

## 4.2 Cross Country Skiing

The major recreational potential of the Pisa Range is for cross country skiing.

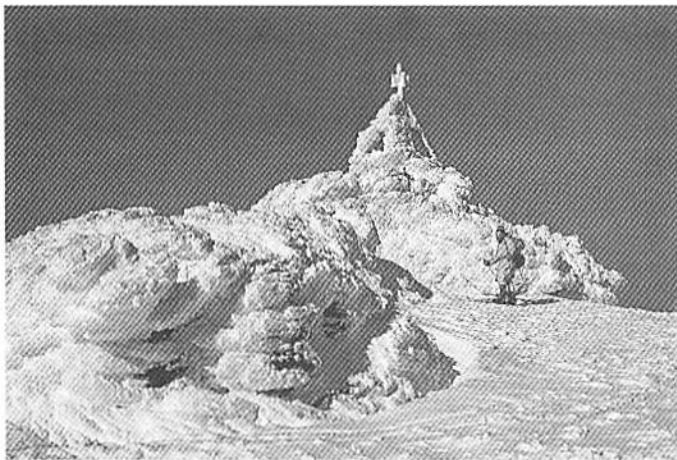
### 4.2.1 Conditions, and Amateur Recreation

Prior to the ready availability of 'nordic' equipment in the mid-1970's, the steeper terrain along the eastern escarpment was visited by ski tourers on alpine touring equipment. Access entails a major climb on foot from the Clutha Valley to establish an overnight camp at Lake McKay. This activity continues.

As is the case on other Otago block mountains, new perceptions of the Pisa's cross country potential have grown under overseas influences, especially from North America and Australia, and from rapidly increasing domestic participation.

The Pisa Range exhibits a full gamut of terrain to suit a wide variety of skier abilities. There are extensive, gently rolling high tops; relatively sheltered, easy valley systems (generally confined); and short, steep valley and cirque walls for the expert.

Unlike many other ranges, the whole back-slope of the Pisas is skiable, without major breaks due to inadequate snow cover or rugged terrain. This allows a large variety of ski tours, from camping bases on the Criffel Range, from within the Roaring Meg headwater tributaries (several), the Lake McKay area, or from Mt. Dottrel-Mitre Rocks to the south.



*Pisa summit.* Photo: Don Greer

Winter snow cover on the plateau appears to be consistently good season-to-season. However, the highest crests and saddles, and the leeward lip of the eastern escarpment have more variable snow cover due to wind exposure. The Pisas provide the largest cross country ski area close to the Southern Lakes district.

However, it appears that although the terrain and snow cover is excellent, the range shares, in common with other Otago block mountains, severe climatic limitations to recreational use. 'White-out' conditions and strong winds occur frequently. With an absence of shelter, and indistinct topography, under poor conditions one can quickly become totally disorientated (*i.e.* lost).

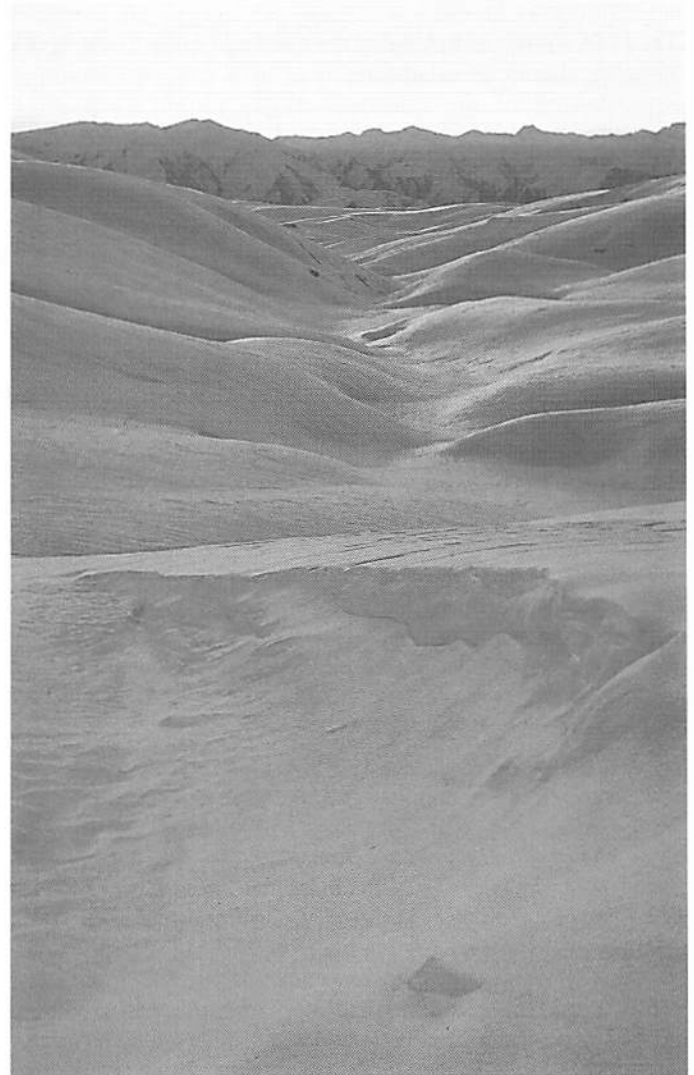
Mountain club experience over many winters indicates that basic safety requires competence in alpine navigation (map and compass use) and snow survival skills, plus the carrying of

overnight survival equipment. The rapidity with which the weather can change, means that no reliance can be placed on travelling light, and locating a hut or known navigational feature if the weather suddenly deteriorates. Self-sufficiency in skills and equipment are essential.

### 4.2.2 Commercial Recreation

Since 1980 commercial operators have promoted the Pisas as a cross country ski destination. In separate ventures, two huts were built, with access by 4WD and ski in one instance, and by either skiplane or helicopter in the other. One of these operations has ceased and the hut removed.

Central in plans for commercial activities on the Pisa Range has been a pastoral lessee, who leases the Roaring Meg headwaters above the Cardrona Valley. His scheme has brought to public attention the issue of public versus private interest in high country pastoral leasehold lands. The rights and effectiveness of Crown agencies acting as landlord, the extent of lessees' legal and perceived rights, and policies for the protection of the public's interest, have all been tested by this case.



*Sunset in the Roaring Meg headwaters.*

At the official level the balancing of interests is dealt with at length by the Land Settlement Board's (LSB) Commercial Recreation Policy. This continues to apply over pastoral lands despite the demise of the Board. A pastoral lessee has no legal

entitlement to change the use of the land, only a right to graze within conditions prescribed by the landlord. Therefore any commercial recreation venture requires consent by means of the issue of either a recreation permit or special lease. To proceed without such consent legally renders a pastoral lease liable to forfeiture by the Crown.

FMC has taken an active interest in the growth of commercial activities, relative to rights of amateur recreationalists to continue using these lands. The legal reality is that a pastoral lessee holds trespass rights over all the land contained within a lease, irrespective of lack of pasturage or seasonal unavailability due to snow cover. In the Pisa case, the developer-lessee wishes to retain control of all recreational activities, for a mix of commercial and public safety reasons. FMC acknowledges that the use of private facilities by 'freedom skiers' is a privilege that cannot be expected to continue, however rights of independent entry and recreation on Crown lands must be assured.

When developments on the range were publicly mooted in 1983, FMC sought and received an assurance from the Department of Lands and Survey that any authorisation of commercial activities would be in terms of the Land Act and the LSB's high country policies. The policies require public advertisement of applications, hearing of objections if any are received, and decisions in accordance with policy.

A recreation permit application was received in late 1984 and later advertised for public comment. FMC submitted that high lands unsuitable for grazing (Class 8 and severely eroded Class 7) should be surrendered from the pastoral lease, and public foot access up the road alignment thereto guaranteed. Safety requirements for extended cross country skiing were also suggested, to be stipulated as part of a recreation permit. Reservations were also expressed over unrestrained snow mobile use conflicting with the non-motorised nature of cross country skiing. FMC prefers confinement of these intrusive machines to one 'main activity area'.

The Federation was perturbed by the construction of a 'farm and winter access track' early in 1985 up the Cardrona face, under the authority of an earth disturbance permit issued by Lands and Survey which 'considered this matter as part of the proposed cross country skiing operation.'<sup>(10)</sup> Subsequently (1987) the road was widened and partly realigned, exceeding the authority of a further permit to metal the formation. By such means a substantial investment towards establishing a commercial ski area was made without the prior obtaining of proper consents.

After a hearing (late 1985) by the local Land Settlement Committee of the application for a recreation permit, and of FMC's *conditional* objection, a permit was granted with the surrender and foot access provisions requested by the Federation. The permit is to apply over the surrendered land (to become Unalienated Crown Land), and the balance of the pastoral lease subject to commercial activity.

The applicant applied for a rehearing asking that surrender be struck out and with foot access provided not up the road but by a more circuitous route. The rehearing by the LSB in May 1986 confirmed the original decisions.

The terms of the confirmed offer of a recreation permit have been rejected by the applicant as unacceptable. Despite having

no rights to proceed with commercial activities, placement of facilities, promotion, and guided skiing continues. Patrons are utilising the road, huts, equipment, and guides. Widespread snowmobile use is also occurring. The extent of this activity was to be subject to a development plan and official approval, as a further condition of the recreation permit. Other operators have also advertised their services.



'1987 N.Z. Cross Country Ski Championships', Roaring Meg Valley.

There are increasing references to the Pisa Range as the venue for international skiing events, including Winter Olympics; the developer now wishing to create a commercial ski area of international standing. These changing circumstances reinforce the need for balancing commercial aspirations against the protection of this outstanding natural area, and of the rights of independent users.

FMC is of the view that the balance struck by the Land Settlement Board between the respective interests is the best guarantee that everyone's rights will be protected. Consequently the legal requirements protecting the Crown and public interests must be complied with.

#### 4.3 Summer Recreation

Currently summer recreation is limited to some 4WD and trail bike use on farm access tracks, and botanical visits by individuals and conservation groups. Lake McKay is a frequent destination. With road access now from the Cardrona Valley, it is expected that greatly increasing visitation will occur. Plans for an all-seasons 'alpine' village at Cardrona will inevitably have its effects on the types and intensity of recreational use on the Pisa Range. This could have detrimental impacts on natural values within the Pisa Tops PNA.

There is potential for horse riding, particularly along the Roaring Meg, Cromwell-Cardrona, and Criffel pack tracks.

The Criffel gold workings are of interest for the energetic walker who wishes to piece together the network of water races and other field remains.

The Cardrona-Roaring Meg pack track has been proposed for walkway designation. There are no physical difficulties with this route. Its identification and use as a Walkway will be desirable as Cardrona develops in to a holiday resort.

## 5. Zoning

### 5.1 *Natural Experience*

The main Pisa plateau and crest between the Mt. Dottrel area, to above the 'Lochar Burn ridge,' is zoned *natural experience*. This contains all the Pisa Tops PNA plus extensions to the S.E and N.E.

The zone should be managed for the primary purpose of nature conservation, with compatible recreation (commercial and public) as secondary uses.

Because of outstanding conservation values, and intensity of recreational interest in the area, the whole zone should be under public control and management. This will provide some assurance that commercial operations do not degrade conservation values, and that an equitable balance is struck with public recreation needs. Remaining under pastoral lease tenure, in the presence of either authorised or unauthorised commercial activities, can provide no such assurance.



Luggate Creek, Criffel Range.

### 5.2 *Open Space*

The Criffel Range, and all the mid to low-altitude flanks of the Pisas, are zoned *open space*.

The whole upland is an imposing massif as viewed from its encircling highways. There is a need for retaining harmonious landscapes by earth disturbance controls, on the basis of qualified advice from the Department of Conservation (DOC).

Extensive grazing can continue over the greater balance of the zone, although local 'trade-offs' (part surrender for part freehold) may be required in the future for partial reclassifications of individual pastoral leases. However, Class 7 lands should remain in Crown ownership.

PNAs, and historic sites and trails are contained within the zone. The latter will require further assessment. Many of the PNAs can be adequately safeguarded by covenanting, however areas of public interest require reservation.

Provision needs to be made for public access on to the Criffel Range and Queensberry Hills, in view of their winter recreation potential. There is a major need for formalised public foot access to the Pisa Tops from a variety of different approaches.

## 6. Recommendations

### *Natural Experience Zone*

6.1 Class 8 and severely eroded Class 7 lands be progressively removed from pastoral leases, with immediate removal of areas subject to commercial recreation activities.

6.2 The whole natural experience zone become a Conservation Area under DOC.

6.3 Public management planning procedures be initiated immediately on lands identified for surrender from Waiorau pastoral lease, to resolve the following issues related to commercial recreation:

- \* the protection of natural/landscape values;
- \* extent and location of commercial facilities/huts;
- \* extent of poled ski routes and set tracks;
- \* permissibility of aircraft landings;
- \* permissible extent of oversnow vehicle use;
- \* extent of commercial recreation, and vehicle use, during non ski season;
- \* the number of operators permitted in this area.

Note: (i) Many of the above could be best resolved through a recreational zoning approach on this one property, to be extended over the whole Conservation Area as further areas are added. Procedures for temporary accommodation of international ski events should also be established, where these require the use of areas that would normally exclude set tracks and snowmobile use.

(ii) Development/operational plans submitted from holders of recreation permits should be in conformity with the management plan. In the interim, only relocatable facilities should be approved, confined within the 'main activity area' approved by the LSB.

6.4 The provision of public huts be considered as part of the management planning process.

6.5 Beyond the provision and maintenance of wheeled vehicle access during the ski season, no further earth disturbances be permitted.

### *Open Space Zone*

6.6 Public foot access easements be provided:

- \* to Mt. Michael;
- \* Lowburn Valley - Mitre Rocks - Mt. Dottrel;
- \* Lochar Burn track to Lake McKay;
- \* from Cardrona through Waiorau pastoral lease;
- \* Crown Range saddle - Mt. Hocken - Queensberry Hill - Tuohys Saddle

6.7 Provide public access easement from Mt. Barker Road to start of legal road alignment along Criffel Diggings track.

6.8 Vehicle access on farm tracks continue to be at the discretion of the runholders as owners of these formations.

6.9 Reserve Luggate Creek and Lochar Burn PNAs, and provide public access thereto.

6.10 Apply the LSB Rural Landscape Policy to any roading or other earth disturbances on the Clutha and Cardrona faces of Pisa and Criffel Ranges within pastoral lease.

6.11 The potential for walkways and horse trails along the

Cardrona-Roaring Meg and Cardrona-Cromwell pack-tracks be noted for future utilisation.

Note: *These are legal 'paper' roads which should be retained.*



Spring camp.

