges of the runs.

To address Significant Issue #4. The cleared ski run will be designed with irregular edges and widths to help retain the natural appearance of the landscape when viewed from across the valley.

To address Significant Issue #5. The following best management practices will be applied to maintain the health of the remaining trees and avoid attracting insects and disease to the adjacent forest:

- When determining what trees to save in gladed runs, choose aspen over conifers; choose Douglas-fir over Engelmann spruce; and choose Engelmann spruce over subalpine (corkbark fir). Aspen and Douglas-fir trees are more wind-firm. Douglas-fir and Engelmann spruce are longer lived trees than subalpine fir.
- Choose unhealthy trees with fading crowns. Removing spruce budworm weakened trees and retaining healthier trees will improve forest health.
- Remove cut Engelmann spruce trees greater than 5 inches in diameter, and/or burn Engelmann spruce trees greater than 5 inches in diameter, within 18 months. This will help prevent the creation of spruce beetle habitat in slash.

To address Significant Issue #6. Most of the springs and the associated intermittent stream are within the area between the two trails. There are no springs in the proposed open run. If springs cannot be avoided within the gladed run, measures are included to protect water quantity and quality while providing openings for skiers. These apply to any cutting within 30 feet on each side of stream or spring channels (also referred to as “streamside management zone”) or any isolated springs in gladed runs:

- Enhance existing deciduous species by thinning conifers less than 5 inches in diameter.
- Remove all hazard trees.
- Prohibit slash piles or burning within the streamside management zone.
- Retain downed, dead conifers within riparian zone not to exceed 10 tons/acre.
- Lay felled conifers across the riparian zone at 20-45 degrees to the stream channel.

To address Significant Issue #7. The following measures are included in alternative 2 to protect air quality when cutting trees and disposing of cut trees:

- Obtain New Mexico Environmental Department Air Quality Bureau permit for any slash disposed through burning.
- Comply with air quality standards in the Clean Air Act and the Wilderness Act when burning.
- Monitor success with data from the existing air quality station.
- Burn only on days with good dispersal.

- Monitor slash density and do not leave more than 40 tons/acre fuels on the ground at one time, to prevent increasing fuel loads that could support a wildfire.

To maintain the health of the remaining trees, practices would be used to avoid attracting insects and disease. Since catastrophic fire can affect many resources, limits for fuel loading would be applied to slash production. Measures are also included to protect air quality, soil productivity, and wildlife habitat. Most of the springs and associated intermittent stream are between the two proposed trails. There are no springs in the proposed open run. If springs are found within the gladed run, buffer zones and other measures are included to protect water quantity and quality, while providing openings for skier safety. Felled trees would either be piled and burned or removed to the edge of the project area.

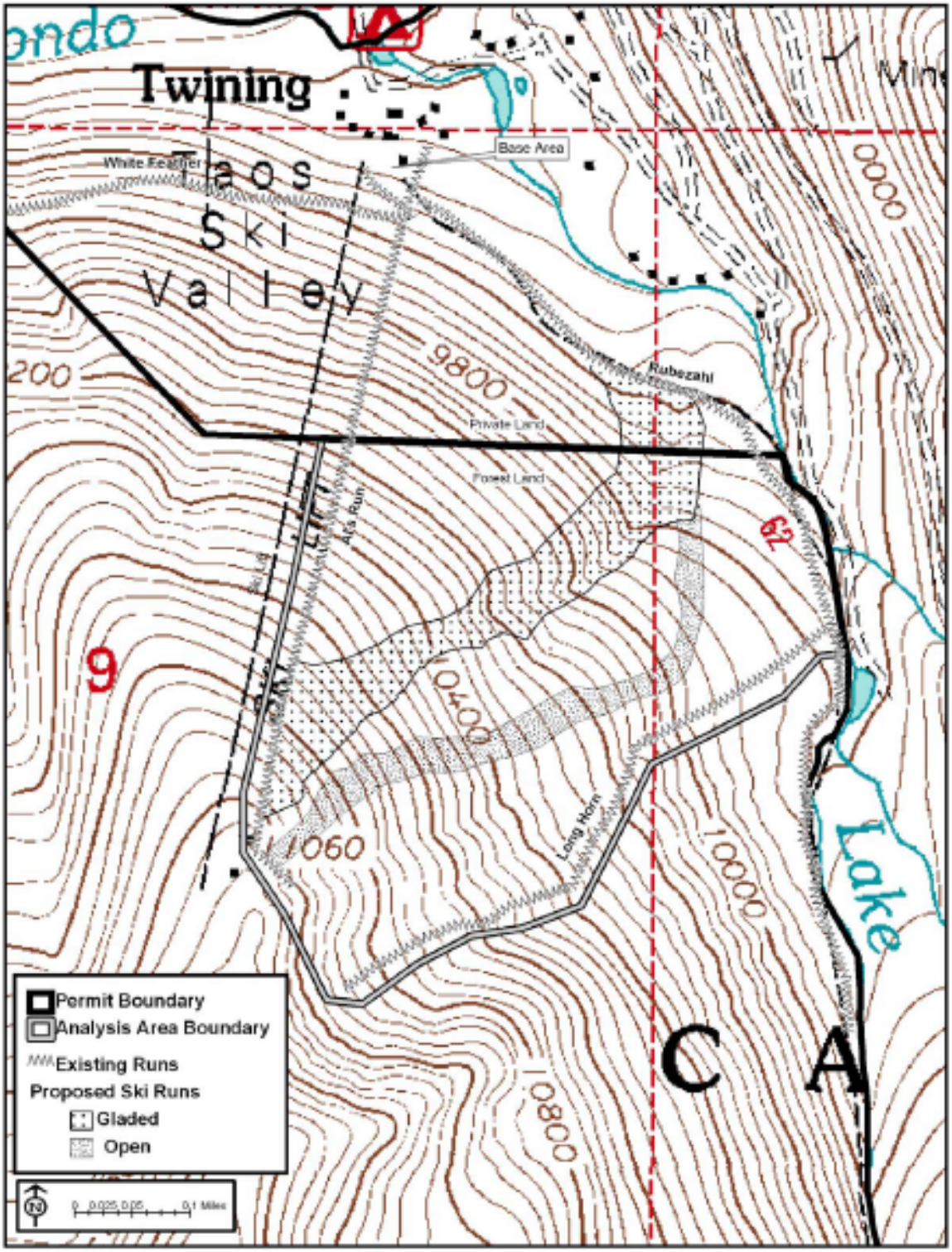

Figure 4. Alternative 2, proposed action

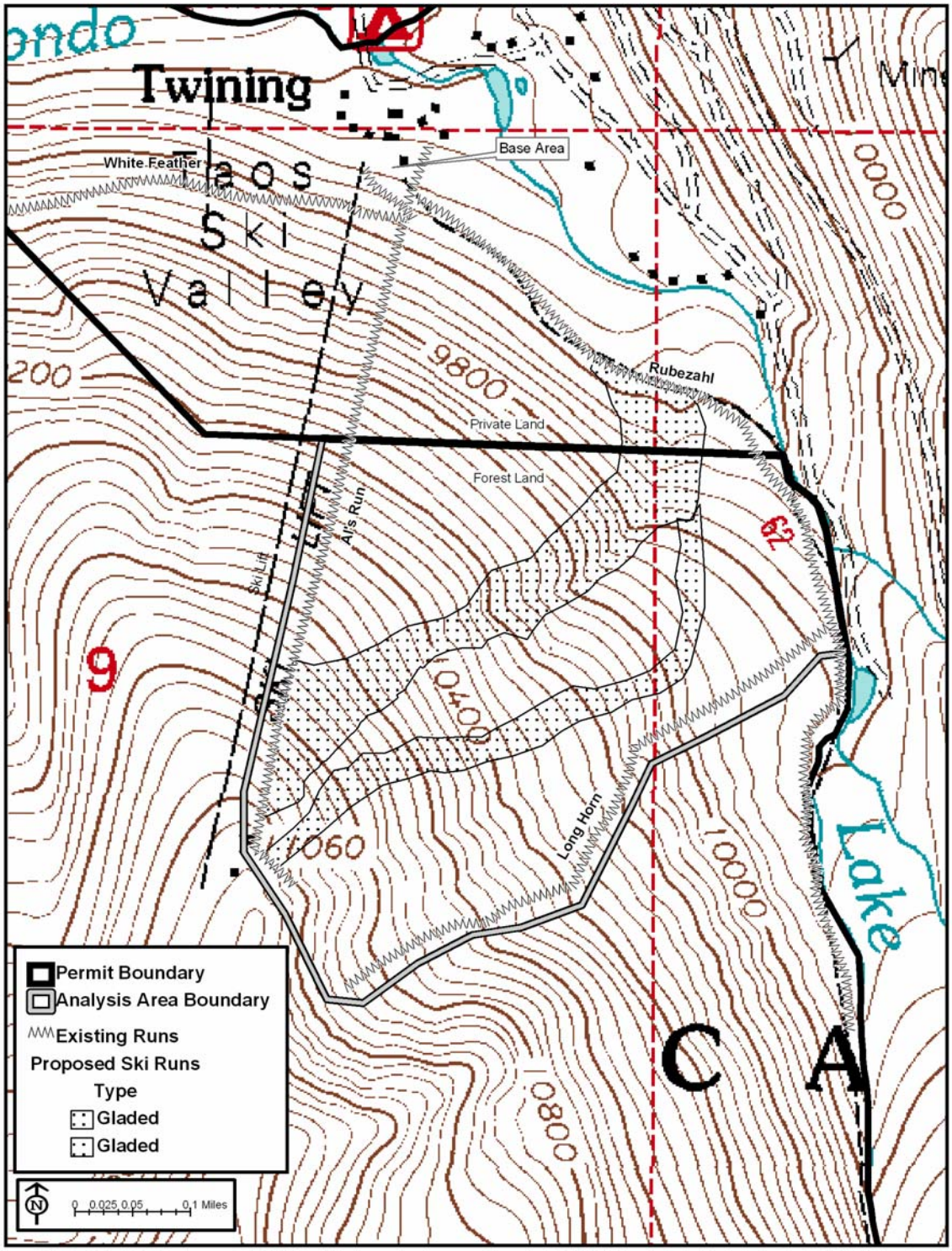

Figure 5. Alternative 3

Environmental effects are estimated with the assumption that all mitigation measures listed in the previous section would be implemented.

Table 1. Summary of Effects

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Gladed Runs
Consistent with forest plan standards & guidelines for recreation sites?	Yes	Yes	Yes
Implements the TSV Master Development Plan?	No	Yes	Yes
Decreases congestion on Lower White Feather Trail?	No	Yes	Yes
Improves public safety by reducing skier conflicts?	No	Yes	Yes
Increases variety of ski terrain and opportunity for uncongested experience?	No	Yes, adds 19 acres of steep, glade skiing and 8 acres of steep, open skiing	Yes, but there is less variety in terrain because all 25 acres are gladed.
Significant Issue 1: Effects to soil productivity?	No	In both alternatives there is no measurable increase in soil erosion or sediment deposition due to limited potential for bare soils, gradual project implementation and mitigation.	
Significant Issue 2: Effects to red squirrel habitat?	No	There would be a loss of 8 acres of red squirrel nesting and foraging habitat in the cleared run. Middens would be avoided in gladed run, but there would be some loss of forage.	Middens would be avoided in the gladed runs but there would be some loss of forage.
Significant Issue 3:	No	There would be minor	

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Gladed Runs
Effects to black bear maternity sites?		impacts since the spruce-fir zone plays a small role in black bear denning. There is abundant suitable denning habitat adjacent the project area.	
Significant Issue 4: Effects to visual quality?	No	In both alternatives the runs would appear natural and "Retention" is met.	
Significant Issue 5: Effects to forest health (insects & disease)?	No	In both alternatives, increased tree vigor in gladed runs would allow the remaining trees the ability to repel bark beetle attacks more successfully. In the open run, the vegetation would be maintained as a grassy opening.	
Significant Issue 6: Effects to water quality and quantity?	No	There would be a small increase (0.35 %) in total Phosphorus nutrient export & a small decrease (0.42 %) in total Nitrogen nutrient export into the Rio Hondo watershed. There would be no measurable increase change in erosion and sediment. The proposed activities are not likely to alter the timing of water flow or increasing the quantity of water produced from this project area or sub-watershed area.	The change in nutrient export loads as described in alternative 2 would not occur. There would be no measurable increase change in erosion and sediment. The proposed activities are not likely to alter the timing of water flow or increasing the quantity of water produced from this project area or sub-watershed area.
Effects on federally listed species?	No	In both alternatives there would be no effect because there is an absence of habitat for 3 species in and adjacent the analysis area and the analysis area is outside all designated Critical Habitat Units for Mexican spotted owl and for the southwestern willow flycatcher.	
Effects on Forest Service sensitive species?			
Peregrine falcon	No	In both alternatives there may be some	

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Gladed Runs
		displacement from the project being in conifer forest habitat. There would be a benefit to peregrine prey species diversity. Effects would not lead to federal listing.	
Boreal owl	No	There would be a loss of 8 acres of foraging and nesting habitat in the cleared run. There would be a loss of some nesting cavities in the gladed run. Effects would not lead to federal listing.	There would be a loss of some nesting cavities in the gladed run. Effects would not lead to federal listing.
Northern goshawk	No	In both alternatives there is an increase in foraging habitat	
Rio Grande cutthroat trout	No	Habitat is present, but this species is absent in Lake Fork Creek. There would be no direct, indirect or cumulative effects from either alternative.	
American marten	No	In both alternatives there is a loss of prey species habitat, loss of cover, more predators, and loss of 27 acres of denning habitat that could lead to local displacement, but not to extinction. There would be no effect to overall population size. There is less loss of prey species habitat and cover in alternative 3. Effects would not lead Federal listing.	
Masked shrew	No	In both alternatives there is a small loss of habitat in gladed run near springs. Effects would not lead to Federal listing.	
Red-backed vole	No	There would be a loss of 8 acres of habitat in the cleared run. Effects would not lead to Federal listing.	There would be an immeasurable loss of habitat. Effects would not lead to Federal listing.
Western heather vole	No	In both alternatives 2 and 3, 27 acres of foraging habitat would improve.	
Snowshoe hare:	No	There would be 8 acres of loss of protective cover, an increase in predators, and decreased mobility.	There would be more protective cover retained and less impact on mobility than alternative 2. An

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Gladed Runs
		Effects would not lead to Federal listing.	increase in predators would occur, similar to alternative 2. Effects would not lead to Federal listing.
Effects on Forest-wide management indicator species?	No	For hairy woodpecker, elk and aquatic macroinvertebrates, there would be no loss in forest population or habitat trend.	
Effects on migratory birds?	No	Blue grouse: increased nesting material and cover Boreal owl: see effects to Forest Service sensitive species above.	Blue grouse: same as alternative 2 Boreal owl: see effects to Forest sensitive species (above)
Effects on heritage resources?	No	There are no cultural resources sites recorded in the project area. No traditional cultural properties were identified.	
Economic effects to downstream villages?	No	There would be no effect on surface water or groundwater quality upon which downstream communities depend or on the water quantity in the Rio Hondo that is used for irrigating downstream fields.	
Social effects to downstream villages?	No	Neither alternative would affect the sense of personal identity, prestige within a community, pride of life-style, and feeling of self-sufficiency that contributes to a strong sense of community.	

Chapter 3. Environmental Consequences

Chapter 3 summarizes the physical, biological, social, and economic environments of the affected analysis area (analysis area) and the potential changes to these environments if the alternatives were implemented. Chapter 3 also presents the scientific and analytical basis for the comparison of alternatives, as presented in the following Table 1 – Effects comparison by alternative in chapter 2. Chapter 3 complies with the implementing regulations (40 CFR 1500-1508) of the National Environmental Policy Act (NEPA) for analytic and concise environmental documents (40 CFR 1502.2). The project record (Appendix A) contains copies of the full reports for most of the resources analyzed.

Environmental resources could be affected in various ways during implementation of alternatives. The effect, or impact, is defined as any change or alteration in the environment's existing condition produced by the alternatives, either directly or indirectly. NEPA regulations (40 CFR 1508.27 (a)) refer to effects in terms of short and long term duration. For this analysis, short-term effects may be considered as occurring over a period of up to two to four years, while long-term effects are considered to last longer than five years. Chapter 3 analyzes the environmental consequences of the proposed action and any alternatives to the proposed action. The analysis of effects for alternatives 2 and 3 under each resource is described with the assumption mitigation measures described in chapter 2 would be applied.

Cumulative Effects

A cumulative effect is the effect on the environment that results from the incremental effect of the action when added to the effects of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions and regardless of land ownership on which the other actions occur. An individual action when considered alone may not have a significant effect, but when its effects are considered in sum with the effects of other past, present, and reasonably foreseeable future actions, the effects may be significant. Cumulative impacts are assessed in terms of how the proposed action would add to the past, present, and reasonably foreseeable activities.

For this project, the analysis area commonly used by each resource in evaluating cumulative effects was the Rio Hondo Watershed. Past, present, and reasonably foreseeable activities within the watershed are listed in table 2. Completing the cumulative effects analysis required each specialist to choose those activities from the list that overlaps in time and space and location with each alternative. The specialist then analyzed the incremental effect of the alternative when the proposed action was added to these activities.

Table 2. Past, Present, and Reasonably Foreseeable Activities

No.	Project or Activity Name	Activity or Project Type	Status	Affected Area (or acres)
1	Rio Hondo Watershed	Watershed	90% undeveloped	20, 515 acres[1]
2	Village of Taos Ski Valley	Wastewater treatment plant, new public safety buildings	On-going	Encompasses ~ 2.36 miles of Hondo Canyon [24]
3	TSV Ski Area ski trails	Ski trails	1956 to present	1,195 skiable acres and 110 trails [24]
4	Rhoda's Run at TSV	Gladed Ski Trail	~2000	1 ski trail
5	Rio Hondo/TSV WUI	Fuels reduction	Foreseeable – within 5 years	Up to 200 acres
6	Valdez and Arroyo Hondo	Downstream communities	On-going	Located along the Rio Hondo, 7 -10 miles downstream of TSV [24]
7	Taos Pueblo	Pueblo	On-going	2 air miles from TSV
8	TSV village and base area development/reconstruction	Development	2006	75 residences, 214 condos, 55 suites and 91 hotel rooms.
9	TSV Ski Area operations	Summer and winter operations	1956 to present	1,279 acres - ski area permit boundary.
10	Wheeler Peak Wilderness	Wilderness	Wilderness Act of 1964	19,661 acres
11	Columbine-Hondo Wilderness Study Area	Proposed Wilderness	Proposed via the New Mexico Wilderness Act of 1980	43,276 acres

[1] It is estimated (see vegetation report in the project record, #62) that within the Rio Hondo Watershed, approximately 44% is wilderness study area, 40% is wilderness, 9% is private lands, 6% has developed recreation, and 1% is suitable for timber production.

No.	Project or Activity Name	Activity or Project Type	Status	Affected Area (or acres)
12	Dispersed recreation within Rio Hondo watershed	Camping, hiking, horseback riding, backcountry skiing, snow-shoeing,	On-going	Forest Trails 63, 64, #90 [24]
13	Deer Creek Allotment	Grazing	On-going	5,370 acres
14	Rio Hondo Mining District	Mining	1880's – early 1900's	
15	Roads to Kachina Village and Bavarian Lodge	Roads	On-going	
16	Timber harvest on private lands	Vegetation harvest	On-going	
17	Big horn sheep transplant	Wildlife	Past	Alpine areas
18	Snowboarding	Winter recreation	Beginning March 2008	1,270 acres – ski area permit boundary
19	Pattison Trust development	Private land development	On-going	3,000 acres in the vicinity of Taos Ski Valley

Monitoring

Monitoring provides a quality control and an adaptive management strategy. By monitoring the effects of treatments and evaluating the results, we are able to make appropriate modifications in management practices, assess resource trends and apply new knowledge to similar projects in the future. Monitoring and evaluating informs the decision maker, specialists, and interested public of progress towards the goals and objectives during the implementation of projects. The following monitoring will apply to either action alternative if implemented. The monitoring elements have been organized to provide answers to the following questions:

1) Effects of pile burning on the forest floor: Was the forest floor burned or scorched by this activity? Is there an understanding by TSV regarding the required mitigation of inoculation with surface soil from surround areas? Did the mitigation of "inoculation" get implemented? What was the result?

