Toitu te whenua
Land Information
New Zealand

# Crown Pastoral Land Tenure Review

## Lease name : MIDDLE HILL

## Lease number : PM 022

## 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.

August 05

# MIDDLE HILL PASTORAL LEASE

## CONSERVATION RESOURCES REPORT

**Department of Conservation**

**June 2005**

# CONTENTS

# PART 1 INTRODUCTION

This report describes the significant inherent values present on Middle Hill Pastoral Lease. Middle Hill Pastoral Lease covers an area of approximately 3217 ha on the eastern flank of the Seaward Kaikoura Range, southwest of the lower Clarence River in South Marlborough. The property is bounded by Miller Stream to the north, the lower Clarence River to the northeast, the main northern ridge of Batty to the east, the mid slopes of the Seaward Kaikoura Range to the west and a straight-line boundary to the south. It lies between an altitude of less than 100 m on the river terraces in the Clarence Valley and more than 1300 m on the eastern slopes of the Seaward Kaikoura Range.

Middle Hill Pastoral Lease adjoins George Conservation Area on the Seaward Kaikoura Range west of the property and an area of public conservation land on the slopes of Batty south of the property. The property adjoins riverbeds with marginal strips or legal roads alongside them or privately-owned land on other boundaries (see attached map).

Middle Hill Pastoral Lease lies on the boundaries of four ecological districts (McEwen, 1987). The northeast part of the property lies in the Kekerengu Ecological District (ED), within the Kaikoura Ecological Region (ER); the southeast part in Aniseed ED (Kaikoura ER); the northwest part in George ED (Inland Marlborough ER); and, the southwest part in Manakau ED (Clarence ER). The Kaikoura ER (including the Kekerengu and Aniseed EDs) was surveyed as part of the Protected Natural Areas Programme (PNAP) between 1985 and 1986 (Breese *et al*, 1986). One area on Middle Hill Pastoral Lease was recommended for protection as a result of that survey: RAP 4 Wharekiri Stream (see botanical values map).

**This report has been compiled from the following field survey reports:**

- Middle Hill Pastoral Lease landscape Assessment, Alan Petrie, November 2004, 8p + photographs + map.
- Plant Communities of Middle Hill Pastoral Lease with Recommendations for Protection, Mike Harding, December 2004, 22p + photographs + maps.
- Assessment of the Fauna Values of Middle Hill Pastoral Lease, Jane Sedgeley, December 2004, 15p + photographs + maps.
- Middle Hill Pastoral Lease, A Report on the Aquatic Fauna Survey, Scott Bowie, December 2004, 13p + map.
- Middle Hill Tenure Review, Invertebrates, Ian Millar, January 2005, 9p.

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

## 2.1 LANDSCAPE

### 2.1.1 Landscape Context

Middle Hill Pastoral Lease is located within the band of rolling foothills and high hills that extend east from the Seaward Kaikoura Range just south of the lower Clarence River. The Seaward Kaikoura Range west of the property can be described as a tectonic landscape due to relatively rapid uplift and the prominence of natural weathering processes. This dramatic coastal mountain range stretches from the Clarence River in the north to the Conway River in the south. Middle Hill Pastoral Lease spans a wide altitudinal range, from 100 m on the alluvial terraces of the Clarence River to 1300 m on the lower slopes of the Seaward Kaikoura Range. The summits of Middle Hill (902 m) and Devils Lookout (886 m) dominate the centre of the property.

The main structural components of Middle Hill Pastoral Lease are the front alluvial terraces and the two major valley-ridge systems that stem out from the slopes of the Seaward Kaikoura Range. The front and middle sections of the property are highly visible from State Highway 1, especially for people traveling south across the Clarence River Bridge.

### 2.1.2 Landscape Description

For the purposes of this landscape assessment Middle Hill Pastoral Lease is divided into four landscape units, principally reflecting different water catchments (see attached map). The criteria used to assess and evaluate the landscape values of each unit are based on the following attributes:

1. Naturalness: an expression of the indigenous content of the vegetative cover and the extent of human intervention.
2. Legibility: an expression of the clarity of the formative processes and how striking these processes are.
3. Aesthetic value: the memorability and naturalness of the area, including factors which can make a landscape vivid, such as simplicity in landform, muted colours and fine-textured ground cover.

Finally, visual values, which are a sub-set of landscape values and relate to the visibility of a particular landscape or natural feature as seen from key viewing points, are also assessed.

**Landscape Unit 1**

This landscape unit incorporates the low front country overlooking the Clarence River. The unit is triangular in shape, bounded to the north, east and south by the property boundaries and to the west by the main ridge that forms the boundary of the Wharekiri Stream catchment. A small basin is formed by the limestone outcrops on the terrace. The spur adjoining the southeast corner of the property is the site of a limestone quarry. Bordering the alluvial terraces are the steep slopes of adjoining ridges.

The alluvial terraces have been developed into pasture and are intensively farmed. The surrounding slopes support kanuka scrub or rough pasture with a scattering of kanuka and tauhinu, and are semi-extensively farmed. The limestone hillocks are covered in shrubland, pasture and rockland. The front paddocks are sheltered by plantings of both coniferous and deciduous trees. The unit contains the homestead and farm buildings.

Landscape Values
This unit has moderate inherent landscape values providing an overall impression of a transitional area between natural and cultural landscapes. In aesthetic terms, the unit is memorable due to the striking contrasts in colour and texture between the kanuka scrub and improved pasture.

Visual Values
The limestone outcrops within this unit have high visual resource values. They are a prominent natural feature when viewed from State Highway 1 at the Clarence River Bridge and form the foreground of the suite of landforms that step up towards the Seaward Kaikoura Range.

Potential Vulnerability to Change
Land uses and activities that have the potential to affect this unit include:
- Loss of kanuka scrub on the darker faces
- Quarrying of the limestone outcrops.

## Landscape Unit 2

This landscape unit includes the part of the Wharekiri Stream catchment within the property boundary. It adjoins an area of public conservation land on the peak, Batty, to the south, and is enclosed by the narrow-crested ridges above Wharekiri Stream to the northwest and southeast. The ridges contain distinctive conical high points, the most notable being Middle Hill. The valley sides are moderately steep to nearly precipitous, with rock outcrops jutting from the steeper faces. Slopes are deeply dissected with incised runnels draining directly into Wharekiri Stream. The stream winds around a series of interlocking rocky spurs and frequently flows over a wide bed of alluvium. The dominant vegetative cover is kanuka scrub, hardwood forest, rockland and rough pasture.

Landscape Values
This unit has significant landscape values owing to its deep canyon-like valley. The special features that make a contribution to the overall landscape character of this unit include the steep slopes, entrenched stream channel and the cragginess of the surrounding rock outcrops. These features complement the overall sense of naturalness of the vegetation. These attributes combine to form a natural landscape that has significant wild and scenic values.

Visual Values
Parts of this unit have significant visual resource values. They form the middle ground of the Seaward Kaikoura Range when viewed from the Clarence River Bridge and its approaches. From this public viewpoint the views inland are dramatic, with the rolling foothills and high hills stepping up rapidly towards the rangelands.

Potential Vulnerability to Change
Land uses and activities that have the potential to affect this unit include:
- Further subdivision fencing and intensification of land use that would fragment the kanuka scrub.

- Decline in plant diversity owing to selective grazing of stock.
- Introduction of mono cultural land uses such as plantation forestry.
- Creation of open straight swathes through the kanuka scrub.
- Construction of inappropriate structures on prominent high points and natural features.

## Landscape Unit 3

This landscape unit encompasses nearly all that part of the Miller Stream catchment within the property boundary. The unit is bounded by public conservation land rising to the summit of the Seaward Kaikoura Range to the west, a tributary of Miller Steam to the north and the catchment boundary of Miller Stream to the south and east. The unit is characterized by the wide bed of Miller Stream, low rounded summits and concave gullies. This undulating topography extends to the base of the Seaward Kaikoura Range where it changes to long steep slopes clad in stable scree. Between Devils Lookout and Middle Hill the valley tapers with the side slopes becoming steeper and more open. The dominant cover is scree and tussockland at higher altitudes, beech-podocarp forest west of Devils Lookout, and kanuka scrub, rockland and small areas of rough pasture to the east.

Landscape Values

This unit has significant inherent landscape values due to the assemblage of landforms and mosaic of vegetation types. The entire unit conveys a sense of naturalness with both climax vegetation (beech-podocarp forest) and successional vegetation (kanuka scrub) dominant. Areas that have been modified by previous burning and grazing are minor in the context of the overall unit. The unit forms part of an uninterrupted sequence of native plant communities extending from the summit of the Seaward Kaikoura Range to near sea level.

Visual Values

This unit has only moderate visual resource values, as it is obscured from the main public viewpoints by intervening high points such as Middle Hill.

Potential Vulnerability to Change

Land uses and activities that have the potential to affect this unit include:

- Subdivision fencing and intensification of land use that would fragment the existing vegetation pattern.
- Decline in plant diversity owing to selective grazing by stock.
- Creation of swathes through the kanuka scrub for either fencing or stock access.

## Landscape Unit 4

This landscape unit incorporates the rounded ridgeline that forms the watershed between Miller and Wharekiri streams. The southern boundary of the unit is the property boundary and the northern boundary is the open saddle utilized as an airstrip. The topography is generally convex in character and features rocky outcrops that jut out from the upper and mid slopes. The vegetation comprises a mixture of pasture, short native grassland, remnants of *Carex* wetland and kanuka shrubland and scrub. The kanuka becomes more prolific on the shadier faces.

Landscape Values

This unit has only moderate inherent landscape values due to the fragmented nature of the vegetation and the dominant effects of farming.

Visual Values
This unit has only moderate visual resource value, as it is obscured from most public viewpoints by high hills.

Potential Vulnerability to Change
Land uses and activities that have the potential to affect this unit include:

- Further modification to the more intact areas of kanuka shrubland and scrub.

**SUMMARY**

A large proportion of Middle Hill Pastoral Lease makes a significant contribution towards the inherent landscape character of northeastern South Island high country. Within a wider context this property has strong connectivity with both the Seaward Kaikoura Range and the Clarence River Valley. A large part of the Wharekiri Stream catchment (Landscape Unit 2) and the entire Miller Stream catchment (Landscape Unit 3) are significant to the overall inherent landscape character of the Kaikoura district. A significant feature of the lower country is the limestone outcrops that project from the alluvial terraces.

## 2.2 LANDFORMS AND GEOLOGY

Middle Hill Pastoral Lease extends across very steep to moderately-steep hill country rising from less than 100 m altitude at the terraces and flats near the Clarence River to over 1300 m altitude on the eastern slopes of the Seaward Kaikoura Range. The property is drained by Miller Stream in the north and west and Wharekiri Stream in the south and east. The area is characterised by relatively high rates of natural erosion, evident by the wide debris-filled beds of Miller and Wharekiri streams. The head of Wharekiri Stream lies well west of the property and the stream traverses broader valleys before becoming more enclosed within the property. Its mid-section on the property is a deeply incised gorge with high rock bluffs on both sides. Many smaller streams entering Wharekiri Stream within the property, do so via waterfalls, especially within the more heavily gorged section, suggesting recent and possibly ongoing incision. Miller Stream has a wide gravely bed enclosed by steep slopes and small bluffs for much of its length through the property.

Other notable landforms on the property include a series of three small, very steep limestone hills near the homestead. The largest and southernmost of these three outcrops forms a classic hogback ridge, where the angle of the backslope formed down the steeply dipping strata roughly matches the angle of the escarpment on the other side.