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## OLD MAN, OLD WOMAN and CARRICK Ranges

### 1. Landforms

The **Old Man Range** forms the south-westerly boundary of Central Otago's block mountains. Its easterly escarpment rises moderately steeply from the Clutha Valley to a gentle, convex summit crest at 1440-1690 m. Western back-slopes are drained by two high altitude basins, both parallel to the summit plateau. The Fraser River drains northwards from Hyde Rock and truncates the range as it turns eastward to the Clutha River. The Campbell Creek tributary of the Waikaia River drains westward from south of Hyde Rock. Its upper catchment consists of a gentle-floored glacial basin at 1200 m.

Two cirques and a number of nivation formations occur below the leeward (eastern) crest of the range. The most developed example is below Hyde Rock in the headwaters of Gorge Creek, with a spectacular headwall over 150 m high. An unnamed dividing range 18 km long between the Fraser and



Gorge Creek cirque.

Waikaia catchments, connects the Old Man and Old Woman ranges. This is a gently rolling crest from 1500 to 1600 m.

The 10 km long **Old Woman Range** rises to 1690 m before dropping to Duffers Saddle in the north. It is very similar in relief to the Old Man Range.

The **Carrick Range** is a northwards extension of the Old Woman Range. It terminates on Mt. Difficulty above the Kawarau Gorge. This range is different in character from the higher block mountains of Central Otago, being more dissected by narrow gullies and relatively sharp ridges. The crest height is markedly lower than the adjacent ranges.

The summit plateau of the **Old Man Range** is well known for mountain tors. Clusters of schist tors stand as stark sentinels above smooth, easy rolling surfaces. There are a variety of forms, the most spectacular being vertical shafts with one of the highest examples to occur in Otago being the Obelisk. Others are overhanging pedestals or of irregular block form. On the eastern foothills fretted tors provide a dominant craggy landscape which extends down to the environs of Alexandra.



Patterned summit topography(Class 8), towards Fraser head-basin, Old Woman Range, and Remarkables.

Around what must have been a Pleistocene snow cap, patterned ground has developed, providing the greatest variety and most well formed periglacial features to be found in New Zealand. On north-eastern slopes below the range crest, solifluction terraces and lobes developed from slow creeping action. Some of these are up to a metre high at the face and appear to still be active. They occur as broad, gentle steps several metres apart.<sup>(2)</sup> Further downslope, solifluction and slumping processes have rippled the whole surface topography. On colder, gentle surfaces around the summit crest, earth hummocks have been heaved up by frost action. These merge into parallel stripes on sloping surfaces. These can cover hundreds of ha, but are largely absent from the wind-eroded summit where the underlying schist is uncovered.

## 2. Climate and Vegetation

### 2.1 Climate (3,4,5)

Although the topography is far from being rugged, the climate of the alpine zone certainly is. Even when Alexandra is sweltering, temperatures can be freezing on the tops. The mean annual temperature is close to freezing point. Air temperatures well below freezing occur in the alpine zone during all months of the year. Even during the warmest month, February, freezing occurs on about 40 per cent of days.

Mean annual precipitation on the top of the Old Man Range is about 1800-2500 mm compared to a sixth of that at Alexandra. The very strong precipitation gradient with increasing altitude is due to the prevalence of dense cold fogs which occur as cloud

caps almost 60 per cent of the days of the year, and maximum precipitation in the form of snow during winter. Snow falls in the alpine zone almost every month of the year and forms a near continuous cover for 4-6 months. Some snowbanks may persist throughout summer and autumn in leeward cirques.

Wind speeds increase logarithmically towards the summit, with a phenomenal average velocity of 20 km per hour. Wind direction is predominantly westerly (NW and SW) and is responsible for major snow redistribution into leeward depressions.

The summit plateau of the Old Man is among the harshest alpine environments recorded in New Zealand.

### 2.2 Vegetation (3,6,7)

Several distinct vegetation zones are distinguishable over the 1500 m rise from Clutha valley to summit crest of the **Old Man Range**.

On the lower northern flanks there are extensive semi-desert scabweed communities which have been induced from the original short tussock grassland by overgrazing by both sheep and rabbits. Above this zone and on lower and wetter eastern faces is a light cover of short, fescue tussock grassland supporting oversown exotic grasses and clovers. Matagouri is generally prominent, giving a savannah-like appearance to the vegetation. With increasing altitude the shorter fescue tussock grades into the evergreen narrow-leaved snowgrass, to be completely displaced above 1000 m. The golden spaniard is dominant where tussock cover has been depleted by fire. The shorter slim snowgrass becomes dominant at the upper extent of the tussock grasslands.

A well defined, narrow zone of the dwarfed blue tussock prevails between the tussock and high-alpine zones. This is thought to have resulted from burning and heavy grazing of snow tussock shortly after pastoral occupation. Within the high-alpine zone there is an alpine tundra with three distinct types of vegetation. Extensive herbfields, dominated by the mountain daisy *Celmisia viscosa*, occupy more sheltered localities. Extremely dwarfed, moor-like cushion vegetation occupies the highly exposed summit plateau. Bare rock pavement and sand-blasted cushions attest to the severity of growing conditions. In snowbank areas there are concentric bands of different species with different requirements for growing and flowering seasons. The micro-environments provided by patterned ground, shelter, length of snowlie, and drainage produces a diverse vegetative mosaic. The alpine vegetation exhibits a rich species and community diversity.

Peat bogs occur in gullies or as blankets over more extensive areas of the almost level Campbells Creek - Pomahaka divide. The vegetation consists of dense mats of *Sphagnum* mosses and grass species.

Vegetation patterns are similar on the **Old Woman Range**; however, drier conditions combined with impacts from fires and grazing has largely eliminated snow tussock as dominant species. Blue tussock and herbfield, with scattered slim snowgrass, occurs over the alpine zone, with depleted fescue tussock (alpine and common) at lower altitudes.

The drier and lower **Carrick Range** has a sparse cover of fescue tussock, severely depleted on lower, sunny faces. The fire-resistant golden spaniard is locally dominant to the extent

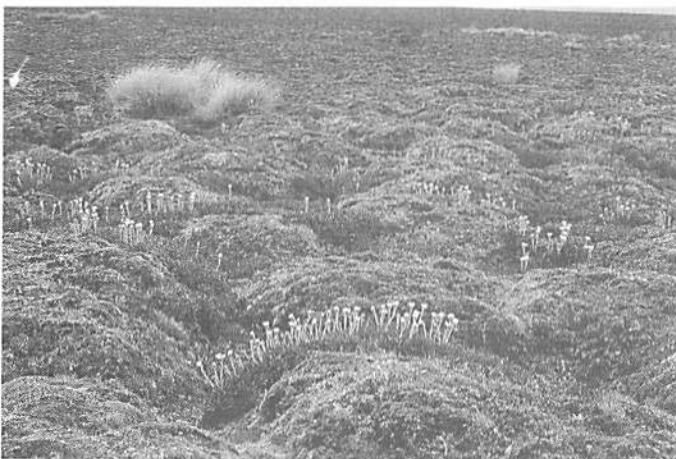


*Wind-deflated crest, Old Man Range.*

that foot travel can be impeded. There are extensive areas devoid of vegetation, with the remaining subsoil subject to the ravages of wind and frost erosion. Southern catchments have the narrow-leaved snowgrass, however the slim snowgrass is virtually non-existent. The alpine fescue tussock is present as a successor of snowgrass.

The whole area is within the Old Man district of the Central Otago Ecological Region.

*Alpine hummockfield on Old Man summit.*



### 2.3 Wildlife

*Sphagnum* moss bogs and associated tarns support what appears to be distinct alpine breeding populations of pied oystercatcher, black-backed gulls, and banded dotterel in surrounding tundra areas. In common with other Central Otago block mountains, these summits are the only places in the world where an oystercatcher nests at high altitudes.<sup>(8)</sup> The alpine wetlands are of prime importance to waterfowl and wading birds. Damage by trail bikes and cattle could threaten the future of these populations.<sup>(7)</sup>

The New Zealand falcon is widely distributed through the whole region. The relatively sparse native bird populations today contrast markedly with those at the time of first settlement. Wekas, ducks, dotterel and flocks of parakeets were then common.<sup>(9)</sup>

## 3. History and Land Use

### 3.1 Gold Mining

The Old Man Range first achieved notoriety when over 500 men became isolated at Campbells diggings during the winter of 1863, as snow piled up and provisions ran out. Many escaped down through the Waikaia bush, while others attempted to reach their source of supplies in the Clutha Valley by crossing the crest of the range. Despite there already being

a poled route across 'The Glacier', as the crest of the range was known, (*the poles were 180 m apart, 4.5 m high, with wire strung between*<sup>(10)</sup>) at least 34 miners lost their lives. Two further deaths occurred in a December blizzard.<sup>(11)</sup> After these disasters the Government erected a new set of poles in early 1864 (*300 poles, 3 m high, 40 m apart, suspended wire, plus two shelter huts*<sup>(10,11)</sup>) but this proved to be useless as most poles were completely covered by snow that winter and the wire either broke or was completely covered by up to 15 cm of ice.<sup>(10)</sup> At that time the mining population at Campbells was down to fifty. Lives continued to be lost in storms over the years, including two packers on route between Roxburgh and Campbell's Gully in the early 1870's, and in 1897.<sup>(12)</sup>

Little remains of the historic snowpoles, however more recent poling marks the route of the county Waikaia Bush Road which dates from 1886. The Government erected a monument to the victims of the 1863 winter at Gorge Creek, near the site of the former packers' town of Chamonix.

The major area of mining interest on the Old Man Range was Potters No. 2 diggings at 1200 m in the lower Campbells Gully, where extensive shallow sluicings were continuously undertaken from 1863 until the turn of the century. One of the principal mining ventures in this locality was the Tunnel Claim in the bed of Campbells Creek. A 'flood race' involving massive stone channels with walls 3.5 m high, and tunnels were constructed to divert the flow out of the creek bed. The last miner to live in the locality left for warmer climes in 1923, after 50 years on-site.

Mining interest continued intermittently into more recent times, as indicated by a water race from the head of Campbells Flat being used for sluicing at Potters until some time after 1953.<sup>(12)</sup> The east branch of the Waikaia has also been of long standing gold mining interest, with activity continuing to the present day.

Auriferous quartz reefs were discovered at a few localities high on the range, with intermittent prospecting and mining occurring from the 1870's to 1920's. The particularly high Nicholsons or Alpine Reef was mined in 1877-79 in the Fraser Basin, with crushing machinery installed.<sup>(12)</sup> A 6.8 m diameter all-steel water wheel was left on site, until it was removed in 1968 for display outside the Alexandra Museum.<sup>(13)</sup> A small stamping battery was removed from Whites Reef high above Fruitlands during the 1970's, although a well constructed stone hut remains nearby. There are very extensive alluvial workings at Bald Hill Flat (Fruitlands), where numerous stone cottages also remain.

From late 1862 alluvial gold mining took place at Bannockburn and in the Nevis Valley. By 1870 mining of quartz reefs high on the Carrick Range was in full swing but was in decline by 1876. Right up until 1921 there were brief revivals; however declining yields at greater depths and shortage of water mitigated against greater activity. Coal for powering the numerous stamping batteries had to be hauled uphill from Bannockburn.<sup>(9)</sup>

Evidence of this era is scattered over the Carrick Range, with numerous miners' huts, especially at 'Carricktown' halfway up the range. A water wheel dating from 1874 and a battery remain near the range crest. The 25 km Carrick Water Race dates from 1872-77. This draws from the Coal Creek catchment of the northern Garvies, and crosses Duffers Saddle

on the Old Woman Range. It still supplies irrigators at Bannockburn.

### 3.2 Pastoralism

The first attempt at pastoralism in the district was in 1858 when H.P. Morse attempted to stock his newly selected Earnsclough Station. The necessity of crossing the unbridged Clutha River delayed him in this, but by 1861 a new owner had 2300 sheep on the property.<sup>(14)</sup>

The huge Kawarau Station was the next to become established in 1858, when everything north of Watts Rock (Carrick Range) between the Clutha and the Remarkables was taken up.<sup>(9)</sup> Shortly afterwards another pastoral licence was issued over the lower eastern face of the Old Man Range.

It was not until 1869 that the remaining country, being of high snow risk, was applied for and four more licences issued.<sup>(15)</sup> The 1878 winter took a heavy toll on sheep numbers, where on one property alone 60,000 sheep were lost, being half the flock. Such catastrophic set-backs caused abandonment of some licences.<sup>(12)</sup> Several of these very large runs were broken up during the 1880's. Present-day run boundaries largely result from further subdivision in 1910-11.<sup>(12)</sup>

Since rabbits were introduced by Fraser of Earnsclough Station to provide *sport*, they have proved to be a scourge, especially on the lower semi-arid country. Earnsclough was abandoned to the Crown about 1900. A subsequent lessee employed 32 permanent hands for rabbit control, removing 250,000 in the first five months of 1902.<sup>(14)</sup> Rabbits remain a substantial problem today on this and adjacent properties.

In addition to grazing effecting substantial changes to the composition and vigour of the native grasslands, pastoral activities have resulted in rough 4WD tracks along the length of the summit plateau, usually associated with boundary fencing. These fences are now largely derelict due to the impracticality of maintenance against snow damage. A 9 km section from the summit of the Old Woman towards the Old Man Range remains untracked. More recent vehicle track formation has occurred with the bulldozing of a track from near Hyde Rock down into the Waikaia for mining access. This is one of the very few vehicle tracks visible from within the adjacent Garvies *remote experience zone*.

The Carrick and Old Woman ranges are substantially roaded and tracked for farm access and water race maintenance.

### 3.3 Hydro-electric Development

The Earnsclough Dredge Company constructed a hydro-electric scheme on the lower Fraser River to power its gold mining machinery. This plant was replaced by a Power Board scheme in 1964, having an output of 2500 kilowatts.<sup>(16)</sup> The Fraser Dam's storage is also used for irrigation.

### 3.4 Land Tenure

Existing land tenure is predominantly pastoral lease. The large Earnsclough Station occupies the Fraser catchment and the northern end of the Old Man Range, while there are four more pastoral leases over the remaining Clutha Valley faces. The upper Shingle/Boulder creek catchments until 1979 was under pastoral occupation licence, but this has been incorporated into pastoral leases. The Otago Catchment Board (OCB) recommended that half the area, being poor Class 7 and 8

lands, should not be so disposed of. The lessee's interest in the 'Bains block', covering the upper Campbell basin and Pomahaka Valley, has been purchased by the Crown for implementation of the Protected Natural Areas (PNA) programme (*see also 3.8*). Whitecombe Station occupies the Waikaia flanks.

The Old Woman Range is divided between four pastoral leases, with a common boundary along its crest.

The southern Carrick Range has two pastoral leases, while the northern half down to the Kawarau River is a recently reclassified renewable lease/new pastoral lease. The 38 ha Young Australian Historic Reserve around the water wheel and battery on this range, is managed as part of the Otago Goldfields Park.

### 3.5 Land Use Capability <sup>(17,18)</sup>

These ranges are predominantly Class 7, with severe climatic limitations for pastoral use, covering steep lands and rolling tops with potentials for moderate to severe sheetwash and wind erosion. The highest crests above 1400-1500 m are Class 8.

