

Crown Pastoral Land Tenure Review

Lease name : KIRKLISTON

Lease number : PT 119

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.

September 09

KIRKLISTON

PASTORAL LEASE



CONSERVATION RESOURCES

REPORT

DEPARTMENT OF CONSERVATION

AUGUST 2009

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PART 1 INTRODUCTION

Kirkliston Pastoral Lease (hereafter called “the property”) is leased by Haldon Station Limited and managed as part of Haldon Station. The 7521 ha property is located on the western flank of the Kirkliston Range in the southeast part of the Mackenzie Basin in South Canterbury. The southern part of the property covers steep to moderately-steep mountainous country encompassing the catchments of Basin and Hay streams; the northern part covers the gentler Haldon Downs encompassing the catchments of Pringle Stream and upper Stony River. The property ranges in altitude from 700 m at its western boundary in the Stony River valley to approximately 1730 m at the southeast corner of the property on the crest of the Kirkliston Range. The property is drained by Basin, Hay and Pringle streams and other unnamed tributaries of Stony River. Stony River flows into Lake Benmore in the Waitaki River catchment.

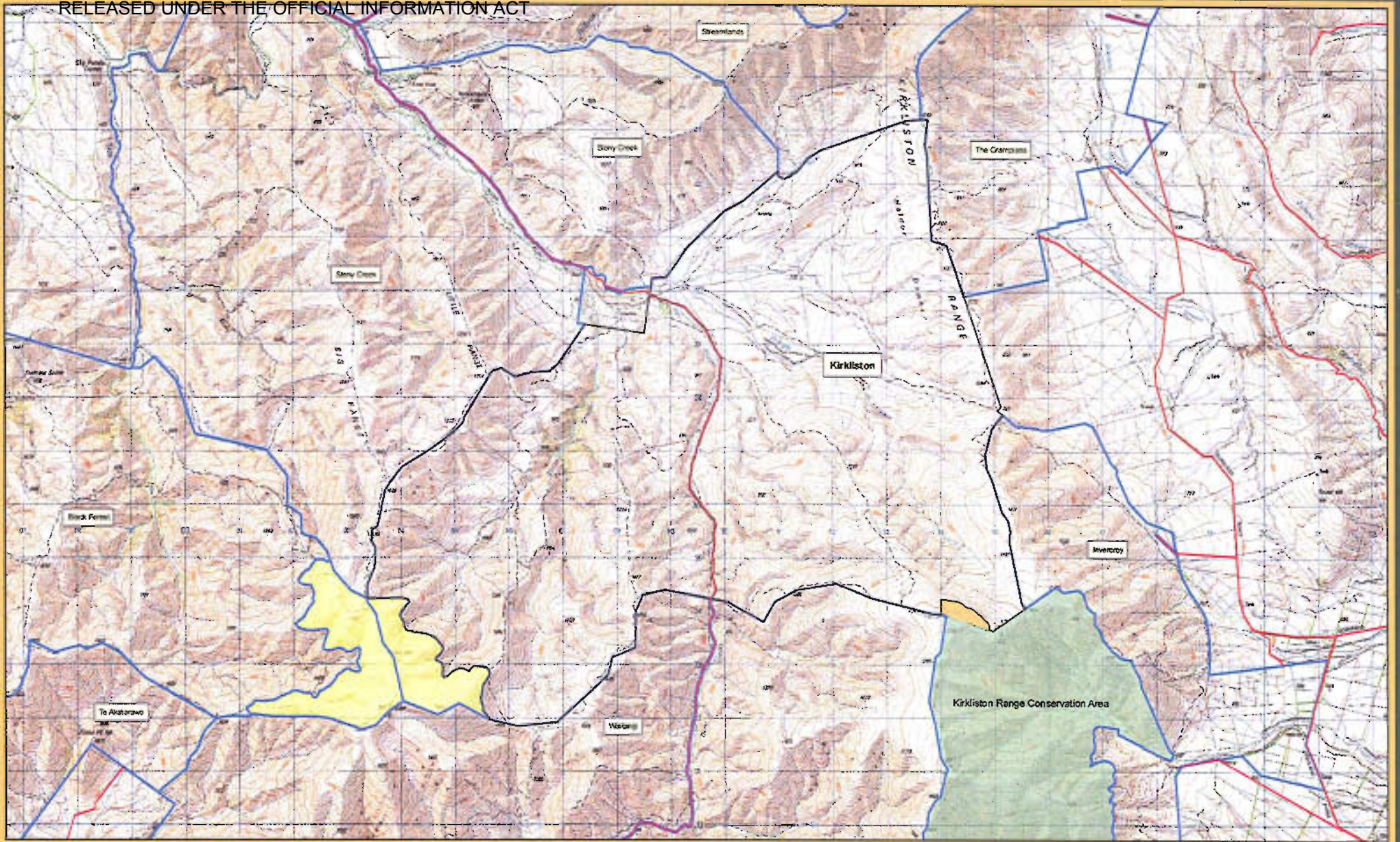
Kirkliston Pastoral Lease lies in Kirkliston Ecological District (ED), though the northwest boundary of the property is close to the boundary between Kirkliston and Grampians EDs. Kirkliston ED lies within Waitaki Ecological Region. Kirkliston ED has not been surveyed as part of the Protected Natural Areas Programme. However the property has been previously surveyed for tenure review, in 1995.

The property adjoins The Grampians Pastoral Lease to the northeast, Streamlands Pastoral Lease to the north, Stony Creek Pastoral Lease to the northwest, Waitangi Pastoral Lease to the south, Kirkliston Range Conservation Area to the southeast and Invercroy Pastoral Lease to the east. Access to the property is from State Highway 8 near Burkes Pass via Haldon Road and Stony River Road. An unformed legal road bisects the property up the Hay Stream valley to and beyond the property boundary at the saddle to Deep Stream, (refer to the Topographical/Cadastral map, page 3).

The tenure review inspection of the property was undertaken during February 2009 by a number of specialists. These specialists’ reports (listed below) form the basis of this Conservation Resources Report.

- High Country Tenure Review Programme Landscape Assessment, Kirkliston Pastoral Lease, Blakely Wallace Associates, April 2009, 13p + photos + maps.
- Botanical Values of the Kirkliston Pastoral Lease, Report for Tenure Review, Nicholas Head, May 2009, 16p + maps.
- Assessment of the Bird and Lizard Values of Kirkliston Pastoral Lease, Marieke Lettink, April 2009, 14p including photos + maps.
- Kirkliston Pastoral Lease, A Report on the Aquatic Fauna Surveys, Scott Bowie, May 2009, 16p including photos + maps.
- Kirkliston Pastoral Lease Tenure Review, Summary of Invertebrate Values, May 2009, Warren Chinn, 11p including photos + maps.

Topo/Cadastral **map**



Kirkliston PL - Topo/Cadastral



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CANTERBURY CONSERVANCY - TENURE REVIEW



- Legend
- Legal roads
 - Kirkliston boundary
 - Adjoining pastoral leases
 - Existing public conservation land
 - Crown land ex pol
 - Retirement area - under investigation for protection

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

2.1 LANDSCAPE

2.1.1 Landscape Context

Kirkliston Pastoral Lease is located at the north end of the Kirkliston Range, nestled between the southeast side of the Mackenzie Basin and the Hakataramea valley. The Mackenzie Basin and adjoining ranges, basins and valleys are noted for their semi-arid character and the vast scale of their landscapes.

The property includes most of the relatively small intermontane Stony River basin. The basin is isolated and geographically contained by several ranges. These include the northern and lower section of the Kirkliston Range to the east, the Grampian Mountains to the north, and the Little and Big ranges to the west. Big Range rises to Mount Sutton (1916 m), the highest mountain in the area. The lower north-east slopes of Mount Sutton are within the property.

The Basin is open to the northwest along the narrow Stony River valley. This valley provides long views to the Ben Ohau Range from many parts of the property. The ranges enclosing the south side of the basin are transitional between the Canterbury and Otago mountain landscapes with broad rolling peri-glacial summits dotted with rock tors.

The upper Hakataramea valley is immediately east of the property. It is separated from the Stony River basin by Haldon Downs at the northern end of the Kirkliston Range. The property includes several tributaries of Stony River including Basin, Hay and Pringle streams and an unnamed stream draining Haldon Downs. All of the property lies within the Waitaki River catchment.

The Stony River basin is within the greywacke/argillite hill and mountain landscape that is characteristic of the southeast side of the Mackenzie Basin. The basin itself is an in-faulted tectonic basin comprising a well-formed cuesta with a west-facing dip slope. The steep scarp drops down into the Hakataramea valley.

The property includes the following land types:

- central lowlands and flats (referred to as the central basin)
- the distinctive cuesta landform of Haldon Downs on the eastern edge of the property
- the lower slopes, downlands, valleys and basins of Basin, Pringle and Hay streams
- the upper slopes, spurs and range summits

2.1.2 Landscape Description

For the purposes of this landscape assessment, Kirkliston Pastoral Lease is divided into three landscape units, reflecting areas of similar landscape character. For each landscape unit, landscape character is evaluated using the following criteria:

- Intactness: the condition of the natural vegetation, patterns and processes and the degree of modification present

- **Legibility:** expressiveness: how obviously the landscape demonstrates its formative processes
- **Aesthetic Factors:** e.g. distinctiveness and coherence. Distinctiveness is the quality that makes a particular landscape visually striking; frequently this occurs when contrasting natural elements combine to form a distinctive and memorable visual pattern. Coherence is based on characteristics including intactness, unity, continuity, and compatibility (intrusions, alterations, disruptions tend to detract from coherence)
- **Historic Factors:** historically valued attributes in the context of a high country landscape
- **Visibility:** the visibility of the landscape from public vantage points
- **Significance:** the local, regional or national significance of the characteristics and features, or combination of characteristics and features, within each unit.
- **Vulnerability:** a measure of the susceptibility of the landscape unit to landscape degradation

Haldon Downs and Central Basin –Landscape Unit (LU1)

Haldon Downs and the upper Stony River basin form a clear topographic unit. This unit includes the Stony River flats at the northwest property boundary, Haldon Downs dip slope and the rolling lowlands and flats adjoining Haldon Downs. Together the various components make up an interesting and memorable landform and landscape. A small spur lies adjacent to upper Stony River. The southeast side of the spur displays a “wave” slope landform which contrasts with the sloping plane of the spur itself.

Haldon Downs is a distinctive cuesta landform. The scarp slope is beyond the property and drops steeply to the Hakataramea valley while the large west-facing dip slope is within the property. The topography of the west-facing slopes is smooth and rolling, with a series of small steep-sided stream valleys and rounded spurs which drain into an unnamed tributary stream of Stony River. A feature of one of the tributary streams at the base of Haldon Downs is a steep-sided gorge with very craggy rock outcrops, bluffs and talus slopes. Shrubland is present in this gorge.

The vegetative cover of Haldon Downs is depleted short tussockland and open tall tussockland. Stock camps are prominent in places, appearing as clearings of short tussock and introduced grasses surrounded by modified tall tussock. Young wilding pines are also present. Viewed as a whole, Haldon Downs appears relatively natural. The tussockland emphasises the rolling smooth topography and the rhythmic pattern of spur and gully. Hawkweed is present within the tussock sward. Small modified wetlands are present.

The central basin is flat to rolling with defined stream-cut edges and small alluvial terraces. Vegetation across the central basin is depleted short tussockland with hawkweed, introduced grasses and clover. Seasonally the colour of this will change from green in the spring to brown and gold in the summer/autumn and grey/brown in winter. An airstrip and fertiliser shed on the spur are visible over a wide area of the Kirkliston Basin.

Key characteristics of Haldon Downs and the Stony River basin are openness, expansiveness, relative isolation and the back-country character. Also important are the variable and interesting landforms. The lowlands, flats, streams and wetlands complement and contrast with Haldon Downs and the small spur. Together they form a coherent landscape. Tussockland, though fragmented, remains the dominant vegetation. Viewed together the Haldon Downs and basin appear reasonably natural.

Evaluation Summary

Criteria	Value	Comment
intactness	low-moderate	Low within the Stony River basin and small spur. Moderate within Haldon Downs where tussockland is reasonably continuous with small remnant wetlands and shrubland associated with rocky gullies.
legibility	very high	Landform is very expressive of formative processes (glacial, fluvial

		and erosion).
aesthetic factors	moderate - high	Aesthetic values are derived from the interesting and visually impressive landforms. Also contributing are the openness and scale of the landscape and the setting within the Stony River basin and surrounding ranges. Tussock cover on Haldon Downs emphasises the underlying topography. Overall forms a very coherent landscape.
historic factors	moderate	Early pastoralism, including historic rabbit fences, contributes to the cultural character of the landscape
visibility	low	Not visible from frequently visited public places. Largely hidden from view.
significance	high	Cuesta landform geologically significant; at least of regional significance.
vulnerability	moderate	Vulnerable to land-use change such as forestry, land uses which would mask underlying landform patterns or farming practices that would further deplete tussock cover.

Hay and Pringle Catchments – Landscape Unit (LU2)

Hay and Pringle stream catchments occupy the southeast part of the property and comprise areas of valley floor, downlands, extensive hill slopes, ridges and mountain summits. The dominant feature of lower Hay Stream is the aridness and degree of modification. The valley floor is characterised by extensive areas of hawkweed that appear as large grey mats. Matagouri is also extensive on the valley floor but largely absent on lower valley sides. Tussockland at lower altitudes is either depleted or absent. Lower hill slopes are also degraded and bare. Small bluffs are common at the base of slopes.

Mid to upper slopes of both Hay and Pringle stream catchments are predominately short tussockland and hawkweed which gradually grades into tall tussockland. Other features are numerous small seepages and flushes. Rock outcrops, rock mantle areas, and small tors are dotted about, breaking up the otherwise smooth spur and gully landform. Upper slopes and the summit area are also typically smooth with a rolling rounded landform and continuous tussockland, cushionfield, fellfield and erosion pavement. Summit areas are variable but overall have a moderately-high degree of naturalness.

As with the whole property, this unit has a large expansive character. The summits are gently sloping and rounded. There is a sense of remoteness and exposure. Man-made features are confined to fences and 4WD tracks.

The station stockyards and buildings are located within a small area of freehold at the entrance to the lease. A small conifer plantation is located within the lease adjacent to the area of freehold.

