

VOLUME I

FINAL ENVIRONMENTAL IMPACT STATEMENT

VAIL CATEGORY III
SKI AREA DEVELOPMENT

AUGUST 1996



**White River National Forest
Holy Cross Ranger District
Rocky Mountain Region**

**U.S. Department of Agriculture
Forest Service**

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AFFECTED ENVIRONMENT

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CHAPTER 3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter is the baseline description of the existing environment in terms of the physical, biological, and human resources, and conditions which may be affected by the Proposed Action and alternatives to it. The description is structured by resource/discipline. The purpose of Chapter 3 is to describe the environment of the area that would be affected by the alternatives under consideration. CEQ regulations direct agencies to succinctly describe the environment that could be affected commensurate with the importance of the impacts (40 CFR 1502.15). The topics are discussed in the same order in chapters 3 and 4 in order to provide straight-forward comparisons.

The Project Area (PA) for this EIS includes all of the CAT III area, Tea Cup Bowl, and another small portion of the CAT II area along Two Elk Creek. For vegetation, wildlife, and biodiversity, this EIS also incorporates two broader levels of information and analysis. These areas are referred to as the landscape and regional areas, LA and RA, respectively, and are first depicted on MAPs 5 and 6.

3.2 PHYSICAL ENVIRONMENT

3.2.1 GEOLOGY

The following description of geologic conditions in the CAT III area is based on the Engineering Geology and Geologic Hazards Evaluation of the CAT III area prepared for WRNF and VA by Goolsby Brothers and Associates, Inc. (1993). This study was based on field mapping studies combined with aerial photo-geologic mapping, a review of existing literature, and previous reports.

3.2.1.1 Geologic Setting

The Vail CAT III area lies on the north slope of Battle Mountain, which is situated in a structural trough stretching from Vail Pass to McCoy in north-central Eagle County. Bedrock within this trough consists of the Minturn Formation, which originated during the Pennsylvanian period 290 to 330 million years ago. The bulk of the formation consists of interfingered lens-shaped or lenticular beds of sandstone, siltstone, shale, conglomerate, limestone, and dolomite.

Sediments comprising this formation were likely deposited by rivers and streams flowing westward from the ancestral Rocky Mountains toward a narrow seaway which bordered the region in Pennsylvanian time. The seaway was gradually filled with sands, shales, and conglomerates as erosion of the ancestral Rockies continued through geologic time. Periodic rises of the sea, or reductions in sediment deposition rates, caused marine limestone beds to be deposited within the fragments of pre-existing rocks derived from terrestrial sediments of the trough. Deposition of younger sedimentary formations above the Minturn Formation continued throughout the remainder of the Paleozoic and most of Mesozoic time, approximately 66 to 290 million years ago.

By the close of the Cretaceous period, a renewed period of episodic regional uplifting began along many of the old existing fault lines of the ancestral Rockies. This uplift elevated the area and allowed a period of intensive

erosion to begin. In eastern Eagle County, the Minturn Formation rocks are flanked by the Gore Range Uplift to the north and by the Sawatch Range Uplift to the southwest. Structural deformation and faulting during periods of tectonic uplift have heaved and tilted the Minturn strata so that the strike and dip of bedding varies widely in the Eagle County area. On Battle Mountain, the Minturn dips gently north-northeast at 3 to 5 degrees.

Relative to seismic considerations, the general area around CAT III is structurally defined by the inactive Spraddle Creek fault zone and a series of synclines. The Spraddle Creek fault zone extends in a southwest direction from the Gore Creek fault zone north of I-70, through Vail Mountain, and terminates east of Gilman. These conditions are typical for mountainous areas in central Colorado. Seismic activity is mostly associated with Laramide-age uplifts (Algermissen et al. 1982); however, historical accounts of earthquake activity in the Vail area do exist.

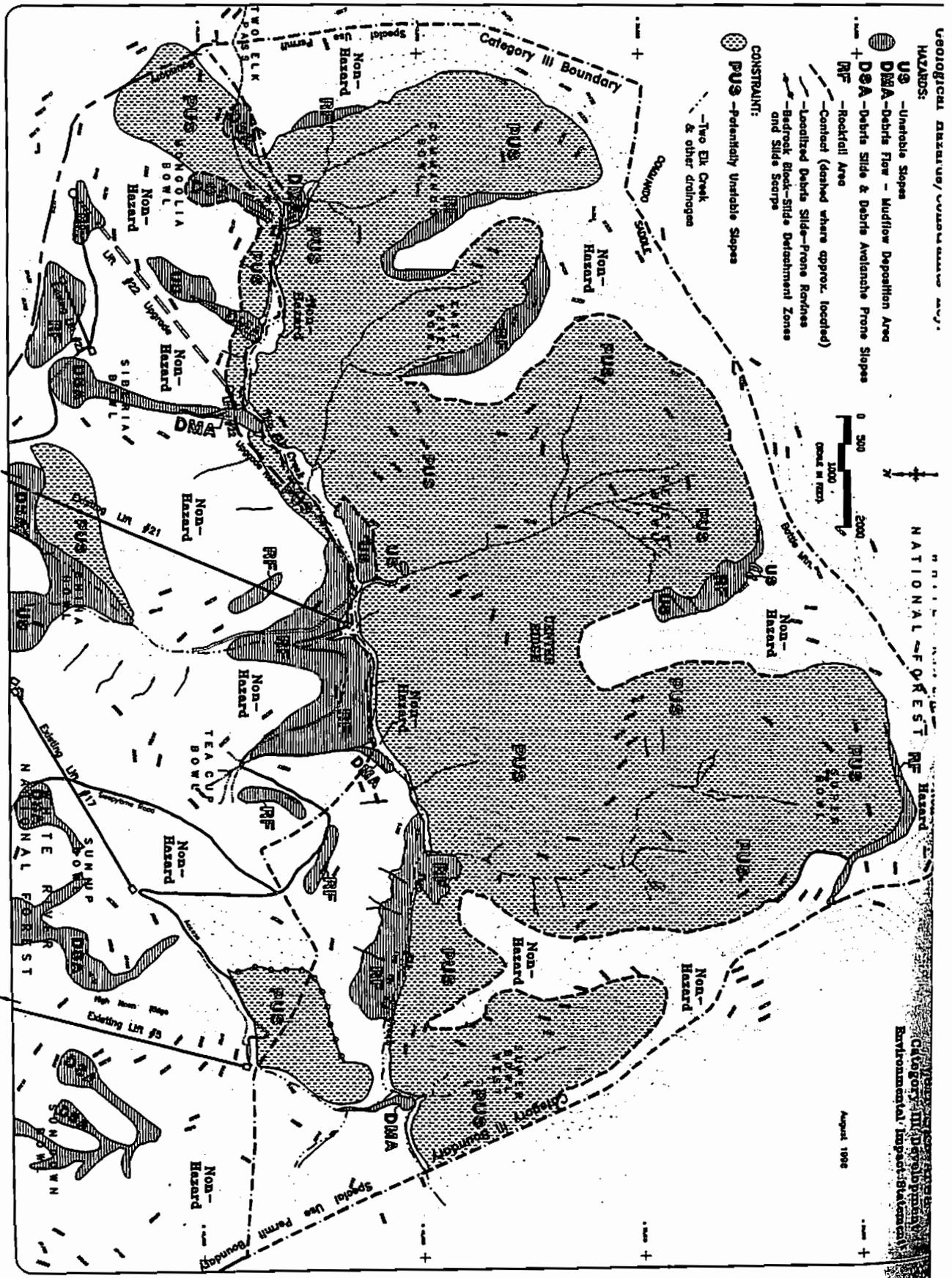
At present, erosion is still very active in the region. All the sedimentary rock overlying the Minturn Formation, and much of the upper part of the Minturn itself, has been stripped away in the last few million years. Exposures of the Minturn Formation in eastern Eagle County are typically marked by steep slopes and cliffs. Examples include the canyons and cliff areas along upper portions of the Eagle River and Gore and Two Elk creeks. Erosion and mass-wasting processes continue to operate on a geologic time scale.

Geologic processes have resulted in the creation of several different landforms within the PA. Landforms present in the CAT III area include stream alluvium, terrace alluvium, debris fan deposits, landslide deposits, colluvial slope-failure complexes, bedrock dip-slope failure complexes, thick colluvial slope and foot-slope wedge deposits, thin colluvium and slope wash, talus and rockfall boulders, and the residual slopes of the Minturn Formation.

3.2.1.2 Geologic Hazards and Constraints

The CAT III area is comprised of three main classes of geologic or slope stability considerations. Figure 3.1 depicts the location of these areas, while Table 3.1 provides a description of the units which are represented on this map. Geologic hazards are areas that should be either avoided, or merit detailed geotechnical studies prior to allowing construction. Geologic hazards within the CAT III area include rockfalls, unstable slopes, debris, slide-prone fans, and ravines. Geologic constraints are areas where facilities can generally be constructed without significantly affecting slope stability. Geologic constraints within the CAT III area include potentially unstable slopes underlain by old landslide deposits, or colluvium of the Minturn Formation. Geologic constraints are relatively common in mountainous regions, and nearly all of the facilities on the front side of the Vail Ski Area are located on the areas of potentially unstable slopes. The third category of geologic consideration includes areas with no known slope stability concerns. These are relatively gently sloping ridgetops and are indicated on Figure 3.1 as "non-hazard areas."

During much of the Quaternary period of the last 2 million years, nivational conditions (heavy, lingering snow cover but no glaciers) have existed in the Battle Mountain area. These high levels of precipitation have resulted in increased soil moisture and groundwater levels. Frost action and nivational processes acting on the ridges and slopes of Battle Mountain have accelerated weathering and erosion of the rock strata and contributed ultimately to large-scale mass wasting of the terrain. Landslide-earthflow and bedrock block-slide complexes have occurred along first-order streams on the steep side-slopes of the CAT III area, leaving large bowl-shaped scars floored with landslide deposits.

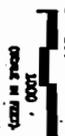


HAZARDS:

- US - Unstable Slopes
- DMA - Debris Flow - Mudflow Deposition Area
- DSA - Debris Slide & Debris Avalanche Prone Slopes
- RPF - Rockfall Area

CONSTRAINTS:

- PUS - Potentially Unstable Slopes
- Two Elk Creek & other drainages
- Contact (dashed where approx. located)
- Localized Debris Slide-Prone Ranges
- Badrock Block-Slide Displacement Zones and Slide Scars



NATIONAL FOREST R.F. Hazard

August 1992

Figure 3.1. Geologic hazards & constraints within the upper Two Elk Creek watershed.

Table 3.1. Geologic hazards and constraints within the PA.	
Hazard	
Unstable slopes (US)	These comprise oversteepened slopes on the west wall of Pete's Bowl and local areas of recent landslide deposits. These sites exhibit evidence of active creep and show related features such as tension cracks, fresh scarps, and recent slide deposits. The stability of these areas is greatest during the winter while slopes are frozen under snow pack, and lowest during spring runoff.
Debris flow-mudflow deposition areas (DMA)	Several fan-shaped deposits of debris occur along Two Elk Creek at its confluence with steep tributary side valleys. Boulders, mud, and debris derived from flash floods and debris slides from steep slopes along the tributary valley walls are periodically deposited on the fan surfaces. The processes forming the fans are still active; deposition of mudflows and debris flows can occur naturally in DMA areas. They should be avoided as sites for any critical or permanent structures, unless site-specific studies are conducted to determine the nature and extent of hazard areas, and mitigation measures are developed.
Debris slide and debris avalanche prone slopes (DSA)	These slopes are comprised of thin colluvial deposits in small bowl-like areas on steep slopes above narrow ravines that can detach from the underlying slope and slide down the ravines forming a viscous, rocky slurry which travels rapidly to the base of the slope. Slide occurrences are most often related to conditions which cause surcharges of moisture and groundwater along the colluvium-bedrock interface on steep, sparsely vegetated slopes. Most debris slides occur during heavy, rapid spring snowmelt, or in association with prolonged, intense rainfall.
Rock fall areas (RF)	Rock falls are associated with steep, nearly vertical cliffs and outcrops of the more resistant rock types within the Minturn Formation. They are of limited extent and, if avoided for placement of critical facilities, should not pose significant problems.
Constraint	
Potentially unstable slopes (PUS)	Potentially unstable slopes occur in areas of landslide terrain and thick colluvium. These slopes differ from active areas of landslide and slope creep in that, rather than mass-wasting being an ongoing process, it is a dormant one. Such slopes are in a state of metastable equilibrium, where slope failures can be initiated by a change in either natural (e.g., precipitation, increased soil moisture, adjacent slope creep) or anthropogenic (e.g., road cuts, addition of moisture through irrigation, improper drainage) conditions.
Source: Goolsby Brothers and Associates, Inc. 1993	

The Minturn Formation outcrop is characterized by landslides and slope failures throughout much of its exposure in Eagle County. The weak and platy rocks of the Minturn Formation readily form a heavy, failure-prone wash or colluvium, which creeps downslope and forms thick deposits along valleys and footslopes. The many soft and crumbly shale beds within the Minturn strata provide ideal surfaces for block-glide landslides where the beds dip toward valleys. In addition, the shale intervals are relatively impermeable, forming perched water tables which contribute to slope and rock mass instability. The nature of most sandstone beds limit their ability to strengthen and tie the rock mass together.

These factors combine to make landslides common within areas underlain by the Minturn Formation, particularly where steep valleys have been cut into the formation. Larger slides are mostly of the dip-slope, block-glide type. Most conspicuous slides are post-glacial (15,000 years before present), and some are recent or presently active. Almost all of the large slides still have some potential for future movement, as indicated by topography and favorable geologic characteristics.

Smaller landslides and debris slides are generally localized failures of the heavy slope debris which mantles much of the Minturn Formation. Debris slides are fairly common along first-order gullies and ravines on steep slopes.

