

Crown Pastoral Land Tenure Review

Lease name : Manahune

Lease number : Pt 091

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.

The report attached is released under the Official Information Act 1982.

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MANAHUNE PASTORAL LEASE



CONSERVATION RESOURCES REPORT

Department of Conservation

May 2003

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PART 1 INTRODUCTION

This report describes the significant inherent values present on Manahune Pastoral Lease. Field survey reports upon which this report is based are listed below.

Manahune Pastoral Lease covers an area of approximately 1246 hectares on the southwest slopes of the Albury Range, southwest of Fairlie, in South Canterbury. The property lies between the Tengawai River and its tributary Duck Stream, and the crest of the Albury Range. It adjoins two other pastoral leases (Silver Hill and Chetwynd) along the Albury Range to the east, and freehold land on other boundaries.

Manahune Pastoral Lease covers moderately-steep slopes on the Albury Range, between approximately 400m and 1150m altitude. The property is drained by tributaries of the Tengawai River and Duck Stream. Areas of limestone outcrop are at lower altitudes on and adjacent to the property.

The property lies in the Hunters Ecological District, within Pareora Ecological Region. There has been no Protected Natural Areas Programme (PNAP) survey of this district, so no areas have been previously recommended for protection as part of that programme.

Field survey reports upon which this report is based:

- Manahune Pastoral Lease Landscape Assessment, Alan Petrie, November 2002, 8p+map+photographs.
- Tenure Review Report, Manahune Vegetation, Mark Davis, March 2003, 14p+map+appendices.
- Assessment of the Fauna Values of Manahune Pastoral Lease, Jane Sedgeley, DOC, December 2002, 9p+map+photographs.
- Manahune Pastoral Lease Invertebrate Assessment, Simon Morris, February 2003, 8p+map+photographs.
- Manahune Pastoral Lease, Report on Aquatic Fauna Surveys, Scott Bowie, January 2003, 10p+map+photographs.

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

2.1 LANDSCAPE

Manahune Pastoral Lease is located on the southern end of the Albury Range which, along with the Dalgety and Rollesby ranges, forms the front ranges that separate the coastal hills and plains from the inter-montane Mackenzie Basin. The Albury Range is typified by a low-relief skyline with dissected ridges and spurs that separate V-shaped gullies. The vegetation is fragmented, having been modified and manipulated for pastoral farming. However areas of low forest and shrubland are still present in incised gullies and around rocky outcrops. To the east of the property are rolling downlands that have been converted into highly productive farmland.

For this assessment of significant inherent values, Manahune Pastoral Lease is divided into three landscape units. These units are illustrated on the Landscape Unit Map on the following page and are described below.

Landscape Unit 1

This unit is located at the southeast end of the Albury Range. The lower boundary follows the margins of the Tengawai River around the base of the range. The dominant landforms within the unit are the series of broad spurs and deep intervening gullies that extend down from the central ridgeline. The altitude of the unit ranges from approximately 400m at the base of the slope to over 1000m at the rounded ridge-line summit.

The ground cover varies depending on aspect, altitude, and stock pressure, with the vegetation along the foot slopes being predominately introduced grasses. Over the mid slopes there is a co-dominance of introduced grasses and short tussock, with shrubland in some of the gullies. Above 800m introduced grasses are less dominant, and are replaced with tall tussock, golden spaniard¹, daisies (*Celmisia* sp.), and inaka scrub. Scrub and regenerating broadleaved forest are present in deeper gullies. Inaka shrubland is present around rocky outcrops and along the main ridge at the edge of the unit.

The unit is subdivided into a number of paddocks and small grazing blocks, and is semi-intensively grazed. Well-graded tracks provide good access to the paddocks and to the electricity pylons within this unit. A prominent limestone scarp spanning two kilometres is located on adjoining freehold land across the Tengawai River.

Landscape Values

This unit has moderate inherent landscape values due to the lack of memorable landform features and the modified state of the vegetation. These result in a disjointed landscape character. The imposing transmission lines and towers that traverse the property are a major visual detraction. However, the prominent limestone scarp on adjoining freehold land is an outstanding natural feature.

¹ Scientific names of species are listed in Section 4.1.1

Visual Values

This unit has moderate visual resource values as it is only visible from local roads, notably Limestone Valley Road.

Potential Vulnerability to Change

This unit is moderately vulnerable to change. Threats include:

- Spread of wilding pines.
- Loss of vegetation from the eastern gullies.
- Further loss of subalpine shrubland.
- Quarrying of limestone on adjoining freehold land.
- Planting of inappropriate trees around the edges of the limestone scarp.

Landscape Unit 2

This is the major landscape unit on the property occupying all west-facing upper and mid slopes. The eastern boundary is the central ridgeline where the property adjoins Silver Hill and Chetwynd pastoral leases, and the western boundary is the base of the steep side slopes. The altitude ranges from 500m at the base of the slopes in the south and 600m in the north to just over 1150m on the central ridge crest. Side ridges are typically narrow in their upper and mid sections and more rounded lower down. Gullies separating the ridgelines are crooked due to the numerous intersecting spurs that protrude out from the side slopes.

The drainage pattern is incised with the streams often leaving the gullies by way of a V-shaped gorge. The mid sections of the gullies frequently contain undercut faces that expose the fine loess soils. A feature of the central ridgeline is the change from a narrow rocky crest in the south to a gently sloping plateau in the north.

Native vegetation is more dominant at the northern end of this unit, notably in the large gully descending from high point 1152m. This gully still contains a relatively intact sequence of plant communities, with low-stature snow tussock on upper slopes, short tussock on drier low-altitude slopes, and scrub and regenerating forest lower in the gully. Golden spaniard, mountain flax, ti tree and mountain ribbonwood are also present.

Generally the ground cover becomes more fragmented further south particularly on the lower gentler country which has been converted to pasture. Some gullies still retain native vegetation, notably the large gully descending from high point 1145m. This contains an altitudinal sequence of various native plant communities including scrub and regenerating broadleaved forest, though scrub on lower slopes appears to have been sprayed with herbicide. Vegetation along the crest of the central ridgeline is dominated by inaka scrub, with *Celmisia* daisies, golden spaniard, snow tussock and occasional native broom.

