

# **FALLS CREEK ALPINE RESORT**

## **SCHOOL PROJECT INFORMATION KIT**

Produced by  
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## INTRODUCTION

The Australian Alps are our highest mountain country, a magnificent area with spectacular landscapes, a rich heritage, and of vital importance for present and future generations. Most of the land in the alpine region is Crown (public) Land. Alpine Resorts are specially designated areas of Crown Land, managed for the State Government by individual Boards of Management. Land for resort development purposes must be leased from the Falls Creek Resort Management (FCRM).

The FCRM is responsible for municipal functions such as parking, road and village maintenance, public shelters, ski patrol and water and sewer utilities. Responsibility for the management of the adjacent Alpine Park lies with the Department of Natural Resources and Environment. This department was previously known as the Department of Conservation and Natural Resources (DCNR), Department of Conservation and Environment (DCE) and the Department of Conservation, Forests and Land (DCF&L).

Attitudes to public land use have changed considerably since settlement. Public land was once considered valuable for exploitative activities and "uses" such as mining, grazing and logging, it is now appreciated largely for its conservation and recreation values (DCE, 1992). Management authorities must balance the needs and values of a variety of user groups.

The ski industry makes a major contribution to the Victorian economy each year. Approximately \$211 million dollars was spent in Victorian snowfields in 1996. The FCRM aims to develop and maintain the Resort as a tourist destination in all seasons, to ensure development is demand driven, identify and facilitate development opportunities, provide major public sector infrastructure such as roads, car parks, and public amenities and, thereby encouraging private sector tourism expansion.

Falls Creek Alpine Resort is located in North East Victoria on the Northern edge of the Bogong High Plains in the East Kiewa River catchment. Falls Creek is 356 km from Melbourne. The total resort area encompasses approximately 1,500 ha. It is surrounded by smooth undulating mountains and abuts the Rocky Valley Hydro-Electricity Storage (lake). The Rocky Valley Storage is used for various water sports during the summer months.

Falls Creek Village is at an elevation of 1,550m. To the North East of the village is the Frying Pan Spur (rising to elevation 1,750m) and to the South, running East to West, is the Ruined Castle Ridge (elevation 1,760m). (Kinhill et al, 1989). The southern side of the ridge falls to the Rocky Valley Storage (elevation 1,600m) in the area known as Sun Valley. Snowline occurs at 1,400 - 1500 metres (ARC, 1992 facts).

The Falls Creek Alpine Resort has 450 ha of alpine ski field terrain with 145 ha groomed for downhill skiing and snowboarding. Nineteen lifts service 90 runs which comprise of 17% for beginners, 60% for intermediate and 23% for advanced skiers.

There are 15.1 km of groomed cross country ski trails within the resort connecting with a further 17.7 km of trails outside the resort area, within the Alpine National Park, making a total of 32.8km of groomed trails.

Village roads are closed in the Snow Season and all transport is via oversnow vehicles. Falls Creek is the only genuine ski in/ski out Resort in Australia, accommodation is provided with in the skiable terrain.

## HISTORY

### *FALLS CREEK RESORT*

Falls Creek was first called Horseshoe Creek by the early cattlemen. Due to the boggy conditions, horses often lost a shoe in this area. The creek was renamed by the Country Roads Board, while carrying out a road survey for the State Electricity Commission in 1938.

The first building to be erected in the Falls Creek area was a weather recording hut for the SEC – this was around 1946-1947. Mr and Mrs St Elmo-Beveridge lived in this hut and around 1949 they built a rope tow on the site where the Summit Chair is now situated.

The Skyline Lodge was the first lodge to be built and this was in 1948. In 1949, Bogong Ski Club lodge was built. Mr Tom Mitchell's lodge called Dawn was built that year. It was later called Magpie and has since been pulled down and Rocky Valley Flats now stands on that site.

Mr Bob Hymans built a small lodge in 1948/49 called Four Seasons and in 1950 he built a large two-storey lodge called Grand Couer. This lodge accommodated around 60 people. It was burnt down in 1954 and not rebuilt. Mr Hymans also built the first chairlift in Australia at Falls Creek in 1957.

By 1961 the St Elmo's rope tow and Hyman's chair had become unreliable and Alpine Developments Pty Ltd was formed and two lifts, the Summit and Village T-bar were installed. In 1984, Alpine Developments was sold to a new company Falls Creek Ski Lifts P/L. By 1996, the Mount Hotham Skiing Company, through BCR Asset Management, purchased Falls Creek Ski Lifts and continue to trade as Falls Creek Ski Lifts P/L.

### *FALLS CREEK RESORT MANAGEMENT*

The Falls Creek Tourist Area Management Committee, under the direction of the State Electricity Commission, came into effect in 1959 and from then on building sites were leased and building and sewerage controls were applied.

In 1979 the Victorian State Government had established the Ski Industry of Victoria Working Party with a brief to report on:

- Development of the Victorian industry within the framework of the Land Conservation Council recommendations for the Alpine Area and the Melbourne Study Area;
- The system of management by appointed Committees;
- The role of Local Government;
- Types of franchises to be granted to developers; and,
- Government support needed to promote the growth of the industry.

In a wide ranging report, published in November 1980, the working party recommended the creation of a single body (the Ski Resorts Council) to coordinate resort strategic planning, management, development and control, financing (Public funds), and standards.

Over the next three years the Government modified the proposal on a bipartisan basis with the Opposition to create an Alpine Resorts Commission with land management responsibility (instead of a Council with a coordinating role).