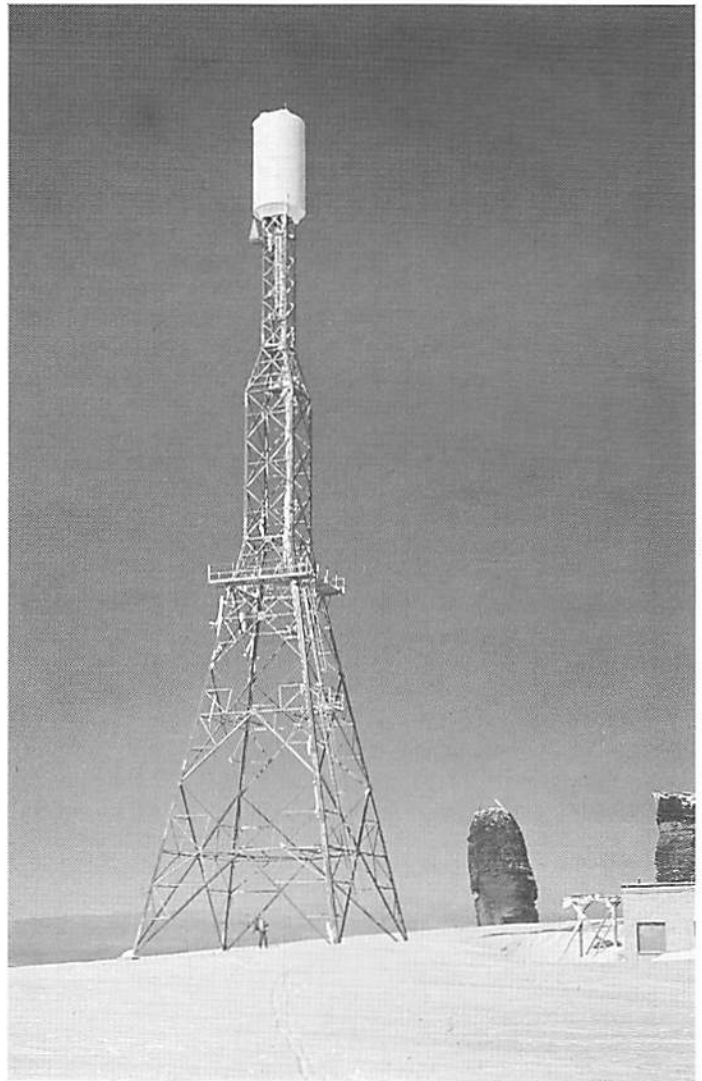
Below approximately 1000 m on the Clutha faces of the Old Man Range is Class 6, as are favourable moist pockets at the toes of the Old Woman and Carrick Ranges.

The OCB sees the need for restricted grazing practices over higher altitude Class 7 and all Class 8 lands with the primary aim of improvement of vegetation particularly of wetlands, tall tussock grasslands and associated depleted areas. The Board also sees substantial potential for extension of improved pasture by oversowing and topdressing higher on Clutha faces than has been done so far.<sup>(18)</sup>

The upper Fraser Basin and Old Man Range is probably the most studied block mountain in Otago. Since the late 1950's, intermittent botanical, climatic and hydrological/snow studies have been undertaken. The latter activities are being continued by the Ministry of Works and Development (MWD) in the Fraser Basin. The Ministry concluded from a study of snow-fences that these structures, on present designs, have limited effectiveness in trapping extra snow as water storage. It would take 670 km of fencing over the entire upper Fraser catchment to fill the Fraser reservoir. It was also found that snow-fences cause a substantial change to the composition of vegetation in their environs. In contrast, a tall tussock sward doubled the water equivalent compared to that of bare ground, and extended the period of snow cover by 2-3 weeks.<sup>(19)</sup>

The OCB considers the whole upper Fraser catchment (White Creek to upper basin) important for water harvesting and watershed protection. However the National Water and Soil and Water Conservation Authority (NWASCA) and the Land Settlement Board (LSB) agreed in 1985 to rescind a requirement in Earnsleugh Station's Soil and Water Conservation (Run) Plan for surrender of areas considered unsuitable for grazing, in favour of stock limitations without cattle. Current irrigation, hydro-electric, and domestic water demands exceed supply from the Fraser River.

For some time the reserve potential of the Old Man Range has been identified by conservationists. In 1975 scenic reserve status was proposed for the range crest<sup>(8)</sup> but, like a 1978 National Parks Authority request for a National Park



Television tower at the Obelisk.

investigation to be carried out, this remains unactioned. In 1982 the range was further advanced as a candidate for National Reserve status.<sup>(20)</sup> Recent PNA surveys have added greatly to the existing knowledge of this area, and have identified a large proportion of the range as deserving priority for protection (*See also 3.8*).

### 3.6 District Scheme Zoning

North of the head of Campbells Creek the area is within **Vincent County's** general Rural 1 zone, which permits forestry as a conditional use. At the foot of the Old Man Range, between Fruitlands and Alexandra, is a Rural 2 (Landscape Protection) zone. Council lists the Hyde and Obelisk Rocks and Andrew Mitchell's Cottage, as objects of special interest on the Old Man Range worthy of preservation. The Young Australian mine complex on the Carrick Range is similarly designated.<sup>(21)</sup>

The Campbells Creek catchment to the crest of the Old Man Range is within **Southland County's** Rural A zone, with commercial forestry as a predominant use. A stone miner's hut at Potters is listed as an object of historic interest.<sup>(22)</sup>

The balance of the Old Man Range is within **Tuapeka County's** one rural zone with no controls on farming practices, but with conditional mining uses. The snowpole track crossing the Old Man Range and associated stone



*On the first ascent of The Obelisk or 'Old Man Rock': 16 January 1879<sup>(1)</sup>*

The rock itself is a solid pillar over 80 feet high, with straight sides, about 25 feet along the base and 9 feet in diameter across the top. The manner in which the rock was ascended is of interest. A pointed lead weight was attached to the end of a long line of strong thin whipcord; an assistant was sent to the other side of the rock to look out for and hold the weight if it came over; and then, with a flying heave, the surveyor (W.D.B. Murray) sent the rope fair over the top of the rock at first attempt. A stout, strong marline was then bent on to the whipcord, and on to this a 3/4 inch manila rope which was knotted at every foot, and when this was hauled over, the two ends were pegged firmly in the ground, with heavy rocks on top; and grasping the rope, the surveyor went up hand over hand to the top, the knots giving great assistance. The assistant then came up, and after him the hammer, drill, bottle of water, and iron bar were hauled up. A hole 9 inches deep was then drilled in the centre of the rock, the iron bar fixed in it and duly flagged.

buildings are registered as 'objects of historic interest' in both the Southland and Tuapeka district schemes.<sup>(23)</sup> The Tuapeka Council's 'Pre-Review Statement' provides for the future adoption of a system of rural zoning aimed at maintaining and increasing primary production, and for the establishment of a comprehensive reserves and recreation policy for the county.<sup>(24)</sup>

### 3.7 Communications Installations

In recent years the Old Man Range has seen the placement of communications installations. In 1974-75 the N.Z. Broadcasting Corporation (NZBC) constructed a road to the Obelisk on the range crest. A 52 m tower was erected beside the rock for the purpose of replacing a private television repeater station lower on the range. The new structure dwarfs the Obelisk and is visible from throughout a wide area of Central Otago. To form an 'all weather' access road along the summit plateau, borrow material was obtained by pushing up earth from a wide strip either side of the formation, with the intention of creating a 'snow-free', raised carriageway. The formation was constructed to two-wheel drive standard.<sup>(25)</sup> Subsequent experimentation to revegetate a trial area of disturbed ground with transplanted snowgrass had only a limited success. The process of natural recovery by blue tussock is occurring, but only very slowly. The corporation also underestimated the severity of the climate, as evidenced by the construction of the tower being interrupted for months, after workers were trapped at the site for several days by blizzard conditions. The Obelisk installation has been unserviceable at times due to adverse weather. No vehicle access is possible for at least half the year. Helicopters are used for technical servicing.

Of any development, this installation has had the largest single impact on the range in recent years. This instance alone demonstrates the need for more rigorous assessment of future development plans (both their practicality and design) on such fragile and climatically rugged lands.

The N.Z. Electricity Division erected a small VHF tower at Hyde Rock, by using existing 4WD access along the summit plateau. Due to its positioning back off the skyline, and lack of additional access roading, this installation has had only a fraction of the detrimental impact of the TV structure. A particularly vigorous westerly wind resulted in the lattice tower collapsing in 1981. It was replaced by pole antennae.

### 3.8 Protected Natural Area Surveys

A pilot study of PNA programme survey procedures was conducted over two successive summers (1983-84 and 1984-

85), by workers for the Department of Lands and Survey and covered the Old Man Ecological District. This encompasses the Garvie-Carrick-Old Man uplands. On the basis of predominantly vegetative criteria eleven areas were identified on the Carrick, Old Woman, and Old Man ranges with recommended priorities for protection.<sup>(7)</sup>

A further two areas on the southern extent of the Old Man Range were identified as priority natural areas by a University of Otago PNA survey, of the Umbrella district of the Waikaia Ecological Region, during the 1985-86 summer.<sup>(26)</sup>

Both sets of proposals affect 15,700 ha on the three ranges considered in this chapter. Within the total Old Man Ecological District, 23 per cent was identified as deserving priority for protection, centred primarily on the Old Man-Garvie uplands. This indicates a high degree of naturalness overall.

The proposals entail:

#### 3.8.1 Obelisk - Old Man Ranges

The centre-piece of the PNA proposals is a 6400 ha core area which spans the length of the range crest, including the Fraser head-basin and Campbells Gully, and containing full altitudinal sequences on the eastern escarpment of tussock grasslands (Omeo and Shingle Creeks), and alpine cushion and herbfield communities from montane to high-alpine zones.

'Ripple landscapes,' periglacial landforms, shaft tors, cirques, and a glaciated valley are featured.

This core area is abutted by three smaller areas to the west (East Waikaia)<sup>(7)</sup> and south (Pomahaka River and Boulder Creek Headwaters)<sup>(26)</sup> which include mixed snow tussock and the most extensive plateau stringbogs in the district. The survey teams recorded that cattle have caused severe damage to wetlands by trampling and browsing, and damage by trail bikes has caused serious and widespread damage across the Old Man and Umbrella Ecological Districts. A measure of the intensity of trail bike activity is provided by a 20 m x 10 m plot in a bog on the crest of the Umbrella Range: 44 wheel ruts were recorded within this area.<sup>(26)</sup>

The Old Man survey team noted that the alpine wetlands are of prime importance to waterfowl and wading birds, and concluded that damage by trail bikes and cattle could threaten the future of these populations.

Two other adjacent priority areas are identified on the eastern

face of the range. The mid reaches of the Butchers Creek<sup>(7)</sup> catchment are identified as the best alternative to that portion of the Shingle Creek catchment that lies within the core area. Being adjacent to the Symes Road access on to the range, it also has considerable value for landscape protection in its own right. Mid Gorge Creek<sup>(7)</sup> is a steep, dramatic area with one of the most vigorous and dense examples of narrow-leaved snow tussock in the district. This is recommended as a complementary addition to the core area.

Approximately 9900 ha of pastoral lease are affected by these proposals.

### 3.8.2 Bannock Burn - Old Woman Range <sup>(7)</sup>

2700 ha of high summit plateau, outlier cirque basins, and the deep Bannock Burn catchment are proposed for protection. This contains a full altitudinal sequence of vegetation communities from montane tussock and scrub through to high alpine cushionfield. The plateau cushionfield-herbfield-wetland mosaic is considered to be the richest and most extensive example in the district and appears unmodified by exotics or grazing. It abuts the Northern Garvies priority natural area. (see *Garvies 3.11.1*).

Periglacial features on the plateau are of high quality, and the White Creek cirques are described as spectacular.

The drier northern range crest and the steep western faces are not included within the PNA as these are greatly modified.

The Bannock Burn catchment covers a considerable altitudinal range and contains one of the best tussockland sequences (silver, alpine fescue, narrow-leaved and slim snow) in the district. The Old Woman Range proposal is designed to encompass the entire upper Bannock Burn catchment, extending on to the range crest, rather than the range itself.

The total Barn Creek tributary catchment of the Nevis (750 ha) is identified for priority protection. This is on the north-western extent of the range, south of the Cromwell-Nevis Road. The area was assessed to be of high landscape quality with the most impressive off-summit tor landscape in the district. The catchment is dominated by fescue tussocklands over an extensive altitudinal range.

### 3.8.3 Carrick Range <sup>(7)</sup>

Four separate areas totalling 2300 ha have been selected for priority protection. These include representative semi-arid tussocklands and low altitude scrub and herb communities. The PNAs are on Mt. Difficulty, and in Long Gully, Slapjack, and Potters Creeks.

### 3.8.4 Conclusions

The potential impacts of protection for all the areas identified by these surveys (entailing a mix of grazing restrictions, stock exclusions, prohibition of development and burning) on individual leaseholds will be highly variable, dependent on run size and current utilisation. The immediate benefit of the published PNA reports in protecting natural values is a moratorium on oversowing, burning, increased stocking, and earth disturbance until such time as negotiations for permanent protection are complete. The reports therefore attain immense value for not only identifying long-term nature conservation priorities but also for immediate containment, in key areas, of pastoral practices that are destructive of biological values.

The differing issues of recreational and scenic landscape values were not part of the PNA exercise. These values require assessment, overlay and synthesis with PNAs to determine broader community requirements on these Crown lands.

It is important to appreciate that the PNA programme is based on obtaining protection for the most *representative* examples, on protected areas' design criteria, based on comparative assessments within each ecological district. The non-identification of other areas for priority protection does not mean that protective management is not required outside PNAs. The Old Man Ecological District is distinctive within the Central Otago region in retaining a fairly continuous cover of native vegetation above approximately 1000 m, with extensive lower areas still containing a dominance of native vegetation in the canopy. This is a total resource which attains national significance for tussock grasslands conservation.

The identified PNAs largely coincide with areas of greatest recreational use. Relatively small additional areas of high public interest require protection and management for recreational purposes, in addition to the PNAs themselves.

## 4. Recreational Opportunities

### 4.1 Skifields

The Old Man Range has long been an attraction for winter recreation. This has been due to ease of access to the snowline and proximity to centres of population.

In 1953 the Vincent Ski Club was formed in Alexandra with the intention of developing ski grounds on the slopes near the Obelisk above Fruitlands. By the following season road access was available up to 1070 m and an historic stone cottage was re-roofed for shelter. Intended rope tow installation never eventuated as the club's membership was divided over the issue of whether there were suitable snow conditions and slopes for a rope tow. Shortly afterwards the Club shifted its activities to Coronet Peak.<sup>(27)</sup>

The Blue Mountains Ski Club improved a rock bivouac ('Skiers' Rock') in the head of the Boulder Creek as a base for its short-lived activities. These ceased after World War II.