2) Effects of streamside management zone (SMZ) designation for spring/seeps and intermittent stream channel in gladed run(s): Were SMZ's identified and marked on the ground? Is there an understanding on TSV's part regarding the required mitigation to minimize activities in these zones? Did slash disposal occur within SMZ? Were SMZ effective in mitigating effects to water quality?

3) Monitoring of vegetation response to thinning and clearing of forest vegetation in run areas: Did the implementation of these activities occur over the anticipated timeframe of 4 to 5 years? What was the vegetation response to the thinning or clearing of forest vegetation in these runs (glade vs. open)? Did understory vegetation respond with increased density? What compositional changes occurred?

Soils and Watershed [59]

Issue #1: The indicators used to evaluate significant issue #1, removal of vegetation may cause erosion and sediment deposits by increasing storm water runoff, are: (1) impact to soil productivity; (2) increase in storm water runoff (tied to Clean Water Act, Section 402); and (3) increase in nutrient export to surface water from conversion of forest vegetation cover to shrub or grass vegetation cover (tied to TMDL for Rio Hondo).

Soil Condition

Soil condition of the analysis area and the land areas proposed for development as ski trails was evaluated for this project. Guidance for determination of soil condition is found at Forest Service Handbook (FSH) 2509.18 – Soil Management Handbook, October 20, 1999. The determination of soil condition for this project analysis is the result of field reconnaissance and evaluation of the proposed action with respect to the potential to affect soil stability, soil hydrology, and nutrient cycling. Definition of soil condition categories, soil function and respective indicators are included in FSH 2509.18.

A Terrestrial Ecosystems Survey of the Carson National Forest was conducted in 1987. [8] The survey contains information used in land planning and management programs on the Carson National Forest. It provides predictions and limitations of soil and vegetation behavior for selected land uses and highlights hazards or capabilities inherent in the soil and the impact of selected uses on the environment. Three terrestrial ecosystem map units (TEU) are potentially affected by the proposed action – TEU 305, 313, and 316. The evaluation of soil stability was two pronged. Evaluation of the relationship of current soil loss rates versus tolerance soil loss was determined by referring to the soil unit descriptions found in the terrestrial ecosystem survey. The relationship of current soil loss to tolerance soil loss for these three map units results in a satisfactory soil stability determination.

Field reconnaissance of these map units found that indicators of soil stability and nutrient cycling were within the satisfactory category as well. No visible surface erosion, rill or gully erosion, or unusual areas of soil deposition were noted. Surface litter cover was evenly distributed, coarse woody material was abundant and well distributed over the soil surface, and the vegetation composition of desirable plant species reflect what would be expected as identified in the potential plant community. Soil hydrology is also determined to be in satisfactory condition as well – little to no evidence of disruption of surface infiltration or compaction was noted, as indicated by lack of evidence of any significant land disturbing activities in these mature stands.

From the field reconnaissance and evaluation of soil properties all map units (TEU 305, 313, and 316) within the areas potentially affected by ski trail development are considered to be in satisfactory soil condition.

Current Water Quality Status

The Rio Hondo Watershed encompasses approximately 21 square miles and is primarily forest land, with 90 percent of the watershed area undeveloped.[2] Recent stream surveys (2000-2004) have found the Rio Hondo near the Village of Taos Ski Valley fully supports its designated uses defined by the State of New Mexico. [59]

The State of New Mexico – Surface Water Quality Bureau has written a total maximum daily load (TMDL) for the Rio Hondo (South Fork of the Rio Hondo to Lake Fork Creek). The purpose of the Rio Hondo TMDL is to define a waste load allocation for the Village of Taos Ski Valley such that increased discharge from the waste water treatment plant will not cause violations of water quality standards protecting the Rio Hondo. The New Mexico Administrative Code (NMAC) defines the Rio Hondo in standards segment 20.6.4.123 of the Rio Grande Basin. The proposal to develop additional ski runs at Taos Ski Valley would potentially result in change to background levels of nutrient export from the forest environment. This background or natural source of nutrient export to surface water was considered in the development of the TMDL.

The other potential effect to water quality of the Rio Hondo to be considered is increased sediment resulting from disturbance of the forest floor and increase in stream temperature from removal of vegetation that provides stream shading to the water surface.

Baseline monitoring determined that the springs, the intermittent stream, and the East Fork of the Lake Fork of the Rio Hondo (upstream and downstream of the analysis area) meet State of New Mexico standards for Interstate and Intrastate Streams, NM Water Quality Control Commission Regulation defined at 20.6.4.123 NMAC. A copy of this letter and accompanying documentation of water quality analysis is located in the project record.

Soil Productivity

Alternative 1

Under this alternative no new ski trails would be developed in the North America area of Taos Ski Valley. No effects, positive or negative to soil productivity would result from this alternative. Existing and future development of private land near and surrounding the analysis area would be expected to continue, guided by the Village of Taos Ski Valley Master Plan and County and State land use and development codes. [3] Because there are no effects to soil productivity under alternative 1, there would be no cumulative impacts.

Alternatives 2 and 3

The direct effects of alternatives 2 and 3 were evaluated by looking at the level of ground disturbance anticipated by the thinning of forest vegetation and disposal of woody debris or slash that would result. The required thinning of overstory vegetation to create the two ski trails would occur over a period of 4 to 5 years for both the gladed and open run. As overstory vegetation is thinned, sunlight reaching the forest floor would increase, resulting in increased growth and vigor of understory vegetation (grasses, forbs and shrubs). Loss or disturbance of the existing forest litter layer (vegetation groundcover) would be minimal, for the following reasons: 1) the thinning required to create the gladed run conditions would occur gradually over a 4 to 5 year timeframe;

[2] This includes the more developed portion of the watershed downstream of the national forest boundary.

2) as this thinning occurs the existing understory vegetation would increase in vigor and density in the thinned areas; 3) the use of hand thinning methods and slash disposal would allow existing vegetation groundcover to be left intact; and 4) the lack of any needed roads, skid trails, or other infrastructure common to more conventional means of thinning and slash disposal eliminates the possibility of soil compaction, minimizes the loss or displacement of protective groundcover associated with this type of disturbance, and eliminates potential change in infiltration characteristics of the surface soil layer often associated with the use of heavy machinery and road construction.

Slash generated by the thinning would be either hauled by hand to the edges of the gladed run(s) and scattered on site or hand piled, and burned through the 4 to 5 year implementation period. These disposal methods would minimize the amount and extent of groundcover loss in the ski runs further providing protection of soil and water resources. Burn piles would be disposed of over the 4 to 5 year timeframe, allowing for at least partial recovery of these areas prior to implementation of additional burning. Needle cast and leaf drop from adjoining undisturbed areas would also assist in the reestablishment of surface cover of any bare area that may result. Other mitigation measures, such as the inoculation of burned areas with soil from adjoining undisturbed areas would help to restore biological processes to the burn pile areas by reintroducing soil microbiota that may be affected by surface heating. By limiting the potential bare soil exposed by thinning, yarding, and slash disposal activities through gradual implementation, and mitigating surface litter disturbance or loss, no measurable increase in soil erosion or sediment deposition is expected.

Development of only gladed runs under alternative 3, rather than a gladed and open run would not result in discernibly different effects than alternative 2, with mitigation.

Storm Water Runoff

Requirements for storm water pollution prevention are regulated under section 402 of the Clean Water Act (40 CFR Chapter 1, sec. 122.27 describes silvicultural activities subject to the National Pollutant Discharge Elimination System (NPDES) programs administered by the Environmental Protection Agency (EPA).

A silvicultural point source means “any discernable, confined and discrete conveyance related to rock crushing, gravel washing, log sorting, or log storage facilities which are operated in connection with silvicultural activities and from which pollutants are discharged into waters of the United States.” The term does not include non-point source silvicultural activities such as nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance from which there is natural runoff.

Storm water runoff related to the thinning forest vegetation or the prescribed burning of slash that may be generated from the thinning would not be subject to regulation under the NPDES program of EPA or the State of New Mexico. Any increase of runoff expected to occur which may increase erosion and/or sedimentation in either the gladed run or the open run must be addressed by the application of best management practices (BMPs) as outlined in the memorandum of understanding (MOU) between the USDA Forest Service, Southwestern Region and the State of New Mexico Environment Department, Surface Water Quality Bureau (see specialist report for additional MOU information).

Through field reconnaissance of the analysis area and project design, BMPs were identified to address potential impacts to water quality that may result as a consequence of implementation of any) action alternatives (see appendix A). In addition, the following mitigation measures were developed to address the potential for erosion and sediment deposits by increasing storm water run off :

- Minimize surface disturbance by not using mechanical equipment.
- Prohibit any road construction.
- Keep slash piles less than 15 feet in diameter and 6 feet high.
- Maintain existing organic cover during thinning and slash treatment.
- Replace any disturbance to existing organic cover with slash.
- Buck Engelmann spruce trees less than 5 inches in diameter into less than 3 foot lengths and scatter without contact to help stabilize soils. Larger Engelmann must be treated differently, as specified for Significant Issue #5, below.
- Inoculate any burned pile where organic layer is consumed with material from adjacent undisturbed organic layer.

This effects analysis is based on the application of these BMPs and mitigation measures during and after implementation.

Alternative 1

Under alternative 1 no new ski trails would be developed in the North America area of Taos Ski Valley. No effects, positive or negative, on water quality or quantity would result from this alternative. Existing and future development of private land near and surrounding the analysis area would be expected to continue, guided by the Village of Taos Ski Valley Master Plan and County and State land use and development codes. [3] Because there are no effects to storm water runoff under alternative 1, there would be no cumulative impacts.

Alternatives 2 and 3

In addition to the specific mitigation measures outlined above, the implementation of these ski trails under alternatives 2 or 3 over a period of 4 to 5 years would minimize the amount of surface disturbance present within the proposed ski trail areas at any one time, further reducing the potential for increased runoff and soil erosion related to the proposed activities.

In addition under both alternatives 2 and 3, the identification and development of site-specific BMPs would address potential impacts to water quality and implementation and monitoring of these mitigation measures during the development of the ski trails, it is not anticipated that any adverse effect to water quality or quantity would result.

Development of only gladed runs under alternative 3, rather than a gladed and open run would not result in discernibly different effects to storm water runoff than alternative 2, with mitigation.

Nutrient Export to Surface Water

To address increase in nutrient export resulting from the conversion of forest vegetation cover, the model used by New Mexico Environment Department (NMED), Surface Water Quality Bureau in the development of the final approved TMDL for the Rio Hondo (South Fork of Rio Hondo to

Lake Fork Creek) was utilized to document the expected change (if any) in nutrient export. The details of this analysis can be found in the specialist report located in the project record. [59]

Alternative 1

Under alternative 1 no new ski trails would be developed in the North America area of Taos Ski Valley. No effects, positive or negative, on water quality would result from this alternative. Existing and future development of private land near and surrounding the analysis area would be expected to continue, guided by the Village of Taos Ski Valley Master Plan and County and State land use and development codes. [3] Because there are no effects to surface water under alternative 1, there would be no cumulative impacts.

Alternatives 2 and 3

The development of the gladed trail(s) under either alternative 2 or 3 is not expected to increase the level of nutrient export for nitrogen or phosphorous to surface water. The model used to define nutrient export for the Rio Hondo TMDL utilized geographic analysis of land cover to define the extent and proportion of canopy cover and type within the upper Rio Hondo Watershed. This land cover data was derived from the National Land Cover Dataset (NLCD). This dataset, used to define the proportion and distribution of various land cover types over the watershed area in question, was then assigned nutrient export coefficient values (taken from a literature review) for each cover type - forest, grassland, shrubland, urban, and barren.

The level of thinning anticipated to develop the gladed trail(s) would not exceed the canopy cover threshold that defines the “forest” land cover type (tree cover generally greater than 6 meters tall; tree canopy cover accounts for 25 to 100 percent of the cover).

The effects analysis for forest vegetation for this project predicts “canopy would be reduced over a 4-5 year period from 80 percent to approximately 30 percent. Residual trees would not be evenly spaced, therefore canopy cover would be represented by trees in groups or scattered individuals.” With no change in land cover type anticipated as a result of the implementation of the gladed ski trail, no change in nutrient export would result.

The Rio Hondo TMDL presents calculated total phosphorous background load to the Rio Hondo (see specialist report) from natural background sources. These natural background load sources are attributed to soil erosion and the decay of plant material and wild animal waste associated with undeveloped land in the Rio Hondo Watershed. The effect of forest canopy removal on nutrient export in the open run under alternative 2 would result in a change in nitrogen and phosphorous export. The expected change in land cover type is a shift from “forest” to a “shrubland” cover type.

The conversion from forest to shrubland would result in an increase in total phosphorous export based on the analysis of total land area converted within the 500 and 5000 meter buffer distances. This increase in total phosphorous load would equal 0.3055 kg per year (0.674 lb per year).

The estimated annual total phosphorous load is calculated at 0.53 pounds per day. Extrapolating this daily load value to an annual basis, total phosphorous loading to the Rio Hondo from natural background sources would equal 193.45 pounds per year. Thus, when compared on an annual basis the predicted increase in total phosphorous loading would be approximately 0.35 percent per year.

The conversion from forest to shrubland would also cause a change in total nitrogen export, based on the analysis of total land area converted within the 500 and 5000 meter buffer distances. This decrease in total nitrogen load under alternative 2 would equal -0.472 kg per year (-1.04 lb per year). The decrease in total nitrogen load is due to slightly lower nutrient export coefficient values assigned to a “shrubland” cover type than the “forest” cover type within the 500 and 5000 meter buffer distances. The estimated annual total nitrogen load is calculated at 6.84 pounds per day. Extrapolating this daily load value to an annual basis, total nitrogen loading to the Rio Hondo from natural background sources would equal 2496.6 pounds per year. Thus, when compared on an annual basis the predicted change (decrease) in total nitrogen loading would be approximately -0.42 percent per year.

Development of only gladed runs under alternative 3, rather than a gladed and open run, would not result in discernibly different effects to nutrient export to surface water than alternative 2, with mitigation.

Issue #6: The indicator used to address significant issue #6, tree removal may affect water quantity and quality in the springs and intermittent stream in the analysis area, is impacts to water quality and quantity.

Water Quality and Quantity

Increased water quantity resulting from forest harvest or thinning was a concern raised during the public comment phase of this analysis (significant issue #6). The potential effects of the proposed action to affect water quantity are more difficult to address directly. Effects to water quantity were evaluated in depth in the Environmental Impact Statement (EIS) – Proposed Taos Ski Valley Inc. Master Development Plan. [2, 3] The analysis in the EIS addressed change in water quantity related to development of ski area infrastructure (lifts, trails, etc.) within the Rio Hondo Watershed. Based on analysis of stream flow for the Rio Hondo from gage data it was determined that annual stream flow had declined over the period of analysis (1934 to 1979). Possible explanations of the decrease in stream flow examined were: 1) increase in maximum air temperature; 2) an increase in the basal area of the timber component of the Rio Hondo; 3) inaccuracies of stream flow gauging data; 4) current and past management of the Rio Hondo Watershed; and 5) decrease in precipitation. The conclusion of this analysis was that increase in the basal area of the timber component was determined to be the most feasible explanation of decreased stream flow in the Rio Hondo Watershed due to increased transpiration and evaporation of available moisture into the atmosphere. This analysis also concluded the effect of removal of forest overstory over approximately 316 acres of land would have a positive effect on water quantity (water yield) due to decreased transpiration and evaporation losses, although this increase would not be measurable due to accuracy of the stream gauge data and the annual variations in stream flow. The conclusions of the EIS are in line with the current literature for water augmentation opportunities resulting from vegetation management of forested environments. Numerous sources of information were consulted. A bibliography of those information sources can be found in the specialist report located in the project record. [59]

Alternative 1

Under alternative 1 no new ski trails would be developed in the North America area of Taos Ski Valley. No effects, positive or negative, on water quantity or quality would result from this alternative. Existing and future development of private land near and surrounding the analysis area would be expected to continue, guided by the Village of Taos Ski Valley Master Plan and

County and State land use and development codes. [3] Because there are no effects to water quality or quantity of the Rio Hondo under alternative 1, there would be no cumulative impacts.

Alternative 2

The thinning of forest vegetation, as proposed for either the gladed trail or open trail would not be expected to result in a measurable change in water quantity. Opening of the canopy would allow additional sunlight to reach the ground, encouraging herbaceous vegetation to grow and increase in vigor and increase diversity of the plant community composition. Slash disposal activities (pile burning) would release nutrients from the slash, making them available for plant use in the immediate area of the piles.

Within the analysis area (109 acres) the implementation of alternative 2 would result in approximately 28 acres (25 percent) of the area would have cover altered, but only 8 acres (7 percent) would have forest overstory cover completely removed and maintained through time in that condition. Within the watershed, this total alteration of forest canopy conditions would not be detectable.

The potential of the proposed activities under alternative 2 to alter the timing of water flow or increasing the quantity of water produced from this analysis area or sub-watershed area is not likely. This conclusion is based on the following rationale: 1) treatments proposed in the gladed run area would thin the forest vegetation more or less uniformly; 2) treatments proposed in the open run area would remove almost all of the existing forest vegetation and type convert the area to a shrub vegetation, which would have a lesser water consumption requirements; 3) treatments in the open run would maintain these open conditions for a continued time period; 4) treatments in both the gladed and open run areas would release suppressed herbaceous vegetation and allow for enhanced growth rates, thereby maintaining, at least partially, the current balance of water use in these ski run areas; and 5) the driver in increased water quantity would be the proportion of the watershed converted from forest to another vegetation type (such as a shrubland), which would be expected to alter the current balance of water use. The proposed development of the gladed and open ski trails would affect this conversion over approximately 28 acres. As described in the Rio Hondo TMDL (page 5), approximately 78 percent (10,475 acres) is “forest.” The development of these two ski trails would decrease this amount to approximately 10,447 acres, an approximate change of less than one half of 1 percent (77.78 percent v. 78 percent).

Alternative 3

The effects of alternative 3 on water quality would differ from what is described above in alternative 2 in the following way: no change in nutrient export loads as described in alternative 2 would occur from implementation of two gladed runs rather than a gladed and open run. This difference in effect would be reflected by the lack of conversion of forest cover type to a shrubland cover type assumed to result in a change in nutrient export coefficient values within the 500 and 5000 meter buffer distances. Forest cover type would persist and therefore no change in total nitrogen or total phosphorous loading would be expected. Water quantity effects would not be expected to differ from what is described above under alternative 2.

Riparian and Wetlands

The North America ski trail analysis area is situated along a steep slope with northeasterly aspect and has a simple drainage network reflective of the topography characteristic of the analysis area.

One intermittent stream channel occurs approximately halfway down the mountain slope within the proposed gladed run area (alternative 2), a tributary to the East Fork of the Lake Fork of the Rio Hondo. This intermittent stream channel is steep, well vegetated and has an abundance of large woody debris in and along the channel. Surface water flow from spring snowmelt and surface and subsurface flow from the springs described previously are the source of water in this channel. As the intermittent stream channel nears the East Fork of the Lake Fork of the Rio Hondo it enters private land near the toe slope of the mountain. Water quality status of this intermittent stream is detailed above in the water quality status section. It should be noted that the June 2005 water quality monitoring for this intermittent stream indicated a discharge of approximately 55 gallons per minute (gpm). However, field reconnaissance was conducted in June 2006 and surface flow was estimated at approximately 15 to 20 gpm. The surface water became subsurface near the forest/private land boundary at the toe of the slope.