The Alpine Resorts Act 1983 established the legal framework for the Alpine Resorts Commission to exist, established its objects and powers, and set out the broad structure and functions of the organisation.

Whilst the first Commissioners were appointed in 1983, it was not until the 17<sup>th</sup> of April 1985 that the Commission assumed land management for Falls Creek.

Committees of Management were retained in the takeover process, to advise the Commission on matters pertaining to their respective resorts and to the industry as a whole.

The Alpine Resorts Advisory Council was established in 1989, as allowed for by the Act, to advise the Minister on industry matters.

The Act has been amended several times to improve management functions, overcome shortcomings in the original drafting, and to alter resort boundaries. Various sets of Regulations have been put in place for similar reasons.

By restructuring, tightened financial control and by other changes to management and operational practices the Commission has become a financially self-supporting agency. The ARC at the completion of its financial year (31 October) produces an Annual Report. This report is available to the public upon request.

From 30 April 1998, Victoria's alpine resorts have been under a new management structure. The new *Alpine Resorts (Management) Act 1997* provides for the resorts to plan and develop in a competitive atmosphere. The ARC has now been replaced by individual boards of management for Falls Creek, Mt Buller and Mt Hotham and an Alpine Resorts Coordinating Council.

## FALLS CREEK RESORT

### FACILITIES

- Accommodation
  - . 4,745 beds available on the mountain
  - . 2,500 beds available in Mt. Beauty (30 km away)
  - . 89 accommodation sites comprising of 35 flats/apartments, 26 lodges, 27 ski clubs and 1 motel
  - . of the accommodation above: (22) commercial lodges, (8) commercial flats
  
- Facilities: (snow season)
  - . entertainment
  - . boutiques and shops
  - . restaurants / cafes (25)
  - . ski school (alpine and cross country)
  - . ski hires (6)
  - . alpine skiing - 19 lifts
  - . cross country skiing – 32.8km groomed trails
  - . cocktail bars
  - . newsagent
  - . supermarkets
  - . chemist
  - . medical centre (24 hr doctor's surgery in winter)
  - . emergency services – CFA, SES, Ambulance, Police
  - . on slope public conveniences
  - . massage
  - . ski patrol
  - . locker hire
  - . banking facilities
  - . scheduled bus service
  
- Special Services for
  - . disabled skiing
  - . foreign race teams
  - . racing facilities
  
- Activities – Winter
  - . down hill and cross country skiing
  - . snow boarding
  - . tobogganing
  - . a calender of both racing and non racing events for the winter
  
- Activities – Summer
  - . fishing
  - . water sports on Rocky Valley
  - . mountain biking
  - . bushwalking
  - . chairlift rides
  - . tennis
  - . horse riding
  - . high altitude training

specific weekends for food, wine wildflower and music

## GEOLOGY AND SOILS WITHIN THE RESORT

Geological Time Line:

<i>Quaternary</i> holocene 10,000 (years before present) - Recent	<i>Cretaceous</i> Jurassic, Triassic Permian Carboniferous 350 - 65 million
<i>Quaternary</i> Pleistocene 2 million - 10,000	<i>Devonian</i> 400 - 350 million
<i>Tertiary</i> Pliocene, Miocene 23 - 2 million	<i>Silurian</i> 430 - 400 million
<i>Tertiary</i> Palaeocene, Eocene, Oligocene 65 - 23 million	<i>Ordovician</i> 500 - 430 million
	<i>Cambrian</i> 560-500million

The bedrock of the Falls Creek Resort Area is part of the "Omeo Metamorphics"; (Metamorphism refers to a change in the structure of rocks under pressure, heat, or chemical action). There are also patches of granite and basal within the Resort which have resisted erosion. The most significant geological feature is Ruined Castle which is granite outcrop, uncommon within this locality. (Kinhill Engineers et al, 1989).

Soil types within the resort are generally alpine humus soils. Although these soils are generally shallow, they are less susceptible to erosion here because of their metamorphic origin only moderate terrain and lower susceptibility of the resort to weather extremes. Considerable areas of bog or peat soils are also present and are highly sensitive to disturbance. These are generally located along the base of the slopes in the Sun Valley area adjacent to Rocky Valley Dam, and below Ruined Castle. They are also found in wet patches within the tableland ridge areas particularly along Frying Pan Spur around Headwater lift. (Kinhill Engineers, et al, 1989).

## SNOWFALL AND CLIMATE

### Snowfall

The 'alpine climate zone' is designated as that land having a continuous snow cover, on average for at least one month of the year. For mainland South-East Australia this usually corresponds to elevations above 1,300 - 1,400m, with a cover for up to 5 months at higher elevations. Average total annual precipitation, including snow and rainfall is 2,555 mm at Falls Creek. This is measured over a period of 42 years. Snowfalls occur on average 62.7 days annually and have been recorded in every season of the year. (Ruddell et al, 1990).

The average extent, duration and depth of the snow cover will vary throughout the year and in some cases differs between regions according to variations in accumulation and ablation (melting or wind erosion of snow). Snowfalls, which create and maintain a persistent snow cover usually begin about mid-June for all alpine elevations, and continue intermittently until early September. A deep cover does

not usually begin until early July. At Falls Creek the average maximum snowdepth is 110cm at 1842 m elevation (determined over a 12 year period).

Snow depth is not expected to be greatest on the upper mountain site because of high wind exposure and increased drifting of snow off the ridge.

