less steep without affecting the overall run designation. For example, novice skiers are typically not intimidated by short, steeper pitches of slope, but a sustained steeper pitch may cause the trail to be classified with a higher difficulty rating. The following general gradients are used by SE GROUP to classify the skier difficulty level of the mountain terrain. Keystone's slope gradients and terrain/skier ability level breakdown is consistent with the mountain guidelines presented in the following tables.

Table 2-1:
Terrain Gradients

Skier Ability	Slope Gradient
Beginner	8 to 12%
Novice	to 25%
Low Intermediate	to 35%
Intermediate	to 45%
Advanced Intermediate	to 55%
Expert	over 55%

Source: SE GROUP, Mountain Planning Guidelines

The distribution of terrain by skier ability level and slope gradient is compared with the market demand for each ability level. It is desirable for the available ski terrain to be capable of accommodating the full range of ability levels reasonably consistent with market demand. The market breakdown for the Central Rocky Mountain skier market is shown in Table 2-2.

Table 2-2:
Central Rocky Mountain Skier Ability Breakdown

Skier Ability	Percent of Skier Market
Beginner	5%
Novice	15%
Low Intermediate	25%
Intermediate	35%
Advanced Intermediate	15%
Expert	5%

Source: SE GROUP, Mountain Planning Guidelines

b. Trail Density

The calculation of capacity for a ski area is based in part on the target number of riders that can be accommodated, on average, on a typical acre of terrain at any one given time. The criteria for the range of trail densities for North American ski areas that SE GROUP utilizes are listed in the following table (Table 2-3). Keystone's planned trail densities fall within the ranges depicted in Table 2-3.

Table 2-3:
Skier Density per Acre

Skier Ability	Trail Density
Beginner	25-40 skiers/acre
Novice	12-30 skiers/acre
Low Intermediate	8-25 skiers/acre
Intermediate	6-20 skiers/acre
Advanced Intermediate	4-15 skiers/acre
Expert	2-10 skiers/acre
Alpine Bowls	0.5 skier/acre

Source: SE GROUP, Mountain Planning Guidelines

These density figures account for the riders that are actually populating the trails and do not account for other guests who are either waiting in lift lines, riding the lifts, using the milling areas or other support facilities. SE GROUP'S observations and calculations indicate that on an average day approximately 40 percent of the total number of riders at the resort is on the trails at any given time. Additionally, areas on the mountain, such as merge zones, convergence areas, lift milling areas, major circulation routes, and egress routes, experience higher densities periodically during the day.

As witnessed at many Colorado resorts, there is a segment of the market that has a preference for more natural, unstructured, semi-backcountry types of terrain commonly referred to as off-piste.[5] Demand is increasing for alpine open bowls, glades, and other similar types of terrain. Rider density per acre numbers are not necessarily applicable to these types of terrain, particularly as there often is not a defined edge to these areas as on traditional trails. However, riders are attracted to these areas for the un-crowded feel, and the experience and challenge that they afford. Planning and design should provide these types of areas if possible. Examples range from glading between existing runs, to providing guided out-of-bounds tours.

c. Trail System

A primary goal for Keystone's trail system design is to provide a variety of terrain to accommodate diverse opportunities for a wide spectrum of guests. Each trail should provide an interesting and challenging experience for skiers with the ability level for which the trail is designed. Optimum trail widths vary depending upon topographic conditions and the caliber of the rider being served. The trail network should provide the full range of ability levels consistent with each level's respective market demand.

In terms of a resort's ability to retain guests, both for longer durations of visitation and for repeat business, one of the more important factors has proven to be variation in terrain. Once again, this means providing developed runs for all ability levels, including some that are groomed on a regular

[5] "Piste" is a term commonly borrowed from French vernacular which refers to a groomed, maintained, defined ski trail. "Off-Piste" therefore refers to the ungroomed, less defined natural style of skiing commonly found in high Alpine areas and bowls.

basis and some that are not (bowls, trees, off-piste areas, and alternative terrain [e.g., parks and pipes]).

In summary, a broad range of terrain is likely to satisfy guests from beginner through expert ability levels within the natural topographic characteristics of the resort.

d. Terrain Parks

Terrain parks have become a vital part of most mountain resorts' operations, and are now considered an essential mountain amenity. Popularity of terrain parks continues to increase, and is dependent on the regional location of the resort, demographics of the resort's target guests, and, most significantly, the quality of the parks. Resorts that understand the importance of addressing the needs of the youth market have focused considerable attention on building high quality parks. The presence of terrain parks at mountain resorts has changed various operational and design elements. The demand for grooming can increase, as terrain parks often require specialized or dedicated operators, grooming machines, and equipment (such as half-pipe cutting tools). Terrain parks typically require significant quantities of snow, either natural or machine produced, often increasing snowmaking demands. Terrain parks can affect circulation on the mountain, as the parks are often a guest destination. Many resorts have either installed terrain park specific lifts, or locate their parks in areas that can easily be repeatedly skied using adjacent lifts. Additionally, terrain parks are commonly located in highly visible, accessible locations on the mountain, given the excitement and marketability they create. In order to help create and maintain energy around terrain parks, music and animation are typically associated with them.

Providing a progression of terrain parks, from beginner through expert, is a primary goal. Teaching parks should be provided. Cross traffic should be minimized with good visibility provided in merge zones. Park features should flow easily from one to another and avoid creating bottle necks and traffic jams. Novice parks and features should be separated from the more advanced parks, and should be geared toward a learning environment. A low pressure venue should be provided for beginners, to allow them to feel comfortable as they practice tricks and become accustomed to transitions and jumps. Signage should clearly and simply delineate the difficulty of the various parks and features. This will help ensure that users are directed to the feature size most appropriate to their ability. Maintenance of the park is critical to ensure quality and maintain the reputation of the park with enthusiasts. Quality and diversity of features over quantity should be a goal. As the locations of features, particularly pipes, become fixed, constructing them out of earth can greatly reduce the amount of snow coverage required.

2. Lift Design

A myriad of factors are considered in lift design and placement, including wind conditions, visual impacts, resource constraints (e.g., wetlands), round-trip use, access needs, interconnectability between other lifts and trails, and the need for circulation space at the lower and upper terminal sites. The vertical rise and length of lifts for a particular mountain are important measures of overall attractiveness and marketability of a ski area.

