

## **Appendix: Chapter 6—Environmental Resources**

### **Synopsis of Public Input**

Though the topic was not a prominent one during the public process for the 2008 update of this plan, a healthy natural environment continues to be highly valued by the community.

Public input received on the topic of environmental resources addressed the following areas:

- Preservation of open space
- Maintaining view corridors
- Retaining the scenic beauty
- Promoting respect of our mountain environment
- Protecting water quality, air quality, and wildlife

### **Existing Environmental Conditions**

#### ***Elevation***

Elevation affects vegetation, temperature, precipitation, oxygen, and air pollution. The Town boundary encompasses a topographic span reaching from the lower end of Wildcat Ranch, at approximately 7,300 feet, up to 12,600 feet at the summit of the Snowmass Ski Area. Brush Creek Road, at its intersection with State Highway 82, is at an elevation of 7,500 feet. Elevation rises steadily as Brush Creek Road approaches and enters the Town limits at 7,900 feet. A majority of the Town's residential neighborhoods as well as its commercial core lie between 7,800 and 9,100 feet.

#### ***Slope***

Slope steepness is one determinant of the development suitability of land. Consideration should be given to physical hazards, the potential for successful revegetation, and the difficulty in repairing soil disturbances. Steep slopes are vulnerable to erosion and soil slippage. The Snowmass Village Municipal Code prohibits construction on natural slopes greater than 30 percent unless approved by a supermajority vote of the Town Council and subject to specific findings, exceptions, and/or circumstantial criteria.

Approximately 7,700 acres, or 44 percent, of Town land has a slope of 30 percent or greater. Mapping of slope is broken into five categories: 0–3 percent, 3–8 percent, 8–15 percent, 15–30 percent, and 30 percent or greater, and can be found at the end of this chapter.

#### ***Aspect***

Slope aspect is how a site is oriented to the sun, which influences soil and air moisture and temperature. The majority of Snowmass Village has a cooler slope aspect, a situation that is typical of ski areas. Slopes south of Brush Creek Road and much of Wildcat Ranch have a northern aspect with denser vegetation, longer snowpack, moist soils, and

increased wildfire hazards. Slopes north of Brush Creek Road have a primarily southern aspect with few trees, drier conditions, and higher erosion potential.

### ***Geology/Soils***

Most of Snowmass Village's soils have high shrink-swell potential, low strength, and slow permeability.<sup>1</sup> A large portion of the surface geology is Mancos shale, which can present challenges to development. On specific sites, soil type should be analyzed for engineering qualities and limitations for construction, ability to support plant growth, stability on slopes, erosion potential, and drainage characteristics.

### ***Vegetation***

Snowmass Village's diverse physical conditions create a complex distribution of plant communities. Vegetation distribution is influenced by elevation, solar exposure, slope aspect, soil characteristics, geology, moisture, and wind. Because of their respective aspects, north-facing slopes have abundant streams and lush meadows and south-facing slopes are semi-arid.

Changes in the landscape's plant species are most evidently tied to changes in elevation and according to slope aspect. Major plant communities appear as irregular bands, often with very narrow transition bands between them. The succession of plants, beginning with lichens and mosses in dry areas and water plants in the streams and ponds, has climaxed in the four major "Vegetation Life Zones" within Snowmass Village.

*Foothill Zone.* The Foothill Zone extends from the edge of the Roaring Fork Valley to the rodeo parking lot and the Snowmass Club golf course. This is primarily a shrub zone with few trees except in riparian areas and in deep ravines with northern exposure. Sagebrush, oakbrush, chokecherry, and serviceberry dominate but coexist with aspen trees, foxtail barley, slender wheatgrass, yarrow, and vetch.

*Montane Zone.* This zone covers most of the former ranch land that is now the golf course and residential development. Mountain meadow and grassland communities are numerous in this zone. Douglas fir is prevalent, and turf-forming grasses such as red-top, timothy, and native bluegrass cover moist meadows and the wetter and cooler areas. Along water courses, distinct riparian forest and shrub communities occur that include: narrow-leaf cottonwoods, mountain alder, river birches, Colorado blue spruce, aspen, and several species of willow.