Streamside management zones (SMZ) have been designated for each of the spring areas and the intermittent stream channel that may be affected by thinning and slash disposal activities. Given the location of these features, two springs within the proposed gladed run (alternative 2) are the only areas where possible effects could occur. All other spring locations are situated along the edge of the proposed ski runs (gladed or open) or within the forested strip between these proposed run areas.

Alternative 1

Under this alternative no new ski trails would be developed in the North America area of Taos Ski Valley. No effects, positive or negative, would result.

Alternatives 2 and 3

Streamside management zones are intended to protect riparian, aquatic, and water resources by limiting the level of disturbance in order to maintain shade and surface cover conditions. Implementation of project thinning and slash disposal could occur, while providing for the protection and enhancement of water quality, as well as, maintain conditions that allow for wildlife use. Streamside management zones would also provide a vegetation buffer to protect surface water resources by filtering sediment and enhance or maintain the capture, storage, and release of surface and shallow groundwater flows.

To a large extent, potential impacts to the spring areas would be mitigated by avoidance of activity (e.g., thinning of overstory vegetation, slash disposal, pile burning) associated with the proposed ski trail development. Seven of the nine mapped spring locations are situated within the leave strip that separates the two ski runs. The remaining two springs are within the gladed run area. Designation and maintenance of the SMZ around these two spring areas would provide for selective thinning of smaller trees, while retaining the larger trees for cover and shade. Increased sunlight in the understory should allow shrubs and other understory vegetation to expand and flourish, quickly restoring any canopy lost by tree thinning – again maintaining the shade while creating vegetation conditions allowing for use as a gladed trail. Figure 2 depicts the location of the proposed ski trails within the analysis area. Please refer to the project record for the map that displays the proximity of these proposed runs to the location of the spring areas.

Cumulative Effects

The existing ski area trails and existing development in Village of Taos Ski Valley and base area was used in the cumulative effects analysis. No specific geographic information existed that

would define accurately the number of miles or acres of existing ski trails and other infrastructure in the TSV permitted area. An analysis of aerial photos for this project was used and areas of obvious development were defined within the permit boundary and for private land holdings adjacent to TSV. The analysis included using obvious visual evidence of vegetation or ground alternation, such as ski trails carved through stands and road and trail development. These areas of development were grossly delineated on a color orthophoto image of the permit area. The analysis attempted to differentiate "developed" areas from adjoining areas where natural vegetation conditions result in an open stand, and this open condition is natural (avalanche chutes, talus slopes, etc). This was a gross estimate and the acreage cited above likely over estimates the total by 15 to 25 percent. The Village of Taos Ski Valley Master Plan (July 2006) was also reviewed to define the type and level of development foreseen for private land holdings within the upper watershed. The master plan creates six development districts and the associated regulatory plan provides development and design requirements that are in keeping with that area's unique topography, environmental considerations, viewshed, slopes and character (see specialist report for additional information). [59] Review of aerial photos and field reconnaissance indicate that areas currently affected by existing development (ski trails and other infrastructure) are adequately vegetated to control erosion and runoff. Areas such as roads that alter surface water runoff and drainage patterns do not attain the same level of vegetation cover due to their characteristics (cut/fill slopes and compacted surface), but other drainage and runoff controls are utilized to control surface runoff, such as water bars and cross drain culverts, and minimize these impacts.

There are no cumulative impacts associated with alternative 1 of maintaining current ski area management. The cumulative effects of alternative 2 and alternative 3 would not add any noticeable effects to surface erosion, surface water runoff, or sediment delivery providing the mitigation measures identified as a part of both alternatives are implemented. The additional land area disturbance associated with these ski trails is minimal, additional ski trail development (within the permitted area) is not anticipated and potential environmental effects of development on the adjoining private land is outlined and guided by the master plan and the regulatory authority of the Village of Taos Ski Valley, Taos County, and State of New Mexico codes and regulations.

Existing water quality in the Rio Hondo attains all designated uses. Existing point sources of nutrient loading to the river are regulated by the NPDES discharge permit for the waste water treatment facility and monitoring and reporting requirements are protective of water quality. New public infrastructure permitted on National Forest System lands, such as the public safety building, would be implemented under the NPDES permit requirements and a site-specific storm water pollution prevention plan that requires storm water control and pollution abatement during and after construction.

Other constraints on future land use within the Carson National Forest are guided by the Carson Land and Resource Management Plan (forest plan). The land allocations defined in the forest plan, such as the Wheeler Peak Wilderness and the Columbine-Hondo Wilderness Study Area preclude all but limited activities, primarily low intensity dispersed recreation.

Cumulative effects of nutrient loading to the Rio Hondo stream system are possible beyond what is described above for alternatives 2 and 3. These impacts would be dictated primarily by changes to land cover within the immediate vicinity of the Lake Fork and Rio Hondo. Conversion of existing cover within the area immediately adjacent to the river corridor and exposure of soils to

erosion from development (i.e., roads, building sites) would be likely sources of additional nitrogen and phosphorous loading to surface waters. Careful planning of future development, use of appropriate mitigation measures to prevent sediment delivery from construction activities, and revegetation of disturbed areas would minimize this effect.

Air [59]

The indicator used to address significant issue #7and to quantify environmental consequences is: (1) adverse impacts to air quality resulting from slash pile burning (tied to CAA 1970 as amended and State of NM Air Quality standards 20 NMAC 2.6.0 (Open Burning) and applicable permitting requirements outlined in the NM Smoke Management Program for this type of activity.

Alternative 1

Under this alternative, no new ski trails would be developed in the North America area of Taos Ski Valley. No effects, positive or negative, on air quality would result from this alternative.

Alternatives 2 and 3

Disposal of excess slash generated by the thinning in the gladed run and overstory removal in the open run would be accomplished over a 4 to 5 year timeframe. Needed slash disposal, through pile burning would be dictated by the need to create ground surface conditions conducive to use as a ski trail and other slash disposal options, such as yarding the slash to the edge of the run area and scattering into the adjacent stands.

This type of open burning is regulated by State of New Mexico Air Quality standards (20 NMAC 2.6.0). This activity would typically occur when ventilation conditions would allow for adequate dispersal of generated smoke. No adverse effect to air quality would be expected to result. Air quality effects to the Village of Taos Ski Valley would only be expected to occur if pile burning occurred during the colder months when an inversion layer was present.

The effects of alternative 3 on air quality would be similar to alternative 2 above. Lesser amounts of slash disposed of by pile burning may slightly reduce potential impacts to air quality of this action on the Wheeler Peak Wilderness and the Village of Taos Ski Valley.

Cumulative Effects

No measurable cumulative effects are anticipated.

Vegetation [62]

A majority of the 109 acre analysis area is situated in a 93 acre spruce-fir stand location (701030 site 0006), with a smaller portion in a 344 acre spruce-fir stand location (701030 site 0004). Both stands are comprised primarily of Engelmann spruce (*Picea engelmannii*) and corkbark fir (*Abies lasiocarpa var. arizonica*) in addition to aspen (*Populus tremuloides*). Also, scattered Douglas-fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa*) trees exist at lower elevations within the stand. Tree regeneration is dominated by corkbark fir with occasional Engelmann spruce. The predominant shrub in the stand is grouse whortleberry (*Vaccinium scoparium*) in addition to Oregon grape (*Mahonia repens*). Stand densities exceed 800 trees per acre with an associated basal area ranging from 130 square feet per acres (ft^2/ac) to 180ft^2/ac. High stand densities contribute to increased competition for sunlight, nutrients, water and growing space

between trees decreasing tree vigor. This analysis address significant issue #5: Woody debris (slash) from tree cutting can attract insects and lead to an infestation of the adjacent forest. Slash treatments and controls can protect forest health. Impacts to forest health will be the indicator of this effect.

Forest Health

Based on aerial surveys flown in 2007 and field reconnaissance conducted in 2005 and 2007, the analysis area has experienced damage caused by western spruce budworm (*Choristoneura occidentalis*). The spruce budworm larvae feed in buds and on foliage of the current year. Sustained heavy attacks cause nearly complete defoliation in 4 to 5 years. Epidemics cause decreased growth, tree deformity, top killing, and ultimate death of trees on extensive areas (Furniss and Carolin 1977). Also, young trees are especially vulnerable when growing beneath mature trees, since larvae disperse from the overstory and feed on the small trees below. Most common host trees include Engelmann spruce and corkbark fir-major components of the spruce-fir cover type .

A second forest insect causing damage and significant tree mortality is the western balsam bark beetle (*Dryocoetes confusus*) (UDSA 2006). A combination of drought, high stand densities, and western spruce budworm damage (defoliation) decrease tree vigor and predispose trees to attack by bark beetles. Attacked trees occur in groups or as scattered individuals. Through visual observations, current tree mortality exceeds 3 snags (dead standing trees) per acre. The western balsam bark beetle's host tree species are subalpine fir (*Abies lasiocarpa* var. *lasiocarpa*) and corkbark fir. However, the western balsam bark beetle may occasionally attack Engelmann spruce (Furniss and Carolin 1977).

A potential insect of concern is the spruce beetle (*Dendroctonus rufipennis*). Endemic spruce beetle populations usually live in habitat created by windthrown trees and/or green slash created by vegetation management. When populations increase to high levels, beetles may enter larger (16.0") diameter spruce trees. If an infestation persists, beetles will attack and kill smaller trees after the large trees in the stand are killed (silvics NA). In the Rocky Mountain area, susceptibility, or hazard of a stand to spruce beetle attack is based on physiographic location, tree diameter, basal area, and percentage of spruce in the canopy (Holsten, Their, Munson leaflet 127 1999). However, currently aerial surveys and field reconnaissance show no spruce beetle activity.

Alternative 1

With this alternative, stand densities within the analysis area would continue to increase. Competition for sunlight, water, nutrients and growing space would persist and tree vigor would continue to decrease. Western spruce budworm would still be active with the potential for further western balsam bark beetle activity. Small gaps of tree mortality created by the western balsam bark beetle would eventually be recolonized by shade tolerant tree species including corkbark fir and Engelmann spruce. Some understory vegetation including grasses, forbs and shrubs may gradually diminish and/or be replaced due to a decrease in sunlight. Due to no proposed activities, the potential for windthrow would remain minimal.

Alternatives 2 and 3

Alternative 2 and 3 would improve tree health within the gladed run(s). In the gladed run proposed under alternative 2, all trees greater than 15.0" diameter breast height (DBH) would be

retained and a portion (approximately 30%) of trees 7.0-15.0” DBH would be removed. Most trees less than 7.0” DBH would also be removed. Trees would be gradually removed over a 4- 5 year period and this progressive removal of trees would decrease stand densities, directly decreasing the competition between trees for water, nutrients, sunlight and growing space. This decrease in competition increases the vigor of residual trees, leaving them able to withstand repeated defoliation by the western spruce budworm. Healthy trees with large food reserves are better able to recover from partial defoliation compared to stressed trees in unthinned stands. An increase in tree vigor would also allow trees to repel bark beetle attacks more successfully (Halloin 2003).

Most spruce beetle outbreaks in standing timber originate in windthrown trees (FID leaflet 127). Windthrow tends to be a problem with Engelmann spruce, due to its shallow rooting habits. By gradually removing trees over a 4-5 year period and primarily removing most trees less than 7.0” DBH in addition to approximately 30% of trees 7.0-15.0” DBH, tree densities would initially be kept relatively high. Therefore, the mutual exclusion between trees should prevent any major windthrow events and allow for the buttressing of root systems, a windfirming process. Topographic position plays an important role in windfall risk. In the proposed treatment areas the potential for windthrow events is below average on the lower north-east facing slopes, valley bottoms, and increases in the moderate to steep middle and all upper north and east facing slopes (silvics North America). The greatest windfall risk exists on the exposed ridge at the top of lift #1.

The proper treatment of slash would assist in minimizing the potential buildup of spruce beetle populations. This would be achieved by limbing logs and tops, then cutting them into short lengths and scattering them where they will be exposed to the sun. The removal of slash greater than 8 inches in diameter (Alexander 1987) and/or burning would also assist in reducing the potential for spruce beetle population buildup.

Within the last 5-6 years Rhoda’s Run, which is a gladed run, was created. This treatment involved the removal of trees 6.0” and smaller in a spruce-fir stand. This treatment resulted in the random spacing individual trees, clumps and the creation of openings. Slash was both removed and left on site. Within Rhoda’s Run and the surrounding area, no windthrow or spruce beetle attacks have occurred. Rhoda’s Run occupies a similar range of elevation as the proposed runs and has a north-northeast aspect. The associated windthrow risk with these aspects is below to above average (Silvics NA).

In the proposed open run all trees would be removed over a 4-5 year period. After all trees are cut the open run would no longer considered forested and would be converted to a grassy opening. That portion of the stand would be maintained as an opening. With proper slash treatment there should be no effects to forest health regarding western spruce budworm, western balsam beetle and the spruce beetle.

The effects of alternative 3 are the same as described in alternative 2 for the gladed run.

Cumulative Effects

Within the 20,515 acre Arroyo Hondo Watershed, past activities have taken place within the permit boundaries of the Taos Ski Valley, in addition to development of private and local government lands. Those past actions within the Taos Ski Valley were the creation of open and gladed ski runs. Vegetation treatments included diameter limit cutting to create gladed runs and all tree removal to create open runs. Although those treatments did not address forest health

directly, within the gladed runs, individual tree vigor should have increased with a decrease in competition for water, nutrients, sunlight and growing space. Within the open runs there are no forest/tree health issues. Those open runs are maintained as open runs. Potential future activities within the Arroyo Hondo Watershed include: Taos Ski Valley CFRP, Rio Hondo WUI, development on private land, city projects, and continuing Taos Ski Valley operations.

The Taos Ski Valley CFRP and the Rio Hondo WUI projects would entail the removal of trees and slash disposal. Activities would include intermediate treatments (the cutting of trees from a stand between the time of establishment and final harvest) and possibly regeneration treatments. Intermediate treatments would primarily be thinning from below and pre-commercial thinning. These would remove smaller diameter trees to assist in decreasing ladder fuels, stand densities and reducing fuel loadings. Regeneration methods would be the use of a group selection method which creates small openings. These openings become populated with a new age class of trees, increasing structural diversity. Slash management would involve either pile and burn, chipping, lop and scatter or a combination of these activities. Treatments on private and city land may involve thinning around structures or complete tree removal for construction purposes. These activities would be small in scale in comparison to the Arroyo Hondo watershed.

Forest health within the Arroyo Hondo Watershed, both within and adjacent to Taos Ski Valley would not appreciably change due to the development of two ski runs under alternatives 2 or 3. This can be attributed to the small amount of acres to be treated compared to the overall size of the Arroyo Hondo Watershed (0.5%). Tree vigor within treated areas should increase as there is a decrease in tree density. A decrease in tree density allows for more available resources such as sunlight, water, nutrients, in addition to growing space for residual trees.

Vegetation Structural Stage

The Goshawk Scientific Committee developed vegetation structural stage (VSS) desired condition guidelines for ponderosa pine, mixed conifer, and spruce-fir forests (Reynolds et al. 1992), which were adopted into the Carson forest plan through the 1996 Region-wide Amendment for Forest Plans [193C]. The committee recommended a desired condition of 10 percent of the area be in the grass/forbs/shrub stage (VSS 1), 10 percent in the seedling/sapling stage (VSS 2, 1.0-5.0” DBH), 20 percent in the young forest (VSS 3, 5.0-12.0”DBH), 20 percent in the mid-aged forest (VSS 4, 12.0-18.0”DBH), 20 percent in the mature forest (VSS 5, 18.0-24.0”DBH), and 20 percent in the old forest (VSS 6, 24.0”+DBH). Currently, the analysis area would be classified as VSS 4. However, scattered small openings created by bark beetle mortality could be categorized as VSS 1, depending on their size. However, these guidelines apply to suitable vegetation management areas. The following analysis applies forest plan management direction for Management Area 16 – Developed Recreation Sites.

Alternative 1

Overtime the VSS distribution within the analysis area under alternative 1 would remain unbalanced, dominated by VSS 4. Existing small openings/gaps (VSS 1) created by tree mortality would gradually become re-established with tree regeneration, if it does not already exits. The remainder of the analysis would transition over time into VSS 5 dominated stands. Because stand densities would not be reduced, there would be intense competition between trees for water, nutrients, sunlight, and growing space. This competition would maintain slow growth rates. However, if insect or disease activity increased, pockets of VSS 1 may be created due to tree mortality.

Alternatives 2 and 3

The proposed gladed run(s) under alternatives 2 and 3 would remain categorized as VSS 4 after treatments, since a majority of trees to be removed are from the smaller diameter classes. The removal of smaller diameter trees in addition to scattered trees up to 15.0” DBH would only increase the average diameter within the gladed run. The decrease in stand densities would decrease competition between trees for water, nutrients, sunlight and growing space. This decrease in competition should increase the growth rate of residual trees. Therefore, it would take less time for trees in the gladed run to transition into VSS 5. Areas not treated would take more time to shift into VSS 5. The proposed open run would be taken out of VSS 4 classifications after the 4-5 year treatment window and be maintained as an open run, dominated by grasses and shrubs (VSS 1).

Cumulative Effects

Within the 20,508 acre Arroyo Hondo Watershed, a majority of forested area would be classified as VSS 4. This can be attributed to a lack of vegetation treatments over time, due to land classification within the watershed (see table 2 in this chapter). However, those treatments that have occurred have primarily taken place within the permit area of Taos Ski Valley, Inc. Many of the treatments were the creation of open runs, which take portions of stands out of forest vegetation. These open runs are maintained as grassy openings (VSS1).

Potential future activities within the Arroyo Hondo watershed include: Taos Ski Valley CFRP, Rio Hondo WUI, development on private land, city projects and continuing Taos Ski Valley operations.

The Taos Ski Valley (TSV) CFRP and the Rio Hondo WUI projects would entail the removal of trees and slash disposal. Activities would include intermediate treatments and possibly regeneration treatments. Intermediate treatments would primarily be thinning from below and precommercial thinning. These would remove smaller diameter trees to assist in decreasing ladder fuels, stand densities and reducing fuel loadings. Regeneration treatments would be the creation of small openings (group selection) to increase structural diversity. Slash management would involve either pile and burn, chipping, lop and scatter or a combination of these activities.

The decrease in stand densities would decrease competition between trees for water, nutrients, sunlight and growing space. This decrease in competition should increases the growth rate of residual trees. Therefore, it would take less time for trees in the TSV CFRP and Rio Hondo WUI projects to transition into VSS 5. Areas not treated will take more time to shift into VSS 5. Also, regeneration treatments would create openings classified as VSS 1. These openings over a 10-20 year period would become populated with seedlings and saplings and transition into VSS 2. But, the proposed open run would be maintained as a grassy opening (VSS 1).

VSS distribution within the Arroyo Hondo Watershed would not measurably change due to the limited amount of acres to be treated. Over the next 50-100 years portions of the Arroyo Hondo Watershed would transition from VSS 4 to VSS 5. The amount of time for the transition to occur would be influenced by stand densities and available resources. However, future VSS distribution would be influenced by a variety of factors such as: insects, disease, fire, weather and human activities.

Canopy Cover

The 1996 Region-wide Amendment of Forest Plans incorporated the goshawk guidelines into its desired conditions for canopy cover in spruce-fir, mixed conifer, and ponderosa pine forests. Canopy cover guidelines apply only to mid-aged to old forest structural stages (VSS 4, VSS 5, and VSS 6) and not to grass/forb/shrub/ to young forest structural stages (VSS 1, VSS 2, and VSS 3).