Evaluation Summary

Criteria	Value	Comment
intactness	low- moderately high	Valley floor and lower slopes highly modified. Mid altitude, upper slopes and summit areas have moderate to moderately high level of intactness.
legibility	moderate	Erosion and fluvial processes are legible. The low vegetation highlights the rolling landform.
aesthetic factors	moderate	The large scale of the landform and the views to surrounding ranges are the most impressive aspect. The landscape is not especially distinctive but is similar to large areas of hill and high country in the Mackenzie Basin. The level of degradation on the lower and mid slopes tends to diminish aesthetic values.
historic factors	moderate	The pastoral imprint is inherent in the character of this landscape.
visibility	low	Not visible from public places.

significance	moderate	Local significance.
vulnerability	moderate	Most areas are highly modified by grazing and burning. Threats include wilding tree spread and continued burning and grazing.

Basin Stream – Landscape Unit (LU3)

The Basin Stream unit can be divided into three parts:

Basin Stream hill slopes and downlands

These areas are characterised by moderately steep hill slopes and rounded spurs either side of an enclosed and relatively steep gorge in the lower and mid sections of Basin Stream. The stream itself has steep rocky sides, talus and shrubland. Vegetation on the lower hill slopes is modified and depleted with predominantly introduced grasses and herbs (haresfoot trefoil is especially prominent), scattered short tussockland and hawkweed. Shrublands are sparse and stunted. They are largely restricted to rocky foot slopes and low enclosed stream valleys. Tall tussockland appears at about 1000 m altitude.

Left branch Basin Stream

The true left branch above the gorge opens out to a basin below Mount Sutton. Mountain slopes are typically smooth spur and gully landforms with small hillocks and gentle spurs in the lower basin. Vegetation consists of continuous but depleted short tussockland and tall tussockland with hawkweed. Scrub cover and rock outcrops are conspicuously absent. Short tussockland, exotic grasses and hawkweed occur on the gentle downlands and small hillocks. Wetland areas including red tussock, bog rush and sedges are a feature at poorly-drained sites on the basin floor. Scattered wilding pines occur on the slopes below Mount Sutton.

Right branch Basin Stream

The true right branch comprises a large open basin with several tributaries. Mount Sutton and its impressive scree slopes (outside the lease) are dominant visual features in the southwest corner. Slopes are steep with smooth symmetrical and gently-rolling spurs and summits. The most notable features are the large scale of the landform, the simple forms and the uniformity of landform and vegetative cover. Low-stature tall tussockland interspersed with short tussockland, hawkweed and bare ground is the main vegetation pattern. Other features are exposed rock, talus and small wetland flushes in the gullies. The right branch is grazed as one block. The boundary fence and 4WD track follow the perimeter of the catchment.

Evaluation Summary

Criteria	Value	Comment
intactness	very low to moderate	Depleted across all areas. Upper slopes are more natural but vegetation is still depleted and modified.
legibility	moderate to high	The underlying 'bones' of the landform are emphasised by the low vegetative cover.
aesthetic factors	moderate	As with all of the property the scale of the landscape is simple and impressive. Landforms viewed within the context of the surrounding ranges are visually impressive. The upper basins are visually the most impressive and memorable areas. The true right branch is perhaps the most distinctive and memorable basin.
historic factors	moderate	Pastoralism has left a significant imprint on the condition of the vegetation.
visibility	low	Not visible from frequently used public places.
significance	moderate	Regionally significant.
vulnerability	moderate	Vegetation modified by grazing and burning. Threats include wilding tree spread and unsustainable grazing and burning.

2.1.2 Visual and Scenic Values

The property as a whole has considerable visual and scenic values. A unique feature of Kirkliston Pastoral Lease is that it is geographically contained within the upper Stony River catchment and visually separate from the Mackenzie Basin. It is reached via Stony River and appears as a remote and relatively natural backcountry basin.

Key aspects of visual and scenic value are:

- The scale and magnitude of the landscape. The overriding characteristic is the large scale of the basin/downland/hill and mountain slopes and of the surrounding ranges. The individual basins and valleys are also large scale.
- The landforms are visually impressive. The smooth rounded spurs and narrow gullies combined with low vegetation cover expose the landforms. This is accentuated by changing light and shadow effects.
- Views are expansive and impressive in most directions especially views to Mount Sutton and long views down Stony River to the Ben Ohau Range and Lake Pukaki.
- Vegetation patterns, while modified, appear quite uniform and continuous in upper basins and summit areas and retain natural patterns and processes. The landscape is visually coherent and could be described as iconic high country landscape.

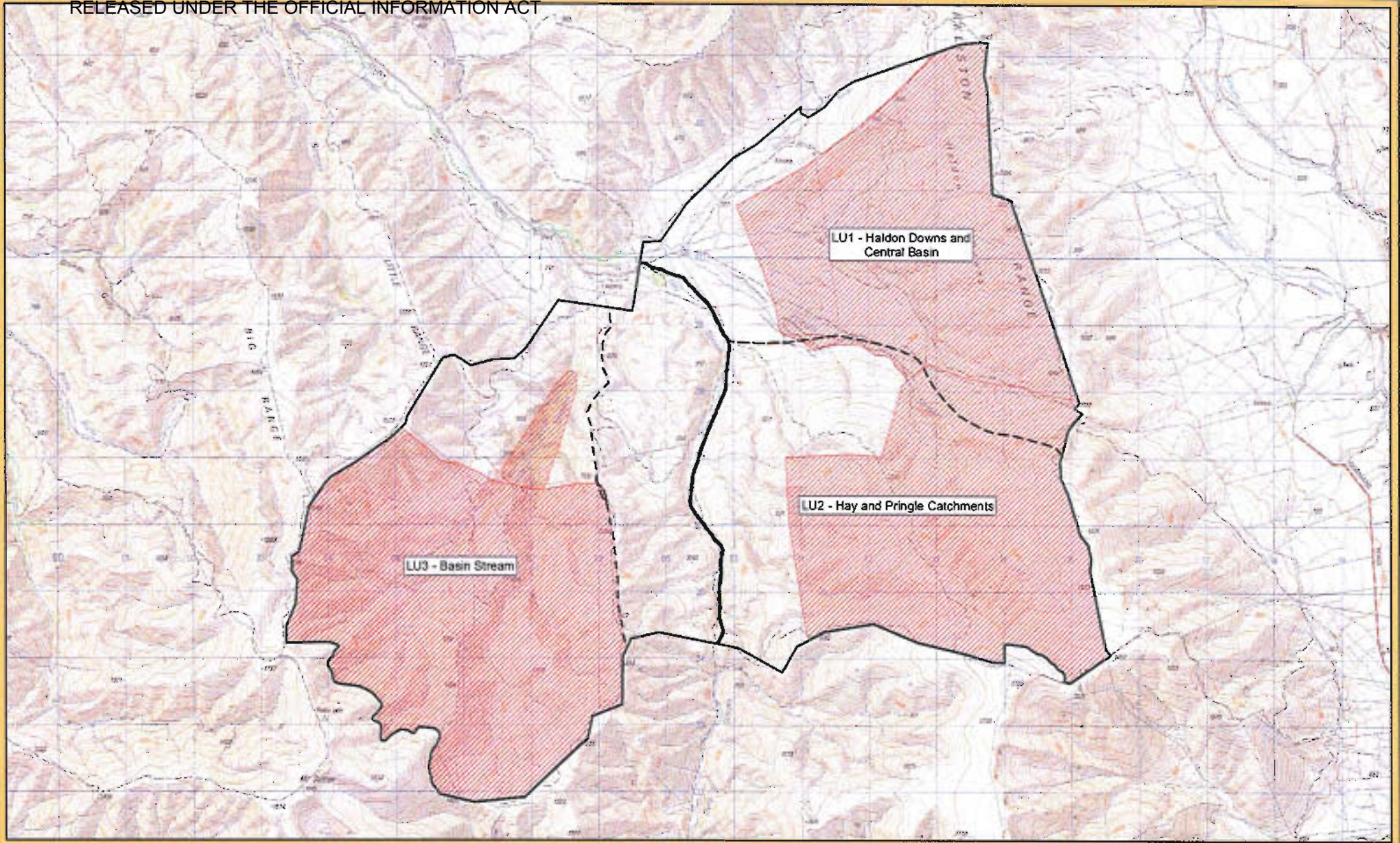
At a more micro scale there are individual features that have significant visual and scenic values:

- The cuesta dip slope and in-faulted tectonic basin landform. The contrasting forms of Haldon Downs, the small spur (wave landform) and the lowland basin together with tussockland and wetland vegetation are visually striking and impressive.
- The numerous rocky gorges and associated shrublands and the many small (but modified) wetlands.
- The reasonably natural, remote and exposed summit areas and associated cushionfield and fellfield vegetation.

Significance of Landscape Values

The key landscape values are the property's unique location within the relatively isolated and contained intermontaine Kirkliston Basin; the large scale, and the impressive and very varied landforms including basin/downlands (including cuesta dip slope and wave landforms), hills, gorges, mountain slopes and basins; and the dominant natural character of the vegetation cover overall which conveys a strongly South Island backcountry character.

Landscape map






Kirkliston PL - Landscape Values

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Legend

-  Kirkliston boundary
-  Landscape unit boundary
-  Landscape values

2.2 GEOLOGY, LANDFORMS AND SOILS

2.2.1 Geology

The basement rocks of the Kirkliston Range and Stony River area are Rakaia terrane rocks comprising schistose to non-schistose quartzofeldspathic sandstone (greywacke) and mudstone (argillite) of Triassic age. Areas of weathered brown gravel in a highly weathered sandy matrix and overlain by loess layers are present on the lower slopes of Haldon Downs (Forsyth 2001). Minor areas of volcanic rock are present in the Rakaia terrane, though no exposures were observed on the property. Rocky slopes and outcrops are frequently sculptured and smoothed by wind. Hill slopes are mostly mantled with deposits of loess (wind-deposited sediments). Minor areas of recent alluvial deposits are present along lower-altitude streams. No major faults are identified on the property, though minor faults are present.

2.2.2 Landforms

Southern and western parts of the property are dominated by the moderately-steep slopes of the Kirkliston Range. These slopes have rounded spurs and small valleys with partly-incised streams. Higher-altitude ridge-crests are rounded and exhibit periglacial features including erosion pavement, soil hummocks and solifluction lobes. This part of the property is drained by Basin and Hay streams, including a gorged section in Basin Stream.

The northeast part of the property comprises the upper Stony River basin. This is dominated by the dip-slope of a cuesta landform (Haldon Downs). This uniform landform is drained by Pringle Stream and an unnamed stream which is incised in a small gorge in its mid-reaches. The scarp slope of the cuesta drops steeply from the property boundary to the Hakataramea valley. The Kirkliston Range forms part of the eastern boundary of the Mackenzie Basin and is transitional in character between the mountain ranges of Canterbury and Otago.

2.2.3 Soils

Higher altitude parts of the property on the Kirkliston Range have poorly-developed shallow soils along the range summits and steepland soils on the upper slopes. Mid-altitude slopes mostly have shallow hill soils. Recent alluvium along rivers and streams has sandy loams.

Significance of Geology, Landforms and Soils

The Kirkliston Range forms part of the eastern boundary of the Mackenzie Basin, separating the lower mountain ranges of coastal South Canterbury from the intermontane Mackenzie Basin. The cuesta landform in the upper Stony River basin, the Basin Stream gorge, the broad high-altitude ridge-crests and the presence of periglacial landforms on the upper ridge crests and summits are notable features on the property. The property is transitional in character between the mountain ranges of Canterbury and Otago. There are no geopreservation sites listed for the property.

2.3 CLIMATE

Kirkliston Pastoral Lease has a semi-arid mountain climate with cold winters and very warm dry summers. Predominant winds are from the northwest, with occasional gales. Snow can affect all

parts of the property and lie at higher altitudes for several weeks in winter. Average annual precipitation is probably between 600 and 1000 mm (Tomlinson 1976). The climate of the area is strongly influenced by the sheltering effects of the Southern Alps, resulting in drier conditions than occur in most of New Zealand's other mountain environments.

2.4 LAND ENVIRONMENTS OF NEW ZEALAND (LENZ)

LENZ is, as described by Leathwick *et al.* (2003), "a classification of New Zealand's landscapes using a comprehensive set of climate, landform and soil variables chosen for their role in driving geographic variation in biological patterns." The classification units of LENZ, termed land environments by Leathwick *et al.* (2003), aim to "identify areas of land having similar environmental conditions regardless of where they occur in New Zealand." Therefore "LENZ provides a framework that allows prediction of a range of biological and environmental attributes. These include the character of natural ecosystems, the vulnerability of environments to human activity, and the potential spread or productivity of new organisms" (Leathwick *et al.* 2003). Leathwick *et al.* (2003) present the LENZ information at four levels of detail, with Level I containing 20 environments, Level II containing 100 environments, Level III containing 200 environments and Level IV containing 500 environments. These LENZ classes are presented nationally to assist use at a range of scales.

In an analysis of the LENZ Level IV data, with consideration of the remaining indigenous vegetation cover and the legal protection of these environments, Walker *et al.* (2005) proposed a threat classification for the remaining indigenous biodiversity in New Zealand's environments based on the two components of vulnerability (likelihood of loss): poor legal protection and risk of loss. This threat classification (Table 1) has become the recognised benchmark for the promotion of threatened LENZ conservation.

Table 1 LENZ threat categories and definitions (Walker *et al.* 2005)

Category	Criterion
acutely threatened	<10% indigenous cover remaining
chronically threatened	10-20% indigenous cover remaining
at risk	20-30% indigenous cover remaining
critically under-protected	>30% indigenous cover remaining <10% legally protected
under-protected	>30% indigenous cover remaining 10-20% legally protected
Less reduced and better protected	>30% indigenous cover remaining >20% legally protected

On Kirkliston Pastoral Lease, small areas at lower altitudes in the upper Stony River basin lie in an "acutely threatened" land environment. Low-altitude areas alongside the main streams in the upper Stony River basin lie in a "chronically threatened" land environment. Remaining low-altitude parts of the upper Stony River basin lie in an "at risk" land environment. All other lower slopes (below approximately 1100 m) are in a "critically under-protected" land environment. Higher-altitude parts of the property on the Kirkliston Mountains are considered less reduced and better protected.

Acutely threatened land environments on the property comprise four small and discrete areas which adjoin streams in the lower part of the property. Notable indigenous plant communities present include a remnant red tussock swamp which occurs on the valley floor tributary between Pringle Stream and Stony River. Other indigenous plant communities present include sedge communities that adjoin streams and occur in old channels generally. Remnants of dryland scrub also occur on the adjoining alluvial surfaces near the confluence of Hay Stream and Stony River. Although the

dryland scrub community is very modified and sparse, it retains scattered plants of porcupine shrub, mat broom (*Carmichaelia nana*), matagouri and an interesting array of dryland grasses and herbs, such as *Elymus falcis* and *Raoulia monroi*.