The property lies across several geologies, often separated by faults (Lensen, 1962). The principal geologies are sediments (greywackes, conglomerates, siltstones and sandstones) deposited during uplift of the New Zealand Geosyncline from Jurassic through to early Upper Cretaceous time. There are also sandy mudstones and sandstones of Upper Cretaceous age deposited during subsequent slow submergence of the earlier strata. The limestone hills are composed of Amuri Limestone of Paleocene age.

Of the sediments associated with the New Zealand Geosyncline, two elongate slices of the youngest rocks, consisting of sandstones, siltstones and conglomerates of the Motuan stage (approximately mid-Cretaceous), are notable in being associated with some of the steepest rock outcrops on the property: the deep, narrow gorge in the middle section of Wharekiri Stream and the steep southeast faces of Middle Hill.

The Seaward Kaikoura Range is a region of active uplift, associated with major northeast-trending fault-lines. The major fault crossing the property is the Kekerengu Fault, lying

across the upper tributaries of Miller Stream in the northwest of the property. Smaller faults occur in the centre of the property and others bound the limestone outcrops.

## 2.3 CLIMATE

Middle Hill Pastoral Lease lies in an area characterized by very warm summer temperatures and frequent strong northwest winds, and moderate winter temperatures with occasional cool southerly winds. Annual rainfall is between 1000 and 1500 mm, with maximum precipitation during winter (Tomlinson, 1976). Snow lies for short periods on higher altitude parts of the property during winter months. The property lies in an area that has moderate solar radiation, high vapour pressure deficits and low annual water deficits (Leathwick *et al*, 2003).

## 2.4 VEGETATION

### 2.4.1 Ecological Context

The original vegetation of the upland and hilly parts of the Middle Hill area was probably a diverse mix of black beech-mountain beech forest, beech-podocarp forest and podocarp-hardwood forest. At lower altitudes, relatively extensive areas of podocarp forest, podocarp-hardwood forest and lowland/coastal hardwood forest were present. Recently disturbed sites such as river beds and terraces would have supported kanuka forest or woodland, or open stonefield and herbfield communities. Steeper rocky country would have supported a sparse rockland plant community similar to that which is present today.

In their analysis of the Level II Land Environments on the property Leathwick *et al* (2003) propose that Land Environment E1, covering almost 90% of the property, originally supported beech forest and podocarp-hardwood forest. Land Environment B8, covering lower slopes and terraces (c. 4% of the property), is described as supporting podocarp-hardwood forest. Land Environment J3, covering the main terraces at the eastern edge of the property beside the Clarence River (c. 4% of the property), is described as supporting kanuka-dominated woodland or hardwood forest. Land Environment P1, on the slopes of the Seaward Kaikoura Range at the western edge of the property (c. 2% of the property), is described as originally supporting mountain beech forest (Leathwick *et al*, 2003). The extent to which woody vegetation prevailed in the area prior to human settlement would have been influenced by natural erosion events and possibly the occurrence of natural fires.

Analysis of the extent to which the Land Environments of the property are represented within existing protected natural areas indicates that approximately 19% of Land Environment E1, 2.4% of Land Environment B8, 2% of Land Environment J3 and 49% of Land Environment P1 are protected (Department of Conservation, *unpublished data*, 2004). However these data should be interpreted with caution, as the predicted extent and suggested vegetation types for each Land Environment have been extrapolated from limited field data.

## 2.4.2 Plant Communities

A large part of Middle Hill Pastoral Lease is covered in indigenous woody vegetation. Western parts of the property, west of Devils Lookout, support beech or beech-podocarp forest that is largely representative of the original vegetation of the area. Further east kanuka scrub and low kanuka forest are the most widespread woody plant communities, though relatively extensive remnants of beech, beech-podocarp, podocarp-hardwood and hardwood forest are present, especially in the Wharekiri Valley. Drier north-facing slopes in the Wharekiri Valley and lower Miller Valley support kanuka scrub or shrubland. Areas of mixed hardwood forest are present on lower slopes in the east, and remnants of tall kanuka forest or woodland present on lowland alluvial terraces.

Specialised dry-rock plant communities, typical of South Marlborough, are present on steeper rocky slopes and bluffs in the main valleys and on the limestone outcrops in the northeast part of the property.

Areas of open grassland or pasture on the property are confined to the flat or gently-sloping country around the homestead in the northeast part of the property, small areas on the main ridge to Batty on the eastern boundary of the property, east-facing slopes in the lower Wharekiri Valley, gentler country on the main ridge between Miller and Wharekiri streams south of Middle Hill and on the ridge at the southern boundary of the property.

On the hilly parts of the property, only small areas appear to be intensively grazed. Other areas, where woody vegetation has been recently removed, are being rapidly colonised by kanuka and to a lesser extent tauhinu. Older stands of kanuka, particular those in gullies and on damper slopes, support seedlings and saplings of a wide range of the original canopy and subcanopy species including mountain totara, broadleaf, marbleleaf, lancewood, mahoe, horopito, mapou and occasionally black beech or mountain beech. These naturally regenerating stands of indigenous vegetation are a prominent feature of the property. They contain components of the original vegetation and, as the regeneration advances, achieve higher representativeness and naturalness values. However, regeneration of palatable species is being severely hindered by what appear to be very high populations of introduced mammals, particularly feral goats and red deer.

Indigenous plant communities are described below for each of the main parts of Middle Hill Pastoral Lease (see attached map for numbered areas).

**Area 1, Devils Lookout-Upper Miller Stream**

This area covers the northwest part of the property in the upper catchment of Miller Stream. It includes the prominent Devils Lookout and the eastern side of the main branch of Miller Stream. The hill country in this area is moderately steep, grading to steeper slopes on the slopes of Middle Hill and on the flanks of the Seaward Kaikoura Range. Steeper slopes support sparse kanuka shrubland and bare rock in the east, and shrubland, grassland and bare rock in the west. Hill country on slopes west of Devils Lookout supports tall beech or beech-podocarp forest. Slopes east of Devils Lookout and slopes on the eastern side of Miller Stream support kanuka scrub or low forest.

Areas of beech forest are dominated by tall black beech with a range of understorey trees including mountain totara, matai, broadleaf, marbleleaf, lancewood, yellowwood, lemonwood and pokaka. Other common understorey species include horopito, *Coprosma rhamnoides*, *Coprosma microcarpa*, bush lawyer, *Clematis paniculata*, *Asplenium flaccidum*, *Lycopodium varium*, prickly shield fern and crown fern. Additional species present at damper sites include miro, wineberry, weeping matipo, bush rice grass, and the

ferns Prince of Wales feather, *Blechnum fluviatile* and *Blechnum penna-marina*. Additional species present on drier slopes include kowhai, totara, mingimingi, *Cyathodes fasciculata*, *Helichrysum lanceolatum*, kohuhu, akiraho, korokio, *Pyrrosia eleagnifolia* and hound's tongue fern. The threatened (gradual decline) beech mistletoe, *Peraxilla tetrapetala*, was recorded at one location near the southwest corner of the property.

Beech-podocarp forest supports tall matai, totara and black beech trees with an understorey of miro, lemonwood, pokaka, marbleleaf, yellowwood, *Coprosma rhamnoides* and *Coprosma microcarpa*. Beech-podocarp forest is relatively extensive in gullies and on damper slopes west of Devils Lookout.

Kanuka scrub and low forest in the area is dominated by kanuka with *Coprosma rhamnoides*, *Helichrysum lanceolatum*, *Coprosma crassifolia*, *Coprosma propinqua*, mingimingi and scrub pohuehue. Older stands of kanuka support a more diverse range of understorey and emergent species including lancewood, marbleleaf, broadleaf, mahoe, kowhai, horopito, akiraho, cabbage tree and common broom.

The open riverbeds of the two main tributaries of upper Miller Stream lie mostly outside the property. Stable sites are dominated by *Raoulia australis*, *Helichrysum bellidioides*, creeping pohuehue, silver tussock and colonising manuka or kanuka. Other common species present include *Raoulia tenuicaulis*, catsear, mouse-ear hawkweed, king devil hawkweed, white clover, tauhinu, common broom, toetoe, mouse-ear chickweed and occasionally *Gingidia montana*, *Helichrysum depressum*, buddleia and *Olearia odorata*.

Riverside banks and bluffs support a diverse range of species including mahoe, kowhai, prostrate kowhai, *Brachyglottis monroi*, akiraho, *Olearia coriacea*, mapou, kanuka, yellowwood, marbleleaf, broadleaf, fivefinger, toetoe, cabbage tree, mountain flax, *Helichrysum lanceolatum*, common broom, pink broom, *Hebe traversii*, porcupine shrub, Marlborough rock daisy, *Heliohebe hulkeana*, *Clematis afoliata*, leafless lawyer, *Helichrysum parvifolium* and *Vittadinia australis*. Ngaio, titoki, totara, wineberry, tree tutu and narrow-leaved lacebark are present at lower altitudes.

A scattered population of the threatened (gradual decline) weeping broom (*Carmichaelia stevensonii*) is present in the bed of the northern branch of Miller Stream, northwest of Devils Lookout. This population has been monitored in the past, but was not re-checked during this survey.

Species recorded on higher altitude rock and scree at the head of Miller Stream include *Myosotis traversii*, *Hebe epacridea*, *Wahlenbergia cartilaginea*, *Epilobium pycnostachyum*, *Epilobium forbesii*, *Stellaria roughii*, *Oxalis exilis* and *Lignocarpa carnosula*. A small wetland is present at the end of the four-wheel-drive track. It is dominated by *Carex secta* and raupo.

Areas of grassland and open scrub are present on the main ridge along the southern property boundary, where woody vegetation appears to have been removed by relatively recent burning. Taller woody vegetation, including beech forest, is present in the main gullies and on the lower slopes in this area.

Species previously recorded in this area include *Heliohebe acuta*, *Heliohebe raoulii*, *Helichrysum intermedium* and the mistletoe *Tupeia antarctica*.

**Area 2, Middle Hill**

This area covers the gentler hill country between Miller and Wharekiri streams, in the vicinity of the hut and airstrip. It includes the southern slopes of Middle Hill and the northern slopes of the main ridge on the southern boundary of the property. Slopes are gentler than on most other parts of the property and the area appears to have been more recently and/or more regularly cleared of woody vegetation. It is traversed by the main four-wheel-drive track. The area supports open grassland, scattered low kanuka and tauhinu shrubland, denser taller kanuka scrub, small remnants of beech forest and several small wetlands.

Areas of grassland are dominated by introduced pasture grasses with occasional plants of kanuka, tauhinu and silver tussock. Other species present are Maori onion, *Helichrysum bellidioides*, *Helichrysum lanceolatum*, manuka, matagouri, *Coprosma propinqua*, *Coprosma parviflora* (sp.'t'), porcupine shrub, mountain flax, prickly shield fern and bristle tussock. Prostrate kowhai is present at some rocky sites. Most areas of grassland are being rapidly colonised by kanuka.

Kanuka scrub in this area has a sparse understorey of *Coprosma rhamnoides*, *Coprosma crassifolia*, *Coprosma propinqua*, *Coprosma rigida, Helichrysum lanceolatum*, mingimingi, prickly shield fern, necklace fern and seedlings of broadleaf, marbleleaf, lancewood and mountain totara. Additional species in older stands of taller kanuka are cabbage tree, kohuhu, mountain ribbonwood, narrow-leaved lacebark, kowhai, common broom, bush lawyer, *Clematis* sp., akiraho, horopito, mapou, *Hebe salicifolia*, *Cyathodes fasciculata*, *Blechnum procerum*, *Asplenium richardii* and *Asplenium appendiculatum*.