By modern standards (variety of gradient, vertical height, reliability of operation) there is no potential for skifield development on these ranges. The limited extent of steeper snow slopes can, however, be utilised by more proficient cross country skiers.

### 4.2 Cross Country Skiing

The primary winter recreational potential of the area is for cross country skiing. Ease of access has resulted in the Old Man and Old Woman ranges being among the most frequently used areas in Otago. Road access to the snowline on the Old Man Range provides one of the few opportunities for day trips from Dunedin or Invercargill.

The major natural limitation to utilising the vast extent of easy rolling terrain is the severity of weather conditions. A few disused mustering and miners' huts provide some overnight shelter, however due to rapid changes in the weather no reliance can be placed on locating them. Experience in alpine travel and survival are essential prerequisites for safe use during

winter. There have been several close-calls, even for experienced parties, in one instance involving survival conditions in a snow trench for several days.

A 40 km traverse the length of the Old Woman and Old Man ranges is possible, with an overnight camp. However, no quick escape to low country is available in the event of being overtaken by storm conditions.

There is only limited scope for snow recreation on the Carrick Range as it has only intermittent usable snow cover along its crest.

### 4.3 Snowcraft Instruction

Leeward gullies and cirques on the eastern face of the Old Man Range are a regular destination for mountain clubs to practice snowcaving and igloooing techniques. Ease of vehicle access to suitable terrain is the primary reason for the frequent use of this area. This activity has been occurring annually for at least 25 years and is one of the longest standing recreational activities in this area.

### 4.4 Off-Road Vehicles

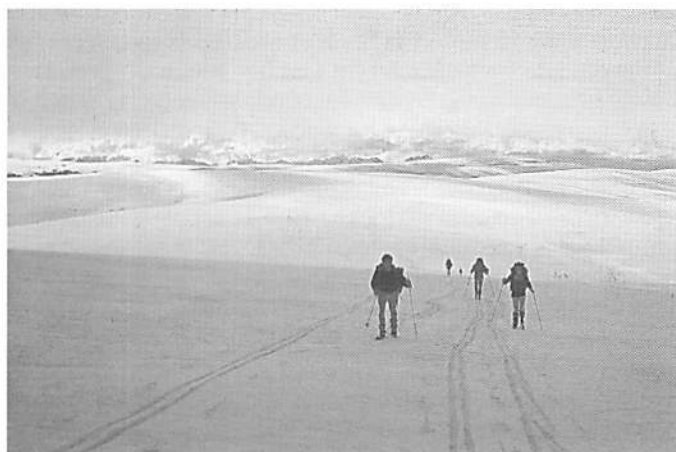
Summer recreation is largely dominated by the use of off-road vehicles and numerically probably exceeds all other activities. The traverse of the county road between Waikaia and Shingle Creek and along the range crest by trail bike being the major activities on the Old Man Range. Even during summer, riders regularly suffer from hypothermia on these exposed tops.

Severe impact on peat bog communities from vehicle use occurs in the vicinity of the Waikaia Bush Road. Particularly during spring and early summer when these areas are saturated with snow-melt, the impact of wheeled vehicles is long-term and almost irreparable. Protective fencing alongside sections of the road is being considered by the OCB. Usage of this road for trail biking is at times heavy, and appears to be increasing (*see also Garvies*). The Protected Areas Scientific Advisory Committee (PASAC) has recommended that ways of excluding off-road vehicle use be urgently pursued.<sup>(28)</sup>

With the construction of the NZBC road, increasing summer visitation to the Obelisk locality is occurring. However rapid deterioration of the weather is common year-round. No extension of vehicle access or encouragement of off-road vehicles should be contemplated, both for reasons of public safety and nature conservation. Confinement of vehicle use to a few well-defined tracks would appear to be a more prudent objective for management of these lands.

### 4.5 Public Road Access

The first indication of official sanctions against public access along legal roads on the Old Man Range, occurred during the winter of 1980 when the Tuapeka County Council commenced 'temporary' legal closures of the Waikaia Bush Road, for seven winter months each year. The closure was in reaction to an incident involving a school snow caving group which had vehicle starting difficulties during cold conditions. No one was endangered by this incident. Annual closures since then have disadvantaged all recreational users of the area, including those who are properly equipped for the conditions on the range. Car access by public road to snowline is important for recreationalists as the Old Man Range provides one of very few opportunities in Otago where this is possible. This situation has been exacerbated by an adjoining runholder locking gates,



*On the 'polar plateau'; an Old Woman to Old Man traverse.*



*Snowcaving, Old Man Range. Photo: Richard Pettinger*



*Trail bike damage to peat bogs, Boulder Creek.*

well down on the Roxburgh face. The metalled road would otherwise be suitable for 2WD vehicles to reach snowline. To-date the county has been reluctant to review its position or to require the removal of the illegal locks during the winter period. This situation has effectively closed off half the range for cross country skiing and snowcraft instruction.

In another case of 'legal' road closure, the MWD required the Lake County Council to keep open the Crown Range road for 'ski' traffic. This was despite that county's reasons of public safety and road damage for its winter closure. The locked barriers had to come down.

It is ironical that in the Old Man case, while public safety has, until very recent times, been advanced as the sole justification for winter road closure, it remains legally open during the rest of the year (November to May) when by far the greatest number of mishaps occur. During these months there is normally no defined snowline to stop vehicle access to the range crest, where the greatest hazards lie (hypothermia, peat bogs, and localised snow drifts). Rescues of vehicles and people occur regularly during this period. In the face of increasing public opposition to winter closures, 'road damage' appears to have become the fall-back *legal* position of the local authority (See also *Garvies 4.4 / 6.13*).

#### 4.6 Natural History Appreciation

The existence of road access to the summit plateau of the Old Man Range provides opportunities for the public to view an alpine tundra environment with its hardy alpine plants, periglacial and tor features.



*Gentian.*

Potentially such an environment is of considerable interest to conservation, natural history, and education groups. Limited use from these quarters already occurs. The delineation and description of PNAs should result in greatly enhanced natural history appreciation, as an educational and recreational resource, within the climatic limitations that exist.

#### 4.7 Historic Sites

The primary recreational attraction of the Carrick Range is the widespread evidence of former gold mining activity, consisting of settlement and mining sites.

'Quartzville' at the base of the range was the site of a short-lived town. From there a steep 450 m climb up an old wagon road leads to 'Carricktown' where stone-walled ruins provide evidence of this unofficial town. Nearby, large opencast cuts, spoil heaps, a few underground workings and battery foundations indicate the main reef area.

A further 300 m up the range at the head of Adams Gully, are the 'Young Australian Company' workings. A 7.9 m iron and timber water wheel and a 5-stamp battery provide the focus of interest for the visitor. Access is either by foot or 4WD vehicle.

The walk up to 'Carricktown' and beyond is a regular part of the programme for students using the Otago Education Board's centre at Bannockburn, as well as for other summer visitors to the district. From the Nevis Road a private 4WD track along

the crest of the range provides alternative access to Adams Gully. As this range is relatively low and sheltered, there are normally few climatic hazards for summer recreation.

Sites of historic interest on the **Old Man Range** are largely confined to Potters No. 2 and the nearby Tunnel Claim, White's Reef and Andrew Mitchell's hut above Fruitlands, and the collapsed remains of the Alpine Battery in the upper Fraser basin.

#### 4.8 Angling and Hunting

The Fraser River is an important spawning and rearing area for trout. It is considered to be the only major contributing nursery area for the Fraser Dam, which is a locally important lake fishery.

Chukar populations are established from Conroy's Gully to Rough Creek and provide a favoured hunting area. Californian quail have been seen in the vicinity of the Fraser Dam.<sup>(29)</sup>

### 5. Zoning

#### 5.1 Natural Experience

The summit plateau and upper eastern faces of the Old Man and Old Woman Ranges, generally above 950 m, are zoned *natural experience*. To the west, the zone extends down to the east branch of the Waikaia to abut the *Garvies remote experience area*.

While it is acknowledged that portions of the zone have been modified in historic times by burning, grazing, and more recently by farm and communications tracking, natural landscapes and systems prevail. The morphology of the alpine tundra and grasslands provides a distinctive setting for wildland recreation. Climatic severity and ecological fragility dictates that recreation is limited to low impact and self sufficient activities.

All areas of highest natural values within this zone (as identified by PNA surveys), and additional areas of greatest recreational value should be reserved and become available for managed public use. The level of conflict between differing land uses and recreational activities requires public control through the Department of Conservation (DOC). Continuation of pastoral lease tenure in these areas is no longer appropriate.

*Young Australian Company's waterwheel, Carrick Range.*



Future management of those portions of the zone that will remain in leasehold title should be directed towards rehabilitation of vegetative cover by reducing grazing pressure, confinement of off-road vehicle use, and avoidance of further earth disturbances and burning. Provision for public access and use should be provided by way of easements, and alteration of lease covenants where appropriate. Protection of landscape and general conservation values should be by the effective implementation of LSB's high country policies.

## 5.2 Open Space

The Carrick Range including the Kawarau Gorge, and the lower eastern flanks of the Old Man and Old Woman Ranges, generally above 450-600 m, are zoned *open space*.

This is a large-scale landscape of predominantly short tussock grasslands, merging into snow tussock with increasing altitude. In gullies and lower faces the grasslands have a 'savannah' character as matagouri becomes co-dominant. These areas have experienced general modification by oversowing, intensified grazing, and farm tracking, however a tussock grasslands character persists. Schist outcrops become very prominent towards the north-east, with the fretted foothills on Earnscleugh and Hawksburn Stations being very craggy in appearance. It is these semi-arid environments that have suffered most from fire, sheep, and rabbits, resulting in extensive replacement of short tussock with low fertility grasses and scabweed. However the *open space experience* obtainable on this harsh landscape deserves retention as a distinctive part of Central Otago's character.

Active recreation tends to be site-specific within the zone (e.g. visiting historic sites or as the backdrop for angling). Trail bike activity is extensive, with intensive activity in the Fraser Dam area. The major recreational use is for through-access to the *natural experience zone* and to the Nevis and Waikaia Valleys, by a few public roads and many private 4WD tracks.

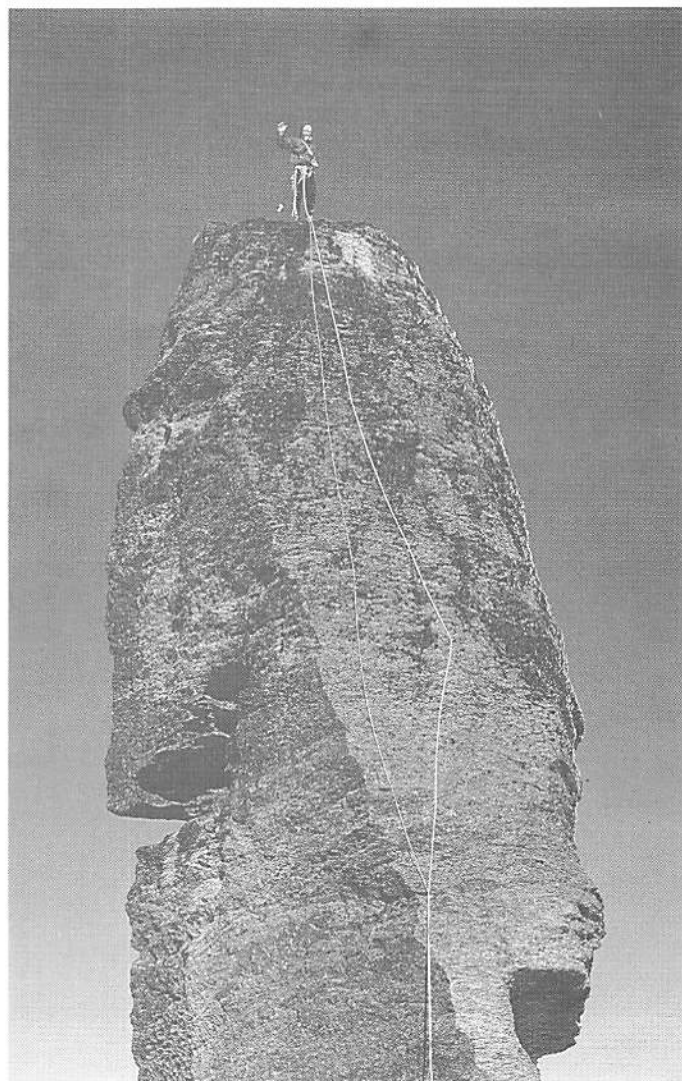
For the travelling public there are only limited opportunities to experience the scale and grandeur of these block mountains. However this is provided from State Highway 8 as it traverses between Roxburgh and Alexandra. The proximity of the Old Man Range, and the road's elevation above the Lake Roxburgh gorge, provides tantalising views up the eastern escarpment to the summit crest. At Shingle and Gorge Creeks the highway swings towards the range, providing the most dramatic vistas of the range's full elevation. Landscape protection is desirable in these localities.

## 6. Recommendations

### Natural Experience Zone

6.1 All identified PNAs and other areas of high recreational, landscape, and historic value on the Old Man and Old Woman ranges be progressively removed from pastoral lease tenure to become designated Scenic Reserves. Areas additional to PNAs include:

- \* 'Skiers' Rock' and environs beside the Waikaia Bush Road;
- \* Andrew Mitchell's cottage and environs beside Symes Road;
- \* historic sites at Potters diggings;



*The Obelisk 1985.*

- \* cirque basins and gullies in the Fraser catchment between the Obelisk and the Waikaia divide, down-valley from the upper basin PNA plus the 'Trig S' tops;
- \* upper flanks of Old Woman Range west of Mt. Black.

Note: (i) *Destocking of high altitude PNAs should be achieved by negotiation of block limitations on adjacent lands rather than extensive fencing at high elevations which would be visually obtrusive and impracticable to maintain against snow damage.*

(ii) *Limited grazing could continue, where appropriate, under non-occupational grazing permits.*

6.2 Remaining *non-reserved* lands within the *natural experience zone* should remain under pastoral lease tenure, but with provision for seasonal public recreation and protection of natural values. This entails:

- \* special covenants in leases allowing public recreation during the ungrazed winter period;
- \* prohibition of further earth disturbances such as roading and fence-line benching;
- \* removal of cattle, and reduction in grazing pressure by sheep on wetlands, overgrazed faces, and herbfields;
- \* revoking the OCB's permit-free burning district, which extends to the summit of the Old Man Range, and the prohibition of all fires within the *natural experience zone*.

6.3 The wildlands of the Old Man and Old Woman ranges be managed for low impact, self-sufficient public recreation, consistent with preservation of natural values and public safety. In accordance with the above policy, no further huts, shelters, or poled routes be established as a means of mitigating climatic hazards or of encouraging use.

6.4 All legal roads above winter snowline be legally closed, specifically:

- \* Waikaia Bush Road (above approximately 1040 m);
- \* Upper Symes Road to north of the Obelisk (above c.1200 m);
- \* Old Snow Pole Track.