The lower slopes are semi-intensively grazed, while the upper slopes have been subdivided into several large grazing blocks. Wilding pines, including a number of large trees, are present on upper slopes.

Landscape Values

This unit has moderate inherent landscape values due to the lack of any highly recognizable landscape features and the lack of intact vegetative cover. However, along with the other high hills in the district, this unit contributes to the character of the region when juxtaposed against the surrounding downlands.

Visual Values

This unit has only moderate visual resource values due to it being obscured from settlements and the local road network by the adjoining Single Hill Range.

Potential Vulnerability to Change

This unit is moderately vulnerable to change. Threats include:

- Fire and stock damage to the forest and scrub remnants.
- Further fragmentation of the native vegetation on mid and upper slopes.
- Loss of individual ti (cabbage) trees.
- Further spread of wilding pines.
- Further loss of subalpine shrublands.

Landscape Unit 3

This unit comprises the foot slopes and river terraces at the northwest corner of the property. The terraces are intermittently bisected by water-courses flowing from the west-facing slopes within Landscape Unit 2. Duck Stream has cut through the mantle of loess soils within this unit to expose a large limestone deposit. This exposed section of limestone has been shaped into a series of interesting figures by water percolating through the fissures in the rock.

Vegetation is mostly pasture with some areas of native shrubland present on steep faces and in damper gullies. A large shelterbelt of exotic trees has been planted at the crest of the scarp above the limestone formation, and willow trees are present along the river below the formation.

Landscape Values

This unit has low-moderate inherent landscape values due to the low relief of the topography and the extent of conversion into farmland. However, the limestone formation is a significant geological feature with individual segments of the limestone being fashioned into memorable forms. Unfortunately this natural feature has been compromised by the establishment of shelter planting close to the top edge.

Visual Values

This unit has low visual resource values, as it is hidden from all viewing points by the Albury and Single Hill ranges.

Potential Vulnerability to Change

This unit is moderately vulnerable to change. Threats include:

- Damage to riparian areas by cattle grazing and trampling.
- Quarrying of limestone.
- Further inappropriate tree planting around the limestone formation.
- Damage to the limestone by the roots of existing trees.

2.2 LANDFORMS AND GEOLOGY

Two distinct and contrasting landforms are present within Manahune Pastoral Lease: the slopes of the Albury Range; and, the alluvial flats and limestone outcrops of the Tengawai and Duck Stream valleys. The Albury Range comprises moderately-indurated greywacke and argillite of the Torlesse Group rocks; the valley floor comprises limestone, siltstone, greensand and greywacke outwash gravel of Tertiary age (Gair, 1967). A fault-line traverses the lower southwest slopes of the Albury Range, forming the contact between the two different-aged rock types described above.

The loess-covered slopes of the Albury Range are moderately steep with broad faces bisected by small incised streams. The range crest is broad and gently-sloping. The valley floors are gentle and relatively broad. Limestone outcrops at two locations: in upper Duck Stream; and, on freehold land near the homestead in the Tengawai Valley. The Duck Stream limestone has been exposed by down-cutting of Duck Stream through recent gravels and loess to expose a

limestone cliff with a thick layer of greywacke gravel perched above. The Tengawai limestone has been stripped of any overlying gravel and is exposed as a weathered limestone outcrop with a steep scarp on one side and a gentle slope on the other. Both landforms are visually impressive, though the former is compromised by the presence of a large planted shelterbelt, and the latter is compromised by the intensively developed pasture that surrounds it.

Most of Manahune Pastoral Lease is located on the slopes of the Albury Range, rising from less than 400m altitude at the Tengawai River to just over 1150m altitude on the crest of the range. The property is drained by small tributaries of the Tengawai River and Duck Stream. Duck Stream flows into the Tengawai River, and the Tengawai River flows into the Opihi River.

Soils on the property are predominantly Hurunui yellow brown earth on the hill country, and Kakahu and Tengawai soils on the valley floors.

2.3 CLIMATE

Manahune Pastoral Lease has a sub-humid hill country climate with cool to cold winters and mild dry summers. Predominant winds are from the northwest, with occasional strong gales. Cool southerlies are relatively common in winter, and snow can affect all parts of the property and lie on upper slopes for several weeks in winter. Average annual rainfall ranges between 800-1200mm.

2.4 VEGETATION

2.4.1 Original Vegetation

McEwen (1987) described the former (pre-European) vegetation of Hunters Ecological District as extensive tussockland with podocarp and podocarp-hardwood forest. The extent to which tall tussockland, scrub or forest prevailed in this area prior to human settlement largely depends on the extent to which the area was affected by natural fire. If natural fires did affect the area it is likely that they would have been of insufficient frequency or intensity to maintain the property completely free of forest cover.

It appears likely that most low-altitude (below 900m) parts of Manahune Pastoral Lease formerly supported podocarp-hardwood forest, with taller podocarp forest present at lower altitudes. Remnants of this type of forest are present in some of the larger valleys of The Hunters Hills to the south of the property. Mixed hardwood forest may have been present alongside the Tengawai River and Duck Stream, and the limestone formations would have supported a sparse but distinct flora. At higher altitudes, tall tussock and shrubland would have been dominant, with areas of low-stature vegetation at exposed high-altitude sites, and specialised rock flora on outcrops.

2.4.2 Indigenous Plant Communities

Manahune Pastoral Lease contains a limited diversity of plant communities, as altitudinal sequences are rather narrow and landforms are relatively uniform. The vegetation has in many places been heavily modified by burning and grazing, but appears to be recovering through seedling establishment and regeneration.

Over-sown and top-dressed short tussockland and pasture grasses are dominant at lower altitudes, and degraded shrubland is widespread. Most areas of shrubland are likely to have been stimulated by the application of fertiliser, many have been burned, and some sprayed. The most dense and diverse shrublands are found in stream valleys and gullies, with some

developing into second growth forest, particularly in southeast valleys. The presence of regenerating lowland shrubland and forest is unusual on a pastoral lease, as most leases do not extend to such low altitudes.

Tall tussock communities are dominant at upper montane and subalpine sites, though mixed shrubland also extends to these altitudes. Dwarf shrub communities occupy subalpine rock outcrops, and there is a small area of bog pine at the south end of the summit ridge. Wetlands are absent, except for very small flushes and damp areas supporting plants such as bog rush and Maori onion.