3. Capacity Analysis and Design

Comfortable Carrying Capacity (CCC) is defined as a level of utilization for the resort (the number of visitors that can be 'comfortably' accommodated at any given time) that provides a pleasant recreational experience, without overburdening the resort infrastructure. It is expected that resorts will experience peak day visitation up to 25 percent above their CCC. The accurate estimation of the CCC of a mountain is a complex issue and is the single most important planning criterion for the resort. Related guest service facilities, including base lodge seating, mountain restaurant requirements, sanitary facilities, parking, and other services are planned around with the proper identification of the mountain's true capacity. The CCC figure is based on a combination of the uphill hourly capacity of the lift system, the downhill capacity of the trail system, and the total amount of time spent in the lift waiting line, on the lift itself, and in the downhill descent.

D. Balance of Facilities

The mountain master planning process emphasizes the importance of balancing recreational facility development. The sizes of the various guest service functions are designed to match the CCC of the mountain. The future development of a resort should be designed and coordinated to maintain a balance between accommodating guest needs, resort capacity (lifts and trails), and the supporting equipment and facilities (e.g., grooming machines, day lodge services and facilities, utility infrastructure, access, and parking).

E. Applicable Forest Service Policy

1. National Management Policies and Direction

Across the 191 million acres of National Forest System (NFS) lands, approximately 178,000 acres of public lands are administered for developed ski areas, representing approximately 0.09 percent of lands managed by the Forest Service. While only 24 percent of the nation's ski areas are on NFS lands (121 currently), they produce approximately 56 percent of the nation's annual skier visits.

The enabling authorities for the Forest Service are contained in many laws enacted by Congress and in the regulations and administrative directives that implement these laws.[6] These authorities allow the Forest Service to provide recreational opportunities to facilitate the use, enjoyment, and appreciation of National Forests.

[6] These laws include: the Organic Administrative Act (1897), the Weeks Act (1911), the Multiple-Use Sustained Yield Act (1960), the Forest and Rangeland Renewable Resources Planning Act (1974), the National Forest Management Act (1976), and the National Forest Ski Area Permit Act (1986).

The Forest Service is authorized to approve certain uses of NFS lands under the terms of SUPs.[7] Generally, SUPs for recreational developments are issued and administered for uses that serve the public, promote public health and safety, and provide land stewardship. In accomplishing these objectives, the 40-year term SUP held by Keystone authorizes the following:

> *"Ski lifts and tows, ski trails, day lodge, restaurants, maintenance and snowmaking facilities, roads, utilities, parking, signs, radio base station, explosive cache, and other facilities and improvements needed in the operation and maintenance of a four-season resort."*

Downhill skiing is an important component of the recreation opportunities offered by National Forests. The National Recreation Strategy, a result of the 1987 President's Commission for America's Outdoors, gives the Forest Service a major role in providing recreation opportunities on National Forests through partnerships such as those with the ski industry.

The relationship between the Forest Service and ski industry is defined in a memorandum of understanding (MOU) that was reaffirmed in 2002 (and dating back to 1996).[8] Per the MOU, the Forest Service and National Ski Area Association (NSAA) work in partnership to achieve common goals of managing and promoting active participation in alpine recreation and sports by all people.

As defined in the MOU, the Forest Service and NSAA share mutual interests and a common focus in:

- natural resource conservation education
- multiple use NFS management
- universal access to recreational opportunities and facilities
- promoting the health and physical fitness of Americans
- public awareness and appreciation of nature and the environment
- encouraging young people to benefit from participation in alpine recreation
- enhancing the experience of newcomers to alpine sports

2. 2002 Revised WRNF LRMP

Keystone's operations and activities within its SUP area must comply with the management direction provided in the WRNF's 2002 Forest Plan. The 2002 Forest Plan includes 33 separate Management Areas for different portions of the forest based on ecological conditions, historic development, and anticipated future conditions. Keystone falls within the 8.25 Management Area (Ski Areas – Existing and Potential). The 8.25 Management Area includes existing resorts that have already been permitted

[7] 16 USC 497

[8] Master Service-Wide Memorandum of Understanding between the National Ski Areas Association and the USDA Forest Service. 02-SU-11132001-185

and developed, as well as additional suitable terrain into which development is planned for the future. Per the 2002 Forest Plan:

> *"Ski areas provide winter sports activities and other intensively managed outdoor recreation opportunities for large numbers of national and international visitors in highly developed settings. In some areas, use in the summer may be as intensive as in the winter… Facilities may be intensively used throughout the year to satisfy a variety of seasonal recreational demands. Base areas that serve as entrance portals are designed as gateways to public lands."*[9]

All of Keystone's existing and proposed infrastructure, operations, and activities that occur on NFS lands are included within its existing 8,536-acre SUP area, within the 8.25 Management Area. All of the resort's base area facilities and activities occur on private lands.

The WRNF's 2002 Forest Plan FEIS provides in-depth analysis of the current conditions of the ski areas in Summit County and the ski industry in general. Specifically regarding Independence Mountain, the 2002 Forest Plan FEIS states:

> *"Snow quality and overall skiing potential for portions of this site are excellent when compared to other inventoried sites and existing resorts. Scenic vistas from the summit are outstanding. Access points are established along the existing Keystone ski area boundary to allow access for dispersed skiing on Independence Mountain. Independence Mountain has potential to be connected by lifts with the existing ski area in several locations or directly from the Snake River. Physically, Independence Mountain has excellent skiing potential and is a logical expansion of Keystone ski area.*[10]

Additionally, regarding Independence Mountain and its suitability for incorporation into Keystone's developed lift and trail system, the 2002 Forest Plan FEIS states:

> *"Keystone is allowed to expand onto Independence Mountain. This will help lower existing skier densities and crowding on the existing terrain… Alternative K [the Selected Alternative] allows the existing resorts in Summit County to lower skier densities by allocating a sufficient number of acres to meet future demands for skiing and snowboarding for the year 2010.*[11]

3. Scenery Management and the Built Environment Image Guide

a. Scenery Management System

In addition to providing recreation experiences and the production of numerous resources, public landscapes provide beauty, which is a valuable resource to many Forest Service constituencies. This resource is explicitly recognized in the law. The National Environmental Policy Act requires equal

[9] White River National Forest Land and Resource Management Plan, 2002 Revision, p. 3-80
[10] White River National Forest Land and Resource Management Plan, Final Environmental Impact Statement, p. 3-460
[11] Ibid, p. 3-475