Chronically threatened land environments are primarily confined to the valley floor alluvial surfaces below 1000m and primarily associated with Stony River and Hay Stream. Indigenous plant communities present include riparian shrublands comprising *Olearia odorata*, matagouri, *Coprosma propinqua*, mountain wineberry and climbers. Matagouri tends to be the dominant species on the wider floodplain where it forms open stands. Dense and more diverse shrublands tend to occur closer to stream margins and on adjoining terrace risers and slopes. Riparian sedgeland are also present in old stream channels that occur frequently across the flood plain. In Hay Stream, shrublands grade into modified exotic grassland, silver tussock and fescue tussock land away from the water courses. In Stony River, shrublands mix with snow tussock. Narrow leaved snow tussock forms a major component of the indigenous cover in the chronically threatened land environment in Stony River.

Chronically threatened land environments also occur in Pringle Stream and in the unnamed tributary stream draining Haldon Downs. On these sites, remnant wetland vegetation is present, but it tends to be highly modified with native vegetation restricted to sedges along stream edges. Fescue tussock and sparse narrow leaved snow tussock is also present within this land environment on the adjoining lower slopes.

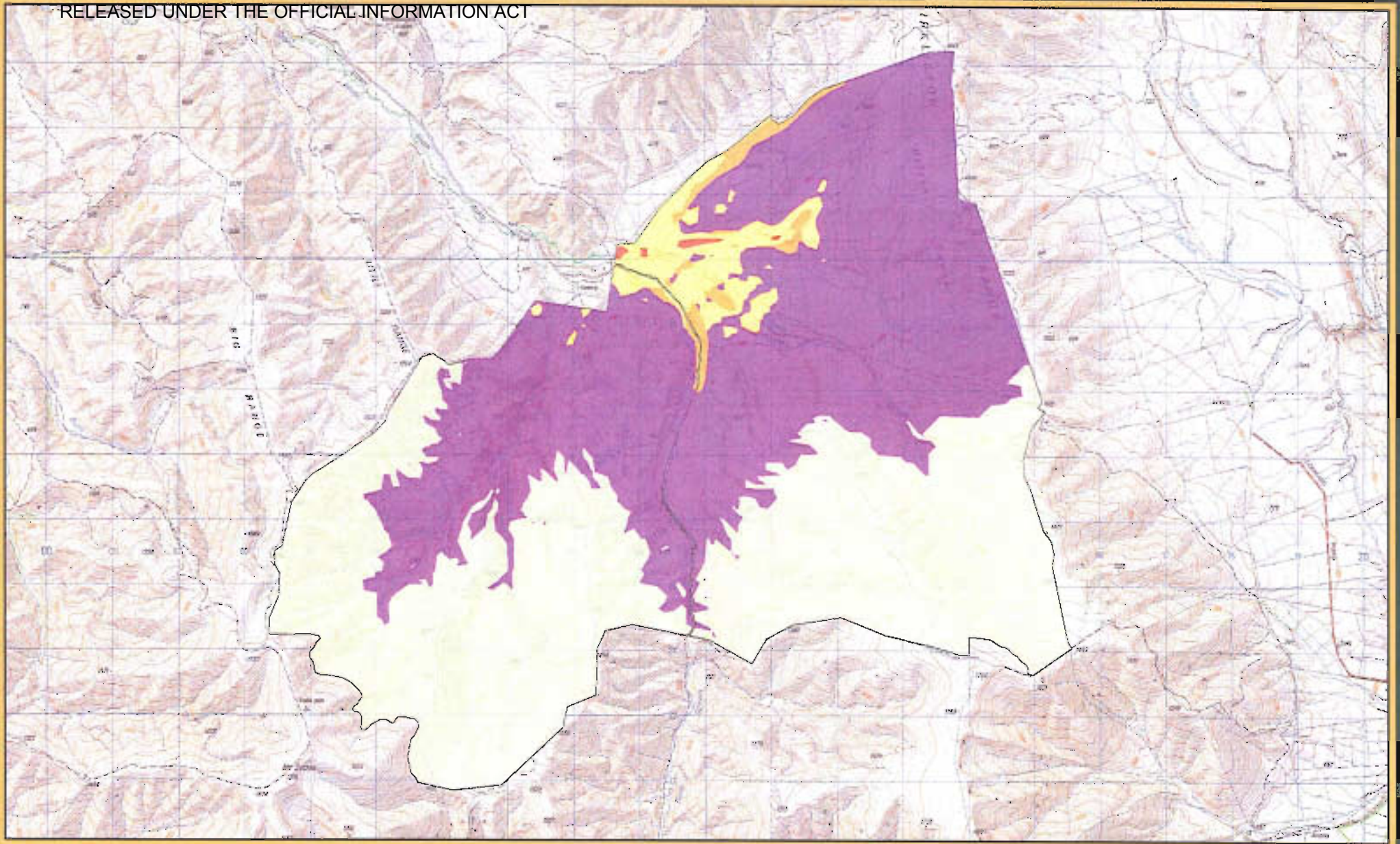
The At Risk land environment includes the majority of the valley floor alluvial surfaces on the property. It adjoins Acutely and Chronically threatened land environments described above. Accordingly there is some overlap in terms of the vegetation present. For example the shrublands and wetland threads present on Acutely and chronically threatened land environments also occur on the adjoining At Risk land environment. However, for the majority of the At Risk land environment, the vegetation is characterised by modified fescue tussock grassland.

Significance of Land Environments


Lenz units present on the property are Acutely Threatened, Chronically Threatened, At Risk, Critically underprotected, Underprotected and Less reduced and better protected.

Acutely and Chronically threatened land environments contain indigenous vegetation albeit modified and sparse in some localities. Of significance is a remnant red tussock swamp which occurs on the valley floor tributary between Pringle Stream and Stony River on acutely threatened and At Risk land environments.

LENZ map



Kirkliston PL - LENZ Threat

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LENZ Threat	
At risk	Essentially threatened
Critically unprotected	Unprotected
Scale reduced and better protected	

2.5 VEGETATION

2.5.1 Ecological Context

Kirkliston Pastoral Lease lies within the Kirkliston Ecological District (ED), which is part of the Waitaki Ecological Region (McEwen 1987). It has not been surveyed as part of the Protected Natural Areas Programme. The former vegetation was considered to be predominantly lowland and subalpine tussockland and subalpine scrub (McEwen 1987). Further work by Leathwick *et al.* (2003) suggest the original (pre-human) vegetation cover below tree line (approx 1200 m) was predominantly mountain totara and broadleaf forest, with scrub, shrubland and tussockland making up a minor proportion. Above tree line, Leathwick *et al.* (2003) agree that the original vegetation was likely to have been scrub, tussockland and herbfield.

As a result of burning (natural and human-induced), most of the original vegetation on the property has been lost or is highly modified. Today the vegetation is dominated by tall tussockland, which forms extensive cover over most parts of the property above 900 m. Shrublands are also present and are associated with rocky outcrops in steep gullies, terrace risers and river margins. Red tussock is locally present in areas of impeded drainage. Wetlands are occasionally present and include remnant valley floor swamps, riparian riverine swamps, flushes and bogs. The latter two wetlands are mainly found at higher altitude.

Much of the property below 900 m appears to have been over-sown and top-dressed and contains higher exotic cover as a result. Small areas have also been cultivated and are dominated by crops and/or pasture species.

2.5.2 Vegetation and Flora

The property is divided into two areas for this description of the vegetation.

Haldon Downs and Stony River Basin

This unit comprises the northeast part of the property. It includes relatively intact sequences of landforms from the valley floor to the ridge of the Kirkliston Range, which forms the eastern boundary of the property. Major landforms present include alluvial surfaces associated with upper Stony River and Pringle Stream and the relatively gentle and predominantly west-facing slopes of the Kirkliston Range.

Narrow-leaved snow-tussock is the dominant plant community in this part of the property and forms extensive cover, especially above 900 m. Tussock cover varies depending on aspect and altitude, with condition and cover generally becoming poorer and sparser with decreasing altitude and on sunny aspects. The entire area has been affected by a long history of pastoralism and localised areas of depletion occur throughout, especially on sunny faces and ridge crests.

Below the 900 m contour, narrow-leaved snow-tussock typically fades out and is replaced with depleted short tussockland, exotic grasses and herbs. Narrow-leaved snow-tussock does extend to the valley floor in places below 800 m, especially on southern aspects and in the head of Stony River, where it mixes and hybridises with red tussock.

The most intact narrow-leaved snow-tussockland occurs above 900 m. Here composition remains relatively natural and representative of historical composition, with fewer exotic species compared to lower altitudes. Cover typically ranges between 30% and 60% on sunny and shady aspects respectively. A diverse range of native inter-tussock species is also present, and typically includes

Raoulia subsericia, fescue tussock, daphne, patotara, dainty daisy, blue tussock, snowberry, red woodrush, dwarf broom, *Carmichaelia vexillata*, (declining), *Agrostis subulata* (naturally uncommon), *Brachyglottis bellidioides*, *B. haastii*, *Deyeuxia avenoides*, mat coprosma, *Carex colensoi* and sun orchid. Matagouri and golden speargrass are also reasonably common, whereas tauhinu and coral broom (declining) are occasionally present. Exotic species are locally abundant in patches, especially below 1000 m and in areas that have been top-dressed. Mouse-ear hawkweed and browntop are particularly abundant (up to 35% cover). Sweet vernal, catsear and sheep's sorrel are also common throughout, but rarely abundant. Bare ground can comprise up to 20% in places.

With decreasing altitude narrow-leaved snow-tussock cover becomes sparse and is generally replaced by fescue tussock below 900 m. Exotic species also become more abundant with decreasing altitude, especially browntop and mouse-ear hawk weed. However, a diverse range of native inter-tussock species is present as described above, albeit in lower abundance than at higher altitudes, due presumably to top-dressing. Of note in these grasslands is an abundance of dwarf broom (declining) and *Kirkianella novae-zelandiae* (nationally vulnerable), which occurs on the lower slopes of Haldon Downs at around 900 m.

Red tussock occupies the poorly-drained broad ridge-crest that leads down to the airstrip in the northeast of the property. Here red tussock mixes and hybridises with narrow-leaved snow-tussock. It occupies a relatively large area and forms quite dense cover (up to 80% in core areas), but fades into scattered narrow-leaved snow-tussock and fescue tussock below 900 m as described above. It includes a high diversity of native species, which is slightly different in composition to the narrow-leaved snow-tussock community that occupies the surrounding slopes, and includes abundant golden speargrass. Other common native species in addition to those listed above include *Gaultheria parvula*, mountain clubmoss and *Celmisia angustifolia*.

Red tussock also occurs in a remnant valley floor wetland associated with the unnamed stream between upper Stony River and Pringle Stream. It is dominated both in cover and structure by representative native wetland species, such as *Carex gaudichaudiana*, bog rush, *Carex sinclairii*, (which form extensive swards) and to a lesser extent *C. virgata*, *C. kaloides*, *C. buechananii*, *C. coriacea*, *C. diandra* and Maori onion. A few clumps of the rare grass *Deschampsia cespitosa* (declining) and *Aciphylla subflabellata* (declining) are also present in this wetland. Common exotic species are present throughout the wetland, especially around the margins, such as oval sedge, soft rush, Yorkshire fog, jointed rush, dock, red clover, white clover and stitchwort. This is a small remnant of what appears to have been a more extensive valley floor wetland complex, most of which is now highly modified and transformed into exotic grassland.

Other wetlands occur as riparian margins adjoining streams, or are associated with old stream channels. These are typically strips and small areas of bog rush, *Carex sinclairii*, *C. buechananii*, *C. virgata*, slender spike sedge and *Gunnera dentata*. Common exotic species include *Myosotis laxa* subsp. *caespitosa*, Yorkshire fog, jointed rush, monkey musk and musk.

A few small kettleholes are present at higher altitudes along the gentle ridge of the Kirkliston Range. These contain relatively intact turf vegetation dominated by *Carex gaudichaudiana* and wire moss, but include a high diversity of native species that are typical of these rare ecosystems, such as *Epilobium angustum*, *Galium* aff. *perpusillum*, *Lobelia isotoma* (nationally vulnerable), *Leptinella maniototo* (data deficient), *Plantago triandra*, *Euchiton mackayii*, *Lachnagrostis filiformis*, *Gentianella grisebachii*, to name a few. A few plants of the dwarf rush *Isolepis basilaris* (nationally endangered) occur here.

Shrubland is present in steep gullies, rocky bluffs and along on stabilised river gravels adjoining streams. The most extensive shrublands are those that occur on valley floors on the stabilised gravels of old flood plains. Commonly present are scented tree daisy, matagouri, porcupine shrub and mingimingi, grading from dense patches to more open shrubland. Other less common species present

are mountain wineberry, native broom, *Coprosma intertexta* (relict) and the climbers *Clematis marata*, scrub pohuehue and lawyer. Sweet brier is also common throughout and elderberry is occasionally present.

More diverse shrubland occurs in steep rocky gorges in the tributary streams on the lower slopes of Haldon Downs between upper Stony River and Pringle Stream. This shrubland is dominated by mingimingi, *Coprosma intertexta* (relict), matagouri, mountain wineberry, scented tree daisy, scrub pohuehue, *Clematis marata* and to a lesser extent prostrate kowhai, *Coprosma cheesemanii*, daphne, *Hebe pimeleoides* var. *pimeleoides* and *Hebe traversii*. A high diversity of herbaceous species is also present, including three species of speargrass (*Aciphylla aurea*, *A. scott-thomsonii*, *A. subflabellata*), fireweed (*Senecio quadridentatus* and *S. dunedinensis* (naturally uncommon), cress (*Pachycladon cheesemanii*), (nationally vulnerable), blue wheatgrass, plume grass, necklace fern, *Raoulia monroi* (declining), thousand-leaved fern and broad-leaved snow-tussock on the shady aspects.

An interesting shrubland variation occurs on old alluvial deposits near the confluence of Stony River and Hay Stream. Here numerous low shrubs of mat broom, *Carmichaelia nana*, (data deficient) occur with scattered porcupine shrub and various dryland herbaceous species, such as *Stellaria gracilentia*, scabweed, creeping pohuehue, *Colobanthus brevicephalus* (naturally uncommon) and *Elymus falcis* (naturally uncommon).