The present-day vegetation of Manahune Pastoral Lease is described below for each plant community in the lowland, montane and subalpine zones.

Lowland Zone (below 500m)

Limestone communities

A limestone scarp occurs on the northwest margin of the property, with a second scarp on freehold land southeast of the pastoral lease boundary. Only a reconnaissance assessment of the northwest scarp was made, as the Department of Conservation undertook a separate survey of both areas. Both scarps extend across lowland and montane zones at around 500m altitude.

The northwest scarp supports scattered indigenous shrubland of matagouri, porcupine shrub and mingimingi. Other shrubs include sweet broom, koromiko, *Olearia bullata*, mountain akeake and broadleaf. Scrambling vines are common, including pohuehue, scrub pohuehue and bush lawyer. An unusual find here was the threatened *Muehlenbeckia ephedroides*, as it is normally found on eastern gravel beaches, or terraces of inland braided riverbeds. Hybrids between *Muehlenbeckia ephedroides* and scrub pohuehue were also seen. Introduced grasses, mouse-ear hawkweed and thistles are common. A shelterbelt of pine trees extends along the top of the scarp, and willow and poplar trees are widespread on the riverbed below. The naturalness of the limestone communities is low to low-medium.

Grassland communities

Minor areas of short tussock grassland and exotic grassland are found on the lower northwest and southeast edges of the property. Wherever they occur, they have been heavily developed and their naturalness is low. They are effectively the same as those in the montane zone and are described in that section.

Shrubland (including scrub) communities

Patches of shrubland are associated with lower stream valleys and incised gullies on the lower southeast part of the property. On open slopes, matagouri and *Coprosma* spp. (mostly mingimingi) are scattered among exotic grassland and silver tussock. The threatened shrub daisy, *Olearia bullata*, is prominent on steep toe slopes. On these open slopes naturalness is typically low.

The most extensive shrublands merge with regenerating forest in valleys and gullies. Adjacent slopes support matagouri, *Coprosma* spp., porcupine shrub, manuka, korokio, scattered broadleaf, prickly shield fern, mountain flax and sometimes *Olearia bullata* and gorse. Manuka is particularly extensive in the far southeast corner of the property. In deeper gullies the shrublands are more diverse, additional species including lancewood, *Olearia avicenniifolia*, fuchsia, kowhai, ti tree, sweet broom, koromiko, several scramblers and ferns (especially thousand-leaved fern and prickly shield fern). Elderberry is sometimes present. Depending on their openness and stock access, naturalness varies from low-medium to medium-high.

An interesting patch of mixed grey shrubland is located immediately north of the limestone scarp. It contains matagouri, mingimingi, *Olearia bullata* and *Olearia lineata*. Both shrub

daisies are threatened, the latter found on the property only here and at the north end of the limestone. *Olearia lineata* is seen infrequently in the South Canterbury high country.

Forest communities

Forest is present in the main southeast-facing valley, part of which was formerly proposed for protection with the QEII National Trust. The site lies at an altitude of approximately 500m, though most of the regenerating forest and shrubland is found lower in the valley. The dominant trees and shrubs are red mapou, broadleaf, fuchsia, yellow-wood, lancewood, orihou, and putaputaweta. Wineberry is also present and kowhai was seen nearby. The tallest trees reach 6-7m. Vines or scramblers are common, including pohuehue, shrub pohuehue, bush lawyers and supplejack. Ferns are widespread including hound's tongue fern, prickly shield fern, bracken, *Blechnum montanum* and *Asplenium* spp. Few exotic plants are present, regeneration is widespread and only limited stock access is evident. Naturalness is high.

Montane Zone (500-900m)

Short tussock communities

These are widespread on lower western slopes above the Tengawai River. They have been over-sown and top-dressed and are dominated by exotic grasses. Clovers and mouse-ear hawkweed are widespread and thistles locally abundant. The open slopes are rockier than the southern slopes and support more shrubs of matagouri, mingimingi and porcupine shrub. Other prominent plants include fescue tussock, blue tussock, silver tussock, Maori onion, golden spaniard, scrambling fuchsia, ti tree and occasional broadleaf and kowhai. Localised areas of shrubland have been sprayed and burnt, leaving very modified grasslands. The naturalness of these communities is typically low-medium.

Tall tussock communities

These communities are found on mid-slopes above the short tussocklands. On shady slopes they extend down to around 700m altitude. They too have been modified by widespread burning, grazing and possibly localised spraying. Where narrow-leaved snow-tussock remains in burned areas, it is often co-dominant with golden spaniard, matagouri, mingimingi, bracken and exotic grasses. In that situation shading suppresses exotic grasses, and naturalness is medium.

In tall tussock at an upper montane site (c.875m), dominant plants are narrow-leaved snow-tussock, inaka, mouse-ear hawkweed, browntop and lichens, with lesser amounts of matagouri, golden spaniard, sweet vernal and catsear. Even though this community was rather open, the diversity of indigenous plants was relatively low. Naturalness was low-medium to medium.

Shrubland communities

The most extensive montane shrublands are on southeast slopes, especially above and north of the "QEII area" described above. The upper main valley is an extension of the lowland forest and shrubland, supporting a mosaic of shrubland among silver tussock and exotic grasses. There are extensive patches of *Coprosma* spp., manuka and mountain flax, with scattered kohuhu, putaputaweta, mountain akeake, mountain ribbonwood, lancewood, ti tree, *Olearia bullata*, broadleaf and fuchsia. In the central valley, a semi-closed canopy shrubland has developed. Naturalness varies from medium to medium-high.

On the western slopes small-leaved shrublands are scattered through gullies, with the deeper gullies and valleys containing more diverse shrubland. Shallow gullies support limited shrubland, though mountain ribbonwood is nearly always present. Shrubland composition is similar but less diverse than in the major southeast valley, and the shrublands are smaller and often discontinuous. Naturalness varies from low-medium to medium-high, reflecting past burning and stock grazing.