*Subalpine Zone.* This region begins at 8,000 feet on north-facing slopes and is covered by dense forests of Engelmann spruce and subalpine fir, with equally dense intrusions of aspen groves or an occasional lodgepole pine stands. In the winter, these dense forests protect snowfall from melting, so snow often remains on the ground until early July. Moisture-loving plants such as fairy slippers, wood nymphs, and dotted saxifrage thrive in this woodland.

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<sup>1</sup> Geology and soils information was obtained from the United States Geological Survey (USGS) and the Soil Survey of the Aspen-Gypsum Area.

*Alpine Zone or Tundra.* Above timberline is the alpine zone. Like the arctic tundra, it is a treeless region of grassland and rock fields. Snow melts sooner in this zone than the Subalpine Zone because of the lack of trees to shade the ground and the fact that winds keep the snow layer thin. A short growing season exists but allows for alpine flowers.

In 2005, the Town of Snowmass Village adopted the Pitkin County weed control program, which attempts to strategically remove noxious weeds from Pitkin County. The program includes a plan and community outreach objectives to prevent noxious weeds from spreading in Snowmass Village.

### ***Hydrology***

Brush Creek is Snowmass Village's main watercourse, and flows through Town from the Divide into the Roaring Fork River. Brush Creek's two major tributaries, the West and East Forks, flow from the Snowmass Ski Area along Fanny Hill in the west and below the Two Creeks lift in the east. Brush Creek Road parallels the creek.

Historically, the creek and the road have vied for territory. As a result, the creek has suffered in the areas of bank erosion and degradation of stream biology. Cumulative impacts resulting from a variety of development practices have impaired the stream channel's ability to function naturally. The degradation of Brush Creek not only affects Snowmass Village but also impacts the downstream water quality of the Roaring Fork River.

The Town has identified stream sections of Brush Creek that are candidates for restoration. Since the early 1990s, four reaches of Brush Creek (Woodbridge, May Fly, Snowmass Chapel, and Base Village) have been restored. The majority of the projects were financed by the Town with the exception of the Base Village reach, which was restored as a condition of development approval. There is an existing town fund for stream restoration but no regular budget line. There are no standard design specifications for restoration because each reach has different fluvial characteristics requiring a design specific to the reach.

The Roaring Fork Conservancy, a nonprofit watershed conservation organization, monitors the health of regional waterways. The Conservancy placed Brush Creek on its impacted list in its 2006 Water Quality Report because of consistently high pH and phosphorous levels and continued development along the drainage way. A targeted study was initiated in 2006 to set baseline conditions for the creek, to determine the levels and duration of pollutants, and to determine appropriate management of open space parcels with regard to the riparian habitat. Most parameters in the study reflected normal and relatively healthy conditions, though continued concern of high pH levels and impacts because of development continue. The Conservancy plans to continue monitoring of the Creek in the future. Future recommendations may include the need for a minimum in-stream flow to be established to ensure continued health.

Water quantity is also important to measure. In recent years, heavy snowpack has eased the drought in the region and will likely begin refilling depleted reservoirs in the

Colorado River Basin. However, severe or extreme drought conditions still exist, and climate change or continued years with low precipitation remove the amount of water available to us and left in stream.

***Rain/Snow***

Rain and snowfall affect several aspects of daily life in Snowmass Village. The public health and safety is frequently affected by snowy and icy road conditions, and heavy downpours have been known to cause landslides and flood damage from time to time. The community’s fire suppression capabilities and drinking water supply are heavily reliant on annual rain and snowfall totals. Our economy is closely tied to annual skier-day numbers, which are greatly affected by snow conditions. Weather resulting in airport and/or road closures also has significant impacts on the local economy. Finally, the condition of our natural environment (i.e., vegetative growth, soil erosion, wildlife health, and habitat) is largely reflective of the rain and snowfall activity within a given year or over a longer period of time.