Note: *Public roads over the tops of these ranges are unnecessary and undesirable. Vehicle use off existing consolidated formations is inappropriate. The extent of permissible vehicle use should be determined through reserve management planning procedures. (See also Garvies 6.13).*

6.5 Symes, Waikaia Bush, and Duffers Saddle-Mt. Black roads, below winter snowlines, be kept legally open year-round for recreational access.

6.6 An active education campaign be mounted by DOC, as a matter of urgency, aimed at 4WD and trail bike users, to discourage vehicle damage to bogs. This could be in conjunction with explanatory signposting and strategic barriers/fencing.

6.7 Protective restoration of historic sites on the Old Man Range be actively pursued, in particular:

- \* graves and hut at Potters;
- \* cairns/shelter huts on Old Snow Pole Track;
- \* alpine battery in upper Fraser basin with possible restoration of waterwheel to its original site;
- \* Andrew Mitchell's cottage and Whites battery.

6.8 Stringent public assessment of proposed communications installations within the zone be undertaken prior to further approvals being given. The feasibility of relocating existing structures off range crests should be investigated.

6.9 Derelict fencing and scientific apparatus on range crests be removed.

6.10 Small-scale mining within the less fragile Waikaia catchments (lower reaches) be permitted to continue, conditional on no significant extensions to access tracking being constructed. All mechanical prospecting, mining, and associated roading should be prohibited within the balance of the zone.

#### *Open Space Zone*

6.11 The *open space character* be retained on Crown leaschold land, which comprises this zone, by exercising the LSB Rural Landscape Policy.

This will entail varying degrees of control dependent on the relative sensitivities involved, and may include controls on:

- \* siting and revegetation of roading;
- \* tree planting/afforestation;
- \* burning and grazing that destroys tussock canopy.

6.12 Key vistas of the Old Man Range from State Highway 8 be delineated for more active landscape protection than would

apply throughout the rest of the *open space zone*. These should include:

- \* the Shingle Creek catchment, particularly to the Shingle/Chasm Creek dividing ridge;
- \* the Hut and Gorge Creek catchments.

6.13 If areas of the zone are reclassified to Farm Land in the future and become available for freeholding, then landscape protection covenants in the above areas be determined for registration against property titles as a condition of reclassification.

6.14 An active programme of restoration and interpretation of historic goldfields sites on the Carrick Range be commenced.

6.15 All legal roads be kept open for public use. Off-road and private road use should remain at land occupiers' discretion. On the Carrick Range the options of 4WD and foot access to historic sites should be maintained.

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## GARVIE MOUNTAINS

### 1. Landforms

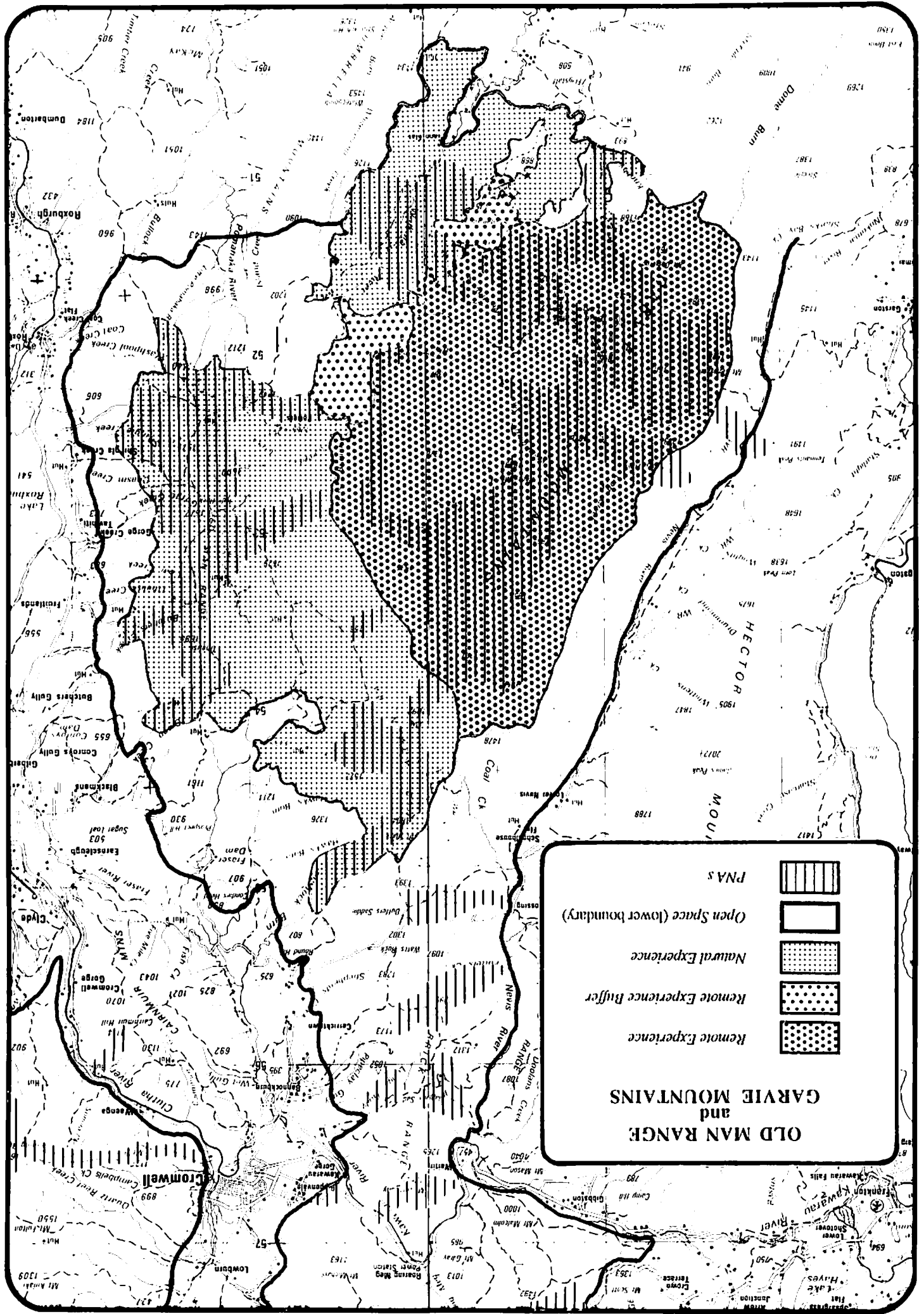
The Garvies in northern Southland, are at the south-western extent of Otago's range and basin topography. These mountains consist of a block range in the north and a dissected ridge system in the south, generally on a north east - south west axis. The Waikaia catchment drains from the eastern slopes, and the Nevis and Nokomai drain to the west. The north-south transition is abrupt, between tilted block and dissected high hills, and relates directly to the basement geology. The northern Garvies are formed from finely foliated schist, whereas the southern area consists of greywacke.

#### 1.1 Northern Garvies

In comparison to Central Otago's block mountains, the



Glaciated headwaters of Waikaia west branch, northern Garvies. Old Man Range rear.



**OLD MAN RANGE  
and  
GARVIE MOUNTAINS**

	PNAS
	(Open Space (lower boundary))
	Natural Experience
	Remote Experience Buffer
	Remote Experience



northern Garvies exhibit greater relief due to glacial erosion. Several upper valleys have pronounced U-shaped cross sections with impressive cirques or headwalls at their source. Cirques and nivation hollows along the eastern crest of the range are often occupied by lakes and tarns. Glacial forms are most pronounced in the central lake basin system, which is an area of outstanding quality featuring a glacial landscape unique in New Zealand.

Spectacular rock buttresses and pinnacles outcrop on many steep upper faces, often as eastern outliers from the main range crest. Rocky Mount (1889 m) is a notable example and the highest point on the range. The Waikaia tributaries draining the cirques are deeply incised and often gorged at mid section, while the ridges between form a broad plateau. Snowdrifts persist year round below the eastern range crest which is between 1700 and 1860 m. The western unglaciated slopes are smooth and only lightly dissected, below which the block-faulted 'Nevis plateau' forms a distinctive tableland above the Nevis Valley.

Patterned ground abounds over higher non-glaciated crests and consists of hummocks, stripes and terraces. These are similar in extent to those found on the Old Man Range to the north. On the broad, rolling summit of Mt. Tennyson (1527 m) (southern extent of the 'Nevis plateau') earth stripes are the largest examples recorded in New Zealand.<sup>(1)</sup> Parallel corrugations run downslope, being approximately 0.3 m high and 1.2 m between crest centres. These produce the appearance of huge, roughly ploughed paddocks.

Blocky rock outcrops stud the ridge crests and can be weathered into strange and grotesque forms. Here and there shafts or pillars stand on skylines while on many of the most wind exposed ridges only bare erosion pavements are present. Generally, tors on the Garvies do not have the spectacular symmetry of those found on the ranges to the north.

The northern Garvies connect with the southern end of the Old Woman Range by a gentle saddle in the Wakaia-Nevis divide, creating a large contiguous upland with the greater Old Man Range.



Garvie Mountains from Campbells Gully, Old Man Range.

## 1.2 Southern Garvies

South of Mt. Cameron (1612 m) the country drops to 1430-1000 m along crests, then falls sharply to the Matura and Dome Burn Valleys. The country is very dissected with intricate, steeply graded catchments off the leading ridges. This

greywacke landscape is very different from that of the northern Garvies. The southern Garvies are not considered in detail by this plan.

## 2. Vegetation and Wildlife

### 2.1 Vegetation

Red, silver and mountain beech occur in the Waikaia Valley between 250 and 910 m. Extensive forest areas on both sides of the Waikaia River account for most of the 10,580 ha Waikaia State Forest, with smaller patches of beech in the lower Gow Burn tributary.

The 'Big Fire' of 1882 burnt into the beech forest at the head of the Waikaia, depressing the bushline by as much as 460 m in this locality.<sup>(2)</sup> Subsequently, fire has been used to suppress regeneration, and as a result broom now occupies extensive areas upvalley of the forest. The lower extent of forest has been determined by direct clearing for farming, and by sawmilling.

Above bushline, short, hard tussock grasslands occur with localised pasture improvement at lower altitudes. Tussock has largely disappeared on Weaner Spur and in the vicinity of Bush Hut and the Titan Rocks, to be replaced by browntop, sweet vernal and oversown clover. The narrow-leaved snow grass dominates the extensive low-alpine zone. Red tussock is locally dominant.

High-alpine vegetation consists of the narrow-leaved snowgrass merging into the shorter slim snow grass, with remnants of the latter occurring up to 1800 m. The occurrence of isolated tussocks throughout many areas of high-altitude herbfield, suggests that the present plant communities have been induced from tussock grassland by the combined impacts of burning and grazing.<sup>(3)</sup> Probably because of wetter ground conditions and resultant quicker recovery from fires, and less dependence on Merinos, snow tussock grasslands on the Garvies appear less modified than on the Central Otago block mountains. However, there is a marked contrast in vegetation communities between the Waikaia faces and the drier Nevis flanks of the range. Relatively high stocking rates on the Nevis side, and burning, have combined with wind exposure and sunny aspect, to result in greater grassland depletion than in the Waikaia. Herbfields of *Celmisia* species with blue tussock now dominate on the west side above approximately 1430 m, with prostrate cushion plant species occupying the most exposed sites.

Much of the uplands and stream margins are covered with peat bogs, often dotted with small tarns. These, and snowbank communities in high, leeward depressions provide a diverse mosaic of texture and colour which is visually and botanically stimulating. These micro environments are susceptible to severe damage from stock trampling or vehicle use. Extensive string-bogs near Mt. Tennyson are of international importance.<sup>(4)</sup>

Due to lower altitude and drier conditions the vegetation of the southern Garvies has been extensively modified by burning and grazing. Beech species are widely distributed, but their extent has been drastically reduced to narrow riparian strips and isolated trees. Tussock grassland has been largely replaced at lower altitudes by pasture.

The northern Garvies are within the Old Man district of the Central Otago Ecological Region, whilst the southern Garvies and Waikaia State Forest are contained within the Nokomai and Umbrella districts of the Waikaia Ecological Region.

## 2.2 Wildlife

Numerous small tarns and their environs, in particular on the southern 'Nevis plateau' and the northern Garvies, are of particular importance for wildlife. They provide nesting and feeding habitat for black-backed gull, paradise shelduck, grey duck, banded dotterel, and pied oystercatcher. Skylark, pipit, black shag, and spur-winged plover are also found throughout the Garvies. Keas occur in the high, craggy terrain of the range crest. The New Zealand falcon is known to breed throughout the area.

As an isolated, extensive and largely unmodified beech forest, the Waikaia State Forest has a high value as bird habitat. Brown teal have been recorded in the Waikaia Gorge. There are populations of South Island robin and yellow-crowned parakeet. This is also the eastern-most stronghold of the yellow head, however the Waikaia Bush population is in decline.<sup>(4)</sup> The lower altitude forest in particular, provides ideal habitat for most common insectivorous native birds. Long-tailed bats have also been reported in this area.<sup>(5)</sup>

The insectivorous birds require well developed forest-floor litter. Compaction and tracking by browsing animals and trail bikes must be restricted if high habitat values are to be maintained.

Liberations of red deer were made in the adjacent Pomahaka catchment in 1901-3 and on Argyle Station in 1919-20.<sup>(2)</sup> The Waikaia herd provided sport for local hunters for many years. Helicopter shooting and live capture has greatly reduced deer numbers. There are low to moderate numbers in the forest, and low numbers in the catchment overall.

Rabbits used to be in plague numbers, with 43,000 taken off Whitecombe Station one winter in the 1890's.<sup>(2)</sup> Hares are widely distributed throughout the alpine zone. They appear to be having a major browsing impact on snowgrass, speargrass and herbfield communities.

## 3. History and Land Use

### 3.1 Pre-history

The grassland-forest margin in the upper Waikaia Valley appears to have been favourable moa habitat. A 'Moa Cave' south of Mt. Cameron is recorded on a 1926 map and a substantial find of moa bones in the east branch of the Waikaia in 1981<sup>(2)</sup> indicates a former wide distribution.

In 1894 Augustus Hamilton discovered a moahunters' campsite near the Gorge Creek (now Blue Creek) tributary of the west branch of the Waikaia.<sup>(6)</sup> His guide informed him that this was one of several moahunter sites in the vicinity. In an unsuccessful attempt to relocate this discovery, another site exhibiting cooking areas, bones and polished stone flakes was discovered in 1980.<sup>(7)</sup>

Polynesians, in conjunction with climatic change, may have been responsible for substantial vegetative changes within the region. Forest dimpling above the present-day bushline, in the

absence of charred logs on the surface, suggests pre-historic fires. European forest fires are indicated by standing and fallen charred logs.

