

TARINGATURA ECOLOGICAL DISTRICT

Survey Report for the Protected Natural Areas Programme

1998



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Department of Conservation
Te Papa Atawhai

Addendum

Since the field work was completed and the report published the Department of Conservation has become aware of several changes in land ownership and some other changes (ie afforestation affecting two RAP's). This note updates these issues.

Page 34	RAP 1A; Tenure: also part North Etal Station, Mr Robin Pears
Page 40	RAP 1C; Tenure: also part Etalvale Station, Mr Robin Pears
Page 46	RAP 3; Tenure: Owner now Mr Steve Clearwater, also part Dipton Lime Co.
Page 49	RAP 4; Tenure: Farm Manager now Mr B. Stevenson contact Mr Gerry Soanes (Landcorp Regional Farming Manager, Christchurch.
Page 52	RAP 5; Tenure: southwest portion, consortium contact Mr Mike Saunders northern portion, Mr Nigel. & Jeffery. Beer northeast portion, Mr Mervin Beer southeast portion, Mr James Duthie
Page 60	RAP 7; Tenure: owner now Dunrobin Farm Ltd, C/- Mr Tony Buchanan Area: c. 40ha.
Page 62	RAP 8; Tenure: owner Mr M. T. Day
Page 64	RAP 9; Tenure: owner Mr Clive Wilson, leasee Mr B. McNaughton
Page 68	RAP 11; Note: This area has been afforested since the survey field work and report completion.
Page 70	RAP 12; Tenure: contact Mr D. Ballantyne
Page 76	RAP 15; Tenure: eastern portion Mr John Douglas western portion Mr Chris Smith
Page 86	RAP 20; Note: Much of this area has been afforested since the survey field work and report completion.
Page 88	RAP 21; Tenure: Farm Manager now Mr B. Stevenson contact Mr Gerry Soanes (Landcorp Regional Farming Manager, Christchurch.
Page 92	RAP 23; Tenure: Farm Manager now Mr B. Stevenson contact Mr Gerry Soanes (Landcorp Regional Farming Manager, Christchurch Note: Hamilton Burn Bush area is protected under a Reserves Act Covenant.

Brian Rance
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Southland Conservancy
14 June 1999.

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Survey Report for the Protected Natural Areas Programme

N.C. SIMPSON

New Zealand Protected Natural Areas Programme

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Summary

Taringatura Ecological District was surveyed as part of the New Zealand Protected Natural Areas Programme (PNAP) during the summer of 1995-96.

Taringatura Ecological District lies to the east of the Takitimu Mountains, south of the Eyre Mountains and north of the Southland Plains. It comprises low, rolling hill country of sedimentary rock dissected by the broad river valley of the Aparima and cut off to the east by the similar broad valley of the Oreti River. Along the northern edge, north-west to south-east trending hills form part of the edge of the Southland Syncline. A small but spectacular outcrop of limestone occurs on its southern boundary. Several large peat bogs are a feature of the district. The climate is cool temperate with few extremes in temperature or rainfall.

In pre-European times the district was largely forested with small areas of red tussockland, shrubland and peat bogs. Subsequent clearing for farm land has changed this dramatically with most of the flat land now in pasture and the semi-developed hill country converted or being converted to exotic forestry. But significant areas of natural vegetation are found in damp valleys, lowland bogs and on the hill country. Remnant pockets of podocarp-broadleaved forest and beech forest, areas of red tussock grassland, shrublands and peat bogs, still remain. Much of the hill country today has either been de-stocked, has low stock numbers or is being planted for forestry. Regeneration of shrublands in particular shows the potential for this land to recover to something akin to its original vegetation in time. Eleven plants that are listed in the New Zealand Threatened and Local Plants List (1995) are found within the district. Threats to native vegetation include clearing and draining, afforestation, browsing animals and weeds.

There are only eleven, generally small, areas presently protected as reserves or by QEII covenant in the district totalling less than 2,500 ha. Only silver beech forest has reasonable representation in existing reserves. Red tussock grassland, peat bog, shrubland and limestone communities are poorly represented or not represented at all.

