

Crown Pastoral Land Tenure Review

Lease name : IRISHMAN CREEK

Lease number : PT 014

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.

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DOC CONSERVATION RESOURCES REPORT ON TENURE REVIEW OF IRISHMAN CREEK PASTORAL LEASE

PART 1 INTRODUCTION

Irishman Creek Pastoral Lease (*Irishman Creek*) covers 9802 ha of moraine and outwash plain between the Tekapo River and Lake Pukaki in the Mackenzie Basin. The station buildings are located to the west of the intersection of SH8 and the Tekapo canal. Land adjoining to the north is Balmoral Pastoral Lease and Guide Hill, and to the south is The Wolds Pastoral Lease.

Irishman Creek lies largely within the Tekapo Ecological District of the Mackenzie Ecological Region, with a small section in the Pukaki Ecological District. Both Ecological Districts have been surveyed as part of the Protected Natural Areas Programme (PNAP) in 1983 and a number of RAPs identified; two of which fall within *Irishman Creek*; Tekapo 9 (Balmoral fescue and red tussock grassland) and a small part of a RAP identified in the Pukaki Ecological District PNAP survey; Pukaki 13 (North-east face Mt Mary).

PART 2 INHERENT VALUES: DESCRIPTION OF CONSERVATION RESOURCES AND ASSESSMENT OF SIGNIFICANCE

2.1 Landforms & Geology

The Irishman Creek Pastoral Lease (*Irishman Creek*) is located in the middle of the Mackenzie Basin, a vast structural depression or intermontane basin in the centre of the South Island mountain ranges. Covering the basin floor is extensive areas of moraine, and fluvio-glacial outwash plain related to the four known glacial advances of the last Otiran glaciation in the Mackenzie Basin - the "Wolds", "Balmoral", "Mt John" and "Tekapo" advances (listed from oldest to youngest). The basin floor is also made up of more recent alluvial plain and fans and is occasionally broken by low, hard-rock greywacke mountain ranges and tilt block mountains of deep gravels.

The landforms on Irishman Creek are a typical cross-section of this basin floor, with three main types of landform represented (i) hard rock and tilt block mountain ranges (ii) moraine (iii) outwash and alluvial surfaces. For the purposes of this report, these landforms are subdivided into 12 geomorphic units, and are described below (Landform map for location and extent of these units).

Hard rock and tilt block mountain ranges

1. *Mary Range*

Part of the northern tip of the Mary Range, a low, isolated, hard-rock range, lies within *Irishman Creek*. It is comprised of greywacke and argillite of medium induration of the Torlesse Group (Chlorite Subzone 1). The range has been glaciated along both sides resulting in steep, planar, side slopes and prominent "shoulders" of moraine veneer marking the levels of different advances, and includes a west-facing basin along the rest, which was once a hanging valley above the ice. On the west side, numerous small, shallow, vertical

channels give a slightly fluted appearance, and on the eastern side several large rock outcrops stud an otherwise smooth surface.

2. *Old Man Range*

A small part of the southern slopes of the Old Man Range lie just within the Irishman Creek boundary. This low mountain range is comprised of thick layers of old, weathered greywacke gravels (the Glentanner Beds). Small areas of these gravels remain on the higher surface on either side of Irishman Creek Gorge, forming smooth, broadly rolling terrain sloping away to the southeast. Several evenly-spaced minor streams dissect the surface forming a broad north-south trending ridge and swale pattern.

Moraine

3. *"Wolds" Moraine*

Two areas on *Irishman Creek* are underlain by moraine of the oldest glacial advance - the "Wolds"- a 2-3 km wide band lying to the east of Irishman Creek and straddling SH8, and a small rectangular section close to the Tekapo River and separated from the other by an area of Balmoral outwash. These smooth-surfaced, large-scale landforms are virtually free of erratics and any surface detail, compared with the landscapes formed by more recent advances. The surface is dissected by stream activity forming large rolling ridges and swales. Channels drain radially into a depression lying about 1.5km north of the SH8-Tekapo Canal intersection. Subsequent fluvio-glacial activity has removed a lot of this material from the Basin floor and given the area scarp margins, their sharp form now generally rounded with weathering.

4. *"Balmoral" Moraine*

Situated between Irishman Creek and the Mary Burn and extending from the north to the south boundary is a large area of varied moraine terrain formed during the "Balmoral" advance. At the north-west boundary of the property, the Balmoral moraine comprises large, narrowly rounded moraine ridges and erratic-strewn knob and kettle topography. Adjacent to the knob and kettle terrain is a small, well-defined basin. This basin is thought to have contained a small meltwater lake that was drained by the two deep channels cutting south-east through the moraine and adjacent outwash. To the west and north-west of the homestead are high hills made up of large curving moraine ridges underlain by pre-existing ridges, and, at their southern end, separated from the ridge by the Tekapo Canal are ice-contact terraces indicating glacial retreat. The eastern side of the hills slope away to the south-east and are characterised by smoothly rolling ridges of varying size through to undulating and hummocky terrain dotted with erratics. A further large, south-east draining valley was formed through the middle of a large ridge west of the homestead, cutting it in two. A relatively flat kame terrace comprises the remainder of the area up to the Old Man Range.

5. *"Mt John" Moraine*

To the west of the Mary Burn is a broad band of moraine associated with the "Mt John" advance. This is the middle part of a huge band of moraine extending from the Jollie Valley in the north, to the bottom of Lake Pukaki. Mt McDonald and the Mary Range were barriers in the path of this glacier, which was forced to flow over their lower north ends and down their west sides where it left a veneer of lateral moraines gradually descending in height southward. These can be traced as distinct ridges across the west side of Mt McDonald and across the northwest end of the Mary Range. A lobe of ice pushed eastward through the gap between the two hills, leaving a tongue of moraine between what is now the Mary Burn Fill

and the south boundary. Marginal ice movement created a series of minor, hummocky washboard moraines immediately to the east, and beyond that, a small area of undulating subdued moraine of the "Mt John" glacial merges with outwash plain forming the floor of the Mary Burn Basin proper. To the south, between the Canal and the Mary Range, there are several sinuous moraine ridges running north-south. In between these ridges are smaller moraine hillocks and flatter fluvial surfaces. Erratics and ephemeral tarns lie scattered throughout this area. A swampy stream valley separates this area from the Mary Range. The valley comprises old weathered moraine remnants from the "Balmoral" advance and is partly covered with piedmont colluvial deposits on its east side.

6. *"Tekapo" Moraine*

Between the "Mt John" moraine and Lake Pukaki lies a band of glacial landforms left by the "Tekapo" glacial advance. The terrain is moderately rolling to hummocky, incorporating numerous flatter inter-moraine depressions and terraces that are often occupied by tarns and wetlands. Erratics are also common. The middle part of this band is composed of depositional landforms while the north and south parts have been shaped by ice-scouring.

Outwash and alluvial surfaces

7. *Upper Mary Burn Basin*

This is an ice-scoured basin lying to the north of the Canal, formed during the "Balmoral" advance (Note: it is distinct from what is known as the Mary Burn Basin which lies to the south of the Canal, mostly on The Wolds pastoral lease (see 8 below). The basin floor comprises from west to east: a small relatively flat area of old terrace; the slightly entrenched floodplain of the Mary Burn; undulating terraced moraine; a deep valley cut by the Mary Burn stream; lumpy moraine; a swampy depression with a drumlinoid ridge pointing into it from the north. Also included in this area is the southeast flank of Mt McDonald, a small, high, isolated, hard-rock hill, modified by Canal construction at its southern end. The Mary Burn itself is a large meandering stream set within well-vegetated banks. It passes under the Canal via a culvert.

8. *"Mt John" Outwash (Mary Burn Basin)*

This is the northern part of the Mary Burn Basin outwash surface formed during the "Mt John" advance. This large surface has a particularly well-developed mound and hollow pattern that is visible from the Canal road. However, work associated with the Canal has completely modified about half of this area.

