

Crown Pastoral Land Tenure Review

Lease name : GLENFOYLE

Lease number : PO 364

Conservation Resources Report

As part of the process of Tenure Review, advice on significant inherent values within the pastoral lease is provided by Department of Conservation officials in the form of a Conservation Resources Report. This report is the result of outdoor survey and inspection. It is a key piece of information for the development of a preliminary consultation document.

Note: Plans which form part of the Conservation Resources Report are published separately.

These documents are all released under the Official information Act 1982.

May

03

**DOC REPORT ON TENURE REVIEW OF
GLENFOYLE PASTORAL LEASE (P364) UNDER
PART 2 CROWN PASTORAL LAND ACT**

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PART 1

1.1 INTRODUCTION

The lessee of Glenfoyle pastoral lease has applied to the Commissioner of Crown Lands for a review of the property's pastoral lease tenure.

Glenfoyle pastoral lease (3535 hectares) is located approximately 5 km south east of Hawea Flat. The homestead is located off State Highway 8A which connects Luggate and Tarras. The western flanks of the property which largely comprise the Crook Burn catchment, drain into the Clutha water shed while the eastern flanks (Camp Creek) feed the Lindis water shed. The pastoral lease contains less than 100 ha of flats and terraces, the balance comprising steep hill country lying between 300 and 1130 m.a.s.l..

The property is in the Central Otago Ecological Region and the Lindis Ecological District and forms part of the Grandview and Breast Land Systems. A Protected Natural Areas Survey (PNA) of the Lindis, Pisa, and Dunstan Ecological Districts was carried out during the summer of 1984/5. A final report was published in November 1994. RAP (Recommended Area for Protection) Lindis A11 (100ha) is located within the property's boundaries. This RAP was identified to represent an altitudinal sequence typical of the Central Lindis Ecological District. Approximately 100 ha of the 710 ha RAP Lindis A10 also lies within Glenfoyle. This RAP was identified to represent the montane and subalpine zone ecological pattern of the Central Lindis Ecological District. A brief Department of Lands and Survey Report dated 1984 described botanical, faunal, historical and recreational values on the property. This report notes that the Otago skink (*Leiopisma otagense*) was sited on the property. Subsequent surveys prior to tenure review have turned up only one possible sighting.

A variety of specialists from the Department of Conservation visited Glenfoyle as part of this tenure review exercise in December 1998.

No parts of the lease are current subject to protection for conservation purposes.

PART 2

INHERENT VALUES: DESCRIPTION OF CONSERVATION RESOURCES AND ASSESSMENT OF SIGNIFICANCE

2.1 Landscape

METHODOLOGY

For this assessment Glenfoyle has been divided into two landscape units and four sub-units with the boundaries being defined principally by differences in physical characteristics and land-use. After defining the landscape units (LU's) the following landscape criteria was applied to each unit to help determine each unit's distinctive and high inherent values.

1. **CHARACTER DESCRIPTION:** This section of the assessment explains the overall appearance of the LU using common descriptive terms to help create a "mental picture" of the primary elements which include landform, landcover, and where appropriate, land-use.
2. **QUALITY ATTRIBUTES:** The following are the attributes which contribute to the overall quality of each landscape unit:
 - (a) Intactness is the condition of the natural vegetation and the degree of modifications to natural processes. In a landscape context intactness can be looked upon within a continuum of areas being completely pristine to being heavily modified.
 - (b) Coherence is the level of harmony visually evident between natural elements, in other words coherence refers to the way a landscape "hangs together".
 - (c) Distinctiveness is the special elusive quality which makes a particular landscape visually striking, frequently this occurs when contrasting natural elements combine to form a distinctive and memorable visual pattern.
3. **VULNERABILITY** is a measure of each landscape unit's susceptibility to further ecological deterioration based primarily on the intactness and coherence attributes. In general terms the less modified a LU is, the more vulnerable to further change as a result of human activities that unit is likely to be.

LANDSCAPE UNIT 1.

This unit encompasses all of the property's front rangelands which includes the dissected slopes overlooking the Upper Clutha Valley and the entire Crook Burn catchment. The main ridges within the unit have a north-south orientation running parallel with the Clutha Valley.

The main drainage pattern comprises the Crook Burn which has its origins along the northern side of the property, then follows a V-shaped valley out to the Clutha. The ridgelines enclosing the stream are smooth and rounded with outcropping of bedrock being a common feature in the upper catchment and along the spurs that run off the main ridgeline. On the drier faces there are occasional patches of wind erosion. A well graded track has been constructed on the western facing slope, this track is the primary access to the back grazing blocks on the property.

The vegetative cover within the unit has been strongly influenced by aspect, altitude, and the response to AOSTD, with most of the slopes overlooking the Clutha River being covered in exotic pasture grasses such as Yorkshire fog and sweet vernal, with a few tufts of small blue tussock still being present along the dry ridgelines. Owing to the high fertility of much of the front country, a strong sward of grass has repelled *Hieracium* invasion. At the toe of the slopes kanuka shrublands are starting to expand out from the gullies with single outlying shrubs now growing on the colluvial faces. The vegetative cover within the headwaters of the Crook Burn comprises modified short tussocklands with a high component of introduced grasses. Exotic species become more dominant below 900m. while near the valley floor there has been an extensive voluntary recovery of kanuka shrublands. The most significant regeneration of kanuka is contained within a west facing catchment where the shrubs are rapidly colonising stable scree slopes. In other areas the shrublands have a relatively high component of woody weeds such as sweet briar and elderberry. Where the Crook Burn reaches the valley floor there are discontinuous groupings of mature kanuka along the margins of the stream.

In a landscape context, much of the original character of this unit has been transformed due to an intensive farming operation with the intactness of both landscape patterns and ecological processes having been fragmented. The extensive changes to the natural vegetation means that quality attributes such as coherence are only minimal with the unit now best described as typical front rangeland.

The unit's main vulnerability to change would come from fire that would rapidly spread through the dry shrublands along with possible further infestation of weed species that could include wilding pines.

LANDSCAPE SUB-UNIT 2(A)

This sub-unit includes the mid section of the north west branch of Camp Creek. The top boundary of the unit, which comprises mostly the back grazing block, follows a relatively arbitrary line across the valley between Great Rock (1227m.) and Bluenose (1223m.). At this point the sub-unit is characterised by a wide V-shaped valley with extensive outcropping of rock following a band at mid-slope and along the crest. There are isolated patches of wind erosion occurring along the drier faces and ridgelines.

The drainage patterns of this sub-unit is typical of a land system where the headwaters stem from feeder streams that begin just below the crest of the ridgeline (outside the property). These small streams link up into a single water course that form the main Camp Creek which then drains into the Lindis River about 15km north of Glenfoyle. The vegetative cover is largely dictated by aspect, altitude, and response to fertiliser. The top exposed ridgelines comprise depleted tussock grasslands with an intermingling of golden spaniard and *Celmisia* *ssp.* Thin soils on the ridgelines are weakly structured and prone to wind erosion, the result being large gaps of bare ground which are now being colonised by *Hieracium*. The impressive rocky outcrops such as Great Rock have become important refuges for the more palatable native species. On the higher south facing slopes there still remain "islands" of dense and quite vigorous tall tussock, but these natural grasslands frequently fade out into more modified grasslands where the fertility has been increased. On the damper valley floor there is a thread of grey shrublands with matagouri being the dominant species.

Besides fencing, the most conspicuous human impact is the access track which has been sited so that its effect is only moderate.