3.4.2.1.6 Research Natural Areas

Research Natural Areas (RNAs) are a formal part of a national network of ecological areas designated in perpetuity for research and education, or to maintain biological diversity on NFS lands. They are defined as "a physical or biological unit in which current natural conditions are maintained insofar as possible. The conditions are ordinarily achieved by allowing natural physical and biological processes to prevail without human intervention" (FSM 4063.05). The process to designate a RNA is initiated under the terms of a 1979 Memorandum of Understanding between the Forest Service and the Colorado Natural Areas Program. To begin the process, the Forest Service must undertake a study to determine if the candidate area is suitable. National Forests are directed to include RNA suitability recommendations in Forest Plans, and amendments and revisions to Forest Plans. The authority to determine what important forest and range types are needed in the RNA system and formally designate RNAs is reserved for Chief of the Forest Service (FSM 4063(a)).

There are currently eight RNAs within Colorado (USDA-FS 1994g). During the development of the Forest Plan, no areas on the WRNF were identified as suitable, and no recommendations were made to the Chief relative to RNAs. On August 1, 1990, the Forest Supervisor amended the Forest Plan and allowed for 322 acres on the Dillon Ranger District, known as Hoosier Ridge, to be recommended to the Chief for designation as an RNA. On December 12, 1995 the Regional Forester signed the Decision Notice to establish the Hoosier Ridge RNA.

No suitability studies for RNA designation have been conducted in or around the CAT III area. Recommendations for future RNA designation are being identified under the current Forest Plan revision process for the WRNF. No potential areas have been identified in the vicinity of the PA.

3.4.2.2 Private Lands

3.4.2.2.1 Eagle County Master Plan

The adoption in January 1996 of the Eagle County Master Plan (Fox 1996) culminated an effort to integrate the various regulatory and county support requirements into a comprehensive, working framework. The document reaches beyond the regulatory and administrative level, and establishes goals, planning guidelines, and implementing actions for land use and other concerns.

In the plan, Eagle County classifies itself as a resort/recreation-based economy, and a significant portion of the document is devoted to mapping and discussion of planning and controls which would integrate such land use issues as: 1) wildlife habitat, 2) geologic features, 3) water supply and storage, 4) open space and recreation, and 5) development of public versus private land. For example, under the goal of "protecting the environmental quality of Eagle County," three of the five implementing policies directly address land use or protection of "natural land values" and other related resources. The County has also adopted an Environmental Impact Report procedure that requires land developers to formally inventory the environmental features of their property, technically evaluate impacts, and to then identify mitigation measures.

Colorado HB 1041 provides for an environmental review (full or minor) for areas and activities of local or state interest located on private land. This review process is required when proposed development would occur in designated geologic hazard areas, floodplain hazard areas, wildfire hazard areas, wildlife habitat areas, or historic and archaeological resource areas. There is no private land within the PA; however, about 6,446 acres of private land is located along the southwestern periphery of the LA. Extension of water/sewer service to the proposed restaurant should the restaurant be approved may require Eagle County review and approval.

3.4.2.2.2 The Town of Vail

The PA is more than 5 miles from the TOV and is entirely on NFS lands. Therefore, there are no current zoning or land use concerns in the TOV that would have a direct effect on the Proposed Action or any alternative. Because about 90 percent of the land that has been zoned for development in the TOV has been developed, establishing priorities for residential, commercial, recreational and open space uses is a major land use issue there. Dedication of land to the provision of parking and other visitor-related services is another major land use concern in the TOV.

3.4.3 RECREATION AND ALPINE SKIING

Public lands provide the primary outdoor recreational opportunities in the Vail Valley. Approximately 80 percent of the total land base of Eagle County is federally controlled, managed by either the Forest Service or the BLM. Much of the ski-related recreation is centered around the county's three ski resorts: Vail, Beaver Creek, and Arrowhead. The number of annual skier visits at these resorts has exceeded 2 million in recent years, which is roughly 20 percent of Colorado's total. Given these levels of demand, skiing remains the county's dominant recreational attraction. Downhill skiing accounts for approximately 45 percent of the total recreation visitor days on the WRNF.

The TOV, surrounded by more than 350,000 acres of public lands managed by the Holy Cross Ranger District, serves as a focal point for recreational activities in the area. In support of tourism, the town's retail mix includes more than 100 bars and restaurants, 300 shops, and a bedbase of more than 32,000. Lodging, services, and retail sales account for approximately 60 percent of the county's overall employment.

Although skiing remains dominant, the demand for non-skiing recreational activities has dramatically increased in recent years. While the number of downhill skiers on WRNF has shown modest growth, its percentage of total Forest use actually declined by 5 percent between 1989 and 1992 (USDA-FS 1992b) due to significant increases in the popularity of other activities such as biking and hiking.

An array of non-skiing activities is available to visitors of Vail Valley and surrounding areas, including mountain biking, hiking, camping, golf, tennis, fly-fishing along several sections of Gold Medal trout stream, rafting, and kayaking. Two wildernesses, the Eagles Nest north of Gore Creek and the Holy Cross south of the Eagle River, provide abundant opportunities for wilderness recreation. A paved bike path connects the Vail Valley with the Summit County resorts of Copper Mountain, Breckenridge, and Keystone. In addition, the town has developed and promoted numerous summer events which have increased summer visitation. Various special events, including major golf tournaments, kayaking, and mountain biking competitions, have also contributed to an influx of visitors. In light of such successes, more events are planned in the future.

The growth in popularity of summer activities has begun to balance seasonal fluctuations in the economy and has contributed to year-round increases in resident and tourist populations. Expanding populations, in turn, have generally brought new pressures to bear on the recreational resources provided by surrounding NFS lands. As the remaining parcels of open space in the Vail Valley are developed, adjacent NFS lands will play an increasingly important role for the recreational amenities they provide.

The remainder of this section describes popular recreation activities, roads, and trails in the LA. It concludes with a discussion of alpine skiing.

3.4.3.1 General Recreation

3.4.3.1.1 Roads and Trails and the Recreational Opportunities Spectrum

Figure 3.8 depicts roads and trails involved in the following discussion. Using the Forest Plan (USDA-FS 1984b) and the Recreation Opportunity Spectrum (ROS), areas of National Forest are designated to offer various types of recreational experiences. In large part, the ROS system is based on the level of human developments and motorized activity that occurs within a given area. Several ROS classes are assigned to lands within the LA.

A "rural, roaded natural" ROS is assigned to many corridors containing a relatively high standard road. In locations where a less developed road system is in place, the area is designated as offering "semi-primitive motorized" recreation opportunities. Areas where no roads are located and the intent is to provide an even less developed setting are designated as "semi-primitive, non-motorized." A "primitive" classification is assigned to the ROS in designated wilderness, although no wilderness lies within the LA. The Forest Plan has not assigned ROS classification to lands under SUP for ski area purposes, including the CAT III area. However, based on the character of the area and the low level of development, the CAT III area currently provides a semi-primitive, non-motorized setting. This ROS class is what many would call "backcountry." Consequently, that term is used throughout this section. A small portion of the CAT III area is adjacent to the base terminal of Lift 21 and the lowest section of Sleepytime Road. Again, though lacking a formal ROS classification, this portion of the CAT III area could be thought of as offering a semi-primitive, motorized setting, because of the presence of these facilities.

On the front side of the Vail Ski Area, VA offers 23 trails, totaling nearly 59 miles in length. These trails are designed and maintained for a variety of purposes including: "hiking only," with eight trails totaling 13.2 miles; "biking only," with four sections totaling 14.5 miles; and "multiple use," with eleven sections totaling 30.9 miles. Within this mix of uses, there are also opportunities for the physically challenged, as well as programs for guided nature interpretation and education.

Connected to this network of trails are several longer trails originating outside the ski area boundary. Two of the more important, the Two Elk and Commando Run trails, which are managed by the Forest Service, are discussed in detail below. In addition, the Game Creek Trail, beginning outside of Minturn, receives moderate amounts of hiking and mountain biking use. Forest Service Trail 711, south of Gore Creek, has been historically a jeep trail, but current use is largely mixed between hiking and mountain biking.

The Two Elk National Recreation Trail, extending 9 miles east to west along the northern boundary of the CAT III area, provides non-motorized access to the entire Two Elk basin. Use originates primarily from one of two trailheads: Gore Creek and I-70 to the east, and Eagle River and U.S. Highway 24 to the west. However, access can also be gained from the Sleepytime Road and Commando Run Trail. The trail receives substantial use during its short use-season. According to 1994 trail register data, use between July 1 and September 15, 1994, was estimated at 2,594 people, of which 63 percent started from the Vail Pass trailhead and 37 percent from the Minturn trailhead. The trail was designated as a National Recreation Trail in 1979 (USDA-FS 1979). It was previously open to motorcycles. No specific management guidelines or restrictions are provided under such status, but future actions should not detract from the trail's long-term recreational purposes and visual quality objectives.

The Commando Run Trail, connecting Shrine Pass with the TOV, is a popular backcountry route in the area. Much of the trail is forested, but spectacular views are provided of the Gore and Sawatch Ranges, as well as of Mongolia Bowl. The trail defines the eastern SUP boundary of the Vail Ski Area in the vicinity of Commando and Mongolia bowls, and travels through the ski area in Mongolia Bowl and Mill Creek before finally descending into the TOV. Along its length, the Commando Run Trail follows a route of widely varying standards and types of use. Along Shrine Pass, the route overlays the Turkey Creek Road (FS #709). From the intersection with Lime Creek Road (FS #743) to the top of Red Mountain in Mongolia Bowl, the trail is a relatively narrow single-track tread. From Red Mountain through most of the Mill Creek drainage, the trail is actually a jeep road (FS #710). The lowest segment of the Commando Run Trail continues on the Mill Creek Road through the developed ski area and into the TOV. The portion of the trail which connects Lime Creek with the Mill Creek Road is not an official Forest Service trail, though levels of use are thought to be moderate. The trail users are mainly hikers, hunters, mountain bikers, backcountry skiers, and occasional horseback riders. Most people are attracted by the trail's accessibility, challenge, elevation drop, and relatively undisturbed backcountry character.

Within the LA is a system of roads, originally developed for such purposes as timber management, mining, or ski area operations and maintenance. With the exception of Mill Creek Road, all roads within the ski area are closed to public motorized travel. In the Back Bowls, the Sleepytime Road provides one route from the top of Vail Mountain to Two Elk Creek, from which access is gained to Two Elk Trail, Commando Run Trail, and the CAT III area. The Lime Creek Road (FS 743) extends along the south side of Battle Mountain. Upper sections of what becomes the Mill Creek Road provide a connection between the Commando Run Trail and the TOV. A jeep road, not appearing on most maps, provides a route from near Red Cliff to the ridge above Super Bowl.

In order to protect elk calving habitat, recreation and administrative access to the China Bowl is restricted from May 1 through June 30. Each year, a gate and informational sign are provided and placed by VA on Sleepytime Road near the top of Vail Mountain. The closure is considered to have been largely successful, due in part to on-mountain educational efforts. It should be noted that, while accumulations of snow tend to negate much of the early season use, there are currently no closures in place that restrict access from either end of the Two Elk or Commando Run trails.

3.4.3.1.2 Backcountry Skiing

Backcountry skiing has become increasingly popular in the CAT III area, especially along the Commando Run Trail. The Commando Run Trail is about 18 miles long and provides a challenging backcountry experience to skiers traveling from the popular Vail Pass area to the TOV. Some skiers occasionally detour from the Commando Run Trail and ski the glades in Commando Bowl, connecting with the main trail again near Two Elk Pass. In ascending Red Mountain from Two Elk Pass via Mongolia Bowl, the trail extends through a developed portion of the ski area. From the summit of Red Mountain, skiers are able to see the Gore and Sawatch ranges, as well as most of the CAT II and III areas. The final descent involves traversing into Benchmark Bowl for the 8-mile, 3,200-vertical-foot return to the TOV.

Following discussions with the Colorado Mountain Club, the SUP boundary for the Vail Ski Area was adjusted (USDA-FS 1986a) in the Benchmark Bowl area in order to reduce potential conflicts between users of the Commando Run Trail and ski area operations. Some backcountry skiers who leave the main Commando Run Trail route and ski Commando Bowl find themselves in an avalanche-prone area (Figure 3.9). In the past, ski area personnel have performed rescues of backcountry skiers in this area. Backcountry skiers sometimes avoid the difficult ascent of Red Mountain and instead use Lift 21 to access the top of Vail Mountain.