Fescue tussock occupies much of the lower slopes and alluvial terraces. Tussock cover is generally sparse and depleted, typically less than 15% and comprised heavily of exotic grasses and herbs, especially browntop, sweet vernal, mouse-ear hawkweed and sheep's sorrel. Timothy is locally abundant in some places. Numerous native species are also present and commonly include *Rytidosperma pumilum*, *Carex breviculmis*, creeping pohuehue, mat coprosma and *Geranium sessiliflorum*. Matagouri and porcupine shrub are also scattered throughout. Of note is an abundance of the native grass *Agrostis subulata* (naturally uncommon), which is unusually common at these altitudes especially on dry alluvial surfaces. Silver tussock is also locally abundant in areas of higher fertility, such as near the airstrip, on alluvial terraces and toe slopes.

Basin, Hay and Pringle Stream Catchments

This vegetation unit comprises the predominantly north-facing slopes of the Kirkliston Range from Pringle Stream to the ridge on the west side of Basin Stream. Mountain slopes are the major landforms present within this unit. Other key features include the relatively steep gullies of Hay and Basin streams and associated valley floor alluvial surfaces.

Narrow-leaved snow-tussock is the dominant plant community between 900 m and around 1400 m. Tussock cover varies between <20% and 50% on northern and southern aspects respectively. Tall tussock cover and condition decreases with decreasing altitude, and on sunnier aspects. Cover becomes very patchy and inconsistent below 1000 m, especially in the Hay Stream catchment, where it is being replaced with fescue tussock, exotic grasses and herbs. Narrow-leaved snow-tussock does extend to the valley floor (below 900 m) in places, especially on southern aspects and in the upper reaches of Basin Stream, where it mixes with native shrubland and fescue tussock grassland.

The narrow-leaved snow-tussockland typically includes fescue tussock, which can form up to 25% cover in places, *Raoulia subsericia*, blue tussock, *Rytidosperma pumilum*, daphne, patotara, dainty daisy, *Craspedia lanata*, red woodrush, *Brachyglottis bellidioides*, *B. haastii*, *Deyeuxia avenoides*, *Carex muelleri*, mat coprosma, sun orchid and harebell. Matagouri and golden speargrass are also reasonably abundant and coral broom (declining) is occasionally present. Exotic species include mouse-ear hawkweed, which can be locally abundant (c.40%). Browntop, sweet vernal, catsear, and sheep's sorrel are also common but less abundant. Bare ground and rock can commonly be up to 15%.

Slim snow-tussock replaces narrow-leaved snow-tussock at around 1400 m, where both species merge together. Cover is generally quite sparse and depleted, probably due to the greater palatability of slim snow-tussock. This is especially so on sunny aspects where it has been largely replaced by fescue tussock or cushionfield. Cover is better on southern aspects, but rarely exceeds 30% and tends to be patchy. Numerous young plants are present and indicative of recovery potential. Native species diversity is quite high and includes numerous cushion species (listed below) in addition to those species associated with narrow-leaved snow-tussock listed above. Exotic species present include mouse-ear hawkweed and sheep's sorrel, although these species are less common at these altitudes.

Relatively extensive cushionfield occurs at the highest altitudes and along gentle ridge crests. Common cushion species include *Celmisia sessiliflora*, *Phyllachne rubra*, *Anisotome imbricata*, *Celmisia angustifolia*, *Scleranthus uniflora*, *Dracophyllum muscosa* and *Dracophyllum pronum*. Other species include *Aciphylla montana* var. *gracilis* (naturally uncommon), blue tussock, snow berry, *Raoulia grandiflora*, *Raoulia hectorii*, *Carex muelleri*, *Deyeuxia avenoides* and *Kelleria dieffenbachii*. Fellfield occurs locally but is generally limited in extent and supports mat shrubs and herbs similar to those described above. One small patch of turpentine shrub is also present and probably a remnant of a previously widespread shrubland that was present prior to extensive burning.

Rock bluffs and tors are scattered throughout the upper altitudes of this unit. These support distinctive assemblages of species, including bristle tussock, blue tussock, *Brachyglottis lagopus*, *Coprosma cheesemanii*, coral broom (declining), *Cardamine depressa*, *Luzula picta* and *Colobanthus* sp. Many are festooned with black beard lichen (*Neuropogon ciliatus*), which is a distinctive feature of these bluffs.

Seeps and cushion bogs are also relatively common at the highest altitudes on gentle slopes. Comb sedge is the dominant plant but numerous other specialist bog species are also present, such as sundew, *Juncus antarcticus*, *Rytidosperma australe*, *Psychrophila obtusa*, *Gentianella amabilis*, *Carex gaudichaudiana*, eye bright (*Euphrasia* sp.), *Oreomyrrhis rigida*, *Coprosma atropurpurea*, *Pratia angulata*, *Leptinella* sp., *Euchiton traversii*, *Ranunculus maculatus*, *Hydrocotyle sulcata*, *Lobelia isotoma* and *Colobanthus apetalus*. These distinctive ecosystems remain largely weed-free and highly natural.

Depleted fescue tussockland dominates the lower slopes of this unit, especially below 900 m, where it blends with depleted narrow-leaved snow-tussock. Tussock cover is generally sparse, typically less than 15%, but can be up to 30% cover in places. Exotic grasses and herbs form a major component of these tussocklands and can dominate the inter-tussock sward, especially browntop, sweet vernal, mouse-ear hawkweed and sheep's sorrel, with timothy also locally common. Native species present include *Rytidosperma pumilum*, *Carex breviculmis*, creeping pohuehue, mat coprosma and *Geranium sessiliflorum*. Matagouri, porcupine shrub, scented tree daisy and native broom are also scattered throughout. Silver tussock can be locally abundant in areas of higher fertility, such as on alluvial terraces and toe slopes.

Shrubland is present in steep gullies, rocky bluffs and on stabilised river gravels adjoining streams. The most extensive shrublands are those that occur in the valley floors on the stabilised gravels of Basin Stream and Hay Stream. Commonly present are scented tree daisy, matagouri (including relatively old specimens of matagouri over 3 metres in height), porcupine shrub and mingimingi, which grade from dense patches to more open cover. Other less common species present include mountain wineberry, native broom, *Coprosma intertexta* (relict), and the climbers *Clematis marata*, scrub pohuehue and lawyer. Turpentine shrub is also present in the upper gullies and can be locally abundant, often occurring with golden speargrass. Elderberry and gooseberry are present in the lower reaches of Hay Stream.

Palustrine wetlands are limited in extent in this unit, but do occur in old stream channels. They typically occur as small strips dominated by bog rush, *Carex coriacea* and *C. gaudichaudiana*. Less common species include *Carex buechananii*, *C. virgata* and Maori onion. Stream margins also contain a narrow fringe of wetland species, such as *Carex coriacea*, *C. buechananii*, *C. kaloides*, slender spike sedge, as well as exotic species, such as monkey musk, *Epilobium ciliatum* and jointed rush. Although small, these wetlands remain relatively original and quite natural.

Notable Flora

Notable plant species recorded on the property are listed in Table 2 below. Threat categories are those proposed by de Lange *et al.* (2009).

Table 2 Notable plant species, Kirkliston Pastoral Lease.

Threat Division	Threat Category	Species	Location on Property
threatened	nationally endangered	<i>Isolepis basilaris</i>	kettlehole turfs
	nationally vulnerable	<i>Pachycladon cheesemanii</i>	Haldon Downs shrubland in rocky gully
		<i>Kirkianella novae-zelandiae</i>	narrow-leaved snow-tussockland on Haldon Downs
		<i>Lobelia isotoma</i>	kettlehole turfs
at risk	declining	<i>Aciphylla subflabellata</i>	red tussockland and at wetland margins
		<i>Carmichaelia crassicaulis</i> subsp. <i>crassicaulis</i> (coral broom)	narrow-leaved snow-tussockland and rocky bluffs on mid-altitude slopes
		<i>Carmichaelia vexillata</i> (dwarf broom)	narrow-leaved snow-tussockland on mid-altitude slopes
		<i>Deschampsia cespitosa</i>	red tussock wetland
		<i>Raoulia monroi</i>	rock outcrops in Haldon Downs gully
	naturally uncommon	<i>Agrostis subulata</i>	alluvial surfaces and mid-altitude dry slopes
		<i>Senecio dunedinensis</i>	Haldon Downs shrubland in rocky gully
		<i>Aciphylla montana</i> var. <i>gracilis</i>	upper-altitude fellfield and open faces
		<i>Colobanthus brevicephalus</i>	depleted alluvial surfaces
		<i>Elymus falcis</i>	alluvial flats at lower end of Hay and Pringle streams
	relict	<i>Coprosma intertexta</i>	shrublands
	data deficient		<i>Leptinella maniototo</i>
		<i>Carmichaelia nana</i> (mat broom)	alluvial flats at confluence of Hay Stream and Stony River

Significance of Vegetation and Flora

The tall tussocklands and red tussocklands on Kirkliston Pastoral Lease are significant as relatively good examples of native vegetation characteristic of the ecological district and these land environments (McEwen 1987; McGlone 2001). They include a high diversity of native species, including good populations of rare species, such as *Kirkianella novae-zelandiae* and dwarf broom which are locally abundant on the lower slopes of Haldon Downs.

Although these grasslands are partly induced and tend to be depleted from a long history of pastoralism, they remain reasonably intact and in moderate condition, and improve with increasing altitude. They also appear reasonably resilient and their condition and naturalness could be expected to improve in the absence of stock grazing (Walker *et al* 2000; Walker *et al* 2003).

Throughout the wider snow tussock community are plant communities that are of high significance. These include cushion bogs, cushionfield and bluff communities. These remain relatively unmodified and are highly representative of their original composition. They also support distinctive assemblages of species that make an important contribution to the overall biodiversity present on the property including threatened plant species.

The lower altitude parts of the property (typically below 900 m) have suffered the greatest depletion. Significant inherent botanical values that remain are predominantly represented by native shrubland. These are generally restricted to valley floors, incised gullies and bluffs; where they have either survived and/or recovered from past burning. Although many of these shrublands lack the structural dominance of the presumed pre-human composition of these environments, they are generally representative of the shrubland/low forest mosaic that was thought to have been widespread prior to human-induced burning (McGlone 2001; Walker and Lee 2000; Walker *et al.* 2003). In some instances shrubland remnants contain a notably high diversity of species including numerous rare plants. These are usually small remnants that have been well protected by steep incised gullies and rocky bluffs. Shrubland remnants on the property often occur within either threatened or at risk land environments.

Wetlands have been vastly reduced on the property and throughout the ecological region generally. Those that remain are significant as remnant examples of what are now regionally and nationally rare ecosystems (Johnson and Rogers 2003; Williams *et al.* 2007). These are generally represented by riparian strips in old stream channels and remnants of valley floor swamps. Wetlands are considered national priority for protection. Furthermore, the significance of valley floor swamps is greater as they occur on acutely threatened and at risk land environments.

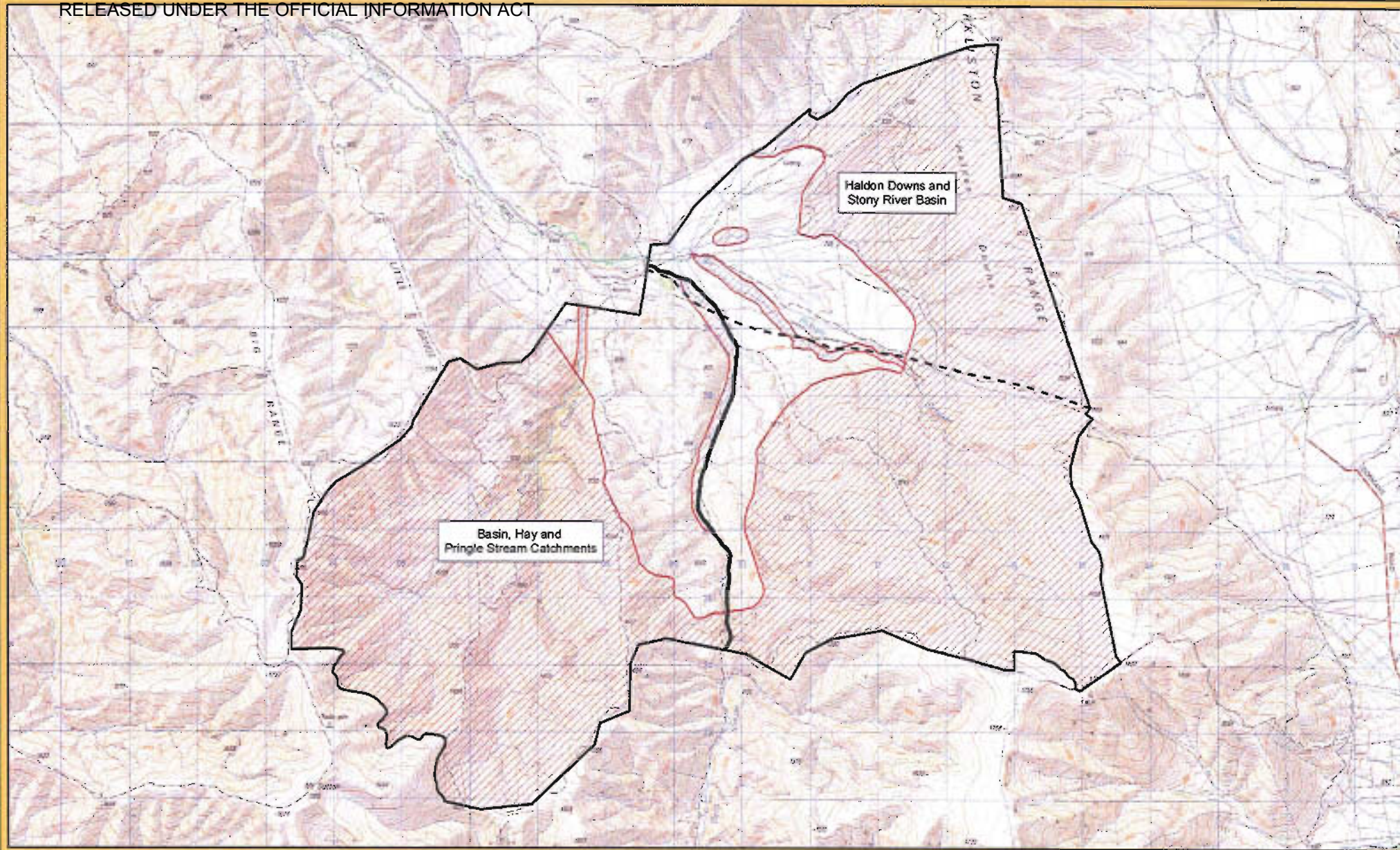
Several threatened plant species occur on the property. The most significant of these are species in the 'threatened' threat divisions as they are in most urgent need of protection and management. Other species present in the 'at risk' threat divisions are significant in a local and regional context. Protecting habitats of rare species generally is important to stop further decline and for the protection of indigenous biodiversity (Walker *et al.* 2006).