This sub-unit's vulnerability to change would come from further "greening" of the more productive areas, however in a landscape context such changes are relatively moderate due to the extent of changes that have already occurred.

LANDSCAPE SUB-UNIT 2(B)

This sub-unit incorporates the balance of the land within the north west branch of Camp Creek. The top boundary is the side tributary that has already been identified as an RAP (Lindis A11) due to the continual expansion of kanuka shrublands. Below this point the valley becomes more enclosed with the last 2 km's of the stream within Glenfoyle being confined to a rugged gorge.

Besides the strong sense of enclosure the characteristic that make this area so different to LU2(A) is the extent of the outcropping of rock that in some places comes in the form of high columns that silhouette against the skyline. The rocky outcrops extend further up the ridgeline on the true right of the stream while on the opposite side the rock formation stops quite abruptly at the lower shoulder of the ridge.

Growing around and amongst the rocky outcrops are kanuka/manuka shrublands. The natural geographic range of the shrublands would appear to be expanding with single outlying shrubs being scattered across the drier colluvial slopes, with some of the smaller manuka shrubs appearing to be affected by blight.

In a visual context the attributes that make this sub-unit memorable include the contrasts between the coarse textured shrublands and the surrounding finely textured grasslands. Another vivid feature is the olive green colouring of the shrublands that contrasts sharply with the muted coloration's of the grasslands. These shrublands take on a chaparral quality (shrublands within a semi arid environment) that in association with the rocky formations create a distinctive natural landscape.

Although the physical characteristics of this sub-unit are naturally robust and possibly not threatened by current farming activities, these dry shrublands would be vulnerable to fire, as well as further infestation of woody weeds.

LANDSCAPE UNIT 3

This is a physically well defined unit that encompasses the whole of the catchment of a major tributary of Camp Creek. The unit is characterised by a series of large side valleys that are contained by narrow ridgelines. Trig Hill (1130m.) with its dome shaped summit is a distinctive feature along the southern boundary of the property. Just below Trig Hill is a substantial band of exposed rock which contrasts markedly with the surrounding tussock cover.

The original vegetative cover in many areas has been extensively modified by the application of AOS+TD. Grey shrublands are widely distributed along the margins of the streams and follow many of the gullies to the mid section.

In many respects the landscape character is similar to LU2(A) with the mosaic of native vegetation being altered extensively for farming purposes, with the landscape unit being subdivided into four grazing blocks. This farming intensification has resulted in a landscape that conveys moderately low intactness and coherent qualities and could be best described as typical eastern high country.

2.2 Landforms & Geology

Penetration of the glaciers which excavated Lakes Wanaka and Hawea has had a strong influence on the western side of the district (western side of Glenfoyle), steepening the valley wall and leaving extensive moraines and outwash gravels modified by younger alluvial fans. Except for

the effects of an externally derived glacier, the mountains of the Lindis have been essentially unglaciated and retain characteristic smooth, rounded ridges and summits. Even on the western side of the property, the slopes have not been glaciated since the Lindis glacial advance (140,000 years b.p). Further north landforms have been modified by the more recent Albert Town advance (35,000 years b.p). The eastern side of the property (Breast Land System) is characterised by long undulating ridges and very extensive development of ripply colluvial surfaces, especially on the valley sides of Camp Creek.

The rock underlying the Lindis Ecological District is Haast Schist, a metamorphic derivative of older marine sediments. 20-30 million years ago an ancient precursor of the Central Otago schist land mass was worn down to a peneplain. The schist was then buried by the Manuherikia group of sediments. In the last 4 million years the schist basement has been uplifted, warped and dislocated by major faults. In the Lindis Ecological District, the pattern of warping and faulting is more complex and on a somewhat finer scale than further south in the Central Otago Ecological Region. Here the old erosion surface is warped into a set of north east trending folds with Manuherikia group sediments stripped away from intervening folding ridges, re-exposing the mid Tertiary erosion surface. In the Lindis, dissection and erosion has reduced the former peneplain to vestiges seen as relatively smooth ridge profiles or eliminated all traces of the old surface.

There are no Geopreservation sites on the pastoral lease.

2.3 Climate

Climate is typical of the Lakes/Central Otago region with warm summers and cold winters. Winters usually bring only an intermittent snow pack due to the property's moderate altitude and location in the lee of the Southern Alps. Rainfall at the homestead on the western margin of the property averages 550mm. Precipitation is highest along the central crest of the property and declines with decreasing altitude to the east and west.

2.4 Vegetation

Six broad vegetation communities were identified and these are discussed in detail below.

Tall tussock grasslands

Chionochloa rigida is present as very scattered, generally short statured tussocks over much of the property but only assumes the nature of relatively intact tall tussock grasslands in two distinct locations on the highest parts of the property.

Around Great Rock and Bluenose *C. rigida* occurs at moderate density with low-moderate stature. Other significant elements of the community include the shrubs, *Carmichaelia petrei*, *C. crassicaule*, *C. monroi*, *Leucopogon fraseri*, *Pimelea oreophila*, and herbs *Aciphylla aurea*, *Leptinella pectinata*, *Kelleria dieffenbachii*, *Celmisia densiflora*, *C. sessiliflora*, *Brachyglottis haastii*, and *Anisotome aromatica*.

While there is low weed diversity, tussock hawkweed *Hieracium lepidulum* is abundant. Overall, these tussock grasslands are quite depleted.

Short tussock/introduced pasture grasslands

This is the major vegetation community over the western half of the property and to a lesser extent over the eastern half. It is dominated by various pasture grasses, hard tussock, *Poa colensoi*,

Hieracium lepidotum, *H. pilosella* and *H. praealtum*. *Chionochloa rigida* is sometimes present as individual tussocks, becoming more prevalent towards the east. Likewise, scattered shrubs of matagouri, sweet briar, *Coprosma propinqua*, kanuka, *Carmichaelia petrei* and *Melicactus alpinus* form localised minor elements of the community.

A mixed native and exotic herb ground cover, where it exists, includes *Raoulia* spp, *Acaena* spp, *Rumex acetosella* and *Hypochoeris radicata*. Some damp gullies have Maori onion *Bulbinella allglistifolia*. Overall this is a predominantly exotic community with few natural botanical values.

Kanuka shrublands

Kanuka dominated shrublands are a significant community associated with the sunny aspect of much of the west bank of Camp Creek (including RAP A11), the lower reaches of the north-eastern branch of Camp Creek (part RAP A10), and the head of a gully on the east side of Crook Burn. Small kanuka fragments occur elsewhere throughout the property, in particular at the base of bluffs north-east of Trig Hill.

Manuka is a minor component of the shrublands; there are few other woody species. A sparse herb ground cover occurs in areas where woody cover is sparse. There is evidence of ongoing expansion of kanuka into open and sparsely wooded areas around the main kanuka concentrations. Scattered kanuka and manuka up to **1100** metres in RAP 11 are near the natural forest limit for the district. Rocky outcrops with their own distinctive flora are interspersed amongst the kanuka.

In general the shrublands are in good condition with few weeds and low stock usage which is likely to further reduce if present shrub expansion continues. Manuka blight is present at low altitudes.



Photo 1. Kanuka dominated shrublands - mid reaches of Camp Creek



Photo 2. Kanuka Shrublands on High Knob Spur on the True Right of the Crook Burn

Rock outcrop shrublands

Rock outcrops are a distinctive feature of the property and reach their maximum expression on the western side of Camp Creek. The specialised nature of the habitat and general inaccessibility to stock has led to a diverse range of low stature shrubs and associated grasses and herbs.