### 3.2 Pastoralism <sup>(8)</sup>

Earliest pastoral activity dates from 1860 to 1869 with the issuing of depasturing licences which were later transferred for leases. Today, two of the largest pastoral leases in Otago and Southland occupy the Garvie Mountains, with a common boundary along the crest. The 54,000 ha Glenaray Station is the result of the amalgamation of earlier runs.

Nokomai Station, formerly known as Glenfalloch, occupies the Nevis and Nokomai faces of the range. Early in its history this run extended over the range and into the headwaters of the Waikaia.

To successfully control stock movement within and between these runs, the employment of boundary keepers was required. At Jack Mac's, 'Fred's Lake' (now known as Blue Lake), and Gow's Lake, stone huts were built in the 1870's and occupied for a five month summer. It was the lonely keepers' task to keep sheep up on the higher country during these months. After the fall muster (late March) a keeper at the log Bush Huts would keep his sheep from drifting back up until a permanent snowline became established. The last keeper, Julian Jackson (alias Jack Mac) finally left his hut in 1921, after 23 years of duty. Another boundary keeper spent almost 25 years based from the Old Blue Lake and Bush Huts.

In 1918 a Glenaray-'Glenfalloch' boundary fence was completed along the crest of the Garvies, although successive winter snows destroyed this. Only the segment south of Mt. Cameron is still maintained. The remainder lies derelict along the range crest.

Pastoral use of the high country on Glenaray Station has declined substantially in recent years, particularly since large-scale pasture improvement downvalley from the State Forest has permitted year-round grazing of breeding ewes. However, localised pasture improvement and sub-divisional fencing has occurred above bushline in the Waikaia. Glenaray still grazes approximately 14,000 wethers over its high country during three months of summer.<sup>(9)</sup> Because of footrot problems arising from the large areas of bog and wet ground, the country has been unsuitable for Merino sheep. The flock is generally maintained as Romney Merino cross.

In 1985 a revised run plan for Glenaray was approved. This sets a 33 year stock limitation over 23,200 ha of high country. Sheep only are permitted, but at a greater level than is currently grazed. 'Off-site development' includes oversowing and topdressing of the lower Weaner and Bush Hut blocks. Cattle trespass into the headwaters of the East Waikaia occurs from adjacent runs on the Old Man Range.

Stock numbers on Nokomai's 'Nevis plateau' and Garvies face appear relatively high, with sheep drifting across the range into Glenaray.

The combination of burning and grazing has had a major impact on the composition of native plant communities. Burning and localised heavy stocking throughout the high country is continuing to have severe impacts on natural values.<sup>(10)</sup> (See Section 3.11).

### 3.3 Sawmilling (11)

The Waikaia beech forests provided a convenient local timber supply. In the mid-1870's two sawmills were established in the district to meet local needs - both goldfields and farming. Bullocks were used to haul logs out of the bush; some time after 1905 a small steam-powered mill was built at Piano Flat (originally known as 'Piano Harry's Flat' after a digger H. Selig.<sup>(2)</sup>)

### 3.4 Goldmining

Goldfields were discovered and mined in the Nevis, Nokomai, the lower Waikaia Valleys at Switzers, and in the east branch. The Garston to Nevis Road, an early goldminers' route, traverses the edge of the Garvie's massif. The Waikaia Bush Road was constructed in 1886-87, along an established goldminers' route, to permit timber extraction but the grades were found to be too steep for horse traffic. It is now a 4WD road over the Old Man Range to Roxburgh.

There has been little direct impact from mining on the Garvies, other than the extraction of timber from the Waikaia forest and the occasional water race.

### 3.5 Land Use Capability

Above approximately 900 m the northern Garvies and their Nevis and upper Waikaia flanks are predominantly Class 7, with severe limitations for pastoral use. Class 8 generally occurs on steeper slopes above 1400 m. At the head of the Waikaia Bush, there is approximately 1400 ha of Class 6.<sup>(12)</sup> 1350 ha has been oversown and topdressed in this locality, and there are proposals to oversow and topdress a further 2000+ ha with a corresponding 50 per cent increase in stock numbers.<sup>(13)</sup> For this to be achieved would require the development of at least 1500 ha of class 7 land, with moderate to severe erosion risk. Such development appears very questionable on soil conservation and economic grounds. An additional concern arising from eventual loss of tussock cover, is contribution to accelerated run-off. Flash floods are common, with the Waikaia contributing significantly to flooding of the Maitai River.<sup>(14)</sup>

The Southland Catchment Board considers that the extensive Class 7 plateau in the Waikaia catchment can sustain some short term grazing by sheep, but attaches a high value to these lands for watershed protection.<sup>(15)</sup>

The southern Garvies have a narrow zone of Classes 7 and 8 along their crest, with Class 6 predominating below 900 m. This extensive tract of developable hill country lies downvalley and south-west of Piano Flat, and includes substantial areas of the Dome Burn and Nokomai Valleys.

Approximately 50 tonne of moss was extracted in 1980 from Whitecombe Station at the head of the Waikaia bush for export. Orders for a further 300 tonne per annum were obtained,<sup>(13)</sup> however extraction has apparently ceased.

### 3.6 District Scheme Zoning

South of Rocky Mount the whole area is within Southland County. Class 8 land, as defined by the Ministry of Works and Development,<sup>(12)</sup> is zoned Rural B (Water and Soil Conservation) in the district scheme.<sup>(16)</sup> Retirement from grazing, pastoral farming in accordance with an approved run plan, reserves and recreation are predominant uses within this zone, whilst farming and tourist facilities are conditional uses.

The remainder of the Garvies is zoned Rural A with 'farming of any kind' and commercial forestry as predominant uses, and all other non-conforming rural industries as conditional uses. The Southland Council's rationale for permitting forestry over Class 7 lands is to ensure that more productive land within the County is not 'locked up' by forestry.

The northernmost end of the Garvies is within Vincent County's general Rural 1 zone which permits forestry as a conditional use. However the County Council 'is conscious of the value of the landscape qualities of the countryside as an asset for recreation and tourism'.<sup>(17)</sup>

### 3.7 Land Tenure

Between the Old Woman Range in the north and the Maitai Gorge in the south, the area is predominantly occupied under pastoral lease. There are three such leases, with Nokomai and Glenaray Stations being among the largest in the South Island. Since 1976 over 6,800 ha of Pastoral Land has been reclassified as Farm Land on the lower Waikaia flanks of the southern Garvies. This is currently being freeholded under deferred payment licences. A 44 ha domain (recreation reserve) at Piano Flat in the Waikaia Valley is vested in the control of the Southland County Council.

The 10,580 ha Waikaia State Forest occupies the mid Waikaia Valley and parts of some western tributaries. Since 1978 it has been an Open Indigenous Forest, and available for hunting on foot only. The forest is now vested in the Department of Conservation as Stewardship Land.

### 3.8 State Forest Management

The character of the recently disbanded forests administration has been well displayed in the Waikaia Valley. Despite the Forest Service stating in 1978 that the Waikaia State Forest has no productive role,<sup>(18)</sup> in 1982 the Service concluded that in addition to the primary roles of protection and recreation the forest also possesses a potential for timber production, on a limited scale, from areas that do not conflict with the primary values.<sup>(19)</sup> It was proposed to 'virtually clearfell' approximately 800 ha of red beech within a 'Long Term Indigenous Production' zone, describing the individual areas of treatment as 'very small, in keeping with the scale of the market (speciality timbers for local industry) and the limited area suitable for production'. However, the only existing timber demand is for split posts 'but no effort is made to encourage this'.<sup>(19)</sup> Up to 300 cubic metres/annum for posts and strainers has been removed in recent times from scattered 'decadent' red beech trees.<sup>(20)</sup> In the service's 1983 Mountain Forests Regional Management Plan Preview<sup>(20)</sup>, timber extraction within the Waikaia forest was proposed 'by the tree' or on a group selection basis with the objective of encouraging uses which put the intrinsic qualities of the wood to best advantage.<sup>(19)</sup>

It was proposed to zone the immediate environs and upstream from Piano Flat 'intensive recreation', with the greater area of the forest 'amenity recreation' to protect the scenic backdrop as viewed from Piano Flat, or 'protection' to reflect the primary uses of the forest.<sup>(19)</sup>

The current designation as Stewardship Area provides minimal legal protection of the forest from mining, or from disposal or lease.

### 3.9 Rooding

The Waikaia Bush Road, dating from the 1860's, traverses the State Forest and climbs over the Old Man Range before descending to Roxburgh. During the 1960's the section through the forest was upgraded for 4WD use to assist the working of the two pastoral leases at the head of the Waikaia Valley. The road was metalled only for the first 2 km from Piano Flat, with the remaining 8 km through the forest being a clay surface. This provided difficulties for all weather access by heavy vehicles associated with farm development.

To further assist farm development, in 1985 the Southland County Council upgraded the first 10 km of road to all weather standard, to reduce farm development costs on the two properties. The Council acknowledged, however, that farm development programmes would probably continue whether or not the road was upgraded.<sup>(13)</sup>

The Council's actions have compounded a serious nature conservation and public safety problem, as beyond the upgraded road through the State Forest there are no natural barriers in the tussock grasslands that can be utilised to stop vehicles from reaching the fragile and hazardous country at higher elevations. The Southland County Council shares the concern of the adjoining Tuapeka County that vehicles may become snow-bound during winter on the Old Man Range. However the safety and nature conservation problem is year-round, which the present controls do not address. (See also 4.2, and *Old Man Range* 4.4 / 4.5 / 6.4 - 6.6).

### 3.10 Hydro-electric Development <sup>(14)</sup>

Three possible hydro-electric sites have been investigated in the Waikaia Valley, two in the Mataura Gorge, and one in the Nokomai.

The Waikaia schemes involve a 100 m high dam in the middle reaches of the State Forest which would inundate 5 km of forested gorge. An adjacent scheme utilising head from Welshmans Creek, would tunnel through to a power house in the Waikaia Gorge. A third scheme utilising head in the east and west branches of the Waikaia, has been designated as one of five schemes that are most likely to be developed in the near future within Southland. 400 m of head would be provided by diverting the flows of both branches, from the vicinity of the neck in Weaner Spur, through tunnels to a power house near the confluence of the branches. Nineteen megawatt installed capacity would be generated, with the scheme being economic within 1981 criteria. As a 'run-of-the-river' scheme it would probably not have a major impact on the local environment, excepting access rooding and transmission lines. These factors would have direct impacts on recreational and landscape values within the wider Waikaia-Old Man Range area. If the scheme were to supply Southland, transmission lines would parallel an upgraded road the length of the Waikaia Valley, including through the State Forest. As the scheme 'may be more suitable for development by the Otago Electric Power Board' due to shorter transmission distance, then transmission lines and rooding could straddle the southern end of the Old Man Range at over 1200 m.

The Mataura Gorge possibilities include a 30 m high dam at one of two narrow sections, and a tunnel diversion of Dome Creek to a power house beside the Mataura River. The first scheme would have major land use and environmental impacts. The only dam site in the Nokomai (upstream from the lower

flats) would produce a very low output. None of these proposals are within the five most likely to be developed in Southland.

A draft National Water Conservation Order has been issued over the Mataura River and tributaries, including the Waikaia to its headwaters, but is subject to appeals.

### 3.11 Protected Natural Area Surveys

As part of the Old Man Ecological District, the northern Garvie Mountains were surveyed during 1984-85 by workers for the Department of Lands and Survey.<sup>(10)</sup> A common boundary is shared with the Nokomai Ecological District; this was surveyed during 1987.<sup>(4)</sup>

On the basis of predominantly vegetative criteria a substantial portion (23,300 ha) of the Garvies are recommended for protection. This includes the entire range crest from the Old Woman Range to, and including, the cirque lake system. Generally only the uppermost Nevis crests are included for protection. Portions of the more modified Nevis and Waikaia plateaus are also included in the proposals.

Forest and modified grasslands on the true left bank of the Waikaia were surveyed in 1986 by the Umbrella PNA team.<sup>(21)</sup>

PNA's north to south and east are -

#### 3.11.1 Northern Garvie Mountains <sup>(10)</sup>

5200 ha between the Old Woman Range and Rocky Mount area, including the largest glaciated valley in the Garvies, are given first priority for protection.

Slim snow tussock is the major vegetation cover, being the largest unmodified area in the Old Man Ecological District. It extends to the ridgeline crest of the mountains. Wetlands are numerous and diverse. Large flocks of paradise shelducks and grey ducks utilise tarns for feeding and nesting. Serious threats to the area are identified as fire and cattle.

#### 3.11.2 West Branch Waikaia River <sup>(10)</sup>

750 hectares of the gorged west branch below the Northern Garvies PNA are recommended for first priority protection. The valley harbours the only remnants of formerly extensive forest and scrub communities (celery pine, Hall's totara). Fire and grazing threaten these remaining pockets.

#### 3.11.3 Central Garvie Mountains <sup>(10)</sup>

This 5900 ha area takes in the Kennys Creek tributary of the West Branch and the Gorge Creek (also known as the 'Figure 2 Country') headbasins, north and south of Rocky Mount. An altitudinal sequence extends down the western face on to the 'Nevis plateau', and down the Roaring Lion gorge. It is recommended as a comprehensive second priority alternative to the northern and southern Garvie proposals. Although high altitude communities are intact, lower areas are disturbed by burning and grazing, with resultant induced exotic components. Accelerated erosion is prominent on some steeper slopes, particularly on areas recently burnt (Class 8 land). Stock grazing is heavy on sunny slopes of Kennys Creek.

This area incorporates the spectacular Rocky Mount as a first priority PNA. Slim snow tussock in the Mount's northern cirque basin extends to 1800 m - its highest altitude in the Old Man District.



Spring time at Blue Lake.

#### 3.11.4 Southern Garvie Mountains (10)

This first priority area (2650 ha) extends from the deep upper cirque basins of Lakes Gow, Scott, and Skeleton east of the range crest, to the extensive boglands at the south end of the 'Nevis plateau'. The largest lake and best known feature, Blue Lake, is a second priority area, as an alternative to the upper lakes system, or alternatively as a complementary and valuable addition to the first priority area.

Wetlands are the most extensive and spectacular in the district. However damage by trail bikes has occurred wherever access to the high country is available, being particularly severe around Blue Lake. Modification to *Hebe odora* scrub and tussocklands around Blue Lake is severe in places as a result of recent burning.

#### 3.11.5 Upper Dome Burn (4)

1530 ha of this relatively lightly glaciated catchment is recommended for protection. It is particularly significant for its extensive 'string bog' and inland wetland systems near Mt. Tennyson. These appear like mire systems that could be expected in Arctic regions, being a little-known phenomenon in the Southern Hemisphere. They are assessed as having international significance.

#### 3.11.6 Gow Burn (4)

2450 ha of this heavily glaciated valley is identified as a

priority area. It encompasses a considerable altitudinal range and includes forest and non-forest ecosystems from montane to high-alpine zones. The area partly overlaps with 3.11.4. The Lake Gow cirque has extremely high landform values.