Ecosystem services include the potential for significant carbon storage given the high likelihood that shrubland and tall tussockland will recover and expand following the removal of stock (Walker *et al.* 2003). Recovery of the native plant communities in Stony River catchment has concomitant benefits for water quality and yield, and associated wetland health.

These values outlined above concur generally with those originally identified in the botanical survey undertaken by Davis in 1995. The 2009 survey has, however, revealed a number of additional threatened plant species and general ecological information about the property.

Other changes from 1995 relate to the new assessment criteria developed as part of the Department of Conservation's guidelines for Tenure Review. These new assessment criteria put particular focus on threatened land environments, rare ecosystems, threatened species and ecological services, such as the potential for carbon storage. As a result of applying these new assessment criteria, some additional areas that were not identified in 1995 have now been recognised as ecologically significant.

Botanical values map



Kirkliston PL - Botanical Values

Department of Conservation
Te Papa Atawhai

New Zealand Government



Legend

- Botanical unit boundary
- ▭ Kirkliston boundary
- ▨ Botanical values

2.5.3 Problem Plants

There are numerous exotic plant species present on the property but relatively few are of conservation concern. Many are plants of agricultural importance or are common pastoral weeds.

Wilding conifers

Wilding conifers are locally scattered but not particularly common. One small infestation of young pines is present mid slope on the Haldon Downs. Wilding conifers threaten the conservation and landscape values of the area and require ongoing control.

Sweet brier

Sweet brier is scattered throughout the property. It occurs regularly in valley floor shrubland and is probably relatively benign. Some local control measures might be beneficial especially if it shows signs of spread and dominance.

Elderberry

Several plants of elderberry are present in valley floor shrubland. Removing these plants to prevent further spread is highly desirable and relatively straight forward given their low numbers and the relatively easy access.

Hawkweed

Mouse-ear hawkweed is present throughout the property, but is most common on the outwash channels and plains, where it can be present to c.50% cover locally. King devil hawkweed is localized, with patches present in fescue tussockland and amongst shrubland.

Wetland weeds

Wetland weeds of significant concern include oval sedge and soft rush. Consideration should be given to controlling these weeds given they currently occur as discrete patches and individual clumps.

Broom

Introduced broom occurs sporadically around the property. Broom threatens the conservation and landscape values; however, removing these plants to prevent further spread is highly desirable and relatively straight forward given their low numbers and the relatively easy access.

2.6 FAUNA

2.6.1 Bats

Short-tailed bats have not been recorded in Canterbury since the arrival of Europeans. A small population of South Island long-tailed bats is present in South Canterbury, centered on the Opihi River and Hanging Rock escarpment (Sedgeley and O'Donnell 2004). The property was not surveyed for bats because bat roosting and foraging habitats (forest and mature shrubland) are not present in the area.

2.6.2 Birds and Lizards

Ecological Context

The birdlife of the Mackenzie Basin is characterized by native and introduced species of open tussockland and shrubland habitats (Espie *et al.* 1984). Eastern falcon, (nationally vulnerable) was the only threatened bird species recorded from Kirkliston Pastoral Lease in the previous tenure review survey (Elkington 1995). In addition, one at-risk species, New Zealand pipit (declining), was found to be common in tussockland at higher altitudes (Elkington 1995). Black shag (naturally uncommon), eastern falcon (nationally vulnerable) and New Zealand pipit (declining) have been recorded on adjacent pastoral leases (Bowie 2007; Lettink 2007a). Non-threatened native bird species previously recorded from Kirkliston Pastoral Lease are grey warbler, paradise shelduck, silvereeye, South Island fantail, southern black-backed gull, spur-winged plover and swamp harrier (Elkington 1995).

Lizard species previously recorded from Kirkliston Pastoral Lease are common skink and common gecko (Elkington 1995). Neither is considered threatened, but it should be noted that the taxonomy of these species has been substantially revised in subsequent years because both were found to comprise a number of cryptic species (Hitchmough 1997; Patterson and Daugherty 1990; Patterson and Daugherty 1995).

Threatened lizard species known from adjacent Curraghmore and Streamlands pastoral leases are scree skink and spotted skink "Mackenzie Basin" (both gradual decline) (Lettink 2007a). Jewelled gecko (gradual decline) has been seen at several sites on nearby Mt Dalgety Pastoral Lease (Tim Guerin, lessee, *pers. comm.*; Lettink 2007b). Three non-threatened species (common skink, McCann's skink and Southern Alps gecko) are widespread and abundant throughout the Mackenzie Basin (Herpetofauna Database).

Bird and lizard species observed on Kirkliston Pastoral Lease are described for three geographic areas of the property.

Haldon Downs and Stony River Basin

This area covers the west-facing slopes of the Kirkliston Range (Haldon Downs). It is bounded to the northwest by Stony River, to the east by the ridge of the Kirkliston Range and to the south by a fence line that separates Haldon Downs from most of Pringle Stream catchment. Vegetation is dominated by depleted short tussockland and tall tussockland. Small wetlands and areas of shrubland are also present. Substantial areas of native shrubland, talus and rock outcrops are present in a few gullies on the slopes of the Haldon Downs.

Native bird species recorded from this area were black shag (two sightings: a pair of birds was observed in the willows beside Stony River and a lone bird was seen in a stream gully) (naturally uncommon), New Zealand pipit (commonly seen and/or heard in tussocklands at higher altitudes)

(declining), paradise shelduck, silvereve, spur-winged plover, southern black-backed gull and swamp harrier. Introduced bird species observed were chukar, redpoll, starling, skylark, goldfinch, rock pigeon and yellowhammer.

Common skink (five sightings), McCann's skink (18 sightings), Southern Alps gecko (20 sightings), and two unidentified skinks (glimpsed too briefly to permit identification) were recorded from various sites on Haldon Downs. Habitats for these species were rock outcrops, talus, stream gullies, shrubland and tussockland.

In addition to the species noted above, the shrubland and rockland in gullies on the slopes of the Haldon Downs also provide important feeding and breeding habitat for several non-threatened indigenous species (silvereve, McCann's skink and Southern Alps gecko) and introduced game birds (chukar).

Hay and Pringle Stream Catchments

This large area covers almost all of the Hay Stream catchment and most of the Pringle Stream catchment. It is bounded to the south by the property boundary, to the north by Haldon Downs and to the west by the Basin Stream catchment. Depleted short tussockland and tall tussockland dominate at lower altitudes, giving way to sparse tall tussockland, rock outcrops, cushion plants and fellfield at higher altitudes. Stream gullies contain native shrubland, rock outcrops and talus.

Native bird species recorded from this area were grey warbler, New Zealand pipit (declining), silvereve, spur-winged plover, southern black-backed gull and swamp harrier. Introduced bird species observed were California quail, chaffinch, chukar (one group of five birds and another group of eight birds were seen while travelling along the four-wheel drive track traversing the top of the Hay Stream catchment), redpoll, dunnoek, blackbird, greenfinch and yellowhammer.

Common skink (one sighting), McCann's skink (41 sightings) and Southern Alps gecko (16 sightings) were recorded from a range of altitudes throughout this area. Habitats for these species were rockland (talus, rock outcrops and fellfield), stream gullies, shrubland and tussockland.

Basin Stream Catchment

This area contains the southern parts of the Big and Little ranges and the northeast catchment of Mt Sutton. The Mt Sutton summit lies outside the property. The area is defined to the west and south by the property boundary and to the east by a fence that separates the Basin and Hay stream catchments. Depleted short tussockland and tall tussockland dominate at low- to mid-altitudes, giving way to sparse tall tussockland, rock outcrops, cushion plants and fellfield at higher altitudes. The low- to mid-reaches of Basin Stream are enclosed by steep slopes containing numerous rock outcrops, small bluffs, talus slopes and native shrubland.

Native bird species recorded from this area were black shag (a small breeding colony) (naturally uncommon), eastern falcon (one individual seen in the upper Basin Stream catchment) (nationally vulnerable), grey warbler, New Zealand pipit (declining), silvereve, spur-winged plover, southern black-backed gull, swamp harrier and welcome swallow.

The black shag colony consisted of at least three adults, one active nest with two medium-sized chicks in it, two nests that appeared to be empty and another two nests that were each occupied by a dead adult. Cause of death could not be determined. Introduced bird species observed were Australian magpie, California quail, redpoll, dunnoek, blackbird, skylark, goldfinch, song thrush and yellowhammer.

Common skink (one sighting), McCann's skink (40 sightings) and Southern Alps gecko (seven sightings) were recorded at various altitudes and habitats, including rockland (rock outcrops, small bluffs, talus and fellfield), stream gullies, shrubland and tussockland.

The low-to-mid reaches of Basin Stream gully provide the most substantial native shrublands and rocklands (bluffs, rock outcrops and talus) seen on the property. This area provides feeding and breeding habitat for an assemblage of non-threatened native species, including common skink, grey warbler, McCann's skink, paradise shelduck, silvereye, spur-winged plover, welcome swallow and Southern Alps gecko.

Bird Species Recorded

Twenty-four bird species were recorded on Kirkliston Pastoral Lease during this survey, comprising 10 native species and 14 introduced species. Introduced bird species recorded were Australian magpie, California quail, chaffinch, chukar, redpoll, starling, dunnoek, blackbird, skylark, goldfinch, greenfinch, rock pigeon, song thrush and yellowhammer.

In the previous tenure review survey, Elkington (1995) recorded 22 bird species (nine native and 13 introduced). Minor differences in the composition of the native bird fauna were that black shag (naturally uncommon) and welcome swallow were not recorded at that time, and that an additional species (South Island fantail) was found. Notable indigenous bird species are listed in Table 3.

Table 3 Notable indigenous bird species recorded from Kirkliston Pastoral Lease, February 2009

Threat Division	Threat Category	Species	Distribution on property
threatened	nationally vulnerable	eastern falcon	upper Basin Stream catchment
at risk	declining	New Zealand pipit	low-to mid-reaches of Basin Stream; tussockland at higher altitudes
	naturally uncommon	black shag	willows beside Stony River, Haldon Downs; small breeding colony in the low-to mid-reaches of Basin Stream

Lizard species recorded

One hundred and fifty-one lizards representing three species were recorded from 67 sites at a range of altitudes and habitats throughout the property. This total represents seven common skinks, 99 McCann's skinks, 43 Southern Alps geckos and two unidentified skinks. None of these species are considered threatened (Hitchmough *et al.* 2007).

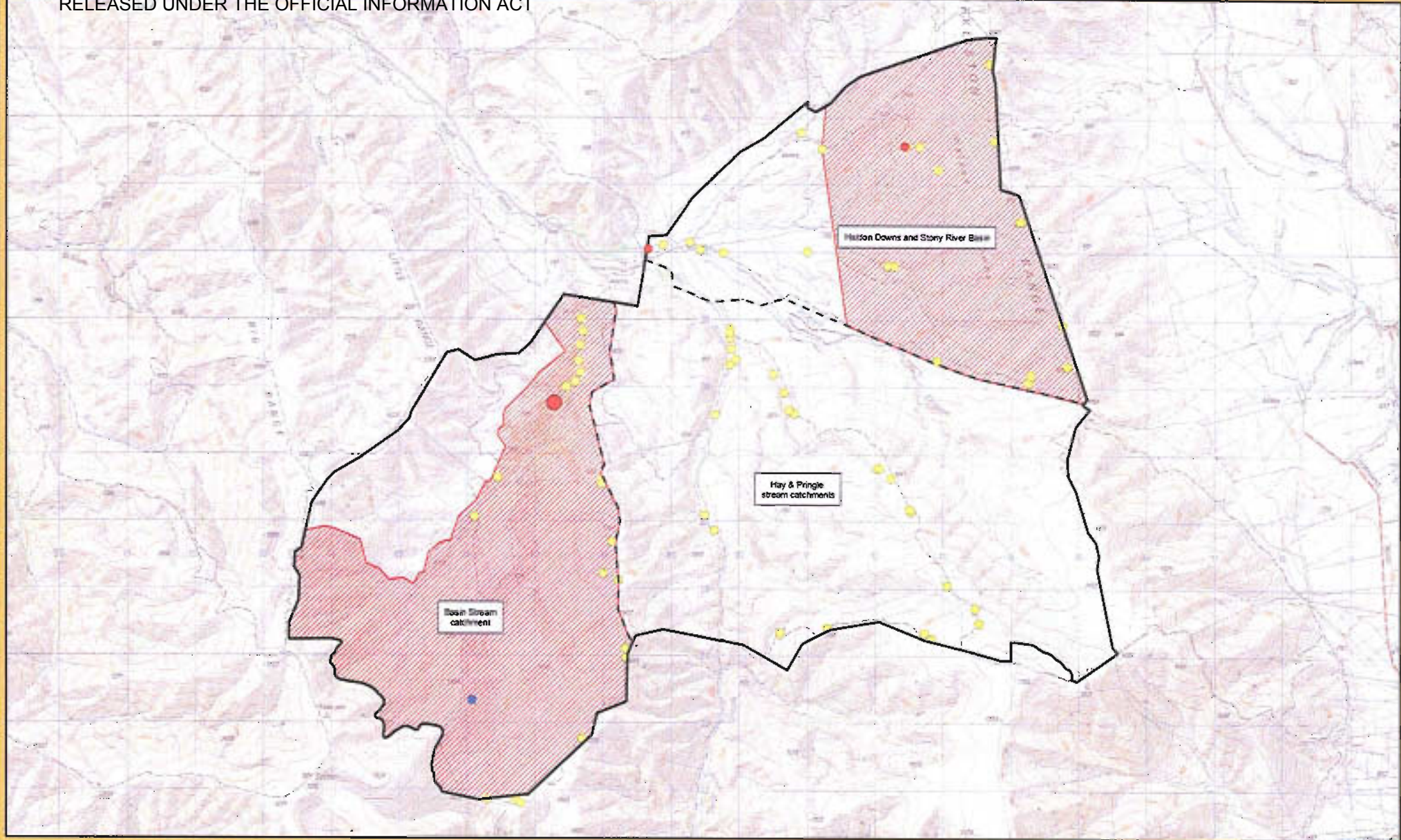
Significance of the Bird and Lizard Fauna

Kirkliston Pastoral Lease provides feeding and breeding habitat for one threatened bird species: eastern falcon (nationally vulnerable) and two at-risk bird species: black shag (naturally uncommon) and New Zealand pipit (declining). The property also provides feeding and breeding habitats for three non-threatened lizard species (common skink, McCann's skink and Southern Alps gecko) and seven non-threatened native bird species though not all of these bird species are likely to breed here (e.g. southern black-backed gull).