The more common larger shrubs include *Helichrysum intermedium*, *H. aggregatum*, *Hebe buchananii*, *Gaultheria antipoda*, *Myrsine nummularia*, *Pinus traversii*, *Carmichaelia crassicaule* and *Melicope alpina*. Sub-shrubs include *Lepidosiphon fraseri* and *Pentachondra plumosa*. A wide range of ferns, herbs and grasses include *Elymus* sp., *Colobanthus bilobatus*, *Brachyglottis haastii*, *Microtis liliifolia*, *Stellaria gracilentia*, *Lilium ballsi*, *Asplenium richardii* and *Cheilanthes holmii*.

Tussock hawkweed *Hieracium lepidotum* is a common element of this community but its protection from grazing and other stock impacts has ensured the retention of high botanical values.

Mixed Olearia-Coprosma-matagouri shrublands

This mostly riparian community occurs at lower elevations in the Crook Burn (where *Olearia* is uncommon), Camp Creek and south-western tributary of Camp Creek. Small outliers of these principal populations are present in gullies on the western edge of the property.

Dominant species in this mixed native/exotic shrubland are matagouri, sweet briar, *Olearia odorata*, *Coprosma propinqua*, elder and less importantly *Carmichaelia petrei*, *Ozothamnus vallivilliersii*, and *Aristotelia fruticosa*. Lianas are also prominent and include *Rhynchospora imbricoides* and *Clematis marata*.

Tussock hawkweed in particular is often abundant in the ground cover. The piecemeal distribution of the community and the strong presence of exotic shrubs has reduced its botanical significance.

Valley floor wetlands

These are small narrow wetlands alongside the major creeks, and are most pronounced in Camp Creek. *Carex coriacea* dominates but several other *Carex* and *Juncus* species are present including several exotic species. Their small size, weediness and piecemeal distribution limit their botanical significance.

Significance of Vegetation

- Tall tussock grasslands are restricted to two small locations at highest altitude. They are significantly modified by grazing and *Hieracium lepidulum*. Scattered, generally heavily browsed individual tussocks are present over much of the property, particularly in the east.
- Introduced pasture grasses in combination with native short tussock dominate the western half of the property. Three species of *Hieracium* are present and often abundant. Botanical values are low.
- Kanuka shrublands are extensive in Camp Creek from valley bottom to near ridge crest at 1000 m. Together with rock outcrop shrublands they constitute an area of high botanical value. They encompass two sites recognised as Recommended Areas for Protection (RAP's) in the report 'Lindis, Pisa, and Dunstan Ecological Districts - A survey report for the Protected Natural Areas Programme'. A further sizeable area of kanuka is present in the Crook Burn.
- Mixed *Olearia-Coprosma matagouri* shrublands occur most notably in the Crook Burn and to a much lesser degree other riparian sites. These are significantly modified by introduced shrub weeds elder and sweet briar and by tussock hawkweed.
- Small riparian wetlands occur alongside the major creeks and are most pronounced in Camp Creek.

Problem Plants

Remaining tall tussock grasslands and higher altitude short tussock grasslands are subject to a severe *Hieracium lepidulum* (tussock hawkweed) invasion. Briar is having a moderate impact on parts of the property although not in areas of particular conservation interest.

The property contains very few wilding conifers due to the lessees vigilant control over wildings on the property.

2.5 Fauna

2.5.1 Herpetofauna values

“Site locations of rare and endangered herpetofauna are recorded in the original report. Herpetofauna of this nature is at risk of illegal activities including damage and removal through unlawful interference and disturbance. Accordingly, information regarding the locations of any such herpetofauna has been deleted from this version of the report. The Department of Conservation has put in place mechanisms to ensure that such information can be released for genuine scientific and research purposes. Please contact the Department of Conservation directly to determine whether the information can be released.”

Otago skinks (*Oligosoma otagense*) are rare endemics to Otago, and are subject to a formal species recovery plan (Whitaker and Loh 1995; currently in review: Whitaker in prep). The species is subject to a category A ranking (highest priority threatened species) (Molloy and Davis 1994). Otago skinks were once distributed throughout Otago from the Lindis region to the Macraes/Middlemarch area. Skinks now have a stronghold in eastern Otago, where DOC has recently acquired significant tracts of land solely for Otago and grand skink (*Oligosoma grande*) conservation. In 1984 the headwaters of Camp Creek on Glenfoyle Station were surveyed for giant skinks (*O.grande* and *O. Otagense*) (Whitaker 1984). This survey recorded one *O.otagense* after approximately 20 minutes searching. Whitaker noted that there was additional habitat elsewhere in the headwaters of Camp Creek. The area where *O.otagense* was recorded was later included in RAP A10 (Camp Creek). At least one resident Otago skink was found in the same area in 1994 (*G.Loh pers. comm. 1998*). Grand skinks have been recorded nearby in Breast Creek (Thorne 1998).

During this survey, 4 searchers surveyed potential habitat for two days (3rd and 4th December 1998) during very hot and sunny weather. Searching consisted of scanning rocks with binoculars, and lifting likely rock slabs in search of all herpetofauna, and concentrated in and around rock castles. Areas of grass, scrub, unstable rock castles, stream margins and gully bottoms were not thoroughly searched.

For the purposes of this report common geckos were identified as *Hoplodactylus* “Southern Alps”.

Three sites were surveyed intensively; Site 1 was the site of the historic sighting of an Otago skink in the upper reaches of Camp Creek in RAP A10. Site 2 appeared to have likely habitat similar to that of RAP A10 i.e. large, reasonably stable rock castles facing north and surrounded in scrub. Site 3 was adjacent to RAP A11 and again had extensive rock castles which looked similar to castles where Otago skinks had been found in other parts of the Lindis region.

Three species of lizards were found on Glenfoyle, two of which are common in western Otago: *Hoplodactylus* “Southern Alps”; Hitchmough 1998, and *Oligosoma maccanni* (McCanns skink). In particular, McCann’s skink was very common throughout Sites 1-3, and also throughout RAP A11.

No grand skinks were found on the property, although their presence cannot be discounted. No Otago skinks were found in the upper Camp Creek area (Site 1) despite a thorough search, and no Otago skinks were found in the nearby Site 2. An aged cat scat was found at Site 2 which did not contain any obvious skink remains.

Two Otago skinks were found at Site 3 after 18 person hours searching. The first skink (Skink 1 Table 1) was spotted on 3/12/98 as it basked on a rock ledge close to a large rock castle (Figure 1). A second skink (Skink 2; Figure 2) was found by lifting rocks on the top of the castle near where the first skink was sighted. A fresh cat scat was found within 10 m of Skink 2, and two cats were sighted in the vicinity. No obvious skink remains were found in the cat scat.

Summary of threats to herpetofauna on Glenfoyle

Cats, a known predator of Otago skinks, seem abundant, and were seen by day implying their activity time has a definite overlap with the activity time of the Otago skinks. Cat populations are likely to be sustained by the high rabbit numbers in the vicinity.

Erosion at Site 1 & 3 is intense. Erosion has resulted in the occasional tumbling of rock castles down the hill. The schist type present at Glenfoyle is not stable, and is susceptible to constant exfoliation. Deep crevices are rare. These factors may explain, at least in part, why Otago skinks are present in low numbers.