Several small wetlands are present in the area, three of which were surveyed and the fourth viewed from a distance. The northernmost occupies the bed of the small stream on the northern side of the airstrip. It is dominated by sedges (*Carex secta* and *Carex dissita*) and rushes (*Juncus effusus* and a smaller unidentified species) with emergent toetoe, manuka and *Coprosma parviflora* (sp.'t'). Also common are *Mimulus moschatus*, *Helichrysum bellidioides*, *Blechnum penna-marina*, *Epilobium* sp. and Yorkshire fog. The wetland is well buffered by surrounding by manuka and kanuka scrub.

Just south of this, within the open area known as the airstrip, is a wetland turf. It is dominated by *Ranunculus glabrifolius, Epilobium nummularifolium, Viola filicaulis, Gonocarpus micranthus, Gnaphalium delicatum, Bulbinella hookeri* and *Ophioglossum coriaceum*. Scattered manuka and rushes are emergent through the turf. The wetland grades into an open manuka shrubland and scrub to the south which contains many of the wetland herb species listed as well as *Hypolepis millefolium*, *Histiopteris incisa* and *Blechnum fluviatile*. This is an unusual wetland type, though has to some extent been artificially maintained by the clearance of taller vegetation.

The third wetland lies directly south, in the headwaters of the main stream draining south from the airstrip into the Wharekiri Valley. It is a flush dominated at its northern end by *Juncus distegus* with scattered emergent manuka and *Coprosma parviflora* (sp.'t') and at its southern end by *Carex geminata*. The intertussock spaces are dominated by exotic grasses and herbs such as Yorkshire fog and *Ranunculus acris*.

The fourth wetland occupies the bed of a small stream northwest of spot height 652, at the southeast corner of the Middle Hill area. This wetland was only viewed from a distance, but appears to be dominated by sedges (similar to the first wetland described above). It is the largest of the four wetlands and is surrounded by open grassland and scattered shrubland.

**Area 3, Wharekiri Stream**

This area covers the catchment of Wharekiri Stream at the southeast corner of the property. The Wharekiri Valley is almost entirely covered with indigenous woody vegetation. The northwest side of the valley (with the exception of the slopes near the mouth of the stream) supports kanuka scrub, kanuka forest, beech forest, beech-podocarp forest and hardwood forest. The southeast (drier) side of the valley supports kanuka scrub, kanuka shrubland and open rock on upper slopes and hardwood forest on lower slopes and in the main gullies. Areas of open grassland, shrubland and scrub are present on the main ridge to Batty, at the southeast boundary of the property.

Older stands of taller kanuka have a diverse range of understorey and emergent species, including cabbage tree, lancewood, mountain totara, marbleleaf, *Coprosma propinqua*, *Coprosma crassifolia*, *Coprosma rhamnoides*, mahoe, kowhai, common broom, *Helichrysum lanceolatum*, native jasmine, bush lawyer, *Clematis* sp., akiraho, horopito, toetoe, mapou, broadleaf, mingimingi, *Cyathodes fasciculata*, tree nettle, prickly shield fern, *Blechnum fluviatile*, *Blechnum chambersii*, *Asplenium richardii* and *Asplenium appendiculatum*.

Beech-podocarp forest is dominated by matai, totara, black beech, lancewood and pokaka. Other important species present are broadleaf, mahoe, lemonwood, *Lophomyrtus obcordata*, kanuka, mapou, weeping matipo, horopito, fivefinger, wineberry, marbleleaf, cabbage tree and climbing rata. Understorey species include tree fuchsia, *Coprosma lucida*, toetoe, *Coprosma rhamnoides*, *Libertia* sp., koromiko, tree tutu, hound's tongue fern, *Asplenium flaccidum*, prickly shield fern, *Pellaea rotundifolia*, *Asplenium richardii*, *Asplenium appendiculatum* and a number of other ferns. Occasionally present are the tree ferns *Dicksonia fibrosa* and *Cyathea dealbata*.

Hardwood forest is present on shady concave slopes and in gullies. It is usually dominated by several of the following species: mahoe, broadleaf, marbleleaf, kowhai, narrow-leaved lacebark, mountain ribbonwood, yellowwood, cabbage tree and mapou. Also commonly present are mountain totara, lemonwood, kaikomako, lowland ribbonwood and tall old kanuka trees. Areas of hardwood forest inspected were severely browsed. The very open understories support scattered plants of less palatable species such as horopito, tree nettle, *Helichrysum lanceolatum*, prickly shield fern and crown fern.

Areas of beech forest were not surveyed on this part of the property, but appear to be (or have been) relatively extensive on the west side of Wharekiri Valley in the catchment of the main tributary stream near the southern boundary of the property. Relatively recent burning appears to have removed most areas of taller forest, but beech forest is regenerating strongly over much of the area.

An area of diverse hardwood forest on the southeast-facing slopes of lower Wharekiri Stream is representative of the lowland forests that were formerly present on low-altitude hill slopes in the area. Dominant species are titoki, pigeonwood, broadleaf, mahoe, ngaio, kowhai, black maire, narrow-leaved lacebark and kanuka. Other important canopy or subcanopy species present are kaikomako, *Coprosma areolata*, tree tutu, lancewood, fivefinger, *Lophomyrtus obcordata*, cabbage tree, supplejack, tree fern (*Dicksonia squarrose)*, marbleleaf, wineberry, mapou, tree fuchsia and young totara and matai. Understorey species include leafless lawyer, tree nettle, kawakawa, *Coprosma lucida*, native jasmine and the ferns *Pellaea rotundifolia*, *Asplenium flaccidum*, prickly shield fern, necklace fern, *Blechnum chambersii*, *Adiantum cunninghamii*, kiokio and *Lastreopsis velutina*. A scattered population of the threatened (sparse) fierce lancewood, including several young plants, is present at the northern end of this forest among dense *Coprosma rhamnoides*, *Coprosma crassifolia* and *Helichrysum lanceolatum*, beneath tall kanuka trees.

Small alluvial flats and terraces beside Wharekiri Stream support tall kanuka forest. One stand surveyed in the upper valley is in an advanced stage of regeneration with kanuka dominating the canopy and a sparse understorey of totara, marbleleaf, narrow-leaved lacebark, kowhai, matai, *Clematis forsteri* agg. and *Rubus schmidelioides*. The dense shrub tier includes *Coprosma crassifolia*, *Coprosma rhamnoides*, lancewood, kaikomako and *Helichrysum lanceolatum*. The ground tier is dominated by *Uncinia uncinata, Uncinia leptostachya, Acaena anserinifolia, Libertia ixioides,* necklace fern and a number of native tree and shrub seedlings including podocarps such as totara and matai. Moss cover is locally abundant.

Rock bluffs in the Wharekiri Valley are dominated by bare rock with *Pachystegia minor*, *Heliohebe hulkeana*, *Brachyglottis monroi*, silver tussock, mountain flax, prostrate kowhai, porcupine shrub, *Linum monogynum*, kanuka, *Gingidia montana*, common broom, pink broom and *Pyrrosia eleagnifolia*. Other species present include *Hebe parviflora*, harebell, *Wahlenbergia albomarginata* X *matthewsii*, mouse-ear chickweed, *Oxalis* sp., tauhinu, *Coprosma propinqua*, mouse-ear hawkweed, catsear, *Helichrysum intermedium* agg., tree tutu and blue tussock. Shadier bluffs support a larger component of forest and shrub species such as tree tutu, mapou and *Coprosma robusta*. Damp seeps support *Blechnum minus, Blechnum colensoi*, *Ranunculus insignis* and *Adiantum cunninghamii*. Vegetation on rock bluffs is highly representative of the original vegetation. One large bluff in Wharekiri Stream was recommended for protection as RAP 4 Wharekiri Stream (Aniseed ED).

Areas of grassland are present on the crest of the ridge to Batty. At lower altitudes this grassland is dominated by introduced pasture species with scattered kanuka, matagouri, tauhinu and porcupine shrub. At higher altitudes dominant species are sweet vernal, bristle tussock, fescue tussock, blue tussock, cotton daisy, mouse-ear hawkweed, *Raoulia subsericea* and shrubs of matagouri, manuka, inaka and *Hebe odora*. Also present are broad-leaved snow tussock, *Helichrysum parvifolium*, Maori onion, *Pimelea oreophila*, *Acaena caesiiglauca*, catsear, *Geranium sessiliflorum*, patotara, Yorkshire fog, snowberry and white clover.

At lower altitudes on the ridge, scrub is dominated by kanuka. Other common species are *Coprosma rhamnoides*, *Coprosma crassifolia*, mingimingi, *Cyathodes fasciculata*, tauhinu, patotara, *Helichrysum lanceolatum*, tree nettle, necklace fern and *Hydrocotyle novaezelandiae*. Scrub at higher altitudes is dominated by manuka, matagouri, tauhinu, *Hebe odora* and broad-leaved snow tussock. Other species present are *Olearia cymbifolia*, golden speargrass, inaka, fescue tussock, cotton daisy, prickly shield fern, mountain flax, tutu, *Gaultheria antipoda*, *Blechnum montanum*, *Blechnum penna-marina* and occasionally broadleaf and mountain totara. Areas of mountain toatoa scrub are present on the ridge crest near the property boundary.

**Area 4, Lower Miller Stream**

This area covers the north-facing slopes of lower Miller Stream, north and east of Middle Hill at the northern boundary of the property. These slopes are mostly steep and dry, and almost entirely covered in kanuka scrub or low kanuka forest. Smaller areas of hardwood forest are present in gullies and taller kanuka forest on small alluvial flats. Kanuka scrub and low forest is dominated by kanuka, and very occasionally manuka, with a relatively bare understorey. Important understorey species include *Coprosma rhamnoides*, *Coprosma crassifolia*, *Coprosma parviflora* (sp.'t') and *Helichrysum lanceolatum*. Important ground-cover species are catsear, wall lettuce, *Blechnum penna-marina* and prickly shield fern. Areas with a sparser kanuka cover support *Coprosma propinqua*, tauhinu, common broom, prostrate kowhai, silver tussock, *Clematis afoliata* and bush lawyer.

Steeper slopes with more exposed rock support bluff vegetation similar to that described for the Wharekiri Valley. Important species are *Pachystegia minor, Heliohebe hulkeana, Brachyglottis monroi,* prostrate kowhai, kanuka, silver tussock, *Gingidia montana* and pohuehue. Akeake is also present where exposure to the coastal influence is more pronounced.

Two small terraces separated by a low spur are present in the lower valley at the northeast corner of this area. They support tall kanuka with totara, mahoe, native jasmine, marbleleaf, mahoe, cabbage tree, *Helichrysum lanceolatum, Coprosma crassifolia* and *Coprosma rhamnoides* in the understorey. The dense ground tier is comprised largely of *Uncinia uncinata* and *Coprosma crassifolia* with stinking iris, necklace fern, *Acaena anserinifolia,* matai, kaikomako, wall lettuce, *Bidens frondosa*, vetch, marbleleaf, *Histiopteris incisa* and *Polystichum richardii*. Kanuka forest on the eastern (down-valley) end of the terrace has been removed. This disturbance has encouraged the establishment of stinking iris, broom, buddleia and a small infestation of old man's beard.

**Area 5, Front Country**

This area covers the lower-altitude northeast corner of the property, in the vicinity of the homestead and at the confluence of Miller and Wharekiri Streams. It includes the terraces and flats of the Clarence River, the lower slopes of the ridge to Batty behind (southwest of) the homestead and the lower slopes alongside the main four-wheel-drive west of lower Wharekiri Stream. It does not include the three prominent limestone outcrops near the homestead or the strip of Crown Land on the main river flats. These areas are fenced from the surrounding developed country and are described separately below.