### Rainfall

Rainfall is greatest over the alpine regions of Victoria during the winter months. Topography has a large influence on rainfall, with the greatest falls recorded at high elevations with a North Westerly orientation. Depending on the type of mountain range, the topography may block, deflect or separate the oncoming airflow. Hence different resorts are subject to varying levels of rainfall for a number of reasons. Thunderstorms with intense rainfall are prevalent in summer. (Ruddell et al, 1990).

### Temperature

In summer, monthly maximum temperatures vary from 30°C at the lowest elevations to 15°C at the highest. Days are hot and dry at lower elevations and cooler and windier higher up the mountain (LCC, 1977). The decrease in temperature with elevation (lapse rate) is close to 0.7°C/100 metres. (Ruddell et al, 1990).

The orientation of slope and steepness of the ground surface will affect the incidence of solar radiation. Lower levels of radiation will lead to lower temperatures. In alpine regions, northward facing slopes receive more solar radiation than southerly aspects. Similarly, the tops of mountains are exposed to more sunlight, while valleys sheltered by mountains will receive less sunlight. These factors are closely related to variations in snow depth at different locations. (Ruddell et al, 1990).

### Comparative Climate Statistics for Mt Beauty and Falls Creek

Town	Month	Elevation (meters)	Average Daily Temperature °C		Average Annual Rainfall (mm)	Wind Speed Km/h	
			Max	Min		1-5	21-30
Mt Beauty	Jan	366	29	12.5	71.5	17	<0.5%
	July		11	2			
Falls Creek	Jan	1510	19	9	54	12	9
	July		2.5	-3			

### FLORA

Vegetation in Victoria's Alps varies with altitude as a result of variations in temperature, duration of snowfall, frost and other influential factors such as soil type, landform and aspect. Each type of vegetation has evolved special characteristics in response to the prevailing conditions at various altitudes. Adaptations include seeds lying dormant over winter, a rapid growth period, seedlings develop root systems early, growth characteristics such as small growth to avoid the high winds or flexible stems so they don't break under the weight of snow. Plants in the alpine zone have also developed drought tolerances similar to desert areas, in response to the lack of readily available water, which is locked up in snow and ice over the winter months. A diverse number of species are present in the Victorian Alps - approximately 1,050 native flowering plant and fern species have been recorded including 92 grasses (family Gramineae), 64 sedges (family Cyperaceae), 24 rushes (family Suncaceae), 79 orchids (family Orchidaceae), 34 wattles (genus Acacia), 38 eucalypts (genus Eucalyptus), 22 beard - heaths (genus Leucopogon) and 18 buttercups (genus Ranunculus). There are also about 150 introduced plant species (LCC, 1977).

On the lower slopes, or tableland areas of the Alps, grassy woodlands and dry open forests occur. This type of vegetation generally occurs from an elevation of around 160m to about 900m (LCC, 1970). This is an open community of short trees with an understorey of grasses and small shrubs and occurs on shallow soils. Dominant species include Mountain Swamp gum (*Eucalyptus Camphora*) and Yellow Box (*Eucalyptus Melliodora*).

Open Forests (Dry sclerophyll) occur on steep West and North facing montane slopes and gentle lowland hills consisting of eucalypts and other trees with an understorey of shrubs and grasses. These forests occur up to an elevation of around 1,500m (LCC, 1977) and include characteristic species such as Red Stringbark (*Eucalyptus macrorhyncha*) and Broad leaved peppermint (*Eucalyptus dives*).

Tall Open Forests (West Sclerophyll) occur on steep moist land, South and East, facing montane slopes. These forests consist of tall eucalypts and other trees with an understorey of tall shrubs and herbs. Characteristic species include narrow-leaved Peppermint (*Eucalyptus radiata*) and Candlebark (*Eucalyptus rubida*).

Alpine Ash Forests occur at the upper levels of the steep montane slopes in a moist environment on soils built up by deposition from higher elevations. These forests occur at elevations ranging from 800 to 1,500m (LCC, 1977) and generally consist only of one species, Alpine Ash (*Eucalyptus dalrympleana*).

The sub-alpine area may be defined as the zone below the tree line and above the altitude where snow usually lies for several months of the year.

Sub-alpine woodland occurs at elevations ranging from 1,300m to 1,600m. This vegetation type consists of an open woodland community dominated by Snow Gum (*Eucalyptus pauciflora*) with an understorey of grassland or herbfield community.

The sub-alpine environment may also have other vegetation types including Alpine Shrubby Heathland, an open community of shrubs, interspersed with herbs and tussock grasses. It occurs on well drained soils in high rocky areas and is dominated by species, such as Yellow Kunzea (*Kunzea ericifolia*) and Alpine Grevillea (*Grevillea australis*). Tussock grassland also occurs in the sub-alpine environment. It consists mainly of herbs such as Prickly Snow Grass (*Poa costiniana*) and Mountain Gentian (*Gentianella diemensis*). It occurs on less well drained soils on undulating plateaux. Alpine Herbfield is another community of this zone and usually occurs on organic loam soils in relatively sheltered sites on undulating plateaux. It is dominated by herbs such as Snow Daisies (*Celmisia* spp.) and Snow Grasses (*Poa* spp.). Alpine bog occurs in permanently wet sites in basin areas on undulating plateaux and is dominated by species such as Sphagnum Moss (*Sphagnum cristatum*) and Pineapple Grass (*Astelia alpina*). Short Alpine herbfields are characteristic of damp, soaked sites where snow persists longest. They occur on undulating plateaux and are dominated by species such as Alpine Marsh Marigold (*Caltha introloba*) and Alpine Wallaby Grass (*Danthonia nudiflora*). All except Tussock grassland are also found in the Alpine zone.