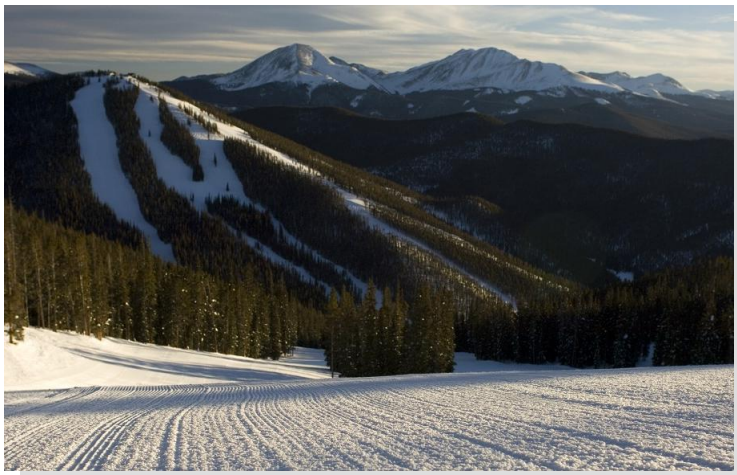
consideration of aesthetics and science. The Forest Service requires application of Scenery Management to all National Forest System lands. In brief, the Scenery Management System (SMS) is a systematic approach for assessing visual resources in a project area and then using the assessment findings to help make management decisions regarding proposed projects. The system is founded on an ecological aesthetic, which recognizes that management which preserves the integrity, stability, and beauty of the biotic community preserves the scenery as well.

The 2002 Forest Plan establishes acceptable limits of change for Scenic Resources.[12] The acceptable limits of change are the documented Scenic Integrity Objectives (SIO), which serve as a management goal for scenic resources.

Scenic Integrity Objectives

A project can cause visual resource change that can be objectively measured. Viewer response to this change, although subjective, usually displays broad patterns of consensus. Thus, visual impacts comprise both the landscape change and viewer response to that change. By assessing the existing visual character of an area in terms of pattern elements (form, line, color and texture) and pattern character (dominance, scale, diversity, and continuity), it is possible to identify the extent to which the visual character of a facility will exhibit visual contrast with the landscape, or its converse, visual compatibility.

People experience the visual environment as an integrated whole, not as a series of separate objects. Scenic Integrity is a measure of the degree to which a landscape is visually perceived to be complete, indicating the degree of intactness and wholeness of the landscape character. The SMS uses SIOs, which range from Very High (unaltered) to Very Low (heavily altered). The SIOs for the Keystone SUP area, as designated in the 2002 Forest Plan, are Low and Very Low. The frame of reference for measuring achievement of SIOs is the valued attributes of the "existing" landscape character "being viewed."



The Low designation applies to the eastern, less developed portion of the SUP area, including Independence Mountain and Independence/ Bergman/Erickson bowls. In an area with a Low SIO, the landscape character appears "moderately altered", and deviations begin to dominate the valued landscape character being viewed but they borrow valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes or architectural styles

[12] White River National Forest Land and Resource Management Plan, 2002 Revision

outside the landscape being viewed. Deviations should not only appear as valued character outside the landscape being viewed but compatible or complimentary to the character within.

The Very Low SIO applies to the more developed portions of the SUP area – Dercum Mountain, the Outback, and North Peak. A Very Low SIO refers to landscapes that are "heavily altered," and deviations may strongly dominate the valued landscape character and may not borrow valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes, or architectural styles outside the landscape being viewed. Deviations must be shaped and blended with the natural terrain (landforms) so that elements such as unnatural edges, roads, landings, and structures do not dominate the composition. However, the 2002 Forest Plan states that all National Forest System lands shall be managed to attain the highest possible visual quality commensurate with other appropriate public uses, costs, and benefits.[13]

b. Built Environment Image Guide

In concept, the Built Environment Image Guide (BEIG) is designed to ensure thoughtful design and management of the built environment, which includes: administrative and recreation structures, landscape structures, site furnishing, structures on roads and trails, and signs installed or operated by the Forest Service, its cooperators, and its permittees. It focuses on the image, appearance, and structural character of facilities. Three core contexts are stressed throughout the BEIG: (1) environmental; (2) cultural; and (3) economic.

The BEIG provides general guidance regarding the image, aesthetics, and overall quality of recreational and administrative structures on NFS lands, but it does not contain enforceable "standards" pertaining to aesthetic quality as would be found in a typical Forest Plan. As indicated on pages 250 - 252 of the BEIG, specific direction for the design of administrative and recreational facilities is found in the Forest Service Manual (FSM) and Forest Service Handbooks (FSH).

The environmental, cultural, and economic contexts with which the BEIG is based are important considerations in development of structural facilities (not including lift terminals) within the Keystone SUP area. Furthermore, there are some elements of the BEIG within the "Rocky Mountain Province" section (pages 159-178) that should be taken into account when designing and constructing facilities on NFS lands.

4. Accessibility to Public Lands

In June 2005, the Forest Service released the Accessibility Guidebook for Ski Areas Operating on Public Lands. This guidebook provides information for a ski area authorized under a SUP to work with the Forest Service in providing equal opportunities for all people, including those with disabilities. Keystone will work with the Forest Service to ensure consistency with this guidebook for future development projects occurring on public lands.

Ski areas operating under special-use authorization from the Forest Service are required to comply with both the Americans with Disabilities Act of 1990 (ADA) and Section 504 of the Rehabilitation

[13] White River National Forest Land and Resource Management Plan, 2002 Revision, p. AA-17

Act of 1973 (Section 504). The ADA applies because Keystone operates as a "public accommodation;" moreover, Keystone is a business open to the public. Section 504 applies because Keystone operates under a SUP authorized by the Forest Service. Through the SUP, the ski area agrees to abide by these and all other laws, regulations, and policies of the federal government.

Significant legislation that preceded the ADA includes the Architectural Barriers Act (ABA) of 1968 and the Rehabilitation Act of 1973, as amended. ABA was the first measure passed by Congress to ensure access to facilities. The ABA requires that all facilities built, bought, or leased by or for a Federal agency be accessible. Section 504 of the Rehabilitation Act states: "No otherwise qualified individual with a disability in the United States shall, solely by reason of his disability, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance or under any program or activity conducted by any Executive Agency."

Keystone currently complies with this legislation through active involvement in assisting disabled guests with skiing and other recreation activities. Through future site-specific NEPA and design development reviews, Keystone will work closely with the Forest Service to ensure accessibility measures are taken to provide equal recreational opportunities to all users of public lands.

5. Vegetation Management Plan

Keystone and the WRNF staff have jointly prepared a Vegetation Management Plan (VMP). The VMP includes a full assessment of forest stands throughout the SUP area and outlines vegetation management projects that would be of long-term benefit to vegetation resources.