In typical regenerating shrubland on western slopes (a boulderfield at around 660m altitude) the community is dominated by broadleaf and mingimingi, with lesser amounts of matagouri, *Coprosma* sp. (t) and golden spaniard. Other prominent plants include cotton daisy, mosses, lichens and ferns. Despite past burning, naturalness is high, as few exotic plants are present.

Subalpine Zone (900-1300m)

Shrubland communities

These are largely restricted to rock outcrops, though *Dracophyllum* shrubs are widespread among tall tussock on upper west-facing slopes.

A shrubland at a rock outcrop on the upper western slopes (at c.1000m altitude) contains the threatened dwarf shrub-daisy *Helichrysum plumeum*, with lichens and mosses having an extensive cover on rocks. Other prominent plants are inaka, narrow-leaved snow-tussock and cotton daisy. The uncommon bog pine occurred here too. Very few exotic plants are present and naturalness is high.

A larger bog pine community is found on the summit ridge. The area is almost flat, with an erosion pavement of shattered stones and poor drainage. The bog pines range in size from small seedlings to plants (or composite plants) up to several metres across. Other prominent plants are inaka, narrow-leaved snow-tussock, cotton daisy, mosses, lichens, *Pentachondra pumila*, *Gaultheria crassa*, *Myrsine nummularia*, *Ourisia caespitosa*, *Coprosma cheesemanii* and red woodrush. Naturalness is high.

Tall tussock communities

Narrow-leaved snow-tussock dominates the upper western slopes. At a typical site on a southwest slope (at c.1080m) narrow-leaved snow-tussock is strongly dominant, with mosses (especially *Racomitrium pruinosum*), lichens and snowberry being common. Other prominent plants are fescue tussock, blue tussock and mouse-ear hawkweed. The threatened coral broom was found here, and several more were seen nearby. Naturalness is medium-high to high.

Other snow tussock communities in the vicinity are more open, reflecting aspect differences, past burning and grazing. On the summit ridge, burning and stock grazing have degraded the snow tussock. The tussocks are stunted (though recovering) and browntop is locally dominant. Naturalness here is low-medium to medium, depending on the locality. Some wetland plants occur in damp depressions, including hybrids between snow tussock and red tussock.

Tall tussock communities with a shrub component characterise the upper west-facing slopes below the summit ridge at about 1000m altitude. The dominant plants are narrow-leaved snow-tussock, inaka, lichens and mouse-ear hawkweed, while golden spaniard, cotton daisy, blue tussock and browntop are also prominent. Naturalness is medium to medium-high.

2.4.3 Notable Flora

The following species classified as threatened by Hitchmough (2002) were recorded from the property.

Table 1 Threatened plant species recorded from Manahune Pastoral Lease, December 2002.

Plant Species	Known Distribution on Property
Gradual Decline	
<i>Carmichaelia crassicaule</i>	Albury Range crest, in tall tussockland
Sparse	
<i>Olearia bullata</i>	Scattered in lowland and montane shrubland
<i>Olearia lineata</i>	North of limestone scarp
<i>Muehlenbeckia ephedroides</i>	Associated with limestone scarp
Range Restricted	
<i>Helichrysum plumeum</i>	Albury Range, summit ridge

The presence of a relatively large population of bog pine is also a notable feature.

2.4.4 Problem Plants

Introduced plants that may have a significant effect on indigenous plant communities on the property, and that can be controlled or contained, are listed and discussed below. Other ubiquitous naturalised species for which containment or control are probably impractical, such as mouse-ear hawkweed and pasture grasses, are not discussed here but are listed in the vegetation descriptions.

Crack willow (*Salix fragilis*)

Crack willow and a number of other tree species are present along the Tengawai River and Duck Stream. While these species may spread, their spread is likely to be confined to the valley floor and appears unlikely to have a significant effect on in-stream values.

Gorse (*Ulex europaeus*) and broom (*Cytisus scoparius*)

Patches of gorse are present at some open sites in the southeast-facing gully. These infestations should be contained until forest regeneration over-tops the gorse. Several patches of broom are present in a shallow gully below the summit ridge (Grid Ref. L31: 284-672). These infestations should be removed, as broom poses a significant threat to open or low-stature plant communities on the property, including tall tussockland.

Wilding pines (conifer species)

Wilding pines are scattered but widespread across the western slopes. Removal of large seed trees and control of wilding spread will be required to protect landscape and naturalness values, especially in areas that are no longer grazed.

Male fern (*Dryopteris filix-mas*)

Male fern was observed in a small south-facing gully on the property, and is likely to be present elsewhere. Sustained control of this species is likely to be difficult.

Stonecrop (*Sedum acre*)

Stonecrop is present on the Duck Stream limestone scarp. This aggressive plant is likely to have a significant impact at this site, however sustained control of this species is likely to be difficult.

Elderberry (*Sambucus nigra*)

Elderberry is present in shrubland at several locations. While this species does not pose a significant threat at these sites, the presence of these trees with their bird-dispersed fruit poses a potential threat to a much wider area. Ideally these trees should be removed.

2.5 FAUNA

2.5.1 Birds, Reptiles and Bats

A total of 26 bird species were recorded on Manahune Pastoral Lease: 13 indigenous (six endemic and seven native), and 13 introduced (Tables 2 and 3). Three lizard species (all endemic), one bat species (endemic, nationally endangered) and one introduced frog species were recorded.

The presence of long-tailed bats on the property is especially significant. This species has been recorded at scattered locations throughout South Canterbury but it is relatively uncommon and the long-term survival of the South Canterbury population is uncertain. Indigenous shrubland provides important feeding habitat for bats, and mature trees and limestone outcrops can provide suitable roosting sites.

The main bird, reptile and bat habitats on the property are: the Tengawai River; the southeast-facing slopes of the Albury Range; the limestone scarps; and, the crest of the Albury Range. These habitat areas are described below.

Tengawai River

The Tengawai River was surveyed for birds and bats from 100m upstream from the bridge on the property to approximately two kilometres downstream. The banks on the north side of the river are planted with a belt of poplar and willow trees that extend for approximately one kilometre downstream from the bridge. The riverbed was relatively weed-free in parts, but vehicle tracks were present throughout.