9. *"Mt John" Outwash (Fork Stream)*

A large terrace underlain by outwash gravels formed during the "Mt John" advance juts into a small part of the property at the eastern edge next to Forks Stream. The bulk of the terrace lies in the neighbouring Balmoral lease to the north. It has a distinctive braided mound-and-hollow micro-topography typical of Mackenzie Basin.

10. *"Balmoral" Outwash (West)*

There are two areas of gravel outwash surface formed during the "Balmoral" advance on Irishman Creek, separated by an area of Wolds moraine. The western section is centred about Irishman Creek and is separated from the Wolds moraine to the east by scarps but merges with "Balmoral" moraine to the west and Old Man Range gravels to the north. The outwash surface itself has a braided, mound-and-hollow pattern characteristic of Mackenzie Basin outwash surfaces and oriented roughly with the winds prevailing at the time of their

formation. The surface is incised by Irishman Creek and three large south-east flowing drainage channels. At its steeper northern end Irishman Creek has cut through Old Man Range gravels, but the remainder of the stream is bordered by long north-south running alluvial terraces on the true right and smaller discontinuous terraces on the true left, both of "Balmoral" age. Today Irishman Creek is a large, clear, gravel-bottomed stream meandering down a mostly vegetated gravel floodplain entrenched between the older terraces.

The eastern section of "Balmoral" outwash lies between the two areas of "Wolds" moraine to the east of SH8. This is an undulating surface that slopes southeast with several evenly spaced drainage channels running north-south. It too displays the braided surface pattern typical of Mackenzie Basin.

12. Man-Made Areas

Small areas of *Irishman Creek* have been re-shaped in association with the hydro works. A portion of the outwash plain forming the Mary Burn Basin floor has been excavated and two small lakes formed in it. The area between SH8 and Irishman Creek, south of the canal, has also had its surface modified.

Landform significance

The area contained by SH8, Lake Pukaki, the Tekapo Canal and the outer edge of the moraines east of the Mary Range and the Mary Range has been identified as a key area geomorphologically (Mansergh 1978). A large part of this area lies within *Irishman Creek*, including some of the major features. Additionally, a large portion of "Wolds" moraine is present on the property. "Wolds" moraine is the oldest known moraine deposit in the Basin and is of limited occurrence. The Old Man Range, part of which lies within the property, is also an unusual and distinctive landform of the Basin.

There are no geopreservation sites on Irishman Creek.

2.2 Landscape

2.2.2 Landscape context

Irishman Creek is situated in the middle of one of the most extensive outstanding natural landscapes in the Canterbury Region – the Mackenzie Basin. The Mackenzie has been described as "one of the most investigated, painted, written about, visited, eulogised and argued over landscapes in New Zealand" (BMP and LA 1993). The sheer scale and openness of the Basin and the relatively natural character is unsurpassed in New Zealand. It is also a highly visible landscape, viewed from major tourist highways (SH8 and SH80) and the Tekapo Canal roads.

The Basin retains very high "natural" qualities because of its overwhelming dominance of natural landform and extensive presence of short grassland, and scattered shrublands which still retain a component of native species and continues to support a diversity of indigenous insects, lizards and birds.

Irishman Creek is an important and integral part of this renowned and highly valued Mackenzie Basin landscape. Large parts of the lease contribute much to people's experience and memory of the Basin. Many of the key attributes that underlie the outstanding natural landscape status and special visual character of the Basin can be found on Irishman Creek - vast scale and openness; visual unity and simplicity due to the subtle range of brown and grey colours and fine visual textures of the ubiquitous tussock grassland cover; and the dominance of well-defined highly legible natural landforms.

2.2.3 Landscape Description

2.2.3.2 Land types and units

To provide a basis for landscape classification the Canterbury region has been divided into land types, after Lynn (1993)¹. Irishman Creek falls within three of those land types:

- H3 Glacial and Fluvial Basin Floor Land Type – includes glacial and fluvial basin landforms, extensive ablation and terminal moraine, and associated meltwater channels, outwash terraces, minor lakes, fans, meandering floodplains, and glacial moulded hills and mountains under 1300m
- H3 Basin Floor Outwash Plains Land Type – includes basin floor fluvio-glacial outwash plains, terraces, piedmont fans, braided and meandering floodplains and associated low hard rock ranges, and
- H7 Isolated Mountain Range Land Type – are steep to very steep, dissected, isolated mountain blocks up to 1830m, nested within the glacial and fluvial valley floor or basin land types

In order to describe the visual landscape, land types are subdivided into landscape units. Landscape units are visually distinct areas able to be set apart from each other on the basis of landform, vegetation patterns, and cultural patterns. Eighteen landscape units have been identified for *Irishman Creek* and these are shown on Map 2(Landscape description) and described below.

1 *Fork Stream Terrace*

This is a small triangular piece of greywacke gravel outwash plain associated with the Mt John glacial advance, and is at the extreme eastern end of the property. It is typical of the Mackenzie Basin outwash surfaces, with a very depleted fescue tussock grassland cover, and characteristic braided mound-and-hollow surface pattern, formed by wind erosion and accentuated by current day vegetation distribution.

2 *"Balmoral" Outwash Plain (East).*

A rectangular area of undulating plain, between SH8 and the Tekapo River, this is typical of the Balmoral glacial outwash surfaces, being generally flat, open and visually simplistic with a degraded to very degraded fescue tussock grassland cover and a characteristic braided surface pattern typifying the outwash surface. Inter-tussock cover is comprised of exotic grasses, a variety of exotic and native prostrate and mat plants, mosses and lichen. Distribution patterns of vegetation mirror soil depth and moisture availability patterns.

3 *"Wolds" Moraine*

A 2-3 km wide band of smoothly rolling terrain on the eastside of Irishman Creek underlain by moraine of the "Wolds" glacial advance, and in the north-west corner by old weathered gravels of the Old Man Range. Short tussock grassland is the predominant cover with patches of red tussock in moist hollows along with small *Schoenus-Carex* wetlands. Matagouri occurs throughout the grassland in varying densities as small bushes little higher

¹ Extracted from Land Types of the Canterbury Region by Ian Lynn in the Canterbury Regional Landscape Study, Boffa Miskell and Lucas Associates 1993

than the tussocks. Taller "grey" scrub² with minor sweet briar component occupies gullies and moister patches. Golden speargrass is prolific over localised areas. A few wilding pines and one group of willows are scattered across the moraine, and a small planting of pines exists on the north boundary next to SH8. The areas are very extensively grazed in conjunction with adjacent areas of outwash. The north boundary fence is a bulldozed line. A power line runs down the ridge east of the highway, which bisects the larger area diagonally. Otherwise there are no cultural features visible over the area.

4 "Balmoral" Outwash Plain (West)

A second "Balmoral" age outwash plain lies between SH8 and Irishman Creek and between the "Wolds" moraine and the Tekapo Canal. This surface has a typical braided surface pattern that is readily seen from the Tekapo Canal road, along with the visually simplistic wide-open spatial character. Apart from a power line crossing the plain near the Canal and a gravel pit on SH8, there are no obvious cultural features. The small area south of the Canal has no cultural features on it either but its shape and small size is unnatural.

5 Irishman Creek

This unit comprises the recent alluvial terraces and floodplains of Irishman Creek. Vegetation cover is varied compared to that of the surrounding plains and moraine. Grey shrublands dotted with sweet briar, *Schoenus-Carex* wetlands and dense swards of exotic grasses occupy moist areas close to the stream and depressions further out on the old terraces. The drier stony floodplain areas and terrace scarps have a sparse and incomplete cover of stunted tussocks, matagouri, porcupine shrub, exotic grasses, hieracium and prostrate native species. Their surfaces often have a wind-eroded, hummocky micro-topography. Downstream, lupins, and willows seasonally add incongruent colour to a predominantly ochre, brown and grey landscape. There has been some modification close to the homestead associated with irrigation and local power generation but otherwise there are no obvious cultural features.