Suitable habitat is also present for two threatened species of lizards that were not recorded during this survey but are known to be present in the vicinity: jewelled gecko and spotted skink "Mackenzie Basin" (both gradual decline). Potential habitats for these species are the native shrubland in Basin

Stream gully (jewelled gecko) and tussockland with talus and/or shrubland (spotted skink “Mackenzie Basin”).





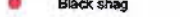


Bird and Lizard value map



Kirkliston PL - Bird and Lizard Values

 Department of Conservation
Te Papa Atawhai
New Zealand Government



Legend	
	Black shag
	Black shag colony
	Eastern falcon
	Bird and Lizard Values
	Unit boundary
	Non-threatened Lizards
	Kirkliston boundary

2.6.3 Freshwater Fauna (fish and invertebrates)

Ecological Context

Kirkliston Pastoral Lease is drained by Basin Stream, Hay Stream, Pringle Stream, upper Stony River and other small unnamed tributaries of Stony River. Stony River flows into Lake Benmore, within the Waitaki River catchment.

One of the distinguishing features of the Waitaki River catchment is the presence of hydroelectric dams. The above streams are separated from the sea by these dams and their associated lakes. This has two major effects on fish communities. The first is that fish communities upstream from the dams are generally composed of only non-diadromous species (those species without a marine phase in their lifecycle), although some exceptions do occur (e.g. longfin eel may still be present and common bully and koaro have become non-diadromous substituting lakes for the sea). The second effect is that fish communities are often separated into discrete populations preventing re-colonization of previously dewatered streams.

Most of the Waitaki River, including all tributaries on the property, is recognised as a 'Type II' Waters of National Importance (Chadderton *et al.* 2004), meaning that sections of waterways in this catchment contain features of national significance.

The New Zealand Freshwater Fish Database (NZFFD) has 1426 records from the Waitaki River catchment (at 27th February 2009). Species recorded from streams near the property are Canterbury galaxias, upland bully and brown trout.

The property comprises three main catchments of freshwater habitat. These habitats and the fish and macro-invertebrate species recorded are described below.

Haldon Downs and Stony River Basin

This area of approximately 3115 ha incorporates the northeast part of the property, being the area that drains the western faces of the Kirkliston Range. The main water bodies in this area are a large basin floor wetland (palustrine swamp), the large stream channel of upper Stony River, the large stream channel of Pringle Stream, small often ephemeral stream channels and a tarn (palustrine ephemeral wetland) on the Haldon Downs. Pringle Stream and Stony River have constant flows. The large wetland contained water at the lower end, though most other water bodies were dry at the time of survey. All these water bodies have their sources within the property, except for Stony River which has part of its headwaters in the adjacent Streamlands and Stony Creek pastoral leases.

Streams in this area flow through tall tussockland, depleted tussockland, shrubland and pasture. The large wetland is dominated by red tussockland, sedgeland, rushland and pasture. The ephemeral tarn lies within tussockland and supports a varied turf community. Lotus and crack willow are present along Pringle Stream and Stony River. All water bodies are accessible to stock and some are crossed by vehicle tracks.

Pringle Stream is up to one and a half metres wide in the middle and upper reaches and approximately two and a half metres wide in the lower reaches. It is 200 to 300 mm deep, with pools up to 600 mm deep. Stony River is approximately two metres wide for most of its length within the property and approximately 200 mm deep with pools up to 500 mm deep. The other flowing stream, an unnamed stream in the small gorge on Haldon Downs, is approximately one and a half metres wide and 100 to 400 mm deep, with pools over one metre deep. This stream disappears into the substrate at the bottom of the gorge and the lower section is a series of pools with small flows

between them. The large wetland is over 400 metres long and about 200 to 300 metres wide. While the majority of the wetland was dry at the time of survey, the areas that were carrying water were over one metre deep in places. The ephemeral tarn was dry at the time of survey, but it appears to normally be about 10 metres long and about five metres wide. The substrates of Pringle Stream and Stony River are mainly cobbles and boulders; whereas the substrate of the stream in the small gorge is mainly bedrock. The wetland and the ephemeral tarn substrates are silt.

Seven sites were surveyed in this area. Brown trout were found at four sites in Pringle Stream and Stony River; Canterbury galaxias were found at three sites in Pringle Stream and in the upper section of the small gorge on Haldon Downs; upland bully were found in three sites, in lower Pringle Stream and Stony River. The survey of Streamlands and Curraghmore pastoral leases recorded Canterbury galaxias in the upper reaches of Stony River. There were two sites where no fish were recorded: the large wetland and the lower reaches of the stream in the Haldon Downs gorge.

Macro-invertebrate fauna assemblages indicate that the main water bodies in this area have very good water quality. Species recorded were: mayflies (*Coloburiscus humeralis*, *Deleatidium lillii*-group and *Deleatidium myzobranchia*-group); stonefly (*Stenoperla prasina*); caddisflies (*Aoteapsyche* sp., *Helicopsyche* sp., *Hydrobiosis* sp., *Olinga feredayi*, *Pycnocentria* sp. and *Pycnocentroides aeris*); two-winged flies (*Austrosimulium* spp. and *Chironominae* sp.); snail (*Potamopyrgus* sp.); flatworm (*Cura* sp.); and worm (*Oligochaete* sp.). Ponds in the wetland and the lower part of the gorge were of lower water quality, indicated by the presence of backswimmers (*Anisops* sp.), damselflies (*Zygoptera* spp.), dragonflies (*Anisoptera* spp.) and water boatmen (*Sigara* sp.). Cosmopolitan diving beetles (*Rhantus suturalis*) were also found in the lower gorge.

Hay Stream Catchment

This area of approximately 1945 hectares incorporates the central part of the property, being the area that drains into Hay Stream. The main water bodies in this area are Hay Stream and its tributaries. These streams flow through tussockland, depleted tussockland, shrubland and pasture. Monkey musk is present along stream margins. All water bodies in this area are accessible to stock and some are crossed by vehicle tracks.

The main channel of Hay Stream has permanent flow in its upper reaches, though becomes a subsurface stream at the flats above its confluence with Stony River. The stream ranges in width from one metre in its upper reaches to two metres in its lower reaches. It is generally between 100 and 400 mm deep, with pools up to 800 mm deep. The tributary streams were mostly dry at the time of survey. Tributaries carrying water were up to one metre wide and about 100 mm deep. Stream substrates are mainly boulders and cobbles, although bedrock is also present in places.

Four sites were surveyed in the Hay Stream catchment. Canterbury galaxias and upland bully were found at all four sites; brown trout were only found at the upper-most site in the main channel.

Macro-invertebrate fauna assemblages indicate that the main water bodies in this area have very good water quality. Species recorded were: mayflies (*Deleatidium lillii*-group and *Deleatidium myzobranchia*-group); stonefly (*Stenoperla prasina*); caddisflies (*Aoteapsyche* sp., *Helicopsyche* sp., *Hydrobiosis frater*, *Hydrobiosis* sp., *Olinga feredayi*, *Pycnocentria* sp. and *Pycnocentroides aeris*); dobsonfly (*Archichauliodes diversus*); two-winged flies (*Aphrophila* sp., *Austrosimulium* spp., and *Chironominae* sp.); snail (*Potamopyrgus* sp.); flatworm (*Cura* sp.); and worm (*Oligochaete* sp.).

Basin Stream Catchment

This area of approximately 2461 hectares incorporates the southwest part of property, being the area that drains into Basin Stream. This area contains the least modified vegetation and aquatic communities. The main water bodies present in this area are Basin Stream and its tributaries. These streams flow through tussockland, depleted tussockland, shrubland and pasture. Monkey musk and lotus are present along stream margins. All water bodies in this area are accessible to stock and some are crossed by vehicle tracks.

There are two main branches of Basin Stream: the left (west) branch draining Big Range and the slopes of Mt Sutton; the right branch draining the smaller range east of Mt Sutton. These streams vary in width from less than one metre to over two and a half metres wide. Basin Stream and its two main tributaries are approximately 200 mm deep, with pools up to 700 mm deep. Smaller tributary streams are approximately 100 to 200 mm deep. Stream substrates are mainly cobble and gravel, although boulders and bedrock are also present.

Five sites were surveyed in the Basin Stream catchment. Brown trout were found at four sites in the main stream and the two main tributaries. Canterbury galaxias were found in one smaller tributary. Records from the NZFFD indicate that Canterbury galaxias are also sporadically present in the main Basin Stream channels and that upland bully are present in the lower reaches of Basin Stream.

Macro-invertebrate fauna assemblages indicate that the main water bodies in this area have very good water quality. Species recorded were: mayflies (*Coloburiscus humeralis*, *Deleatidium lillii*-group, *Deleatidium myzobranchia*-group and *Nesameletus* sp.) stoneflies (*Stenoperla prasina* and *Zelandobius* sp.); caddisflies (*Aoteapsyche* sp., *Hydrobiosis* sp., *Olinga feredayi*, *Pycnocentria* sp. and *Pycnocentroides aeris*); dobsonfly (*Archichauliodes diversus*); two-winged flies (*Austrosimulium* spp., *Chironominae* sp. and *Hexatomini* sp.); flatworm (*Cura* sp.) and worm (*Oligochaete* sp.).

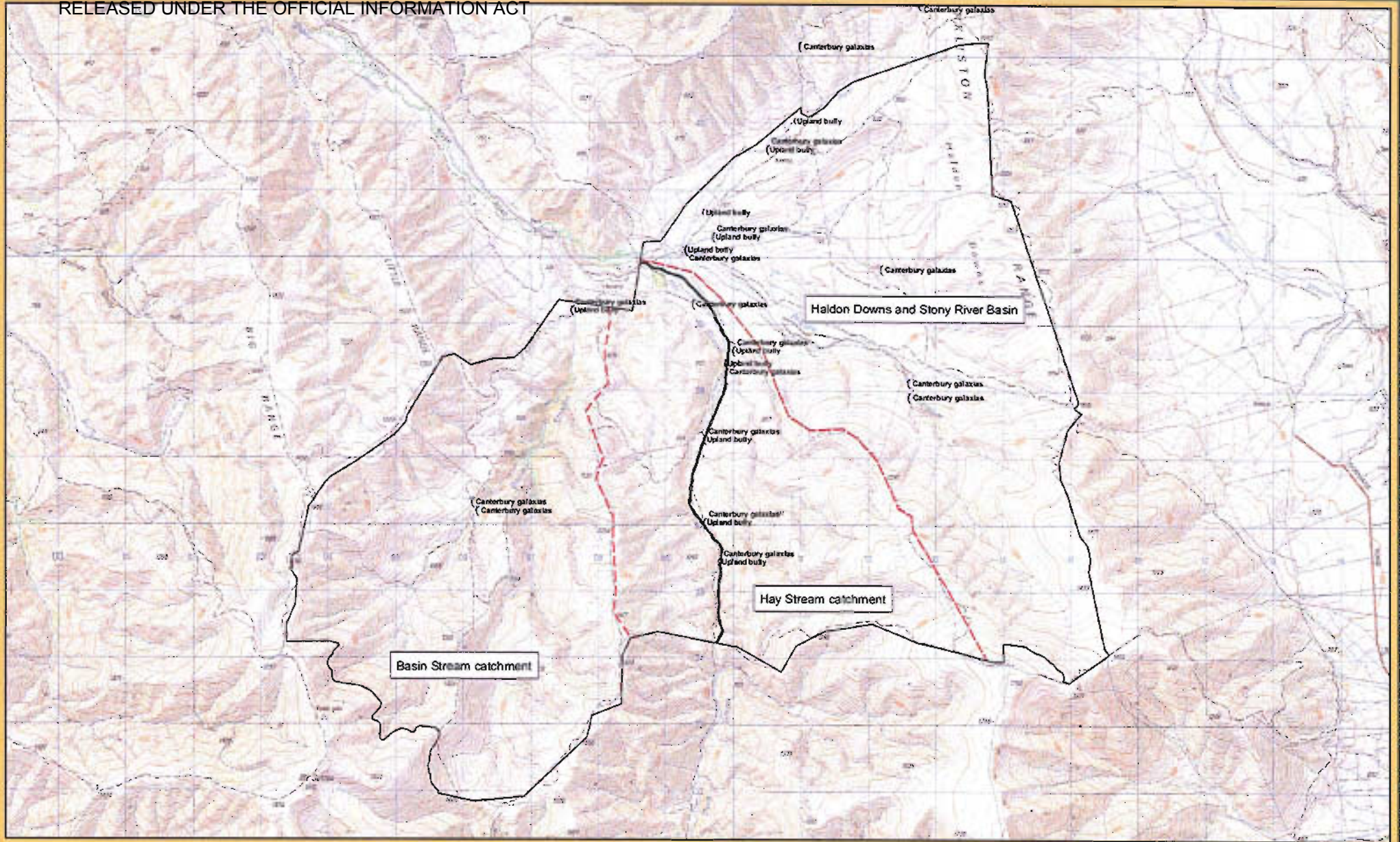
Species Recorded

Three fish species were recorded during this survey of Kirkliston Pastoral Lease: Canterbury galaxias, upland bully and brown trout. These species were present throughout the property. High quality macro-invertebrate communities were recorded throughout the property.

Significance of Freshwater Fauna

No threatened fish species were recorded in freshwater habitats on the property, though these habitats are in relatively good condition. Most of the Waitaki River including all catchments on the property is listed as a 'Type II' Waters of National Importance (Chadderton *et al.* 2004), indicating that the water bodies contain features of national significance.

Freshwater Fauna Values Map



Kirkliston PL - Aquatic Values

Department of Conservation
Te Papa Atawhai

New Zealand Government

2



Legend

- Kirkliston boundary
- Upland bully
- Canterbury galaxias
- Kirkliston Aquatic Geographical Units

2.6.4 Terrestrial Invertebrates

Ecological Context

Kirkliston Pastoral Lease forms an ecological link between the surrounding ranges, particularly across the higher, less modified habitats. Ecological connectivity between the Mackenzie Basin and the eastern hills is important given the degree of agricultural modification of the valley floors (e.g. the Hakatamea Valley). As it is, few habitat corridors now exist connecting the ecological transition between Otago and the Mackenzie Basin. The invertebrate fauna of the area reflects this transition between regions, with several localised (i.e. highly endemic) species, such as the speargrass weevils *Lyperobius carinatus* (found from Marlborough to South Canterbury) and *L. barbarae* (found only in north Otago) (Craw 1999).