The pattern of woody vegetation surrounding rock castles has resulted from periodic burning. Although the affects changes in vegetation may have on Otago skinks is not known, we can assume that the original vegetation supported greater populations of Otago skinks. The affects of top-dressing/over sowing are not known.

Fire is a constant threat to all Otago skink populations (*Patterson pers. comm.*).

Photo 3. Otago skink (*Oligosoma ottagense*). Camp Creek.



2.5.2 Avi Fauna

Four falcons were observed over 2 days in the Camp Creek catchment. It appeared that there was a breeding pair living in bluffs. The core nesting territory is likely to be in the rock castle / shrubland areas on the western side of Camp Creek. These areas appear to provide an ideal combination of food supply and cover. These birds have a large home range.

2.5.3 Aquatic Fauna

The NIWA Freshwater Fisheries Database holds no records for this property. The nearest records are for the lower section of Camp Creek, (longfinned eel, rainbow and brown trout) the headwaters of which arise partly on Glenfoyle.

Six sites on two separate stream systems (Camp Creek, in the Lindis catchment and the Crook Burn, which flows directly to the Clutha) were fished during this survey. No native fish were found. The only fish discovered were brown trout, which were present at four sites. There were no fish present at the other two sites fished.

Sites Fished

G40 235 084 Nil

G40 226 075 Brown trout.

G40 222 076 Nil.

G40 246 051 Brown trout.

G40 241 051 Brown trout.

G40 206 037 Brown Trout.

Significance of Fauna

Herpetofauna

Of the three lizard species discovered on Glenfoyle, only Otago skinks are regarded as vulnerable. For this reason they are subject to an approved species recovery plan (Whitaker and Loh 1995). Although Otago skinks appear to have suffered a major decline in the number of populations in the vicinity of Glenfoyle, they still have a stronghold in the eastern part of their range (Macraes/Middlemarch). However a recent survey of Morvern Hills pastoral lease has established that more Otago skinks inhabit the area than previously thought (L McFarlene *pers comm*).

Results of allozyme studies suggest variation in gene frequency between Otago skink populations in the western and eastern ranges (Daugherty *pers. comm.* Feb. 1999). A general principle in conservation is to attempt to preserve the entire range of genes present in the species; thus preservation of populations of skinks in the Lindis is vital to ensure the long-term survival of Otago skinks.

The Glenfoyle survey concentrated on Camp Creek, which is adjacent to Breast Creek, an area identified in the Otago and Grand skink recovery plan as a priority for habitat protection. It is probable that the area between Breast Creek and Site 1 contains a scattering of Otago skinks, as well as the area between Site 1 and 3 (an area of Camp Creek not surveyed here). In general the area supports sparse populations of Otago skinks, but the presence of a gravid female is evidence of some reproductive activity (i.e. densities are not so low that skinks cannot find one another). The presence of a Category A threatened species in any numbers is a highly significant from a conservation perspective.

Avi Fauna

Falcon are a category B threatened species (second priority threatened species) (Molloy & Davis 1994).

Aquatic Fauna

There were no significant finds on Glenfoyle in terms of native aquatic values.

2.5.4 Problem Animals

Parts of Glenfoyle are moderately to highly rabbit prone. These areas are mostly confined to the Hawea side of the property although parts of the Camp Creek catchment are also somewhat rabbit prone. Goats (which the lessee periodically controls) were observed in Camp Creek. There are no barriers to stop goats wandering into Glenfoyle from neighbouring land. Cats and ferrets are present on the property and represent a serious threat to the continued survival of Otago skinks on Glenfoyle. Possums are present but are not known to be having major impacts on conservation values.

2.6 Historic

Maori sites: There are no recorded Maori sites on Glenfoyle although several sites have been recorded in the general area. The main route from the Waitaki valley to the lakes was through the Lindis Pass and over Mt. Grandview.

European history and sites: Glenfoyle was originally part of the Morven Hills run which was taken up by John McLean in 1858. At its largest the run consisted of 352000 acres and ran from Timaru Creek on Lake Hawea down to Leaning Rock creek in the Cromwell gorge. After several changes of ownership Morven Hills was broken up for closer settlement in 1910.

Only two historic sites were recorded on Glenfoyle. The first is a stone shepherd's hut behind the present homestead. This was one of the many such huts on the original Morven Hills run. It is currently in very good condition and is obviously maintained by the lessee.

The second site was located on Camp Creek (Grid. Ref: NZMS G40 244 052). This site is unusual and its function is not clear. It comprises an area 6m by 4m which has been excavated 30cm into the ground on the flats adjacent to the creek. What appears to be a fireplace is present in one corner. There are no signs of walls on three sides, the fourth side consists of a natural stone wall about 1.2m high which has been extended a further 1m in height by the addition of stacked stone. The area between the stacked section of the wall and the natural hillslope has been backfilled. The size of floor and the presence of the fire place indicate that it may have been a habitation site but the stacked stone and backfilled wall are most unusual.

The lower reaches of Camp Creek were mined for alluvial gold during the 19th century and again during the 1930s depression but no sign of mining was found during the current survey.

2.7 Public Recreation

2.7.1 Physical Characteristics

In 1992 DOC compiled a Recreation Opportunity Spectrum for the entire conservancy whereby all areas regardless of land tenure, were classified and mapped according to setting, activity and recreational experience characteristics (Harper 1992).

On Glenfoyle the part of the property which drains into the Clutha has been zoned as "Rural". In this zone the "recreation opportunity is characterised by a feeling of being away from urban areas, but in a strongly human-modified setting." "Common recreation activities would be driving for pleasure, horse riding, , walking and picnicking" "This class encompasses most of the more developed and accessible farmland including orchards, flat land farms and hill country farms close to good road access."

The portion of the property which drains into the Camp Creek (Lindis catchment) has been classified as "Backcountry 4*4 Drive In" which "is characterised by a feeling of relative remoteness from populated areas". "The highly natural setting is a valued part of the experience and may be associated with motivations of "escape from town", education and nature appreciation". "Four wheel drive vehicles are desirable to give access to high country tussock grasslands and block mountains and more rugged remote areas."

2.7.2 Legal Access

A legal formed road gives access to the homestead from State Highway 8A. The legal road is aligned to a farm track for a short distance beyond this point. The legal road then deviates from the farm track and climbs steeply to the southern property boundary on the crest of the range which separates the Clutha and Lindis catchments. This line does not provide for practical public access. The section over which the legal and formed roads correspond is of little recreational utility.

2.7.3 Activities

The property currently receives no commercial recreational usage and only a low level of public use. The only known recreational use is occasional quail and chukar hunting.

The dividing ridge between the Lindis and Clutha catchments (Grandview Range) is of strategic importance as it represents part of a practical 4WD, horse trekking or mountain biking route along a gentle ridge which runs between Timaru Creek in the North and Long Gully in the south.

The main farm track on the eastern side of the property represents a possible entry/exit point to the range crest for recreationists although it traverses the most intensively farmed part of the property and runs past the homestead, implement sheds and yards.

PART 3

CONSULTATION AND OTHER PLANS

3.1 Consultation

Conservation resources on Glenfoyle were discussed at a meeting with “umbrella” recreation and conservation groups (NGO’s) in Dunedin on December 3 1998.

Key points raised at the meeting were:

- Property provides a possible link for public horse, foot mountain bike and 4WD access from Mount Grandview and the Grandview track.
- Potential exists to link in with a route to the Lindis Highway.
- There appear to be some shrublands in the upper part of Camp Creek which have natural values and need inspection to assess whether these qualify as significant inherent values.