Currently, based on 2005 and 2007 field reconnaissance and aerial photo interpretation, existing conditions do not meet the desired canopy cover for landscapes within goshawk foraging areas. Table 3 compares the existing condition in the spruce-fir forest type for canopy cover in the analysis area and the desired condition. However, tree mortality caused by bark beetle activity have created small openings/gaps in the canopy. These guidelines apply to suitable vegetation management areas. The following analysis applies forest plan management direction for Management Area 16 – Developed Recreation Sites; therefore vegetation management may reduce treatment areas below these guidelines.

Table 3. Percent canopy cover for spruce-fir cover type.

Cover Type	VSS Class	Existing Condition	Desired Condition
Spruce-fir	4	80%	60% (1/3) 40% (2/3)

Alternative 1

Current canopy cover in the analysis area is higher than the desired condition for the spruce-fir forest type in VSS 4 (table 3). With the no action alternative, the canopy cover would not be reduced. As trees grow, the canopy cover would continue to become denser until all growing space is utilized. Due to a lack of sunlight the amount of grasses, forbs, and shrubs would decrease. Shade tolerant tree species would continue to regenerate and grow in the understory. Western spruce budworm would still be active with the potential for further western balsam bark beetle activity. Further western balsam bark beetle activity would create more scattered openings/gaps in the canopy due to tree mortality.

Alternatives 2 and 3

The proposed gladed run(s) under alternatives 2 and 3 would reduce stand densities over a 4-5 year period to approximately 40 ft2/ac to 50 ft2/ac. This would reduce the current canopy cover from 80% to approximately 30%. Residual trees would not be evenly spaced, therefore canopy cover would be represented by trees in groups or scattered individuals. Within the proposed open run canopy cover would be reduced to 0%.

With a considerable reduction in canopy cover, a change in understory vegetation would take place. The understory would become dominated by grasses and forbs and existing shade tolerant shrubs (grouse whortleberry and Oregon grape) would be lost and replaced by more shade intolerant species such as raspberry. The proposed open run (alternative 2) would be maintained so no tree regeneration would be allowed to reach past seedling size. Areas not treated would maintain high canopy cover and effects would resemble those in the no action alternative.

Cumulative Effects

Within the Arroyo Hondo watershed, future treatments on public lands including TSV CFRP and Rio Hondo WUI, would minimally affect overall canopy cover. By thinning from below most trees removed would be in the smaller diameter classes (VSS 1, VSS 2, and VSS 3) with incidental taking of larger trees to meet objectives. The 1996 Forest Plan Amendment canopy cover guidelines apply only to mid-aged to old forest structural stages (VSS 4, VSS 5, and VSS 6).Therefore, change in canopy cover represented by VSS 4, VSS 5, and VSS 6 would be minimal and the desired condition would not be met. However, tree mortality caused by insects, disease, fire, and weather would create small openings/gap reducing canopy cover percentage. The scale of the mortality incident would influence the change in canopy cover.

Old Growth

Currently, the Carson National Forest is analyzing old growth on an ecosystem management area (EMA) level. Within each EMA, approximately 20% of each cover type would be allocated as existing or potential old growth. The Arroyo Hondo Watershed (used for cumulative effects) occupies parts of the Wheeler Peak Wilderness EMA, the Columbine-Hondo Wilderness Study Area EMA, and the Red River EMA. The Taos Ski Valley resort is located in the Red River EMA. Currently, no old growth analysis has taken place in any of the previously stated EMAs.

For a forested site to be considered old-growth, it must meet the minimum criteria for the structural attributes used to determine old-growth which can be found in the 1996 Record of Decision for Amendment of Forest Plans. The proposed activities would remove trees up to 15.0” in diameter in the gladed run and all trees in the proposed open run. Therefore, trees contributing to the structure of a forested site with the potential to meet old growth requirements would be removed. However, the open run would be considered a grassy opening. The gladed run would not be considered when allocating existing or potential old-growth forested sites within the Red River EMA. The EMA’s referenced above which make up the Arroyo Hondo watershed meet or exceed the minimum requirements as defined in the 1996 Record of Decision for Amendment of Forest Plans.

Alternative 1

There are no direct or indirect effects to old growth in taking no action under this alternative. Therefore there are no cumulative effects.

Alternatives 2 and 3

The proposed activities (alternatives 1 and 2) would remove trees up to 15.0” dbh in the gladed run(s) and all trees in the proposed open run (alternative 2). Therefore, trees contributing to the structure of a forested site with the potential to meet old growth requirements would be removed. However, the open run would be considered a grassy opening. The gladed run would not be considered when allocating existing or potential old-growth forested sites within the Red River EMA.

Because the EMAs (see above) that make up the Arroyo Hondo Watershed meet or exceed the old growth minimum requirements (as defined in the 1996 Record of Decision for Amendment of Forest Plans), there are no direct, indirect or cumulative effects to old growth.

Fuels and Fire [63]

Fire Risk

Fire risk is the potential for a fire to ignite or start. The analysis area is on a north-facing slope. North-facing slopes are generally not conducive to fire spread, as they are moist and cooler. In the past 10 years three wildfires have been reported within the Rio Hondo watershed. The greatest risk of fire damage is to private property to the north and west of the analysis area. The use of iIntegrated Forest Management System (INFORMS) and the BEHAVE program showed that the risk of a catastrophic or a sustained crown fire under average worst fire conditions would be minimal, however an increase in fuel loading would increase the risk of a catastrophic or a sustained crown fire under average fire conditions. [63]

Fire season in New Mexico generally occurs from April 1 to July 20. It is characterized by low humidity, strong winds and unstable atmosphere. Slope affects fire spread and intensity. Fire burns faster and hotter upslope than downslope or on level ground. Slopes in the North America trails analysis area are 55 percent and are on north and northeast facing aspects.

During fire season, winds blow through the valley predominately from the southwest to the northeast. Wind speeds increase as wind is funneled through the valley. High winds make fires burn hotter and spread faster. On-site weather observations show that 5 to 10 mph winds at eye level in the spring and early summer are common.

Fuel Models

The area queried for the canopy cover, as well as, vegetation structural stages and trees per acre, were within the analysis area. Data was derived from an INFORMS analysis and field reconnaissance. Fuels, weather and topography combine to determine how hot and fast a fire burns. Fuel conditions are defined by quantity and arrangement and have been categorized into 13 standard descriptive fuel models (Andersen 1982). Fuel models are used as one of the inputs in the BEHAVE computer model to determine flame height and rate of spread for a wildfire. The dominant models in the North America Trails are fuel predominately fuel model 10. Fuel model 10 represents “timber litter” models, where the fuel to carry a surface fire consists mostly of needles, twigs, and branches from trees. Fuel models are based on the surface (dead) fuels rather than live trees. Fuel model 10 typically occurs on north and east slopes where there are more down logs and other woody debris. Fires burn differently in the different fuel models under the same weather conditions. During average worse fire conditions (not extreme) when dead fuel moisture averages 8 percent, live fuel moisture is 100 percent, and the effective wind speed at mid-flame height is 5 miles per hour (mph) a fire in the various fuel models are likely to have the characteristics identified in table 4. The table represents fire behavior that is ignited within or adjacent to the analysis area. The area queried for the canopy cover, as well as for vegetation structural stages and trees per acre were within the analysis area.

Table 4. Analysis area existing predicted fire behavior

Fuel Model	10
Flame Length	4 to 5 ft.
Rate of Spread	7.8 ch/hr.

Surface Fuel Accumulations

Within the analysis area dead and down fuel loading is considered heavy (Sackett 1979), ranging from 14 tons per acre at low elevations to 55 tons per acre at high elevations. Trees that are growing close together are under stress from competing for moisture and nutrients with nearby trees. Stressed trees are susceptible to mortality from insects and disease. As the trees die and fall over, surface fuel-loading increases. Maintenance of existing trails can temporarily increase surface areas that are now fuel model 8 would become fuel model 10 (which has more branches and logs on the surface than a model 8) as the dead trees fall over and add to the fuel load, which would hamper suppression efforts.

Ladder Fuels and Crown-to-Base Heights

The structure and composition of forest vegetation affects fuel loads and fire behavior (Van Wagner 1977), as well as wildlife habitat, soil, and other resources. Multi-storied stand structure and continuous overstory forest canopies create conditions conducive to crown fires (Van Wagner 1977). Ladder fuels are the small understory trees growing beneath larger trees. These small trees provide for a continuous vertical fuel arrangement that encourages crown fire initiation (Van Wagner 1977), by carrying surface fire into the crowns of the overstory trees. As crown base height increases so does the wind speed needed to initiate a crown fire. Ladder fuels tend to be sparse within the analysis area the crown to base heights average 11 feet within the analysis area according to the INFORMS analysis. This means that eye level winds would need to be at approximately 50 miles per hour (mph) in order to initiate a crown fire but 13 mph to sustain a crown fire

Forest Canopy and Crown Bulk Density

One factor affecting fire behavior is crown bulk density, which is the mass of crown fuel per unit of crown volume. Increased numbers and sizes of trees result in more fuel in the crowns. Crown bulk density of 0.17 pounds per cubic yard (lb/yd3) can sustain a crown fire (Agee 1996). Crown bulk densities in the analysis area average 0.233lb/yd3 to 0.0035lb/yd3 based on tables converting tree size and density to crown bulk density. This means forested stands in the analysis area is are not prone to a crown fire initiation but are prone to sustain a crown fire that enters from outside the analysis area.

Species Composition

Vegetation is described in terms of major forest species type, diameter class, number of trees per acre, and percent canopy cover. Forest types are defined by the dominant and co-dominant tree species in the overstory. The major forest types within the analysis area, is Spruce Fir. Spruce-fir forests of the Southwest historically experienced larger, high-intensity stand replacement crown fires at mean intervals of over 100 years (Allen 1989; Veblen et al. 1994; Grissino-Mayer et al. 1995). Spruce and fir growth in the analysis area have not experienced fire in 150 years.

Aspen is a short-lived species that regenerates by sprouting following fire (Gruell and Loopel 1974). Aspen stands are usually quite wet and do not easily burn. Aspen provides important diversity and wildlife habitat values within the coniferous forest landscape. Aspen is another species that is gradually declining and may be eliminated due to the lengthening of fire return intervals. However, aspen clones can persist underground in a suppressed state with a conifer

overstory for extended periods (Barnes 1966). The aspen stands in the analysis area are 25 to 50 years old, declining in vigor, and being replaced with shade-tolerant fir trees.

Alternative 1

With the no action alternative, stand densities in areas within proposed trail areas would continue to increase. The long-term fire return interval found in the vegetation type would exhibit two distinct fire behaviors. Either low intensity surface fire with smoldering, or stand replacement fire across the larger landscape.

Alternative 2

Removal of residual surface vegetation would help mitigate fire behavior from fuel accumulations associated with tree cutting on the runs. Because of the small size of the project overall fire behavior would not change in the analysis area. The likelihood of a natural ignition would be lowered but the probability of a human caused fire would remain the same. Potential increased surface fire behavior would be temporary as residual fuels will be removed mechanically or by prescribed fire.

Alternative 3

Removal of residual surface vegetation would help mitigate fire behavior from fuel accumulations associated with tree cutting on the runs. Because of the small size of the project overall fire behavior would not change in the analysis area. The likelihood of a natural ignition would be lowered but the probability of a human caused fire would remain the same. Potential increased surface fire behavior will be temporary as residual fuels would be removed mechanically or by prescribed fire.

Cumulative Effects

Within the 20,515 acre Arroyo Hondo watershed, past activities have taken place within the boundaries of the Taos Ski Valley in addition to development of private and local government lands. Those past actions within the Taos Ski Valley were the creation of open and gladed ski runs. Vegetative treatments included diameter limit cutting to create gladed runs and all tree removal to create open runs. Although those treatments did not address forest health directly, within the gladed runs, individual tree vigor should have increased with a decrease in competition for water, nutrients, sunlight and growing space. Within the open runs there are no forest/tree health issues. Those open runs are maintained as open runs.

Potential future activities within the Arroyo Hondo watershed include: Taos Ski Valley CFRP, Rio Hondo WUI, development on private land, city projects and continuing Taos Ski Valley operations. The Taos Ski Valley CFRP and the Rio Hondo WUI projects would entail the removal of trees and slash disposal. Activities would include intermediate treatments and possibly regeneration treatments. Intermediate treatments would primarily be thinning from below and precommercial thinning. These would remove smaller diameter trees to assist in decreasing ladder fuels, stand densities and reducing fuel loadings. As the number of treatments increase the overall effect to fire behavior would improve resulting in the likelihood of low intensity surface fires. Treatments on private and city land may involve thinning around structures or complete tree removal for construction purposes. These activities would be small in scale in relation to Arroyo Hondo watershed. When considering past, present and any foreseeable actions, the small size of the project in relation to the landscape would not have a measurable change to fire risk and fire behavior.

Wildlife [60, 61]

Federally Listed Species

A list of federally listed species that occur in Taos County was pulled from the U.S. Fish and Wildlife Service (FWS) website on April 6, 2008 (USDI 2008). There are three species listed for Taos County (see appendix 1 in the specialist report). These species are the southwestern willow flycatcher (*Empidonax traillii extimus*), Mexican spotted owl (*Strix occidentalis lucida*), and the black-footed ferret (*Mustela nigripes*). Listing of these species includes designation of "Critical Habitat" for the southwestern willow flycatcher and the Mexican spotted owl.

None of the three Federal listed species warrant further analysis due to the absence of habitat for these species in and adjacent the analysis area. This proposed project is between 9,600 to 11,000 feet (2926 – 3352 m) in elevation on steep spruce-fir mountain slopes. Both the southwestern willow flycatcher and the black-footed ferret are found at elevations lower than 9,000 feet (2743 m). Mixed conifer habitat for the Mexican spotted owl is absent the analysis area. The analysis area is outside all designated Critical Habitat Units for Mexican spotted owl and for the southwestern willow flycatcher (see Biological Assessment for additional information).[60, 61]

Forest Service Sensitive Species

Of the 47 species on the Regional Forester Sensitive species list (USDA 2007), 38 have the potential to occur on the Questa Ranger District (USDA 2008). Of these 38 species, only nine species warranted further analysis:

- American peregrine falcon (*Falco peregrinus anatum*)
- Boreal owl (*Aegolius funereus)*
- Northern goshawk (*Accipiter gentilis*)
- Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*)
- American marten (*Martes americana origenes)*
- Cinereus (masked) shrew (*Sorex cinereus cinerues)*
- Southern red-backed vole (*Clethriomomys gapperi)*
- Western heather vole (*Phenacomys intermedius intermedius)*
- Snowshoe hare (*Lepus americanus)*

American Peregrine Falcon

Suitable foraging habitat exists for this species throughout the analysis boundary. Peregrine also rely upon the diversity of prey species found in riparian areas and/or adjacent impoundments due to the abundance of preys associated with these areas (USDI 1977). Peregrines may forage up to 12.4 mi. (20 km) from the nest site, but normally stay within 7.5 mi. (12 km). Only one known peregrine site exists within foraging range of the analysis boundary.

Alternative 1

Implementation of alternative 1 would not impact peregrines current use of the area. Current timber stands in the proposed analysis area would remain intact and peregrine prey species that utilize conifer stands like the northern flicker, Clarke's nutcracker and western tanager would be

unaffected. Existing peregrine foraging activities in and adjacent the analysis area would remain unaffected. Changes in peregrine foraging activities would not be expected under this alternative.

Alternatives 2 and 3

Implementation of alternative 2 or 3 would locally have a negative impact to peregrine prey species (Steller's jay, red-shafted flicker, and Clark's nutcracker) that rely upon conifer forest habitats and may cause some displacement of those species. However, implementation of either alternative 2 or 3 would benefit peregrine prey species diversity by having changes in forest canopies that allow for understory habitat development for birds that forage on the ground for insects, worms, and grains, which were absent due to closed forested canopies. Opening the forested canopy for a gladed or open run would allow for sunlight to reach the forest floor, which makes possible an understory vegetation of grasses, forbs, and shrubs that are a benefit to ground oriented peregrine prey species. Other prey species such as the blue grouse, mourning dove, northern flicker, and American robin would utilize the habitat, thereby increasing peregrine prey species diversity.

Implementation of either alternative 2 or 3 are not measurable in their impacts, whether negative or beneficial toward peregrine foraging activities due to the presence of numerous openings of other ski runs already existing within the Taos Ski Valley permitted area and adjacent the analysis area. Diversity of grassland and forested habitats is already well represented by those areas. Differences between alternative 2 and 3 are also indistinguishable and not measurable as they relate to diversity of prey species habitat for the same reason that abundant habitat diversity already exists elsewhere within the existing ski area boundary.

Boreal Owl

In 2005, a boreal owl was photographed in the spruce-timber adjacent Williams Lake attesting to the persistence of this species in the area. This species inhabit a variety of forest habitats from deciduous forests to mixed conifer forests to subalpine forests (Hayward 1997). The analysis boundary is a dense spruce/fir forest with 60 – 80% canopy cover and is a suitable habitat for this species. The analysis boundary is also a suitable foraging as there are mesic areas for the southern red-backed vole, a prey species for the boreal owl.

Alternative 1

Implementation of alternative 1 would not impact boreal owl habitat or individuals within the analysis area. The existing stand of mature spruce-fir would remain intact and provide foraging habitat for the owl. Principal prey base species habitat, such as the red-backed vole would remain undisturbed and intact.

Alternatives 2 and 3

Implementation of either alternative 2 or 3 would likely remove boreal owl nesting habitat by changing forest canopy cover to 30% in gladed runs and to zero % in the open runs. Hayward (1997) states that open habitats provide few resources for boreal owls. Hadley and Wilson (2004) found red-backed voles (a principal prey species for boreal owls) were absent from ski runs with little to no residual woody debris and that they generally disappeared within 2 summers of cutting. Hadley and Wilson (2004) found red-backed voles persisted in ski runs that retained at least 10% live tree residual basal area that included woody debris and that survival of red-backed voles was highest at the forest edges adjacent the ski runs where large woody debris were piled.

These residual tree stands and woody debris help to retain the moisture content and create micro habitats that are suitable for red-backed voles. Also the effective area or suitability of the edge habitat to support boreal owl prey species (red-backed voles) probably does not extend beyond 98-114 ft. (30 to 35 m) from the forest edge (Walters 1991).

In contrast(Steller's jay, red-shafted flicker, and Clark's nutcracker) Hadley and Wilson (2004) found cleared ski runs at Vail Ski Area had low densities of red-backed voles and that captures of red-backed voles only occurred in or near the forested edges. Other research cited by Hadley and Wilson (2004) states red-backed voles were not captured >16.4 ft. (5m) beyond the forest edge into the clear cut. A conservative approach for the effective use of edge habitat by boreal owl prey species might range from 16 - 30 ft. (4.8 – 9.0 m) depending upon the amount of course woody debris (CWD) that is retained on the edges of either the cleared or gladed.

Regardless of the discrepancy between the findings of these researchers, the impact of the 110 ft (33 m) wide cleared run under alternative 2 would likely not remove boreal owl prey (red-backed voles) from the area provided existing dead and down large diameter CWD is retained and moved to the edges of the proposed ski run.

Implementation of alternative 2 is likely to alter foraging habitat use of boreal owls, due to owls avoidance of clearings and their preference for foraging in mature forests, even when prey species are low (Hayward 1994). Instead of using this area year-round, the boreal owl is only likely to use the cleared run of alternative 2 in the spring prior to forage green-up due to higher densities of voles at the edges of these clearings versus the lower vole density found within the adjacent forested area (Hayward 1994).