Birds

Australasian harrier, South Island pied oystercatcher, spur-winged plover, southern black-backed gull, pied stilt, white-faced heron, welcome swallow and kingfisher were recorded along the river. Grey warbler, fantail, bellbird (including juveniles) and silveryeye were recorded in the river bank plantings.

Bats

Two long-tailed bat (*Chalinolobus tuberculatus*) passes were recorded: one 50m downstream from the bridge amongst willow and poplar trees; and one 100m upstream from the bridge at a rock outcrop amongst broom, *Olearia* sp., flax, broadleaf and pine trees.

Other species

Introduced whistling frogs (*Litoria ewingii*) were observed in a pond near the Tengawai River.

Southeast-facing slopes and gullies above the Tengawai River

Southeast-facing slopes of the Albury Range along the Tengawai River support areas of native shrubland. The largest area is fenced from stock and contains an extensive and well developed

shrubland with several large broadleaf trees. There is also a reasonably extensive area of manuka-kanuka shrubland on these slopes.

Birds

Grey warbler, silvereye, bellbird, fantail and welcome swallow were recorded in these indigenous shrublands. Numerous introduced species were also present.

Bats

Indigenous shrubland provides important feeding habitat for long-tailed bats (O'Donnell, 2000) and, although bats were not recorded from these shrublands, they are likely to be utilised by the bats recorded nearby along the Tengawai River.

Limestone scarp

The limestone scarp at the north-western corner is approximately two kilometres long. Grazed paddocks and a pine shelterbelt are present at its upper edge, and willow and poplar trees are present along Duck Stream at its lower edge. At its southern extent the limestone outcrops on both sides of the stream.

Birds

South Island pied oystercatcher (one pair and two chicks), paradise shelduck and spur-winged plover were recorded along the stream and in grazed paddocks at the foot of the limestone. A welcome swallow's nest was found beneath an overhang on the limestone scarp.

Bats

Two automatic bat detector units were placed on large limestone boulders between the willow-lined Duck Stream and the limestone scarp, but no bats were recorded. At the southern-most extent of the limestone scarp there are numerous crevices and small holes that may provide suitable bat roosting habitat.

Lizards

Two common geckos (*Hoplodactylus* aff. *maculatus* "Southern Alps") were found under flakes of limestone at two different locations. Three common or McCann's skinks (*Oligosoma nigriplantare polychroma* or *O. maccanni*) were seen in the grasslands at the foot of the limestone: positive identification was not possible, as the lizards were not captured.

Other species

An introduced whistling frog (*Litoria ewingii*) was found under a flake of limestone.

Albury Range crest

Numerous small rock outcrops are present at higher altitudes near the crest of the Albury Range. Native vegetation comprises golden spaniard, inaka, narrow-leaved snow-tussock, *Celmisia* sp., *Pimelia* sp., snowberry and mosses.

Lizards

Conditions were very cold and windy and generally unsuitable for observing skinks. However, seven common geckos (including one striped form) were found in close proximity to each other under rocks. Other lizard species may be present, but weather conditions precluded adequate survey.

Other species

Brown hares were recorded throughout, and chamois (one single adult and one adult with young) were recorded.

Table 2 Indigenous bird species recorded from Manahune Pastoral Lease, December 2002.

Bird species		Known Distribution on Property
Common name	Scientific name	
white-faced heron	<i>Ardea novaehollandiae</i>	Tengawai River
paradise shelduck	<i>Tadorna variegata</i>	throughout
Australasian harrier	<i>Circus approximans</i>	throughout
South Island pied oystercatcher	<i>Haematopus ostralegus finschi</i>	Tengawai River; paddocks near Duck Stream
spur-winged plover	<i>Vanellus miles</i>	throughout
pied stilt	<i>Himantopus himantopus</i>	Tengawai River
black-backed gull	<i>Larus dominicanus</i>	throughout
kingfisher	<i>Halcyon sancta vagans</i>	Tengawai River
welcome swallow	<i>Hirundo tahitica</i>	Tengawai River; limestone scarp
grey warbler	<i>Gerygone igata</i>	throughout
fantail	<i>Rhipidura fuliginosa fuliginosa</i>	indigenous shrubland and river control plantings
silveryeye	<i>Zosterops lateralis</i>	indigenous shrubland and river control plantings
bellbird	<i>Anthornis melanura melanura</i>	indigenous shrubland and river control plantings

Table 3 Introduced bird species recorded from Manahune Pastoral Lease, December 2002.

Bird species	
Common name	Scientific name
mallard	<i>Anas platyrhynchos</i>
Californian quail	<i>Callipepla californica</i>
skylark	<i>Alauda arvensis</i>
dunnock	<i>Prunella modularis</i>
song thrush	<i>Turdus philomelos</i>
blackbird	<i>T. merula</i>
starling	<i>Sturnus vulgaris</i>
house sparrow	<i>Passer domesticus</i>
chaffinch	<i>Fringilla coelebs</i>
redpoll	<i>Carduelis flammea</i>
goldfinch	<i>C. carduelis</i>
yellow hammer	<i>Emberiza cinctrenella</i>
Australian magpie	<i>Gymnorhina tibicen</i>

Table 4 Endemic lizard species recorded from Manahune Pastoral Lease, December 2002.

Lizard species		Known Distribution on Property
Common name	Scientific name	
common gecko	<i>Hoplodactylus</i> aff. <i>maculatus</i>	crest of Albury Range; limestone scarp "Southern Alps"
McCann's skink*	<i>Oligosoma maccanni</i>	limestone scarp
common skink*	<i>Oligosoma nigriplantare</i> <i>polychroma</i>	limestone scarp

*positive identification of these two species was not possible.

2.5.2 Freshwater Fauna

Freshwater fauna communities were surveyed at 11 sites on Manahune Pastoral Lease, along the Tengawai River, Duck Stream and the tributaries associated with these waterways. Seven different fish species, including six native species, one introduced frog and a wide range of aquatic macro-invertebrates including insect larvae, crustaceans, molluscs and worms were observed on the property.

Five different aquatic habitat types are described. These are classified by water source, resistance to drying, and surrounding landform structure. Of these, four are flowing-water habitats and one is a still-water habitat. Native fish were found in most habitat types, except for some of the steeper streams descending from the Albury Range and some of the small streams that are prone to drying-up. Four of the fish species observed are diadromous species. The macro-invertebrate fauna was diverse, especially in the more stable streams.