Alpine vegetation which generally occurs above the tree line (about 1,600m) (LCC, 1977), consists of a mosaic of communities including several of those which are also found in the sub-alpine environment. Vegetation in the Alpine zone varies from dwarf herbfield, short herbfield, mossland (bog) and sedgeland. Alpine vegetation has high diversity.

Vegetation communities within the Falls Creek Alpine Resort area include alpine herbfields, alpine shrubby heathland, tussock grassland and sub alpine woodland. The more common varieties of these not listed previously include Billy Buttons (*Craspedia asteliifolia*) in herbfields, Leafy Bossiaea (*Bossiaea foliosa*) in heathland, and Alpine Rice-flower (*Pimelea alpina*).

The following flora species, recorded within the Falls Creek Alpine Resort, are listed as threatened on Schedule 2 of the *Flora and Fauna Guarantee Act 1988*:

Mountain Daisy (*Brachyscome Tenuiscapa*);

Wire-head Sedge (*Carex Cephalotes*)'  
Swarf Sedge (*Carex Paupera*); and  
Rough Eyebright (*Euphrasia scabra*).

The following flora species, defined as noxious weeds under the *Catchment and Land Protection Act* 1994 include:

Spear Thistle (*Cirsium vulgare*)  
English Broom (*Cytisus scoparius*)  
Blackberry (*Rubus fruticosus* sp. agg.)  
St John's Wort (*Hypericum perforatum*)

## FAUNA

Fauna of Victoria's Alps comprises 34 mammals, 183 birds, 30 reptiles, 17 amphibians, 13 fish and many invertebrates. Introduced fauna includes 10 mammals, 8 birds and 4 fish species. (LCC, 1977).

The diversity of mammals is greatest in the forests and woodlands of the mountain slopes. Some common mammals include the Common Wombat, Black Wallaby and Eastern Grey Kangaroo. Possums are also common such as the Common Brushtail, Bobuck, and Ringtail. Bats are also common, such as Gould's wattled bat. Only small mammals occur in the Alpine Zone with the exception of wombats and echidnas.

The bird species of the high country are generally the same as those present in the lowlands and forests. The Australian Kestrel and Pied and Grey Currawongs are some of the more common birds found at the highest altitudes, whilst at lower elevations, below the treeline, birds such as the Gang-gang Cockatoo and Crimson Rosella are common.

The distribution of reptiles is controlled by temperature, availability of sunshine and basking sites and presence of suitable protection from low temperatures in winter. High densities of lizards often occur around alpine summits. Two species that have a liking for high altitudes are the Alpine Water Skink found in spagnum bogs and the She-oak skink in sub-alpine woodland. Other characteristic reptiles include the Tree Dragon, McCoy's Skink, Southern Blue tongue and Copperhead snake.

Frogs dominate amphibians of the high country. There are an abundance of frogs because of the moist environment and generally clean water, and in fact half the frog species in Victoria are found in the high country (DCE, 1992).

Invertebrates highly outnumber vertebrates in Victoria's high country. They include arthropods (arachnids, crustaceans, insects, myriapods etc.), molluscs (snails, slugs and shellfish) and worms. As is the case with birds, some insects live in the alpine zone year-round whilst others migrate there during summer and leave during winter. Invertebrates form a vital part of the ecosystem, performing such functions as providing for higher animals, parasitising other animals (eg. ticks and lice), pollinating plants (eg. bees, wasps and flies), and consuming living or dead plant or animal material (eg. aphids, scale insects, lerps). One of the most fascinating insects of the High Country is the Bogong Moth.

The distribution of fauna is largely determined by habitat, which in many instances includes vegetation. Therefore, there is a certain degree of correlation between the distribution of flora and fauna. The factors that influence the distribution of vegetation, such as topography, soil type and temperature, also influence the distribution of fauna.

To cope with the cold, harsh environment, some species living in the Alpine zone, live beneath the snow during the winter months where there is space between the snow and the ground for animals to move around. Conditions are more favourable beneath the snow, because a constant temperature is experienced as opposed to above the snow. The Mountain Pygmy-Possum and the Broad-toothed Rat are examples of mammals that survive in such a way. Some animals also hibernate for the winter months.

In this situation, the animal's metabolism almost completely shuts down, and only the core of the animal remains functional. As a result the animals use very little energy, thus do not require food. This is particularly characteristic of reptiles and amphibians. Small mammals tend to hibernate in large groups to keep warm. This is known as annual nesting.

Other species, particularly birds and insects migrate from the Alpine areas during the winter months either to areas of lower altitude or northwards to warmer latitudes. Birds such as Flame Robins migrate to a lower altitude whilst others such as the Brush Cuckoo and Satin Flycatcher migrate Northwards.

The most common mammals in Falls Creek are the Wombat, Echidna, Dusky Antechinus (Marsupial Mouse) and Bush Rat. The Pygmy Possum is classed as endangered; there are about 3000 Adults on earth with 1/2 being found in the Alpine Areas of Victoria. They can be found in various sights over the Bogong High Plains, the largest colony being Timms Spur. The Broad Toothed Rat is classed as rare.