A preliminary report prepared by Dr M Floate for Federated Mountain Clubs of New Zealand on Recreational and Related Significant Inherent Values of Glenfoyle pastoral lease in February 1999 contained the following recommendations (summarised):

- Transfer to the conservation estate:
 - (1) Kanuka shrublands in Camp Creek identified as RAP’s.
 - (2) An area of ridge crest above 1000m. in the vicinity of Bluenose.
 - (3) Unspecified areas of Class 8 land.
- Protection under conservation covenant.
 - (1) Kanuka shrublands on the terrace riser on the true left of the Crookburn below Pt1046m.
 - (2) Landscape values over the balance of the property (covenant to exclude developments including afforestation, earthworks and erection of structures).
 - (3) Historic cottage (covenant or small historic reserve).
- Public access easement for foot and mountain bike use.
 - (1) Ridge crest of Grandview Range (including off shoot to trig hill).
 - (2) Main farm track to ridge crest on true left of the Crook Burn.
 - (3) Ridge on true right of the Crook Burn.

3.2 District Plans (Matters of National Importance)

The part of Glenfoyle pastoral lease which drains into the Lindis is situated within the area administered by the Central Otago District Council. This area is subject to the provisions of two planning documents; the current plan (the transitional district plan) and the Proposed District Plan. The transitional district plan remains the principle planning document at the present time. However, both documents are used when assessing activities involving the use of natural and physical resources in the district.

Under the transitional Central Otago District plan the Camp Creek headwaters are zoned 'Rural 1'. Rural 1 is the zone comprising the District's productive land which is predominantly utilised for intensive grazing, pastoral use, horticulture, market gardening etc. Conditional uses include industries ancillary to farming and other primary industries.

Section 6c of the RMA (1990) requires council to recognise and provide for protection of indigenous vegetation and significant habitats of indigenous fauna, as a matter of national importance.

With respect to the proposed Central Otago District Plan district plan released for public submissions in 1998 the document states that the council shall:

- (a) Encourage and advocate to DOC that the department negotiates directly with landowners whose properties may contain areas of significance worthy of protection.
- (b) Encourage and advocate to Central Government, that in consultation with affected lessees, areas of significance be appropriately protected through the tenure review process.
- (d) Encourage land owners to provide voluntary protection and enhancement for such areas.
- (e) Review the extent to which significant areas are protected by being included in the conservation estate or made subject to restrictions to protect natural values once the tenure review is complete or when the district plan is reviewed, whichever is earlier.

Only areas with current formal protection have been identified as areas of significant natural value. For this reason no areas have been identified on Glenfoyle in the proposed plan.

Controlled activities in the proposed plan residential activities, subdivision, and retail activity. There are a number of standards which provide the basis for the other types of activities. Restricted Discretionary activities include activities in breach of standards on tree planting, storage and signs. Discretionary activities include activities in breach of standards on residential activities, traffic generation, earthworks and outstanding and significant landscapes. Non-complying activities include activities in breach of the significant indigenous vegetation, habitats of indigenous fauna and wetlands (matters of national importance) standard.

The portion of Glenfoyle which forms part of the Clutha catchment is within the area administered by the Queenstown Lakes District Council.

Under the transitional Queenstown Lakes District plan, Glenfoyle is zoned Rural B. The zone statement for rural B reads "Soils found in this zone have limited cropping value and are suitable for pastoral use. The land in this zone is generally stable hill country and high country which forms a

scenic backdrop to the Rural A Zone. It is anticipated that extensive pastoral farming will continue to be the major rural activity in this zone with some commercial forestry.”

The “policy with respect to hill and stable highcountry land is to maintain and support its function of providing extensive grazing in conjunction with lower lying fertile land in the Rural A Zone. Other uses compatible with scenic values and land stability will also be permitted in the Rural B Zone.” Uses specified include a full range of rural industries/community facilities, outdoor recreation and commercial forestry.

Under the proposed plan, Glenfoyle lies within the general rural zone. Controlled activities (which require consent that may be granted subject to conditions) include buildings, retail sales and mineral exploration. Discretionary activities include residential units on sites between 4 & 20 hectares, mining and a breach of site standard for significant indigenous vegetation. Non complying activities include power generation facilities, residential units on sites of less than 4 hectares and commercial activities. There are no prohibited land based activities within the zone.

It is of note that the proposed Queenstown Lakes District Plan is subject to up to 200 references to the Environment Court and is unlikely to become operative prior to the turn of the century.

The council may consider applications on a non notified basis for certain activities including all controlled activities.

3.3 Conservation Management Strategies

The Otago Conservancy of DOC has prepared a Conservation Management Strategy (CMS) which was approved by the Minister of Conservation in August 1998.

The CMS identifies 41 special places of conservation interest in Otago Conservancy. Glenfoyle pastoral lease is within the Hawea – Lindis Special Place.

The CMS objectives for the Hawea – Lindis Special Place are :

To manage and enhance recreational opportunities on lands administered by the department in the Hunter-Hawea area to maintain the natural and historic resources of areas while providing for an appropriate range of recreational activity of high quality.

To achieve permanent protection for areas of significant nature conservation importance in the area.

To maintain and where appropriate enhance the quality of aquatic habitats in the area.

The key implementation methods relevant to Glenfoyle pastoral lease are :

- (a) Negotiation opportunities presented by pastoral lease tenure review or land exchanges on the large pastoral runs in the area or Crown land allocation opportunities will be taken with a view to:
 - protecting areas of significant conservation value.
 - improving recreational opportunities on lands administered by the department.

- protecting and enhancing the qualities of aquatic habitats.
 - implementing the skink species recovery plan.
- (b) Removal of exotic conifers and control of broom.
- (c) Monitoring the adverse effects which may arise from rabbits, hares, pigs and goats in the forests, scrub and alpine areas and take control action as resources and priorities permit.
- (d) The species recovery plan for Otago skinks and grand skinks will be implemented.
- (e) When informed of the nature and location of waahi taoka and waahi rapu on land administered by the department, consult with Kai Tahu about the appropriate management of that site.
- (f) The protection of other significant natural and historic resources will be advocated through the Resource Management Act and other statutory processes.
- (g) Implementation of the Ngai Tahu settlement Heads of Agreement as it relates to this area.

The stated priority for this special place is “**Consolidation of protected areas and protection of key habitats through tenure review negotiations, improving public access and animal and plant pest control activities.**”

PART 4 FOR OFFICIAL USE ONLY

RECOMMENDATIONS AND JUSTIFICATION

4.1 Recommendations

4.1.1 That the proposals described below be submitted to the CCL's Agent, during the consultation process on the preliminary proposal for this tenure review, as representing the views developed under delegated authority from the Director-General of Conservation.

4.1.2 Note that statutory consents will be required before the CCL can include the following proposals in the preliminary proposal for this tenure review:

4.1.3 Note that any disposition of land by the Crown will be subject to the relevant provisions of Part IVA Conservation Act.

4.2.1 Land to be Restored to or Retained in Full Crown Ownership and Control

4.2.1.1 Name: CAMP CREEK

Existing Status: Pastoral Lease

Authority: s.35(2)(a) (i) CPLA

Proposal: To restore approximately 450 hectares of land in the headwaters of Camp Creek to full Crown control as a Conservation Area under DOC administration. The area comprises approximately 435 hectares fenced into 3 blocks. (i) Three Deer Gully Block (~160 ha) (ii) Camp Creek Block (~200ha) (iii) Part Bargour Block (~90ha).