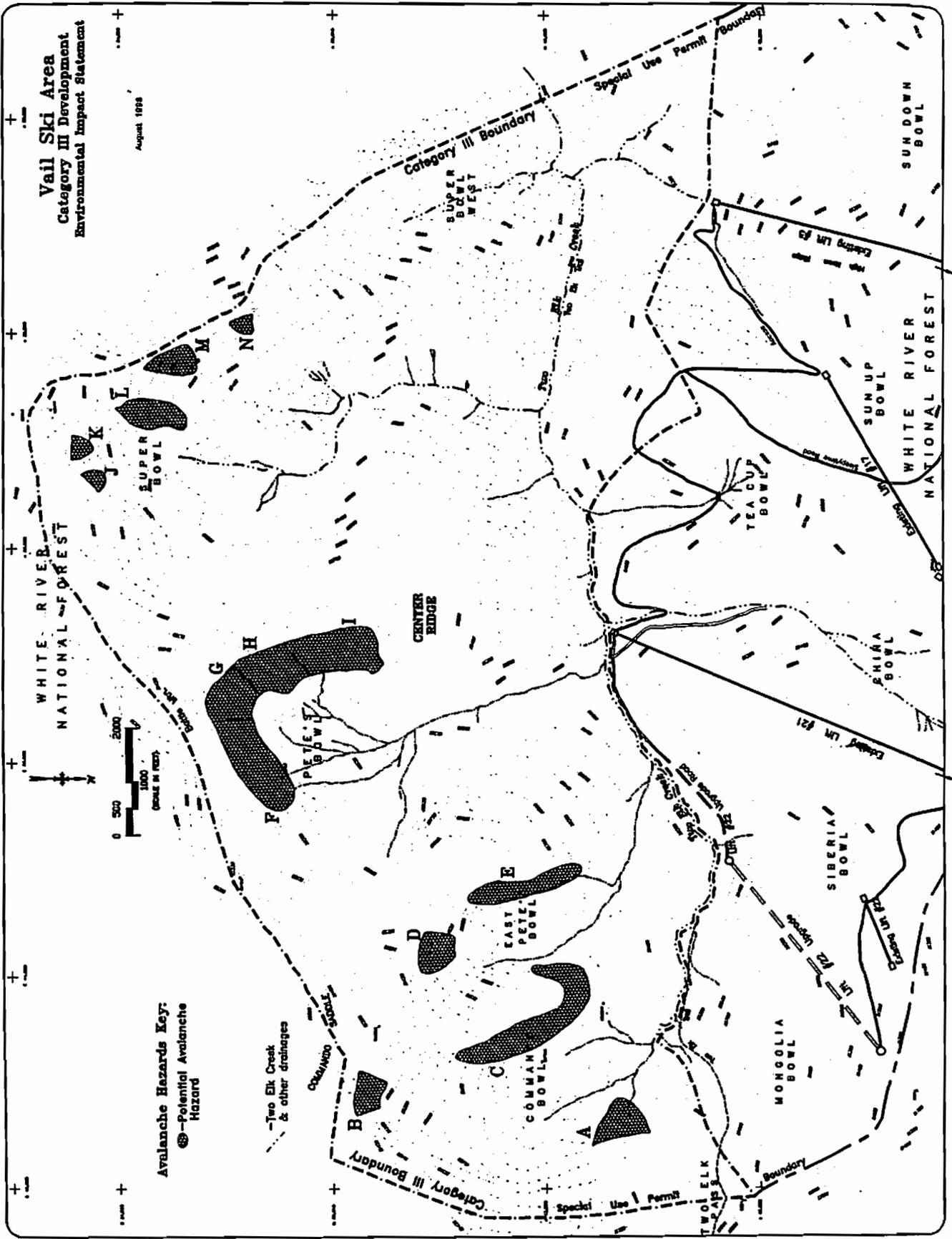


Figure 3.9. Avalanche areas in the PA.

The Vail Pass/Shrine Pass use area experiences intensive skier and snowmobile use during the winter months. Much of the appeal of the area is its accessibility. The Commando Run Trail, in particular, is considered a fairly unique resource within the WRNF, because motorized activities are relatively uncommon along portions of it, and because it is also relatively easily to access. However, its length, along with the various rigors of backcountry skiing, effectively limit the number of people capable of traveling this route. Nonetheless, several dozen people travel the route each weekend between mid-winter and spring, and use is thought to be growing.

3.4.3.1.3 Outfitter/Guide Activities

Several commercial outfitters and guides, whose activities are authorized under SUP by the Forest Service, operate on lands adjacent to or within the CAT III area. Six permittees have been approved for operating within the Shrine Pass and Vail Pass areas. These operations provide their clientele with a variety of services, including snowcat skiing tours, snowmobile tours, jeep tours, cross-country skiing tours, snowshoe tours and horse-packing trips. In the vicinity of the PA, these trips are confined to the Commando Run Trail and/or Two Elk Trail. One permittee is authorized to provide a small number of horseback trips on the Two Elk Trail each summer.

3.4.3.1.4 Mountain Biking

Biking has become one of the fastest growing recreational activities on the WRNF. The bike path connecting the TOV with Summit County is partly responsible for increased use levels. However, much of the increase is the direct result of the soaring popularity of mountain biking nationwide. On a local level, promotional efforts by VA and other local businesses have helped raise an awareness and appreciation of local mountain biking opportunities. The Vail Ski Area has twice been the site of world class mountain biking events. Such events have further amplified growth trends in the sport and contributed to major increases in summer tourism. For instance, two-day attendance at one competition was estimated at 40,000 people, which generated substantial revenues to the local service industry. Press and television coverage provided widespread exposure to a large pool of potential visitors. Given such overwhelming success, the Vail area will continue to be a venue for mountain-bike racing.

Mountain biking is popular throughout the Vail Valley, but the Vail Ski Area in particular holds strong appeal for summer visitors. Bike transports on lifts is estimated to have increased by 141 percent between 1989 and 1993 (VA 1994b). Most use occurs on the front side along a series of single-track trails and ski area access roads. The rider skill levels vary greatly, but a majority of riders on these trails are less experienced than those using other trails in the area. To reach these routes, people either bike up the mountain or take advantage of summertime lift service provided on the Gondola and Vistabahn Lift.

Little mountain biking occurs within the main part of the CAT III area. However, it is a relatively popular activity along its periphery on the Commando Run and Two Elk trails. To reach the Two Elk Trail, some mountain bikers descend Sleepytime Road from the top of Vail Mountain. As a group, these riders are generally more advanced and are often local riders. From the top of Vail Ski Area, bikers can make their way down Sun Up and Tea Cup bowls via Sleepytime Road and gain access to Two Elk Trail, from which several options are available. Most bikers ride west along the Two Elk Trail to Minturn or return to the TOV via Sleepytime Road and routes on the front side of the ski area. The Two Elk Trail extending west from the base of Lift 21 is a technical route used mostly by advanced riders.

A popular option involves parking at Vail Pass and riding the single track of the Commando Run and Two Elk trails. The section of the Two Elk Trail between Two Elk Pass and I-70 has minimal appeal to bikers as an ascent

route because of steep grades. It is, however, sometimes used as a descent route from the Two Elk Pass or Commando Run Trail because it provides a connection back to Vail Pass.

VA is planning to host additional national and international mountain biking competitions in the future. All these trends suggest increased demand for extended riding and training opportunities in close proximity to the TOV.

3.4.3.1.5 Hiking

In the Vail Valley, many recreational opportunities are located within the Eagles Nest and Holy Cross wildernesses. Together they provide visitors with the opportunity to explore 255,986 acres of alpine peaks, meadows, lakes, streams, and forests. Access to this terrain is provided by 355 miles of hiking trails. Twenty-nine of the more than 54 trailheads are located within a 30-mile drive of the Vail Valley, along the I-70 and U.S. Highway 24 corridors.

Hiking is also a major activity in the immediate Vail area. To promote use of 13.2 miles of hiking trails and 30.9 miles of multiple use trails that are developed across Vail Mountain, lift service is provided to the mid-mountain and summit via the Vistabahn Lift and the Lionshead Gondola. Hikers can either hike up and down, use lift-service up and hike down, or use lift service up, hike, then use lift service down. Upon reaching mid-mountain or the summit ridge, hikers can enjoy scenic vistas, view and photograph nature, and observe wildlife. The season of operation generally lasts from May until October.

Hiking is generally restricted to the periphery of the CAT III area, usually on either the Commando Run or Two Elk Trail. There are no designated or established hiking trails in the main part of the CAT III area, although there is some off-trail use. A very limited amount of dispersed camping has been observed, mostly during the fall hunting season.

3.4.3.1.6 Fishing

Two Elk Creek, a tributary of the Eagle River, is the only identified fishery within the CAT III area. While Two Elk Creek does support a viable brook trout fishery, the creek is not often fished. Several factors are responsible for the creek's low use, including its small fish sizes, relative inaccessibility, low summertime water flow, and dense thickets of willow. While there are few quality fishing opportunities within the PA, sections of the Eagle River, as well as portions of Gore Creek, offer high-quality fisheries that receive a substantial amount of use.

3.4.3.1.7 Hunting

Levels of hunting in the PA are similar to those in the surrounding region. In most cases, hunters park and camp along the Lime Creek Road and enter the PA on foot or horseback for the day. Isolated overnight camps have been observed in the Commando Bowl area during hunting seasons. The PA is also used by grouse hunters in September.

3.4.3.2 Alpine Skiing

3.4.3.2.1 Introduction

The purpose of this section is to provide the background information necessary to understand the assessment of impacts to alpine skiing potentially resulting from implementation of the Proposed Action and alternatives addressed in this EIS. This section is not intended to provide a comprehensive description of Vail Ski Area's

infrastructure, services or resources. Detailed information is contained in planning documents, particularly VA's 1985 MDP and 1987 MDP revision.

The alpine skiing topics addressed in this analysis were derived in two ways. First, the stated purpose of the proposed CAT III area development comprises various improvements in alpine skiing, and assessment of these improvements is a key objective of this analysis. Second, public and agency scoping identified several issues regarding alpine skiing. Pooling these topics yielded the following list:

- ◆ Need for the development in terms of supply and demand for alpine skiing opportunities.
- ◆ Overall quality of skiing at Vail Ski Area.
- ◆ Ski area capacity.
- ◆ Reliability of skiing, particularly during early and late season off-peak visitation periods and when conditions can limit use of the Back Bowls.
- ◆ Match between terrain difficulty and skier ability levels.
- ◆ Skier densities at key areas on the front side of the ski area.
- ◆ CAT III area access and services.
- ◆ Skier safety and management.

Current background conditions regarding each of these topics are outlined below. The assessment of associated impacts is presented in Chapter 4, Alpine Skiing.

Related concerns regarding the economic benefits of increased skier numbers were expressed during scoping. They are addressed in this EIS under the heading of Socioeconomics.

3.4.3.2.2 Need for the Project

Section 1.3.2 of this EIS, Need for the Proposal, outlines in general terms elements of the Rocky Mountain Regional Guide and Forest Plan which specifically address the CAT III area development. That section also notes that the development is described in the ski area's accepted MDP, but cites the Forest Service stipulation (USDA-FS 1986a) that VA submit a detailed, site-specific proposal for environmental review prior to initiating it.

Between 1986—when these original decisions regarding the development were made—and the present, concern has emerged over the need for more ski area development on NFS land in light of recent trends in skier numbers. Further, the Forest Plan stipulates that the balance between supply and demand for alpine skiing must be considered in decisions regarding authorization of ski area development. For these reasons, need for the project is assessed in terms of supply and demand below.

The Forest Service recently assessed the balance between supply and demand for alpine skiing on Colorado's NFS lands in the *Snowmass Ski Area Final Environmental Impact Statement* (Snowmass EIS)(USDA-FS 1994g). That detailed analysis is hereby incorporated by reference into this analysis. Key points are summarized below, with updates and other supporting information as appropriate.

3.4.3.2.2.1 Demand

At the national level, skier numbers grew slowly until the 1960s, then began to increase dramatically, with annual growth rates averaging 16 percent. The ski industry matured in the 1970s, and growth rates tapered off to about 10 percent. The 1980s brought adverse weather conditions, a slowing economy, and changes in attitudes toward recreation which resulted in increased variability in annual participation and an overall slowdown. This variable trend has carried into the 1990s. Current projections suggest modest growth in skier numbers over the coming decade, probably at annual rates between 0.75 and 1.5 nationally. This would equate to 4 million to 9 million additional skier visits being generated between 1992/93 and 2002/03. (USDA-FS 1994g.)

Slower growth and aging in the U.S. population are major factors in current low growth rates according to most analysts. However, there are signs that the limiting influence of these trends may decrease, as people in our increasingly health-conscious society take up the sport later in life. Since 1986, older skiers have comprised a higher percentage of the skiing population. Further, the U.S. is experiencing the greatest upswing in the number of babies born since the peak of the baby boom, which could mean the recent downward trend in numbers of new, young skiers may not be holding. (USDA-FS 1994g.)

At the national scale, improvements to the ski experience through new lifts, trail improvements, snowmaking, and grooming advances have stimulated demand at resorts making quality upgrades. In conjunction with this there has been an industry focus on the overall resort experience, which caters to demand by skiers for convenient air travel, good accommodations, high levels of service, and a broad array of year-round recreation opportunities. Recent marketing surveys have indicated that skiers have responded to quality and service upgrades by coming to those resorts offering such upgrades. Further, skiers have tended to become increasingly discriminating in selecting a destination ski resort based upon the quality of the resort experience. Successful ski areas are responding by focusing on qualitative aspects of the on-mountain experience, including new, high-speed lift technology, snowmaking, a broad array of trails at all ability levels, and comfortable skier-support facilities.

Cumulatively, these observations suggest that recent slowing in the rate of growth in national skier numbers is not necessarily indicative of longer-term trends. More importantly in the case of this proposal, they show that quality rather than quantity is an ever-more-critical aspect of maintaining or increasing skier visitation. While the quality rationale is more relevant to the CAT III area development proposal, as outlined under following headings in this section, the remainder of this discussion will focus primarily on need in quantitative terms.

Describing recent demand trends in the Colorado skier market, the Snowmass EIS notes that Colorado has continued to buck national trends, with steady growth in skier numbers and in market share. The slowing trends in the late 1980s were reversed early in this decade, when skier visits grew by 6.1 percent in 1991/92 then by 6.7 percent in 1992/93. The majority of this growth in demand came from destination rather than day skiers. Since 1992/93, the last season addressed in the Snowmass EIS, growth has fallen off again, changing negligibly in 1993/94 and 1994/95. Skier visits for the 1995/96 season were 2.6 percent higher than the previous season and reached a new record of 11.6 million skier visits (*Vail Daily* 1996). The 10-year average for the state, ending in 1994/95, is just over 2 percent.

Eagle County ski areas have experienced growth in excess of the state average over the medium term, with visitation up by about 650,000 visits—or 44 percent—since 1983. Growth in the short term has approximated the state average at about 5 percent per annum for the past five seasons. (USDA-FS 1995c.)

The Vail Ski Area has roughly tracked Colorado trends, though season-to-season shifts have tended to be smaller during recent years. The area did not match the statewide growth rate experienced in 1991/92 and 1992/93, and

numbers fell off more sharply than average in 1993/94. From 1993/94 to 1994/95, Vail skier visits increased notably, while the Colorado total declined slightly. The Vail Ski Area's 10-year average annual increase through 1994/95 is just under 2 percent. Overall, for the past several years, the ski area has fallen off statewide norms over a period when destination resorts have led the market, though 1994/95 was an exception. The 1995/96 season at Vail saw a 5.5 percent increase in skier visits for a season total of 1,652,247 (*Vail Daily* 1996). Table 3.12 compares the Vail Ski Area's visitation growth rates with Colorado's totals for the 1990s.