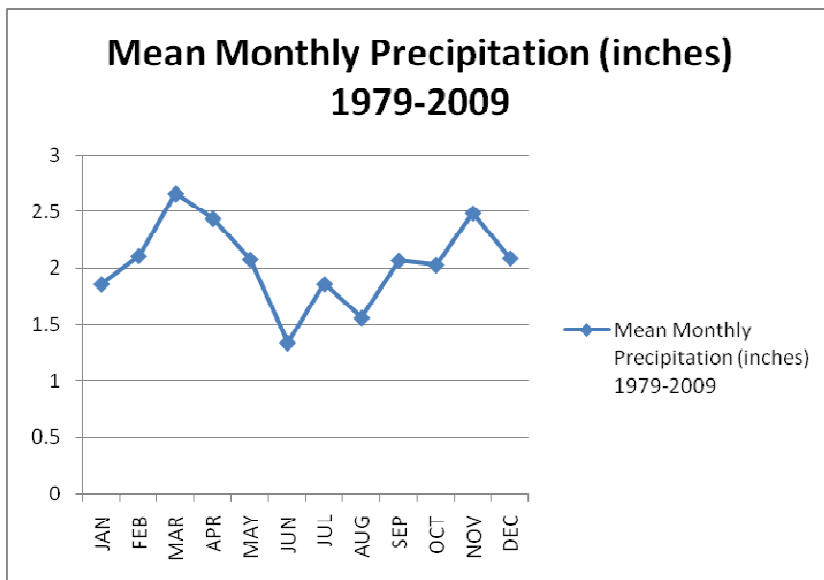
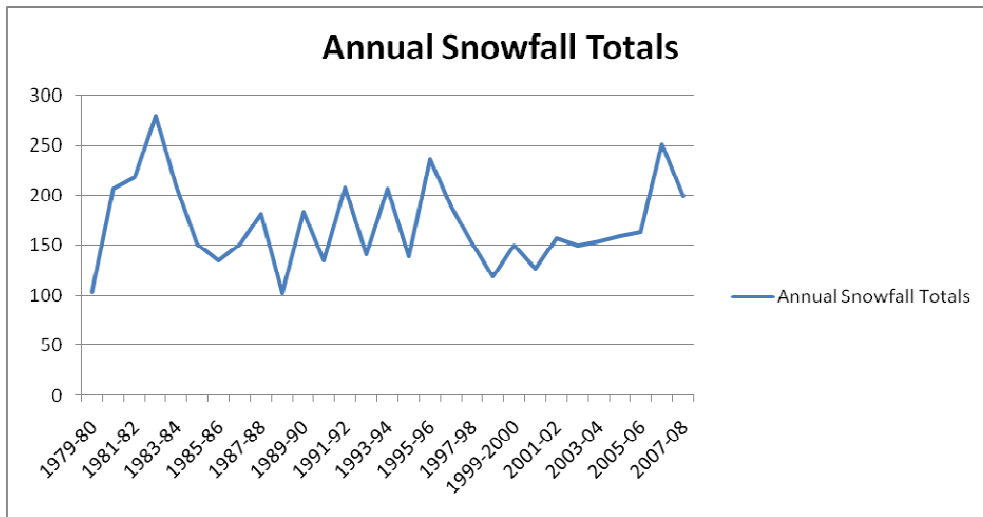
Data collected by the National Oceanic and Atmospheric Administration’s (NOAA) Western Regional Climate Center from the Aspen 1SW, COLORADO Cooperative Observer Program (COOP) weather station (1980–2008) provide the following information regarding rainfall and snowfall in the Snowmass Village area:

Annual Average Total Rainfall (Precipitation): 24.61 inches

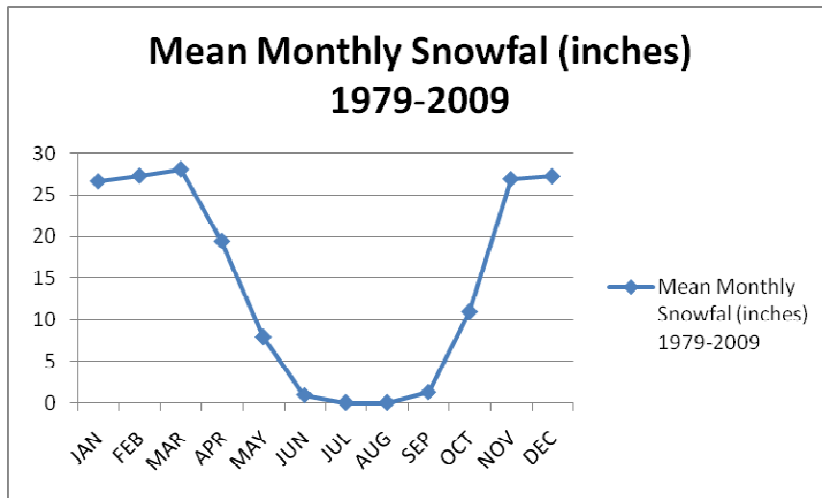
Annual Average Total Snowfall : 177 inches

**Comment [TOSV1]:** WHERE MEASURED?

**Figure 6.1 Annual Snowfall Totals**



**Figure 6.2 Mean Monthly Snowfall (inches) 1979–2009**



***Snowmass Water and Sanitation District***

The Snowmass Water and Sanitation District is a special district created under the provisions of the Special District Act, C.R.S. 32-1-101. The District was formed in 1966 to provide potable water and sanitary sewer service for the Snowmass Village area. The District operation consists of water and sewer systems.

*Water System.* The water system consists of a raw water intake system, a Water Treatment Plant to treat raw water and make it potable, a system of pressure zones, water tanks and water pipelines to deliver potable water to its customers. The Water Treatment Plant has a treatment capacity of 5.1 million gallons per day of potable water. The Water Treatment Plant utilizes mechanical filtration and ultra violet treatment to process raw water and produce potable water. Raw water is diverted from one of the three District sources of supply, Brush Creek, East Snowmass Creek and Snowmass Creek, or from storage at the Ziegler Reservoir and conveyed by pipeline to the Water Treatment Plant. Potable water storage tanks totaling in aggregate of approximately 6.2 million gallons are located in various District pressure zones to allow the District to manage water distribution during peak demand periods or during exigent circumstances.

*Waste Water System.* The waste water system consists of collection sewer mains and lift stations and a Waste Water Treatment Plant. The Waste Water Treatment Plant has a treatment capacity of 3.2 million gallons per day of influent. The Waste Water Treatment Plant is a mirror image 1.6 million gallon bifurcated system, allowing the District to use the minimum capacity for its primary and tertiary treatment. After completion of the treatment process, treated effluent is discharged into Brush Creek. Sludge waste from the treatment operations is taken to the Pitkin County landfill to aid in the composting project or to the District's sludge disposal site in Woody Creek.

The District recently conducted a review of its water rights inventory and its ability to serve future development and service requirements generally in the Snowmass Village

area (W. W. Wheeler & Associates, Dry Year Yield Analysis for Snowmass Creek Water Supplies and Evaluation of Raw Water Storage Requirements, 2006). As discussed more fully in Chapter 6, the District currently is serving a demand of approximately 4,900 equivalent residential units (EQR). On the basis of the planning the District determined that a reasonable estimate of its ability to reliably serve potable water is 6,200 EQR. The District determined that treatment capacity of the Waste Water Treatment Plant is adequate and can treat the anticipated associated influent from 6,200 EQR potable water usage.