Flat or gently sloping areas in the vicinity of the homestead support developed pasture. Lower hill slopes support scattered kanuka shrubland, grading in places to denser kanuka scrub. Areas of taller kanuka forest are present on and adjacent to river terraces, notably at the confluence of Miller and Wharekiri streams and in lower Miller Stream. Small areas of hardwood forest are present. The distribution of woody vegetation appears to have been strongly influenced by the frequency of burning or spraying.

A small stand of alluvial forest is present near the confluence of Wharekiri and Miller streams. The canopy is dominated by kanuka close to the river bank but kaikomako becomes co-dominant over much of the stand. Manuka is a minor canopy component while the well-developed understorey and shrub tier is comprised of kaikomako, *Coprosma crassifolia, Helichrysum lanceolatum* and occasional matai. Other notable species in the canopy include *Cordyline banksii,* titoki and narrow-leaved lacebark. Stinking iris dominates the ground tier with *Polystichum richardii, Pellaea rotundifolia,* necklace fern, seedling mahoe and *Uncinia uncinata*.

An area of hardwood forest is present in a small gully near the four-wheel-drive track to Middle Hill. This remnant was only viewed from a distance. It appears to be dominated by kowhai, broadleaf, marbleleaf, kanuka and ngaio. The area of forest is relatively small and is surrounded by grassland and kanuka shrubland.

**Area 6, Limestone Outcrops**

Three separate limestone outcrops are present alongside Waipapa Road in the vicinity of the homestead at the eastern corner of the property. Four main plant communities are present on these outcrops: shrubland-herbfield on rock and talus; grassland-herbfield on hill and toe slopes; kanuka-*Coprosma* scrub on hill slopes; and, hardwood-*Coprosma* shrubland-low forest on toe slopes.

Common species in shrubland-herbfield communities are *Coprosma crassifolia*, tauhinu, mountain flax, *Pachystegia minor*, *Heliohebe hulkeana*, *Poa acicularifolia*, *Elymus* "channel", necklace fern, *Haloragis erecta*, and *Anisotome filifolia*. Prostrate kowhai, *Wahlenbergia matthewsii*, *Pimelea aridula* and the threatened (sparse) fern *Pleurosorus rutifolius* are scattered throughout the bluffs. Snapdragon and stonecrop are common and widespread on bluffs and talus. A small infestation of old man's beard is present at the southwest end of the southern outcrop. On the talus areas *Bromus* sp. and other exotic grasses are common along with *Convolvulus waitaha*, creeping pohuehue, silver tussock, *Calystegia tuguriorum* and sweet brier. Additional species recorded on the middle outcrop were *Asplenium lyallii*, *Epilobium glabellum*, *Celmisia monroi*, *Brachyglottis lagopus*, *Brachyscome sinclairii*, *Ileostylis micranthus*, akiraho, broadleaf, tauhinu and common broom. Additional species recorded on the northernmost bluff were *Carex* "Wakatipu small", *Pellaea calidirupium*, *Pyrrosia eleagnifolia*, *Gingidia montana*, *Linum monogynum*, kaikomako, pink broom and *Asplenium trichomanes*. *Epilobium wilsonii* has been previously recorded from the area.

Areas of grassland between the rocky slopes and bluffs are dominated by pasture grasses of which *Bromus* sp. appears to be dominant, along with snapdragon, vetch, mouse-ear chickweed and silver tussock. Occasional shrubs are present, including *Coprosma propinqua*, *Coprosma crassifolia* and *Melicytus* "Waipapa". The mistletoe *Ileostylus micranthus* occurs on *Coprosma propinqua* and is locally abundant.

Scrub on the limestone outcrops is dominated by kanuka, *Coprosma propinqua*, *Coprosma crassifolia*, *Rubus schmidelioides*, native jasmine and pohuehue. Beneath the canopy, tree nettle is abundant, while the ground is covered with exotic grasses and herbs (such as *Torilis arvensis* and *Galium aparine*) and occasional *Melicytus* "Waipapa" and tauhinu. Additional species recorded on the northernmost outcrop were cabbage tree, kawakawa and ngaio.

Shrubland-low forest on toe slopes of the limestone outcrops is dominated by *Coprosma propinqua* (with *Ileostylus micranthus*), fivefinger, mahoe, narrow-leaved lacebark, matagouri, cabbage tree, tree fuchsia, hound's tongue fern, tauhinu, *Clematis afoliata*, *Calystegia tuguriorum*, pohuehue, scrub pohuehue and leafless lawyer. Additional species recorded on the northernmost outcrop were titoki, ngaio, mapou and kaikomako. Cotoneaster and privet are common to abundant and occasional pine trees are present.

All three limestone outcrops are infested with a range of weeds. The most extensive infestations of woody weeds are of cotoneaster and privet, though hawthorn, pines, sweet brier, gooseberry, elderberry, old man's beard and rowan are also present.

**Area 7, Crown Land Strip (Clarence Valley)**

This area covers an old channel of the Clarence River at the northeast corner of the property. It lies between two parts of the pastoral lease and is farmed as part of the property. The southeast part of the channel is occupied by a small stream which forms areas of pond and wetland. Dominant are large crack willow trees with occasional tall kanuka and scattered matagouri. Sedges and rushes are present in parts of the wetland. Elsewhere pasture grasses are dominant.

The northwest part of the channel is drier and stonier. Soils appear mostly uncultivated and although dominated by pasture grasses do support remnant native species including creeping pohuehue, porcupine shrub, necklace fern and mosses (including *Polytrichum juniperinum*). Scattered plants of kanuka, *Coprosma propinqua*, gorse, matagouri, tree nettle and kowhai are present, but mostly confined to the old channel and its steeper banks. Most notable is an area (in the vicinity of E2582077-N5895028) which supports a small area of woodland comprising several large kowhai trees and scattered tall kanuka trees. This woodland

vegetation is partly representative of the vegetation that originally occupied lowland terraces in the area.

### 2.4.3 Notable Flora

Notable plant species observed on Middle Hill Pastoral Lease are listed in Table 1 below. Threat categories are those proposed by de Lange *et al* (2004).

**Table 1** Notable plant species recorded from Middle Hill Pastoral Lease.

| Plant Species | Known Distribution on Property |
|---|---|
| **Serious Decline** | |
| *Heliohebe acuta* | previously recorded from upper Miller Stream |
| **Gradual Decline** | |
| *Carmichaelia stevensonii* | upper northern tributary of Miller Stream |
| *Melicytus* aff. *alpinus* "Waipapa" | limestone outcrops |
| *Peraxilla tetrapetala* | beech forest, upper Miller Stream |
| *Tupeia antarctica* | previously recorded from upper Miller Stream |
| **Sparse** | |
| *Pleurosorus rutifolius* | limestone outcrops |
| *Pseudopanax ferox* | lower Wharekiri Stream |
| **Range Restricted** | |
| *Poa acicularifolia* | limestone outcrops |
| *Wahlenbergia matthewsii* | limestone outcrops, possibly greywacke bluffs |
| *Epilobium wilsonii* | previously recorded from limestone outcrops |
| **Data Deficient** | |
| *Elymus* aff. *solandri* "channel" | limestone outcrops |
| *Pachystegia minor* | limestone outcrops and greywacke bluffs |
| *Vittadinia australis* | greywacke bluffs |
| **Locally Endemic** | |
| *Brachyglottis monroi* | outcrops and bluffs |
| *Carmichaelia glabrescens* | outcrops and bluffs |
| *Heliohebe hulkeana* | limestone outcrops and greywacke bluffs |
| *Pachystegia minor* | limestone outcrops and greywacke bluffs |
| *Pachystegia minor* X *insignis* s.s. | greywacke bluffs, lower Miller Stream |
| **Uncommon in Ecological District** | |
| *Nestegis cunninghamii* | lower Wharekiri Stream; near southern limit |
| **Calcicoles (restricted to limestone)** | |
| *Asplenium lyallii* | limestone outcrops |
| *Pimelea aridula* | limestone outcrops |

Limestone outcrops and greywacke bluffs support a large proportion of the notable plant species observed on the property. South Marlborough endemics, such as *Pachystegia minor* (at or near its southern limit), *Heliohebe hulkeana* and pink broom, and threatened species, such as *Melicytus* aff. *alpinus* "Waipapa", *Poa acicularifolia*, *Wahlenbergia matthewsii*, *Epilobium wilsonii* and *Elymus* aff. *solandri* "channel", are relatively widespread and/or common in these habitats. Populations of these species are relatively well buffered on steeper greywacke bluffs, but threatened by introduced plants and animals on gentler slopes and limestone bluffs.

The upper Miller Stream area supports populations of four threatened species: weeping broom, beech mistletoe (*Peraxilla tetrapetala)*, *Tupeia antarctica* and *Heliohebe acuta*. The

hardwood forest remnant in lower Wharekiri Stream supports the threatened fierce lancewood, a healthy population of black maire near its southern limit, and a diverse range of lowland species that are absent or uncommon on other parts of the property, such as pigeonwood, supplejack and the fern *Lastreopsis velutina*.

**SUMMARY**

An important feature of Middle Hill Pastoral Lease is the extent of the cover of indigenous woody vegetation. All parts of the property other than the 'front country' at the northeast corner of the property and gentler country on the main ridges support intact or regenerating indigenous vegetation. While much of this indigenous cover is kanuka scrub or low forest and not highly representative of the original vegetation, it contains elements of the original plant communities and has high naturalness values. It is also contiguous with areas of intact or regenerating indigenous vegetation to the north and west of the property, collectively forming one of the most extensive remaining areas of indigenous forest on the east coast of the South Island.

Forest communities on western parts of the property (west of Devils Lookout) are especially significant. These communities are intact except for the effects of relatively high populations of introduced animals. Intact or regenerating forest remnants elsewhere on the property are generally diverse, support a number of typically lowland species and, in lower Wharekiri Stream, support populations of threatened and uncommon species.

Rockland (greywacke and limestone outcrops) plant communities are also significant. They support plant communities that are highly representative of the original vegetation at these sites, a number of threatened species and several species that are endemic to South Marlborough. Wetlands observed on the property are also significant as they support vegetation that is representative of that present in the original plant communities and are relatively uncommon in South Marlborough.

These significant plant communities are linked and buffered by an almost complete cover of regenerating indigenous woody vegetation. If this regenerating vegetation is protected from disturbance, including the effects of high populations of introduced animals, it will eventually form a large contiguous area of indigenous forest of very high conservation value. The rapid rate of natural regeneration of indigenous woody vegetation on the property, and the way in which this vegetation links and buffers more intact indigenous plant communities, means that vegetation on a large part of the property must be considered to have significant inherent values.

Populations of several notable plant species are present on the property, including three species listed as 'chronically threatened' (gradual decline) by de Lange *et al* (2004), four listed as 'at risk', three as 'data deficient', and a further four species regarded as locally endemic or uncommon.

## 2.4.4 Problem Plants

Introduced plants that may have an important 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.

Backcountry parts of the property appear free of significant conservation weeds. Buddleia and broom are present in the stream beds adjoining the property, though are common only in the lower reaches of the streams. However, a number of significant conservation weeds are present on 'front country' parts of the property, notably old man's beard, privet, cotoneaster, stinking iris, stonecrop, ivy, rowan and snapdragon. Other less significant or extensive weed species observed on the 'front country' include foxglove, thistles, viper's bugloss, wilding pines, gooseberry, elderberry and gorse.