6 "Balmoral" Moraine and Outwash

A large area of flat to undulating, to steeper rolling topography lying to the west of Irishman Creek and extending from the developed homestead area to the north boundary. It is composed of moraines and flat outwash surfaces of the "Balmoral" advance, and, in the higher north-east part, the old gravels of the Old Man Range underlie the surface. The surface is generally smooth and lacking much surface detail. The outwash surfaces have a remarkably consistent cover of short tussock. Native broom and the occasional *Cassinia* bushes are found across the surface, as well as numerous small matagouri bushes. On scarp crests however wind erosion has reduced the cover to intermittent hieracium, sheep sorrel and a few native mat species over a hummocky micro-topography with much exposed soil. A few wilding pines are scattered throughout. The rolling moraine areas and steeper slopes of the Old Man Range have more varied cover, including patches of grey shrubland and red tussock. Red tussock is also present on the south-facing sides of the stream gullies. 4WD tracks are present but are little more than wheel marks worn in over time. As with the previously described areas, there is a marked absence of development over such a large area of easy terrain at low altitude.

7 Northwest "Balmoral" Moraine

An area of moraine lying to the south-west of the Old Man Range. It comprises an area of

² Grey scrub refers to a mix of divaricating shrub species of predominantly matagouri, *Olearia*, and *Coprosma* species which together appear as a fine-textured, grey-brown, bushy shrubland

knob and kettle moraine with many erratics, as well as smoothly rolling to flat inter-moraine areas thought to be kame terraces to the west. Vegetation cover is similar to preceding units although the tussock cover is more depleted and hieracium more common. Diverse native shrublands exist among the piles of rock in the knob and kettle area along with scattered red tussock, and speargrass. There are no visible cultural features within it apart from an inconspicuous 4WD track.

8 Central Trig E Ridge and Eastern Moraine

This is an area of more strongly rolling and hummocky moraine associated with the "Balmoral" advance. The vegetation has been greatly modified by AOSTD (aerial oversowing and topdressing) and comprises dense green exotic pasture with dense matagouri growth over the hillier part. This grades into more open short tussock grassland over-sown with exotic grasses and clover on the lower moraine and outwash areas. The area is subdivided into several relatively small grazing blocks. The Tekapo Canal hugs the curve of the southern end of the ridge, which has been graded back as part of the Canal construction. A pylon line also crosses the southern end of the landscape unit.

9 Upper Mary Burn Basin.

This is an ice-scoured basin lying to the north of the Canal. The vegetation cover and use of this area is similar to that of Unit 8. Some of the terrain close to the Canal has been graded and re-shaped and the Canal itself is a substantial man-made feature enclosing the basin. A small group of conifers exists right on the north boundary next to the Mary Burn.

10 Mt McDonald.

A small isolated, ice scoured, hard rock hill lying about 1 km west of the Mary Burn on the north side of the canal. Vegetation cover is a mix of shrubs, short tussock, exotic grasses, hieracium and other exotic herbs, speargrass, and native mat plants. Exotic species are widespread and locally dominant due to sheep camping on the hill. The west side is more "natural" than the both the summit and east side, having a cover visually dominated by short tussock, matagouri and speargrass.

11 "Mt John" Moraine

A 3-4 km wide band of moraine west of the Mary Burn, Mt McDonald and the Mary Range and extending north and south of the canal. A depleted short tussock grassland with hieracium and native mat plants is the pre-dominant cover, and the area has a dry-looking brown-grey colour. Grey scrub species are also a common element both in patches (especially around rocks) and scattered through the grassland as small shrubs. Sweet briar and the occasional wilding pine and exotic broadleaved shrubs are also present as well as exotic grasses. A larger grove of conifers exists near the edge of the moraine in the Mary Burn Basin with perimeter wilding spread evident. The area is extensively grazed and one fence subdivides the southern area into two blocks. The land has been graded either side of the Canal for variable distances and now has a surface of bare soil and stones or sparse exotic grasses and herbs. Beyond this development, the terrain of the moraine area between the Canal and the Mary Range has much of its original form and surface detail still apparent, forming a complex and varied landscape. The shingle road up to the Mt Mary translator passes through the southern part, and there are several 4WD tracks. There are two pylon lines and a power line in the southern part.

MR2 Valley

This is a small swampy stream valley separating the Mary Range and the "Mt John" moraine. A shingled 4WD track running through the "Mt John" moraine defines the west edge more sharply, thus a narrow band of moraine is also included in this unit. The valley has been fenced off from the surrounding moraine and has been over-sown, which together with the moister conditions supports a denser, greener and more robust growth of short tussock and exotic pasture species. *Schoenus-Carex* wetlands also occupy the wetter areas. Along the east side are areas of grey scrub and sweet briar, dense in gullies but scattered through the grassland. An airstrip has been constructed across the south boundary, and a 4WD track crosses the area just north of the strip.

13 Mary Burn Flats

A small area of undulating subdued Mt John moraine and fluvial plain. This area has been fenced off to form a large paddock and the short tussock grassland over-sown and top-dressed, resulting in a dense, green, exotic-dominated sward with thick matagouri growth starting.

14 Mary Burn Basin Outwash Plain

The northern edge of a large outwash plain on the Mary Burn Basin floor lies within *Irishman Creek*. Visually it is integral with the rest of the plain, the boundary fence being hard to see. This plain retains an "unimproved" short tussock grassland cover and is a good display of the braided mound-and hollow pattern typical of Mackenzie Basin outwash plains visible from the canal road.

15 Ice-Contact Terraces

A series of terraces formed on the edge of the "Balmoral" age glacier as it retreated, situated south of the canal. Short tussock grassland predominates with a mix of native prostrate and mat/cushion plants, and some hieracium and exotic grass species. Grey scrub is also present mixed with sweet briar, generally clustered in the gullies. Canal construction has modified the ground close to the Canal, and a 4WD track descends the terraces to the Basin floor. A second track follows a terrace edge south-east into The Wolds.

16 Mary Range

The northernmost end of the Mary Range lies within Irishman Creek. Depleted short tussock grassland is the predominant cover on the west side and summit. Mixed "grey" shrubland is visibly dominant on the east side giving a dark grey speckled appearance to the slopes. Exotic grasses and hieracium are widespread amongst the tussock, and sweet briar is a common component of scrub areas on the west side. A few wilding pines of varying ages are dotted over the slopes. There is at least one subdivision fence running vertically down the west side. A rough shingle road runs inconspicuously along the summit providing access to the Mt Mary translator. A 4WD track zig-zags up the western slope near the south boundary but is not a significantly obtrusive feature.

17 "Tekapo" Moraine

A 2.5-3 km wide band of moraine left by the "Tekapo" age glacier between the older Mt John moraine and Lake Pukaki. Erratics are widely present including, a large skyline boulder in the shape of the Australian continent, locally recognised as "Aussie Rock". Short tussock grassland is the predominant cover, similar in composition to the "Mt John" moraine area (Unit 11) to the east. Numerous *Schoenus-Carex* wetlands and small tarns occupy

depressions, including one large one close to the Hayman Road at a point 3.5km south of the northern boundary. The area has been subdivided into 9 small grazing blocks. The lower 6 blocks excluding the area immediately north of the Power Station have been over-sown and top-dressed, forming a dense green sward of exotic grasses and clover (plus short tussock) with extensive matagouri and sweet briar. There are conifers present along the lakeshore side of the property, and a number of wilding trees spreading over the small lakeside area immediately south of the Power Station, however, as of yet there are no wilding trees visible in the area north of the Power Station.

18 *Developed Areas and Areas associated with Canal Works*

These are areas that have been completely modified in the course of canal construction, or through cultivation, building and tree planting.