Invertebrates of Kirkliston Pastoral Lease are described below for three distinct parts of the property.

Haldon Downs/Pringle Stream Catchment

Covering the eastern third of the property, this area includes upper Stony River, the northern part of the Kirkliston Range, Haldon Downs and Pringle Stream. The area represents some of the lowest altitude habitat on the property. At the time of this survey, the lower slopes and valley floor of Pringle Stream were extensively modified (over-sown and grazed) and the upper slopes of Haldon Downs supported extensive tall tussockland.

The majority of invertebrates collected (or seen) in this area are typical of tussockland habitats. Some of the more obvious and characteristic species include: the attractive 'alpine orange' day flying moth (*Aponotoreas insignis*); the large speargrass moth (*Graphania nullifera*); ground weta (*Hemiandrus furcifer*) and the common (but un-described) *Eugnomini* speargrass weevils. The spiders *Matua valida* and *Dolomedes aquaticus* (both data deficient) were collected from the main un-named stream draining Haldon Downs. Ground weta (*Hemiandrus furcifer*) were also dug out from holes on the range crest near the northeast corner of the property.

Hay Stream Catchment

Four distinct habitats were identified in the Hay Stream catchment during the inspection: riparian shrubland; short tussockland; depleted tall tussockland on north-facing slopes; and semi-modified sub-alpine pavement habitat on the slopes of the higher summits. Each of these habitats support invertebrate communities, however those of highest conservation value were in the less modified, higher altitude zone, an area where large, flightless invertebrates occur.

Scree weta (*Deinacrida connectens*), mountain stone weta (*Hemideina maori*) and the alpine grasshopper (*Brachaspis nivalis*) were all found on the ridge between the head of Hay Stream and the high summit (1755 m) to the east. Several endemic hunting spiders were identified from the area including two wolf spiders (*Anoteropsis arescens* and *A. hilaris*) and the large prowling spider *Uliodon frenatus*, a common native species. Scree weta, mountain stone weta and alpine grasshopper are South Island endemics of high conservation, scientific and biogeographical importance. Furthermore, scree weta and mountain stone weta were found together (sympatric), a situation not often encountered in the eastern high country. The presence of scree weta at these sites is probably a new location record.

Basin Stream Catchment

Several shrubland communities are present throughout the length of Basin Stream. Elsewhere in the catchment are pasture, depleted tussockland and, at higher altitudes, tussockland and fellfield.

Native invertebrates were more abundant at higher altitudes than on the lower slopes and outwash terraces of Basin Stream. Upper Basin Stream sites support intact native invertebrate communities. Species recorded included a speargrass weevil (*Lyperobius carinatus*), an alpine grasshopper (*Brachaspis nivalis*) and the alpine tussock moth (*Aponotoreas insignis*). The habitat in the area surveyed was visually identical throughout the Basin Stream headwaters suggesting that a similar suite of taxa are likely to be present in the neighbouring landscape.

In this area, several invertebrates of conservation interest are present, including the 'stealthy spider' *Matua valida* (data deficient), speargrass weevil near its range limit, alpine grasshopper and ground weta (*Hemiandrus furcifer*). The latter species is of intrinsic value for its endemic status and of scientific value for biogeographic and speciation analysis.

Species Recorded

The invertebrate fauna observed on the property is typical of the ecological region and reflects the current ecological state of the property. Lower-altitude parts of the property are modified and support few native invertebrate taxa, whereas higher-altitude areas support habitats that are more intact and a richer assemblage of native taxa. Notable species recorded are listed below.

Table 4 Notable invertebrate species recorded from Kirkliston Pastoral Lease, February 2009.

Threat Division	Threat Category*	Species	Distribution on Property
data deficient		<i>Dolomedes aquaticus</i> (water spider)	un-named stream on Haldon Downs
		<i>Matua valida</i> (stealthy spider)	Basin Stream; un-named stream on Haldon Downs
distributional limit		<i>Deinacrida connectens</i> scree weta	ridge crest near summit 1755; uncommon in ED; at eastern distributional limit
		<i>Lyperobius carinatus</i> (speargrass weevil)	upper Basin Stream; near distributional limit
scientific interest		<i>Brachaspis nivalis</i> mountain grasshopper	high altitude sites; characteristic alpine species of intrinsic value
		<i>Hemiandrus furcifer</i> ground weta	upper Basin Stream; ridge crest at northeast corner of property; vulnerable to predation
		<i>Hemideina maori</i> mountain stone weta	ridge crest near summit 1755; vulnerable to predation

*Threat status from Hitchmough *et al.* (2007)

Significance of the Invertebrate Fauna

Kirkliston Pastoral Lease supports two species listed as data deficient (*Matua valida* and *Dolomedes aquaticus*), along with several iconic orthopterans including scree weta (*Deinacrida connectens*), mountain stone weta (*Hemideina maori*) and the alpine grasshopper (*Brachaspis nivalis*). The property also supports a population of some of New Zealand's largest weevils (*Lyperobius carinatus*) which are becoming increasingly rare throughout their natural range (McGuinness 2001).

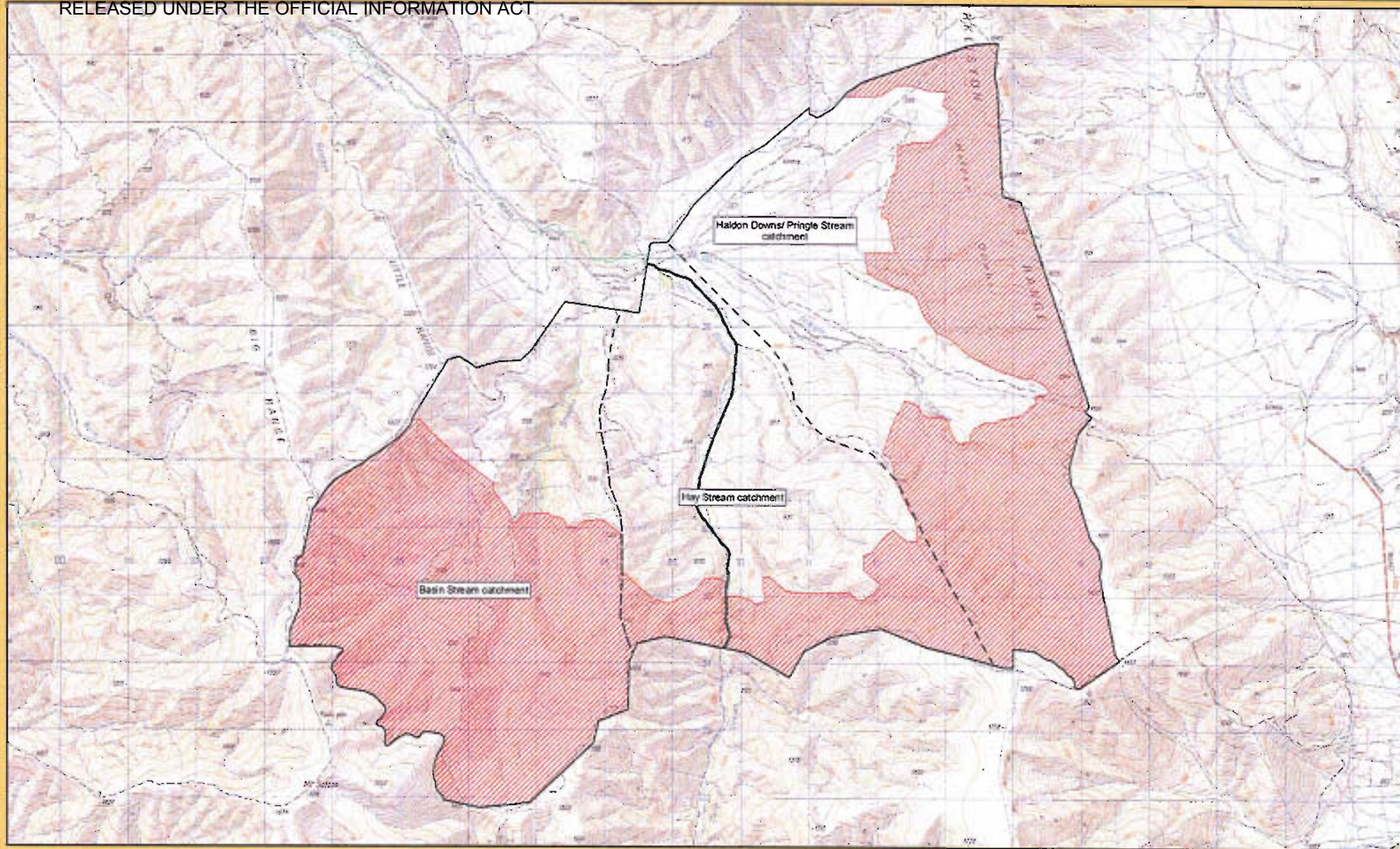
The presence of two species of large weta on the property is of considerable ecological value. While mountain stone weta is common and widespread in the South Island high country, isolated populations (as on the property) are of biogeographic interest. By contrast, the presence of the scree

weta on the property is highly informative, given the altitude (approximately 1580 m) at which specimens were found.

The ridge crest below summit 1755 represents an ecological 'island' for scree weta, an insect that is vulnerable to predators and dependant on a sufficient thermal range and den sites within semi-disturbed rocky ground. Similarly, the area provides suitable habitat for the alpine grasshopper, another endemic species confined to the sub-alpine zone.

Collectively, these populations represent peripheral variants of the 'core' populations (those found closer to the Southern Alps and at higher altitudes) and are therefore highly significant for protection of genetic diversity.

Invertebrate Values Map



Kirkliston PL - Invertebrate Values

2



Department of Conservation
Te Papa Atawhai

New Zealand Government



Legend

- Kirkliston boundary
- Invertebrate units
- Invertebrate values

2.6.5 Problem Animals

Bennett's wallabies and hares were encountered on higher altitude parts of the property. Hares and rabbits were common at lower altitudes. Possum scat was found in rocky areas and shrublands throughout the property. Collectively, these introduced herbivores browse native vegetation, exacerbating damage caused by sheep and cattle. Hares and rabbits also have a role in supporting predator populations because they are primary prey for some introduced predators such as feral cats and ferrets (Norbury *et al.* 1998). Feral cats, hedgehogs, mustelids (ferrets, stoats and weasels) and rodents were not encountered during this survey but at least some of these species are almost certainly present. These predators include native birds and lizards in their diets and pose a significant threat to invertebrates, especially the larger, flightless species.

2.7 HISTORIC

2.7.1 European Heritage Values

Kirkliston Pastoral Lease has historically been part of Haldon Station (Kirkliston Run). Haldon Hills Run was first taken up for grazing by the Teschemaker brothers in 1857. Haldon was sold to Smith, Wallace and Dennistoun in 1867. The property was sold again in 1878, to Pringle. In 1889, James Preston bought the property, though sold it to and re-purchased it from Archibald Morton before the Haldon runs were divided in 1911. Kirkliston Run went to Miss C R Campbell and after her marriage, to James Preston's son John. Kirkliston passed to Simon Mackenzie in 1917 and then to John Innes as part of the reunited Haldon Station in 1919 (Pinney, 1971).

The original government funded rabbit fence (built 1890s) which extended from the Waitaki Valley to Lake Pukaki traverses the property. It runs from the saddle immediately south of Haldon Downs to the entrance of the Stony River valley and remains an integral part of the fencing on the property. The fence was approximately 67.6 kilometres long and materials for it valued at 3600 pounds were purchased in 1888. Men and huts were located every 16km along the fence for maintenance purposes. The fence is significant as it provides impressive historical testimony to the magnitude of the rabbit problem and the government's active financial involvement in the problem.

Significance of Historic Resources

One significant historic feature is present on the property. This is the government funded rabbit fence that remains an integral part of the fencing on the property. The fence is significant as it provides impressive historical testimony to the magnitude of the rabbit problem and the government's active financial involvement in the problem.

2.8 PUBLIC RECREATION

2.8.1 Physical Characteristics

The property is a mix of moderately-steep country on the upper slopes and gentler country along the main streams, on Haldon Downs and the main ridge crests. It is typical of mountains of the eastern Mackenzie Basin and is transitional in character between the mountains of South Canterbury and Otago.

2.8.2 Legal Access

Roads

A legal road between the Stony River valley and Deep Stream traverses the property via Hay Stream. The main road access to the property is via Stony River Road, though parts of this formed road do not appear to follow the legal road alignment. Other 4WD vehicle tracks approach or traverse the property from the Little and Big ranges to the west, Mt Sutton, the Kirkliston Range and Hakataramea River valley. Reasonably good 4WD tracks traverse most ridges and valleys on the property.

Adjoining Public Conservation Land

Kirkliston Range Conservation Area adjoins the property to the southeast.

Marginal Strips

The pastoral lease contains a notation for Section 58 strips to be excluded from the lease. This applies to rivers and streams over three metres in width but there is no specific definition on the relevant SO plan. This situation was continued at renewal in 1998 (albeit the strips were deemed to be marginal strips under Section 24 (3) of the Conservation Act 1987). Until the marginal strips are defined they remain as “notational”.

2.8.3 Activities

There are no current recreation permits issued for Kirkliston Pastoral Lease. Likely existing recreational activities may include four-wheel-driving, hunting and tramping. Higher-altitude parts of the property provide good opportunities for tramping, walking, hunting, nature study, scenery appreciation and, in winter months, may provide opportunities for skiing. Lower-altitude parts of the property provide good opportunities for horse-riding, mountain-biking, four-wheel-driving, picnicking and nature study.

Significance of Recreation

Significant recreational features of Kirkliston Pastoral Lease are the highly-natural recreation setting on the ridge crests, the semi-natural tussocklands on the upper slopes and on the upper part of Haldon Downs. The property has potential for recreational use as part of longer journeys between the Mackenzie Basin and Hakataramea River valley, and along the length of the Kirkliston Range.

PART 3 OTHER RELEVANT MATTERS AND PLANS

3.1 CONSULTATION

The previous Conservation Resources Report (1995) stated the following;

The Forest and Bird Protection Society suggested that the following areas were of conservation interest:

- The south and east facing slopes of the West Branch of Basin Stream because of its tall tussock communities.
- Red tussock on downlands immediately west of Basin Stream
- The tall tussock in the upper valley of Stony River

A request for interested party comment was sent out on the 2/7/2009. Interested party consultation comments were received from the Federated Mountain Clubs of NZ (Inc), Environment Canterbury and the Canterbury Aoraki Conservation Board. The comments are listed below.