The following fauna species, recorded within the Falls Creek Alpine Resort, are listed as threatened on Schedule 2 of the *Flora and Fauna Guarantee act* 1988:

Mountain Pygmy-possum (*Burramys Parvus*)  
Stonefly (*Riekoperla intermedia*); and  
Stonefly (*Thaumatoperla alpina*).

The following fauna species, recorded within the Falls Creek Alpine Resort, are listed as pest animals, defined under the *Catchment and Land Protection Act* 1994:

Starlings, rabbits, hares, foxes, and feral cats.

## *ENVIRONMENTAL FACTORS*

The Falls Creek Alpine Resort is surrounded by the National Park. Therefore the resort ecosystems are obviously connected with the wider alpine environment. The Alpine Resort Management will ensure that environmental management is among its highest priorities and will strive to achieve a balance of environmental, ecological and development goals. An Environmental Policy is in place to help achieve these goals.

## **POLICY COMPONENTS**

**Environmental Expertise:** The Resort Management will use external advisers where the expertise is not included throughout the management staff.

**Strategic Planning:** Resort Strategy Plans will be formulated for the resort as well as overall resort development in Victoria. These plans will include Environmental Surveys, Environment Effects Statements, Rationalising Boundaries and Climate Change. Plans will be formally reviewed on a periodic basis.

**Statutory Planning:** The Department of Planning and Infrastructure handle the planning applications for the Resort. Alpine Resort Management Boards will have some input into decisions as will the Department of Natural Resources and Environment if relevant.

**Toward Minimising Adverse Environmental Impacts:** Development and management of the resort will be carried out in accordance with relevant Codes of Practise, EPA Guidelines and State Environment Protection Policies and in compliance with other applicable statutory requirements.

**Public Utilities and the Environment:** Public Utilities will continue to be assessed to ensure environmental sound practices are maintained and improved if applicable.

**Survey and Research:** While the FCRM is not primarily a research organisation, the acquisition of reliable research results is critical to its core business of responsible land management. It will therefore

continue to commission environmental studies and surveys to try to resolve specific questions that arise in the course of fulfilling its other principal objectives.

Education and Training: The FCRM recognises the need for the regular provision of environmental information and training to resort users and to the general public. The FCRM will promote training programs for employees of the FCRM and other interested commercial operators in the resort.

## *HOW YOU CAN HELP TO PROTECT THE FALLS CREEK'S ENVIRONMENT*

### Water Supply

Falls Creek Alpine Resort obtains its water supply from Rocky Valley Storage Dam. This precious resource is not in danger of running low at present but the management at the resort are always looking to reduce consumption. Some water conservation practices include:

- use a glass of water when cleaning your teeth;
- have a half filled bath instead of a shower to halve water use;
- always fill the dishwasher or washing machine, part loads waste water and cost you more electricity;
- don't use the toilet as an ash-tray or waste bin, each time a cigarette, paper tissue, tampon or condom is flushed down the toilet up to 13 litres of water is wasted.

### Hard Rubbish Disposal

- Windblown litter can arise when the garbage truck is unable to make a collection due to icy road conditions. You can minimise this problem by:
  - placing litter in plastic bags provided so that the wind cannot blow it away and place in the strategically placed garbage receptacles
  - reducing your waste and recycling where possible.

Many different types of packaging are used at the Resort. Some are environmentally unfriendly either as litter or buried in a tip. Take the initiative and wherever possible don't purchase packaging that won't breakdown naturally.

### Energy Conservation

While improved water use and waste minimisation are important energy conservation measures you can also take a personal responsibility for reducing electricity consumption. Some ideas include:

- turning off lights in unoccupied rooms; and
- wearing warmer clothes indoors to minimise heating requirements.

## *THE GREENHOUSE EFFECT*

Significant scientific research and concern has developed over possible changes in global and local climatic conditions. The nature and extent of these changes has not yet been established, however the potential impact on alpine areas of a warming trend may be substantial. It is extremely difficult to predict Greenhouse effects on annual snow precipitation and therefore, the viability of Alpine Resorts.

Preliminary results of a survey undertaken by the previous ARC and University of Melbourne indicate that "high interannual variability of snowfall overshadows any possible climate effects attributable to global warming" (University of Melbourne, 1990). Possible Greenhouse effects on Alpine Resorts may be summarised as:

- A shorter snow season as a result of increasing temperature, although variables such as precipitation, cloud cover duration, aspect and wind also influence season length.
- On average, snowline would probably rise in accordance with a lapse rate of  $1^{0c/100}$  metres elevation.
- Greater variations in snow season length and snowdepth. (Keage, 1990).

The current level of knowledge does not justify deferring needed development, however designs should show regard for non-snow use (ARC & DCE, 1990). Responses to these challenges may involve resort planning, ski field management practice, snowmaking and research. (Keage, 1990).

It appears that technology will be able to ameliorate many of the potential effects of Greenhouse (ARC, 1990). The deposition, accumulation and movement of natural snow may be increased significantly by collector snow fences and snow pumping technologies. Greater use of snow fence technologies, including research into ski area wind fields, is a major area of activity for the Australian ski industry. The ability to manufacture snow is probably the greatest technological advance for the Ski Industry since it provides an effective means of compensating for deficient natural snow cover (Keage, 1990).

Two research areas have value for Alpine Resorts.

- i) There is scope for consumer and marketing studies focusing on the year-round use of the Resorts that would also increase their economic viability.
- ii) Meteorological studies including microclimate studies of ski slope areas to assist with the operation of snowmaking facilities, and computer simulation of ski area wind fields to provide a detailed assessment of snow-fanning potential. Long term monitoring for climate change through the establishment of continuous recording automatic weather stations is an important study area. (Keage, 1990).