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CHAPTER 3: SITE INVENTORY

3. SITE INVENTORY

In particular, physiographic features which substantially affect mountain planning include: aspect (i.e., solar exposure), slope gradients, fall line patterns and elevation. Keystone is spread over three mountain ridges with Independence Mountain, Bear Mountain, Keystone Peak and Wapiti Peak above and to the east of the ski area, and Keystone Gulch bordering the western edge.

Most of the skiing and riding is located on the north and west facing slopes with connecting routes on some south, southeast and southwest faces. The valleys between the three peaks drain southwest before joining the Keystone Gulch drainage and then moving northwest.

A. PHYSICAL RESOURCES

1. Topography

Keystone is located on the southern side of a valley which extends in a generally east/west direction. The rugged topography of the area affects wind patterns, and wind generally flows along the valley from the west or out of the east. Fluctuations in wind speed are common, with peak gusts common at higher elevations and on exposed ridges.

Avalanche activity within the Keystone SUP area occurs primarily in above treeline alpine zones. Keystone has a comprehensive avalanche inventory and control plan authored in 2007 by Hal Hartman & Associates. It not only addresses areas of potential avalanche activity that currently affect the resort operations but also strategies to manage and minimize risk within the ski area and in those areas affected by the cat skiing operations.

2. Climate

Keystone is located in the Rocky Mountain Physiographic Zone and is influenced both by storm tracks from the Pacific and (less so) by up-slope storms from east. The local climate at Keystone is typical of those in the Colorado Rocky Mountains, with the daytime temperature decreasing approximately 3 to 4°F for each 1,000 feet of elevation gain. During winter months, daytime high temperatures average 30.6°F, and nightly lows average 10.1°F. Average low temperatures are coldest during the month of January, averaging 4.6°F, and warmest during May, at 37°F.

Snowfall averages 235 inches per year. Monthly winter season snowfall between November and April averaged 39 inches. November typically receives the least snowfall while March receives the most – 31.5 and 47.2 inches, respectively. December snowfall is the most unpredictable and includes both the highest and lowest recorded monthly snowfall totals.

3. Slope Gradients

Due to the long history and developed nature of Keystone, an area-wide slope analysis is not necessary within the developed portions of the SUP area. However, a slope analysis has been completed for Bergman, Erickson and Independence Bowls. The majority of slopes within Bergman Bowl are low intermediate and intermediate levels. Slopes within Independence Bowl range from

intermediate to expert. Slopes within Erickson Bowl range for advanced intermediate to expert. The slope analysis is in Figure 5-4.

4. Aspect

Slope aspect plays an important role in snow quality and retention at this latitude. The variety of exposures present opportunities to provide a range of slope aspects that can respond to changes in sun angle. Due to Keystone's unique configuration (composed of three mountains) it offers a variety trails with exposures in all four cardinal directions, with the majority of developed trails oriented toward the north and west.

As with slope gradients, due to the long history and developed nature of Keystone, an area-wide aspect analysis is not necessary within the developed portions of the SUP area. However, an aspect analysis has been completed for Bergman, Erickson and Independence Bowls. The aspect analysis is included in Figure 5-4.

Snowpack retention is a critical concern for any winter resort, and for this reason, it is optimal to concentrate terrain where the natural snowpack remains for the longest period. In general, south slopes are the warmest, eastern and western slopes the next warmest and northern slopes the coolest.

At this latitude, elevation plays a large part in the snow holding capabilities of slopes with southern aspects and therefore, the slopes with southerly aspects that have been developed for skiing are primarily over 10,000 feet elevation and supplied with snowmaking.

Considering the important role in snow quality and retention that aspect plays at this latitude, the variety of exposures at Keystone present opportunities to provide terrain that can respond to changes in sun angle. The various angles of exposure are discussed below:

- **North-facing** - ideal for snow retention, minimal wind scour, minimal sun exposure
- **Northeast-facing** - ideal for snow retention, minimal wind scour, minimal sun exposure
- **East-facing** - good for snow retention, some wind scour, morning sun exposure
- **Southeast-facing** - fair for snow retention, moderate wind scour, morning and early afternoon sun exposure
- **South-facing** - poor for snow retention, moderate wind scour, full sun exposure

- **Southwest-facing** - poor for snow retention, high wind scour, full sun exposure
- **West-facing** - fair for snow retention, high wind scour, late morning and afternoon sun exposure
- **Northwest-facing** - good for snow retention, high wind scour, afternoon sun exposure

5. Elevation

Elevations within the Keystone study area range from the top of Bear Mountain at approximately 12,610 feet, to the western edge of the resort at 9,220 feet. The River Run base area is at the 9,340-foot elevation, while the Mountain House Base area is near the 9,280-foot elevation.

The existing lift-served vertical drop is approximately 2,663 feet (from the top of Outback to Mountain House). However additional vertical can be gained by hiking, which increases to approximately 3,330 feet from the top of Bear Mountain to the Mountain House Base Area.

B. Preliminary Environmental Reconnaissance

In conjunction with mountain planning, fieldwork was completed during 2008 and 2009 to address numerous resources.

1. Botany

Field surveys for MDP projects were conducted at phenologically appropriate (flowering) times (late July and early August 2008) in proposed disturbance areas in those habitats (alpine and subalpine wetlands) where federally listed, proposed, and Forest Service Regionally Sensitive plants may occur.

2. Wildlife

Field surveys were conducted in summer 2008 to identify MDP-related wildlife issues associated with listed, proposed, and candidate species, Forest Service Regionally Sensitive species, WRNF Management Indicator Species (MIS), and migratory birds. All proposed disturbance and project component use areas were surveyed and their habitats characterized.

Field surveys were also conducted to identify lynx winter foraging habitat (WFH) compensatory treatment areas to meet Term and Condition 2 of the 2002 WRNF Forest Plan Record for Decision. Project biologists developed a lynx habitat map overlapping all proposed disturbance and project component use areas. The map was field verified, with respect to lynx WFH, and project-related impacts to WFH quantified so that an appropriate treatment acreage can be identified and silvicultural treatment(s) developed for consideration in future NEPA analyses and Section 7 consultation.