Old man's beard
Observed at two locations: on the small terrace in lower Miller Stream where tall kanuka has been felled, and at the southwest end of the southern limestone outcrop. These infestations pose a major threat to indigenous plant communities in the area through spread by windblown seed. The infestations should be removed.

Cotoneaster, privet, hawthorn and rowan
Infestations of these species were observed on and around the limestone outcrops. They pose a significant threat to limestone plant communities and to other vegetation in the area through spread of seeds by birds. Infestations should be removed.

Stonecrop
Observed on and around the limestone outcrops. These infestations pose a threat to limestone plant communities and to other low-stature plant communities in the area through spread by windblown seed. Stonecrop is difficult to control.

Snapdragon
Observed on the limestone outcrops. These infestations pose a significant threat to limestone plant communities. The infestations should be contained or removed.

Stinking iris
Observed in alluvial forest and scrub on the eastern margin of the property where, in some places, it forms the dominant ground cover. These infestations pose a significant threat to lowland plant communities and to other plant communities in the area through spread of seeds by birds.

Buddleia
Observed in stream beds adjoining the property, and on stream banks and bluffs on the property. Only isolated plants were observed in the upper stream beds, but it forms dense stands in the lower parts of Miller and Wharekiri Streams. Isolated infestations should be removed from the upper valleys, and denser infestations contained in lower valleys.

# 2.5 FAUNA

## 2.5.1 Bats

The only record of bats from the region is an anecdotal report of a sighting in the Rakautara area, just north of Kaikoura (Department of Conservation, Kaikoura). Bat detectors were placed at several locations on the property but no bats were recorded.

## 2.5.2 Birds

Approximately 30 indigenous bird species are regarded as resident breeders in the Kaikoura Ecological Region (Bull *et al*, 1985; Breese *et al*, 1986). Rivers and streams provide habitat for southern black-backed gull, black-billed gull (threat status: serious decline), black-fronted tern (nationally endangered), black shag (sparse), little shag, white-faced heron, paradise shelduck, grey duck (nationally endangered), South Island pied oystercatcher, pied stilt, banded dotterel (gradual decline), welcome swallow and spur-winged plover. Waterfowl are few in numbers in the region due to the scarcity of shallow lakes and swampy wetlands (Breese *et al*, 1986).

Indigenous species commonly present in forests and shrublands are brown creeper, grey warbler, silvereye, South Island fantail, bellbird, South Island tomtit, New Zealand pigeon (gradual decline) and New Zealand kingfisher. Also present are tui, South Island rifleman, morepork, New Zealand falcon, shining cuckoo, long-tailed cuckoo, South Island robin and parakeet (Breese *et al*, 1986). South Island robin are patchily distributed and usually associated with stands of kanuka or manuka. Parakeets have been recorded from the northern and southern ends of the eastern Seaward Kaikoura Range. New Zealand pipit is present at higher altitudes and Australasian harrier is ubiquitous.

Birds observed on Middle Hill Pastoral Lease are described below for the six main locations surveyed (representing the main habitat types) and listed in Table 2 (indigenous species) and Table 3 (introduced species) (see attached map)

### Limestone rockland and associated shrubland near Middle Hill homestead

A wide range of indigenous bird species were seen and heard in shrubland on limestone. Bellbird and silvereye were common. Also present were grey warbler, South Island fantail, New Zealand kingfisher, Australasian harrier, southern black-backed gull and tui. A morepork was heard calling at night. Introduced passerines were common.

### Rockland and shrubland, between Middle Hill and 1.5 km west of the airstrip

This area encompasses shrubland, forest and rockland either side of the main vehicle track that traverses the central ridge on the property, near Middle Hill. Almost all common forest birds representative of the region were present: brown creeper, silvereye, South Island tomtit, South Island fantail, grey warbler, South Island robin, shining cuckoo and New Zealand pigeon (gradual decline). Parakeets (unidentified species) were heard in an area adjacent to the airstrip. Other indigenous birds present were welcome swallow, Australasian harrier and paradise shelduck. Introduced passerines were abundant throughout, and California quail and chukor relatively common.

### Batty Ridge

Australasian harrier, bellbird, skylark and Australian magpie were recorded on the northeast ridge of Batty.

### Kanuka forest, beech-podocarp forest and hardwood forest, Wharekiri Valley

This area includes the kanuka and beech-podocarp forests on steep slopes on the northern side of Wharekiri Stream and hardwood forest in lower Wharekiri Stream. Brown creeper, silvereye, bellbird, South Island tomtit, South Island fantail, grey warbler and South Island robin were recorded throughout. Parakeets (unidentified species) and New Zealand pigeon (gradual decline) were seen in hardwood forest in the lower valley. A pair of New Zealand falcon was observed on the river bed of upper Wharekiri Stream. The defensive behaviour of the birds indicated they had a nest-site close-by. Introduced passerines were abundant throughout.

### Forest, upper Miller Stream and west of Devils Lookout

This area covers the north-west part of the property in the upper catchment of Miller Stream. It includes kanuka shrubland and tall beech-podocarp forest, particularly west of Devils Lookout. Bird species recorded in this area were brown creeper, bellbird, silvereye, South Island tomtit, South Island fantail, grey warbler and South Island robin. Riflemen (not recorded elsewhere on the property) were observed in forest west of Devils Lookout, and parakeets were heard on the hill slopes on the south side of upper Miller Stream.

### Cultivated paddocks, bordering the Clarence River

This area comprises deer-fenced paddocks, ploughed paddocks, small areas of shrubland/woodland and a wetland on flats adjacent to the Clarence River. Hybrid mallard/grey ducks were recorded in the wetland, and range of river birds were recorded in the paddocks, including South Island pied oystercatcher, spur-winged plover, New Zealand kingfisher, white-faced heron, black shag (sparse) and black-billed gull (serious decline). Bellbird, silvereye and grey warbler were present in kanuka/kowhai woodland.

**SUMMARY**

A total of 38 bird species were recorded on Middle Hill Pastoral Lease during this survey: 24 indigenous species (16 endemic and eight native) (Table 2) and 14 introduced species (Table 3). Forests on the property are some of the most extensive remnants of low altitude beech-podocarp forest in the region and provide important habitat for a rich bird fauna. The birds recorded almost fully represent the bird fauna of eastern South Island forest communities (with the absence of kaka, long-tailed cuckoo and yellowhead).

The presence of parakeets is particularly notable given their scarcity in the region. There are reports of parakeets from the southern and northern ends of the Seaward Kaikoura Range; these records from Middle Hill extend the known range of parakeets in the area. Four threatened bird species were recorded during this inspection: black shag (sparse), New Zealand pigeon (gradual decline), New Zealand falcon (gradual decline) and black-billed gull (serious decline) (Table 5). A fifth threatened species, yellow-crowned parakeet (gradual decline), may be present.

**Table 2** Indigenous bird species recorded from Middle Hill Pastoral Lease, November 2004.

| **Bird species** Common name | Scientific name | Known Distribution on Property |
|---|---|---|
| Australasian harrier | *Circus approximans* | throughout |
| bellbird | *Anthornis melanura melanura* | shrubland and forest throughout |
| black-billed gull | *Larus bulleri* | paddocks bordering Clarence River |
| black shag | *Phalacrocorax carbo novaehollandiae* | flying over paddocks bordering Clarence River |
| brown creeper | *Mohoua novaeseelandiae* | shrubland and forest throughout |
| grey warbler | *Gerygone igata* | shrubland and forest throughout |
| morepork | *Ninox novaeseelandiae novaeseelandiae* | pine trees near cottage |
| New Zealand falcon | *Falco novaeseelandiae "eastern"* | upper Wharekiri Stream |
| New Zealand kingfisher | *Halcyon sancta vagans* | paddocks bordering Clarence River |
| New Zealand pigeon | *Hemiphaga novaeseelandiae novaeseelandiae* | podocarp and hardwood forest Wharekiri Stream |
| paradise shelduck | *Tadorna variegata* | airstrip |
| parakeet | *Cyanoramphus* sp. | airstrip, upper Miller Stream, lower Wharekiri Stream |
| shining cuckoo | *Chrysococcyx lucidus lucidus* | airstrip |
| silvereye | *Zosterops lateralis lateralis* | shrubland and forest throughout |
| southern black-backed gull | *Larus dominicanus dominicanus* | paddocks bordering Clarence River |
| South Island fantail | *Rhipidura fuliginosa fuliginosa* | shrubland and forest throughout |
| South Island pied oystercatcher | *Haematopus ostralegus finschi* | paddocks bordering Clarence River |
| South Island rifleman | *Acanthisitta chloris chloris* | upper Miller Stream |
| South Island robin | *Petroica australis australis* | shrublands deer trap, airstrip & Middle Hill |
| South Island tomtit | *Petroica macrocephala macrocephala* | shrubland and forest throughout |
| spur-winged plover | *Vanellus miles novaehollandiae* | paddocks bordering Clarence River |
| tui | *Prosthemadera novaeseelandiae novaeseelandiae* | limestone shrubland near cottage |
| welcome swallow | *Hirundo tahitica neoxena* | throughout |
| white-faced heron | *Ardea novaehollandiae novaehollandiae* | paddocks bordering Clarence River |

**Table 3** Introduced bird species recorded from Middle Hill Pastoral Lease, November 2004.

| **Bird species** | |
|---|---|
| Common name | Scientific name |
| Australian magpie | *Gymnorhina tibicen* |
| blackbird | *Turdus merula* |
| California quail | *Callipepla californica brunnescens* |
| chaffinch | *Fringilla coelebs* |
| chukor | *Alectoris chukar* |
| dunnock | *Prunella modularis* |
| goldfinch | *Carduelis carduelis* |
| greenfinch | *Carduelis chloris* |
| house sparrow | *Passer domesticus* |
| redpoll | *Carduelis flammea* |
| skylark | *Alauda arvensis* |
| song thrush | *Turdus philomelos* |
| starling | *Sturnus vulgaris* |
| yellowhammer | *Emberiza citrinella* |

## 2.5.3 Lizards

Common skinks have been found throughout the Kaikoura Ecological Region at widely varying altitudes. Spotted skink (gradual decline) has been recorded in at least three areas in the Kowhai and Aniseed EDs. Scree skink (gradual decline) has been recorded in the George ED. Three *Hoplodactylus* gecko species have been recorded in the area: Kaikouras gecko (range restricted), Marlborough mini gecko and common gecko. Rough gecko (gradual decline) has been recorded in the Manakau ED (Breese *et al*, 1986; Whitaker and Gaze, 1999). There are records in the Department of Conservation Herpetofauna Database of Marlborough mini gecko and common skink at Camp Stream on Middle Hill Pastoral Lease.

Lizards observed on Middle Hill Pastoral Lease are described below for the four main areas surveyed, and listed in Table 4.

### Limestone rockland and associated shrubland near Middle Hill homestead

The abundant limestone talus, boulderfield and shrubland cover provide good habitat for lizards. Six Kaikouras geckos (range restricted) and two common skinks were found in one hour of searching on the southernmost limestone outcrop. Four unidentified geckos were found on the limestone nearest the homestead (Gibraltar Rock). Although no further species were found during this inspection, the habitat appears to be suitable for other lizard species such as spotted skink (gradual decline), scree skink (gradual decline) and rough gecko (gradual decline).

### Rockland and shrubland, between Middle Hill and 1.5 km west of the airstrip

This area encompasses shrubland, forest and rockland either side of the main vehicle track that traverses the central ridge on the property, near Middle Hill. Rocklands comprised a variety of substrate sizes ranging from small rock outcrops and larger rocky bluffs to old stable boulderfield covered with vegetation. Two common skinks were found on Middle

Hill, one under an Artificial Cover Object (ACO). Five Kaikouras geckos were found in rocky outcrops on a northeast facing slope at the north end of the airstrip.