### *VISITOR STATISTICS*

The following statistics have been processed from data obtained during the 1997 Winter Visitor Survey conducted by the Alpine Resorts Commission. Administration, data processing and reporting has been undertaken by Yann Campbell Hoare Wheeler (consultants). The survey was conducted for a period of three weeks at the resort from Monday 18<sup>th</sup> August to Sunday 7<sup>th</sup> September 1997.

The key objectives of the Winter Visitors Survey were to establish a profile of visitors to the resort. To achieve this the Survey aimed to –

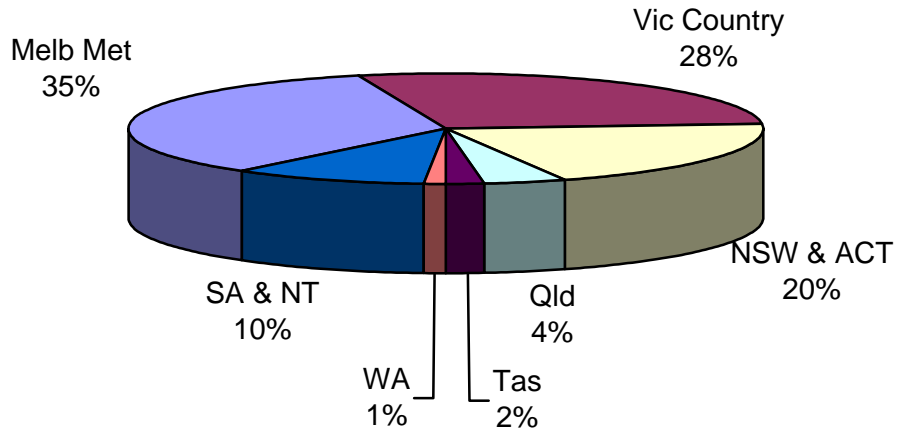
- Identify the specific characteristics of populations visiting the resort.
- Determine activities and usage patterns for individual resorts, and for the resort as a whole
- Collect data that will assist in the development of strategies to meet visitor requirements.
- Report relevant longitudinal findings.

A total of 1,473 car surveys were distributed and 1,630 bus surveys with a response rating of 40.7% and 15.3% respectively.

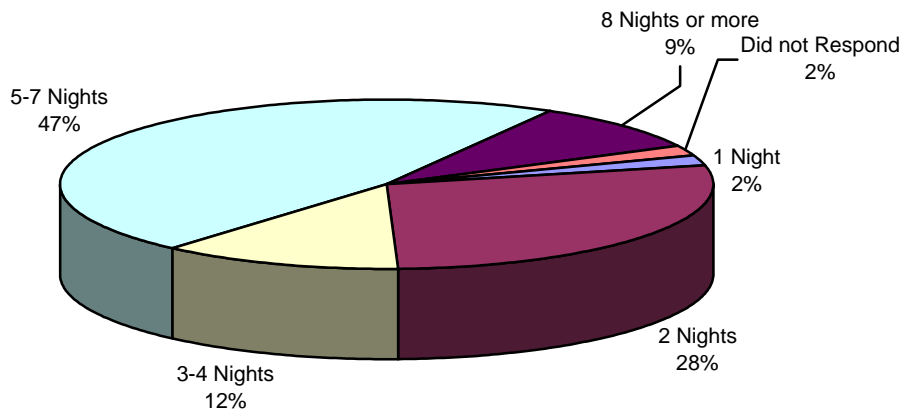
In order to obtain a statistically valid sample size, one survey was given to every third car, at Falls Creek, and 10 surveys were given to every bus and distributed randomly among the passengers. Whilst in the event that there were less than 10 passengers, every passenger was given a survey. The numbers of surveys to be distributed were based on estimates of the likely numbers of visitors and response level.

Summary of Some Survey Findings:

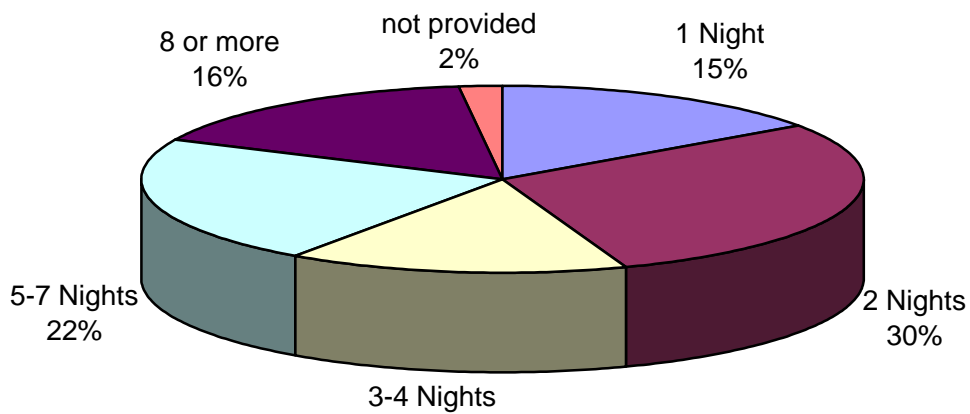
Origin of Resort Visitors



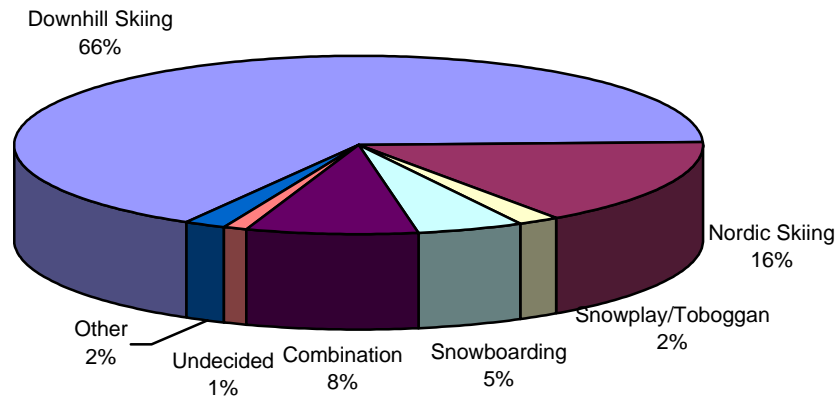
**Resort Visitors Length of Stay On Mountain**



**Resort Visitors Length of Stay Off Mountain**



## Main Activity of Visitors



There were a total of 131,198 visitors to Falls Creek during the 1997 snow season, staying for a total of 304,993 visitor days.

## RESORT OPERATIONS

### Resort Entry

The management at Falls Creek Alpine Resort are responsible for providing a wide range of services and facilities in the resort. These include snow clearing, Ski Patrol, Car Parking, Visitor Information, Snow Reports, Public Shelters and Facilities, Snow Play Area, Village Maintenance and Municipal Services.

It is necessary to charge Resort Entry as the revenue contributes significantly to the cost of providing these services and facilities. The revenue from Entry Fees benefits the resort at which it is collected. Expenditure priorities are determined by the Management Board. Resort Entry may be purchased at various outlets on and off mountain.

Vehicles are charged depending on how long the occupants are staying in the resort or travelling to the resort each day. Season permits are also available.

Drivers should see a parking attendant to ensure their vehicles are parked correctly. Parking fines apply to vehicles parked incorrectly or not displaying a valid entry ticket.

### Safety

Certain safety issues must be considered when planning to drive to Falls Creek. It is advisable to let your mechanic know about the impending journey and ensure your vehicle is equipped for snow conditions. Snow chains are required by law and must be fitted where directed anti freeze is essential. A shovel and torch may also be handy. The roads may be icy so drive at a constant speed and do not brake suddenly. Leave a safe distance to the vehicle in front and be on the lookout for snow clearing machinery.

The weather is unpredictable in alpine areas and can change dramatically quite quickly. You should go prepared for any sort of weather. You should have several layers of clothing including an inner insulating layer and an outer windproof and waterproof layer. Thinner layers are often better than fewer thicker layers. Woollen or polar fleece material is ideal for insulating because it retains insulation even when wet. A large amount of body heat can be lost from the head and neck so an

effective hat or balaclava is essential. Jeans and cotton/vinyl gloves do not give adequate protection against wind, rain or snow. A sunscreen with a high protection factor and good quality sunglasses or goggles are also a necessity.

If ski touring, let someone know before you go. You should include details of your planned trip, vehicle details and where the car is to be left, when you plan to return. This should be left with someone reliable whom you can contact as soon as you return and who can raise the alarm if you don't return on time.

There are some basic rules and precautions to ensure a safe and happy ski:

#### THE SKIER SAFETY CODE

- Never ski alone - particularly in remote areas
- Take special precautions with children. Be sure your child is warmly dressed. Make sure they know where to contact you when they are skiing.
- Always wear proper clothing, have good meals and stop when tired, Hypothermia and Hypoglycaemia can be fatal.
- Ski in control - be able to stop when necessary and be ready to avoid other skiers or obstacles. Do not stop where you will obstruct a trail.
- Be aware of changing snow and weather conditions. Regularly check bulletin boards for special notices.
- Don't drink before skiing. Alcohol and skiing don't mix.
- Be alert on tows - keep your lift ticket visible and move into a loading position quickly. If unfamiliar with loading procedures ask the operator for help.
- Entering a trail or starting downhill yield to other skiers.
- Retention devices - all skiers and snowboarders must wear retention straps or ski brakes, to help prevent runaway skis on alpine slopes.
- Bindings should be serviced at the start of each season by a qualified technician and activated at the beginning of each day.
- Have your skis tuned, to give maximum control, especially for icy conditions.
- When skiing keep clear of all roads.

#### **Snowmaking**

Falls Creek Ski Lifts has been making snow since 1985, longer than any other resort in Victoria. Falls Creek has the largest area of snowmaking in Victoria covering in excess of 100 hectares and 15 lifts. The snow making covers advanced, intermediate and beginner areas. Over 19 kilometres of underground air and water pipes with nearly 300 air/water hydrants spaced at 33 metre intervals, now cover the mountain. The quality of compressed air can be up to 14,000 cfm. They also have approximately 8 fan guns. These facilities have a capacity of up to 100 L per second being pumped. Snowmakers can produce the highest quality snow crystals, more dense in some instances than natural snow. There are 6 remote weather stations spread around the mountain, which are connected to a computer logging system.