	89/90-90/91	90/91-91/92	91/92-92/93	92/93-93/94	93/94-94/95	94/95-95/96
Colorado total	0.9%	6.5%	6.1%	0.5%	-0.5%	2.6%
Vail Ski Area	0.9%	0.2%	2.0%	-2.7%	2.3%	5.5%

Source: RRC Associates, unpublished 1995 data.

3.4.3.2.2.2 Supply

Supply of skiing opportunities is more difficult to assess objectively. The *Rocky Mountain Regional Guide Supply and Demand Assessment* (Supply and Demand Assessment) (USDA-FS 1992d) estimated 1990 capacity in the region at 162,550 SAOT and predicted that capacity would grow at a rate between 1.75 and 5.2 percent per annum until 2000. This is based on 1990 in-place capacity expanded pending environmental reviews and plan approvals of expansions and new developments indicated in the Regional Guide. These include the CAT III area development.

It should be noted that Geneva Basin, Cuchara Valley, and Mountain Cliff, which were included in the 1990 capacity estimate, have since closed, bringing to 10 the number of small ski areas going out of business since 1982. Further, the SUP has been revoked for the East Fork Ski Area, with a planned capacity of 13,500 SAOT, and a number of new ski areas or expansions, including Lake Catamount and Adam's Rib Recreation Area, are on hold or behind schedule. These changes should be considered in interpreting the Supply and Demand Assessment's projections of supply, though overall the Regional Guide's projections and the strategies based on them have proven accurate over the long term.

3.4.3.2.2.3 Balance Between Supply and Demand

Assessing the balance between supply, expressed in actual or approved SAOT, and demand, expressed in skier visits per season is difficult. Average utilization, calculated by dividing actual seasonal skier visits by the sum of SAOT capacity for a 140-day season, is a useful figure in this regard. The Forest Service uses the 140-day season in the Forest Plan as a standard for a typical winter operating period in order to provide a framework for the comparison of the utilization rates between ski areas. The Snowmass EIS indicates that from 1986/87 through 1992/93, Colorado skier visits grew by 18.1 percent, while capacity in terms of SAOT gained only 14.5 percent. This has resulted in average utilization increasing from 39.6 to 45.2 over the same period. This indicates high levels of utilization by industry standards, suggesting that there is no notable surplus of skier capacity in Colorado.

At its current approved SAOT capacity of 19,152, the Vail Ski Area's utilization rate is almost 59 percent (USDA-FS 1994g). The utilization rate is derived by dividing the actual annual skier visits by the annual skier capacity. For the 1992/93 season, 1,570,00 actual skier visits is divided by the annual skier capacity of 2,681,280 (140 days x 19,152 SAOT) for a 58.6 percent utilization. This indicates less surplus capacity at Vail than at most ski areas in Colorado or elsewhere.

This information provides the background for assessing whether there is need for the CAT III area development based on the balance between supply and demand and how the alternatives being considered would address such a need.

3.4.3.2.3 Sking Quality

The Vail Ski Area is one of North America's premier ski resorts, attracting a blend of local and Front Range day skiers and destination skiers from the U.S. and abroad. In contrast to other Colorado ski areas, Vail skiers tend to be older and include more professionals in higher income brackets, though skiers of all categories contribute to the ski area's 1.5 million annual visitor days (Eagle Co. 1994). Foreign skiers comprise nearly 12 percent of annual skier visitation (TOV 1994a). Overall, the quality of Vail Ski Area's skiing experience has been the central factor in the ski area's consistently strong performance as a cornerstone of the U.S. ski industry.

Keys to the Vail Ski Area's success in attracting day skiers from the Front Range metropolitan corridor are ready access on I-70 coupled with high-quality ski terrain, snow, lifts, skier services, and other on- and off-mountain amenities. Additional attractions for destination skiers include: easy air access via Eagle County or Denver International Airports; expansive and diverse ski terrain, featuring the unique Back Bowls, which invites longer stays by providing a wider range of opportunities; outstanding lodging, dining, and apré-ski activities; and many recreational alternatives to alpine skiing.

Maintaining a competitive position in the face of changing skier preferences, new ski-area technology, shifting economies, and competition from other resorts requires constant adjustment and refinement of the Vail Ski Area's product. VA's desire to create and maintain a market niche on the basis of the quality of the skiing opportunities they have developed is an important consideration in this proposal.

Most of the previously approved developments which have been completed or are scheduled for the next couple of years center on improvements to skier circulation and more efficient utilization of the CAT I and CAT II areas. These are described in VA's 1985 MDP and 1987 MDP revision also see Table 2.11 in Chapter 2). CAT III area development, as originally planned and currently proposed, is intended to incorporate the remaining SUP area into the ski area, optimizing the quality and dependability of the alpine skiing experience offered.

While there are no developed ski facilities in the CAT III area, VA has operated limited snowcat tours in the area since 1992 to assess its potential. This effort has demonstrated the CAT III area's potential to provide a fundamental, qualitative addition to the Vail Ski Area's alpine skiing product. The CAT III area would afford more effective utilization of the ski area's SUP. Its natural glades and open bowls provide a rare and sought-after skiing experience accessible to skiers of various ability levels. In short, use on a trial basis has indicated that the CAT III area could significantly increase the diversity and quality of alpine skiing at Vail Ski Area.

3.4.3.2.4 Ski Area Capacity

Ski area capacity in itself is not a major factor in this analysis because VA has not proposed any change to the existing 19,900 SAOT manage-to approach established through the NEPA process on VA's MDP in 1986 and

reaffirmed in the TOV/VA Agreement (TOV/VA 1995). The manage-to approach provides a flexible framework involving the Forest Service, the TOV, and VA in managing peak days. Details of the approach are presented in Appendix A. All alternatives discussed in this EIS incorporate the current manage-to capacity of 19,900 SAOT. Increases beyond this capacity are outside the scope of this EIS.

In this context, VA's proposal is properly viewed as a means of providing new and different terrain, improving diversity and terrain mix, and improving skier circulation, thereby enhancing the quality of the skiing experience at Vail Ski Area. While capacity would increase with the proposed development, the increase would not change the number of skiers the ski area would accommodate because the 19,900 SAOT manage-to capacity will remain in force. However, the theoretical capacity increase should be assessed to set the stage for describing and assessing impacts to related topics. The current capacity situation is outlined in the following section.

3.4.3.2.4.1 Trail Capacity

A range of methods—including SAOT, mechanical lift capacity, out-of-base lift capacity, restaurant and restroom capacity, and other infrastructure measures such as parking, bed base and general services and amenities—can be used to gauge and describe ski area capacity. In this case, trail capacity, calculated on the basis of skiable acreage and anticipated skier densities, is the logical measure to use in assessing development of new terrain since it is based directly on land area rather than more abstract and alterable factors such as lift capacity, base-area capacity, or bed base. The skier densities used in calculating trail capacity in this analysis are consistent with the Quality Management Guidelines outlined in the EA (USDA-FS 1986b) established by VA. Table 3.13 depicts the current trail capacity by terrain class at Vail Ski Area.

	Beginner			Intermediate			Advanced			Total		
	Acre	% ²	Capacity	Acre	% ²	Capacity	Acre	% ²	Capacity	Acre	% ²	Capacity
Front Side	416	44	6,240	469	33	4,690	416	23	3,328	1,301	100	14,258
Back Bowls	36	2	180	951	43	3,329	1,726	55	4,315	2,713	100	7,824
Total	452	29	6,420	1,420	36	8,019	2,142	35	7,643	4,014	100	22,082

¹Trail capacity is a theoretical measure, since the 19,900 manage-to capacity actually limits visitation.
²Percentage of capacity, not acreage, in this terrain class.
Source: Vail Associates, unpublished 1995 data.

Skier densities used in these calculations for the Back Bowls are reduced because of two related factors. First, densities are generally higher on a per-acre basis on groomed trails than on open terrain. This reflects natural dispersion to a large degree, but it is also consistent with management considerations and skier expectations. Second, uncrowded skiing in glades and open bowls such as the Back Bowls is a key component of Vail Ski Area's attraction, and VA actively manages to retain it.

As is indicated in Table 3.13, the trail capacity for the front side of Vail Mountain is estimated at about 14,258 skiers. The trail capacity in the Back Bowls is approximately 7,824 skiers. However, current lift capabilities actually limit this more realistically to about 3,645 skiers. Interestingly, subtracting the front-side capacity of

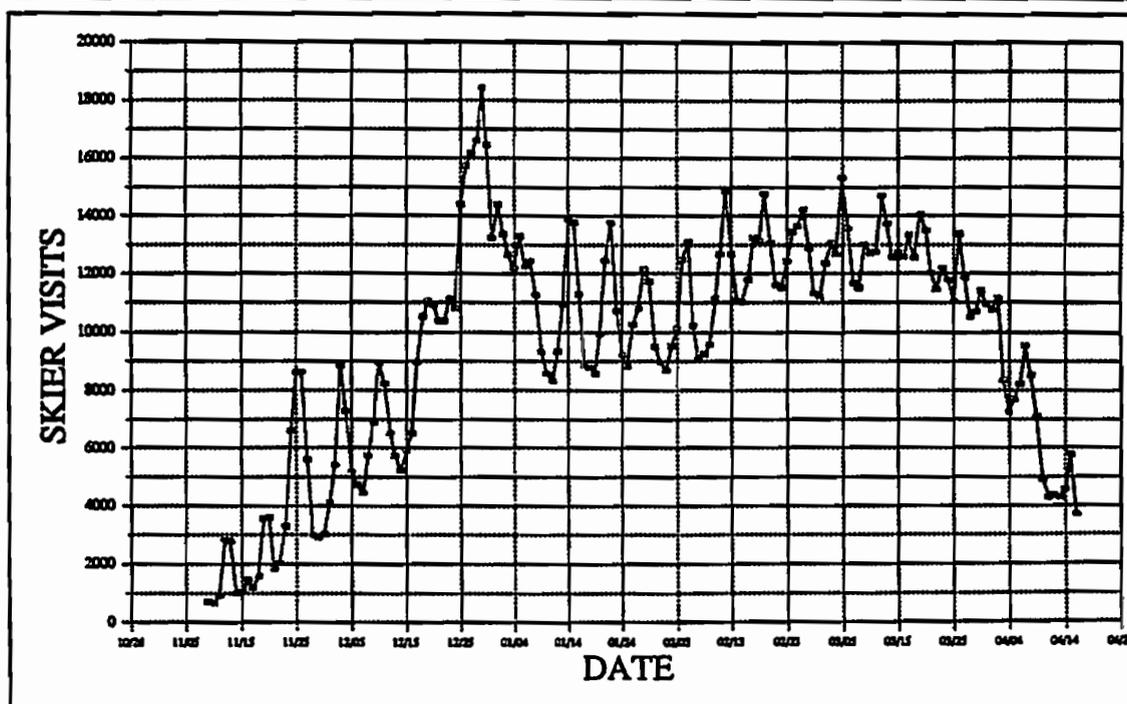


Figure 3.10. Average daily skier-visit profile, 1989 through 1994.

14,258 from the 19,900 manage-to capacity leaves 5,642 skiers to be accommodated in the Back Bowls. With the lift constraint of 3,645 skiers, this indicates an existing overall capacity deficit of 1,997 skiers.

In terms of trail capacity alone—without considering terrain mix, reliability of skiing, or limitations of lift service and village infrastructure—these figures indicate that the ski area currently has a maximum trail capacity of 22,082 skiers.

3.4.3.2.4.2 Capacity Utilization

Another capacity-related issue under consideration is the degree to which existing capacity is utilized by skiers. This is the key to the potential for increased annual skier visits with the 19,900 SAOT manage-to program in place. Figure 3.10 indicates the profile of daily skier visits at the Vail Ski Area averaged across five seasons from 1988/89 to 1993/94. Peak periods around Christmas and New Year's and during spring break are evident. On a finer scale, the difference between weekends and mid-week periods is clear. Three-day weekends associated with holidays strengthen this pattern.

This basic profile, with clear holiday and weekend peaks and mid-week lows, is consistent with most ski areas. Where Vail Ski Area differs from many other resorts is in the high level of visitation maintained in spite of these standard fluctuations. The large area under the curve when weekends and holiday peaks are disregarded indicates the large proportion of destination skiers in the visitor mix. These skiers generally stay longer than a weekend, and their visits are not as tightly confined to peak periods. Conversely, the sharp spikes at peak periods and weekends reflect primarily day-skier visits. The spiked pattern indicates underutilization of existing on- and off-mountain infrastructure. Together with the relatively large area above the curve up to the 19,900 manage-to level,

this indicates a considerable margin in which to expand annual skier visitation. A key aspect of VA's proposal is building annual skier visitation, particularly by attracting more destination skiers.

3.4.3.2.5 Reliability of Skiing

As indicated in Table 3.13, 35 percent of Vail Ski Area's trail capacity is contained in the Back Bowls. This area is generally south facing, open, and more exposed to wind than the front side of the mountain. Collectively these factors can create conditions which limit the reliability of the skiing opportunity afforded by this area. VA has been monitoring snow conditions throughout the existing ski area, including the Back Bowls, for the past 31 years. The Back Bowls have been open for lift-serviced skiing since 1988. Their data form the basis for this assessment of ski conditions in the Back Bowls.

Adequate snow cover usually accumulates later, so the Back Bowls typically open several weeks later than the front side. Snow retention is also problematic, and snow depth has been below the minimum required during the key Christmas/New Year's peak four times in the last 9 years according to VA's snow-depth data. These data indicate that during the past 31 years, the Back Bowls would not have opened eight Christmas seasons because of inadequate snow, and conditions have been marginal another five seasons. The Back Bowls would not have opened until late February during four seasons.