To adequately protect the biodiversity and allow natural changes to occur, protected areas should be relatively large areas with a range of moisture regimes, altitudinal sequences and differing aspects. Linkages between areas, such as between the Takitimu mountains, Letham bush and Wairaki Hills are important to allow the free movement of biota, particularly birds and invertebrates.

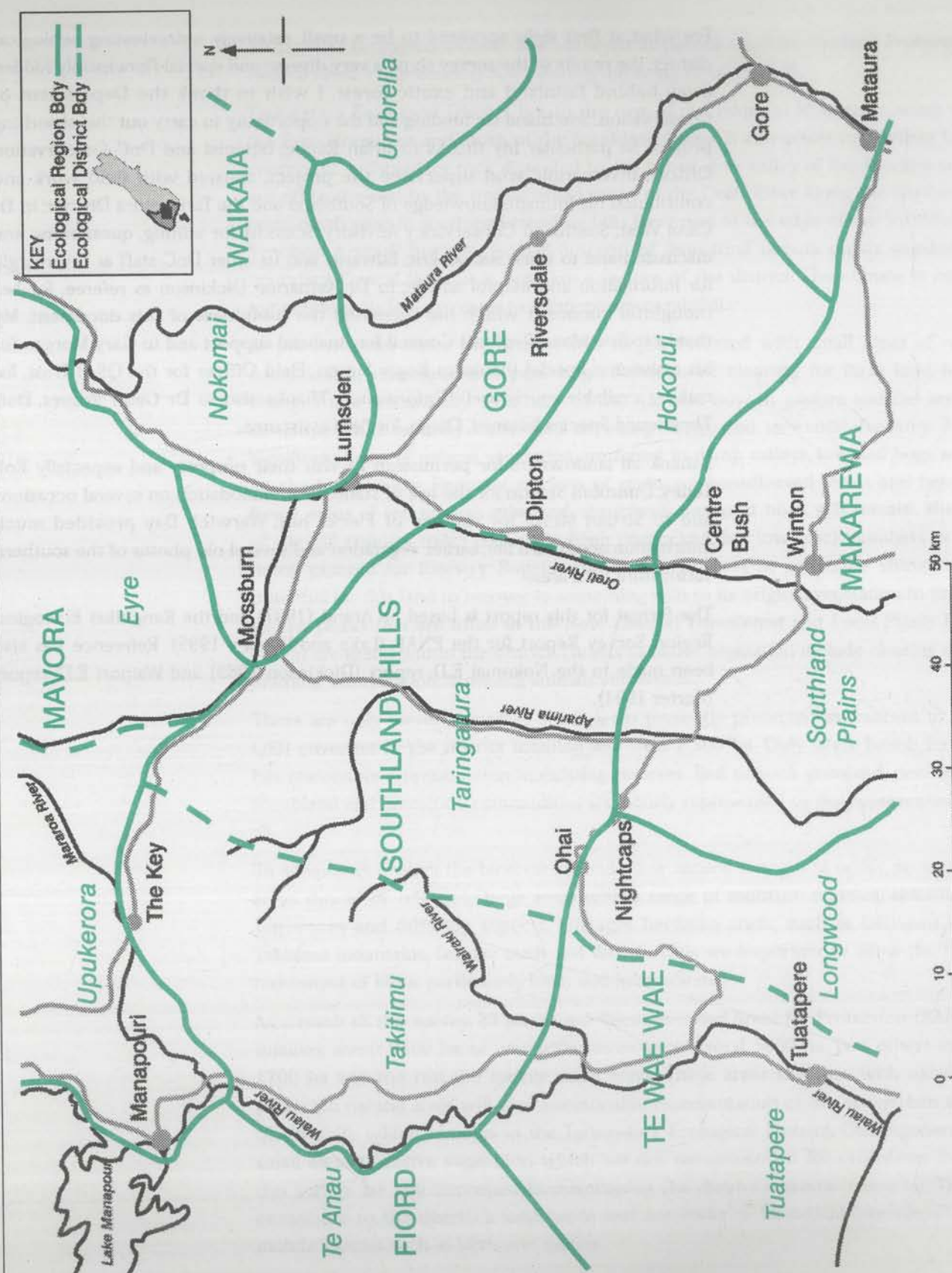
As a result of this survey, 23 places are Recommended Areas for Protection (RAPs), totalling about 9500 ha, of which the three largest total 5600 ha. Two others total 1700 ha and the rest are mainly small areas. These areas together with existing protected natural areas will give a reasonable representation of the ecosystems and biodiversity which remains in the Taringatura Ecological District. Other generally small areas of native vegetation which are not recommended for protection from this survey are still important in maintaining the district's natural character. They contribute to the district's landscapes and networks of biological "corridors" for mobile species such as birds and insects.