3. Hydrology

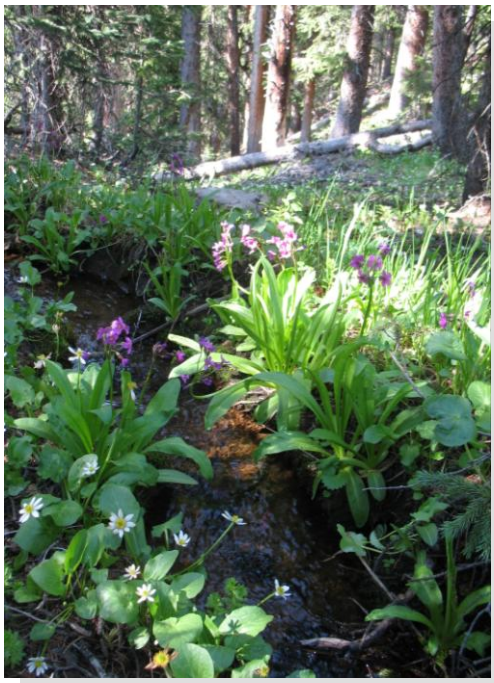
Forest Service hydrologists have made it clear that protecting hydrologic function on National Forest System Lands within ski area SUP boundaries is a high priority. The WRNF relies upon the Forest Service Region 2 Watershed Conservation Practices Handbook (WCPH – Forest Service Handbook

2509.25) for evaluation of watershed health and management direction to meet the agency's mandate as a designated Water Quality Management Agency pursuant to the Clean Water Act.

Thus, an inventory and assessment of watershed conditions was performed at Keystone which included on-mountain connected disturbed area (CDA)/vegetative cover assessment of the entire SUP.

4. Wetlands

Wetland and stream delineations aid in the preparation of a well-designed project. Therefore, project ecologists completed a wetland and stream delineation of all priority project areas, with a considerable buffer included. The wetlands fieldwork included a standard Corps of Engineers (Corps) wetlands delineation for the site to assist in the pre-NEPA planning process and future NEPA analysis, and provides the baseline data for potential project permitting. The delineation was composed of "areas" as opposed to "lines" due to the potential need to relocate/reconfigure trail layouts to minimize and/or avoid resource impacts.



Project areas throughout the SUP boundary that were delineated for the presence/absence of wetlands and streams included:

- Proposed lift line corridors
- Proposed trail pods (traditional trails, gladed and tree-skiing) and associated facilities
- Proposed mountain access roads
- Proposed grading projects
- Proposed snowmaking trails
- Proposed utility line corridors (for lifts, patrol shacks, etc.)

5. Archaeology

In July 2008, a file search was conducted at the Colorado State Historic Preservation Office, Compass Database, to identify past archaeological surveys conducted in the SUP area. A previous cultural resources inventory was conducted in the SUP area in 1983 by Mariah. In August 2008, another Class III cultural resources survey was preformed in the SUP area to cover remaining, unsurveyed areas.

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CHAPTER 4: EXISTING FACILITIES INVENTORY AND ANALYSIS

4. EXISTING FACILITIES INVENTORY AND ANALYSIS

Completion of a thorough resort inventory is the first step in the master planning process. This inventory extends to the lift and trail network, guest services, the snowmaking system, base area structures, day-use parking, and shuttle services. The subsequent analysis of inventoried data involved the application of ski industry norms to Keystone's existing conditions. This process allows for the comparison of Keystone's existing facilities to those commonly found at resorts of similar size and composition that share Keystone's market.

A resort's strengths and deficiencies are identified by examining the overall balance of the existing terrain, infrastructure, and facilities in relation to its Comfortable Carrying Capacity, defined below. The next step is the identification of improvements which would bring the existing facilities into better equilibrium, and will assist the resort in meeting the evolving expectations of its marketplace. Accomplishing these objectives results in a well-balanced resort, that provides an adequate array of services and experiences to satisfy guest expectations.

A. COMFORTABLE CARRYING CAPACITY (CCC)

The daily capacity of a resort is described as the Comfortable Carrying Capacity, referred to as CCC. CCC does not indicate a maximum level of, or cap on, visitation, but is rather a planning tool defined as the number of daily visitors a resort can comfortably or efficiently accommodate at one time without overburdening the resort's infrastructure. The CCC is a function of demand for, and supply of, vertical transport – i.e., the combined uphill hourly capacities of the lifts and the aggregate number of runs demanded multiplied by the vertical rise associated with those runs. CCC is calculated by dividing vertical supply (VTF/day) by vertical demand.

The accurate calculation of a ski area's CCC is an important, complex analysis and is the single most important planning criterion for any resort. All other related skier service facilities can be evaluated and planned based on the proper identification of the mountain's capacity. The detailed calculation of Keystone's current CCC is described in Table 5 of Appendix A and is calculated at 12,110 guests per day.[14] It is important to note that it is typical, and expected, for ski areas to experience peak days during which skier visitation exceeds the CCC by as much as 25 percent. However, from a planning perspective, it is not recommended to consistently exceed the CCC due to the resulting decrease in the quality of the recreational experience, and thus the resort's market appeal. With that being said, Keystone's CCC of 12,110 is exceeded throughout the season, and peak days in excess of 15,000 guests (24 percent over CCC) occur periodically during holiday weekends and during spring break in March. During these high visitation periods it is inevitable that a degradation of quality is experienced – e.g., crowding and longer wait times at lifts and in food service facilities. While the fact that Keystone

[14] The 12,110 CCC does not account for night operations. Unlike most destination resorts, Keystone operates over an extended day, with several lifts operating until 8:30 p.m. on a majority of days over the season (more often during busy periods and weekends). The night ski CCC is 3,130 skiers. Experience shows that guests will ride slower at night; however, they will take fewer breaks resulting in a similar VTF demand per hour during the day versus evening. The other issue at night is that many riders use trails that are rated below their skill level due the inherent difficulty of riding under artificial lighting.

exceeds its CCC on a handful of days each season is not a problem, per se, this occurrence is anticipated to continue until the resort's infrastructure is upgraded commensurately to meet existing and future demand.

B. Mountain Access Portals

Keystone has quite a unique skier arrival pattern for a destination resort due to the extensive amount of terrain that is illuminated at night. Although most skiers and riders start between 9-10 a.m. and finish between 2-3 p.m., Keystone's guests may choose to arrive late because they can ski/ride until 8:30 p.m.

Currently, all day and overnight skiers/riders stage through either the River Run or Mountain House base areas, including those staying in Lakeside or arriving from outside the valley. Approximately 70 percent of Keystone's guests enter the resort through River Run, with the remaining 30 percent entering though Mountain House. The reader is referred to Figure 4.2 for additional information on portal staging.

Out-of-base lift capacity is critically important, especially during the early morning hours when the majority of a resort's skiers and snowboarders arrive at the base area portals. Mountain planners prefer that a resort's CCC be able to flow through mountain access portals in roughly 90 minutes. Accordingly, the 90 minute cycle time is relied upon to size the hourly capacities of a resort's out-of-base lifts (i.e., lifts located at base area portals that "feed" guests to other lift systems). With an existing CCC of 12,110 guests, the River Run and Mountain House portals' uphill lift capacity should move guests onto the mountain in an efficient manner over the ingress period.