The Back Bowls' southern exposure results in greater day/night temperature fluctuations and direct solar gain, both of which can work against maintaining good snow conditions. Also, when heavy or blowing snow or fog occur, the open terrain does not provide skiers adequate visual reference to ski safely or comfortably.

In short, adverse conditions in the Back Bowls can easily restrict most skiers to the front side of the mountain. This translates to significantly reduced overall trail capacity and terrain variety and increased skier densities. When this occurs during seasonal peaks or weekends, crowding occurs on the front side, and the overall quality of the skiing experience suffers.

Terrain opportunities throughout the SUP area have been explored to develop a more reliable product. Only the CAT III area offers significant opportunity to offset the inherent limitations of the Back Bowls. The remaining ski trail development opportunities of Vail Ski Area outside of the CAT III area are summarized in Chapter 2 (Table 2.1).

3.4.3.2.6 Terrain Mix

Marketing studies from the 1994/95 season indicate that about 50 percent of Vail Ski Area's skiers rate themselves as intermediates. As indicated in Table 3.13 above, only about 36 percent of the ski area's trail capacity is rated as intermediate. This indicates that on a near-capacity day there is potentially a deficit in intermediate terrain. To quantify this deficit, 50 percent of 19,900 skiers is 9,950 skiers, which is 1,931 more than the area's intermediate terrain currently accommodates under VA's Quality Management Guidelines. Further, when the Back Bowls are not available, the shortfall of intermediate terrain increases to 5,260 skiers. This is an oversimplified approach, but it provides a basis for assessing this potential problem. Industry figures suggest a trend toward an older skiing population and an associated increase in the proportion of intermediate skiers. Therefore, Vail Ski Area's deficit of intermediate terrain can be expected to grow.

Skiers vary in ability, ranging from beginners to experts. The ability-level breakdown of the skier population can be described as a bell-shaped curve with the vast bulk of the population being intermediate or "average" in ability level, while beginning and advanced skiers represent smaller segments of the population. Terrain is determined

to be suitable for a particular ability level based upon its slope gradient. The range of slope gradients a skier may comfortably negotiate, based upon ability level, has been defined by years of study and has been incorporated into accepted ski industry standards and practices. Skiers of lower ability level are able to ski comfortably on terrain with shallower slope gradients. Slope gradients generally considered suitable for intermediate skiers range up to 40 percent. Further, lower-ability-level skiers ski within a narrower range of slope gradients than skiers of more advanced ability, which restricts their ability to move throughout a ski area. Additional considerations in determining the ability-level rating of a ski trail include trail widths, access, and circulation considerations.

Significant changes in ski equipment technology, including such innovations as snowboards and "fat skis," are creating new opportunities to negotiate terrain and snow conditions previously considered too difficult for a given ability level. This has brought into question the need to provide as much intermediate ski terrain as was required according to past ski-area planning and development criteria. The technology is very new, and the degree to which it will affect skier market demand, as it relates to terrain, is unknown at this time. Regardless of the technology, the bulk of the skier market still "demands" terrain offering slope gradients within intermediate ability levels. Providing a mix of ability-level terrain that matches the demands of the skier population remains a primary principle of modern ski-area planning.

3.4.3.2.7 Skier Densities

The skier density concerns identified during scoping centered on two perceived problems which could be associated with the CAT III area development: crowding on major egress routes in late afternoon, and crowding in the Mid-Vail area, particularly around mid-day.

In regard to egress, a circulation capacity study being completed by VA (Larson 1995) indicates that one trail, upper Flapjack, which is associated with egress from the Back Bowls and the CAT III area, poses a potential problem in terms of inadequate end-of-day capacity on days when the ski area is near the manage-to capacity. The study suggests that this problem can continue to be handled through implementation of passive skier management measures.

There is less potential for the CAT III area development to affect congestion at Mid-Vail. Located at the top of the Vistabahn and the base of Lifts 3 and 4, the area is one of the busiest on the mountain. Mid-day skier movements coupled with the attraction of one of the largest and most popular restaurants on the mountain make crowding more severe on peak days. Recent mountain improvements, such as the upgrade of Lift 3 and the realignment and upgrade of Lift 6 are expected to provide an improvement to this situation.

3.4.3.2.8 CAT III Area Access and Services

A concern expressed during scoping is whether the CAT III area is too far from the base area to be practically accessed and supported by existing ski area infrastructure, particularly lifts. Since the CAT III area is adjacent to the Back Bowls, the accessibility of the bottom of the Back Bowls provides a reference for the accessibility of the CAT III area. Major access routes and transit times to the bottom of China and Sun Down bowls are indicated in Figure 3.11. The transit times are general estimates and will vary based upon snow and weather conditions.

It is important to note that even when snow or weather conditions limit use of the Back Bowls as noted above (Reliability of Skiing), there is generally enough snow to make the Sleepytime Skiway/Road skiable; thus assuring access to the CAT III area under most conditions. Further, the Tea Cup Bowl Lift will also be engineered to accommodate downloading at its full capacity to augment skier capacity of the Sleepytime Skiway/Road. High-

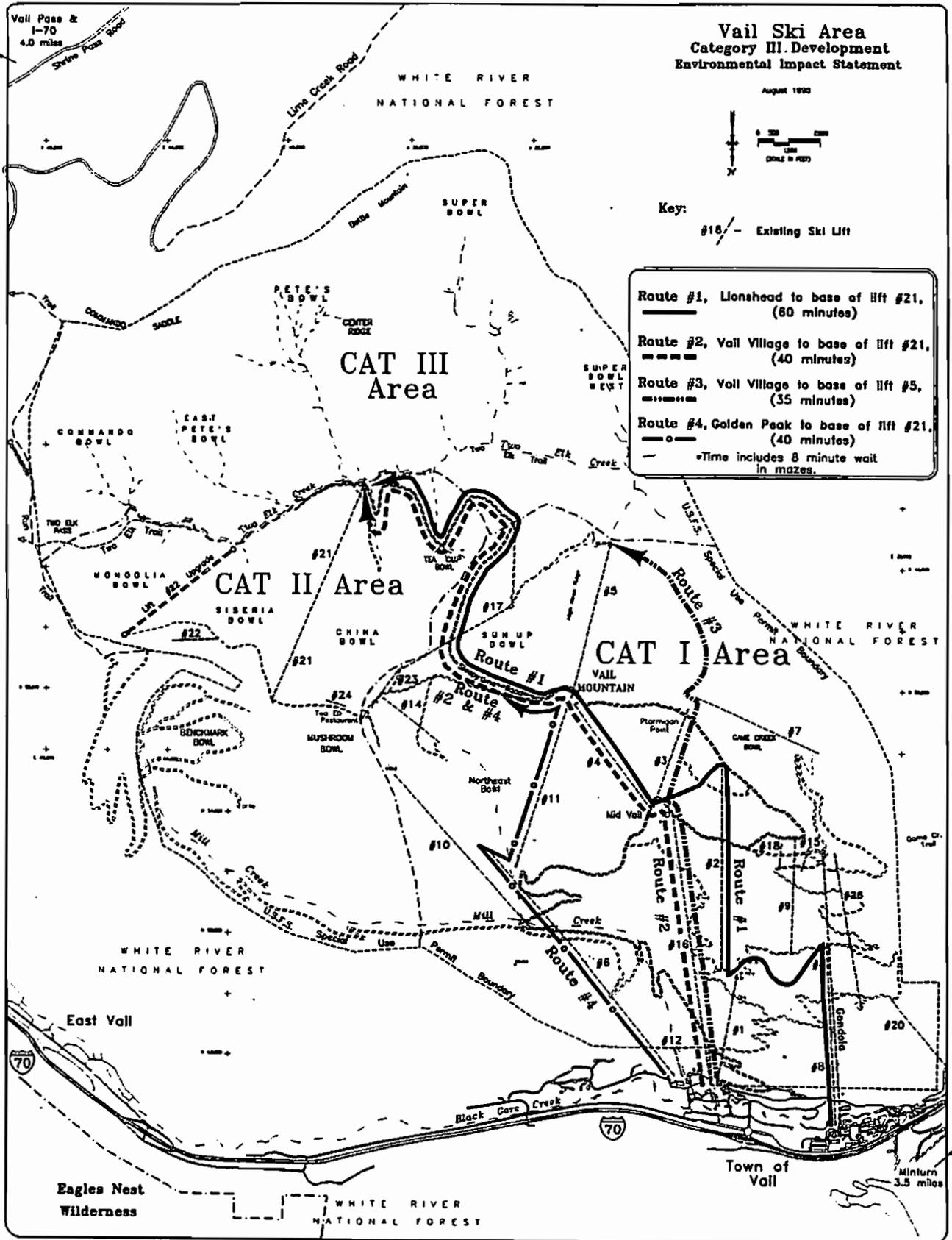


Figure 3.11. Major routes and transit times to the bases of China and Sun Down bowls.

speed lifts have made access to the Back Bowls, and hence to the CAT III area, considerably faster over the past several years. More improvements are planned (see Alpine Skiing in Chapter 4), which would eliminate other bottlenecks and expedite access.

The adequacy of egress from the CAT III area is limited, since a single lift (Lift 21) provides the only means of return access to the front side for over 1,800 acres of skiable terrain. This would be problematic if additional skiers in the CAT III area were added to those using the Back Bowls and depending solely on Lift 21 for egress.

In terms of other support services, skiers in the Back Bowls currently use the same facilities as those on the rest of the mountain, with the addition of food service at the bottom of Lift 21. Two Elk Restaurant and Camp 1 probably serve more Back Bowl skiers than other facilities, but Summit, Wildwood, and Mid-Vail are also popular. All these facilities are accessible to Back Bowls skiers but, with the exception of the facility at the bottom of Lift 21, would be somewhat less so to the CAT III area skiers, particularly in light of the limited egress via Lift 21.

3.4.3.2.9 Skier Safety and Management

This section provides background information for assessing potential impacts in the areas of snow avalanche and out-of-area skiing.

3.4.3.2.9.1 Avalanche

Avalanche control is an important operational consideration at ski areas. Standard control measures employed by the snow safety specialists and ski patrol include avalanche forecasting, ski cutting, use of explosives, and normal skier compaction. In preparation for the potential development of the CAT III area, avalanche studies have been conducted over the past four winter seasons (VA 1995). Figure 3.9 shows the avalanche areas of concern. Table 3.14 lists CAT III areas with potential avalanche hazards and identifies control measures appropriate to each.

3.4.3.2.9.2 Out-of-Area Skiing

During public scoping, concern was expressed that the development of the CAT III area might create attractive opportunities for skiers to leave the managed ski-area boundary and potentially expose themselves to hazards common in the backcountry. Concern was also voiced that out-of-area skiers bound for Red Cliff and Minturn might create parking problems in these communities, which are approximately 6.5 and 4.1 miles, respectively, from the summit of Vail Mountain. In neither case would the ski experience be particularly attractive, since both routes would involve a considerable amount of relatively flat terrain. Routes to Red Cliff would also pass through low-elevation terrain with many southern exposures, which would normally not provide good skiing conditions. Any route to Minturn would be confined to the bottom of Two Elk Creek and be unattractive to downhill skiers. This route is currently accessible to skiers from the Back Bowls, but it is not used frequently.

A Boundary Management Plan is required under the Vail Ski Area's SUP. The plan details how the ski area boundary will be managed, including placement of gates at points of access into the backcountry. This plan is reviewed annually and updated as necessary. Frequently, as a new area is developed, patterns of out-of-area skiing develop which are difficult to forecast. It is Forest Service policy to generally allow entry into the backcountry via ski lifts, but to inform individuals about hazards inherent in uncontrolled conditions outside of ski area boundaries. Under certain very limited conditions, the Forest Service can administratively close areas in order to prevent exposure to areas of inordinate risk.

CHAPTER 4.0

**ENVIRONMENTAL
CONSEQUENCES**

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Additional information regarding recently completed, ongoing, and foreseeable future projects that could affect this resource is found in Section 4.1.2, Cumulative Actions.

4.4.3.5 Alpine Skiing

4.4.3.5.1 Direct and Indirect Impacts

Since the proposal to develop the CAT III area was formulated expressly to improve alpine skiing at Vail Ski Area, most of the direct impacts of the Proposed Action fall in this realm, and most are positive. The physical and technical aspects of the Proposed Action and alternatives are detailed in Chapter 2. This section deals more with the functional impacts of these developments on alpine skiing.

Both positive and negative impacts are presented below to compare and contrast the Proposed Action and alternatives in terms of key considerations regarding alpine skiing. The process by which these considerations were identified and background information on each are presented in Chapter 3.

The discussion below focuses on the qualitative rather than the quantitative differences among alternatives. Yet it is reasonable to expect some difference in visitation over the long term. Represented in Table 4.24 are 10-year projections for skier visitation at Vail Ski Area based on potential compounded growth rates, ranging from 0.5 to 3.0 percent annually (Frick, *pers. comm.*, 1995). These projections are highly speculative but give an indication of the magnitude of change. Note that the Proposed Action would result in higher maximum skier numbers than the MDP Alternative in this time frame. This would result from the longer time frame for completion of the MDP Alternative.

Table 4.24. Projected skier visitation by alternative (thousand skiers/year).

Ski Season	No Action	Center Ridge Alternative	Proposed Action	MDP Alternative
1994/95 (thousand)	1,568 - 1,568	1,568 - 1,568	1,568 - 1,568	1,568 - 1,568
2004/05 (thousand)	1,659 - 1,732	1,707 - 1,856	1,732 - 1,911	1,732 - 1,837
Change (%)	5.2 - 10.5	8.9 - 18.4	10.5 - 21.9	10.5 - 17.2

The qualitative and other quantitative differences among the alternatives are discussed in the sections which follow under the issue-based headings identified in Chapter 3.