Description:

The majority of the proposed Conservation Area is on the west side of Camp Creek. Approximately 90 ha comprises a small catchment which flows into Camp Creek near the eastern extremity of the pastoral lease. Most of this country has a warm northerly aspect and is characterised by steep rocky slopes with intermittent castle like loose schist tors. Much of the country between rock outcrops is clothed in a shrubland dominated by kanuka and manuka.

Justification:

The significance of inherent values within the proposed conservation area, is reflected in the high rankings the area achieves when assessed against 7 primary criteria set out in the Reserves Act (1977) under which natural areas are assessed for protection (see below). Given the lack of knowledge on the ecology of Otago skinks, it cannot be certain that the area will meet the criteria of long term ecological viability and size and shape for the recovery of this species. Approximately 15 ha of modified AOSTD country on the true right of a small catchment which forms the eastern extremity of the property has been included in the proposed conservation area. The area is within RAP Lindis A10 (West Camp Creek). Should the opportunity arise in

the future to achieve formal protection of the balance of this RAP, this area stands to link two protected areas. It is of note that Otago skinks have been recorded in RAP A10 and that the amount of suitable habitat would appear to be large.

- Representativeness H
- Diversity and pattern H
- Rarity and special features H
- Naturalness M
- Long-term ecological viability (botanical H, Fauna – recovery program required)
- Size and shape (botanical H, Fauna –M)
- Buffering, surrounding landscape and boundaries (botanical H, Fauna M)

Landscape: Special landscape features include the contrasts between the coarse textured shrublands and finely textured grasslands. These shrublands take on a chaparral quality which in association with the rocky formations create a distinctive natural landscape.

Fauna: (a) Herpetofauna Otago skinks which inhabit the proposed conservation area are a Category A threatened species (Molloy & Davis 1994). The species is regarded as vulnerable and for this reason are subject to an approved species recovery plan. A general principle in conservation is to attempt to preserve the entire range of genes present in the species; thus preservation of populations of skinks in the Lindis are vital to ensure the long-term survival of Otago skinks. The area is adjacent to Breast Creek, an area identified in the Otago and Grand skink recovery plan as a priority for habitat protection. It is uncertain when and if the opportunity to pursue habitat protection will occur in the Breast Creek area. For this reason it is important that the opportunity is taken to manage adjoining land with a known population of Otago skinks. Whilst the area appears to support sparse populations of Otago skinks, the presence of a gravid female is evidence of some reproductive activity. It is probable that the threats to Otago skinks at the Glenfoyle site cannot be alleviated, except by intense management by the Department.

(b) Avi Fauna. Falcon are present in the area and probably use it for breeding\nesting purposes. Falcon are a category B threatened species (Molloy & Davis 1994).

Botanical: Contains several uncommon species. This area is one of the largest kanuka shrublands in the Lindis Ecological District (the only larger area (unprotected) is located on the adjoining Bargour pastoral lease). Scattered kanuka within RAP A11 represents the highest altitude kanuka in the Lindis and Dunstan Ecological Districts and grows to within 100m of the natural beech forest line in nearby Timaru Creek.

Management and boundary issues:

(a) Fencing

The Three Deer Spur block is completely fenced from adjoining land. The Camp Creek block is not fenced adjacent to Camp Creek although it is believed that the Creek forms a reasonably stock proof boundary. The harsh nature of the block makes frequent stock trespass into the area somewhat unlikely. Similarly the part of the Bargour block (Part RAP A10) with high inherent values within the proposed conservation area is unattractive to stock. The balance of the Bargour Block within the proposed conservation area has been included due to its possible value in terms of future protected area connectivity. Until such time as the Balance of RAP A10 is subject to formal protection, continued stocking of this area is of little concern. Fenced boundaries will require periodic maintenance. All fences are on good lines and well below the winter snow line.

(b) Problem Animals

The head of Camp Creek is of low to moderate rabbit proneness. Although the area is of moderate altitude ((600-1100 m) its sunny aspect makes it the most attractive part of the catchment for a build up in rabbit numbers. Rabbit control has periodically been carried out in the area. It is important that during tenure review negotiations that agreement is reached with the lessee for a formula of rabbit control contribution by DOC. Given the presence of Otago skinks in the area DOC will want to avoid a situation of strong fluctuations in rabbit/predator numbers. The presence of cats and ferrets in the area is of major concern. These animals will require a well researched control plan – for example annual cat trapping/shooting at a critical time in the cat breeding cycle. Goats are a problem in the area, however they have been kept under strict control by the lessee who periodically employs a hunter. DOC would need to work in with periodic control initiatives in the future.

(c) Problem Plants.

With the exception of *Hieracium lepidulum* (tussock hawkweed) the area is not particularly weed prone. Hawkweed appears to be having a much greater effect on remaining native grasslands than on shrublands. Given that shrublands are showing a strong tendency to re-invade the remaining areas of mixed tall/short tussock grasslands control of hawkweed (were it possible) is not considered a problem. Nevertheless the presence of this weed is of concern as it is likely to have some effect on shrubland structure/regeneration.

No wilding pines are present in the area. The lessee has historically maintained a vigilant control over wildings on the property. Only one tree was seen within the Camp Creek catchment.

(d) Monitoring.

Given that there are some unknowns in relation to increasing the populations of Otago skinks a monitoring programme in the proposed conservation area will be essential. This will need to entail both skink and habitat monitoring. In 1986 Department of Lands and Survey staff established vegetation monitoring on Glenfoyle. Two out of the three 100 metre transects established are within the proposed conservation area (Camp Creek and Three Deer Spur Blocks). Base data from this monitoring program (including photo points) is currently held by Knight Frank (New Zealand Ltd) in Christchurch.

4.2.2 Land To Be Restored to or Retained in Crown Control (Qualified Designation)

N/A

4.2.3 Existing Reserve

N/A

4.2.4 Existing Conservation Area

N/A

4.2.5 Land Being Disposed of Subject to a Protective Mechanism

4.2.5.1 Name: HIGH KNOB KANUKA SHRUBLAND – Proposed Covenant

Existing Status: Pastoral lease

Authority: s40(1) (c) CPLA

Proposal: That an area of approximately 20 ha be designated freehold subject to the creation of a conservation covenant under Section 77 Reserves Act 1977 for the purpose of protecting of an area of kanuka shrubland which contributes to the natural character of the Lindis ecological district.

Description: An intact kanuka shrubland covering approximately 20 hectares.

Justification: This remnant of native vegetation has persisted (and probably expanded under the current lessees management) within an area which has been quite intensively developed. The remnant provides an attractive an natural component to a landscape which is otherwise pastoral.

Management and Boundary issues: The shrubland is confined to the mid reaches of steep sub catchment with little soil development. The shrubland has regenerated despite the absence of fences or natural barriers to stock. The topography of the shrubland has protected the shrubland from burning on surrounding land. The possibility of future burning on surrounding land is not seen as a major management issue. The area does not contain weeds of threat to its conservation values. Problem animals do not currently pose a serious threat.

Attachment: Terms and conditions

4.2.5.2 Name: Grandview Range Crest Public Access Route

Existing Status: Pastoral lease.

Authority: s.40(1)(c) CPLA

Proposal: To create a public access easement (foot, mountain bike and horse) under section 7 Conservation Act (1987).