Even if prey species are abundant; a lack of nest cavities may preclude boreal owl presence in the same area. In a review of the literature of bird species that do not excavate their own nest cavities (non-excavators), Martin and Li (1992) found adult survival of non-excavators is lower than species of birds that excavated their own tree cavities. In essence populations of non-excavators such as the boreal owl are dependent upon other species and natural processes to make available nest cavities for boreal owl population maintenance and as such reproductive success is dependent upon nest cavity availability. This is why boreal owls prefer mature and old growth forests or forests that have a fast processing of decaying trees (such as mature aspen forests) to create nest cavities. As a result alternative 2, with the cleared run, would have more impact on boreal owls due to total tree removal than alternative 3, which contains only gladed ski runs with residual islands of trees. Hayward (1997) found forest timber treatments such as group selection and single tree selection in uneven aged stands in a pattern that maintains the size structure of the stand, retaining large diameter trees combined with thinning from below retains boreal owl nesting habitat and retains abundant red-backed vole populations. Alternative 3 for gladed runs only best fits this prescription.

Implementation of either alternative 2 or 3 would negatively impact boreal owls as it relates to snags and trees that may provide cavities for nesting. Trees or snags with cavities are a limiting factor that can affect boreal owl distributions. Removal of hazard trees for skier safety concerns would primarily focus on snags that have rotted bases or would be at risk of wind-throw due to removal of adjacent live trees. The impact of alternative 2 in the cleared run would impact more habitat than in alternative 3 which could result in retention of more snags than alternative 2 and having less risk to wind-throw thereby making residual snags less hazardous for skiers.

Regardless of the impacts of either alternative 2 or 3, implementation would not lead toward listing of the boreal owl.

Northern Goshawk

Suitable habitat exists for this species within and adjacent the analysis area. This species is recognized as a forest generalist, requiring a mixture of habitat diversity (Reynolds et al. 1992; Hoover and Wills 1987). The highest potential exists in ponderosa pine and mixed conifer stands with large trees. A review of the spruce-fir forested area of the analysis area indicates the area is not suitable for nesting habitat, but is suitable as foraging habitat in forest stands adjacent the riparian vegetation associated with Lake Fork Creek and the existing open meadows created by earlier development of clearcut ski runs adjacent to the analysis area.

Alternative 1

Implementation of alternative 1 would have no impact on existing goshawk foraging activities in and adjacent the analysis area. Goshawk use of the analysis area is likely to focus on the forest areas adjacent Lake Fork Creek and on the forested edges of adjacent open ski runs. Existing goshawk prey species habitats would remain unaffected. Additional foraging areas would not be created under this alternative.

Alternatives 2 and 3

Implementation of either alternative 2 or 3 would be beneficial toward increasing ground oriented prey base species habitats and could expand goshawk foraging activities beyond that area around Lake Fork Creek to include the area of the developed ski runs. Clear cutting the forest for one run (as in alternative 2) or creating gladed runs (alternatives 2 and 3) would open the forest canopy and increase the ratio of open meadows interspersed in forested stands and allow for grasses and shrubs to flourish. In a review of the scientific literature Kennedy (2003) found that 35 to 62% of goshawk preys were obtained in the ground-shrub zone within goshawk foraging territories. The remaining prey was evenly distributed in the shrub-canopy and the canopy aerial zones. Any difference between the impacts of alternatives 2 and 3 is indistinguishable and not measurable. Both alternatives would be beneficial at creation of more goshawk foraging habitat.

Rio Grande Cutthroat Trout

Rio Grande cutthroat trout habitat is present, but this species is absent in Lake Fork Creek. There would be no direct, indirect or cumulative effects from any alternative.

Snowshoe Hare

This species is a habitat specialist confined largely to mid- to high elevation boreal and subalpine spruce-fir forests at 9,800 - 12,000 ft. (2987- 3657 m) elevation in New Mexico (Ellsworth and Reynolds 2006; Malaney and Frey 2006; Findley et al. 1975). Snowshoe hare tracks are regularly observed on ski slopes at Taos Ski Valley during winter. The entire analysis area is suitable habitat for snowshoe hare.

Alternative 1

Implementation of alternative 1 would have no impact to snowshoe hare habitat in the analysis area. Snowshoe hare foraging and security habitat found in the existing spruce-fir forest would

remain intact with low lying branches and associated existing CWD. Current distributions and use of the area by snowshoe hares would remain unaltered.

Alternatives 2 and 3

Implementation of alternatives 2 or 3 would result in loss of snowshoe hare habitat. Removal of the tree canopy in the cleared run and removal of understory vegetation in the gladed runs begins to limit the movement of snowshoe hares. Personal observations of snowshoe hare tracks on existing ski runs at Taos Ski Valley have shown snowshoe hare tracks are more often noted under the ski lift where a narrow corridor of forest has been cleared. These tracks appear to go from forested area to forested area; snowshoe hare tracks typically only ventured out from the edges of forested areas in large cleared ski runs and usually showed a return route back to the forest stand of origination. Bull et al. (2005) found snowshoe hares regularly crossed thinned forests that were only 65 ft. (20 m) wide, indicating the gladed run would not be as big of an impact to snowshoe hare movements as the cleared ski run. However, both Bull et al. (2005) and Buskirk (2002) note that low lying branches within 3.3 ft. (1 m) of the ground are important for hares for security and that hares will avoid forested stands that are lacking these low lying branches such as the open understory of a gladed run. In this regard, thinning activities of gladed runs should retain low lying branches on trees retained within the gladed run. This will provide protective habitat for snowshoe hares. Therefore implementation of alternative 3 provides more retention of protective habitat for snowshoe hares than alternative 2. Both alternatives have the potential for increase predators into the area through the compaction of the snow in the runs.

In comparison alternative 3 would have less of an impact on snowshoe hare distributions than alternative 2. Implementation of the gladed runs on alternative 3 would retain islands of uncut trees and retention of associated existing dead and down CWD which is used as cover for snowshoe hares. Bull and Blumton (1999) found tree island retention minimized the impacts to snowshoe.

American Marten

Surveys on the Carson National Forest (CNF) for the presence of marten were conducted from 1997 to 2001 (Long 2001). Marten presence as indicated from track sign and visual sign was found from the mouth of Arroyo Hondo Canyon to the spruce-fir habitat type above Taos Ski Valley to the Williams Lake area. The tracks and visual observations in the Arroyo Hondo Canyon are adjacent to the analysis area. Also one marten that was radio collared was tracked sufficiently to determine a home range that overlaps a majority of the analysis area. These surveys indicate regular use of the analysis area as habitat for martens.

In a review of the scientific literature, Benette and Samson (1984) found marten population size and condition and dispersal rates are correlated to small mammal populations. Microtine rodents, particularly red-backed voles (*Clethrionomys* spp.), other voles (*Microtus* spp.), red squirrels (*Tamiasciurus* spp.), snowshoe hare (*Lepus americanus*), birds, insects and berries comprise the most common foods for marten (Buskirk 2002). However, red-backed voles, red squirrels, and snowshoe hares are considered the most important marten food source (Buskirk 2002; Bull and Blumton 1999). Red squirrels share a unique relationship with marten since middens provide resting sites, natal/den sites and subnivean (below snow) access (Buskirk and Ruggiero 1994). These areas are associated with large diameter snags and large diameter CWD (Buskirk 2002).

Alternative 1

Implementation of alternative 1 would not impact marten habitat or individuals within the analysis area. The existing stand of mature spruce-fir would remain intact and provide foraging habitat for the marten. Principal prey base species habitats for the red-backed vole, red squirrel, and snowshoe hare would remain undisturbed and intact.

Alternatives 2 and 3

Implementation of either alternative 2 or 3 would negatively impact marten's prey species habitat. Development of both cleared and gladed runs would impact marten by direct removal of forested habitat important to marten's prey species. Cleared ski run development would result in removal of red squirrel nesting and foraging habitat by conifer removal, destruction of midden sites, and removal of course woody debris. The CWD is also important for red-backed voles foraging habitat and subnivean access by martens to search for prey species (Thompson and Colgan 1994), such as the red-backed vole. The effects to red-backed vole habitat would be the same as discussed in the boreal owl section. In summary, the gladed runs would likely retain enough existing CWD adjacent tree islands and on the edges of the ski runs to support the red-backed vole at some level and part of the 8 acres on the cleared run could be removed as habitat for the red-backed vole, but would not remove them from the area.

Reduction of canopy cover in both cleared and gladed ski runs increases predation of martens to avian predators (Bull and Heater 2001) and removes valuable hiding cover of lower branches for both marten and snowshoe hares (Ewers and Didham 2007, Bull and Heater 2001). The packed snow in the runs can increase the amount of predators in the area, along with the more open ground increases the potential for avian predation on both the marten and its prey species.

Implementation of either alternative 2 or 3 would result in loss of snowshoe hare habitat distribution and availability as marten prey. Removal of the tree canopy in the cleared run and removal of understory vegetation in the gladed runs begins to limit the movement of snowshoe hares. Bull et al. (2005) found snowshoe hares regularly crossed thinned forests that were only 65 feet (20 m) wide; indicating the gladed runs of alternative 3 would not have as big of an impact to snowshoe hare movements as the cleared ski run. In this regard, thinning activities of gladed runs should retain low lying branches on trees retained within the gladed run to provide protective habitat for marten prey species and provide marten with subnivean access to prey. Both Bull et al. (2005) and Buskirk (2002) note that low lying branches within 3.3 ft. (1 m) of the ground are important for hares for security and that hares avoid forested stands that are lacking these low lying branches such as the open understory of a gladed run. Personal observations of snowshoe hare tracks on existing ski runs at Taos Ski Valley have shown snowshoe hare tracks are more often noted under the ski lift where a narrow corridor of forest has been cleared. These tracks appear to go from forested area to forested area. Snowshoe hare tracks typically only ventured out from the edges of forested areas in large cleared ski runs and usually showed a return route back to the forest stand of origination or the next nearest adjacent forested stand, indicating the preference of snowshoe hares for the protective cover of uncut forested areas. Correspondingly, martens prefer areas with low overhead cover for hunting and travel and are thought to be important for predator avoidance. Pine martens have been noted to have significantly higher mortalities in logged versus uncut forests (Buskirk 2002;, Bull and Heater 2001, and Thompson 1994).

Under alternatives 2 and 3 removals of conifers would impact marten populations if harvests exceed 25% (Buskirk 2002) to 30% (Thompson 1997) within marten home ranges. Martens will not use clearcuts for several decades (Buskirk and Ruggiero 1994). Hargis and Bissonette (1995) suggest that the threshold for marten abandonment of habitat occurs when forest landscape openings occupied > 35% of the landscape. Marten mortalities are also higher in logged forests than in uncut forests (Thompson 1994) and may help to explain why martens will expand their home range into uncut forested areas in an effort to avoid risk of predation.

In a review of cut and uncut boreal forests Thompson and Colgan (1994) found marten preferred old coniferous forests (uncut) to avoid predation but also because of a greater rate of prey capture compared to the open habitats associated with logged forests. Both alternative 2 and 3 would likely remove pine marten denning habitat on 27 acres regardless of whether a ski run is gladed or cleared. The loss of 27 acres within the home range of a marten would remove between 3 to 5% of the home range. However, provided existing dead and down large diameter CWD is piled at the edges of the ski runs (cleared or gladed) both the gladed run(s) and/or the cleared run to a certain extent could still be used for pine marten foraging since red backed voles would occupy these areas. The 27 acres might not be considered a total removal of habitat in the home range since openings and meadows are part of home ranges of marten. It is likely martens would continue to use these areas since martens typically will utilize (hunt) the edge of meadows surrounded by forests w/in 32 - 75 ft. (10 -23 m) of the forest edge (Buskirk 2002; Bennett and Samson 1984). However this is not preferred habitat for martens. Thompson and Cogan (1994) in suitable marten habitats found prey biomass in uncut forests was over twice as much as in logged forests during periods of prey abundance; and during periods of prey scarcity, the uncut forests had 30% greater available prey biomass than in logged areas. Buskirk (2002) further states that "…no evidence currently shows that carrying capacity for martens can be increased by timber harvest in any pattern, at any scale…" indicating that implementation of either alternatives 2 or 3 would impact martens foraging habitat within the analysis area.

In comparison, alternative 3 would have less of an impact on the primary prey species of the pine marten than alternative 2. Implementation of the gladed runs on alternative 3 would retain islands of uncut trees and retention of associated existing dead and downed large diameter CWD, which is used as cover for snowshoe hares, and retains conifers for cone crop for red squirrels. The retention of CWD on these islands also benefits retention of foraging habitat for red-backed voles. Bull and Blumton (1999) found tree island retention minimized the impacts to snowshoe hares and red-backed voles, and had no impact on red squirrels.

Masked Shrew

The favored habitat for masked shrew may be thick leaf litter in damp forest or along banks of cold streams (NatureServe 2008). Suitable habitat for the masked shrew occurs along Lake Fork Creek and around some springs found in the proposed gladed run (alternative 2) within the analysis boundary.

Alternative 1

Implementation of alternative 1 would not impact masked shrew habitat or individuals within the analysis area. The existing riparian habitat would remain intact and provide habitat for the masked shrew adjacent Lake Fork Creek and the springs located within the analysis area. This species habitat would remain undisturbed and intact.

Alternatives 2 and 3

Implementation of both alternative 2 and 3 would impact masked shrews only where forested areas are cleared adjacent the springs at the head of the gladed run. This impact may cause a drying out of adjacent moist habitats that the shrew needs and may accelerate decomposition such that current moist sites are reduces available leaf litter and damp forest conditions adjacent the springs. However, this impact would only occur for the short-term as mitigation measures put in place would encourage deciduous tree species which would in time increase leaf litter and help retain moist soil conditions adjacent the springs for the long-term. Also mitigation that increases large diameter coarse woody debris adjacent the springs and down gradient from the springs would enhance moist soil conditions and promote decay processes that would improve certain masked shrew prey species such as insects, worms, insect larvae, and fungus for the long-term. It is likely that the masked shrew would still use these areas in the long-term; as long as large woody debris and leaf litter occur on the site (forest decay process at high elevations are slow and last many years due to the cold environment which slows decay processes).

Implementation of the open ski run under alternative 2 would not impact masked shrew habitat since hydrosere[3] riparian communities are not present. Implementation of either alternative 2 or 3 would not impact masked shrew habitat or its prey species habitats adjacent Lake Fork Creek. The proposed vegetation changes to create the gladed and open ski runs are approximately 300 ft. (91 m) away from Lake Fork Creek. This 300 foot (91 m) area between Lake Fork Creek and the edge of the nearest gladed or open ski runs is undisturbed and habitat in this area is unaltered even though it falls within the analysis area.

Southern Red-backed Vole

The western subspecies of red-backed voles are mostly restricted to coniferous forest (Allen 1983). The habitat of the red-backed vole is highly correlated to the same habitats as described for the boreal owl and the American marten. Suitable habitat and foraging habitat occurs throughout most of this analysis area. No surveys have occurred for the red backed vole within the project area.

Alternative 1

Implementation of alternative 1 would not impact red-backed vole habitat or individuals within the analysis area. The existing stand of mature spruce-fir would remain intact with large diameter dead and down CWD left in place to provide foraging habitat for the red-backed vole within the analysis area. This species habitat would remain undisturbed and intact.

Alternatives 2 and 3

Implementation of either alternative 2 or 3 would impact red-backed vole habitat in both cleared and gladed runs. However, the cleared ski run under alternative 2 would have the greatest impact on red-backed vole habitat, since forested conditions would be changed to an open area and include removal of large woody debris, which would change the soil moisture conditions to a drier site not compatible with red-backed vole habitat needs.

[3] An ecological sere of a vegetative community in which the pioneer plants invade open water, eventually forming some kind of soil such as peat or muck.

In research that studied the impacts of ski run development on small mammal populations Hadley and Wilson (2004a) found cleared ski runs had low densities of red-backed voles. They also found that captures of red-backed voles only occurred in or near the forested edges adjacent cleared ski runs. Other research cited by Hadley and Wilson (2004) states red-backed voles were not captured >16.4 ft. (5m) beyond the forest edge into the clear cut. Also the effective area or suitability of the edge habitat to support red-backed voles probably does not extend beyond 98-114 ft. (30 to 35 m) from the forest edge (Walters 1991). The impact of the 110 ft (33 m) wide cleared run under alternative 2 would likely not remove red-backed voles from the area provided existing dead and down large diameter CWD is retained on the proposed ski run edges. However, the density of red-backed voles is likely to be low in the middle of the cleared run due to a lack of protective CWD habitat and due to dessication of the soils with the change in habitat from a forested to a open grassland vegetation type.

Compared to alternative 2, implementation alternative 3 with gladed ski runs only may not have an impact on red-backed voles. The gladed runs would retain existing dead and down large diameter CWD in the amount of 10 tons/acre. These decomposing logs would provide foraging habitat for red-backed voles for the long-term. In addition the gladed runs would provide islands of uncut trees within the run area with associated woody debris making a minimal change in the quantity of red-backed vole habitat. Hadley and Wilson (2004a and 2003) found red-backed voles persisted in ski runs that retained at least 10% live tree residual basal area that included woody debris and survival of red-backed voles was highest at the forest edges adjacent the ski runs where large woody debris were piled. These residual tree stands and woody debris help to retain soil moisture content that promotes fungal development and creates micro habitats that are suitable for red-backed voles for foraging.

The impact of implementation of alternative 3 on red-backed vole habitat overall is probably not measurable. The only exception would be the impact on red-backed vole distribution (post gladed run development), which may concentrate these voles into areas where CWD are piled at the edges of the ski runs and at the islands of trees left intact within the gladed run boundaries. Ucitel et al. (2003) also found red-back voles tended to move into areas with higher than average CWD accumulations.

Western Heather Vole

Within the mountains of New Mexico, this species inhabits in a variety of habitats such as meadows, open coniferous forests with an understory of heaths (blue berry, sheep laurel, dwarf birch, bearberry, buffalo berry and soapberry), and areas with shrubby vegetation and tall grasses on forest borders (NMDGF 2008a). The western heather vole has been found on both the Santa Fe and Carson national forests (NMDGF 2008a). Suitable habitat for this species exists in the adjacent clearcut ski runs (Longhorn and Al’s Run) that occur on the border inside the analysis area.

Alternative 1

Implementation of alternative 1 would not impact current western heather vole habitat. Habitat in the existing ski runs within the analysis area would remain open meadows with interspersed shrubs to provide foraging habitat for the western heather vole. This species habitat would remain undisturbed and intact. The potential creation of new habitat would be foregone with the alternative.

Alternatives 2 and 3

Implementation of either alternative 2 or 3 would have a beneficial effect to western heather vole habitat in both the open and gladed runs. Twenty-seven acres of dense spruce/fir forest would be thinned, creating new open forest and meadow foraging habitat for this species by allowing heaths and shrubby vegetation to increase in canopy cover over the long-term. Improvement in available foraging habitat would be gradual over the short-term, as heaths and other shrubby vegetation compete with grasses in the open run to eventually create a mosaic of shrubs and grasses on both the open and gladed runs. Differences between alternatives 2 and 3 are not measurable relative to western heather vole habitat changes. This is due to an inability to predict outcomes of thinning and forest canopy removal as it relates to the unpredictable responses of grasses and shrubs to colonize disturbed areas.

Black Bear

Concerns regarding Black bear were identified as Significant Issue #3: “Black bear maternity sites may be disturbed by construction activities. Delaying all activity in the affected area until after June 1 would eliminate effects to maternity sites. The number of maternity sites affected will be the indicator of this effect”.

Alternative 1

Implementation of alternative 1 would not impact black bear habitat or individuals within the proposed action area. The existing stand of mature spruce-fir would remain intact and provide foraging and limited denning habitat for the black bear. Principal prey base species associated with large diameter CWD (insects and small mammals) habitats would remain undisturbed and intact. Foraging habitat associated with herbage production would remain unchanged and would be located in existing open ski runs that are outside or adjacent the proposed project. Bear use of these areas would remain unchanged.