### Batty Ridge

Four unidentified *Hoplodactylus* geckos and one common skink (under an ACO) were recorded on the northeast ridge of Batty.

### Kanuka forest, beech-podocarp forest and hardwood forest, Wharekiri Valley

This area includes the kanuka and beech-podocarp forests on steep slopes on the north side of Wharekiri Stream and the hardwood forest in lower Wharekiri Stream. No lizards were found in this area. The introduced southern bell frog was present in the mid- and lower-reaches of Wharekiri Stream.

**Table 4** Lizard species recorded from Middle Hill Pastoral Lease.

| **Lizard species** Common name | Scientific name | **Known Distribution on Property** |
|---|---|---|
| common skink | *Oligosoma nigriplantare polychroma* | Middle Hill, limestone, Batty ridge |
| Kaikouras gecko | *Hoplodactylus* aff. *maculatus* "Kaikouras" | limestone, NE facing slopes west of airstrip |
| *Hoplodactylus* species unknown | *Hoplodactylus* aff. *maculatus* sp. | limestone, Batty ridge |
| Marlborough mini gecko | *Hoplodactylus* aff. *maculatus* "Marlborough mini" | lower hill slopes of Batty |

**SUMMARY**

The abundant limestone scree, boulderfield, outcrop, bluff and shrubland cover on the property provide good habitat for lizards. Two species of lizard were found during this inspection: common skink and Kaikouras gecko. A third species, the Marlborough mini gecko, has been recorded previously. The presence of the threatened (range restricted) Kaikouras gecko is particularly notable. It is an uncommon species of the "common gecko" complex and is known previously from only two sites: Patutu (peak) and inland of Ward (Whitaker and Gaze, 1999).

## 2.5.4 Fish

Middle Hill Pastoral Lease lies in the catchment of the Clarence River. Two main tributaries of the Clarence River drain the property: Miller Stream and Wharekiri Stream. One of the distinguishing characteristics of the Clarence River is the absence of dams. This has two effects on the fish communities. The first is that the fish communities are more likely to have diadromous species present (species with a sea phase in their lifecycle). The second effect is that fish are able to migrate between streams, allowing colonisation of previously dewatered streams.

The New Zealand Freshwater Fish Database contains 51 records (at the 1st November 2004) from the Clarence River catchment, and eight records from nearby coastal streams (McDowall and Richardson, 1983). Species recorded from the waterways near Middle Hill Pastoral Lease are koaro, inanga, shortjaw kokopu, banded kokopu, Canterbury galaxias,

upland bully, bluegill bully, torrentfish, longfin eel, common smelt, brown trout and Chinook salmon. Two of these species are listed as threatened by Hitchmough (2002): longfin eel (gradual decline) and shortjaw kokopu (gradual decline). The status of Canterbury galaxias in the Marlborough area is currently under review. It is now thought that they belong to a new species yet to be described but commonly known as "northern galaxias" (*Galaxias* "Northern sp.").

Four freshwater habitats were surveyed on the property. These are classified by water source, size, physical character and the aquatic fauna communities present. These habitats and the fish species recorded are described below (see attached map).

### Large Streams

This habitat is represented by Wharekiri Stream and the two main tributaries of Miller Stream. These large streams flow through beech-podocarp forest, kanuka forest, kanuka scrub and rockland. The stream beds are characteristically wide, open and dominated by un-vegetated bedrock, boulders, cobbles and gravel. All are accessible to stock and wild animals, notably feral goats. Stream channels are mostly greater than three metres wide and between 300 and 500 mm deep. Four sites were surveyed and two fish species recorded: torrentfish and koaro. Southern bell frogs were recorded in remnant pools of an old flood channel.

### Small Streams

This habitat is present throughout the property and frequently separated from the large streams by waterfalls. These small streams flow through beech-podocarp forest, kanuka forest, hardwood forest, kanuka scrub, rockland and pasture. Substrates are mainly bedrock, boulders and cobbles. All are accessible to stock, though stock access is frequently restricted by terrain or vegetation. Almost all parts are accessible to wild animals, notably feral goats and red deer. The small streams are mostly less than two metres wide, though occasionally up to four metres wide, with average depths between 100 and 500 mm. Three sites were surveyed, but no fish species recorded.

### Small Waterways

This habitat type includes naturally-occurring springs, constructed water races, ponds, drainage ditches and small spring-fed streams. All are on the low-altitude flats of the property, in the vicinity of the Clarence River, the limestone outcrops and the terraces at the confluence of Miller and Wharekiri streams. These waterways are surrounded by pasture, except for small areas of kanuka-kowhai woodland. Waterway substrates are muddy, except for one spring with a gravel and cobble substrate. All are accessible to stock, except the spring which is beside the road. The spring, drainage ditches and water race are all less than two metres wide and between 100 and 300 mm deep. A stream-fed waterway in an old channel of the Clarence River is greater than 10 metres in width and up to 1.2 m deep. One site in the old river channel was surveyed and shortfin eels recorded.

### Wetlands

Four wetlands were observed on the property, two in tributaries of Miller Stream and two in a tributary of Wharekiri Stream. The first is part of a small stream originating near the airstrip, southwest of Middle Hill and comprises two parts: one within pasture on the airstrip and the other a sedgeland within forest and scrub along the main stream. The second wetland is a small area of sedgeland within kanuka forest, adjacent to Miller Stream

northeast of Middle Hill. One site in the airstrip wetland was surveyed and only tadpoles of the southern bell frog were found.

The other two wetlands are within the catchment of a large tributary of Wharekiri Stream that flows south from the airstrip. One wetland is dominated by sedges and rushes, and surrounded by kanuka forest. The other is also dominated by sedges, is larger and is surrounded by scrub and pasture.

**SUMMARY**

Freshwater fish communities of four different habitats were surveyed at nine sites on Middle Hill Pastoral Lease. Three indigenous species were recorded: torrentfish, koaro and shortfin eel. The limited occurrence of fish on the property is not unexpected. Waterfalls in the lower reaches of many small streams are likely to prevent fish migrating to upstream habitats. The reason for the lack of fish in the main streams is less clear, but could be related to the frequency of large floods and the unstable nature of the main streambeds.

The main western tributary of Wharekiri Stream contains aquatic habitat that is regionally important due to its quality and diversity.

## 2.5.5 Invertebrates

The most significant invertebrate species known from the area is a rare darkling beetle *Mimopeus paralellus*, previously recorded only from slightly elevated flats along the south side of the lower Clarence Valley, mainly in the semi-stable edges of tributary streams. Other species of note in the area include three giant weta, two carnivorous landsnails, speargrass weevils and potentially several rare moth species.

The Marlborough giant weta was once widespread in inland Marlborough but now largely confined to the eastern side of the Seaward Kaikoura Range. The scree weta, is the most widespread of all giant weta species and is found in scree slopes at higher altitudes. The bluff weta is found in cracks in rock bluffs at higher altitudes in the Seaward Kaikoura Range and several other Marlborough ranges, as well as at Mt Somers in Canterbury. This species would only occur on the property if appropriate habitat was present in the limited area of subalpine country. The carnivorous landsnails, *Wainuia edwardi* and *Rhytida stephenensis*, both occur in the area. The 'Wellington' speargrass weevil is known from a number of sites on this and other ranges in Marlborough as well as sites on the Wellington coast. Rare moth species that could be present, depending in part on food-plant distribution, include the *Gingidium*-feeding *Gingidiobora nebulosa* and other species.

Invertebrates observed on the property are described below for each of the areas and habitats surveyed, followed by a description of the significant species observed on the property (see attached map).

### Headwater tributaries of Miller Stream

This area covers the western part of the property, including Devils Lookout and the slopes on the south side of Miller Stream, from the airstrip to spot height 977 m. West and northwest of Devils Lookout the area supports large stands of mature beech and beech-podocarp forest, forest types that were once widespread along the southeast slopes of the Seaward Kaikoura Range. These forests are important remnants of the original habitats and associated invertebrate communities of the area. Slopes on the south side of Miller Stream support a mosaic of beech-podocarp forest, kanuka forest, regenerating scrub and pockets of rough pasture.

Along the slopes north and northwest of spot height 977 m is a substantial boulderfield, above and below the bulldozed track. The vegetation here has been heavily modified by burning and now consists mainly of tall kanuka. In some areas the boulders are quite shallowly deposited on soils, providing few refuges for ground invertebrates to survive the heat of burning. However, in other areas the boulders are very large and there is considerable depth to the deposits. This suggests that the original forest cover would have been relatively sparse on these sites and would have provided good refuge for invertebrates during burning. At least two species of moderate-sized carabid beetles were relatively plentiful in this area.

The whole of this area is considered to have high significant inherent value for invertebrate conservation, with the exception of some areas of pasture along or adjacent to the ridgeline from spot height 977 m to near spot height 1008 m.

### South and southwest faces of Middle Hill

This area covers the steep hill (spot height 805 m) southwest of Middle Hill and the small catchment on the southwest side of Middle Hill. It includes the wetlands near the airstrip and rocky outcrops on the spur west of spot height 805 m. These features, especially the wetlands, provide considerable habitat diversity on a property which has few wetlands. Given the comparative rarity of wetlands at mid altitude in the region, this area is considered to have moderate-high significant inherent value for invertebrate conservation. The slopes of Middle Hill and the bed of the small stream feeding the wetland are important for protection of water quality in the wetlands.

### Faces above Wharekiri Stream

Biologically, this is one of the more diverse areas on the property, with vegetation ranging from pasture through extensive kanuka stands to remnant podocarp forest and hardwood forest in gullies, on benches and gentler slopes on rocky faces. It also features extensive, steep to vertical rock bluffs. It includes the deep gorge within Wharekiri Stream, with both exposed and sheltered rock bluffs and extensive bluff vegetation. This area appears to provide the largest diversity of invertebrate habitats on the property.

On the eastern fringe of this area, near the ridgeline between spot heights 251 m and 489 m, a specimen of the rare darkling beetle *Mimopeus parallelus* was found by team members under a cover for a lizard trap. This appears to be the first record of this species away from the dry gravel terraces closer to the Clarence Valley floor where it has been previously found. This area is considered to have high significant inherent value for invertebrate conservation.

### Lower Miller and Wharekiri streams

Three sites were investigated for invertebrate habitat within this area: the flats with tall kanuka beside Miller Stream, a little over one kilometre upstream from the confluence of the two streams; the rocky point and associated scrub and forest covered flats separating Miller and Wharekiri streams, directly upstream from the confluence; and, the kanuka-manuka stand on the true right of lower Wharekiri Stream just above its confluence with the Clarence River.

The kanuka flats furthest up Miller Stream differ considerably in character. Downstream, the kanuka has a sparse understorey, apparently strongly influenced by feral goats and/or domestic stock. Upstream the understorey is substantially thicker, with significant

regeneration, although with a predominance of browse-resistant species. The upstream part of these flats is considered to have moderate invertebrate value; the downstream portion to have low value.

The site immediately above the confluence has good vegetation diversity and the clayey bluffs above Miller Stream add habitat diversity. This area is considered to have moderate invertebrate value.

The scrub on the true right of lower Wharekiri Stream was investigated primarily for the rare darkling beetle *Mimopeus parallelus*, as this habitat is closest to that in which this species has been found further up the Clarence Valley. No *Mimopeus* beetles were found here, although the search effort was not sufficient to conclude that none are present. Given that this species occurs on at least one of the limestone hills and on a ridge at higher altitude, this remnant is accorded moderate invertebrate value on the basis that it is a likely habitat within which this species may occur.