Description: The route follows a formed track along the Crest of the Grandview Range entering the property at its northern boundary and exiting at the southern boundary.

Justification:

This easement is proposed for two reasons:

- (i) In order to retain the opportunity in the future to implement a route which links the Grandview track from the Lindis Pass to the Grandview ridge crest and beyond. This action retains the opportunity of completing the route when and if Grandview, Sandy Point and Long Gully pastoral leases enter the tenure review process. An existing partially formed legal road along the Forest Range Bargour boundary provides a link with this route to State Highway 8 (Lindis Pass Tarras Road). From this route tremendous views of the Lindis Pass, Lakes Wanaka and Hawea, the Hunter Valley and Mount Aspiring National Park can be attained.

Not taking the opportunity to secure this portion of the route would narrow options for future tenure reviews.

- (ii) The route stands to eventually provide public access to the proposed Camp Creek Scientific Reserve and to other areas on adjoining properties which may become public land under the pastoral lease tenure review process.

Management and boundary issues:

It is not anticipated that this route will be implemented until neighbouring properties have completed tenure review.

There are no foreseeable serious management issues associated with the implementation and management of this route. The formed farm track within Glenfoyle crosses 5 fences (including 2 boundary fences). There will be no requirement for style construction in the immediate future. The crest of the Grandview range is not intensively farmed so little conflict between farming and public access is envisaged when the route is implemented. As the route is unlikely to provide access to significant areas of public conservation land, it is anticipated that the control over carrying guns will rest with respective landowners. Dog access will be addressed during tenure review negotiations although it is considered unlikely that right of dog access will be acceptable to the lessee.

Attachments: Terms and conditions

4.2.6 Other Qualified Designations

4.2.6.1 Name: DOC Management Easement to Proposed Camp Creek Scientific Reserve/Range Crest Access.

Existing Status: Pastoral Lease

Authority: s.36(3)(b) CPLA

Proposal: That the designation land under Section 35(1)(a) CPLA for disposal be subject to an easement under Section 7 Conservation Act 1987 for management purposes.

Description: The easement is to enable Department of Conservation staff to access the proposed Camp Creek Scientific Reserve via a formed farm track (see map in attachments) by vehicle or foot for management purposes. (includes 2 stretches of track immediately outside proposed Camp Creek Scientific Reserve). Also includes range crest public access route described in 4.2.5.2.

Justification: If an area is formally protected in Camp Creek it is essential that DOC secures legal access to the area to ensure that the department can carry out day to day management functions. When the range crest public access route is developed DOC will require vehicle access for erection of styles/Signage.

Management and Boundary Issues: Nil

Attachment: Terms and Conditions:

4.2.7 Exemption or Variation of a Marginal Strip Width

N/A

4.2.8 Other Matters

4.2.8.1 Explanation of Variation in Proposals and Proposal Recommended by NGO's

Proposal Meets the following stated NGO objectives in the following respects:*

- Property provides a possible link for public horse, foot mountain bike and 4WD access from Mount Grandview and the Grandview track 3 (4WD not recommended due to track maintenance issues).
- Potential exists to link in with a route to the Lindis Highway³.
- There appear to be some shrublands in the upper part of Camp Creek which have natural values and need inspection to assess whether these qualify as significant inherent values³.

Federated Mountain Clubs Proposals:

- Transfer to the conservation estate:
 - (1) Kanuka shrublands in Camp Creek identified as RAP's³.
 - (2) An area of ridge crest above 1000m. in the vicinity of Bluenose⁶ (*this area has only moderate inherent values*).
 - (3) Unspecified areas of Class 8 land.⁶ (*These lands do not contain high inherent natural values*)
- Protection under conservation covenant.
 - (1) Kanuka shrublands on the terrace riser on the true left of the Crookburn below Pt1046m.⁴

- (2) Landscape values over the balance of the property (covenant to exclude developments including afforestation, earthworks and erection of structures).⁶ (*These lands do not contain high inherent natural values*)
- (3) Historic cottage (covenant or small historic reserve).⁶ (***This is a single site which is considered to be adequately protected under the Historic Places Act***).

- Public access easement for foot and mountain bike use.

- (1) Ridge crest of Grandview Range (including off shoot to trig hill)⁴.
- (2) Main farm track to ridge crest on true left of the Crook Burn.⁶ (***This route was considered and rejected for 2 reasons (a) Better routes exist on other pastoral leases elsewhere on the range (b) The route goes right past the homestead, yards and implement sheds.***
- (3) Ridge on true right of the Crook Burn.⁶ (***This route also passes the homestead, implement sheds etc. Much of the route is not on a formed track – as most public use is likely to be on mountain bike or horse this the route stands to serve little purpose***)

* Indicates that the proposal fully meets NGO recommendations

Indicates that the proposal differs from NGO recommendations. Where this is the case an explanation of why the difference occurs is provided.

PART 5

REFERENCES

- Anderson, A. J. 1980: **Towards an Explanation of Protohistoric Social Organisation and Settlement patterns amongst the Southern Ngai Tahu.** *New Zealand Journal of Archaeology* 2:3-23.
- Anderson, A. J. 1986: **Te Puoho's Last Raid.** Otago Heritage Books
Dunedin.
- Floate, M 1999: Recreational and Related Significant Inherent Values of Glenfoyle Pastoral Lease. Unpublished report prepared on behalf of Federated Mountain Clubs of New Zealand.
- Harper, R 1992: **Otago Recreation Opportunity Spectrum.** Department of Conservation. Otago Conservancy. Miscellaneous Series No. 10.
- Hitchmough, R.A. 1998: **Significance of Gecko Populations on Islands of Lake Wanaka.** Department of Conservation. Wellington.
- Molloy, J.M and Davis A 1994: **Setting Priorities for the Conservation of New Zealand's Threatened Plants and Animals.** Second Edition. Department of Conservation 1994.
- Thorne, S 1998: **Giant Skink Survey of the Wanaka Area.** Unpublished report.
- Ward C.M, Bruce D.L, Rance B.D, Roozen DA & Grove P (Ed) 1994: **Lindis Pisa Dunstan Ecological Districts. A Survey Report for the Protected Natural Areas Programme.** Department of Conservation, Otago Conservancy. Dunedin.
- Whitaker, A.H 1984 **A Survey of Lizards of the Lindis Pass Area, Otago.** Unpublished Report. NZ Wildlife Service.
- Whitaker, A.H and Loh, G 1995. **Otago Skink and Grand Skink Recovery Plan.** Threatened Species Recovery Plan Series #14. Department of Conservation. Wellington.