The District is pursuing upgrades and capital replacement to its system, and is replacing older water and sewer pipelines with pipelines made of modern materials. The District anticipates that it will require approximately \$4,000,000.00 per year to conduct the upgrade and capital replacement program. The District is also seeking approval to expand Ziegler Reservoir to a total storage capacity of 225 acre feet with an estimated project budget of \$10,000,000.00.

### ***Wildlife***

The Comprehensive Plan Wildlife Map shows the habitat of three species of raptors, big horn sheep, and ptarmigan. Seasonal Activity Maps show critical habitat for mule deer and elk. These mapped species were selected from a broad range of mammals and birds because they have a high level of public interest or are an "indicator species"<sup>2</sup> for the area in and around Snowmass Village. Though the black bear attracts a high level of public interest, it was not mapped because its range covers the entire Town. The wildlife maps were created using Colorado Division of Wildlife (CDOW) data.

The United States Forest Service (USFS) has compiled a list of Management Indicator Species (MIS) for the Burnt Mountain area. These species are also of high public interest or are indicator species. Additionally, the White River National Forest has also drafted a list of sensitive species that are likely to occur in forested and nonforested communities in the area. The CDOW and USFS species lists should be kept on file in the Planning Department and reviewed when making planning decisions to ensure that impacts to indicator species or local sensitive species are identified. Development can then incorporate appropriate mitigation and ecologically sound design that protects the wildlife in Snowmass Village.

*Environmentally Sensitive Wildlife Areas.* Regulations to protect certain elk habitats are included in the Town Municipal Code. Town policy prohibits development in the elk calving, severe winter range, and migration corridors mapped by the CDOW unless certain conditions are met.

The elk that use habitats in or adjacent to Snowmass Village are part of the Maroon Bells–Snowmass Wilderness (MB-SW) elk herd. The size of this herd has been estimated at approximately 350 elk. The MB-SW elk herd combines with other herds in the winter, forming a group estimated at more than 600 elk that use the surrounding winter range.

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<sup>2</sup> Indicator Species are species whose habitat also meets the needs of an array of other species.

The 1994 Snowmass Ski Area Final Environmental Impact Statement (FEIS) indicates that half of the elk habitat has been rendered unsuitable because of nearby development on both private and national forest land. Since 1966, calving habitat has been reduced by 54 percent, and the migration corridor for the MB-SW herd has been reduced by 90 percent.

Because of habitat loss, protecting the remaining habitat should be a high priority if the herd is to remain viable. Elk habitats vital for protection include:

1. Calving Habitat (Production Areas). This includes but is not limited to the aspen groves in the Owl Creek drainage east and north of Burnt Mountain. This extends west through Owl Creek, Spring Creek, the East Fork of Brush Creek, and to the area immediately adjacent to the Pines. This also includes areas such as Kelley Park, Mandalay Ranch, and the USFS area prescribed as the future "4B" in the White River National Forest Plan.
2. Migration Corridors. These consist of several routes between summer and winter range areas, including but not limited to the three crossings on Brush Creek Road near the Droste and Seven Star properties and the crossings along Owl Creek Road.
3. Winter Range. In general, winter range located within Town limits extends north of Owl Creek Road, south and west of Highway 82, and east and north of Wildcat Reservoir. During winters with deep snows, winter range availability is the most crucial factor in the survival of the herd. Severe winter range habitat in the Snowmass Village area is located on the south or west facing oakbrush or sage-covered hills of the Seven Star, Droste, and Wildcat Ranch properties.

*Areas of Ecological Significance.* In addition to the elk habitat areas, there are three areas of ecological significance with elements that can support wildlife on a continuous basis and have a high biodiversity value:

1. Upper Eastern Section of the Snowmass Ski Area near Elk Camp.
2. Sam's Knob west to East Snowmass Creek and to the top of the Big Burn. These areas contain mixed conifer-aspen habitat that is used throughout the year by deer, elk, bighorn sheep, neotropical birds, raptors, carnivores, small and medium-sized herbivores, and ptarmigan. Land use decisions concerning the portions of the Snowmass Ski Area located within the Town's boundaries should insure preservation of the richness of this wildlife mix.
3. Habitat between Spring Creek and Owl Creek. This is a core area of species diversity due to the type of vegetation, abundant water and remoteness. It is of particular importance to elk and deer in the spring for calving/fawning and nursing.