One of the distinguishing characteristics of the Opihi River and its tributaries such as the Tengawai River is the lack of hydroelectric dams. This has two major effects on the fish communities within the river. The first is that the fish communities are more likely to have diadromous species present (those species with a marine phase in their lifecycle). The second effect is that fish communities are able to migrate between streams, enabling re-colonisation of previously de-watered streams.

Diadromous species previously recorded from Tengawai River in the vicinity of Manahune Pastoral Lease and listed in the New Zealand Freshwater Fish Database are koaro (*Galaxias brevipinnis*), shortfin eel (*Anguilla australis*) and longfin eel (*A. dieffenbachii*). The non-diadromous species recorded are brown trout (*Salmo trutta*) and the native Canterbury galaxias (*Galaxias vulgaris*). Of these, only longfin eels are considered threatened by Hitchmough (2002).

Habitat Types

The five different habitats associated with freshwater communities on Manahune Pastoral Lease are described below.

Braided gravel-bed river

The Tengawai River has a braided gravel bed in the section where it flows past the homestead. The river flow is generally in two main channels, except where it flows through a small gorge. Riparian vegetation comprises willow trees and pasture, with patches of herbaceous vegetation

on the gravel riverbed. The riverbed is fenced from adjoining pasture, but appears to be grazed by stock. A vehicle track traverses the riverbed.

Stable-channel river

The section of Duck Stream that flows through the property has a single channel where it has cut down through the limestone bedrock and flows over a gravel bed. The river channel meanders down a valley between limestone scarps. Willow, pine and poplar trees, and grazed pasture are present on the riverbanks.

Shallow-gradient tributary

Two types of shallow-gradient tributary stream flow into the Tengawai River:

A. "Continuous-flow streams" have substantial high-altitude catchments that provide a year-round surface-water flow down the stream channel. All have pasture in their catchments, and some have patches of scrub and regenerating forest. All streams are accessible to stock, except one small catchment on the lower southeast slopes of the Albury Range.

B. "Intermittent-flow streams" have smaller catchments which are insufficient to provide year-round surface flow, though all contained some areas of permanent water. All have pasture in their catchments, and some have patches of scrub and regenerating forest. All streams are accessible to stock.

Steep-gradient tributary

Two types of steep-gradient streams flow into the Tengawai River and Duck Stream:

A. "Open-gully streams" descend steeply with a continuous riffle and pool sequence, and no waterfalls. Most open-gully streams have matagouri or manuka scrub and pasture; some also support willow or pine trees. All are accessible to stock, except one which is fenced to prevent stock falling over a limestone scarp.

B. "Gorgy-gully streams" descend through a waterfall and pool sequence, with only a few riffles present. These gullies support similar vegetation to open gullies. All gorgy-gully streams are accessible to stock.

Pond

One small pond (c.1.5m deep and c.20m long) was observed on the property. It is located adjacent to the Tengawai River near the lower (eastern) boundary of the property. It is a natural pond, although it appears to have been modified to provide a permanent water-supply for stock. The pond has willow trees and pasture at its margins.

Fish

Five fish species were recorded in the lower braided section of the Tengawai River: koaro, Canterbury galaxias, common bully (*Gobiomorphus cotidianus*), upland bully (*G. breviceps*) and brown trout. This was the only location where introduced fish, (Brown trout), were recorded. Juvenile and larval Canterbury galaxiids were common at this location. Three fish species were recorded in Duck Stream (stable-channel river): Canterbury galaxias, common bully and upland bully. Larval Canterbury galaxiids were also present.

Two fish species were recorded in the stream flowing from the fenced shrubland catchment (shallow-gradient tributary): banded kokopu (*Galaxias fasciatus*) and koaro. However, no fish were recorded above the fenced portion of this stream, presumably because a small (2.5m) steep (70-80°) waterfall prevents or discourages fish movement. Canterbury galaxias were present in all open-gully streams and koaro were recorded from the fenced open-gully stream. Species recorded in the pond were shortfin eel, common bully and golden bell frog (*Litoria raniformis*).

No fish were recorded in the steep-gully streams.

Aquatic macro-invertebrates

The largest macro-invertebrate groups recorded in the braided gravel-bed river (Tengawai River) were the *lillii*- and *myzobranhia-Deleatidium* groups. Also common were *Elmidae* sp. and *Eriopterini* sp. Similar species were recorded in the stable-channel river (Duck Stream) with the addition of *Stenoperla prasina* and *Paralimnophila* sp.

Common species in continuous-flow streams (shallow-gradient tributaries) were *Neozephlebia scita*, *Zelandoperla fenestrata*, *Hydrobiosis charadraea* and the beetle *Hydraenidae* sp. Intermittent-flow streams were not surveyed due to a lack of accessible water, but these are expected to contain similar species to those in the continuous-flow streams with the possible exception of some of the species that require a significant volume of water.

Species recorded in open-gully streams (steep-gradient tributaries) were cased- and uncased-caddisflies (*Hydrobiosella stenocerca*, *Helicopsyche albescens* and *Olinga feredayi*) and snails (*Potamopyrgus* sp.). In contrast, the gorgy-gully streams were less diverse: species recorded were *Hydrobiosella stenocerca*, *Nesameletus* sp. and the mayfly groups (*Deleatidium lillii* and *myzobranhia*).

The pond was not formally surveyed for macro-invertebrates, but snails (*Potamopyrgus* spp.), dragonfly and damselfly larvae (*Odonata* sp.) and some Hemiptera (*Sigara* sp. and *Anisops* sp.) were observed.

2.5.3 Invertebrates

Invertebrates were sampled from five main habitats on Manahune Pastoral Lease: sub-alpine; shrubland; open tussockland; forest; and, aquatic. Invertebrate communities are described below for each of the main habitats sampled.

Subalpine

Windy conditions precluded effective sampling at high-altitude sites, although invertebrate communities are likely to be similar to those sampled on the nearby West Hills Pastoral Lease in 2001 (Morris, 2001). Species observed were cicada (Cicadidae), robber fly (Asilidae), manuka beetle (Scarabaeidae), boulder copper butterfly (*Lycaena boldenarum*), copper butterfly (*Lycaena* spp.) and southern blue butterfly (*Zizina otis oxleyi*). Large populations of ants (Formicidae) were found under stones on the ridgeline.