4.4.3.5.1.1 Need for Development

The picture that emerges from the Chapter 3 discussion of need for the CAT III area development on the basis of supply and demand for skiing opportunities is that:

- ◆ The rate of growth in Colorado skier visits is variable and thus somewhat unpredictable.
- ◆ Future growth is likely to be primarily in the form of destination skiers who are increasingly selective, choosing ski areas on the basis of quality and service, which will intensify competition among destination resorts to retain or increase market share.

- ◆ The supply of skiing opportunities in Colorado is likely less than most estimates indicate.
- ◆ The perception that there is a large surplus in capacity at Colorado's ski areas is misguided.
- ◆ Vail Ski Area has lagged Colorado's average growth in skier visits since 1990, with this trend reversing in 1994/95 and 1995/96 ski seasons.

In this scenario, CAT III area development might be justified on the basis of increased capacity alone if the 19,900 SAOT capacity threshold were not to remain in force. Conversely, the evidence of increased need for qualitative ski area improvements to retain or increase skier numbers and market share indicates need for the development. How the alternatives under consideration address this need is assessed below.

Alternative A: No Action

As highlighted below under Skiing Quality, then detailed under subsequent headings, the qualitative improvements comprised by this alternative would incrementally improve the skiing experience offered by Vail Ski Area, but the front side is largely built out and the potential for improvements is limited. Further, these developments would do little to increase the diversity of skiing alternatives or provide the attraction necessary to maintain or increase destination skier numbers. Thus, its overall impact in meeting the needs addressed by CAT III development would be limited.

Alternatives B, C and D: Center Ridge, Proposed Action and MDP Alternatives

As clear from discussions under the preceding headings, the three CAT III development alternatives would all go a long way toward addressing the need for qualitative improvements to the ski area's desired experience for skiers. Increased glade and bowl skiing, more overall diversity and expanse in terrain, more reliable and consistent skiing, and a more appropriate terrain mix would be achieved under all three alternatives. These improvements would significantly impact the stated needs for CAT III area development in terms of supply and demand, particularly through their collective effect in helping attract destination skiers. This impact would increase from the Center Ridge Alternative through the MDP Alternative.

In terms of trail capacity, the increases associated with each alternative are specified in Table 4.25. In light of the 19,900 SAOT threshold, however, these capacities remain theoretical and of marginal utility in this analysis. They do indicate that Vail skiers would have enough terrain to preclude crowding even on peak days, especially when use of some areas, particularly the Back Bowls, is limited.

It should also be noted that, like any major ski area development, the CAT III area development would be monitored and phased according to performance in meeting the stated needs, supply-and-demand-related or otherwise, as well as to market conditions and skier preferences.

4.4.3.5.1.2. Skiing Quality

Enhancing the quality of skiing opportunities at Vail Ski Area is a key aspect of the purpose of this proposal, as is making more efficient use of the on-mountain and local infrastructure and thereby helping stabilize seasonal fluctuations in the local economy. Section 3.4.3.2.3, Skiing Quality, outlines the overall importance of a quality alpine skiing experience in attracting day and destination skiers to Vail. It further outlines current conditions in regard to bowl and glade skiing, effective utilization of the SUP area, and new development to freshen the ski area's skiing experience and thereby keep skiers who already ski Vail Ski Area interested and also attract new skiers to the area. The impacts of the Proposed Action and alternatives in these regards are outlined below.

	Beginner			Intermediate			Advanced			Total		
	Acres	% ²	Capacity	Acres	% ²	Capacity	Acres	% ²	Capacity	Acres	% ²	Capacity
Front Side	416	44	6,240	469	33	4,690	416	23	3,328	1,301	100	14,258
Back Bowls	36	2	180	951	43	3,329	1,726	55	4,315	2,713	100	7,824
Current Total	452	29	6,420	1,420	36	8,019	2,142	35	7,643	4,014	100	22,082
No Action	38	43	570	9	7	90	83	50	664	130	100	1,324
New Total	490	30	6,990	1,429	35	8,109	2,225	35	8,307	4,144	100	23,406
Center Ridge	38	8	152	265	51	927	242	40	726	545	100	1,805
New Total	528	28	7,142	1,694	36	9,036	2,467	36	9,033	4,689	100	25,211
Proposed Action	36	8	224	460	55	1,610	369	38	1,107	885	100	2,941
New Total	546	27	7,214	1,889	37	9,719	2,594	36	9,414	5,029	100	26,347
MDP Alternative	80	8	320	491	42	1,718	688	50	2,064	1,259	100	4,102
New Total	570	26	7,310	1,920	36	9,827	2,913	38	10,371	5,403	100	27,508

¹Trail capacity is a theoretical measure, since the 19,900 SAOT manage-to capacity actually limits visitation.
²Percentage of total capacity, not acreage, in this category.
Source: Vail Associates, unpublished 1995 data.

Alternative A: No Action

Some previously approved development would occur at the ski area under the No Action Alternative, mainly in the CAT I area (see Chapter 2). Key details are assessed below, but in summary these developments are intended to improve front side circulation, primarily through upgrading to higher capacity lifts. These developments have their own utility but would do little to address the quality-related objectives of the proposed CAT III area development. Specifically:

- ◆ No new bowl and only minimal gladed skiing terrain would be developed. Opportunities for such skiing would continue to be restricted to advanced skiers, primarily in the Back Bowls. Intermediate skiers would continue to rely on the front side's conventional trails.
- ◆ Little change in the overall diversity of the alpine skiing experience at Vail Ski Area would result, and this experience would be further limited when conditions precluded full use of the Back Bowls. Effective use of Vail's SUP area would be minimized.
- ◆ The unique skiing experience at Vail Ski Area would not be substantially updated in response to changing skier demands. Thus, this alternative would probably not constitute the change necessary to boost low-season visitation, as detailed below under Capacity Utilization.

The net impact of this development would probably not increase the ski area's attraction to destination skiers, and the ski area could lose ground to competitors upgrading with new developments. As a result, any growth in

annual skier numbers would likely require increased day skiing. This would place Vail Ski Area squarely in competition with the many Front Range resorts vying to attract day skiers from the Colorado Springs-Fort Collins metropolitan corridor. In this intensely competitive market, promotions and decreased lift pass prices are required practices, so more skiers are needed to maintain a given revenue flow. Further, substantial growth in day-skier numbers generally translates to higher skier numbers on already high visitation days, since day-skier visits are highest on weekends and holidays.

While increasing annual visitation through the day-skier market might maintain or increase skier visitation on an annual basis and thereby help to at least maintain recreation opportunities for skiers visiting NFS lands as well as the ski area's viability, it could well diminish the quality of Vail Ski Area's desired skiing experience.

Alternatives B, C and D: Center Ridge, Proposed Action and MDP Alternatives

Implementation of these alternatives would positively impact skiing quality, helping the ski area maintain its desired ski experience and market niche. By bringing new terrain under the resort's management, it would also increase the range of options available to VA to continue refining the ski area's offerings. Generally, these options would increase across alternatives, growing from B through D.

Development of areas in Super and Pete's bowls would add new bowl and gladed skiing to the ski area's terrain inventory. More development of Pete's Bowl and development in East Pete's under the Proposed Action, and adding Commando, more of East Pete's, more of Super, and West Super bowls under the MDP Alternative would substantially increase the availability of this type of terrain. Much of the new terrain would be classified as intermediate, making this kind of skiing accessible to less advanced skiers. This is discussed further under Section 4.4.3.5.1.5, Terrain Mix.

Any of the development alternatives would diversify the alpine skiing opportunities available at the ski area and make more effective use of the SUP area. As detailed below under Reliability of Skiing, Section 4.4.3.5.1.4, snow and weather conditions in the CAT III area are typically better and more consistent than in the Back Bowls, so more diversity could be maintained when the Back Bowls were not being used. This diversity would help maintain the area's attraction to destination skiers seeking new experiences over longer periods.

Development of Super Bowl and part of Pete's Bowl might constitute the update to Vail Ski Area's desired skiing experience necessary to boost off-peak skier numbers and maintain or increase annual visitation. Adding more ski terrain from Pete's and East Pete's bowls would strengthen the draw, and further expansion into Commando, East Pete's, Super and West Super bowls would offer a whole new dimension. Any new CAT III area terrain could legitimately be considered a fundamental addition to Vail's alpine skiing opportunities, but the addition would grow from the Center Ridge Alternative through the MDP Alternative.

Any of these improvements might prove sufficient to sustain Vail Ski Area's overall performance in providing recreation on public lands and to allow it to maintain its current, general character in terms of skiing quality. The assurance that this would be the case probably increases from the Center Ridge Alternative through the MDP Alternative.

4.4.3.5.1.3 Skl Area Capacity

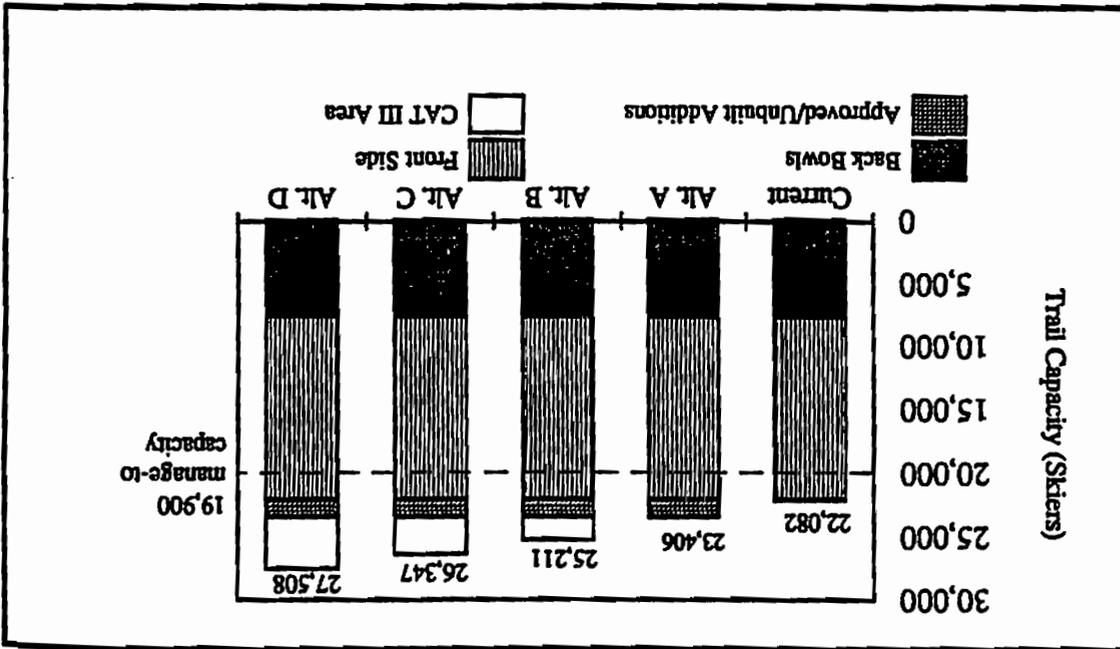
As indicated in the statements of purpose and need for this proposal (Chapter 1) and stated directly in Chapter 3, capacity in itself is not a major consideration in this proposal or this analysis. The 19,900 SAOT manage-to approach will remain in force regardless of the alternative implemented, so the skier capacity increases noted below would not translate to a higher limit on daily skier visits. Thus, no real change from previous capacity

considerations is involved. However, more efficient, consistent, and uniform utilization of capacity are central aspects of the proposed development, particularly as they bear on use of off-mountain infrastructure and seasonal economic fluctuation. Both trail capacity and the more relevant capacity utilization are addressed below.

In this analysis, it is most useful to assess capacity changes in terms of the type of alpine skiing experience VA is attempting to maintain and further develop. For reasons outlined under Ski Area Capacity in Chapter 3, this assessment focuses on skier capacity, based on the acreage of developed terrain and the skier densities required to provide a particular kind of skiing experience. The skier densities used in the following trail-capacity analysis reflect this consideration, blending the higher densities anticipated on conventional trails in the CAT III area with lower densities on gladed runs and open bowls. It should also be noted that the acreage projections used are conservative, comprising only ski terrain identified by VA as meeting their quality standards. The acreages used in assessing effects on other resources such as soils, wildlife or vegetation may differ somewhat. Table 4.25 summarizes the current trail capacity as well as an analysis of trail-capacity change under each alternative. Figure 4.18 depicts the overall trail capacity for Vall Ski Area under the current and projected conditions for each alternative relative to the 19,900 SAOT manage-to capacity. The reader is reminded that any capacity shown in excess of 19,900 is hypothetical because of the reasons discussed earlier involving the 19,900 SAOT threshold.

There are several figures which are essential to understanding Table 4.25 and the histograms that depict key aspects of that table. These figures represent trail capacity in terms of skier numbers, calculated on the basis of Vall Ski Area's skier-per-acre quality criteria. The first key figure is the 19,900 SAOT manage-to capacity threshold which cannot be exceeded without further environmental analysis. The second figure is 14,258 which is the trail capacity on the front side of Vall Ski Area based on VA's desired skier densities. Similarly, the Back Bowls could accommodate 7,824 skiers. Considering existing lifts and other facilities, the 14,258 figure is a

Figure 4.18. Trail capacity increases relative to the 19,900 manage-to capacity threshold



reasonable estimate of real front-side skier capacity, but the 7,824 figure for the Back Bowls is not realistic. A more accurate number for skier capacity of the Back Bowls is 3,645 given current lift capacities.

Subtracting 14,258 from 19,900 yields 5,642 skiers, which is the number of skiers to be accommodated somewhere other than the front side on a near-capacity day. Given the actual skier capacity of the Back Bowls (3,645) and the need to accommodate 5,642 skiers when the manage-to capacity of 19,900 SAOT is reached, there is an existing capacity deficit of 1,997. Similarly, on a day that approaches 19,900 skiers when the Back Bowls are not available for use, this deficit increases to about 5,642. These figures address overall trail capacity without regard to skier ability or terrain preferences. The picture becomes more focused when considering only intermediate skiers.