## Limestone hills

The limestone outcrops provide a substantially different series of habitats from that found on the rest of the property, primarily due to the presence of some plant species that do not occur at other sites and the large area of exposed arid faces and escarpments with steep mobile scree.Two specimens of the rare darkling beetle *Mimopeus parallelus* were found on the smallest hill (Gibraltar Rock), near the homestead. This may be a remnant of a population that occupied formerly more extensive habitats on the river terrace. These limestone hills are moderate-high value for invertebrate conservation.

## Significant species

The most significant find is the darkling beetle *Mimopeus parallelus*, which has a threat status of nationally endangered. This species is one of a small group of darkling beetles from the Molesworth-Clarence region characterised by quite limited distributions. It is considered by Watt (1988, 1989) as probably always having been quite confined in distribution, to the lower Clarence Valley. Its habitat is described as "under stones on river flats, usually around the bases of shrubs…" The type locality is the banks of George Stream, with earlier specimens labelled as 'Clarence Valley' and 'Clarence Bridge'. In recent years, extensive searching in the George Stream area and on the Clarence River floodplains above and below the rail bridge have shown that the species occurs irregularly on the southwest side of the lower Clarence from McLean Stream to George Stream. Occurrences are predominantly on private land, where its distribution is increasingly restricted by more intensive farm practices and pine afforestation. Marginal strips alongside George Stream may be the only 'protected' land on which the species occurs. None were found on the lower Clarence floodplains.

The occurrences of this species on Middle Hill Pastoral Lease are therefore of some interest. The limestone hill occurrence can be seen as roughly equivalent to other known habitats. It probably represents a remnant of a once more widely occurring population in this area, now limited by land development. However, the find at higher altitude, above Wharekiri Stream, is intriguing and bears further investigation. It is highly desirable to secure protection for habitats known to hold this species.

A species likely to be present in the area, but not found during the survey is the geometrid moth, *Gingidiobora nebulosa*, whose larvae feed on *Gingidium montana*. This species is sparsely distributed in Otago and Marlborough, having retreated considerably with the restriction of its palatable food-plant to inaccessible bluffs and rock faces by stock and wild

animals. The moth is found sporadically from inland and eastern parts of Marlborough. Its type locality is Coverham, 20 km north of Middle Hill. The threat status of this species is sparse. Although this species was not found during the survey the abundance of its host plant on the shadier bluffs of the Wharekiri Stream gorge, and the occasional presence of feeding sign on these, suggests that it will be present. At the time of year of the survey this species would normally be present as young larvae. Adults occur later in the season.

It is probable that the Marlborough giant weta and scree weta occur in the western part of the property on the slopes of the Seaward Kaikoura Range, but this area was not investigated. The Marlborough giant weta has been found in the past in the Puhipuhi Valley to the west and is still present near the bushline in montane valleys and subalpine areas along the eastern side of the range. This threat status of this species is gradual decline.

A large number of spider species was encountered during the survey, but none collected for identification. Noteworthy were high densities of large mygalomorph spiders, including *Hexathele* (trapdoor) and *Porrhothele* (funnelweb) species found under rocks and logs on many parts of the property. These densities appear unusual and may be due to an ability to survive and/or re-invade after changes such as fire, logging or predator irruptions.

A moderate-sized earthworm specimen of rather translucent yellowish appearance found beneath a rock near the summit of Middle Hill was collected. This keys out to the genus *Maoridrilus* but it appears to be an un-described species.

## 2.5.6 Notable Fauna

**Table 5** Notable fauna recorded from Middle Hill Pastoral Lease, November 2004.

| **Animal Species** Common name | Scientific name | **Known Distribution on Property** |
|---|---|---|
| **Nationally Endangered*** | | |
| darkling beetle | *Mimopeus parallelus* | limestone hill (Gibraltar Rock) and lower northeast ridge of Batty |
| **Serious Decline** | | |
| black-billed gull | *Larus bulleri* | paddocks close to the Clarence River |
| **Gradual Decline** | | |
| New Zealand falcon | *Falco novaeseelandiae* "eastern" | upper Wharekiri Stream |
| New Zealand pigeon | *Hemiphaga novaeseelandiae novaeseelandiae* | forests of Wharekiri Valley |
| **Sparse** | | |
| black shag | *Phalacrocorax carbo novaehollandiae* | paddocks close to the Clarence River |
| **Range Restricted** | | |
| Kaikouras gecko | *Hoplodactylus aff maculatus* "Kaikouras" | limestone hills near the homestead |
| **Regionally Significant** | | |
| parakeet/kakariki | *Cyanoramphus* sp. | podocarp-beech forest upper Miller Stream, shrublands close to airstrip, hardwood forest lower Wharekiri Stream |

* Threat rankings (except 'regionally significant') are those proposed by Hitchmough (2002)

### 2.5.7 Problem Animals

Introduced animals that may have an important effect on indigenous plant or animal 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 rodents and mustelids), or domesticated animals that are grazed on the property, are not discussed here.

Feral goat
Feral goats are the most obvious of the larger wild mammals on the property. Small- to medium-sized groups of feral goats were observed on nearly all parts of the property visited. They, along with other wild animals, appear to be causing significant damage to indigenous plant communities on the property. Most areas of taller woody vegetation are severely browsed, with very open understories and few palatable species remaining. Feral goats also appear to be having a significant impact on indigenous vegetation on dry slopes and accessible rock bluffs. Numbers of feral goats are high. Immediate and ongoing control of feral goats will be necessary to ensure the protection and continued regeneration of indigenous plant communities on the property. Feral goat control is the key present conservation management issue on the property.

Red deer
Red deer were observed in the Wharekiri Valley and in upper Miller Stream. They appear to be having a significant impact on indigenous plant communities, especially forests in upper Miller Stream, though it was often unclear whether the browsing damage observed was caused by red deer or feral goats. Control of red deer will be required to protect conservation values on the property.

Chamois
No chamois were observed on the property, though they are likely to be present on the slopes close to the Seaward Kaikoura Range.

Feral pig
Feral pig rooting was observed at a number of locations of the property. Control of feral pig populations will be required to protect conservation values on the property.

Brushtail possum
Brushtail possum sign was observed at a number of locations on the property, especially rockland areas, though numbers do not appear to be high. Brushtail possums are predators of birds and lizards, as well as foliage browsers. Brushtail possum control is likely to be necessary to maintain conservation values.

## 2.6 HISTORIC

Areas in the vicinity of Middle Hill Pastoral Lease appear to have been first grazed in 1852, when Sir William Congreve occupied the Waipapa area for a period of two years. William McRae then leased the area from 1855 (Sherrard, 1966). No records of archaeological or historic sites on the property were located during the preparation of this report.

# 2.7 PUBLIC RECREATION

## 2.7.1 Physical Characteristics

Middle Hill Pastoral Lease lies within the 'rural' and 'backcountry' recreation opportunity spectrum zones of the Nelson/Marlborough Conservancy Conservation Management Strategy (CMS) (Department of Conservation, 1996). The property can be divided into two main recreation settings:

### Front Country

This recreation setting covers the lower-altitude hills, terraces and streams that are readily-accessible from Waipapa Road and the Clarence River. It includes the limestone outcrops alongside Waipapa Road and the broad open stream-beds in the lower reaches of Wharekiri and Miller streams. This setting is characterised by gentler terrain and low-altitude (and mostly modified) plant communities. There are no recreational facilities in this area, though four-wheel-drive tracks provide access through this area to the lower northeast ridge of Batty, to the lower parts of Wharekiri and Miller streams and beyond to the central ridge of Middle Hill.

### Back Country

This recreation setting covers the higher-altitude hills and headwater tributaries that are less accessible. It includes most of the upper Miller Stream catchment and the part of the Wharekiri Stream catchment that lies within the property boundary. This setting is characterised by steeper terrain and montane (and mostly indigenous) plant communities. A four-wheel-drive vehicle track traverses the central part of the property, along the ridge between Miller and Wharekiri streams, terminating near the property boundary on the lower slopes of the Seaward Kaikoura Range. There is a small hut beside this track southwest of Middle Hill.

## 2.7.2 Legal Access

One legal road traverses the eastern corner of the property, providing access along Waipapa Road to the confluence of Wharekiri Stream and the Clarence River. Public foot access is available via the Crown riverbeds of the Clarence River, Wharekiri Stream and Miller Stream. The legal roadline alongside Wharekiri Stream provides access right through the eastern part of the property, whereas the legal roadline alongside Miller Stream ends short of the property boundary on the slopes of the Seaward Kaikoura Range. Public access is also available from George Conservation Area on the Seaward Kaikoura Range.

## 2.7.3 Activities

Existing public recreational use of the property appears low, partly because the main stream beds (outside the property boundary) provide the most practical foot access to the area, and partly because access to recreation destinations on the Seaward Kaikoura Range has traditionally been via George Spur north of the property or via Puhi Peaks south of the property.

The property offers potential for a range of recreational activities, including tramping, walking, hunting, mountain-biking, horse-riding, picnicking and nature study. The summits of Batty and Middle Hill provide panoramic views of the coastal hills, and would be suitable day-trips for trampers. Miller Stream provides good practical access to more challenging

tramping and climbing country west of the property on the Seaward Kaikoura Range. Miller and Wharekiri streams offer the potential for interesting day excursions, with spectacular stream gorges, populations of rare plants and opportunities for picnicking and swimming.

# PART 3 OTHER RELEVANT MATTERS AND PLANS

## 3.1 CONSULTATION

Information-gathering meetings were held with non-governmental organisations (NGOs) at Renwick on 6th September 2004, Christchurch on 8th September 2004 and at Geraldine on 9th September 2004. Issues raised at those meetings are summarised below.

- The most commonly used route in the area is George Stream/George Spur (north of the property) which provides access to Waiautoa and the Seaward Kaikoura Range.
- Trampers use the Puhi Peaks area (south of the property) to gain access to the Seaward Kaikoura Range.
- Happy Valley Stream (on Puhi Peaks south of the property) provides tramping and climbing access to Te ao Whekere on the Seaward Kaikoura Range; this is a popular peak (it is almost as high as the highest peak on the range, Manakau, further south).
- Agreed that if recreational access was restricted on Puhi Peaks (a new tourist lodge has been recently built in Happy Valley), access to the Seaward Kaikoura Range via Miller Stream on Middle Hill PL may become important.
- The property is used for safari hunting; it is not used for recreational hunting. Red deer and pigs are present. There have been problems with Canada geese on the river flats of the lower Clarence Valley.

## 3.2 DISTRICT PLANS

Middle Hill Pastoral Lease is in the Kaikoura District. The Kaikoura District Plan was notified in April 2000. In the Plan, Middle Hill is in the Rural zone and in an area classified as a significant landscape area. The following activities are restricted discretionary activities in a significant landscape area:

1. Earthworks exceeding cumulatively 2500$m^2$ in any 5 hectare area in any three year period, except for the maintenance of existing tracks, fence lines, drains, dams, ponds and except for earthworks for foot tracks provided that such tracks are no wider than 1.5m. Council's discretion in respect of this rule is restricted to:
    - Effects on landscape.
    - Visual effects.
2. Commercial forestry where any part of the forestry activity is visible against the skyline, when viewed from a Strategic Arterial Road (State Highway 1 and the Inland Road), or from the Kaikoura Peninsula water reservoir. Council's discretion in respect of this rule is restricted to the following:
    - Effects on landscape
    - Visual effects.