#### 3.11.7 West Waikaia

2620 ha, being the majority of the beech forests on the true right bank of the Waikaia, upstream of Titan Rocks, is identified as a *representative* area for protection.<sup>(4)</sup> It is apparent however that the whole forest deserves protection; the *priority* attached to the PNA however should assist forest management planning.

#### 3.11.8 Welshmans - Camerons Creeks (10)

1500 ha of 'basin and range' topography on the southern extent of the Waikaia plateau is recommended for first priority protection. The area is dominated by mixed tussocklands (red, narrow-leaved, slim), wetlands, and shrublands typical of former bushline associations. A bog pine community is the only example recorded for the district. It is extremely vulnerable to disturbance by fire, grazing, or from disruption to the wetland regime.



Blue Lake and the 'Waikaia plateau', towards the Waikaia Bush and Umbrella Mountains.

Modification by burning, grazing, and exotic intrusion (browntop, sweet vernal) is severe across most of the southern plateau, however disturbance is only localised within the recommended PNA.

#### 3.11.9 Upper Nevis Valley (10)

580 ha, from the alluvial valley floor to the western lip of the 'Nevis plateau', are recommended for second priority protection. Extensive modification of upper snow tussock slopes by past, and recent burning (up to 1300 m) is resulting in accelerated erosion along many mid to upper slopes. Red tussocklands on the valley floor are the most extensive low altitude example in the district. This area is an alternative PNA to Welshmans-Camerons Creeks.

#### 3.11.10 Waikaia Tors (21)

The largest and most prominent tors in the Umbrella district are recommended for first priority protection due to their species-rich vegetation. The tors plus a 10 ha buffer straddle the much used, and abused, Waikaia Bush Road.

#### 3.11.11 Waikaia Bush (21)

1350 ha of former state forest/stewardship land plus modified tussock and shrubland is recommended for first priority protection. This coincides with the bulk of the forest proposed

by the Forest Service in 1982 for 'long term indigenous production'.<sup>(19)</sup>

### 3.11.12 Conclusions

Protection of PNA's, *in isolation from other values*, could probably be achieved by:

- \* banning fires;
- \* excluding cattle and vehicles;
- \* reduction in sheep pressure (stock limits in adjacent unfenced blocks), assisted by exclusion from Class 8 and other fragile lands by strategic fencing (e.g. across Weaner Spur and upper valley entrances).

These measures could be superior to ring-fencing along the recommended boundaries which would be very expensive to construct, visually obtrusive, and impracticable to maintain at higher elevations due to snow damage.

As the PNA Programme is designed to delineate a *representative* rather than an all-embracing protected areas system, many areas with high natural values lie outside the priority areas. The additional values of landscape and recreation have not been assessed, although the PNA's partly coincide with areas of greatest recreational interest. A broader complex of protected areas is required to meet recreational requirements as well as to provide protective buffering for the priority natural areas within. (*Refer also to Old Man Range 3.8*).

## 4. Recreational Opportunities

### 4.1 Picnicking and Angling

Piano Flat in the main Waikaia Valley, has long been a focus of public recreational interest in the region. The presence of a large and easily accessible tract of indigenous forest, at the edge of the settled Waimea Plains, has been an obvious outlet for recreational use.

Picnic and 'play' facilities are established in the Piano Flat domain. Grassed forest glades and river scenery provide a pleasant setting for camping, picnicking and brown trout fishing. There are two short walking tracks in the surrounding forest suitable for day visitors. The visual focus tends to be inward towards river and glade, as only limited vistas of open range-top are available from the valley floor.

### 4.2 Trail Biking

The Waikaia Bush Road has become a major attraction for trail bikers in particular. On most weekends activity is intense, with a severe localised impact on forest floor vegetation and on picnickers at Piano Flat. Over one hundred unregistered bikes have been intercepted by the Ministry of Transport in one day's operations. There is a considerable speed hazard from these machines, to walkers in the otherwise pleasant environs of the flat.

The Waikaia River provides a natural barrier to vehicles throughout the beech forest, except at the 'Canton Bridge' at the head of the forest. This bridge allows vehicle access to Bush Hut, and the outlet of Blue Lake 12 km beyond.

The impact of trail bikes on alpine bogs along the Old Man Range section of the Waikaia Bush Road is probably the severest of all vehicle impacts on alpine vegetation in Otago and Southland. However, nature has occasionally retaliated, with bikes being *devoured* by particularly 'bottomless' bogs

and 4WD's being stuck for extended periods. There are also regular reports of hypothermia occurring to bike riders during the summer months. 4WD vehicles becoming bogged and mishaps by trail bikers regularly result in search and rescue operations.

To an experienced trail bike rider, once above the bushline, there are few obstacles to lengthy over-land traverses. Steep cirque topography and deeply incised creeks provide the only major limitation for machine use. At this stage, bike use is relatively light away from the vicinity of existing track formations. (*See also Old Man Range 4.4 /4.5*)

### 4.3 Tramping

The Waikaia beech forests have long been attractive for easy tramping in pleasant surroundings. Since the 1930's mountain clubs have used the area for introductory bushcraft instruction.<sup>(22)</sup> As one of the few large indigenous forests close to the east coast it is well suited for this. The Titan Rocks and Blue Lake in the Garvies, and Gem Lake and Whitecoomb Creek in the Umbrella Mountains are usual objectives for such trips.

Above bushline the vast extent of gently rolling tussock uplands provide an often bleak and exposed environment for summer tramping. The rapid onset and high frequency of fog causes navigation difficulties. The general lack of topographic features, except in the cirque lake basin system, provides generally unattractive conditions for the general tramp. However, botanical attractions, especially in the alpine zone, are great for the more specialised visitor. The general absence of conspicuous, man-induced changes to the landscape, or of developments such as huts and vehicle tracks, combined with the grand scale of this upland, provide opportunities for *remote experiences* in a tussock grassland setting. Activity above bushline at any time of the year requires caution. Storm-proof clothing, compasses and tents are essential, as severe storms, including snowfalls, are experienced year-round. Several miners and even a shepherd familiar with the terrain (at the Titans) have lost their lives. The gentle topography belies the climatic hazards of this high country.

### 4.4 Cross Country Skiing

Under winter snow cover, these same rolling uplands have considerable potential for the cross country skier. Relative ease of travel and mobility can provide exhilarating experiences over this vast upland. In conjunction with the Old Man and Old Woman ranges, the Garvies are the largest contiguous tract of winter snow cover in Otago and Southland.

*Northern Garvies winter traverse.*



A combination of snow cover to distant horizons, an absence of developments within or visible from the uplands, relative remoteness and a necessity for self-sufficiency, make the Garvies a *winter wilderness experience* to an extent greater than other similar ranges in Otago.

Before the general availability of 'nordic' skis in the late 1970's, a few hardy souls were known to have traversed the Garvies on alpine skis, using climbing skins and touring bindings.

Winter conditions can be extreme, with frequent and sudden fronts from the south and west. Conditions are generally more severe than on the rain-shadow Central Otago ranges to the north. Alpine navigation and survival experience is an essential prerequisite. There are only two huts which are suitably located to be of use on ski expeditions. Tenting, snow caving, or iglooming is required on extended traverses. Most north-south traverses, with side trips, would be 4 to 7 days duration.

In spite of these limitations, or because of them, the personal rewards arising from a well prepared and competent ski expedition can be great. A small but increasing number of cross country skiers are seeking out these challenges.

## 5. Zoning

### 5.1 Remote Experience

The northern Garvie Mountains, from the saddle with the Old Woman Range in the north, to the vicinity of Mt. Cameron is zoned *remote experience*.

Recreational criteria have prevailed over natural criteria in determining the boundaries for this zone. As the PNA survey highlights, substantial areas are moderately to severely modified in a botanical sense, however this has only a limited effect on overall recreational values. The bulk of the Nevis and Waikaia plateaus fall into the modified category, however they are integral parts of the wild land resource. The whole zone is characterised by large-scale landscapes of considerable variety, with few conspicuous signs of human activity.

The primary recreational value of the zone is for cross country skiing, however its secondary value for foot recreation in summer cannot be overlooked.

Two areas along the Waikaia boundary are zoned *remote experience buffer*. The wildland character of the **lower Weaner Spur and Bush Hut** blocks is gone and further pasture development is planned. Existing farming practices can continue provided the open space character is retained (no forestry, shelter belts, and discrete siting of farm buildings and tracking.) Recreation vehicles need to be excluded at the Waikaia River as no practical alternative exists to protect the *remote experience area* from their intrusion. The **Titan Rock** block retains a wildland character, and provides an important focus for short duration tramping and hunting. Separate vehicle and foot access is available and these opportunities should remain. *This buffer zone should be managed as a natural experience area*, with no farm developments, and vehicle access limited to as far as Titan Hut.

Since the time of the first proposal for a Garvies 'winter

wilderness' in 1981<sup>(23)</sup>, there has been considerable discussion within FMC's affiliated clubs and with Government's Wilderness Advisory Group as to the applicability of a 'seasonal' wilderness area, given that the whole area in question is occupied for pastoral use. This has led to the current re-evaluation of the original proposal. In terms of Government's policies it is clear that the area does not meet all the criteria necessary for Wilderness Area designation. However, there are only relatively minor management incompatibilities which can be accommodated within a Remote Experience Area, as defined by the Wilderness Policy.<sup>(24)</sup>

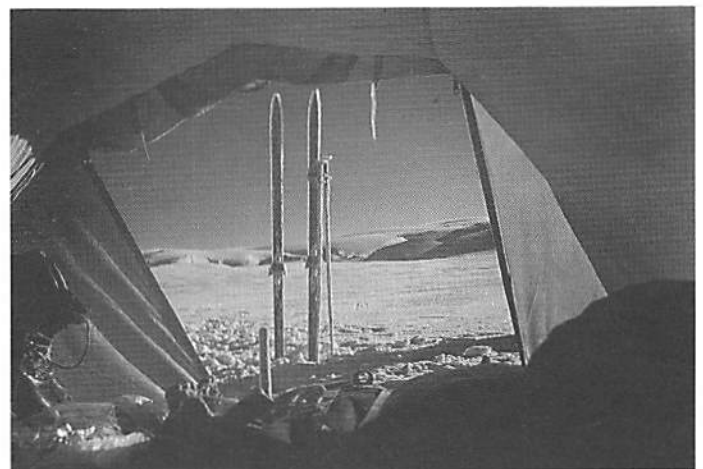
#### 5.1.1 Management Considerations

##### (i) Huts

Two mustering huts, serviced by horse and helicopter, exist within the zone. Continued pastoral use of the area will presumably require their retention. The huts will continue to be used by cross country skiers, if available, however their presence is contrary to the spirit of self-sufficiency necessary for a *remote experience*.

There are two prevailing schools of thought regarding huts in wild and hazardous environments. One believes that there should be 'refuges of safety' available in emergency situations; the other sees huts as focal attractions which draw ill-prepared people to them, due to the false sense of security, and comforts, that their presence provide. In the case of the Garvies there are far too few huts to provide even a modest prospect of a hut being in the right place at the time of greatest need. Therefore, an ability to travel independently of huts is still necessary. Providing more huts might satisfy the 'safety' school, but would remove self-reliance as a major component of the recreational experience. In effect, another of New Zealand's few remaining wildernesses would be developed to extinction.

Current winter recreational use indicates that many parties use one or both of the huts at some stage of their expedition. It is fair to surmise that some of those groups may not be as well equipped as they should be and it is more a matter of luck than design that no tragedies have occurred in recent years. Conversely, with no huts present, every party would have to carry tents or snow caving equipment thereby increasing their chances of coping with conditions encountered on route.



Morning, at minus 16 degrees celsius.

There are only limited historical reasons for retention of the existing huts as they are both third generation replacements for

earlier stone and iron structures. If in future they are no longer required for mustering, it is desirable that they be removed.

#### (ii) Vehicle Use

Vehicle access to and through the zone in snow-free months causes the greatest diminution of wilderness values. It would be possible to physically exclude recreational vehicles by means of a lockable barrier on the steep eastern approach to the Canton Bridge, thereby allowing farm vehicle use to continue. Access tracks from the Nevis Valley provide the means for vehicles to reach the western boundary of the *remote experience zone* in summer. As this section of the western boundary is fenced, provided gates are locked, all but the most determined trail biker should be discouraged from proceeding further. Vehicle pressures on the western side are relatively light, and there is an absence of obvious destinations for vehicle use. The presence of extremely important and highly vulnerable wetlands in this quarter dictate that vehicles be totally excluded.

Provided the area remains undeveloped by further tracking and road access is not upgraded, the area is self-managing in winter, unless at some future time snow mobiles become generally available.

During summer, a combination of physical exclusion of non-farm vehicles plus public education provides the only real prospect of maintaining *remote experience values*. An on-site management presence is required during peak periods of visitation to the Waikaia State Forest, to ensure vehicle use restrictions are respected in the forest and beyond. Integrated recreation management is required over the Crown leasehold and Department of Conservation (DOC) lands described in this chapter.

#### (iii) Grazing

During the unstocked period of the year (9 months) there is no conflict with recreational use, provided public access to the area is assured.

Protection of outstanding natural values identified by the PNA surveys is a high priority. The continued existence of fragile alpine wetlands and grasslands is not only of scientific concern, but is shared by thousands of New Zealanders who may never see the area but will rest content knowing of their wellbeing. It is also inevitable that increasing summer visitation will occur as a result of the description of natural values in the PNA reports, although this is likely to be relatively light.

General curtailment of burning will be necessary, plus the total exclusion of cattle from the high country. Amended stock block-limitations will also be necessary to exclude, or at least greatly reduce, sheep pressure on the most vulnerable and scenic localities (e.g. Jack Mac's Creek wetlands; southern 'Nevis plateau' bogs; wetland margins of cirque basin lakes.)

In the legal sense much could be achieved for the protection of PNA's by the removal of the very significant areas of Class 8 land, being land unsuitable for grazing, from pastoral lease tenure. Conservation Area status would assure rights of public use, and provide a statutory basis for management of these areas. In view of the anticipated light demand for summer recreation, reserve status for the above area is unwarranted in the Garvies.

Amended lease covenants over the areas remaining in pastoral occupation should be the option first explored to achieve the required level of protection and public use.

## 5.2 Natural Experience

The Waikaia Bush and outliers are zoned *natural experience*. The forest should continue to be managed for a variety of active and passive recreational activities, although vehicle use needs to be confined to existing road formations. The forest, in total, deserves stronger statutory protection against milling and mining.