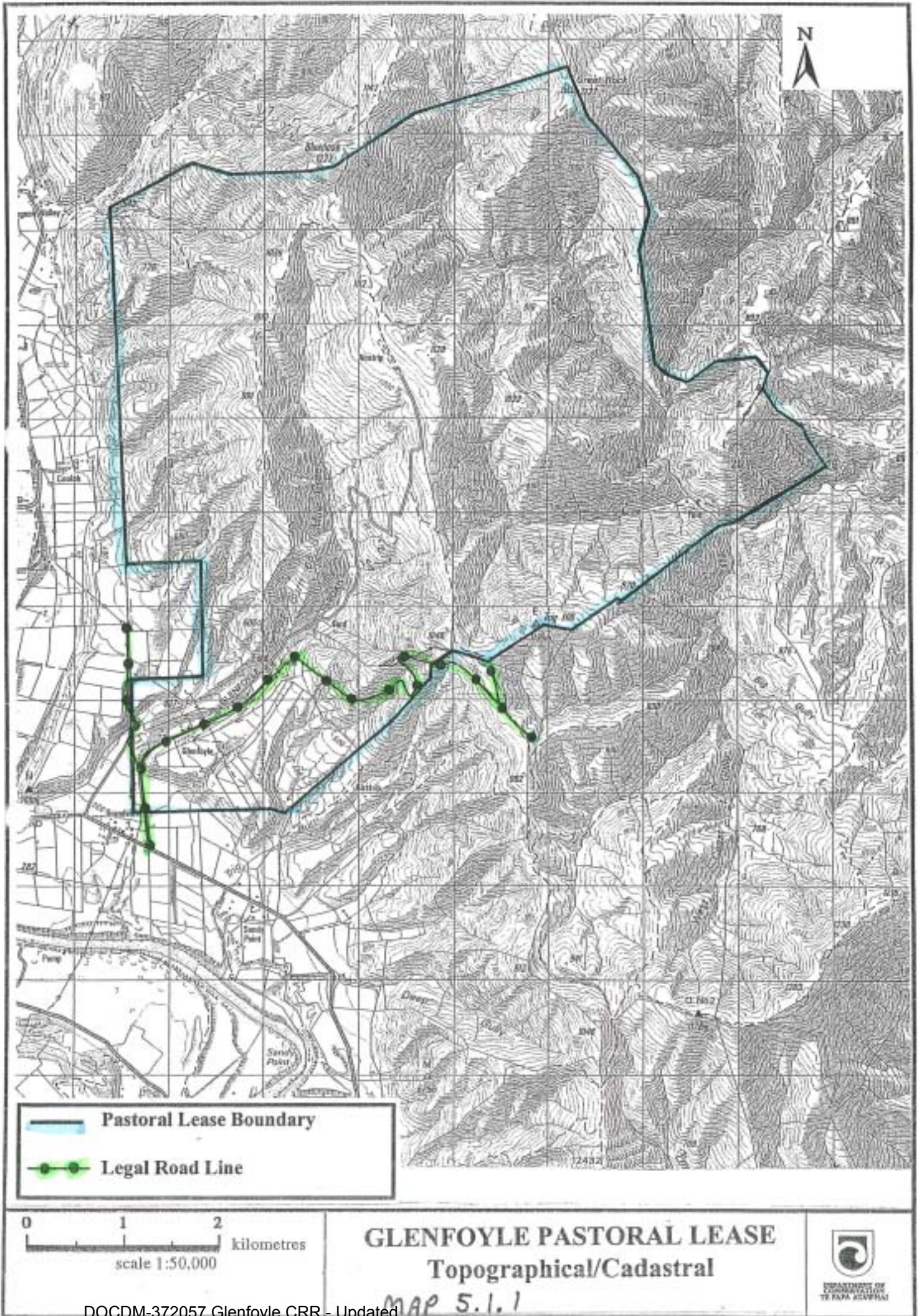
ATTACHMENTS (Maps)

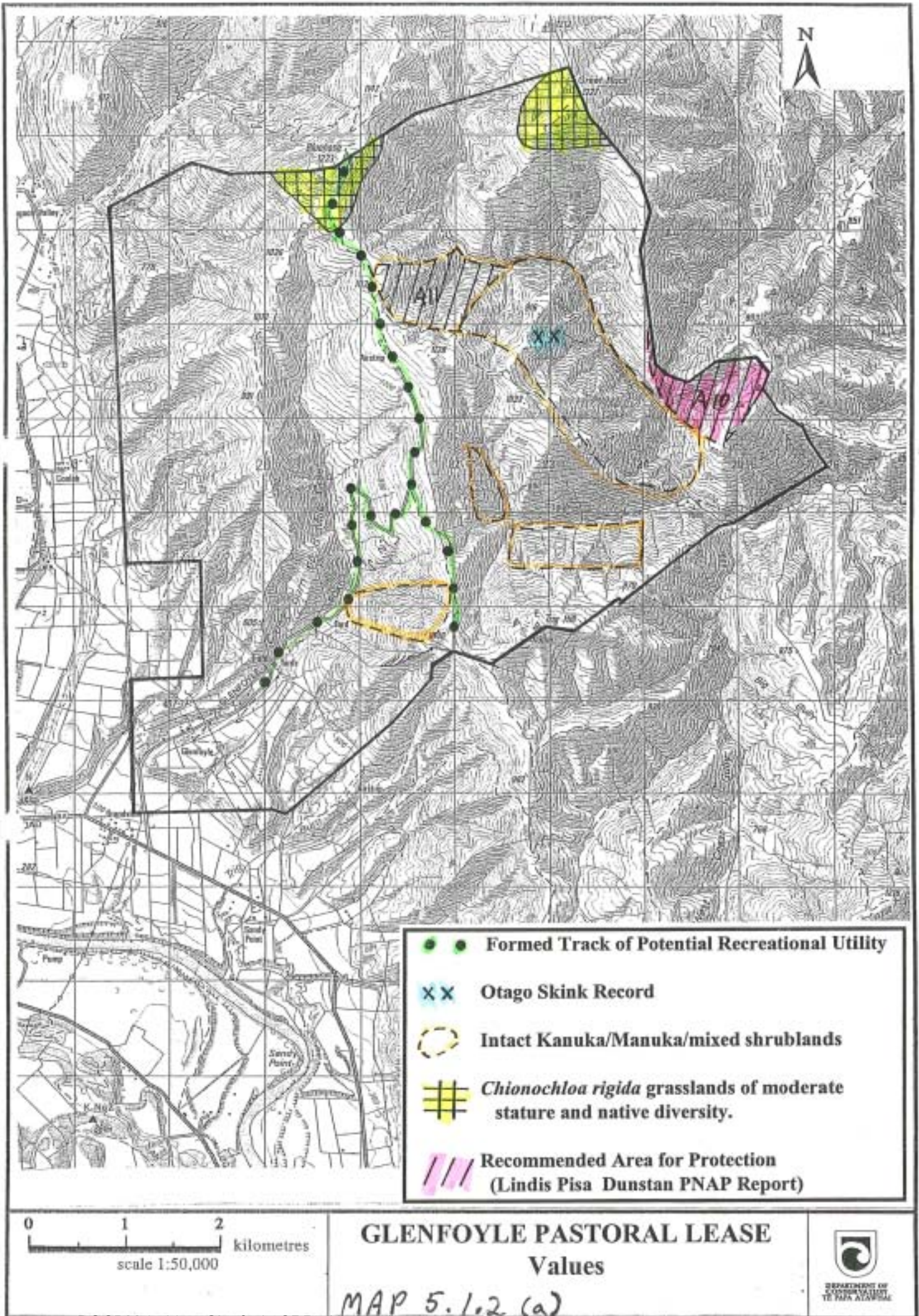
5.1 Illustrative Maps

5.1.1 Topo/Cadastral

5.1.2 Values

5.1.3 Boundaries





- ● Formed Track of Potential Recreational Utility
- XX Otago Skink Record
- Intact Kanuka/Manuka/mixed shrublands
- # *Chionochloa rigida* grasslands of moderate stature and native diversity.
- /// Recommended Area for Protection (Lindis Pisa Dunstan PNAP Report)

0 1 2 kilometres
scale 1:50,000

GLENFOYLE PASTORAL LEASE
Values

MAP 5.1.2 (a)