Total out-of-base lift capacity between the two portals is 8,290 guests per hour (4,400 associated with River Run, 3,890 associated with Mountain House). A recent portal capacity analysis (factoring in circulation, capacity, and visitor movement patterns at Keystone Resort) indicates that these portals are over-utilized, resulting in heavy crowding, particularly during peak morning and afternoon periods. The arrival rate of guests frequently exceeds the hourly capacity of the River Run and Mountain House portals. Long lines are particularly common at River Run, and can be in excess of 30 minutes.

1. River Run

Two lifts – the River Run Gondola and the Summit Express – provide direct access between River Run and the top of Dercum Mountain.

During the summer of 2008, the River Run Gondola was replaced, with the bottom terminal relocated on the north side of the Snake River. A mid-station was located between the River Run and Missouri

trails, approximately 2,600 feet up the lift line from the bottom terminal. The River Run Gondola's hourly capacity increased from 1,400 pph to 2,400 pph. This increase is intended to better serve the mountain staging requirement at River Run.

The total hourly capacity (2,400 pph) of the River Run Gondola is a product of separate loading capacities for both the bottom and mid-load terminals. Keystone staff will have the ability to adjust the hourly capacity at each terminal as needs change throughout the day. For example, during the busy morning ingress period, every fourth cabin moving through the bottom terminal will remain empty. Therefore, the bottom terminal capacity will be 1,800 pph, reserving an hourly capacity of 600 pph for the mid-load station during the morning access period. As the day progresses, more hourly capacity will be needed at the mid-terminal and less at the bottom terminal and staff will adjust the capacities accordingly. 1,800 pph was used for the modeling of the Portal Staging Capacity Analysis.

The Summit Express (a detachable quad chairlift) parallels the River Run Gondola, and tops out at the summit of Dercum Mountain. It experiences most of its use during the morning staging period. On slow days, the Summit Express is sometimes not operated, or only operated for the critical morning staging period.

Based on Keystone's CCC of 12,110, and the assumption that 70 percent of Keystone's guests access the mountain through River Run, approximately 8,477 people would be expected to use the River Run Gondola and Summit Express during the morning ingress period. These two lifts have a combined out-of-base capacity of 4,400 people-per-hour (2,600 associated with the Summit Express and 1,800 with the Gondola bottom terminal), indicating that the River Run portal can stage 70 percent of Keystone's CCC in approximately 115 minutes, which is longer than what is preferable. Keystone staff has the ability to increase the bottom terminal capacity, while reducing the mid-station capacity, in response to the demand during the morning ingress period on peak days. Increasing the capacity at the bottom terminal will reduce the staging time for the 8,477 guests.

Four parking lots are located at the River Run base area. Two are free – Montezuma and Brown's Cabin, and two are pay – Hunki Dori and Gold Bug, for a total of 2,660 parking spaces.

2. Mountain House

Two chairlifts – the Peru Express (a detachable quad) and Argentine (a fixed-grip double) – provide up-mountain access from the Mountain House base area, accommodating approximately 30 percent of Keystone's CCC (approximately 3,633 people). These two lifts combine for an hourly out-of-base capacity of approximately 3,890 pph, and can stage guests in the morning in under an hour.

Three parking lots are located at the Mountain House base area. The Porcupine, Marmot and Pika lots are all pay, and total 1,250 parking spaces. There are limited accommodations located at the Mountain House base are, but there are quite a few within walking distance. The base area facilities are a collection of older one- and two-story buildings providing guest services for staging, food services and operations. The parking lots, combined with a bus loop at each end of the base area, supply guests to this staging base area.

C. LIFT NETWORK

Keystone operates 20 lifts, including 13 chairlifts (one eight-passenger gondola, one six-passenger gondola, one high-speed detachable "six-pack" chairlift; five high-speed detachable quad chairlifts; one fixed-grip quad chairlift, one fixed-grip triple chairlift, and three fixed-grip double chairlifts) and six conveyor (carpet) lifts for beginners, plus one tubing lift. See Appendix A, Table 1 for individual lift specifications. These lifts include:

Table 4-1:
Keystone's Lift Network

Lift Number	Lift Name	Lift Type
Lift 1	River Run Gondola	eight-passenger gondola
Lift 2	Summit Express	detachable quad
Lift 3	Montezuma Express	detachable quad
Lift 4	Argentine	fixed-grip double
Lift 5	Peru Express	detachable quad
Lift 6	Discovery teaching lift	fixed-grip double
Lift 7	A-51 terrain park lift	fixed-grip double
Lift 8	Outpost Gondola	six-passenger gondola
Lift 9	Ruby Express	detachable six-pack
Lift 10	Ranger teaching lift	fixed-grip triple
Lift 11	Santiago Express	detachable quad
Lift 12	Wayback	fixed-grip quad
Lift 13	Outback Express	detachable quad
C-1, C-2a, C-2b, C-3	Mountain House teaching conveyors	
C-4	Kokomo teaching conveyor	
C-5	Sunkid teaching conveyor	
Adventure Point Tubing Lift		Elevated surface conveyor

Of the 20 lifts, only five (the Sunkid teaching conveyor and the four Mountain House teaching conveyors) are located entirely on private land; the rest are located entirely or partially on Forest Service lands within Keystone's SUP area. The bottom terminals of the Summit Express, River Run Gondola, Argentine, and Peru Express are located on private lands. The existing lift network serves Keystone's Alpine terrain in a logical and relatively efficient manner; however, when Keystone's CCC is exceeded, long lift lines are a fairly common occurrence at the River Run and Mountain House portals.

1. Dercum Mountain

Dercum Mountain is the hub of Keystone's skiing and riding with the convergence of five high capacity lifts (River Run Gondola, Summit Express, Montezuma Express, Ruby Express, and Outpost Gondola), two beginner lifts (Kokomo and Ranger) and the Summit House restaurant (with 564 indoor seats). Dercum Mountain's lift and trail network is depicted on Figure 4.1.

As mentioned previously, the River Run Gondola was recently replaced, with the bottom terminal relocated on the north side of the Snake River and a mid-station has been located between the River Run and Missouri trails, approximately 2,600 feet up the lift line from the bottom terminal. By installing the mid-terminal skiers and riders will have the option to roundtrip ski the upper trails and avoid the steeper and congested River Run trail. They will also have the ability to download from the mid-terminal at the end of their day.