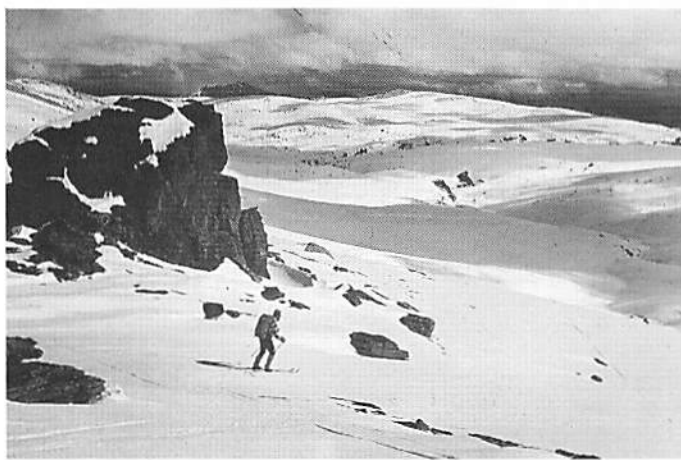
Steps are needed to reduce stock penetration around forest margins.

## 5.3 Open Space

The Nevis Valley face of the 'Nevis plateau' and up-valley (true left bank) of the Waikaia Bush is zoned *open space*.

Although considerably modified, this zone remains important as a predominantly grassland setting, contributing to the overall impression of large-scale undeveloped uplands. The zone provides the western approaches to the *remote experience zone*, and a corridor between natural experience areas in the east. The undeveloped character needs retention despite ongoing pasture improvement. Forestry, and shelter belts should be prohibited, and further tracking and farm buildings require discrete siting. The adjacent Weaner Spur-Bush Hut *remote experience buffer* requires similar treatment.

Vehicle infringement into peat bogs alongside the Waikaia Bush Road requires active discouragement.



The 'Nevis plateau' from the Garvies crest.

## 6. Recommendations

### *Remote Experience Zone*

6.1 The wilderness values of the northern Garvie Mountains be protected and managed as a Remote Experience Area in terms of Government's 1985 Wilderness Policy.

6.2 Public foot access during non-grazing months be formalised, with legally defined access from Piano Flat and the head of the Nevis Valley, and covenants in leases providing for non-motorised public recreation within the area.

6.3 Public access over pastoral lease, when stock are present, to remain at the discretion of lessees.



- 6.4 Recreational management of the area provide for:
- \* hut removal when no longer required for mustering;
  - \* no recreational facilities or marked routes;
  - \* prohibiting all recreational vehicles including oversnow machines and aircraft landings;
  - \* limiting public information/promotion to that essential for protecting wilderness, natural, and farming values only.

6.5 The central core of Class 8 land be removed from pastoral lease tenure in accordance with Government's Destocking and Surrender Policy. This area be vested in DOC as a Conservation Area. Its recreational management to be in accordance with the Wilderness Policy.

- 6.6 Farming and PNA management within the zone entail:
- \* prohibiting cattle, except from the fenced block downvalley from the Welshmans-Blue Creek confluence;
  - \* prohibiting fires, vehicle tracking or other earth disturbances;
  - \* negotiating block limitations to exclude sheep from the most vulnerable (Class 8 and bogs) and scenic localities, assisted by strategic fencing where practicable.

#### *Remote Experience Buffers*

6.7 The Titans Block be managed as a *buffering natural area* entailing:

- \* retention of Crown ownership and leasehold tenure;
- \* prohibiting farm tracking and pasture development;
- \* 'stopping' legal paper roads beyond Titan Huts;
- \* provision for public foot access year-round to the Titan Rocks from state forest tracks, as a round-trip from Piano Flat;
- \* barring all vehicles.

6.8 The Weaner and Bush Hut Blocks be managed as *buffering open spaces* entailing:

- \* retention of Crown ownership and leasehold tenure;
- \* barring all recreational vehicles, in the vicinity of the Canton Bridge, by a locked barrier;
- \* landscape controls on siting of farm tracking and buildings;
- \* no recreational or tourist developments.

#### *Natural Experience Zone*

6.9 The entire former Waikaia State Forest become Scenic Reserve, in recognition of its high fauna and recreational values.

6.10 A management plan be prepared for the forest identifying further opportunities for walking tracks, and informal camping and picnicking (including at the head of the forest and enclosed portions of Whitecombe pastoral lease).

6.11 The above plan address the issue of stock penetration in to forest margins.

#### *Open Space Zone (+ Part Old Man Range Natural Experience)*

6.12 The Crown purchase the lessee's interest in the Whitecombe pastoral lease and:

- \* destock the East Waikaia faces upvalley from the lower East Branch subdivisional fence;
- \* offer Pomahaka catchments minus PNA's for incorporation into adjacent pastoral leases (for exchange purposes);

- \* offer Class 6 lands, downslope from Christies Hut (excluding forest enclaves) and the lower East Branch subdivisional fence, for incorporation into Glenarary pastoral lease conditional on:

- \* adoption of a comprehensive broom eradication programme by the lessee;
- \* the same landscape controls as apply to the Bush Hut and Weaner blocks;
- \* prohibit the continued use of burn-offs to control weeds and forest margin regeneration;
- \* retain direct Crown control over the Waikaia faces above the former state forest and Whitecombe subdivisional fence (at approximately 850 m), to include the Waikaia Tors PNA and Waikaia Bush Road along the Pomahaka divide. Any grazing should be limited to sheep by means of grazing permit.

6.13 The Waikaia Bush Road be legally 'stopped' beyond Christies Hut to become Crown land administered by DOC. Management of the 'road' between Christies and approximately 1040 m on the Roxburgh side of the Old Man Range should initially entail:

- \* maintenance of the formation as an unmetalled, 4WD, summer-only track, with public use required to be confined to the road formation;
- \* minimum upgrading to make bog sections passable, to avoid further vehicle damage to adjacent bogs;
- \* an active user education campaign stressing public safety, and the reasons for restricting vehicle use to the road formation (*periodic ranger presence, signposting, and contact with vehicle user groups will be required*);
- \* erection of vehicle barrier/fencing and lockable gate at Christies for winter closure. (*This action will not unduly limit winter access for skiing, and is desirable on this side of the Old Man Range. The indeterminate snowline on this gentle, lower altitude country, unlike the Roxburgh side, does not always prevent vehicles from getting stuck*).

6.14 Should the measures in 6.13 fail to restrict vehicle use to the road formation then:

- \* permanently close the road for unsupervised vehicle use, except by arrangement with DOC.

#### *All Zones*

6.15 The Southland County Council amend its district scheme to exclude forestry as a use of the Rural A zone within the high country.

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# GLOSSARY

## LAND TENURE, TERMS, AND CLASSIFICATION

Aliciate	Includes a limited disposal by lease or licence, as well as an absolute disposal by sale or otherwise (S. 2 Land Act 1948).	Pastoral Land	improvement to carry equivalent stock numbers to that removed from higher altitude country. Being suitable or adaptable primarily for pastoral purposes only (S. 51 Land Act).
Deferred Payment Licence	Licence to occupy issued under S. 65 Land Act for a maximum term of 30 years, for purchase of freehold on a system of deferred payments.	Pastoral Lease	33 year term with perpetual rights of renewal, entitling the holder to exclusive right of pasturage, but with no rights to the soil or other uses, and no right to acquire the fee simple. Subject to restrictions as to the numbers of stock carried.
Depasturing Licence	Generally short to medium term licenses issued to early pastoralists by provincial governments. Had no rights of renewal.	Pastoral Occupation Licence	Rights and limitations same as for pastoral leases but with no right of renewal. Maximum term 21 years.
Disposal	<i>See alienate.</i>	Private Land	Estates held in fee simple by anyone other than the Crown.
Farm Land	Being land suitable or adaptable for any type of farming (S. 51 Land Act).	Reclassification	Administrative process of redefining the primary use of Crown land. Classification determines the tenures offered. All Crown land available for disposal may be classified as farm land, urban land, commercial or industrial land, or pastoral land (S. 51 Land Act).
Fee Simple	An estate in fee simple confers the fullest rights of use and enjoyment allowed by law. It is one of three freehold estates entitling a tenant to hold for life and permitting inheritance by 'heirs general'. In practical terms fee simple conveys ownership of the land.	Renewable Lease	33 year term with perpetual rights of renewal, and right to acquire the fee simple (S. 63 Land Act).
Freehold	An estate (bundle of rights) of permanent duration, being free of servility to the Crown.	Section 58 strips	Crown land reserved from sale (under S. 58 Land Act) not less than 20 metres wide along the high-water mark of the sea, around every lake in excess of 8 ha, and along the banks of all rivers and streams with an average width of not less than 3 metres. <i>See also marginal strip.</i>
Land Use Capability	A classification system for systematic arrangement of different kinds of land according to their capacity for permanent sustained production in terms of the physical limitations of the land. There are 8 LUC classes used in New Zealand. These range from Class 1 with virtually no limitations to arable use to Class 7 with severe limitations to extensive grazing. Class 8 is unsuitable for primary production.	Small Grazing Run	A tenure first introduced in 1885. 21 year term with right of renewal. Initially no right to freehold, but conditional rights granted in 1913. SGR's were abolished in 1948.
Lessee	The holder of a lease.		
Lessor	Person who lets on lease.		
Marginal Strip	Land within 20 metres of any foreshore, lake exceeding 8 ha, river or stream of average width of 3 metres or greater held for conservation purposes under S. 24 Conservation Act 1987. <i>See also Section 58 strips.</i>		
Off-site development	Method of compensation used by catchment authorities for destocking/retirement of lands unsuitable for grazing under Soil and Water Conservation Plans (run plans). Development usually consists of pasture		

## LANDFORM\* AND MINING TERMS

Auriferous	Gold-bearing.
Backslope	The less sloping side of a ridge contrasted with the scarp, or steeper side.
Block(-faulted) mountain	Rectangular mountain mass bound on two sides by fault-scarps.
Cirque	A deep, steep-walled recess in a mountain formed by glacial erosion.
Dip slope	A slope of the land surface which conforms approximately to the dip of foliation or bedding of the underlying rocks.

Escarpment	<i>See fault-scarp.</i>
Fault-scarp	Cliff or eroded equivalent formed by vertical displacement along a fault line. Can reach mountainside proportions.
Foliation	The laminated structure resulting from segregation of different minerals into layers during metamorphism, producing a slaty cleavage.
Greywacke	Grey sandstone rock.
Ground sluicing	The use of the natural erosive power of water to break up gold-bearing deposits.
Headwall	Steep ice-gouged cliff at the back of a cirque.
Hummockfield	Alpine patterned ground of closely packed soil hummocks and/or stripes.
Hydraulic sluicing	High pressure (piped) washing of deposits by use of sluicing guns (monitors).
Hydraulic elevation	Lifting of deposits from below drainage level by means of suction created by a jet of water directed into a throat at the base of an upright pipe.
Nivation features	Scalloped hollows, eroded (snow) banks and pavements formed at high altitudes by snowpatch erosion processes.
Patterned ground	Symmetrical small scale features produced by past uneven heaving and melting action of ground ice.
Pavement	Smooth bare rock surface resembling that of a paved road.
Peneplain	Gently undulating surface being the end-stage of erosion.
Pleistocene	The earlier of the two epochs of the Quaternary Period (2M-10,000 years ago) characterised by successive episodes of glaciation.
Ripple landscape	Irregular slope defining the surface of a debris layer transported by slumping and other forms of mass movement.
Rock pavement	<i>See pavement.</i>
Scarp	<i>See escarpment.</i>
Schist	Coarse grained foliated metamorphic rock.
Solifluction features	Terraces and lobes formed typically on the high-altitude lee slopes by creep of waterlogged debris matter.
Stone nets	Patterned ground feature of rings, polygons or quads of stones/pebbles.
Tors	Large blocky outcrops of rock exposed by erosion of the surrounding material.

## COMMON BOTANICAL NAMES

Alpine fescue tussock	<i>Festuca mathewsii</i>
Blue tussock	<i>Poa colensoi</i>
Bog pine	<i>Halocarpus bidwillii</i>
Boxwood	<i>Hebe odora</i>
Briar (sweet briar)	<i>Rosa rubiginosa</i>
Broadleaf	<i>Griselinia littoralis</i>
Browntop	<i>Agrostis capillaris</i>
Celery pine	<i>Phyllocladus aspeniiifolius</i> <i>var. alpinus</i>
Clover (white)	<i>Trifolium repens</i>
Common fescue	<i>See fescue tussock</i>
Fescue tussock	<i>Festuca novae-zealandiae</i>
Golden spaniard	<i>Aciphylla aurea</i>
Hall's totara	<i>Podocarpus hallii</i>
Hard tussock	<i>See fescue tussock</i>
Kanuka	<i>Leptospermum ericoides</i>
Manuka	<i>Leptospermum scoparium</i>
Matagouri	<i>Discaria toumatou</i>
Mountain beech	<i>Nothofagus solandri var. cliffortioides</i>
Mountain toatoa	<i>Phyllocladus alpinus</i>
Narrow-leaved snow tussock	<i>Chionochloa rigida</i>
Native broom	<i>Charmichaelia petriei</i> , <i>C. compacta</i>
Red beech	<i>Nothofagus fusca</i>
Red tussock	<i>Chionochloa rubra</i>
Scabweed	<i>Raoulia australis</i>
Silver beech	<i>Nothofagus menziesii</i>
Silver tussock	<i>Poa laevis</i>
Slim snowgrass	<i>Chionochloa macra</i>
Snow totara	<i>Podocarpus nivalis</i>
Speargrass	<i>Aciphylla species</i>
Sweet vernal	<i>Anthoxanthum odoratum</i>
Thyme	<i>Thymus vulgaris</i>

\* (After Stirling, M.W. 1986).

## THE AUTHOR

Bruce Mason is a recreation and conservation consultant, based from his home town of Dunedin.

As an active outdoor recreationalist he has spent much of his free time roaming the South Island high country during the last 20 years. His travels have taken him to Antarctica, and to North America where he undertook a private study tour looking at recreational impacts and the management of national parks and forests. His conclusions were published by the New Zealand National Parks Authority in 1974. This work was instrumental in introducing a minimum impact code of user ethics to back country New Zealand. Concern for the environment and recreational users' welfare led to terms on the Otago Walkway Committee and the FMC Executive, and as President of the Otago Tramping and Mountaineering Club. The latter body awarded him life membership in 1985.

Professional involvement in the outdoors has included 8 years as a reserves ranger with the Department of Lands and Survey, engaged in historic resource assessment and the establishment of the Otago Goldfields Park. During this period he obtained a Diploma in Parks and Recreation from Lincoln College. For the last 8 years of private practice, he has been variously engaged by FMC and the Public Lands Coalition (FMC, Royal Forest and Bird Protection Society, New Zealand Acclimatisation Societies). His primary role has been to conduct research and give advice on matters relating to South Island pastoral lease management and requirements for protecting recreational values, wildlife habitats, landscape, and areas of botanical importance. A recent major involvement was the successful national campaign by the PLC reversing the misallocation to the new State-owned enterprises of large areas of Crown land with high recreation and conservation values.

## THE PUBLISHER

The Federated Mountain Clubs of New Zealand (Incorporated) is a national alliance of over 120 affiliate and associate clubs representing some 16,000 members who are interested in climbing, mountaineering, tramping, hunting and skiing in the mountains and wild places of New Zealand.

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