*Dedicated Open Space and Other Areas of Wildlife Importance.* The Town owns the first two of the three open space parcels listed below, which have high value for wildlife. Any

development of public facilities and/or recreational uses should promote wildlife stewardship on these parcels. These areas include:

1. Open Space above Horse Ranch Subdivision. These 650 acres of open space have high value for wintering deer and elk. The open space is closed to all activity from October 30– June 20.
2. East Highline (Hidden Valley). This 200-acre parcel was deeded to the Town from the Snowmass Land Company for wildlife habitat preservation. It is located in the draw near the Town cemetery and was intended for elk spring and fall migration and winter range.
3. Horse pastures between Brush Creek Road and Horse Ranch Drive. This area is an important deer and elk travel corridor between the dedicated open space parcels. Preserving this area also ensures an undeveloped link for big game moving between winter and summer ranges.

*Current Wildlife Management and Mitigation Plans.* The Town currently has a number of plans and documents to guide the management of wildlife, including:

- Snowmass Village Elk Monitoring Study (2005)
- Greenway Master Plan (2000)
- Two Creeks and the Pines Wildlife Enhancement and Management Plan (1994)
- Snowmass Ski Area Wildlife Enhancement and Management Plan (1994)
- Snowmass Ski Area 1994 FEIS Mitigation and Monitoring Plan
- Snowmass Wildlife Committee Report (1991)
- Pitkin County Wildlife Taskforce and Report (1989)

These reports should be updated as necessary, formally adopted, and referred to during development review.

### ***Open Space***

The community views open space as an important resource, and recognizes that it provides several benefits. Preserving open space allows for protection of sensitive habitat, creates open areas in the built landscape, and promotes a rural character. Open space also provides a mental and spiritual benefit. The Town has an open space program and owns several parcels that are restricted to use as public open space. To better manage this resource, the community needs to understand why the land is to be kept open and what the best use is for the properties. We can start by inventorying our properties to identify the legal parameters that are keeping the areas open (i.e., deed restriction, public ownership, or development requirement). Knowing the ownership and potential for our open spaces will let us know where future acquisitions should occur as opportunities arise or needs are identified. Effort should be given to analyze management techniques and methods of acquisition.

### ***Environmental Sensitivity***

*Environmental Sensitivity Map.* The Environmental Sensitivity Map indicates all land that is markedly sensitive to environmental impacts from development. The Environmental Sensitivity Map indicates natural thresholds for the carrying capacity of the Town. The highest values have been placed on the protection of wildlife, stream corridors, steep slopes, open space, and scenic views. Sensitivity is determined by the resource's historical ability to recover from development impacts and remain sustainable. Some environmental resources do not change significantly over time, but other resources are dynamic and may need periodic impact assessment, evaluation, and monitoring. These areas have physical and ecological features of which preservation is essential to the Town's ability to maintain a high quality environment. The map covers the entire Town limits as well as the designated Influence Areas.

Physically sensitive features include:

1. Slopes in excess of 30 percent. These steep slopes are often highly visible, and development of them could have a major visual, safety, and financial impact.
2. Brush Creek. Brush Creek is important both for its scenic value and for its ecological value as a wildlife, wetlands, and riparian area.
3. Critical Wildlife Habitat. Critical habitat areas for indicator species can be both ecologically and visually sensitive areas.

The Environmental Sensitivity Map designates sensitive areas for preservation, conservation, open space, or low-density residential areas. All proposed development and redevelopment will be evaluated against this map. Proposed development that appears to penetrate any part of designated sensitive lands will require a site-specific review prior to approval regardless of the location.