Alternatives 2 and 3

Implementation of Alternatives 2 or 3 would impact and reduce existing black bear denning habitat by 27 acres in both the cleared and gladed runs with the removal of fir trees greater than > 50 cm and removal of CWD to develop the cleared ski run on 8 acres. This impact to denning habitat is minor since the spruce-fir zone only plays a minor role in black bear denning (Costello et al. 2001). There are very few trees within the project site >50 cm and there is abundant suitable denning habitat adjacent the project area elsewhere in the Wheeler Peak Wilderness area.

Offsetting this impact as a result of clearing and opening these runs under either Alternatives 2 or 3 is an expected increase in herbage production which would provide additional black bear foraging habitat. In addition some piling of existing dead and down large diameter CWD is expected on the edges of these ski runs and would offset to a limited degree the loss of base-entry snags with a limited increase in CWD denning opportunity. However, the benefit of adding foraging habitat and possible use of CWD denning sites on the edges of these ski runs is not measurable since abundant foraging habitat presently exists adjacent the proposed project area and because black bears only use this habitat type to a limited degree for denning anyway. Overall, the impacts to black bear denning and foraging habitat are negligible and their impacts on existing black bears in the area are not measurable. The impacts of this action from either Alternatives 2 or 3 are not likely to lead toward Federal listing of black bears.

Management Indicator Species

All 11 MIS were considered for the proposed North America Ski Trails analysis, however the limited habitat (vegetation) types found within the analysis area some species were dropped from further analysis (see specialist report in project record for additional information) [60] Only two species and two species groups (shown immediately below) were found to have the potential of being affected by development of ski runs in the analysis area boundary:

- Hairy Woodpecker—snags
- Elk — Forest generalist
- Resident Trout —Riparian (perennial stream)
- Aquatic macro-invertebrates — Riparian (perennial stream)

Hairy Woodpecker

Hairy woodpecker is identified in the Carson Forest as an indicator species of snags and down logs (USDA Forest Service 1986, p.97). From 1986 to 2005, hairy woodpecker habitat increased from 106,880 acres to 112,444 acres of habitat or an upward trend of about five percent (USDA 2007a). The whole analysis area is considered hairy woodpecker habitat (109acres). Based on the information provided by national breeding bird surveys (BBS) and from other surveys done adjacent to and on the forest, population trends of hairy woodpecker are stable on the Carson National Forest (USDA 2007a). Site inspections show hairy woodpeckers are using portions of the analysis area.

Alternative 1

Implementation of alternative 1 would not impact hairy woodpecker habitat trend. Existing snags and CWD found within the analysis area would not be altered and foraging habitat would remain intact.

Alternatives 2 and 3

Implementation of either alternatives 2 or 3 would impact hairy woodpecker foraging habitat trend by the removal of snags and removal of existing large diameter dead and downed CWD in the cleared run or removal of snags that are considered safety hazards to skiers in and adjacent the proposed gladed and cleared runs. Snag found within the islands would be protected from wind throw and would likely not be considered a safety hazard to skiers. The impact from alternative 2 would reduce available hairy woodpecker habitat by 8 acres in the cleared run with the complete removal of any snags and removal of most all CWD and would alter habitat on 19 acres of a gladed ski run (total alteration of 27 acres). Implementation of alternative 3 would alter foraging habitat in the gladed run by 27 acres on two gladed ski runs and would redistribute existing dead and down large diameter CWD in the gladed runs to the forest edges. Removal of CWD associated with alternative 2 in the cleared run is more extensive than in alternative 3. Depending upon the location of hazard trees adjacent the runs in either alternative, more foraging habitat acres could be impacted with the removal or felling of snags in the adjacent uncut forest that pose a threat of falling into proposed ski runs.

In comparison, alternative 3 would have less impact to hairy woodpecker habitat trend than alternative 2 due to retention of trees in islands within the gladed runs which may allow for some

retention of snags that would otherwise be removed. Mitigations to retain existing dead and down large diameter CWD adjacent the springs and ephemeral drainage in the gladed run of both alternatives 2 and 3 would help to modify any loss of CWD to create any of the ski runs. Regardless of the impact of either alternative 2 or 3 on hairy woodpecker habitat; the overall habitat trend on the forest is stable and upward; removal or alteration of 27 acres of hairy woodpecker foraging habitat would affect only 0.02 % of the available habitat on the Carson National Forest and would not change the forest habitat trend. Due to the amount of available habitat in the area, neither alternative would change the forest wide population trend for the hairy woodpecker.

Elk

The Carson Forest Plan identifies elk as an indicator of general forest habitat type (USDA Forest Service 1986, p.97). Elk habitat from 1986 to 2005 increased from 1,362,760 acres to 1,424,074 acres of habitat or an upward trend of almost four percent (USDA Forest Service 2007a) due to inclusion of sagebrush as habitat for the elk. The whole analysis area is considered elk habitat (110 acres). The analysis area occurs in New Mexico Big Game Management Unit #53. The New Mexico Department of Game and Fish conducted elk population surveys from 1999 through 2003 for elk in Unit #53. During this survey period, elk population estimates ranged from 300 – 500 head of elk for the unit. The population trend for elk on the Carson National Forest is considered stable (USDA 2007a). On site inspections of the analysis area show elk are infrequent and seem to be only passing through the analysis area. The forest-wide trend for elk habitat has increased since 1986 and is currently considered stable (USDA 2007a).

All Alternatives

No alternative would affect habitat or population trends for elk on the Carson National Forest. This is due to elk being habitat generalist and can readily use both gladed and cleared ski runs when developed and would have no net increase in available habitat since they are presently known to use the area although use appears to presently be infrequent.

Resident Trout

Resident trout are used as indicator species for quality perennial stream and riparian vegetation (USDA Forest Service 2007a). Resident trout species include both Rio Grande cutthroat trout (*Oncorhynchus clarki virginialis*), brown (*Salmo trutta*), brook (*Salvelinus fontinalis*), and rainbow trout (*Oncorhynchus mykiss*). The total number of stream miles suitable for resident trout has not changed since 1986 and has been refined due to better mapping capabilities to contain approximately 444 miles of suitable habitat. The habitat trend for resident trout on the Carson National Forest is currently stable (USDA 2007a). Due to the stocking programs on the Carson National Forest, the population trend for resident trout species is stable (USDA Forest Service 2007a).

All Alternatives

None of the alternatives would impact the current forest-wide population and habitat trends. There is only one perennial stream (Lake Fork Creek) within this analysis area and only occupies 0.2 miles of stream channel. No vegetation treatment associated with alternatives 2 and 3 would be done along this stream. The nearest vegetation treatment under either alternative 2 or 3 is no closer than 300 feet (91 m). This untreated area within the analysis area acts as a buffer strip and

is well able to filter out any soil sediments generated by either alternative 2 or 3 and prevent any sedimentation from impacting resident trout water quality needs.

Aquatic Macroinvertebrates

Aquatic macroinvertebrates or aquatic insects are indicators for quality perennial stream and associated riparian vegetation. For the purpose of analyzing the effects of forest management activities, the primary habitat requirement for aquatic macroinvertebrates is perennial water in streams that contain resident trout (USDA Forest Service 2007a). Population trends for aquatic macroinvertebrates on the Carson National Forest are healthy and appear to be stable (USDA Forest Service 2007a). Aquatic macroinvertebrates occur in Lake Fork Creek.

There is approximately 444 miles of perennial streams on the Carson National Forest defined as MIS aquatic macroinvertebrates habitat (USDA Forest Service 2007a). Available habitat may fluctuate due to changes caused by climate (drought). The Forest–wide trend in available habitat appears to be stable (USDA Forest Service 2007a).

All Alternatives

There is only one perennial stream (Lake Fork Creek) within this analysis area, which only occupies 0.2 miles (32 m) of stream channel. No alteration of vegetation associated with action alternatives would be done along this stream and the nearest vegetation treatment is 300 feet (91 m) away. Sediments that might be caused by the proposed development of ski runs would be filtered by surrounding vegetation and would not impact water quality or habitat conditions needed by aquatic macroinvertebrates in Lake Fork Creek. None of the alternatives would change the forest-wide population and habitat trends.

Avian Species

New Mexico Partners in Flight (PIF) identifies physiographic areas and high priority migratory bird species by broad habitat types. They also developed a list of priority breeding bird species by habitat type. The US Fish and Wildlife Service released its Birds of Conservation Concern 2002 report (http://migratorybirds.fws.gov/reports/bcc2002.pdf). The analysis for this project uses information from both the New Mexico PIF website (http://www.hawksaloft.org/pif.shtml) and the Birds of Conservation Concern Report for the Southern Rockies/Colorado Plateau Bird Conservation Region (BCR) #16 for the migratory bird analysis. The New Mexico PIF highest priority list of species of concern by vegetation type and the BCR #16 species list will be used to determine which species will be analyzed in this analysis.

The following describe habitats found in the analysis area and the migratory birds that are typically found in these habitats. All species described have not been located within the analysis area, but have the potential of occurring.

Spruce-Fir (Subalpine) Species

There is relative little of this type of forest in New Mexico. The largest areas of this type are in the Sangre de Cristo Mountains, with smaller areas in the San Juan and Jemez Mountains. The habitat occurs roughly form 9500 feet to treeline. Highest priority species include blue grouse and boreal owl. The blue grouse was observed in spruce-fir during breeding bird surveys in 2006 (Beason et al. 2006).

Table 5. Spruce-fir species

Species	FWS /PIF	Important Features and Life History Considerations	Effects
Boreal Owl	PIF	See "Forest Sensitive Species" write-up	
Blue Grouse	PIF	Nests in virtually all montane forest communities with relatively open tree canopies out of 1.2+mi (2+km) from forest edge; prefer forests dominated by ponderosa pine or Douglas-fir. Nests almost always on ground with some overhead cover usually under shrubs, rock overhangs, logs or stumps; may nest at base of large trees with no immediate cover in older mature forests. Nest site may change from barren at time of laying to lush and well-concealed at hatch. Generally nests within 164-492ft (50-150m) of free water. Suggestion of a positive correlation between density of birds and age of dominant trees up to about 10 yrs post-logging and a negative correlation after that. Density of birds decreases as tree canopy increases.	Alternatives 2 & 3 a should benefit this species by providing more grass for concealing nest sites. Alternative 2 would be more beneficial for the species. Alterative 1 would have no affect upon existing nesting habitat.

Cumulative Effects, All Species

The analysis area is located in the limited expanse of spruce-fir forest of New Mexico. The spruce-fir forest today is fragmented remnant of what it once was during the ice age and includes many species of animals that are now isolated from much larger populations where this forest type is much more continuous (Dick-Peddie 1993). Some of the species that are tied to this remnant spruce-fir forest in New Mexico are the boreal owl, American marten, snowshoe hare, red-back vole, and masked shrew. To put this area into context, this spruce-fir forest is within the current southern limit of range of the boreal spruce-fir forest in the Rocky Mountains and retains populations of animals that are also at the southern limit of their known range. Most of the animals are isolated from their greater meta-populations that occur further north. Species of

animals that are geographically isolated are at a greater risk of local extinction, due to unpredictable stochastic changes (drought, wildfire, insect infestations, and climate change) and from the impacts associated with human activities.

Human activities include the development of Taos Ski Valley Ski Area and the associated development of private lands in the Village of Taos Ski Valley, which have resulted in the incremental spatial dissection of a once continuous stand of boreal forest comprised mostly of a spruce-fir forest type. Dissection of this forest ecosystem has created a diversity of grassland meadows interspersed within the residual stands of the original spruce-fir forest and the development of a small community that is more urban than rural. The associated changes in this ecosystem of natural changes and anthropogenic activities have had impacts both positive and negative upon the original fauna of this spruce-fir forest and are directed by the increasing development of a multitude of outdoor oriented recreational opportunities (skiing, snowshoeing, hiking, hunting, birding, camping, fishing, etc.). Alterations to the spruce-fir forest on private lands adjacent to the analysis area include pioneering of roads into forested areas, permanent canopy removal for home site development, thinning of the forest canopy for fire breaks, limbing of residual trees to open up understory viewsheds, and removal of dead and down logs to encourage grassland development below the forest canopy. Other impacts associated with the occupancy and recreational use of private and National Forest System lands include an increase in the populations of domestic dogs and cats. The result of these activities is the displacement of wildlife species from either loss of habitat or increase in disturbance in remaining habitat. For wildlife species that may be more sensitive to the increasing pressures upon available habitat in the spruce-fir forest, this would have an additional negative effect to them, if areas are already populated.

Implementation of alternative 1 would have no new incremental impact on species that may be displaced by ongoing developments on private lands. None of the species in this analysis would be subject to any new activities on National Forest System lands. National Forest System lands would act as a refuge to maintain populations and species diversity from the impacts occurring on adjacent private lands.

Implementation of either alternative 2 or 3 would add to the cumulative impact on species of animals that rely upon closed forest canopies for habitat. In addition, associated continued development of private lands would add to the stress on some these species and may lead toward local displacement of species, such as the American marten and snowshoe hare (Ellsworth and Reynolds 2006, Buskirk 2002), but is not likely to lead to local extinction of these species. The development of proposed trails, along with other development on private land could increase the access of predators into the area. Compounding the problem are domestic cats and dogs associated with private land development and to a limited extent winter recreation enthusiasts that bring along their pets. These domestic animals are well fed and are not stressed by the rigors of winter that wild animals endure. These domestic pets also travel packed snow corridors and can increase the levels of mortality on each of these species. This could impact the small mammals, snowshoe hare, blue grouse, and martens. When the snow clears and the ground is exposed mortalities of these species could increase since predators (natural and domestic) now have access into the spruce-fir habitat unhindered by deep snows. The natural occurrence of marten mortalities is highest between May and August (Bull and Heater 2001). This would only increase as the domestic pet population increases with further development of private lands and recreation activities increase in the foreseeable future.

The health and extent of isolation of this population of martens are unknown in the Taos Ski Valley area (NMDGF 2006). Implementation of either alternative 2 or 3 would incrementally continue to fragment habitat for martens and snowshoe hares. Hargis and Bissonette (1995) state that forested buffers less than 328 feet (100 m) wide between clearcuts have little value for marten as habitat. Development of ski runs on Taos Ski Valley over time has incrementally reduced many of the existing residual stands of spruce-fir forest to less than 328 feet in functioning width. Implementation of alternative 2 or 3 would cumulatively begin to divide the last large remaining intact stands of spruce-fir forest within the Taos Ski Valley permit boundary and add to the continued forest fragmentation ongoing on adjacent private lands. It is very likely the private lands at the terminus of the proposed ski runs would be fragmented to some degree as it is zoned for "commercial/recreation" use dedicated to ski area infrastructure and equipment use in the foreseeable future. This may lead to martens vacating the area and moving either up the valley toward Williams Lake or toward the east side of the valley where undivided stands of spruce-fir forest remain on National Forest System lands. The impact of marten displacement upon this small population is unknown and further studies would be needed to ascertain the risk of ongoing habitat loss would be for this population of martens and for one of its prey, the snowshoe hare.

Martens are regularly seen by Taos Ski Valley personnel that groom the ski slopes at night. These martens are only seen in the areas of the open runs as a consequence of where grooming machines can only operate. However, this is not an indicator of marten population health and is highly likely these are immature martens that are dispersing from the forested habitat where mature males occupy the forested territory (Thompson 1994). Immature martens have higher rates of mortalities (Bull and Heater 2001), which are likely because they are using marginal foraging habitats (reduced or absent forest canopy and lack of low lying branches) which do not provide adequate protection from predators whereas the forested uncut habitat provides better protection (Buskirk 2002; Thompson 1994). In a review of research relative to fragmentation of forested marten habitat and based upon trapping data in forested and logged forests, Hargis and others (1999) and Hargis and Bissonette (1995) found forested landscapes that have greater than 25-35% cleared areas (natural and man made combined) within mature forests may make the remaining forest unsuitable for marten habitat, even when prey species were abundant in cleared areas. Hargis and Bissonette (1995) further recommend that a 20% threshold of openings within a mature spruce-fir forest be the limit of acceptable openings to retain healthy marten populations. The existing area of the Taos Ski Valley Ski Area special use permit (SUP) boundary is 1,320 acres. Photo interpretation of natural and man-made openings within the existing SUP boundary shows 47% (623 acres) of the area is open area, which is beyond the 20% threshold of openings tolerated by martens. The majority of openings is due to existing ski runs and roads and is beyond the 35% unsuitable marten habitat threshold indicating martens are likely to abandon this area in the near future with further development of ski runs and widening of existing runs.

Future fragmentation of remaining spruce-fir forests beyond the implementation of either alternative 2 or 3 is reasonably foreseeable to occur within the permit boundary. Taos Ski Valley operations continually review and assess areas of skier congestion with requests to widen runs to improve skier safety and it has been the course of practice with approval for such operations given by the Forest Service. Although these are the last ski runs to be cut according to the Taos Ski Valley Master Development Plan, it is highly likely over time these runs may need to be widened to improve skier safety at various points in the runs resulting in further fragmentation of residual habitat for boreal owls, snow shoe hares and martens. Given the high level of existing

habitat fragmentation that currently exists within the ski area boundary, further forest fragmentation beyond the proposal of either alternative 2 or 3 would likely eventually lead to marten abandonment of all areas within the existing SUP boundary and is a highly probable event when you add current and foreseeable levels of habitat alterations occurring on adjacent private lands. In a review of scientific literature Buskirk (2002) stated martens seem to tolerate forest openings (meadows, including timber harvest induced openings) within 25-30% of their home range. Above this percentage martens will shift and enlarge their home range in response to ongoing timber harvests until the home range becomes too large to maintain which results in abandonment of the home range and becoming locally "extinct." However, in the case of this assessment of the analysis area and the related SUP area, martens would become locally displaced with abandonment of former range, but not extinct from the whole of their range as it currently exists in the surrounding areas of unaltered habitat.

If marten were to abandon this habitat within the permit boundary under either alternative 2 or 3, overall marten populations are not likely to be significantly impacted or result in local extinctions, even if all marten habitat in the existing SUP boundary becomes unsuitable. The same is true for boreal owl populations and habitat. This is due to an abundance of unaltered marten and boreal owl habitat found surrounding the existing SUP boundary in the spruce-fir habitat type of upper Lake Fork Creek, the South Fork of Arroyo Hondo, Long Canyon, and Gavilan Canyon. These areas are protected from anthropogenic habitat alterations by being within the Wheeler Peak Wilderness Area and within the Columbine-Hondo Wilderness Study Area and act as refugia for continuation of boreal owl, snowshoe hare, and marten populations. Only a large scale stochastic event, such as severe extensive drought, extensive pest infestations, or an uncontrolled wildfire event that result in the complete forest conversion (loss) of large tracts of spruce-fir, would severely impact the habitat and populations of these species in this area and could result in their long-term local extinction from the southern periphery of their respective ranges in New Mexico.

Recreation and Special Areas [64]

Taos Ski Valley (TSV) is managed through a special use permit on National Forest System (NFS) lands to Taos Ski Valley, Inc. The permit area is approximately 1,270 acres, adjacent to the Village of Taos Ski Valley, in northern New Mexico. The Village of Taos Ski Valley is surrounded by the Carson National Forest and offers a home-base for many recreation users, accounting for hundreds of thousands of national forest visitor days. TSV contributes over 200,000 to 350,000 of those visitor days annually (notes from TSV special use permit file, Carson NF). The number of annual skier days at TSV fluctuates primarily by the weather. For example, in 2005 and 2006 (a poor snow year) there were only 155,000 skier days. However in 2004 – 2005, a good snow year, there were 237,400 skier visits. [64]

TSV is unique in that visitors are expert and intermediate skiers/riders that can utilize use more advanced terrain. Challenging terrain is an attraction at TSV. Almost all of the challenging runs on the lower front side of the mountain require traveling on the Whitefeather Trail to return to the base. This does create additional congestion and cross travel on the Whitefeather Trail during busy periods when the terrain above the front catwalk is open. TSV believes these trails will help the ski area accommodate a market preference for a less congested experience.