Approximately 50 percent of Vail skiers indicate that they ski at the intermediate level. Thus, the raw need for intermediate terrain is calculated as 50 percent of the 19,900 capacity, or 9,950 skiers. Since intermediate skiers comprise a large and growing segment of the skier market, VA has stated in their proposal to the Forest Service the need to provide adequate terrain to accommodate intermediate skiers under conditions that reflect the traditional Vail Ski Area quality standards. Current intermediate terrain capacity is 4,690 skiers on the front side and 3,329 skiers in the Back Bowls, for a total of 8,019 skiers. Subtracting 8,019 from 9,950 leaves a deficit of 1,931 skiers, the current shortfall of intermediate terrain. Add to that the number of intermediate skiers displaced when the Back Bowls are closed or use is limited, and the deficit is 5,260 during peak periods.

The preceding discussion illustrates a primary goal of developing the CAT III area: to accommodate from 1,997 skiers on a near-capacity day, to 5,642 skiers on a near-capacity day with the Back Bowls unavailable for use. For intermediate skiers, the deficit to be made up ranges from 1,931 to 5,260 skiers. The following sections on Trail Capacity, Reliability of Skiing, and Terrain Mix assess the effects of the alternatives in addressing these capacity deficits.

Alternative A: No Action

Trail Capacity

Based on VA's skier-per-acre density, the current trail capacity of the Vail Ski Area is 22,082 (Table 4.25). Under the No Action Alternative, trail capacity would increase by 1,324 skiers to 23,406 if currently approved improvements and construction were completed. The practical or manage-to capacity would remain at 19,900 SAOT. While this minor change in trail capacity could occur, the possibility noted above for more frequent peak days associated with increased day skiers could reduce VA's ability to maintain the desired densities on all parts of the mountain. This could result simply from natural skier preferences and flow patterns, but any mismatch between the mix of skier ability and terrain difficulty, or any constraint to use of the Back Bowls, would worsen such a problem. These issues are addressed below. In principle, however, current trail capacity should remain adequate under most conditions, providing the Back Bowls are available.

Without lift development, Back Bowl utilization would continue to be limited by the current lift configuration. This underlies the 1,997 deficit in overall skier capacity noted in the introduction to this section. In the event of a mechanical failure of Lift 21, the ski area would lose about 1,800 skiable acres in Tea Cup and the bowls to the east, since there would not be a way for skiers to return to the front side of the ski area.

Capacity Utilization

As noted above, the changes to the overall quality of the skiing experience offered by Vail Ski Area under the No Action Alternative would do little to attract the additional destination skiers required to increase off-peak skier

visitation. The profile of daily skier visits across a given season (see Figure 3.8) would probably not change noticeably.

Alternatives B, C and D: Center Ridge, Proposed Action and MDP Alternative

Trail Capacity

As indicated in Table 4.25, these alternatives would add incrementally to trail capacity, increasing the ski area's total to 25,211, 26,347 or 27,508 skiers, respectively, if currently approved terrain developments outside the CAT III area which comprise the No Action Alternative also occurred. Increases of these magnitudes should allow VA the latitude to maintain desired densities with the number of skiers possible under the 19,900 SAOT manage-to threshold under most conditions. Shifts due to skier preferences on a given day should pose no problem, and more flexibility in matching different mixes of skier ability would be achieved.

The proposed lift in Tea Cup Bowl would provide additional uphill capacity in the Back Bowls. This would minimize the effective capacity loss resulting from the current lift-capacity limitation in the Back Bowls and from failure of Lift 21.

In short, while capacity is not generally a problem and is not directly a focus of the proposed development, new capacity would offset some recurrent problems. Greater development would do more in this regard, so the Center Ridge Alternative would have the least effect, the MDP Alternative the most.

Capacity Utilization

The attraction of new terrain diversity and overall improvement in the quality of Vail Ski Area's alpine skiing experience would improve substantially with the CAT III area development. Since these are among the key characteristics necessary to attract destination skiers, the development would allow VA increased leverage in building off-peak skier visitation.

As noted in Section 4.4.3.5.1.2, Skiing Quality, the positive impact on overall quality of the ski experience offered would increase from the Center Ridge Alternative, through the Proposed Action to the MDP Alternative. Since no targets for increased off-peak skier numbers have been established, the assumption is that more such skiers would be perceived as better, and that the potentially significant, positive impact would increase in the same order.

4.4.3.5.1.4 Reliability of Skiing

Offering more consistent and reliable skiing, particularly early and late in the season, and improving skier distribution are among the key aspects of the purpose and need for this proposal (Chapter I). As outlined in Section 3.4.3.2.5, Reliability of Skiing, adverse conditions in the Back Bowls can limit skier use of the area, resulting in front side crowding and a decline in the overall quality of skiing when it occurs during peak periods. Figure 4.19 depicts the degree to which overall capacity deficits would be offset by the alternatives for CAT III area development.

Alternative A: No Action

Developments planned under the No Action Alternative would primarily improve front side opportunities for a small number of beginning and advanced level skiers and might thus help reduce any crowding associated with limited use of the Back Bowls. Other than this, little change from current conditions is anticipated under this

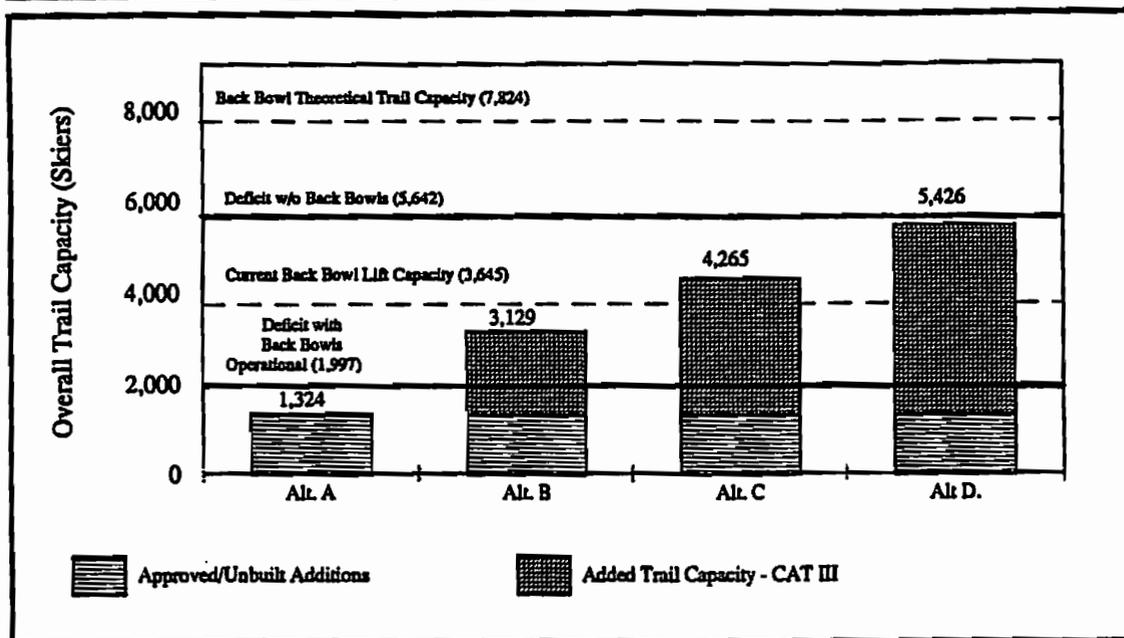


Figure 4.19. Overall trail capacity by alternative compared to existing and potential deficits (Note: Deficits with Back Bowls are based on Back Bowls lift capacity [3,645] not trail capacity [7,824].)

alternative. Overall, Vail Ski Area would continue to be vulnerable to trail-capacity limitations during peak periods when weather or snow conditions limit or preclude skiing the Back Bowls.

Alternatives B, C and D: Center Ridge, Proposed Action, and MDP Alternative

The CAT III area is similar to the upper elevation slopes on the front side in terms of exposure and snow accumulation and retention. The higher elevations of the area are generally more open than the front side, but not so open as to cause the visibility problems that often occur in the Back Bowls. Development of the CAT III area would effectively offset some of the adverse impact on skier densities or overall skiing quality resulting from limited use of the Back Bowls. For this reason, the CAT III area can be thought of as an "insurance policy" against the damage done to the quality of Vail's skiing because of poor conditions in the Back Bowls, particularly during peak periods.

The magnitude of this offset would vary by alternative. As indicated in Table 4.25 above, the Center Ridge Alternative would add (in addition to the 1,324 under No Action) 1,805 to trail capacity, versus a loss of 5,642 when the Back Bowls are not in use. The Proposed Action would add 2,941, a more substantial offset, and the MDP Alternative would add 4,102 (Figure 4.19). Again, the magnitude of positive impact would increase in proportion to the extent of the development, but should be significant under any alternative.

4.4.3.5.1.5 Terrain Mix

Provision of additional intermediate skiing terrain is a central element of the development's purpose (Chapter 1). As noted in Chapter 3, Terrain Mix, 50 percent of Vail's skiers rate themselves in the intermediate category, while only about 36 percent of the ski area's trail capacity falls in this category. On peak days or when conditions

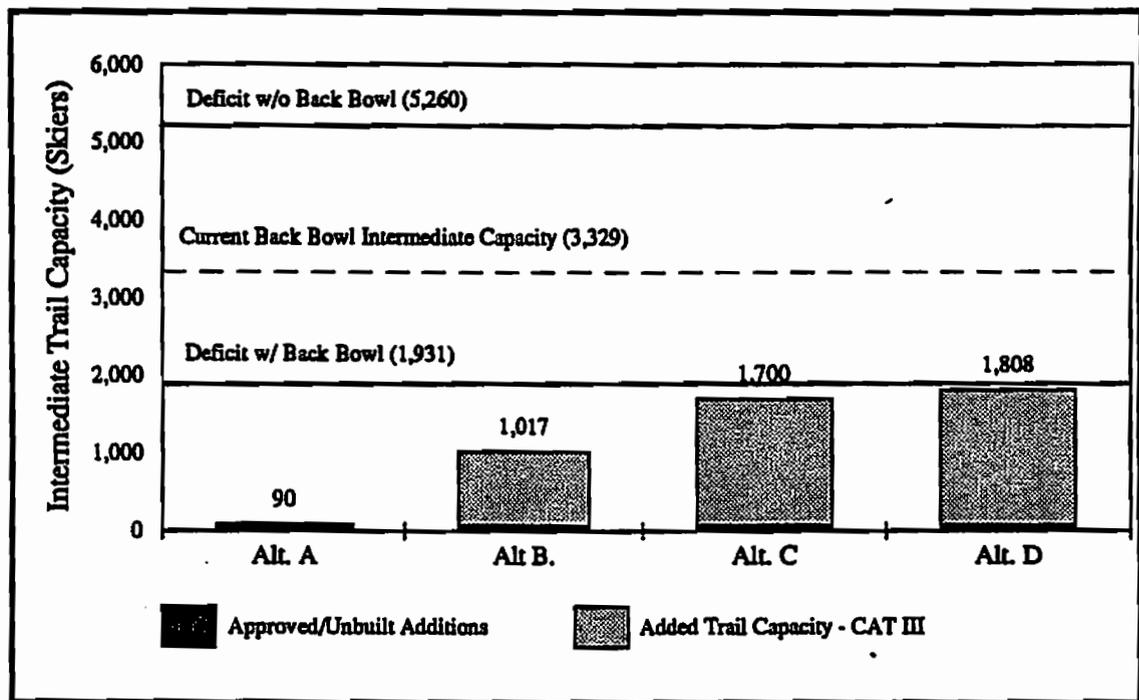


Figure 4.20. Comparison of additional intermediate trail capacity by alternative to potential deficits.

limit use of parts of the area, this can result in crowding of intermediate slopes or skier dissatisfaction with terrain availability. Figure 4.20 depicts the intermediate trail capacity added under each alternative relative to the potential deficit as use approaches 19,900 SAOT with and without use of the Back Bowls.

Alternative A: No Action

The terrain currently approved for development is classified mostly as beginner or advanced. Thus, if all approved terrain were developed, this alternative would lower the percentage of total capacity in the intermediate category to 35 percent.

Alternatives B, C and D: Center Ridge, Proposed Action and MDP Alternative

As indicated in Table 4.25, the development alternatives would increase the proportion of intermediate terrain at the ski area marginally if at all, to 36, 37, and 36 percent, respectively. However, the Center Ridge Alternative would add 927 to intermediate terrain trail capacity, the Proposed Action 1,610, and the MDP Alternative 1,718. Since these additions would be part of a capacity buffer in excess of the ski area's SAOT limit, they would work against the intermediate deficit more than the basically unchanged proportions indicate.

This is demonstrated by calculating the actual number of intermediate skiers in a 19,900 peak-day total and comparing this figure to the skier totals accommodated under the development alternatives. Fifty percent of 19,900 is 9,950 intermediate skiers. As Table 4.25 shows, the Center Ridge Alternative would increase intermediate terrain capacity to only 9,036, while both the Preferred Alternative and the MDP Alternative would closely approach the 9,950 figure, a substantial improvement. Since industry-wide trends suggest a growing

proportion of intermediates in the skiing population, this gain in intermediate capacity may become increasingly significant.

4.4.3.5.1.6 Skier Densities

Concern over potential increases in skier densities was expressed during scoping. Section 3.4.3.2.7, Skier Densities, describes the situation on the upper Flapjack Trail during end-of-day egress and congestion in the Mid-Vail area, particularly at mid-day. The concern is that CAT III area skiers might add to densities on Flapjack late in the day, and that skiers bound for the CAT III area and more skiers in general would worsen Mid-Vail congestion. These issues are addressed below.