The River Run Gondola's hourly capacity increased from 1,400 pph to 2,400 pph. Historically the River Run gondola experienced long lines, even when the Summit Express is running well below capacity. The increased capacity will help alleviate the long lines during the morning ingress periods on peak days.

The Summit Express (a detachable quad chairlift) parallels the River Run gondola, and tops out at the summit of Dercum Mountain. It experiences most of its use during the morning staging period. On slow days, the Summit Express is sometimes not operated, or is only operated for the critical morning staging period. Some guests opt to ride the Summit Express instead of the gondola, as it access the same terrain, but typically has fewer lines and is a shorter ride time.

The Montezuma Express detachable quad provides round-trip skiing on the upper, north facing aspect of Dercum Mountain. Skiers and riders opt to use this lift because it does not necessitate descending all the way to the base of Dercum Mountain, where long lines can be encountered at the River Run and Mountain House base areas.

The Peru Express detachable quad accesses intermediate terrain on the western portion of Dercum Mountain. Because the bottom terminal is located in the Mountain House base area, long lines can be encountered on this lift throughout the day.

The Argentine fixed-grip double chairlift is primarily an access lift, which is only operated on busy weekends, roughly ten days throughout the year. Thus, it is grossly underutilized. This lift provides round-trip skiing on a limited number of primarily intermediate trails on the lower, north side of Dercum Mountain. To get to the summit of Dercum Mountain, guests staging out of the Mountain House base area must take either the Argentine or Peru lift, then use the Montezuma Lift.

The A-51 fixed-grip double provides exclusive access to the A-51 terrain park. Unfortunately, this lift is antiquated and is too short to efficiently serve the terrain park.

The Ruby Express six-pack was installed in 2000, replacing an existing lift. In conjunction with the Outpost Gondola, it provides egress capacity for skiers and riders moving back to Dercum Mountain from North Peak and the Outback.

The Outpost Gondola was installed in 1991 and is generally underutilized. This gondola provides direct access for skiers/riders and pedestrians between the top of Dercum Mountain and the Outpost restaurant on North Peak, but provides no return skiing. Pedestrians use this lift for sightseeing, but mostly for nighttime dining as views from the Outpost are quite limited.

Finally, there are two beginner lifts at the top of Dercum Mountain – the Kokomo surface lift and the Ranger fixed-grip triple. Beginner lifts are further discussed under "Teaching Terrain" below.

2. North Peak

North Peak is not directly accessible from the River Run or Mountain House base area, and guests must descend the south side of Dercum Mountain to access both this area and The Outback (unless they take the Outpost Gondola from Dercum Mountain). The reader is referred to Figure 4.3. The Santiago Express (a detachable quad) provides the exclusive means of round-trip skiing and riding for terrain on North Peak. Terrain serviced by the Santiago Express faces primarily north and northwest, consisting of trails and gladed areas with skill classes ranging from low intermediate to advanced.

The Wayback fixed-grip quad chairlift provides access back to North Peak from the bottom of The Outback. Although there is return skiing on *Fox Trot*, *Anticipation* and *Spillway*, many of the users of these trails use them only for access to The Outback. Due to terrain closures in The Outback toward the end of the day, lift line wait times tend to increase at the Wayback lift since this lift provides the only egress from The Outback to North Peak and Dercum Mountain. This situation, along with an increase in future visitation, will continue to become a problem unless there is an increase in capacity of the Wayback lift.

3. The Outback

Installed in the late 1980s, the Outback Express (a detachable quad) is the only lift servicing terrain in The Outback. From the top of the Outback Express, guests can choose to hike approximately 350 vertical feet and access above treeline terrain in North Bowl and South Bowl. The reader is referred to Figure 4.3.

The Outback Express was designed for an hourly capacity of 2,400 pph, but does not achieve this due to chair spacing (i.e., the number of chairs hung on the rope line). Adding more chairs on the Outback Express would allow this lift to achieve its design capacity.

D. Terrain Network

Keystone offers approximately 3,000 acres of skiing/riding terrain across three mountains and five bowls, making it the largest resort in Summit County.[15] In addition to the 891 acres in the developed terrain network, Keystone offers gladed skiing and in-bounds, hike-to terrain. Boundary management is designed to reduce the instances of skiers and riders leaving the ski area boundary from undesignated locations and into sensitive or closed areas.

Keystone's distribution of terrain is provided in Table 4-2 and Chart 4-1. The "Trail Area" column presents acreages by ability level of developed, lift-served terrain. The far right column in Table 4-2 represents the estimated skill level distribution of Keystone's targeted markets.

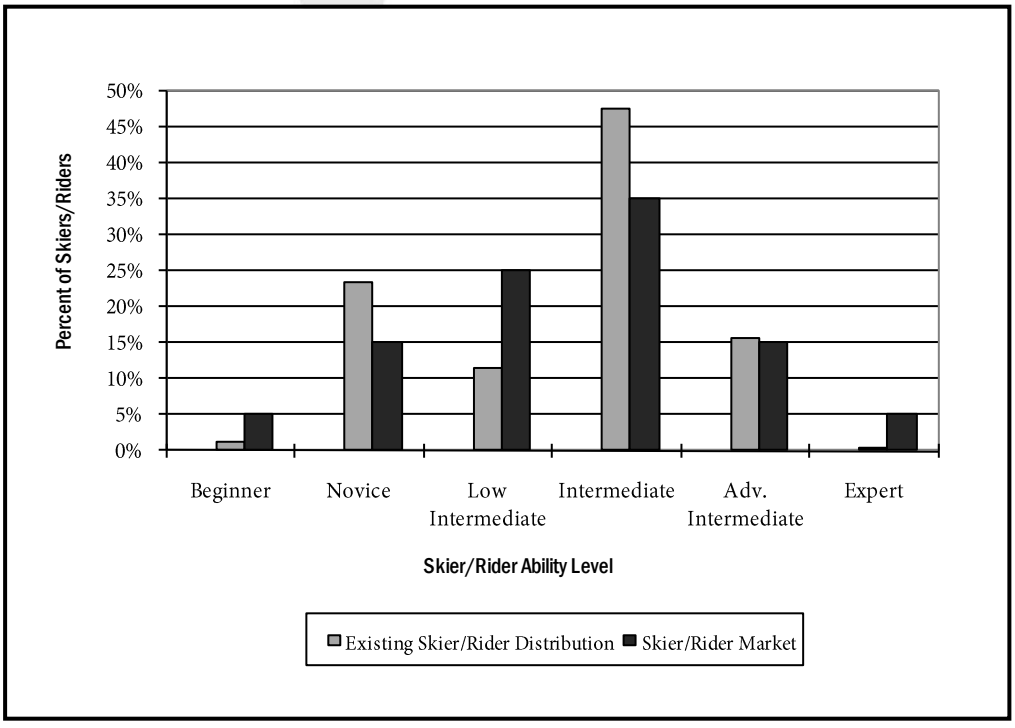
[15] This terrain total includes the managed ski area boundary, including areas accessed via snowcat and hiking.