In a limited sector of resorts, the winter sports industry has experienced some new growth over the last five years. [64] This pattern of growth is occurring at smaller resorts, such as Taos Ski

Valley, and is thought to be due to specialization, where the area can focus and promote its own unique advantages. Adding distinct, new skiing terrain would help the ski area accommodate a market preference for more interesting challenges and a less congested experience. In order to retain its market share of skiers, Taos Ski Valley, Inc. is seeking to implement additional elements of its 1981 Master Development Plan (MDP).

The 1981 Taos Ski Valley MDP decision [2, 3] was based on improving public safety by reducing skier conflicts. Planning more ski runs on the back-side would help relieve congestion. The 1981 objective of providing a safe skiing experience still applies today. Challenging terrain is an attraction at TSV, yet almost all of the most difficult runs on the front-side feed into lower White Feather Trail, a narrow catwalk, which serves to bring all front-side skiers back to the main base area. Adding ski terrain that does not feed into White Feather Trail would improve skier safety by redistributing some of the expert skiers (figure 2).

The overall trend in the ski industry in the last 6 years has been slow growth, with the five best seasons on record having all occurred in the past 6 years (National Ski Areas Association News Release #4, August, 2006). More of the market share of this pattern of growth is happening at smaller resorts, such as Taos Ski Valley. It is thought that this is due to specialization at these smaller resorts, where the area can focus and promote their own unique advantages (BBC Research & Consulting, 2005 Update).

TSV is unique in that visitors are expert and intermediate skiers/riders that can utilize use more advanced terrain. Challenging terrain is an attraction at TSV. Almost all of the challenging runs on the lower front side of the mountain require traveling on the Whitefeather Trail to return to the base. This does create additional congestion and cross travel on the Whitefeather Trail during busy periods when the terrain above the front catwalk is open. TSV believes these trails will help the ski area accommodate a market preference for a less congested experience.

Alternative 1

Alternative 1 would not provide any additional recreation experience or safety benefits, would not continue to meet the needs of the users, and would be detrimental to maintaining market share of skiers, potentially affecting overall viability of the ski area and the community of Village of Taos Ski Valley. Without the opening of additional ski terrain, more of the market share may not go to TSV, because skiers are looking at other ski areas to meet their interests.

Alternatives 2 and 3

Alternatives 2 and 3 would meet the purpose and need of the proposal by maintaining or enhancing the recreation experience at TSV, as well as, potentially improving skier safety. Maintenance or enhancement would be a result of providing additional ski terrain options at TSV, which would help maintain the skiing experience desired for some skiers or enhance it (new opportunity) for others. The proposed new runs would potentially help in redistributing more of the experts returning to the base to the Rubezahl Trail (from Kachina Basin), relieving the front Whitefeather Trail congestion. This would also be important to safer operations at the ski area. Alternatives 2 and 3 would have the potential to improve skier safety by providing another option to getting to the base area without using Whitefeather Trail, which can get congested with skiers (especially beginner and intermediate levels) on busy days. Both action alternatives would also enhance TSV’s ability to provide a high quality skiing experience as it would help fill the needs

of the users and potentially retain market share of skiers (rather than encourage any significant growth), as skiers look at other ski areas to meet their needs for similar skiing experiences.

With both gladed trails, alternative 3 has potential to be less desirable for some skiers and therefore may not meet the purpose and need as well as alternative 2. However, the preference for an open run would most likely be relatively insignificant on skier day numbers and not readily measurable.

Cumulative Effects

Past, present, and reasonably foreseeable actions within the analysis area could influence skier recreation resources, such as recreation user experience and safety. The past, present, and reasonably foreseeable future actions considered in this analysis are found in the project record, [64] The effects analysis described above considers the effects of past and present activities within the TSV's permit area. At the end of the 2007-2008 season, Taos Ski Valley opened the ski area to snowboarding. It is anticipated that snowboarding will contribute to maintaining or increasing TSV's market share, as snowboarding is likely to attract more skiing families (BBC Research and Consulting, 2005 update). [64].

Alternative 1 could have a negative effect on skier experience needs and safety, especially with the addition of snowboarders to the ski area's slopes, which could add to the congestion on Whitefeather Trail. Alternatives 2 and 3 would tend to contribute more to the downhill skier experience, since snowboarders prefer more open terrain and are less likely to ride down steep runs. Snowboarders are even less likely to enter in steep, gladed runs; thus alternative 3 would likely cater more to the downhill skier.

Specially Designated Areas

Wilderness Areas and Wilderness Study Areas

There are no specially designated forest trails (such as national recreation trails) or roads in the project area. The National Forest System lands within TSV have no designated wilderness or wilderness study areas. The proposed trails would be across the valley from both the boundary of the Wheeler Peak Wilderness (approximately 1.25 miles to the east) and the Columbine/Hondo Wilderness Study Area (approximately ¾ of a mile to the north). The presence of Wheeler Peak Wilderness limits potential expansion of the ski area. None of the alternatives would have direct, indirect, or cumulative effects to trails or areas with special designations.

Wild and Scenic River Eligibility

Lake Fork Creek, a tributary of the Rio Hondo, lies along portions of the east and north boundary of the analysis area. Lake Fork Creek was determined not to be eligible for potential inclusion in the National System under the Wild and Scenic Rivers Act (Pub. L. 90-542 (16 U.S.C. 1271-1287). [64] None of the alternatives would have an effect on the wild and scenic rivers or a river's eligibility. Since there no direct or indirect effects to eligible wild and scenic rivers, there are no cumulative effects from any of the alternatives.

Visual Resources [58]

The Carson National Forest uses the Visual Management System to place relative values on scenery based on uniqueness of the scenery, levels of recreation use, and public concern with scenic beauty and degree of visibility. These values determine the appropriate level of management objectives for visual quality (VQO's) (USDA Forest Service 1977). Variety class depends on four elements, landform, rock form, vegetation, or water form. If any of these elements is found to be distinctive, the variety class is rated as Class A (distinctive). The sensitivity and perspective of the analysis area is then evaluated by looking at travel routes, levels of use, and distance from those routes to the analysis area. All these elements are combined and one of five VQO's is assigned for the analysis area.

The VQO for Taos Ski Valley (TSV) was established by Landscape Architect, Rob McIntyre in the Environmental Impact Statement, Proposed Taos Ski Valley Inc. Master Development Plan (Carson National Forest, 1991, Appendix 8). In that document the variety class of the entire mountain was rated as "distinctive": "Terrain is highly varied. Often, slopes exceed 60%. Examples (are) dissected, uneven, sharp, exposed ridges, or other large dominant features; visually dominating peaks with distinctive form; high mountain elevations exhibiting distinctive snow patterns; deep V-shaped canyons with near-vertical sidewalls; unique geologic formations" (p. 203).

The Wheeler Peak Trail was one of several primary travel routes, and private homes were one of the primary use areas considered. All the primary travel routes and primary use areas were found to be sensitivity level 1 (highest level). The most sensitive views of the ski area were found to be from outside TSV, at a middle ground (Mg) distance (0.25 to 5 miles).

The up-mountain portions of TSV were rated as "Retention" (R). The definition of Retention follows: Provides for management activities which are not visually evident to casual visitor, from the visitor's perspective. Activities may only repeat form, line, color and texture which are frequently found in the characteristic landscape. Steps should be taken during the project or immediately following to return to Retention standards, e.g. seeding, hand planting, painting structures (1977 USDA Forest Service).

A variety of methods can be used to make runs natural appearing. "Feathering and scalloping of run edges, thinning or glading timber" will create natural appearing openings. (1984 USDA Forest Service, pp. 3-4). The 1981 EIS found that "When viewed from the Wheeler Peak Trail, clearings for up mountain lifts and runs will appear natural if they have the following visual characteristics of avalanche paths (1) Long, narrow openings, running at right angles to the contours; and, (2) Little or no transition in the height of trees at the edge of clearings. Most of the proposed clearings at TSV have these characteristics. Therefore, all of the up-mountain alternatives could meet the VQO of Retention." (p. 202).

This analysis used the VQO established in the 1981 EIS, by Landscape Architect, Rob McIntyre. The alternatives were compared on whether or not they would meet the VQO definition when they are completed and whether the "Distinctive" variety class would be altered. The primary travel route for the analysis area is the Wheeler Peak Trail, and the primary use area is the private residential area on the east side of the Lake Fork of the Rio Hondo. This analysis addresses Significant Issue #4: Ski runs can affect the natural appearance of landscapes, making ski areas not meet established visual quality objectives (VQO). Careful trail design can make ski runs natural-appearing. Whether the VQO is adversely affected will be the indicator of this effect.

Alternative 1

No new trails would be added within the analysis area under this alternative. This alternative still meets the VQO of “Retention”, since there would be no change in the landscape. Under this alternative the existing variety class would remain “distinctive” and the view from the Wheeler Peak Trail and the private residences would not be changed.

Alternative 2

This alternative still meets the VQO or “Retention”, since two trails in this area were included in Alternative 5 of the EIS, and all alternatives were found to still meet the definition of “Retention”. From the Wheeler Peak Trail, both runs would appear natural. The cleared run would have the visual characteristics of avalanche paths stated above: long, narrow openings, running at right angles to the contours; and little or no transition in the height of trees at the edge of clearing. In the gladed run, the texture of the timber stand would be less even, and there would be more contrast in the winter with snow on the ground. These changes in both runs would actually enhance the variety in that area, making it even more distinctive. Since the variety class is already “Distinctive”, it would not change. This alternative would not change the “Distinctive” variety class for the same reasons (see the specialist report, figure 1, alternative 2, for a depiction of effects on visual resources from aerial perspective.).

Alternative 3

Alternative 3 would glade both trails, with the same dimensions as alternative 2. Within both gladed runs, thinning would not occur evenly. Instead, trees and clumps of trees would be thinned to an average spacing of 20 to 60 feet, to create ski lines running down the slope. Within these lines, most trees smaller than 7 inches would be removed and most trees larger than 15 inches would be retained. The resulting canopy cover for both runs is estimated to be 30% (see vegetation report), and would appear uneven (see figure 5).

This alternative also meets the VQO or “Retention” since two trails in this area were included in Alternative 5 of the EIS, and alternatives were found to still meet the definition of “Retention”. The area between Al’s Run and Longhorn would not be dissected with a clearing. The texture of the timber stand would be less even and there would be more contrast in the winter with snow on the ground. These changes would actually enhance the variety in that area, making it even more distinctive. Since the variety class is already “Distinctive”, it would not change (see the specialist report, figure 2, alternative 3, for a depiction of effects on visual resources from aerial perspective).

Cumulative Effects

Table 2 in this chapter (also see specialist report, Appendix 1) displays the past and reasonably foreseeable future actions considered for this analysis. Some of these activities do have a potential to change the visual resources of TSV. However, since none of the alternatives for this project would change the VQO designation or the variety class, there are no cumulative effects for the TSV visual resource.

Social and Economic Environment [55, 56]

Local Communities

Taos Ski Valley (TSV) is a downhill ski area located in the Sangre de Cristo Mountains, where the old Twining Mining District used to be. It is about 20 miles northeast of The Town of Taos (Taos), along the Rio Hondo, in Taos County, New Mexico. TSV is a destination resort, founded in 1956 by Ernie Blake. Today the resort is operated by a limited family partnership led by the Blake family, but still remains true to the original vision of its founder. About 90% of TSV is located on National Forest System (NFS) lands, within the Carson National Forest, and is managed through a special use permit issued by the Forest Service to Taos Ski Valley, Inc. The special use permit authorizes TSV, Inc. to use approximately 1,270 acres to construct, operate, and maintain a winter sports resort. [PRX] The terms identified in the 1981 decision for the TSV Master Development Plan limits skiers per day to 4,800. [002] Most of the proposed North America trails are within the special use permit area. The lower portion of the proposed gladed trail is located on private land owned by Taos Ski Valley, Inc. The private land is within the Village of Taos Ski Valley (hereby “Village”).

Encompassing 2.36 miles in the Hondo Canyon, the elevation of the Village ranges from 9,200 to 10,200 feet and The Village has a full-time population of 52 residents. When all transient units are occupied, the Village’s full- and part-time population is around 2,000. [VTSV Master Plan, p. 11] Over the past decade, approximately two new single family residences a year have been constructed.

Valdez and Arroyo Hondo are small, residential communities located along the Rio Hondo 7 and 10 miles (respectively) downstream of the Village and TSV resort. These downstream communities have expressed concern related to ongoing development in the TSV area and potential impacts it may have on the quality of surface water and groundwater used downstream for irrigation (acequias) and domestic use.

Taos Pueblo is a Native American reservation located less than two air miles south of the Village, adjoining the Wheeler Peak Wilderness area boundary. Taos Pueblo’s proximity to the publicly owned NFS lands (including Wheeler Peak Wilderness) and the Village have raised concerns by tribal members of continued trespassing on Pueblo lands and water quality impacts of the Rio Hondo.

The Town of Taos (hereby Taos) is located approximately 19 miles southwest of the Village, along NM 64 and US 68. As of the 2000 census, its population was 4,700. Taos supports over 12 hotels used by skiers and summer visitors to TSV. Many TSV employees live in and around Taos, commuting to the ski area for seasonal or year-round work. Taos is the county seat for Taos County (population 31,269), which has seen a 4.3 percent population growth between 2000 and 2003. [US Census Bureau stats]

Ethnicity

The Village of Taos Ski Valley does not fall into the general overall northern New Mexico culture. Much of the private land in and at the mouth of Hondo Canyon is owned for retirement opportunities, investment prospects, or as second homes. Private lands are surrounded by Federal lands administered by the Carson National Forest. The Village’s ethnicity is also dissimilar to the

overall ethnicity of Taos County.[4] The percentage of the populace listed as Hispanic[5] is lower in the study area than the state or county level (figure 6). The location high up in a mountain valley likely precluded settlement. Early settlers tended to settle along river/water course bottoms.

There are differences between general attitudes of rural residents and the more urbanized residents. These attitudes are often an expression of the conflicting values these different social groups' possess. Since the 1960's people of other cultural backgrounds have gradually moved into communities in and around the Carson National Forest to live and recreate. Many have relocated from urban areas, commute for employment, and primarily use the forest for recreational activities such as sightseeing, hiking, bird watching, hunting, and fishing. The influx of second home owners/part-time residents is somewhat reflected in the ethnic breakdowns of the communities (figure 6). This does not preclude the same cultural distinctiveness, independent spirits, and poverty rates of other northern New Mexico communities. The high percentage in the white population indicates a more recent immigration to the Village.

In July 2006, the Village of Taos Ski Valley finalized a master plan of development to respond to increasing development pressure in certain areas of the Village. [VTSV Master Plan] The purpose of the plan is to express "the long-term community intentions regarding the future development and physical form of the community." [VTSV Master Plan, p. 5].

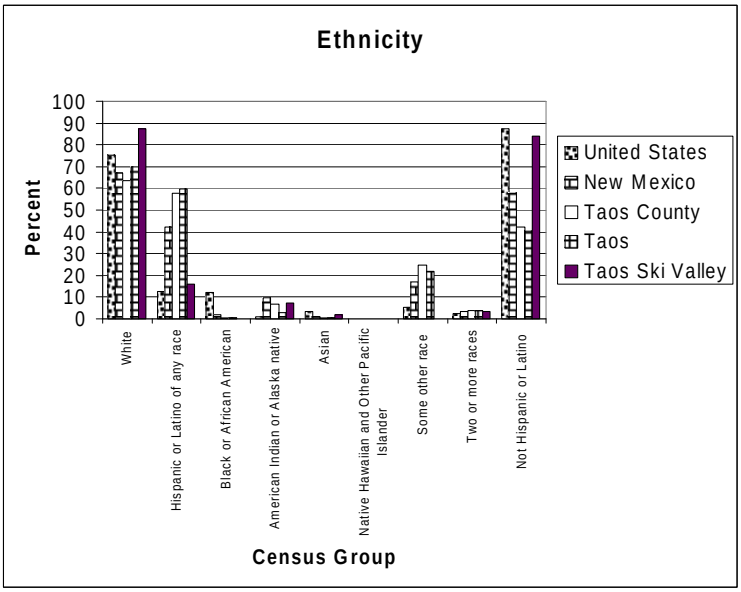

Figure 6. Population breakdown by self identified race by percent (2000 Census) data obtained from the US Census Bureau on April 19, 2005

[4] The Forest Service National Resource Inventory System, Human Dimensions module, and the Sonoran Institute/Headwaters Economics/Bureau of Land Management Economic Profile System (EPS) and the Economic Profile System Community (EPSC) modules are used in this analysis. Comparisons will be at several scales including national, state, and county levels.

[5] Ethnicity is based upon the census group definitions from the 2000 Census.

The goals, strategies, and actions outlined for the Village in the master plan provide a framework for use by the Village Council and Village Planning and Zoning Commission to evaluate plans and proposals for new development. The "Vision" for the Village of Taos Ski Valley is,

"…to create a year-round economy based upon a resort related commerce by improving infrastructure, preserving our environment, and improving amenities for ourselves and our visitors." [VTSV Master Plan, p. 5]

In its master plan, the Village states as one of its goals, "[p]reserve, protect, and maintain Village's high water quality." [VTSV Master Plan, p. 24] The master plan identifies six development districts, which are regulated by the master plan based on topography, environment, and infrastructure of the district. [VTSV Master Plan, p. 27] One of the districts is the "Commercial/Recreation District" and includes the private land located at the base of the proposed North America trails. The master plan describes this area as including "the ski area and equipment necessary to the ski area operations. No commercial development is anticipated in this area." The master plan continues, "[c]ommericial, retail, residential development is not appropriate to this area." [VTSV Master Plan, p. 33]

Recreational opportunities on the Carson National Forest continue to increase. Opportunities such as skiing, snowboarding, hunting, hiking, trail bicycle riding, all terrain vehicle riding, wildlife viewing, and scenery viewings are all parts of the recreational experience of the Questa Ranger District (includes Taos Ski Valley, Inc.) and likewise for the entire forest.

Local Economy

TSV, Inc. contributes both directly and indirectly to the Taos County economy. The economy of the Village of Taos Ski Valley is almost entirely based upon the TSV resort operations and the recreational opportunities it offers, as well as, the surrounding Carson National Forest. Many of those employed at the ski area live in the local communities of Arroyo Seco, Valdez, Arroyo Hondo, and Taos. The ski area provides employment to local residents from November to April and during the summer. Many of the Taos hotels, restaurants, art galleries, and retail stores benefit from TSV resort, especially in the winter and during good snow years. It is estimated that TSV, Inc. contributes about $2,000,000 to the local Taos economy, annually. [55, 56]

Using 2000 Census data, occupations of Village residents are mostly in management, professional, or related jobs, while Taos County's working population is more evenly distributed between management, service, and sales/office type jobs (table 6). This may account for the substantially different per capita income of the two areas (table 7). In comparing the economies of Taos County and the Village of Taos Ski Valley, the per capita income is $25,817 and $43,143, respectively.

Table 6. Percent employment by occupation for the Village of TSV and Taos Co.