Shrubland

The largest area of shrubland sampled was that on mid-slopes (700-900m altitude) between three small tributaries of the Tengawai River on west-facing slopes at the centre of the property. A rich array of invertebrates was observed here, including species of: cockroach (Blattidae), beetle (Coleoptera), centipede (Chilopoda), and millipede (Diplopoda) under stones and/or in the leaf litter; and, spiders (Araneae) on the shrubland foliage. Invertebrates observed on rocky outcrops on the ridgeline were species of cockroach, beetle and millipede.

Open tussockland/grassland

Lowland grasshopper/kawhitiwhiti (*Phaulacridium marginale*) and numerous species of the blowfly (Calliphoridae) were observed in tussockland or grassland communities. The extent to which grasslands are modified at lower altitudes favours common invertebrate species, so these communities generally lacked diversity.

Forest

A small area of regenerating broadleaved forest in a tributary of the Tengawai River on the southeast slopes of the Albury Range near the southern pastoral lease boundary was briefly inspected. This area is fenced to exclude stock and has excellent ground cover condition, providing deep leaf litter for ground-dwelling invertebrates. Invertebrates observed in the leaf litter were species of cockroach, beetle, springtail (Arthropleona), weta (Anostomatidae), centipede and millipede; in decaying wood were species of weevil (Curculionidae), stag beetle (Lucanidae), scarab beetle (Scarabaeidae) and click beetle (Elateridae); and, on the forest edge were species of robber fly, blowfly, ichneumon wasp (Ichneumonidae), spider wasp (Pompilidae), and butterfly (Lycaenidae), Muscidae and Tachinidae. The diversity of native species observed indicates a good functional invertebrate community.

This forest remnant is within the distribution range of the metallic green ground-beetle (*Megadromus antarcticus* ssp.1): a species that was previously recorded from the Albury limestone country but is now presumed extinct (Peter Johns, *pers. comm.*).

Aquatic

The stream flowing through the forest remnant described above is in excellent condition and has a variety of habitats (waterfalls, runs and pools) and substrates (medium/large stones and fine/coarse gravel). Species of all the aquatic insect orders were observed in these habitats: damselflies and dragonflies (Odonata) were present in the large slow-flowing ponds; stoneflies (Plecoptera) were present in the fast-flowing water with a gravel substrate; caddisflies (Trichoptera), mayflies (Ephemeroptera) and dobsonflies (Megaloptera) were present in slow-flowing water with gravel substrate.

A rare caddisfly (*Olinga fumosa*) has been recorded from the Albury Range on the nearby of West Hills Pastoral Lease (Morris, 2001). This species is likely to also be present on Manahune Pastoral Lease. It has only been recorded from five sites in New Zealand, between Dunedin and the Albury Range.

2.5.4 Notable Fauna

The following species classified as threatened by Hitchmough (2002) were observed on the property.

Table 5 Threatened fauna recorded from Manahune Pastoral Lease, December 2002.

Animal Species		Known Distribution on Property
Common name	Scientific name	
Nationally Endangered		
long-tailed bat	<i>Chalinolobus tuberculatus</i>	Tengawai River near bridge
Gradual Decline		
longfin eel	<i>Anguilla dieffenbachii</i>	Tengawai River

2.5.5 Problem Animals

Introduced animals that may have a significant effect on indigenous plant communities on the property, and for which control or containment is practical, are discussed below. Other ubiquitous naturalised species are not listed.

Rabbit, hare, possum, fallow deer and chamois were observed on Manahune Pastoral Lease. Red deer, wallaby and pig are also likely to be present. Of these species, rabbits and wallaby probably pose the greatest threat: the former in drier low-altitude habitats such as the river flats and limestone scarps; and the latter in higher-altitude tussocklands. Control of rabbits, wallabies and pigs (if present) may be required to protect the natural values of areas set aside as public conservation land.

2.6 HISTORIC RESOURCES

Manahune was originally part of the Albury Run and this land was thought to have been taken out in 1874. There are Māori rock art sites in limestone areas nearby.

2.7 PUBLIC RECREATION

2.7.1 Physical Characteristics

The lease includes two contrasting landforms – the slopes of the Albury Range and the alluvial flats of Tengawai River and Duck Stream valleys. The Albury Range slopes are moderately steep with broad faces bisected by small incised streams. The range crest is broad and gently sloping. The valley floors are gentle and relatively broad.

2.7.2 Legal Access

Legal access to the property occurs from Waratah Road, a gravel road that follows the Tengawai River to the south of the lease. Unformed legal roads give access from Waratah Road to the lease from the junction of the Tengawai River and Trap Stream and near the road leading into the homestead (this road into the homestead is not a legal road). There are also legal roads following both sides of the Tengawai River upstream from the homestead to Duck Stream and on the true left of the river downstream of the homestead.

A legal road follows the main ridgeline through the southern part of the lease and along the boundary in the northern part of the lease. There is an offshoot of this legal road line that drops down the northern boundary of the lease into Duck Stream.

2.7.3 Activities

Some use of the property is made by trampers and 4wds wishing to traverse the Albury Range. A limited amount of hunting is also carried out on the property.

PART 3 OTHER RELEVANT MATTERS AND PLANS

3.1 CONSULTATION

Early-warning consultation meetings were held in Timaru on the 10th September 2002 and in Christchurch on the 11th December 2002. Representatives of the following organisations were present at these meetings: NZ Four Wheel Drive Association, Canterbury Four Wheel Drive Association, Canterbury University Tramping Club, Canterbury Botanical Society, Peninsula Tramping Club, NZ Deerstalkers Association, Federated Farmers High Country Committee, Public Access NZ, South Canterbury Tramping Club, Temuka Tramping Club and Federated Mountain Clubs of NZ.

Issues raised at the meetings include:

- That rare and endangered plants are present on this property, probably on the freehold part.
- That there is rock art in the area.
- That there is bush in some of the gullies.
- The name of the property means “very powerful area” (mountain).
- That there is a legal road along the ridge and an access track that has been put in with rate-payers money. This would make a great route for mountain biking or walking from Manahune through to Burkes Pass. Ideally it would be an easement for non-motorised traffic.