## 3.3 CONSERVATION MANAGEMENT STRATEGIES AND PLANS

Middle Hill Pastoral Lease lies within the Kaikoura Management Unit of the Nelson/Marlborough Conservation Management Strategy (Department of Conservation, 1996). Relevant priorities for this unit are listed as:

- Control goats in Inland and Seaward Kaikoura ranges.
- Control goats in forest, and fence remnant plant communities to prevent stock damage in coastal areas.
- Identify and seek protection of areas of significant natural or historic value on pastoral leases.
- Investigate the distribution and conservation status of reptile and giant invertebrate species.
- Survey and record archaeological sites.
- Negotiate appropriate access agreements to key areas.
- Maintain wilderness of central ranges and facilitate wilderness climbing experiences.
- Promote and maintain facilities for recreational hunting of chamois and other species.
- Seek controls on land clearance in the coastal area.
- Advocate retention of the coastal scenic corridor.

# PART 4 ATTACHMENTS

## 4.1 ADDITIONAL INFORMATION

### 4.1.1 Scientific Names of Species

**Plant Species**

Species names follow the published volumes of New Zealand Flora (Allan, 1961; Moore and Edgar, 1976; Webb, Sykes and Garnock-Jones, 1988; and Edgar and Connor, 1999), Brownsey and Smith-Dodsworth (1989) for ferns, Allison and Child (1971) for mosses, the name changes listed in Connor and Edgar (1987) and recent names (for shrubs) listed in Wilson and Galloway (1993). 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 |
|---|---|
| akeake | *Dodonaea viscosa* |
| akiraho | *Olearia paniculata* |
| beech/tawhai | *Nothofagus* spp. |
| black beech | *Nothofagus solandri* |
| black maire | *Nestegis cunninghamii* |
| blue tussock | *Poa colensoi* |
| bristle tussock | *Rytidosperma setifolium* |
| broadleaf/kapuka | *Griselinia littoralis* |
| broad-leaved snow tussock | *Chionochloa flavescens* |
| broom* | *Cytisus scoparius* |
| buddleia* | *Buddleja davidii* |
| bush lawyer | *Rubus* spp. |
| bush rice grass | *Microlaena* sp. |
| cabbage tree/ti rakau | *Cordyline australis* |
| catsear* | *Hypochoeris radicata* |
| climbing rata | *Metrosideros colensoi* |
| common broom | *Carmichaelia australis* |
| cotoneaster* | *Cotoneaster franchetti* |
| cotton daisy/tikumu | *Celmisia spectabilis* |
| crack willow* | *Salix fragilis* |
| creeping pohuehue | *Muehlenbeckia axillaris* |
| crown fern | *Blechnum discolor* |
| elderberry* | *Sambucus nigra* |
| fescue tussock | *Festuca* sp. |
| fierce lancewood | *Pseudopanax ferox* |
| fivefinger | *Pseudopanax arboreus* |
| foxglove* | *Digitalis purpurea* |
| golden speargrass/taramea | *Aciphylla aurea* |
| gooseberry* | *Ribes uva-crispa* |
| gorse* | *Ulex europaeus* |
| harebell | *Wahlenbergia albomarginata* |

hawthorn* ..... *Crataegus monogyna*
horopito ..... *Pseudowintera colorata*
hound's tongue fern ..... *Microsorum pustulatum*
inaka ..... *Dracophyllum uniflorum*
ivy* ..... *Hedera helix*
kaikomako ..... *Pennantia corymbosa*
kanuka ..... *Kunzea ericoides*
kawakawa ..... *Macropiper excelsum*
king devil hawkweed* ..... *Hieracium praealtum*
kiokio ..... *Blechnum novae-zelandiae*
kohuhu ..... *Pittosporum tenuifolium*
korokio ..... *Corokia cotoneaster*
koromiko ..... *Hebe salicifolia*
kowhai ..... *Sophora microphylla*
lancewood ..... *Pseudopanax crassifolium*
lemonwood/tarata ..... *Pittosporum eugenioides*
leafless lawyer ..... *Rubus squarrosus*
lowland ribbonwood ..... *Plagianthus regius*
mahoe ..... *Melicytus ramiflorus*
manuka ..... *Leptospermum scoparium*
Maori onion ..... *Bulbinella* sp.
mapou ..... *Myrsine australis*
Marlborough rock daisy ..... *Pachystegia* sp.
marbleleaf ..... *Carpodetus serratus*
matagouri ..... *Discaria toumatou*
matai ..... *Prumnopitys taxifolia*
mingimingi ..... *Cyathodes juniperina*
miro ..... *Prumnopitys ferruginea*
mountain beech ..... *Nothofagus solandri* var. *cliffortioides*
mountain flax/whaririki ..... *Phormium cookianum*
mountain ribbonwood/houhi ..... *Hoheria lyallii*
mountain toatoa ..... *Phyllocladus alpinus*
mountain totara ..... *Podocarpus hallii*
mouse-ear chickweed* ..... *Cerastium fontanum*
mouse-ear hawkweed* ..... *Hieracium pilosella*
narrow-leaved lacebark ..... *Hoheria angustifolia*
native jasmine ..... *Parsonsia* sp.
necklace fern ..... *Asplenium flabellifolium*
ngaio ..... *Myoporum laetum*
old man's beard* ..... *Clematis vitalba*
patotara ..... *Leucopogon fraseri*
pigeonwood ..... *Hedycarya arborea*
pink broom ..... *Carmichaelia glabrescens*
pohuehue ..... *Muehlenbeckia australis*
pokaka ..... *Elaeocarpus hookerianus*
porcupine shrub ..... *Melicytus alpinus*
prickly shield fern ..... *Polystichum vestitum*
Prince of Wales feathers ..... *Leptopteris superba*
privet* ..... *Ligustrum* sp.
prostrate kowhai ..... *Sophora prostrata*
raupo ..... *Typha orientalis*
rowan* ..... *Sorbus aucuparia*
scrub pohuehue ..... *Muehlenbeckia complexa*
silver tussock/wi ..... *Poa cita*
snapdragon* ..... *Antirrhinum majus*

snowberry ..... *Gaultheria depressa* var. *novae-zelandiae*
stinking iris* ..... *Iris foetidissima*
stonecrop* ..... *Sedum acre*
supplejack/karaeopirita ..... *Ripogonum scandens*
sweet brier* ..... *Rosa rubiginosa*
sweet vernal* ..... *Anthoxanthum odoratum*
tauhinu ..... *Ozothamnus leptophyllus*
thistles* ..... *Cirsium* spp.
titoki ..... *Alectryon excelsus*
toetoe ..... *Cortaderia richardii*
totara ..... *Podocarpus totara*
tree fuchsia/kotukutuku ..... *Fuchsia excorticata*
tree nettle ..... *Urtica ferox*
tree tutu ..... *Coriaria arborea*
tutu ..... *Coriaria sarmentosa*
vetch* ..... *Vicia sativa*
viper's bugloss* ..... *Echium vulgare*
wall lettuce* ..... *Mycelis muralis*
weeping broom ..... *Carmichaelia stevensonii*
weeping matipo ..... *Myrsine divaricata*
white clover* ..... *Trifolium repens*
wineberry ..... *Aristotelia serrata*
yellowwood ..... *Coprosma linariifolia*
Yorkshire fog* ..... *Holcus lanatus*

## Animal Species

Species names follow King (1990) for mammals, 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 birds, 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

Australasian harrier/kahu ..... *Circus approximans*
Australian magpie* ..... *Gymnorhina tibicen*
banded dotterel ..... *Charadrius bicinctus bicinctus*
banded kokopu ..... *Galaxias fasciatus*
bat ..... *see* South Island long-tailed bat
bellbird/korimako ..... *Anthornis melanura melanura*
black-billed gull ..... *Larus bulleri*
black-fronted tern ..... *Sterna albostriata*
black shag/koau ..... *Phalacrocorax carbo novaehollandiae*
bluegill bully ..... *Gobiomorphus hubbsi*
bluff weta…… *Deinacrida elegans,*
brown creeper ..... *Mohoua novaeseelandiae*
brown trout* ..... *Salmo trutta*
brushtail possum* ..... *Trichosurus vulpecula*
California quail* ..... *Callipepla californica brunnescens*
Canterbury galaxias ..... *Galaxias vulgaris*
chaffinch* ..... *Fringilla coelebs*
chamois* ..... *Rupicapra rupicapra rupicapra*
Chinook salmon* ..... *Oncorhynchus tshawytscha*

chukor*.....*Alectoris chukar*
common gecko .....*Hoplodactylus maculatus*
common skink .....*Oligosoma nigriplantare polychroma*
common smelt/paraki .....*Retropinna retropinna*
feral goat*.....*Capra hircus*
feral pig* .....*Sus scrofa*
grey duck/parera.....*Anas superciliosa superciliosa*
grey warbler/rironiro.....*Gerygone igata*
inanga .....*Galaxias maculatus*
Kaikouras gecko.....*Hoplodactylus* aff. *maculatus* "Kaikouras"
koaro.....*Galaxias brevipinnis*
little shag .....*Phalocrocorax melanoleucos brevirostris*
longfin eel.....*Anguilla dieffenbachii*
long-tailed cuckoo/koekoea.....*Eudynamys taitensis*
Marlborough mini gecko.....*Hoplodactylus* aff. *maculatus* "Marlborough
.....mini"
Marlborough giant weta……...*Deinacrida parva*
mallard*.....*Anas platyrhynchos platyrhynchos*
morepork/ruru koukou.....*Ninox novaeseelandiae novaeseelandiae*
New Zealand falcon/karearea.....*Falco novaeseelandiae*
New Zealand kingfisher/kotare .....*Halcyon sancta vagans*
New Zealand pigeon/kereru .....*Hemiphaga novaeseelandiae novaeseelandiae*
New Zealand pipit/pihoihoi.....*Anthus novaeseelandiae novaeseelandiae*
paradise shelduck/putakitaki .....*Tadorna variegata*
parakeet/kakariki .....*Cyanoramphus* sp.
perch* .....*Perca fluviatilis*
red deer* .....*Cervus elaphus scoticus*
rough gecko .....*Heteropholis rudis*
scree skink.....*Oligosoma waimatense*
scree weta…… *Deinacrida connectens*
shining cuckoo/pipiwharauroa .....*Chrysococcyx lucidus lucidus*
shortfin eel.....*Anguilla australis*
shortjaw kokopu .....*Galaxias postvectis*
silvereye .....*Zosterops lateralis lateralis*
skylark* .....*Alauda arvensis*
southern bell frog* .....*Litoria raniformis*
southern black-backed gull/karoro .....*Larus dominicanus dominicanus*
South Island fantail/piwakawaka .....*Rhipidura fuliginosa fuliginosa*
South Island long-tailed bat.....*Chalinolobus tuberculatus*
South Island pied oystercatcher.....*Haematopus ostralegus finschi*
South Island rifleman/titipounamu.....*Acanthisitta chloris chloris*
South Island robin/kakaruai .....*Petroica australis australis*
South Island tomtit/miromiro .....*Petroica macrocephala macrocephala*
spotted skink.....*Oligosoma lineoocellatum*
spur-winged plover.....*Vanellus miles novaehollandiae*
torrentfish/piripiripohatu .....*Cheimarrichthys fosteri*
tui .....*Prosthemadera novaeseelandiae novaeseelandiae*
upland bully.....*Gobiomorphus breviceps*
'Wellington' speargrass weevil…… *Lyperobius huttoni*,
welcome swallow .....*Hirundo tahitica neoxena*
white-faced heron.....*Ardea novaehollandiae novaehollandiae*
yellow-crowned parakeet/kakariki .....*Cyanoramphus auriceps auriceps*
yellowhammer* .....*Emberiza cintrenella*
yellowhead/mohua .....*Mohoua ochrocephala*

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