2.2.4 Visual values

2.2.4.1 Inherent visual values

The Mary Range, the "Mt John" moraine area, the small areas of outwash plain south of the Canal, and the large areas of moraine and outwash areas either side of Irishman Creek and to the east of SH8 are areas considered to have inherent visual value. All these areas have a natural character. There is very little visible human modification, limited to the occasional inconspicuous fence or 4WD track, and power lines. The limited presence of such features also ensures these areas have a moderately high-to-high degree of coherence (harmony) between elements of the landscape. The overall impression is of vast short tussock grassland with patches of native shrubland, wetlands, and areas of red tussock in the north.

The low grassland cover has its own unique visual quality related to its subtle range of pale ochre/brown/grey colours, fine visual texture, and homogeneity. The interplay of light and shadow in certain light conditions can create very beautiful or striking images that are special to tussock grassland. The visual character of short tussock combined with the extent and uniformity of its coverage, creates a landscape of huge scale and openness that is rarely experienced elsewhere in the region. The low uniform cover also creates a very legible landscape, where landforms can be very clearly seen, accentuated by light and shadow, and their inter-relationships understood. Erratics and tarns add to this view, and present some striking images.

2.2.4.2 Visibility from public places

Irishman Creek is a highly visible property³. The property is viewed from SH8; from the Tekapo Canal Road which passes through the property for 15.5 km; the Hayman Road which forms the 10.5km long western boundary; and SH80 on the opposite side of Lake Pukaki. Views from SH8 and the Tekapo Canal Road are considered to be the most significant, and key features are described in Appendix 1b.

2.3 Climate

The Mackenzie Basin has a continental like climate with hot summers and cold winters and annual, diurnal and extreme ranges in temperature. According to climate records from the NZ Met Service, rainfall is normally evenly spread throughout the year, but there is a wide

³ The only parts not seen are parts of the "Mt John", "Tekapo" and "Balmoral" moraines where foreground terrain screens the ground behind relative to viewpoints; the plateau area northwest of Mt McDonald which is high relative to viewpoints; a part of the upper Mary Burn Basin, hidden by the Canal; the area southwest of the Old Man Range, hidden behind nearer large ridges; parts of the homestead area hidden behind shelter belts; and the very eastern point of the property due to distance and the lower elevation of the Fork Stream terrace.

seasonal and annual variability from year to year. Irishman Creek is located in a moist subhumid rainfall region of between 550-800 mm of rain annually (after Belton and Ledgard 1984). The nearest climatological station at Lake Tekapo records an rainfall normal of 606 mm. On average, snow falls on 6-12 days each year, the months May through to September having more than one day of snow per month. However, snow may fall during any month (NZ Met. Service, 1983).

The basin enjoys high sunshine hours, averaging 2000-2300 per year (cf. Christchurch which averages 1950). There is no season that can be called frost free, and the months of April to November have, on average, more than 10 days with frost.

2.4 Vegetation

Four main vegetation communities are identified within *Irishman Creek*: (1) over-sown and topdressed adventive grasslands, (2) short tussock / mouse-ear hawkweed grasslands; (3) red tussock; (4) shrublands. These are described below:

1. *Over-sown and top-dressed adventive grasslands*

Although most development has occurred around the homestead blocks, clovers and adventive grasses are commonly found on the moister western slopes above Lake Pukaki and in the valleys south of the canal (much of the area covered by Tekapo and Mt John moraine, and in the Mary Burn valley).

In the Mary Burn valley north of the canal, matagouri shrublands are extensive with modified grassland of sweet vernal (*Anthoxanthum odoratum*), browntop (*Agrostis capillaris*) and clover (*Trifolium repens*). Below the canal the Mary Burn has been modified by canal works and wetland areas have been developed around borrow pits. Some willows overhang the Mary Burn stream and silver tussock (*Poa cita*) and matagouri (*Discaria toumatou*) dominate with an understorey of clovers and exotic grasses.

Along the slopes above Lake Pukaki are a series of tarns and seepages, often containing bog rush (*Schoenus pauciflorus*) and other rushes and sedges. Surrounding these ponds there tends to be a fairly modified vegetation cover of clovers and exotic grasses with patches of briar (*Rosa rubiginosa*) and matagouri of varying density. Cattle often graze around the ponds causing pugging, especially near gates. Higher on the moraines are some ephemeral tarns surrounded by mouse-ear hawkweed dominated fescue tussock and considerable briar and matagouri.

2. *Short tussock / mouse-ear hawkweed grasslands*

On the extensive moraines of the mainly undeveloped Middle, Road, River and Bottom blocks fescue tussock forms a good cover over the prevalent mouse-ear hawkweed and a number of other species including sweet vernal, *Coprosma petrei*, *Brachyglottis bellidioides*, *Brachyscome longiscapa*, *Pimelia oreophila*, *Luzula rufa*, *Leucopogon fraseri*, *Raoulia subsericea*, *Stackhousia minima* and onion-leaved orchids (*Prasophyllum colensoi*). On damper more fertile spots silver tussock and *Carex muelleri* are sometimes present. Occasional wilding pines have seeded into the moraine. The native brooms *Carmichaelia petrei* and *C. crassicaule* occur sporadically throughout, often appearing to be dead or dying due to browsing by sheep, hares or rabbits. On the moraine outwash the number and cover of native intertussock species appears to be less. Mouse-ear hawkweed dominates with short stunted fescue tussock providing a sparse cover. The hardy mat plant *Coprosma petrei* and occasional mat heath *Leucopogon fraseri* are infrequently present. Rabbit burrows are common.

On a stony terrace above the true right of Irishman Creek a group of *Lepidium sysimbrioides* subsp. *sysimbrioides* plants were observed growing in association with *Poa maniototo*, *Coprosma petrei*, *Carmichaelia nana*, and *Raoulia hookeri*.

Where?
Around the toe slope of the moraine ~~there is~~ a spring emerging from the slope, giving rise to a flush containing monkey musk (*Mimulus guttatus*), rushes and sedges. Silver tussock, bog sedge and *Carex geminata* grow nearby in damp depressions that are periodically inundated with water. A large willow tree growing nearby is surrounded by matagouri, fescue tussock and mouse-ear hawkweed on drier rises.

Occasional ephemeral tarns are scattered over the moraine to the west and north of Mt Mary. The vegetation in most of the tarns and surroundings is fairly modified although damp depressions often contained many tiny native plants including *Pratia perpusilla*, *Gnaphalium laterale*, *Isolepis aucklandia*, *Limosella lineata* and *Epilobium angustum*.

3. Red tussock

Red tussock (*Chionochloa rubra*) was once more widespread in this region. Some remnants remain on *Irishman Creek* in damp hollows and in association with matagouri on drier gently sloping ground. Red tussock associated with matagouri and golden speargrass (*Aciphylla aurea*) occupy outwash gravels on the corner of the property near the main road and the northern boundary fence. Other native plants in the area include fescue tussock, blue tussock (*Poa colensoi*), *Aciphylla subflabellata*, *Carex muelleri*, and an occasional *Olearia bullata*. Some seedling red tussocks were observed indicating that red tussock may regenerate if grazing is controlled. A small patch of lupins near the top boundary fence has probably spread from those bordering the main road.

Other patches of red tussock occur in a tributary Creek where it is associated with *Coprosma intertexta* and *Olearia bullata*. Further patches of red tussock occur in depressions on the moraine below the northern boundary fence. Occasional narrow leaved snow tussocks (*Chionochloa rigida*) and *Dracophyllum uniflorum* grow on drier rises nearby.