Acknowledgements

For what at first sight appeared to be a small, relatively uninteresting ecological district, the results of the survey show a very diverse and special flora mainly hidden away behind farmland and exotic forest. I wish to thank the Department of Conservation, Southland for funding and the opportunity to carry out this absorbing project. In particular my thanks to Brian Rance, botanist and DoC Conservation Officer, Invercargill, who supervised the project, assisted with field work and contributed his intimate knowledge of Southland and the Taringatura District; to Dr Carol West, Southland Conservancy Advisory Scientist for editing, questioning and discussion and to Chris Rance, Eric Edwards and to other DoC staff at Invercargill for information and helpful advice; to Dr Katharine Dickinson as referee, for her thoughtful comment which has increased the usefulness of this document. My thanks to Southland Regional Council for financial support and to Gary Morgan for his assistance. Special thanks to Roger Sutton, Field Officer for the QE II Trust, for making available much useful information. Thanks also to Dr Geoff Rogers, DoC Threatened Species botanist, Otago, for field assistance.

I thank all landowners for permission to visit their property and especially Rob Tetley, Dunrobin Station for the use of station accommodation on several occasions and to Struan Minty for the use of Flecks hut. Warwick Day provided much information about bird life, earlier vegetation and several old photos of the southern Taringatura Hills area.

The format for this report is based on Arand (1997) and the Rangitikei Ecological Region Survey Report for the PNAP (Lake and Whaley 1995). Reference has also been made to the Nokomai E.D. report (Dickinson 1989) and Waipori E.D. report (Carter 1994).



Chapter 1 Introduction

1.1 THE PROTECTED NATURAL AREAS PROGRAMME

The Protected Natural Areas Programme (PNAP) was set up in 1983 in response to the objective expressed in Section 3 (1) (b) of the Reserves Act 1977 which identified the need for

"...the preservation of representative samples of all classes of natural ecosystems and landscapes which in their aggregate originally gave New Zealand its own character".