3.2 DISTRICT PLANS

Manahune Pastoral Lease lies within the Mackenzie District. The Proposed Mackenzie District Plan, as amended by Council decisions, was notified in September 1999. Under this plan the property is zoned Rural. There are no Sites of Natural Significance identified on the property. The Proposed Mackenzie District Plan contains a number of rules relating to land use activities within sites of natural significance, within riparian areas and in high altitude areas (i.e. areas above 900m):

- No clearance of indigenous vegetation (in the case of riparian areas, no vegetation) to exceed 100m² per hectare in any continuous period of 5 years, except for declared weed pests or for the purpose of track maintenance or habitat enhancement.
- No earthworks to exceed 20m³ (volume) or 50m² (area) per hectare in any continuous period of 5 years, except for the purpose of track maintenance (applies to earthworks in Sites of Natural Significance, riparian areas and over 900m).
- No pastoral intensification to exceed 5% of any Site of Natural Significance, except where that activity is provided for under a consent under the Crown Pastoral Land Act, or other management plan or covenant ratified by the District Council.
- No tree planting in Sites of Natural Significance or above 900m, but forestry up to a maximum of 2 hectares per Certificate of Title is a controlled activity within a wetland and riparian areas.

3.3 CONSERVATION MANAGEMENT STRATEGY

Manahune Pastoral Lease lies within the Pareora Unit of the Canterbury Conservation Management Strategy (CMS). The key priorities for this unit are listed as:

- To identify the significant indigenous vegetation and threatened plant and animal species of the Pareora Unit.

- To use a range of effective methods to protect the indigenous biodiversity of the Pareora Unit.
- To protect and enhance the viability of priority threatened species populations and their habitats in the Pareora Unit.
- To co-operate with and assist rūnanga and the New Zealand Historic Places Trust in protecting rock art sites.
- To survey, monitor and control wallabies on land managed by the Department to levels that minimise their adverse effects on indigenous vegetation.

PART 4 ATTACHMENTS

4.1 ADDITIONAL INFORMATION

4.1.1 Scientific Names of Plant Species Cited in the Text

Common name..... Scientific name

(* = naturalised species)

blue tussock	<i>Poa colensoi</i>
bog pine	<i>Halocarpus bidwillii</i>
bog-rush	<i>Schoenus pauciflorus</i>
bracken.....	<i>Pteridium esculentum</i>
broadleaf.....	<i>Griselinia littoralis</i>
broom*	<i>Cytisus scoparius</i>
browntop*	<i>Agrostis tenuis</i>
bush lawyer.....	<i>Rubus schmidelioides</i>
catsear*	<i>Hypochoeris radicata</i>
clovers*	<i>Trifolium</i> spp.
coral broom.....	<i>Carmichaelia crassicaule</i>
cotton daisy.....	<i>Celmisia spectabilis</i>
crack willow*	<i>Salix fragilis</i>
elderberry*	<i>Sambucus nigra</i>
fescue tussock	<i>Festuca</i> sp.
fuchsia.....	<i>Fuchsia excorticata</i>
golden spaniard.....	<i>Aciphylla aurea</i>
gorse*	<i>Ulex europaeus</i>
hound's tongue fern.....	<i>Microsorium pustulatum</i>
inaka.....	<i>Dracophyllum uniflorum</i>
kanuka.....	<i>Kunzea ericoides</i>
kohuhu	<i>Pittosporum tenuifolium</i>
korokio.....	<i>Corokia cotoneaster</i>
koromiko.....	<i>Hebe salicifolia</i>
kowhai	<i>Sophora microphylla</i>
lancewood.....	<i>Pseudopanax crassifolius</i>
male fern*	<i>Dryopteris filix-mas</i>
manuka.....	<i>Leptospermum scoparium</i>
Maori onion	<i>Bulbinella angustifolia</i>
matagouri.....	<i>Discaria toumatou</i>
mingimingi.....	<i>Coprosma propinqua</i>
mountain akeake	<i>Olearia aviceniifolia</i>
mountain flax	<i>Phormium cookianum</i>
mountain ribbonwood.....	<i>Hoheria lyallii</i>
mouse-ear hawkweed*.....	<i>Hieracium pilosella</i>
narrow-leaved snow-tussock	<i>Chionochloa rigida</i>
native broom	<i>Carmichaelia</i> sp.
orihou.....	<i>Pseudopanax colensoi</i>
pohuehue.....	<i>Muehlenbeckia australis</i>

porcupine shrub	<i>Melicytus alpinus</i>
prickly shield fern.....	<i>Polystichum vestitum</i>
putaputaweta.....	<i>Carpodetus serratus</i>
red mapou	<i>Myrsine australis</i>
red tussock	<i>Chionochloa rubra</i>
red woodrush	<i>Luzula rufa</i>
scrambling fuchsia.....	<i>Fuchsia perscandens</i>
scrub pohuehue.....	<i>Muehlenbeckia complexa</i>
short tussock	<i>Festuca</i> sp.
silver tussock	<i>Poa cita</i>
snowberry	<i>Gaultheria depressa</i> var. <i>novae-zelandiae</i>
snow tussock.....	<i>Chionochloa</i> spp.
stonecrop*.....	<i>Sedum acre</i>
supplejack.....	<i>Ripogonum scandens</i>
sweet broom.....	<i>Carmichaelia angustata</i>
sweet vernal*	<i>Anthoxanthum odoratum</i>
thousand-leaved fern.....	<i>Hypolepis millefolium</i>
ti tree	<i>Cordyline australis</i>
willow	<i>Salix</i> sp.
wineberry	<i>Aristotelia serrata</i>
yellow-wood.....	<i>Coprosma linariifolia</i>

4.1.2 References Cited

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O'Donnell, C.F.J. 2000. Distribution, status and conservation of long-tailed bat (*Chalinolobus tuberculatus*) communities in Canterbury, New Zealand. *Unpublished Report U00/38.* Environment Canterbury, Christchurch.

4.2 ILLUSTRATIVE MAPS

4.2.1 Topo/Cadastral

4.2.2 Values