The "Balmoral Fescue and Red Tussock Grassland" identified in the McKenzie Protected Natural Areas (PNA) report as one of the best fescue tussock communities in the district, with red tussock in wet hollows and associated with matagouri on drier hill slopes, was recommended for protection (RAP:Tekapo 9). In a later inspection by Department of Conservation staff it was decided that the area no longer contained the values for which it was originally intended. However, the shallow valleys below trig O on the Old Man Range still support a sometimes dense cover of red tussock and matagouri with many associated native species including *Carmichaelia petrei*, fescue tussock, blue tussock, golden spaniard, *Brachyscome longiscapa*, *Anisotome flexuosa*, *Scleranthus uniflorus*, *Muehlenbeckia axillaris*, *Coprosma petrei*, *Brachyglottis haastii*. Mouse-ear hawkweed is the dominant understorey species with a scattering of other exotic plants such as king devil (*Hieracium praealtum*), sweet vernal and a few large briars. Two large solitary boulders lying beyond the red tussock / matagouri provide protection for a cluster of native shrubs, sedges and herbs including *Coprosma intertexta*, *Melicytus alpinus*, *Coprosma propinqua*, *Carex muelleri*, *Blechnum penna-marina* and *Wahlenbergia albomarginata*.

The largest continuous area of red tussock on the property is in the wide valley to the west of Mt Mary, where previous over-sowing and topdressing has encouraged tall vigorous growth of red tussock. The vegetation here is fairly modified with cattle grazing on relatively lush grassland of clovers and exotic grasses.

4. Shrublands

Mt Mary

On the north-eastern face of Mt Mary there is an excellent example of a mixed dry shrubland community growing on rock outcrops and screes. This area was identified as a RAP in the McKenzie PNA report (Pukaki 13). Only a quarter of the RAP area is in the Irishman Creek pastoral lease, the greater area being on the Wolds pastoral lease. However, an inspection of the Irishman Creek area showed a diverse range of plant species characteristic of dryland areas, including two species (*Coprosma intertexta* and *Pleurosorus rutifolius*) listed as 'naturally uncommon,' one species (*Carmichaelia crassicaule*) listed as 'declining' and one species *Carmichaelia vexillata* listed as 'vulnerable' in de Lange et al, 1999. *Pleurosorus rutifolius* is a rare fern, which is confined to hot dry rock crevices. In this shrubland it is found growing in association with two other ferns (*Cheilanthes humilis* and *Asplenium flabellifolium*) that are also adapted to growing in dry rocky habitats. Also located in the rock outcrops are several clumps of star lily (*Arthropodium candidum*), which is uncommon in this region. *Coprosma propinqua* is the dominant shrub in the shrubland associated with prostrate kowhai (*Sophora prostrata*), *Coprosma intertexta*, matagouri, *Melicytus alpinus*, briar, *Carmichaelia petrei*, and bracken (*Pteridium esculentum*). Other native plants growing beneath the scrub include the grasses; blue tussock, *Dichelachne crinita*, *Elymus solandri*, fescue tussock, and herbs; *Geranium sessiliflorum*, *Raoulia australis*, *Muehlenbeckia axillaris*, *Wahlenbergia albomarginata*, *Brachyglottis haastii*, *Coprosma petrei*, and *Dichondra repens*. *Carmichaelia vexillata* was noted growing in the grassland near the track at the northern end. The exotic mouse-ear hawkweed is commonly present throughout the area.

Irishman Creek riparian shrublands

Irishman Creek cuts down through the moraine near the northern boundary fence and flows down through steep stony banks to the outwash plain. Patches of mainly native scrub occur at the toe of these slopes beside Irishman Creek. These pockets of shrubland include *Olearia odorata*, *O. bullata*, matagouri, briar, *Coprosma intertexta*, *Aristotelia fruticosa*, *Melicytus alpinus*, *Carmichaelia petrei*, *Muehlenbeckia complexa* and *Clematis marata*. In the riverbed there is flowing water, dry streams, seepages and bogs. In the boggy areas bog rush and *Carex coriacea* dominate. On the stony riverbed short matagouri dominates, with briar, *Melicytus alpinus*, *Olearia odorata*, and *Coprosma intertexta* scattered throughout. Mouse-ear hawkweed provides the dominant ground cover with scattered silver tussock, fescue tussock, blue tussock, *Muehlenbeckia axillaris*, *Raoulia australis*, *Gaultheria nubicola*, *Coprosma petrei* and *Wahlenbergia albomarginata* providing the ground cover between shrubs.

Downstream there are fewer native species and the exotic willows, lupins, and briar in the streambed provide most vegetation cover.

Tributary stream riparian shrublands

Another smaller stream was flowing at the top boundary fence but gradually disappears into the moraine lower down. Small shrublands of *Olearia bullata*, *Coprosma intertexta*, tauhinu (*Cassinia leptophylla*), *Carmichaelia crassicaule* and matagouri occur in the damp streambed. A large patch of red tussock occurs in the valley floor boarded by native shrubs. Further downstream small copses of *Coprosma intertexta* grow surrounded by low matagouri. The stunted matagouri extends across the riverbed down to some large willows where the valley floor dissipates onto the moraine outwash plain.

Moraine hummocks

Below "trig O" on the Old Man Range are some rock outcrops on moraine hummocks. These large boulders provide a refuge for a variety of endemic shrubs including *Coprosma intertexta*, *C. propinqua*, *Melicytus alpinus*, *Aristotelia fruticosa*, *Carmichaelia petrei*, tauhinu and scrambling through the shrubs *Clematis marata*. There is also some red tussock and associated golden spaniard with blue tussock, *Pimelea oreophila*, *Blechnum penna-marina* and *Coprosma petrei*.

2.5 Fauna

2.5.1 Birds

The following records of birds on *Irishman Creek* are from a field inspection and from information from the Department of Conservation⁴.

A total of forty bird species have been recorded on *Irishman Creek* in the past twelve years comprising 8 endemic species, 16 native species and 16 introduced species (see Appendix 1).

Irishman Creek contains wetland areas that are important habitats for endemic and native bird species. Among the most significant of these wetlands are: (1) *Irishman Creek*; (2) an ephemeral tarn on the boundary with *The Wolds*; (3) *Mary Burn Stream*; (4) man made ponds adjoining the *Mary Burn Stream* and wetlands alongside *Lake Pukaki*. The significance of these wetlands are described below.

1. Irishman Creek

Irishman Creek is a moderately fast flowing stream with a gravelly bottom that is adjoined by a series of wetlands. It passes through modified short tussock grassland and native shrublands and is bounded within natural terraces. *Irishman Creek* provides valuable habitat for black-fronted tern (Category B species), banded dotterel (Category C species) and a wide range of other wetland birds (see Appendix 2). Black stilt (Category A species) have also utilised this habitat historically and are likely to again. Marsh crake and probably bittern also utilise this habitat.

2. Tarn on the boundary with The Wolds

This un-named ephemeral tarn occurs on both *Irishman Creek* and *The Wolds* properties, east of SH8. The tarn was dry when visited but has provided habitat for wrybill (Category B species), black stilts and various other more common wetland birds in the past (see Appendix 2).

3. Mary Burn Stream

The *Mary Burn* stream is part of the *Tekapo River* system (a Site of Significant Wildlife Interest (SSWI)). This stream provides valuable habitat for black-fronted tern (Category B species), banded dotterel (Category C species), and a wide range of other wetland birds (see Appendix 2).

⁴ Information supplied by Simon Elkington, Twizel Field Centre, Department of Conservation.

4. *Man made ponds adjoining the Mary Burn Stream*

Three man made ponds were built during Canal construction and adjoin the Mary Burn stream below the Tekapo Canal. These ponds provide habitat for a variety of wetland birds including black stilt, black-fronted tern, banded dotterel, pied stilts, South Island pied oystercatcher, NZ shoveler, grey teal and grey ducks.

5. *Wetlands alongside Lake Pukaki*

A series of high quality *Carex* swamps occur near the edge of Lake Pukaki that provide habitat for a variety of wetland species including marsh crake and probably bittern. Black stilt (Category A species) have also utilised this habitat historically and are likely to again.