Table 4-2:
Terrain Distribution by Ability Level – Existing Conditions

Skier/Rider Ability Level	Trail Area	Keystone Skier/Rider Distribution[a]	Skier/Rider Market
	(acres)	(%)	(%)
Beginner	3.7	1.1	5
Novice	124.9	23.5	15
Low Intermediate	79.5	11.6	25
Intermediate	455.2	47.5	35
Adv. Intermediate	216.2	15.8	15
Expert	12.3	0.4	5
TOTAL	**891.1**	**100**	**100**

[a] Keystone's Skier/Rider Distribution is based on terrain capacity.
Source: SE GROUP

Chart 4-1:
Terrain Distribution by Ability Level – Existing Conditions



The terrain distribution figures indicate that there is a surplus of intermediate and advanced intermediate terrain, while a deficit is shown at the beginner, low intermediate and expert ability levels. It should be noted that the shortage of high-end terrain is compensated for by the naturally gladed terrain and open bowl skiing which is not included in the developed trail terrain distribution.

The developed terrain network accommodates the entire range of ability levels, from beginner to expert. The terrain specification table in Appendix A (Table 3) provides specific information by individual ski trail.

Keystone's 891 acres of developed lift-served terrain are located on, or accessible from, three mountains:

1. Dercum Mountain

The summit of Dercum Mountain is at 11,640 feet and offers a variety trails with long groomers, the A-51 Terrain Park, night skiing/riding terrain, and tubing at Adventure Point. The reader is referred to Figure 4.1.

All guests moving to and from North Peak and the Outback must transition through this area. A limited amount of space at the summit of Dercum Mountain, coupled with six lift terminals, the Summit House facility and Adventure Point create congestion issues. People moving from River Run to North Peak and Outback must go over the mountain top after riding the River Run gondola or the Summit Express. Guests coming from the Mountain House base take either the Peru Express or Argentine Lift, and then ride Montezuma, before they can go over the top of Dercum Mountain.

The front side (north face) of Dercum Mountain generally has gentle slopes on the upper three quarters and steeper slopes on the bottom quarter. Most of the skiers/riders in the low intermediate skill class (a large part of Keystone's clientele) choose to use the central trails (i.e., *Paymaster* to *Schoolmarm*) but must negotiate more difficult parts of the mountain to ski these desired trails. Allowing skiers and riders to bypass of this steep section of trail would alleviate this situation. When riding the Montezuma Express, guests can avoid the lower steep pitch but must use *Upper Schoolmarm* to access the top of these trails. If they use the Peru Express, they must take the *Lower Schoolmarm* or *Dercum's Dash* skiways to access the bottom of the mountain. Most guests will choose to use the Montezuma Express (Keystone's second most popular lift), and are likely to stay in the sun and on the more favorable snow conditions of the higher elevations.

Upper Schoolmarm, between the Summit House and the top of the Peru Express, is one of the most popular trails on the mountain (if not the most popular trail). It is the best novice/low intermediate route off the top of the mountain, and it provides access across the front face of the mountain for all skiers/riders, but particularly for the A-51 Terrain Park on the western portion of Dercum Mountain. The trail itself has three short sections which are extremely flat, causing the less skilled skiers to slow down or stop and then walk to the next pitch that has an adequate slope for sliding. The difficulties with the mixing of skill classes on *Schoolmarm*, particularly between the top of the mountain and the A-51 Terrain Park, is only magnified by novices walking and more skilled skiers gaining speed to get past the flat sections.

Most guests use the *River Run* trail when descending to the River Run base area. The last pitch of *River Run* is considered too steep for the number of users in the low intermediate and intermediate skill classes. This pitch gets quite congested and, in turn, the surface can become quite worn and bumpy. This deters return cycle skiing and riding, especially with lower skilled guests.

Congestion on *Spring Dipper* and *Burro Alley* is the result of lower level skiers and rider working their way through steep pitches. Allowing skiers and riders to bypass this steep section of trail would alleviate this situation.

The installation of the mid-station on the River Run Gondola is intended to allow the low intermediate and intermediate guest to comfortably round trip the upper two-thirds of Dercum Mountain, especially the underutilized trails to the east of the Gondola alignment. These guests then can avoid the steep final pitches of the *River Run* trail by downloading to the village from the gondola mid-station.

Most of the terrain on the backside of Dercum Mountain has fairly steep slopes and has aspects in the south to southwest directions. *Mozart* has characteristics which classify it as intermediate. The southern aspect and narrowing in the steepest section towards the bottom cause difficulties for lower ability level skiers and accelerated snow wear. To compound the problem, *Mozart* is the only "blue" route from Dercum Mountain to North Peak and the Outback; therefore, it is the most used access route to the southern part of the ski area.

The Windows area consists of a number of routes in the trees varying from wide meadows to narrow chutes. This area is accessed via a short hike from Dercum Mountain and due to this, is used sporadically, but somewhat heavily when fresh snow falls. Although the center of The Windows is quite steep, terrain bounding this area to the north and south has moderate slopes.

Teaching Terrain

Beginner areas are a vital component of a ski area in attracting new participants to the sport. The 2002 Forest Plan FEIS recognizes the importance of this experience, and states:

> *"The basis of the industry's initiative is the fact that 85 percent of the people who try skiing drop out of the sport, or in other words, 15 percent of people who try the sport are eventually converted from beginners to core skiers. The proposal involves two actions, increasing number of people who try skiing, and increasing the percentage of the people who try skiing and become part of their core market."*[16]

All of Keystone's beginner areas are located on Dercum Mountain.

Beginner skiers and riders coming through the River Run base either use the Sunkid teaching conveyor beside the bottom gondola station or ride the gondola to the mountain top to access the Kokomo conveyor or Ranger lift. Generally, the children's ski school participants stay in the base area and then move onto Kokomo and the Ranger chairlift at the summit of Dercum Mountain, where as the adult ski school participants start at the summit.

Although there are two beginner lifts at the top of Dercum Mountain, there are no specific beginners/children's facilities in the Summit House and the lifts and trails are subject to wind. Both beginner lifts are located in and amongst the other ski trails, and although the Kokomo trail is roped

[16] White River National Forest Land and Resource Management Plan, Final Environmental Impact Statement, p. 3-441