Occupation	VTSV	Taos Co.
Management, professional, and related occupations	66	32
Service occupations	10	22

Occupation	VTSV	Taos Co.
Sales and office occupations	18	25
Farming, fishing, and forestry occupations	0	1
Construction, extraction, and maintenance occupations	6	13
Production, transportation, and material moving occupations	0	7

2000 Census: Employed civilian population 16 years and over

Table 7. Per capita income and unemployment comparison 2005-2006

	Per Capita Income ($) (2005)	% of State Per Capita Income	% Unemployment Rate (2006)
Village of TSV	43,143[6]	154	--
Taos County	25,817	92	5.6
New Mexico	27,889	100	4.2
United States	34,471	1234	4.6

New Mexico Department of Labor, New Mexico Annual Social & Economic Indicators 2007

Table 6 indicates both New Mexico and the United States are near the full employment level; estimated when unemployment percentage rate reaches the 4.0 level. The Department of Labor (United States) uses 4.0 for the full employment level. These numbers indicate a shrinking available labor pool in the Taos County area. Within the county area there may still be pockets where unemployment exceeds the average unemployment level. Unemployment levels in the Taos County area stem partly from the lack of an industrial base. The county has a high proportion of jobs in the service industries such as restaurants, service stations attendants, hospitality industry, and seasonal job markets, such as ski resorts and river rafting. New Mexico Department of Labor data indicates a high level of employment in the service sector and lower employment in the government and industrial sectors.

Alternative 1

This alternative would not permit the construction of the North America trails as outlined in the Taos Ski Valley, Inc. Master Development Plan (1982). Not having additional skiing terrain available for those who ski at Taos Ski Valley would not change the current social conditions of the Village or the surrounding area, including the communities of Valdez, Arroyo Seco, Arroyo

[6] Taken from 2000 Census.

Hondo, and Taos. Taos Ski Valley, Inc. would continue to operate as it currently does. There is no associated development anticipated with not constructing the North America trails.

Job creation in the area is contingent upon development of other recreational activities requiring guides, purchases, and maintenance of recreational equipment and/or an increase in the service industries sector of the local economy. Not having additional ski terrain at the ski area would have no bearing on the local economy. Local residents travel would continue to seek employment in a variety of areas, including Taos Ski Valley, Inc., the Village, and other communities in Taos County.

Alternatives 2 and 3

Public comments related to the proposed North America trails raised concerns that ski area operations have an adverse effect on the traditional culture of downstream communities. As discussed in the "Cultural History" section, downstream communities want to retain their traditional values and continue to rely on natural resources, including grazing, firewood, and other forest products. There are concerns that any additional development prompted by the ski area would lead to additional growth in the area and perpetuate adverse effects on the traditional culture of downstream communities.

The terms identified in the 1981 decision for the TSV Master Development Plan limits skiers per day to 4,800. [2] This 27 year old cap on the number of skiers that can ski at Taos Ski Valley in a day also limits the number of visitors to the village, including those driving up from Taos. The purpose of proposing the ski trails is for improvement in ski terrain opportunities to accommodate a market preference for interesting challenges and a less congested experience. In addition, the proposed trails would improve public safety by reducing skier conflicts. The proposed trails would help retain Taos Ski Valley's market share of skiers and would not increase the number of skiers or the amount of development in the area.

The proposed trails under either alternative 2 or 3 would not affect the social fabric (sense of personal identity, prestige within a community, pride of life-style, and feeling of self-sufficiency) that contributes to a strong sense of community. The proposed trails under either alternative would have no effect on surface water or groundwater quality of the Rio Hondo (see Soils and Watershed section), upon which downstream communities depend. Alternatives 2 and 3 would have no effect on water quantity in the Rio Hondo; therefore the use of this for irrigating fields downstream would not be affected.

Cumulative Effects

Since alternatives 1, 2, and 3 would have no social or economic effects, there would be no cumulative effects.

Environmental Justice

A specific consideration of equity and fairness in resource decision-making is encompassed in the issue environmental justice and civil rights. As required by law and Executive Order, all Federal actions should consider potentially disproportionate effects on minority or low-income populations. Potential impact or change to low-income or minority populations within the study area due to the proposed action and alternatives should be considered. Where possible, measures should be taken to avoid negative impacts to these communities or mitigate the adverse affects.

Regulatory guidance for the evaluation of environmental justice includes both Executive Order 12898 and 13045. Executive Order 12898—Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations—states "…each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States… (US 1994)."

Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, addresses the vulnerability and sensitivity of children stating, "…each Federal agency shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks (US 1997)."

Communities in the study area do not fall under the minority and or low-income populations identified in the Environmental Justice Executive Order 12898. Generally, environmental justice is concerned with identifying these communities and ensuring that they are involved in and understand the potential effects of the proposed action. The people living in villages downstream of Taos Ski Valley are interested in maintaining their traditional lifestyle, using the surrounding area to gather or use resources, such as firewood, latillas, vigas, rock, forage for livestock, and irrigation water. Additional trails within the Taos Ski Valley permit area would not change traditional lifestyles of those who live in Valdez, Arroyo Hondo, Arroyo Seco, or Taos.

Communities in the study area would not fall under the children populations identified in the Environmental Justice Executive Order 13045; therefore the environmental health risks and safety risks noted in this Executive order would continue at the same level or be reduced through implementation of the alternatives 2 or 3.

No adverse effects pertaining to environmental justice for minority groups or children are anticipated from potential implementation of alternatives 2 or 3.

Heritage Resources [54]

The proposed North America Trails are situated in the interior of the Sangre de Cristo Mountains where remnants of historic mining, ranching, and logging activity are common. In earlier times, tribes such as the Navajo, Ute, Comanche, Jicarilla Apache, and Kiowa Apache ranged the Rio Grande Valley hunting grounds and east side of the mountains, and traveled the inner mountain passes to trade and raid in the Taos area. Pueblo peoples mostly inhabited and utilized the valleys and foothills of the western front and the Rio Grande Valley, and also traveled the mountain passes and ridges onto the east side of the mountains. Archaic period and prehistoric chipped stone artifacts in the inner mountain area tend to be located near water sources and near trails, and are related to travel, hunting, camping, and seasonal resource use.

In historic times, the area around what is now known as Taos Ski Valley was the Rio Hondo Mining District and the setting of an intensive but sporadic gold rush, from the 1880s through early 1900s. The ghost towns of Amizette and Twining once lay at the base of the high peaks, and mining claims along with prospect pits, shafts, trenches, and waste piles cover the landscape from streambed to mountain top. A number of developed mining prospects featured surface plants

smelters, ore-mills, log buildings, steam engines, electric power plant, and other industrial machinery. Much of the accessible land has been altered with wagon roads that give access to the mines, and the drainages and hillsides show disturbed ground from prospecting and placer mining. There are no historic properties listed on the National Register of Historic Places (NRHP) or known Traditional Cultural Properties within the analysis area.

The Questa District archaeologist consulted Questa District Site and Survey Atlases, GLO and HES survey maps, Taos County mining records, BLM mineral surveys, literature review, interviewed people regarding the locations of known cultural resources, and conducted several surveys and field visits. About half of the proposed analysis area was surveyed for cultural resources at one hundred percent in 1981 for TSV's planned lifts, runs, and parking lots. The survey for the TSV permit area recorded the historic Twining Hotel at the bottom of the canyon, well outside of the analysis area. Archaeologists conducted additional survey within TSV's permit area in 1986, and recorded three new historic mining sites, one located about a half mile to the southeast, outside of the analysis area. The Lake Fork prospect is an unrecorded copper prospect consisting of a caved adit with a large dump located on the east side of the canyon across from the proposed trail, on private property. Finally, on September 23, 2005, the Questa District Archaeologist conducted a 100% survey of approximately 40 acres for the analysis area, some of which was re-surveyed. No new cultural resources sites were recorded.

The archaeological clearance and IS&A for the North America Trail Survey at TSV, HRR# 1981-02-023-F is signed February 15, 2008, in compliance with Section 106 of the National Historic Preservation Act.

Tribal Consultation

The North America Trail proposal[7] was listed quarterly on the 2006 Schedule of Proposed Actions (SOPA), and January 2007 SOPA, and sent to the sixteen Tribal governments who regularly consult with the Carson National Forest. A formal scoping letter that described the project and elicited comments on TSV's proposed additional ski trails was sent to the Tribal Governments on September 21, 2006. Consultation with Taos Pueblo began in October 2005, with contact between the Questa District Ranger and War Chief's Office, followed by an October 11, 2005 on site visit to discuss and resolve concerns about affects to water quality. With the exception of a response from the Jicarilla Apache Nation stating they have no objection, but would like to be notified immediately in the event of an inadvertent discovery of human remains, no additional comments have been received to date.

Alternatives 1, 2, and 3

There are no cultural resources sites recorded within the analysis area. Because of this, alternatives 1, 2, and 3 are equal in their effects on the resources in the area.

Cumulative Effects

The recreation uses in this area, such as tourism, skiing, hiking, outfitting, camping, and horseback riding, as well as activities like animal grazing, can have an adverse cumulative effect on recorded and unrecorded archaeological sites. The unrecorded prospect on private property will continue to experience cumulative effects of recreation as it has for the last century; the fact

[7] The project name was changed in 2007 to “North America Ski Trails at Taos Ski Valley”.

that the activity occurs in the winter with snow cover will lesson the effects on the mining prospect. Because there are no cultural resources sites recorded in the analysis area, this portion of the project on National Forest land would not add any cumulative effects.

Chapter 4 - Consultation and Coordination

The Forest Service consulted the following individuals, Federal, state and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

Federal and State Agencies

New Mexico State Historical Preservation Office (NM SHPO)
State of New Mexico Department of Game and Fish
State of New Mexico Environment Department
US Department of the Interior, Fish and Wildlife Service

Local Government

Village of Taos Ski Valley
Village of Questa

Tribes

Pueblo of Jemez
Jicarilla Apache Nation
Pueblo of Nambe
Pueblo of Picuris
Pueblo of Pojoaque
Pueblo of San Ildefonso
Pueblo of San Juan
Pueblo of Santa Clara
Pueblo of Taos
Pueblo of Tesuque
Pueblo of Zuni
The Hopi Tribe
The Navajo Nation
Southern Ute Tribe
Ute Mountain Ute Tribe
Comanche Tribe

Organizations

Forest Guardians
Wildearth Guardians
Wild Watershed
Sierra Club Santa Fe Group
Forest Trust
Center for Biological Diversity
Northern NM Stockman's Association
Carson Forest Watch
Forest Conservation Council
New Mexico Cattle Grower's Association
Amigos Bravos

Businesses

Taos Ski Valley

Individuals

Leo Valencia
Al Johnson
Erminio Martinez
Joe Herken
Buell Pattison
Elizardo or Lupe Archuleta
Dion Gonzales or Wanda Salazar

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Chapter 6 – List of Preparers

ID Team Members

Mary Ann Elder	East Zone Recreation Staff (IDT Lead and Visuals)
Greg Miller	Forest Watershed Program Manager (Soils, Water, Air)
George Long	Questa District Wildlife Biologist (Wildlife)
Paul Czeszynski	Forest Silviculture (Vegetation)
Alyssa Radcliff	Questa District Wildlife Technician (Wildlife)
Rob Deyerberg	East Zone Recreation (Recreation)
Steve Miranda	Forest Fuels/Fire Planner (Fuels, Fire)
Jack Carpenter	Forest NEPA/Planning Staff (Social and Economics)
Carrie Leven	Questa Archaeologist (Heritage)

Appendix A. Project Record Index

DOC #	DATE	DOCUMENT	AUTHOR	RECIPIENT
1	03.06.72	Region 3 Policy on Managing National Forest Land in Northern New Mexico	USDA Forest Service, Southwestern Region, Regional Forester	Project Record
2	04.00.81	Environmental Impact Statement Proposed Taos Ski Valley Inc. Master Development Plan	Carson National Forest	Project Record
3	05.21.81	Record of Decision - Final Environmental Impact Statement Taos Ski Valley Master Plan	Carson National Forest	Project Record
4	06.00.84	National Forest Landscape Management Ski Areas: Volume 2, Chapter 7 Agriculture Handbook No. 617	USDA Forest Service,	Project Record
5	09.00.86	Environmental Impact Statement, Carson National Forest Plan (Note: 1 Copy of EIS in a separate binder)	Carson National Forest	Project Record
6	09.00.86	Carson National Forest Plan, as amended	Carson National Forest	Project Record
7	10.31.86	Record of Decision, Environmental Impact Statement, Carson National Forest Plan	USDA Forest Service, Southwest Region	Project Record
8	08.00.87	Terrestrial Ecosystems Survey of the Carson National Forest	USDA Forest Service, Southwest Region	Project Record
9	12.03.90	FSH 2509.22 Soil and Water Conservation Practices Handbook	USDA Forest Service, Southwest Region	Project Record
10	09.03.91	FSH 2508.18 Soil Management Handbook	USDA Forest Service	Project Record
11	10.22.04	Special Use Permit	Carson National Forest	Taos Ski Valley, Inc.
12	06.15.05	Meeting Notes to discuss potential issues to mitigate in proposed action	Mary Ann Elder, IDT Leader	Project Record
13	07.01.05 to Current	Schedule of Proposed Actions (SOPA)	Carson National Forest	Project Record
14	06.07.05	Letter regarding project proposal	Mickey Blake, President Taos Ski Valley, Inc.	Ron Thibedeau, District Ranger
15	07.12.05	NEPA Project Initiation Letter	Ron Thibedeau, District Ranger	Forest Supervisor and (Acting) Public Affairs Officer, Carson National Forest
16	09.16.05	Notes for field visit to Taos Ski Valley Inc.	MaryAnn Elder, Questa Ranger District,	Project Record
17	09.19.05	E-mail to IDT members regarding field visit to Taos Ski Valley, Inc,	Ron Thibedeau, Questa District Ranger	IDT
18	10.04.05	E-mail regarding gladed area	Mary Ann Elder, IDT Leader	Timothy Fruits, Forestry Program Manager

DOC #	DATE	DOCUMENT	AUTHOR	RECIPIENT
19	03.07.06	Letter regarding request of mailings in response to SOPA, regarding North America Trail at Taos Ski Valley	Center for the Biological Diversity	Forest Supervisor, Carson National Forest
20	03.27.06	E-mail regarding TEU spreadsheet	Deborah Kanter, Hydrologist	MaryAnn Elder, Questa RD, & Greg Miller, Soil Scientist
21	04.28.06 - 05.10.06	Revised NEPA Project Initiation Letter and North America IDT Meeting Notes	Mary Ann Elder, IDT Leader	Project Record
22	05.15.06	E-mail regarding Equipment for North America	Mary Ann Elder, IDT Leader	Timothy Fruits, Carson Forestry Program Manager
23	06.12.06	E-mail regarding site visit	Timothy Fruits, Carson Forestry Program Manager	Mary Ann Elder, IDT Leader
24	07.05.06	Village of Taos Ski Valley Master Plan	HDR, Town Planning	Project Record
25	09.21.06	Scoping Letter with mailing list (includes Tribes)	Questa District Ranger	Interested Parties
26	09.29.06	Scoping Letter	Questa Ranger District, Carson National Forest	Leigh Kuwanwisiwma, Cultural Preservation Officer, The Hopi Tribe
27	10.04.06	Scoping Response	Carson Forest Watch	Questa Ranger District
28	10.20.06	Scoping Response	Mark Schiller, La Jicarita News	Questa Ranger District
29	10.23.06	Scoping Response	Ruth Toahty, NAGPRA Associate, Comanche Tribe	Questa Ranger District
30	10.26.06	Scoping Response	Janell Ward, Assist. Chief, Conservation Services Division, State of NM, Dept. of Game and Fish	Questa Ranger District
31	11.02.06	Request – Remove name from mailing List	Southwest Forest Alliance	Questa Ranger District
32	11.09.06	IDT Meeting Notes	Mary Ann Elder, IDT Leader	Project Record
33	11.29.06	Scoping Response	Gedi Cibas, State of NM, Environment Department	Questa Ranger District
34	01.22.07	SOPA response –send information on North America Trail at Taos Ski Valley	Center for Biological Diversity	Forest Supervisor, Carson National Forest
35	02.23.07	E-mail regarding Project Update and content analysis	Mary Ann Elder, IDT Leader	ID Team

DOC #	DATE	DOCUMENT	AUTHOR	RECIPIENT
36	03.02.07	E-mail regarding TSV MDP EIS Review	Mary Ann Elder, IDT Leader	Audrey Kuykendall, Carson NEPA Coordinator
37	03.10.07	Scoping Response	Joe Herken, Free Taos, Taos, NM	Questa RD
38	03.12.07	E-mail regarding private land acres	Mary Ann Elder, IDT Leader	Bill Etchemendy, Ski Taos
39	03.22.07	E-mail regarding TSV acres	Mary Ann Elder, IDT Leader	Paul Czeszynski, Forest Silviculturist
40	04.12.07	E-mail regarding acreages for North America	Alyssa Radcliff, Wildlife Technician, Questa RD	Mary Ann Elder, IDT Leader
41	04.17.07	Scoping Letter including Mailing Lists	Questa District Ranger	Interested Parties
42	04.17.07	Scoping Response	Joanie Berde, Carson Forest Watch	Questa RD
43	04.26.07	Scoping Response (Conversation Record)	Mary Ann Elder, IDT Leader	Mark Schiller, La Jicarita News
44	05.09.07	Scoping Response	Lisa Kirkpatrick, Conservation Services Division, State of NM, Department of Game and Fish	Forest Supervisor, Carson National Forest
45	05.10.07	Legal Notice of Proposed Action	Questa RD	The Taos News
46	05.21.07	Scoping Response	Gedi Cibas, State of NM, Environment Department	Questa RD
47	05.24.07	Scoping Response	Joe Herken, Free Taos	Forest Supervisor, Carson National Forest
48	08.08.07	FOIA for all comments received for the North America Trails Project	Michael Blake, President, Taos Ski Valley, Inc.	Questa District Ranger
49	10.19.07	Scoping Response	Amigos Bravos	Questa Ranger District
50	11.29.07	Letter to Michael Blake, President, Taos Ski Valley, Inc.	Questa District Ranger	Michael Blake, President, Taos Ski Valley, Inc.
51	12.11.07	Letter to Genevieve Masters regarding 11.29.07 letter	Michael Blake, President, Taos Ski Valley, Inc.	Questa District Ranger
52	02.08	Briefing Paper North America Ski Trails EA at Taos Ski Valley	USDA Forest Service, Carson National Forest, Questa RD, District Ranger	Project Record
53	02.22.08	E-mail regarding IDT Notes and Letter to IDT from District Ranger on Issues and Alternatives	Questa District Ranger	ID Team

DOC #	DATE	DOCUMENT	AUTHOR	RECIPIENT
54	02.27.08	Heritage Resources Specialist Report	Carrie Leven, Archeologist, Questa RD	Project Record
55	03.26.08	Social/Economic Specialist Report	Jack Carpenter, NEPA/Planning, Carson National Forest	Project Record
56	04.09.08	Social and Economic Analysis Summary	ID Team	Project Record
57	04.17.08	E-mail regarding Summer Ops Plan	Bill Etchemendy, Ski Taos	Mary Ann Elder, IDT Leader
58	05.11.08	Visuals Specialist Report	Mary Ann Elder, IDT Leader	Project Record
59	05.12.08	Terrestrial Ecosystems, Riparian, and Air Resources Specialist Report	Greg Miller, Soil Scientist, Carson National Forest	Project Record
60	05.16.08	Wildlife and Fisheries Specialist Report	George Long, East Zone Wildlife Biologist and Alyssa Radcliff, East Zone Wildlife Technician	Project Record
61	05.16.08	NA Trails Biological Assessment and Biological Evaluation	George Long, East Zone Wildlife Biologist and Alyssa Radcliff, East Zone Wildlife Technician	Project Record
62	05.19.08	Vegetation Specialist Report	Paul Czeszynski, Forest Silviculturist	Project Record
63	05.19.08	Fuels and Fire Specialist Report	Steven Miranda, Carson Fire/Fuels Planner	Project Record
64	05.19.08	Recreation Specialist Report	Rob Deyerberg, Questa Recreation Planner	Project Record