2.5.2 Reptiles

Information on reptiles was gathered from existing records and observations gathered during the invertebrate survey.

Three species of endemic reptiles, all lizards, have been recorded from the *Irishman Creek* property, these are: McCanns skink (*Oligosoma maccanni*), common skink (*Oligosoma nigriplantare polychroma*), and common gecko (*Hoplodactylus maculatus* sp. *Southern Alps*).

McCanns skink and the common gecko both occur in stony areas, including rock outcrops, and the common skink is found in densely vegetated grasslands and shrublands. All species are common both on *Irishman Creek* and throughout the Mackenzie Basin.

During the invertebrate survey, several common skink were observed while walking through grassland along the east bank of Irishman Creek and on both faces of Mt Mary. Common gecko were also observed under the rocks upturned at Mt Mary while searching for insects.

2.5.3 Freshwater Fish

Sites in the Mary Burn stream, Irishman Creek and their tributaries were sampled for freshwater fish using an electric fishing machine. Additional information to supplement the data was accessed from the national freshwater fish database (NIWA). A total of eight species of freshwater fish were found on this property, comprising six endemic and two introduced species. These are listed in Appendix 2.

1. *Mary Burn stream*

The Mary Burn stream is a permanent water body with a gravelly substrate, an average width of 2 meters and an average depth of around 500mm. Its clear waters originate as springs and seepage's that drain part of the Southern portion of the Gammack Range. Only a small part of the Mary Burn stream flows through *Irishman Creek* and is degraded with heavy grazing by domestic stock and introduced riparian vegetation. Through this stretch the fish fauna appears to be under represented, however below the *Irishman Creek* property the stream is in good condition and is an important habitat for indigenous fish fauna including the longfin eel which has a threat ranking of "5 Gradual decline" (Molloy et al 2001) and the threatened koaro (*Galaxias brevipinnis*). The Mary Burn stream is also a spawning area for both brown and rainbow trout.

2. Irishman Creek

This Creek has clear water that flows constantly over a gravelly substrate, and like the Mary Burn stream, its waters originate as springs and seepage's that drain the southern portion of the Gammack Range. The flow has an average width of around 4 meters and is about 600mm deep. The portion of Irishman Creek that runs through the *Irishman Creek* property has excellent in-stream values with runs, riffles and quiet backwaters. These features provide a variety of freshwater fish habitat, which is enhanced by indigenous riparian vegetation. The freshwater fish observed in this Creek are representative of high country waterways and include the Canterbury galaxias (*Galaxias vulgaris*), common bully (*Gobiomorphus cotidianus*), and the upland bully (*Gobiomorphus breviceps*). Both rainbow and brown trout are also present.

2.5.4 Invertebrates

224 invertebrate species were recorded from the fieldwork (Diptera 81, Lepidoptera 30, Hymenoptera 35, Hemiptera 27, Coleoptera 22, other insect orders 29, and 18 species of spiders and harvestmen). Previous collectors⁵ have recorded a further 14 species of caddisfly, 4 species of fly, 2 species of mayfly, *Sigaus campestris* (grasshopper), elmid, hydrophilid beetles and the dobsonfly, totalling in 248 insect species recorded from *Irishman Creek* station. A relatively high degree of endemism was observed at *Irishman Creek* with 92.6% of the insect species recorded being endemic to New Zealand. This is compared to the national average of 84% endemism. The main vegetation communities providing habitat for invertebrates are described below.

1. Invertebrates associated with tussock grassland

Butterflies recorded from short fescue tussock grassland included:

Zizina labridus and the larger tussock feeding *Argyrophenga antipodum*. The tiger moth *Metacrias huttoni* and the Crambid moth *Eudonia gyrotoma* were also collected. Other species occupying this habitat included: the cicada species *Kikihia rosea*, true bug species *Olarius oppositus* and *Eucoides suturalis* which feeds in grass stems. Four species of grassland Orthoptera (grasshoppers, and crickets) were collected - The Irishman Creek grassland had quite consistent, but modest numbers of the long-horned grasshopper *Conocephalus* and of the grasshopper *Phaulacridium marginale* at Irishman Creek. The small black cricket *Bobilla* sp. (formerly *Pteronemobius*) was only present locally at Irishman Creek in areas with denser grass and wetter grassland sites. The grasshopper *Sigaus australis* was present in areas with better grassland e.g. the moraine area.

The Tephritidae or fruitfly, *Trypaena albopicta* was netted among red snow tussock and eight species of plant hopper were collected in grassland habitats.

The ground beetle *Demetrida moesta* was collected from within the litter of red tussock and a species of *Holcaspis* was collected from a pitfall trap at site 1 within a small possibly hybrid patch of red/snow tussock. This habitat was moist to wet even though little rain had fallen during our visit. The gall midges collected from the snow tussock were mainly litter inhabiting *Peromyia* species (Lestimiinae). Speargrass (*Aciphylla*) were common within the tussock grassland and these plants host a number of native flies including houseflies (Muscidae), Tachinidae (parasitoid flies), native bees and for one of the 10-12 known species of native aphids in New Zealand, but the introduced carrot aphid also can be common on their seed heads (Ward *et al.* 1999). At one site adults of the native orange spotted ladybird were collected on these plants. The sugar secreted by these aphids as well as the importance of them as larval food will be an important factor for the abundance of the large hover fly *Melangyna novaezelandiae* observed in the northern part of Irishman Creek. There was no

⁵ Espie *et al.* 1984 (Mackenzie Ecological Region, Protected Area Programme, Lands & Survey), Canterbury Museum databases, Environment Canterbury freshwater invertebrate survey in 2000.

evidence on the foliage margins that indicated the presence of speargrass weevils (Craw 1999). About 12 species of spiders were found in the grassland to snow tussock vegetation. The deep brown wolf spider '*Lycosa*' *hilaris* with the distinct body stripes, was common on the ground including sites with a considerable amount of *Hieraceum*. The elongated, but poorly worked (taxonomically) long jawed Tetragnathidae were most abundant in denser browntop dominated grassland. The retreat making species of Clubionidae require even more vegetation and were present in both snow tussock and shrubland.

2. Invertebrates associated with shrubland.

Native broom *Carmichaelia petriei* in the northern moraine shrubland, provided habitat for brown looper caterpillars and the small light brown seed feeding weevil *Peristoreus*. *Olearia bullata* on the upper west side of Irishman Creek (site 6), hosted caterpillars of unknown species. *Olearia bullata* is known to support 10 species of moths (Patrick 2000) as well as three species of Hemiptera (Derriak *et al.* 2001). Several dark brown *Rhyphodes cognatus* (Lygaeidae) bugs were also beaten from these shrubs, which were the only shrubby species in the area. *Koroana lanceoloti* was also collected from grey shrubland on the property. The beetle *Dasytes* was also beaten from *Olearia bullata*. This is a modest eastern extension for *K. lanceoloti* from Mt Cook National Park (Lariviere 1999). Isolated cotton wood (*Cassia leptophylla*) were sampled in the upper reaches of Mary Burn Creek, near where an extensive area of grey shrubland dominated by matagouri had been burnt. No clearly herbivorous species were collected although a solitary weevil and several spiders (the green crab spider *Diaea*, immature cobweb spiders Thereiidae) were collected from this plant. Psyllidae (*Trioza discariae*) were collected from matagouri in the shrubland.

Limited sampling for litter and root feeding species resulted in fungus feeding gnats Mycetophilidae and Keroplatidae, but the certain presence of at least one undescribed species indicates further study of inland South Island grey shrublands will probably yield further undescribed species, which are likely to be characteristic of this region of Canterbury, Otago and probably Marlborough.