Snow is made from water forced skywards through high pressure snowguns in freezing conditions (-2 degrees C minimum temperature requirements). A nucleating substance called "Snomax" is added to the water in the pumphouse to facilitate formation of snow crystals in higher temperatures. The droplets of water crystallise and the snow that falls to the ground is the same as natural snow. The quality of man-made snow can be varied according to the temperature and humidity. Water is drawn from Rocky Valley dam (at a mean temperature of approx. +2C) and pumped via the underground pipe network to the hydrants. Air from the compressors is also pumped to the hydrants, where a blend of air and water are mixed in the snowmaking guns. Information from the remote weather stations is logged into a computer control network. Snowmakers (people who control the system) apply a system of formulas to this information, to decide the best mix of water and air to create the optimum quality and quantity of snow. Using this formula, it is possible to control the texture of the

snow and make it drier or wetter, depending on the skiing requirements. The system also ensures the most economical use of resources. A mist of carefully controlled water droplets is sprayed into the air where nature takes over and snow crystals form. After a period of curing on the ground, the new snow can be groomed. Snowmaking facilities can produce snow with or without natural snowfalls.

### **Snowgrooming**

The work of the snowgrooming machines is vital to maintain the quality of the skiing terrain. Falls Creek has 8 Kassbohrer Groomers including a Winch Cat designed for steep terrain. Some of the tasks they perform include smoothing bumps and moguls, maintaining snow depth in high wear areas, reshaping and rebuilding ski trails, stockpiling snow reserves, pushing out windfences and snow drifts, removing excess snow around lift stations, filling creeks and covering rocks, spreading "man made" snow and packing of fresh snow. Kassbohrers can move masses of snow with their blades, and there is hardly a run on the mountain that hasn't been sculptured and reshaped to suit the skiers needs. If there is poor snow conditions, the snow tiller can improve the finish and create a decent ski surface.

The machines spend a combined total 80 hours each night working on the slopes in two shifts, 4.30pm to 2.00am and 2.00am to 10.30am. Due to safety considerations, the machines must be off the slopes during the Ski Lift hours and no grooming is done during the day.

Summer grooming consists mainly of slashing and maintenance of regrowth. Creeks are piped, rocks are removed, intersections improved and trails widened. The summer grooming program has made the skiing more reliable and has increased the ski area considerably over the last 5 years.

### **LAND MANAGEMENT ACTS**

The following Acts govern land management issues in the Falls Creek Alpine Resort:

*Forests Act 1958*

*Catchment and Land Protection Act 1994*

*Environmental Protection Act 1970*

*Environmental Effects Act 1978*

*Alpine Resorts Act 1983*

*Planning and Environment Act 1987*

*Conservation, Forests and Lands Act 1987*

*Flora and Fauna Guarantee Act 1988*

*Catchment and Land Protection Act 1994*

*Crown land (Reserves) Act 1997*

## Appendix 1

### SNOW DEPTHS 1984 - 1997

Centimetres at report date.																				
WEEK No:		Open Wkd	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
PERIOD ENDING, SUNDAY:		8-Jun	15-Jun	22-Jun	29-Jun	6-Jul	13-Jul	20-Jul	27-Jul	3-Aug	10-Aug	17-Aug	24-Aug	31-Aug	7-Sep	14-Sep	21-Sep	28-Sep	5-Oct	
1997		DUSTING	15	13	2.5	1	30	44	36	38	73	93	103	94	68	65	51	43	20	
1996		DUSTING	30	0	41	46	48	66	82	138	170	172	165	170	154	203	170	162	177	
1995			15	16	15	69	70	103	163	168	200	180	149	125	111	116	103	86	58	35
1994			2	24	55	56	42	42	43	57	78	94	94	93	70	56	51	52	54	59
1993			46	52	48	37	56	44	39	39	53	50	53	48	36	24	18	12	0	0
1992			0	46	32	26	30	43	61	59	55	56	118	145	172	217	226	223	205	181
1991			0	0	0	0	10	20	14	25	57	124	145	240	298	242	212	257	227	188
1990			8	0	11	90	181	172	140	173	153	227	262	282	272	262	267	227	204	170
1989			0	0	0	0	14	57	59	46	48	79	69	75	135	119	137	118	106	0
1988			46	43	48	46	41	36	38	106	94	108	85	85	103	90	78	55	30	0
1987			11	4	3	38	34	38	113	112	139	127	105	140	115	128	119	101	63	0
1986			0	0	50	65	77	97	98	103	102	100	149	142	148	141	128	128	99	70
1985			43	36	55	54	43	42	105	110	115	139	142	144	142	135	115	94	75	48
1984			0	0	2	3	12	22	26	19	31	70	90	170	181	165	147	127	135	120
Average (1997 - 1990)			14	18	27	40	51	60	75	85	94	113	122	141	149	141	133	123	105	73
Average (1996 - 1984)			14	19	25	40	50	59	74	85	97	117	126	143	150	142	139	127	109	81
<b>Lifts Operating</b>			1	6	5	3	5	14	18	14	14	19	19	19	19	17	19	17	12	

## GENERAL INFORMATION SOURCES

Land Conservation Council - can see copies of " <i>Report on the Alpine Study Area</i> " 1977 (very comprehensive) and " <i>Supplementary Report</i> " 1982, but cannot borrow from library.	(03) 9412 5551
Information Victoria Bookshop 356 Collins Street Melbourne (for Acts and Regulations)	1300 366 356
Falls Creek Resort Management	(03) 5758 3224
Race Information	
Victorian Ski Association	(03) 9699 3292
<b>Climate</b>	
Bureau of Meteorology	(03) 9669 4920
Falls Creek Resort Management (recorded weather for specific mountains)	1902 240 523
<b>Prices</b>	
Falls Creek Ski Lifts	(03) 5758 3280

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