- The water bodies on Kirkliston contain near pristine water. These water bodies including adequate buffer zones are required to be fenced and adequately protected to retain their value.
- Establish riparian fencing below 900m contour for the Hay Stream, Pringle Stream and Stony River tributaries to protect riparian shrublands and tussocklands, aquatic values, and reduce the impacts of land use on water quality.
- That the terms of the Soil and Water Conservation Plan agreement for the Kirkliston lease that contribute to the ongoing restoration of the vegetation cover should be retained through any proposal for the freeholding of land through tenure review.
- That land burnt in the Haldon/Waitangi fire continues to be monitored for vegetation recovery, and management adjusted to achieve the restoration of an intact cover.
- Adequate access for the public to enjoy future conservation land is also imperative.
- The Kirkliston Range is a popular destination for visitors from South Canterbury seeking a good day or weekend walk not too far from home.
- Walking along the Range's whole length, which includes Kirkliston Station in the north, is known to occur now, and we definitely recommend that provision should be made for it in the future.
- The Kirkliston tenure review is one which must not be considered in isolation, but rather in association with reviews in neighbouring properties.
- The basin in which the lease lies occupies a strategic position.
- Any walking routes wishing to traverse all the hills between Hakataramea Valley and Lake Benmore and between Avimore and Burkes Pass are likely to run through this central point.
- Good routes and tracks already exist on many ridge lines and spurs and in valley farm tracks.
- The lease is contiguous with a conservation area and areas of retired land. Failure to provide for public access would therefore frustrate any future hopes of establishing a network of tracks through picturesque, drier and not difficult country comparatively near centres of moderate population.

3.2 DISTRICT PLANS

Kirkliston Pastoral Lease lies within the Waimate District. The District Plan was made fully operative in 2001. The lease is wholly within the land zoned as Rural within the plan. There are no significant natural areas or outstanding landscapes (as identified in the District plan) within the lease area.

There are a number of Objectives for the Rural zone. A précis of the relevant objectives as they relate to conservation resources is outlined as being;

“ to safeguard indigenous biodiversity and ecosystem functioning through the retention (as far as possible) of indigenous vegetation and wetlands, including protection and enhancement of waterways, wetlands and their margins while managing land use which maintains life supporting capacity of systems, soils and water and maintaining rural amenity consistent with activities anticipated in such areas.”

There are a large number of policies associated with the Objectives in the Plan. The rules and activity status which would trigger consideration of these are:

Relevant Controlled activities include:

Dairying which does not comply with relevant standards, being;

- Holding tanks, storage ponds and carcass disposal to be 100m from boundary or road or 300 m from any reserve or dwelling on an adjacent property.
- Stock managed in a way which ensures no wetlands or waterways are contaminated by stock or their effluent.
- Irrigation water is applied to avoid contamination of wetlands and waterways and no surface flooding.

Relevant Discretionary activities include:

Forestry – within 50m of a wetland or 100m of a lake or river or within 50m of a dwelling.

Earthworks – if within a wetland or 50m of a wetland, 100m of a lake or 20m of a river and earthworks exceed;

- 50m³ in any 1 hectare in any continuous 5 year period
- 150m² in any 1 hectare in any continuous 5 year period
- Slopes greater than 20°.

Vegetation clearance – if above 900m or within a riparian area (50m of a wetland, 100m of a lake or 20m of a river) and clearance of indigenous vegetation exceeds;

- 150m² in any 1 hectare in any continuous 5 year period
- 100m² in any 1 hectare in any continuous 5 year period on land above 900m

Standards for indigenous vegetation clearance in all rural areas also includes:

- Over 100m² of *Chionochloa* spp, or
- More than 500m² of vegetation with an average height 3 m or over, or
- More than 1 ha per title per year over a 5 year period, or
- Clearance on indigenous vegetation which has not been over sown or top dressed in the last 10 years, or
- Indigenous vegetation which has not been burnt within the last 25 years.

High altitude areas (above 900m) – any pastoral intensification.

Relevant Non- Complying activities include:

Forestry – tree planting above 900m

Wetlands – vegetation clearance or drainage greater than 1000m².

3.3 CONSERVATION MANAGEMENT STRATEGIES

Kirkliston Pastoral Lease lies within the Waitaki Place Unit of the Canterbury Conservancy. Relevant priority objectives for this unit listed in the CMS (Department of Conservation, 2000) are:

- To identify, maintain and seek to enhance the natural landscapes and natural landscape values of the Waitaki Unit.
- To identify the significant indigenous vegetation and threatened species of the Waitaki Unit.
- To use a range of effective methods to protect the indigenous biodiversity of the Waitaki Unit.
- To protect and enhance the viability of priority threatened species populations and their habitat(s) in the Waitaki Unit.
- To improve the range of viable riparian habitats for indigenous species in the Mackenzie Basin.
- To prevent the loss of natural and landscape values from wilding trees on land managed by the Department.
- To liaise with land managers and regulatory agencies to control and contain wilding trees.
- To reduce and maintain rabbit and thar densities to levels that ensure their adverse effects on natural values are minimised.
- To provide new recreational facilities and opportunities by the Department and other organisations and concessionaires where natural and historic values are not compromised.
- To liaise with adjacent landholders to resolve conflicts over access for recreation to land managed by the Department.
- To provide quality interpretation at priority sites in the Mackenzie Basin.
- To increase public awareness of the natural and historic values of the Waitaki.

3.4 NEW ZEALAND BIODIVERSITY STRATEGY

The New Zealand Government is a signatory to the Convention on Biological Diversity. In February 2000, Government released the New Zealand Biodiversity Strategy. This strategy is a blueprint for managing the country's diversity of species and habitats. It sets a number of goals to achieve this aim. Of particular relevance to tenure review is Goal 3, which states:

- *Maintain and restore a full range of remaining natural habitats and ecosystems to a healthy functioning state, enhance critically scarce habitats, and sustain the more modified systems in production and urban environments, and do what is necessary to:*
- *Maintain and restore viable populations of all indigenous species across their natural range and maintain their genetic diversity.*

PART 4 ATTACHMENTS

4.1 ADDITIONAL INFORMATION

4.1.1 Scientific Names of Species

Plant Species

Species names follow those in de Lange *et al*, 2009 for recent plant name changes, the published volumes of New Zealand Flora and the name changes listed in A Checklist of Indigenous Vascular Plants of New Zealand, 10th Revision (*Unpublished Document*, S. Courtney, Department of Conservation, Nelson). Maori names are included for taonga species listed in Schedule 97 of the Ngai Tahu Claims Settlement Act 1998. Naturalised species are indicated by an asterisk (*).

<u>Common name</u>	<u>Scientific name</u>
blue tussock.....	<i>Poa colensoi</i>
blue wheatgrass	<i>Elymus solandri</i>
bog rush.....	<i>Schoenus pauciflorus</i>
bristle tussock.....	<i>Rytidosperma setifolium</i>
broadleaf/kapuka	<i>Griselinia littoralis</i>
broad-leaved snow-tussock	<i>Chionochloa flavescens</i>
broom	<i>Cytisus scoparius</i>
browntop*	<i>Agrostis capillaris</i>
catsear*.....	<i>Hypochoeris radicata</i>
clover*	<i>Trifolium</i> sp.
comb sedge.....	<i>Oreobolus pectinatus</i>
coral broom	<i>Carmichaelia crassicaulis</i> subsp. <i>crassicaulis</i>
crack willow*	<i>Salix fragilis</i>
creeping pohuehue.....	<i>Muehlenbeckia axillaris</i>
dainty daisy	<i>Celmisia gracilentia</i>
daphne	<i>Pimelea oreophila</i>
dock*	<i>Rumex obtusifolius</i>
dwarf broom.....	<i>Carmichaelia vexillata</i>
elderberry*	<i>Sambucus nigra</i>
fescue tussock.....	<i>Festuca novae-zelandiae</i>
golden speargrass/taramea.....	<i>Aciphylla aurea</i>
gooseberry*	<i>Ribes uva-crispa</i>
harebell.....	<i>Wahlenbergia albomarginata</i>
haresfoot trefoil*	<i>Trifolium arvense</i>
hawkweed*.....	<i>Hieracium</i> sp.
jointed rush*.....	<i>Juncus articulatus</i>
king devil hawkweed*.....	<i>Hieracium praealtum</i>
lawyer.....	<i>Rubus schmidelioides</i>
lotus*	<i>Lotus pedunculatus</i>
Maori onion.....	<i>Bulbinella angustifolia</i>
matagouri.....	<i>Discaria toumatou</i>
mat broom	<i>Carmichaelia nana</i>

mat coprosma	<i>Coprosma petriei</i>
mingimingi	<i>Coprosma propinqua</i>
monkey musk*	<i>Mimulus guttatus</i>
mountain clubmoss.....	<i>Lycopodium fastigiatum</i>
mountain totara.....	<i>Podocarpus hallii</i>
mountain wineberry.....	<i>Aristotelia fruticosa</i>
mouse-ear hawkweed*	<i>Hieracium pilosella</i>
musk*	<i>Mimulus moschatus</i>
narrow-leaved snow-tussock	<i>Chionochloa rigida</i>
native broom.....	<i>Carmichaelia petriei</i>
necklace fern	<i>Asplenium flabellifolium</i>
oval sedge*	<i>Carex ovalis</i>
patotara	<i>Leucopogon fraseri</i>
plume grass.....	<i>Dichelachne crinita</i>
porcupine shrub	<i>Melicytus alpinus</i>
prostrate kowhai	<i>Sophora prostrata</i>
red clover*.....	<i>Trifolium pratense</i>
red tussock.....	<i>Chionochloa rubra</i>
red woodrush.....	<i>Luzula rufa</i>
scabweed	<i>Raoulia australis</i>
scented tree daisy	<i>Olearia odorata</i>
Scotch thistle*	<i>Cirsium vulgare</i>
scrub pohuehue.....	<i>Muehlenbeckia complexa</i>
sheep's sorrel*.....	<i>Rumex acetosella</i>
silver tussock/wi.....	<i>Poa cita</i>
slender spike sedge.....	<i>Eleocharis gracilis</i>
slim snow-tussock	<i>Chionochloa macra</i>
snowberry	<i>Gaultheria depressa</i>
soft rush*	<i>Juncus effusus</i>
stitchwort*	<i>Stellaria graminea</i>
sundew.....	<i>Drosera arcturi</i>
sun orchid	<i>Thelymitra longifolia</i>
sweet brier*	<i>Rosa rubiginosa</i>
sweet vernal*.....	<i>Anthoxanthum odoratum</i>
tauhinu.....	<i>Ozothamnus leptophyllus</i>
thousand-leaved fern	<i>Hypolepis millefolium</i>
timothy*	<i>Phleum pratense</i>
turpentine shrub.....	<i>Dracophyllum uniflorum</i>
white clover*	<i>Trifolium repens</i>
wilding conifers.....	<i>Pinus spp</i>
wire moss	<i>Polytrichum juniperinum</i>
Yorkshire fog*	<i>Holcus lanatus</i>

Animal Species

Species names follow King (1990) for mammals, Miskelly *et al* 2009 for recent bird name changes and the June 2003 version of the New Zealand Recognized Bird Names list (compiled by C.J.R. Robertson and D.G. Medway for the Ornithological Society of New Zealand Inc.) for the other bird names, Whitaker (1998) for lizards and McDowall (2000) for fish. Maori names are included for taonga species listed in Schedule 97 of the Ngai Tahu Claims Settlement Act 1998. Naturalised species are indicated by an asterisk (*).

Common name Scientific name

Australian magpie*	<i>Gymnorhina tibicen</i>
Bennett's wallaby*	<i>Macropus rufogriseus rufogriseus</i>
blackbird*	<i>Turdus merula</i>
black shag	<i>Phalacrocorax carbo novaehollandiae</i>
brown trout*	<i>Salmo trutta</i>
California quail*	<i>Callipepla californica brunnescens</i>
Canterbury galaxias	<i>Galaxias vulgaris</i>
chaffinch*	<i>Fringilla coelebs</i>
chukar*	<i>Alectoris chukar</i>
common bully	<i>Gobiomorphus cotidianus</i>
common gecko	<i>Hoplodactylus maculatus</i>
common skink	<i>Oligosoma nigriplantare polychroma</i>
dunnock*	<i>Prunella modularis</i>
eastern falcon/karearea	<i>Falco novaeseelandiae</i>
feral cat* (house cat)	<i>Felis catus</i>
feral pig	<i>Sus scrofa</i>
ferret*	<i>Mustela furo</i>
goldfinch*	<i>Carduelis carduelis</i>
greenfinch*	<i>Carduelis chloris</i>
grey warbler/riroriro	<i>Gerygone igata</i>
hare*	<i>Lepus europaeus occidentalis</i>
jewelled gecko	<i>Naultinus gemmeus</i>
koaro	<i>Galaxias brevipinnis</i>
longfin eel/tuna	<i>Anguilla dieffenbachii</i>
McCann's skink	<i>Oligosoma maccanni</i>
mountain stone weta	<i>Hemideina maori</i>
New Zealand pipit/pihoihoi	<i>Anthus novaeseelandiae novaeseelandiae</i>
paradise shelduck/putakitaki	<i>Tadorna variegata</i>
pectoral sandpiper	<i>Calidris melanotos</i>
perch*	<i>Perca fluviatilis</i>
possum*	<i>Trichosurus vulpecula</i>
rabbit*	<i>Oryctolagus cuniculus cuniculus</i>
redpoll*	<i>Carduelis flammea</i>
rock pigeon*	<i>Columba livia</i>
scree skink	<i>Oligosoma waimatense</i>
scree weta	<i>Deinacrida connectens</i>
short-tailed bat	<i>Mystacina tuberculata</i>
silvereve	<i>Zosterops lateralis lateralis</i>
skylark*	<i>Alauda arvensis</i>
song thrush*	<i>Turdus philomelos</i>
Southern Alps gecko	<i>Hoplodactylus</i> aff. <i>maculatus</i> "Southern Alps"
southern black-backed gull/karoro	<i>Larus dominicanus dominicanus</i>
South Island fantail/piwakawaka	<i>Rhipidura fuliginosa fuliginosa</i>
South Island long-tailed bat	<i>Chalinolobus tuberculatus</i>
spotted skink "Mackenzie Basin"	<i>Oligosoma lineocellatum</i> "Mackenzie Basin"
spur-winged plover	<i>Vanellus miles novaehollandiae</i>
swamp harrier	<i>Circus approximans</i>
starling*	<i>Sturnus vulgaris</i>
stoat*	<i>Mustela erminea</i>
upland bully	<i>Gobiomorphus breviceps</i>
welcome swallow	<i>Hirundo tahitica neoxena</i>
yellowhammer*	<i>Emberiza cintrrenella</i>

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