Pans traps at both grey shrubland sites at Mt Mary and at Old Mans Range Creek collected a new undescribed species of the muscid (house fly family) *Spilogona* species. This species is only known from Irishman Creek despite extensive collections of Muscidae. This species has the most restricted known distribution for the family, and is likely to be at least localised and is probably a Mackenzie Basin endemic species.

The native bee *Leioproctus pango* was collected from flowers of the tall native broom *Carmichaelia petriei* and coral broom *Carmichaelia crassicaule*.

Leioproctus fulvescens was the commonest native bee species seen both in grassland and near shrubland. It was collected in the grey shrubland where both *Hieraceum* and *Olearia* were flowering. In addition *Leioproctus pekanui* and *Lasioglossum mataroa* which visits flowers of *Raoulia*, *Wahlenbergia*, *Celmisia* and other species (Donovan unpublished) were collected in pan traps.

Four species of spider hunting wasps (Pompilidae) were collected. All are widespread species with few records from the Mackenzie area (Sweney 1980, Patrick 1994, Harris 1987). The commonest species was the small black *Priocnemis ordishi*, but *Sphictostethus* was also collected. Two species of predatory ground nesting wasps (Sphecidae) were also recorded. The widespread cockroach hunting *Tachysphex nigerrimus* was observed nesting along the periodic sandy fringes of Irishman Creek. It was not recorded in either the Hawkdun (Patrick 1984), or Rollesby Ranges (Edwards 2001) surveys. The presence of *T. nigerrimus* infers that their prey native cockroaches *Celatoblatta* species inhabited grey shrubland on Irishman Creek. *Podagriles cora* was collected in the grey shrubland and the sedge-grassland near the Mary Burn.

The small shiny green manuka beetle (*Pyronota festiva*) was abundant in this habitat and three distinct species fly *Anabarynychus* (Therevidae) were also collected. These flies are little known species previously recorded only from inland Southland (*A. fenwicki*), Arthurs Pass (*A. atratus*) and are almost certainly a new species (male and female) in the *A. indistinctus/curvistylus/rufobasalis* group. The *Anabarynychus* species were collected at the grey shrubland, but were commoner in the denuded patches of vegetation on the west side of Irishman Creek. The small dark grey jumping spider (Salticidae) was beaten from native broom and collected from pan traps near grey shrubland.

3. Invertebrates associated with tussock herbs, mat plants and creepers.

Leioproctus fulvescens, *Lasioglossum sordidum* were swept off *Hieraceum* flowers at two sites. The five species of native bees recorded in this survey represents 15% of the known species in New Zealand (Donovan pers. comm.).

When conditions were warmer, large hover flies *Melangyna neozealandica* were common and were seen visiting *Hieraceum* flowers. Tachinidae flies were observed feeding on the flowers of *Gaultheria parvula*, which are new records of pollinators for this mat plant, which is also visited by native bees (Quinn 1984). At least two fly species were observed feeding on the flowers of matweed *Raoulia australis* (site 15). The beetle *Dasytes* sp. was common on the few remaining flowers of the small fine leaved speargrass *Aciphylla subflabellata*.

4. Invertebrates associated with tarns.

Muscidae (houseflies) flies that included the larger *Spilogona* species as well as the smaller grey *Limnohelina debilis* were observed feeding on the smallest white flowers of an undetermined plant around the tarn in preference to flowers of *Pratia*, *Epilobium* and *Gnaphalium*.

5. Invertebrates associated with woody debris.

The beetle *Stenopalpus aciphyllae* (Oedemeridae) was associated with shrubs at four sites (Mt Mary, Mary Burn bridge, grey shrubland, decaying matagouri twigs) in this survey. This beetle ranges over much of the eastern South Island including the Hawkdun Range (Hudson 1975, Patrick 1984, LUNZ collection) as well as the adjacent Mary Burn and Balmoral stations (Espie *et al.* unpublished). *Odontria* (scarab beetle) were collected from the grey shrubland adjacent to the Old Man Range Creek. All specimens were collected off *Cassinia*.

6. Invertebrates associated with uncultivated grassland.

Nine species of Tachinidae fly were collected from uncultivated grasslands in this survey. These species were quite readily collected in either pan or malaise traps in the survey of Irishman Creek.

Flies belonging to the *Pollenia eurybregma/consanguinea* group were also collected. This species pair has only been recorded previously from Old Man Range in Central Otago (Dear 1984).

One female of *Tomosvaryella novae-zelandiae* was swept from among the tops of red snow tussock. These small black large-headed flies (Pipunculidae) are apparently uncommon. At present these species have not been listed as of potential conservation concern, because they have been inadequately studied.

Eighteen species of parasitic wasps (9 families) were collected in pan and malaise traps, but most were not readily identifiable to species. The possible presence of the seed feeding *Stathmopoda* moths among the shrubland could be inferred from the presence of a largish black braconid wasp *Metoreus luteus*. Eleven specimens of an *Aphidius* sp, which parasitise aphids, were collected in the malaise trap among the snow tussock.

7. Invertebrates associated with wetland areas.

Despite considerable collecting effort on ground beetles only five species were collected (Laroche and Lariviere 2001). Rocks were turned over at Mt Mary, the eastern ridge of Mary Burn stream, along Irishman Creek, a western tarn, and gravel on tracks at two sites along the northern border and the eastern bank of Irishman Creek. Only two *Notagonum marginellum* were found under rocks near the tarn and this Australian species has previously only been recorded from the Auckland area (Laroche and Lariviere 2001). The second species, *N. feredayi* was collected in pan traps beside the bridge over the Mary Burn. It was also recorded from the adjacent stations (Espie *et al.* unpublished). *Demetriida moesta* was also collected but is also found in the Hawkdun range (Patrick 1994) and Otago (Laroche and Lariviere 2001).

8. Freshwater insects

Before this survey, 23 species of caddisflies were previously collected from Irishman Creek. *Olinga feredayi* and undetermined species of *Pycnocentroides* were the main caddisfly species collected during this survey of Irishman Creek and Mary Burn. The species collected represent 12% of the species known in New Zealand. One of the few undescribed species left in New Zealand *Psilochorema* species Q was collected at the Old Man Range Creek. Previously, this species was only known from 5 sites in Southland and Otago. Nymphs of *Deleatidium* and *Coloburiscus humeralis* mayflies were readily collected from both Irishman Creek and Mary Burn. The eight species of mayfly now recorded from these three streams and small creeks represent 18.6 % of the species known in New Zealand. This diversity is as high as any known on the eastern parts of the South Island (Hitchings 2001). When the species of Trichoptera, Ephemeroptera, Odonata, Megaloptera, Neuroptera and Mecoptera are considered 12% of the species are represented on Irishman Creek station.

From the muddy margins of streams, the tarn and swamps, several fly species including: *Odontomyia* (Stratiomyidae), *Limnophila* species (Muscidae), the *Scatella* species (Ephydriidae), *Hilarempis* (Empididae), *Neolimnia* (Sciomyzidae), *Sympychnus* and *Parentia* species (Dolichopodidae) were collected.

Elmidae beetles are present in both the Irishman Creek and Mary Burn. They were by far the most numerous beetles collected from these streams. The four samples of Irishman Creek by Environment Canterbury gave MCI values that averaged 115 (range 109-123), while the Mary Burn Creek site averaged 102 (range 97-105). Thus below the irrigation inlets these freshwater streams are of good quality, but somewhat below the 120 or more MCI value for unpolluted streams.

2.6 Historic

Alexander Sinclair first took up the Irishman Creek property in 1857. It was transferred several times and in 1921 Charles William Feiden Hamilton (Bill Hamilton) bought the station

and built the homestead that is still in existence today, as well as the hydro-electric plant and workshop. Bill Hamilton is most famous for inventing the jet boat, and his workshop used to be set up as a tourist attraction. The workshop itself has an interesting history; it was built in 1938 to replace one that was too small and was initially used in the production of bulldozers and other heavy machinery. However, in the Second World War it was converted to making munitions until 1945 when the Hamilton Engineering Works was shifted to Christchurch. Bill Hamilton's power plant, built to power the homestead and workshop, is also virtually unchanged. These sites are rated as being of Regional importance due to their distinctiveness and their association with a notable New Zealander – Bill Hamilton.