Alternative A: No Action

Potential problems associated with higher peak-day skier densities on Flapjack Trail can occur under present conditions. However, VA's experience, supported by a recent circulation capacity study completed by VA (Larson, *pers. comm.*, 1995), indicates that such problems can be adequately addressed by implementing standard, passive, skier management measures (i.e., signing, fencing, and other skier traffic controls). VA could implement more of these measures should higher skier numbers warrant it, avoiding any significant problem.

In regard to Mid-Vail congestion, a recent upgrade of Lift 3 to a detachable quad has helped to reduce skier densities by moving skiers out of the area faster. Some lunchtime congestion is likely to continue in the area since Mid-Vail would remain a major food service outlet. However, with an upgraded Lift 6 in place for the 1996/97 ski season, it is reasonable to expect those problems to be reduced.

Alternatives B, C and D: Center Ridge, Proposed Action and MDP Alternative

The primary consideration in assessing the impact of the development on end-of-day skier densities on Flapjack is understanding the circulation capacity study cited above. The study concludes that excessive crowding would occur only on days when the 19,900 SAOT manage-to capacity is approached, and that it would be manageable through normal circulation control measures used by VA. Since the manage-to capacity would not change under any development alternative, this conclusion would not change.

It should be noted, however, that if more peak-day skiers were using the CAT II and CAT III areas than currently use the CAT II area alone, skier densities on Flapjack would increase as these skiers left the back side. This would mean that control measures might be employed more frequently. As outlined above under the headings of Skiing Quality (Section 4.4.3.5.1.2) and Ski Area Capacity (Section 4.4.3.5.1.3), CAT III area skier numbers would likely increase with the amount of terrain developed. As a result, this relatively minor negative impact might increase from the Center Ridge Alternative through the MDP Alternative.

This same pattern would describe potential impacts to congestion at Mid-Vail. More skiers passing through the area to access the CAT III area would add to congestion, as would more skiers overall. This adverse impact would not be significant, especially in light of the Lift 3 and Lift 6 upgrades. In addition, construction of a restaurant in the CAT III area could alleviate some mid-day crowding at Mid-Vail.

4.4.3.5.1.7 CAT III Area Access

The concern identified in Section 3.4.3.2.8, CAT III Area Access, is whether the CAT III area is too far from the base area to be effectively accessed and supported by existing or proposed ski-area infrastructure. This relates

indirectly to the aspects of the development's purpose regarding provision of backup lift capacity into and out of the Two Elk Creek drainage and improvement of skier utilization of the Back Bowls (Chapter 1). These issues are addressed below. Figure 4.21 schematically presents the major access routes and transit times into the CAT III area. It should be noted that the rates and times shown to reach various points within the CAT III area are additive to those shown for frontside travel in Figure 3.11.

Alternative A: No Action

Several improvements to lifts on the front side which would improve access to the Back Bowls have recently been completed, are under construction, or could be built in the future. Because of their positive impact on front side circulation, these improvements would be part of any alternative selected. They include:

- ◆ Upgrading Lift 3 to a detachable quad, which has reduced pressure on Lift 4 and improved access to the Back Bowls.
- ◆ Replacing Lift 6 out of Golden Peak is currently underway and its extension will allow skiers to load to Lift 11 directly and access the summit and the Back Bowls. Lift 10 could also be upgraded and realigned to allow a skier connection from Lift 6, and to near the top of China Bowl. These improvements would provide another effective, high-speed portal into the Back Bowls by providing access to the ridge with only two chair lift rides.
- ◆ Other lift development and upgrades to improve skier circulation.

These improvements would facilitate adequate access to the CAT II and CAT III areas, but egress would continue to be limited to Lift 21. This would pose a problem for skier evacuation if the lift were inoperative.

Alternatives B, C and D: Center Ridge, Proposed Action and MDP Alternative

The facility upgrades and expansions outlined in the No Action Alternative would be implemented in all of the action alternatives. With the upgrades of Lift 6 and Lift 10, the Golden Peak base will see a significant increase in the out-of-base-capacity due to the fact that both would be detachable quads and would provide access to the ridgeline. Transit time from the Golden Peak base to the base of Lift #21 would be similar to that of the Vail Village transit time portrayed in Figure 3.11. Transit times to CAT III will not be significantly longer than that required to access many popular existing skiing at Vail. Under all these development alternatives, the Tea Cup Lift would be built, significantly improving egress from the Back Bowls and the CAT III area. Uphill capacity would increase and, perhaps more importantly, redundant capacity would minimize the impact of Lift 21 being out of service. It should be noted that response and evacuation times for skier injuries in the CAT III area would not vary substantially from the Back Bowls. From either side, injured skiers would have to be brought down to Two Elk Creek before being taken out via one of the egress lifts. The Tea Cup Lift could also be downloaded at 2400 people per hour (pph) to transport skiers to the CAT III area when use of the Back Bowls was limited because of poor snow conditions.

In terms of lift capacity into the CAT III area, under the Center Ridge Alternative the Ridge and Super Bowl lifts would access the western flank of Pete's Bowl and the eastern flank of Super Bowl. The Proposed Action would add the Pete's Bowl Lift, accessing most of Pete's and East Pete's bowls. Under the MDP Alternative, the Super Bowl Long, Super Bowl West, and Lower Sun Down lifts would be built, and Ridge and Super Bowl lifts would not. Figure 4.21 indicates these access routes and transit times.

In regard to other services for the CAT III area skiers, a picnic deck, a warming hut, and a ski patrol facility would be constructed under the Center Ridge Alternative. The Proposed Action would add an additional restaurant at the bottom of Pete's Bowl, another picnic deck, another warming hut, and another ski patrol facility. Another warming hut and ski patrol facility would be added under the MDP Alternative. These should provide adequate services for CAT III area skiers regardless of the distance from front side and base area facilities. Services under the Center Ridge Alternative would be minimal. Under the other two development alternatives they should be ample.

In light of these approved and proposed improvements to lifts and other support facilities, the distance of the CAT III area from the rest of the ski area's infrastructure should pose no significant problem under any development alternative.

4.4.3.5.1.8 Skier Safety and Management

This section discusses concerns about snow avalanche and out-of-area skiing. VA's snow safety program is recognized as meeting state-of-the-art industry standards. Key elements of the program are avalanche control and management of out-of-area skiing. Section 3.4.3.2.9, Skier Safety and Management, outlines current conditions in these areas.

Alternative A: No Action

Avalanche hazard under the No Action Alternative would be basically the same as described in Chapter 3. There would be no change to the developed ski area boundary in the Back Bowls. To discourage out-of-area skiing in the CAT III area, the roped and signed boundary would remain along the CAT II/CAT III area boundary, generally following Two Elk Creek.

Alternatives B, C and D: Center Ridge, Proposed Action and MDP Alternative

All action alternatives would provide lift access to the CAT III area and Battle Mountain ridge. This would create the potential for skiers to leave the managed ski area and enter the backcountry. As noted in Chapter 3, Forest Service policy generally allows for public use of lifts to enter the backcountry unless especially hazardous conditions exist. Specific boundary management actions and closures are typically dealt with in the Boundary Management Plan prepared by VA and the Forest Service.

Under the Center Ridge Alternative, two lifts (Super Bowl and Ridge) and associated ski trails would be constructed on the east side of Super Bowl and the west side of Pete's Bowl. On the north side of Two Elk Creek, the Tea Cup Lift and a few associated ski trails would be developed. None of these lifts or trails intersect avalanche pathways (see Figure 3.9).

Under the Proposed Action, Super Bowl, Ridge, and Pete's Bowl lifts and numerous associated ski trails would be developed on the east side of Super Bowl, in Pete's Bowl, and on the west side of East Pete's Bowl. In addition, the Tea Cup Lift and associated ski trails would be constructed. All four lifts and the trails in Super, Pete's, and Tea Cup bowls avoid known avalanche hazards. Avalanche pathways D and E intersect parts of ski trails 3B' and 3C in East Pete's Bowl. These pathways can be controlled using standard snow-safety practices.

Under the MDP Alternative, the Super Bowl West, Super Bowl Long, and Commando lifts and associated ski trails would be constructed south of Two Elk Creek. In addition, the Tea Cup Bowl Lift and Lower Sun Down Lift and associated ski trails would be developed north of Two Elk Creek. The top terminal of the Super Bowl West Lift

is located in avalanche pathway N. The avalanche hazard associated with this pathway can be controlled with standard control practices. All the other lifts avoid known avalanche pathways. Under the MDP Alternative there also would be extensive ski trails in the Commando Bowl. In this bowl, ski trail CBB intersects avalanche pathway B and ski trails CBD, CBE, CBF, and CBG intersect avalanche pathway C. Avalanche pathway B can be controlled by ski cutting, while avalanche pathway C would likely require explosives.

4.4.3.5.2 Potential Mitigation

A discussion of standard mitigation measures and potential mitigation measures that are project specific for each resource are discussed in Chapter 2. Table 2.11 summarizes the major measures noting their effectiveness and the organizations responsible for authorizing and implementing them.

The only potential negative impact to alpine skiing not inherently mitigated by the proposed development is crowding on upper Flapjack during late afternoon egress. More skiers, or a higher proportion of skiers, using the Back Bowls and the CAT III area could result in skier densities which would pose a threat to the quality of the experience. Skier management techniques such as signing, fencing and other skier traffic controls are currently being used and could be expanded should conditions warrant it. The efficacy of these measures should be monitored, and alternatives should be identified and employed if necessary.

In regard to skier safety and management, standard avalanche control and skier management practices would preclude any significant adverse impact. Should one of the action alternatives be selected, Vail's Boundary Management Plan will be revised appropriately to address out-of-area skiing from the CAT III area.

4.4.3.5.3 Unavoidable Adverse Impacts

No unavoidable impacts to alpine skiing resulting from any development alternative have been identified in this analysis.

4.4.3.5.4 Cumulative Impacts

While Vail Ski Area is certainly part of a larger complex, impact analysis becomes increasingly speculative as it extended farther afield. Therefore, this analysis focuses on other ski areas existing in the vicinity as well as new ski-area development or expansion in the foreseeable future. In that the need for the development in terms of supply and demand has been addressed quantitatively—in terms of SAOT and skier visits—above, this section emphasizes more qualitative aspects.

VA also owns and operates Beaver Creek Ski Area and Arrowhead at Vail. Beaver Creek is about 13 miles west of Vail. It offers approximately 1,100 acres of skiable terrain with a capacity of about 7,500 SAOT. The Forest Plan cites approved expansion capacity both inside and outside the SUP boundary.

Skier visitation has grown steadily since Beaver Creek opened in 1980 to over 504,000 in 1993/94. The resort features conventional trails and a well balanced mix of terrain. The base area and mountain village are modern, up-market and well integrated. Destination skiers are the major part of Beaver Creek's market, but they differ from Vail visitors in that they include more families, and more are second home owners in the immediate area.

Arrowhead, also located about 13 miles west of Vail, was a very small resort catering to second home owners and other local skiers. VA acquired it in 1993. Development plans are underway to link Arrowhead with Beaver Creek and develop ski facilities and residential properties in the intervening Bachelor Gulch area. With about

170 skiable acres and a current capacity of about 1,000 SAOT, Arrowhead is not a major component of the area's alpine skiing scene, but its developing role as a portal into the larger skiing and residential complex comprising Arrowhead, Bachelor Gulch and Beaver Creek will likely increase its prominence.

As suggested by their common VA ownership, these areas are being developed to complement rather than compete with Vail Ski Area. The terrain mix, the overall alpine skiing experience offered, and the clientele served differ enough that each area has its own identity, while collectively they make a well balanced whole. As a result, the CAT III area development, when viewed in conjunction with continued development of these other VA-owned areas, poses the potential for a cumulative improvement in alpine skiing.

Copper Mountain is located 18 miles east of Vail on I-70. Copper is a year-round resort with over 7,000 acres under a Forest Service SUP. The resort offers 1,360 acres of skiable terrain with 19 chairlifts and has an SAOT of 13,000. Market orientation is to the destination, as well as the front-range, skier. The 1989 master plan for Copper Mountain authorizes an SAOT expansion to 15,520 with four additional chairlifts to be installed along with six lift upgrades.

The other existing ski area in the vicinity of Vail is Ski Cooper, a small, family-oriented area about 25 miles south of Vail on U.S. Highway 24. The area's current capacity is about 1,600 SAOT, with approved expansion capacity of 1,700 SAOT within the SUP boundary and potential for 1,430 SAOT outside the boundary. Cooper offers terrain amenable primarily to beginning and intermediate skiers, most of whom are local day skiers from Lake County and the Colorado Springs area. Some destination skiers visit the resort, most of them using accommodations in Leadville. Because of Ski Cooper's size, distance, and fairly distinct clientele, its contribution to cumulative impacts with the proposed the CAT III area development is negligible.

The Adam's Rib Resort Development is a proposed four-season resort about 45 miles west of Vail. The Forest Service SUP authorizing a 9,000 SAOT capacity was issued in 1982. A supplemental EIS is being prepared by the Forest Service and the U.S. Army Corps of Engineers to address potential impacts of both the on-mountain and base-area developments. A decision is expected within the next several years, but other permits and approvals would be required before construction could begin. Potential expansion capacity of 3,000 SAOT outside the SUP boundary is noted in the Forest Plan.

This resort would focus primarily on the destination skier market, which would place it in competition with Vail Ski Area and the Beaver Creek/Arrowhead complex regionally. In terms of terrain and overall skiing experience, Adam's Rib as currently conceived would approximate Beaver Creek/Arrowhead more closely than Vail, which would reduce direct competition with Vail. In light of these similarities, the cumulative impacts of the CAT III area development and Adam's Rib development would be an expanded range of options for local and destination skiers tempered by an element of competition.

All in all, when the proposed CAT III area development's impacts on alpine skiing are viewed in the context of the region, the picture which emerges is positive. All of the cited benefits to Vail Ski Area skiing would accrue to the region as a whole, providing an expanded range of skiing opportunities and an overall improvement in skiing quality. If it were approved and developed, Adam's Rib resort would add a somewhat competitive element to an otherwise complementary scenario within Eagle County.