2.7 Public Recreation

2.7.1 Physical Characteristics

The majority of Irishmans is flat and physically easily accessible, especially the larger eastern block. The western block has more variety with areas of moraine, river terraces and a section of the Mary Range. Altitude varies from the lake at about 540m to 880m along the Mary Range. According to **DOC's** recreation opportunity descriptors Maryburn has the primary characteristics of a back-country environment. This means that the property is a modified environment but one that is generally dominated by natural vegetation or landscapes and is natural looking. It is accessible to all terrain vehicles and is traversed mainly by ungravelled roads, or 4 x 4 access. Obvious elements of modification include roads and areas of farming or forestry.

According to the **FMC** guidelines Maryburn would be mainly within an "open space" recreational experience zoning. For open space the descriptors are semi-natural grasslands under extensive grazing, accessible by roads, off-road vehicles and foot tracks.

2.7.2 Legal Access

Legal access to the property is available along the Tekapo Twizel Road (State Highway 8), Tekapo River Road and Hayman Road. A number of unformed legal roads traverse the property.

2.7.3 Activities

Many people use the Tekapo Canal Road for its scenic views and recreational values (e.g. fishing). A salmon farm and scenic helicopter flight operation located on the Canal about 2km north of the Stilling Basin, also attracts tourists and through-travellers. In addition SH8, which passes through the property, is a major through-route for tourists.

PART 3

OTHER RELEVANT MATTERS & PLANS

3.1 Consultation

Meetings were held on 25 September 2001 in Christchurch and 26 September in Timaru with representatives from Federated Mountain Clubs, New Zealand Deer Stalkers Association, Peninsula Tramping Club, Canterbury Conservation Board, New Zealand Mountain Bike Association, Forest and Bird Society, Canterbury University Tramping Club, Opus Consultants, Mount Cheeseman Ski Club, Environment Canterbury, Friends of Lewis Pass, QEII, Pegasus Pig Hunting Club, as well as Public Access New Zealand, Fish and Game Council, QV Valuations, Knight Frank Ltd, Geraldine Tramping Club, 4 WD Club, Temuka Tramping Club, and Environment Canterbury in Timaru.

The main issues brought up in the meeting were:

- There should be marginal strips along Irishmans Stream for walking and fishing.
- Wilding trees are a problem in that area and it is important for landscape values to protect vistas views to Mount Cook from the road.
- There was a question as to whether an area of Crown Land in the triangle by Tekapo Canal and the Tekapo River should be included in tenure review.
- Access to the lake is important – whether it is pastoral lease or Crown Land.

3.2 District Plans

Irishman Creek pastoral lease lies within the Mackenzie District. Their proposed plan, as amended by Council decisions, was notified in September 1999.

Under this plan Irishman Creek is zoned Rural. the plan identifies a number of scenic viewing areas (SV 11), a small section of a site of natural significance (39) and four heritage items centred around powerhouse, workshop and station buildings on Irishman Creek.

For the sites of natural significance, riparian areas⁴ and high altitude areas (areas above 900m) the District Plan contains a number of rules:

3.3 Conservation Management Strategies & Plans

Irishman Creek pastoral lease lies in the CMS unit known as Waitaki. The key priorities for this unit are:

- to identify, maintain and seek to enhance the natural landscapes and natural landscape values of the unit – through appropriate methods such as tenure review and district plans.
- to identify the significant native vegetation and threatened species of the unit and to use a range of effect methods to protect a representative range of indigenous biodiversity of the unit as well as protecting and enhancing the viability of priority threatened species populations and their habitats in the unit.

⁴ within 50m of wetlands and lakes, 75m of listed lakes, 10m of a bank of a river, and within 20m of listed rivers.

- For recreation and access the Conservancy's objectives are to provide new recreational facilities and opportunities by the Department and other organisations and concessionaires where natural and historic resources and cultural values are not compromised, and to liaise with adjacent landholders to resolve conflicts over access for recreation to land managed by the Department.
- To reduce and maintain rabbit and thar densities to levels that ensure their adverse effects on natural values are minimised.

Other priorities identified in the CMS that are Conservancy wide and relevant to tenure review on these properties are – to undertake necessary actions to secure the conservation of Category A and B species, including predator control, fencing and habitat protection. The species listed as priority include the robust grasshopper, black stilt, black-fronted tern and banded dotterel.

PART 4 MAPS ETC.

4.1 Illustrative Maps

Landform Map.
Landscape description.

4.1.1 Topo/Cadastral

4.1.2 Values

4.2 Additional information

Appendix 1 - Bird species of the Irishman Creek Leasehold property

Endemic species

Kaki (Black stilt)	<i>Himantopus novaezealandiae</i>
Black billed gull	<i>Larus bulleri</i>
Black fronted tern	<i>Sterna albobriata</i>
Banded dotterel	<i>Charadrius bicinctus</i>
Paradise shelduck	<i>Tadorna variegata</i>
Grey warbler	<i>Gerygone igata</i>
Wrybill	<i>Anarhynchus frontalis</i>
NZ Falcon	<i>Falco novaeseelandiae</i>

Native species

Australasian harrier	<i>Circus approximans</i>
Spur winged plover	<i>Vanellus miles novaehollandiae</i>
White faced heron	<i>Ardea novaehollandiae</i>
Welcome swallow	<i>Hirundo tahitica neoxena</i>
Pied stilt	<i>Himantopus himantopus leucocephalus</i>
Grey teal	<i>Anas gibberifrons gracilis</i>
Australasian shoveler	<i>Anas rhynchotis</i>
Grey duck	<i>Anas Supercilliosa</i>
Black shag	<i>Phalacrocorax carbo</i>
Little shag	<i>Phalacrocorax melanoleucos</i>
Black backed gull	<i>Larus dominicanus</i>
Pied fantail	<i>Rhipidura fuliginosa</i>

Silvereye	<i>Zosterops lateralis lateralis</i>
Pipit	<i>Anthus novaeseelandiae</i>
Pied oystercatcher	<i>Haematopus ostralegus finschi</i>
Marsh crane	<i>Porzana pusilla affinis</i>

Introduced species

House sparrow	<i>Passer domesticus</i>
Hedge sparrow	<i>Prunella modularis</i>
Blackbird	<i>Turdus merula</i>
Songthrush	<i>Turdus philomelos</i>
Starling	<i>Sturnus vulgaris</i>
Chaffinch	<i>Fringilla coelebs</i>
Goldfinch	<i>Carduelis carduelis</i>
Greenfinch	<i>Carduelis chloris</i>
Redpoll	<i>Carduelis flammea</i>
Yellow hammer	<i>Emberiza citrinella</i>
Skylark	<i>Alauda arvensis</i>
White backed magpie	<i>Gymnorhina tibicen hypoleuca</i>
Mallard duck	<i>Anas platyrhynchos</i>
Rock Pigeon	<i>Columba livia</i>
Black swan	<i>Cygnus atratus</i>
Canada goose	<i>Branta canadensis</i>

Appendix 2 - Fish species of the Irishman Creek pastoral lease

Endemic species

Long finned eel	<i>Anguilla dieffenbachii</i>
Alpine galaxiid	<i>Galaxias paucispondylus</i>
Koaro	<i>Galaxias brevipinnis</i>
Canterbury galaxiid	<i>Galaxias vulgaris</i>
Common bully	<i>Gobiomorphus cotidianus</i>
Upland bully	<i>Gobiomorphus breviceps</i>

Introduced species

Brown trout	<i>Salmo trutta</i>
Rainbow trout	<i>Oncorhynchus mykiss</i>

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