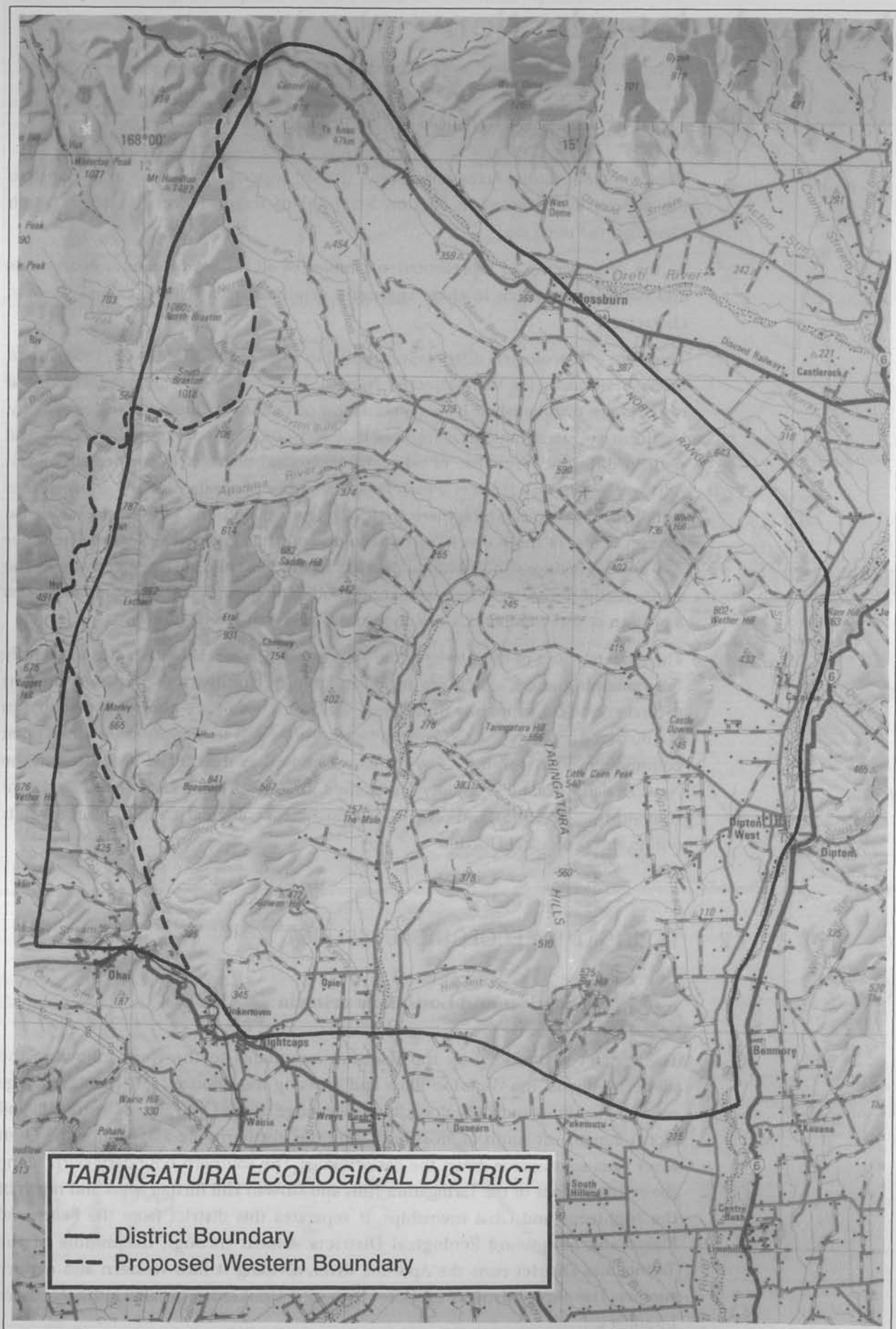
There are 268 ecological districts recognised in New Zealand (McEwen, 1987), these being basic units for the Protected Natural Areas Survey Programme. Ecological districts are distinguished by a combination of factors, including climate, geology, landform, soils and biological features that serve to form a recognisable ecological pattern different from that of adjacent ecological districts (Myers et al., 1987). Adjacent ecological districts which have a number of similarities are grouped into ecological regions, of which there are 85 in New Zealand. The Taringatura Ecological District is one of three districts in the Southland Hills Ecological Region. The other two are the Takitimu and Hokonui districts to the west and east, respectively. To the south, lie the Southland Plains and Longwood Ecological Districts. To the north, lies a portion of three Districts, Gore, Eyre and Upukerora (see Figure 1).

The main purpose of the survey of the Taringatura Ecological District was to identify the remaining areas which are representative of the district's past and present natural condition, especially those areas which are not or are poorly represented in the district's protected areas. A secondary purpose was to identify any special plant communities and search for any plants recognised as threatened and listed in the New Zealand Botanical Society Threatened and Local Plant Lists (1995 Revision) (Cameron et al., 1995) and also to evaluate the ecological condition and trends within the Ecological District.

1.2 TARINGATURA ECOLOGICAL DISTRICT

Location and boundary criteria

The district is bounded by the Takitimu mountains to the west, following the western edge of the Waterloo Burn and crossing the Braxton - Mt Hamilton ridge over Mt Hamilton and then along its eastern edge to the Oreti River. Centre Hill and North Range, just south of Mossburn, form the northern boundary while the Oreti River runs southwards down the eastern edge. The southern boundary skirts along the southern foot of the Taringatura Hills and Gowan Hill further west and north of the Nightcaps and Ohai townships. It separates this district from the Southland Plains and Longwood Ecological Districts. Almost through the middle of the Taringatura District runs the Aparima River, dividing it into western and eastern sectors. The three districts of Gore, Eyre and Upukerora lie along the northern boundary.



The survey included the whole of the Beaumont, Ardross and Waterloo pastoral leases although the western parts of Beaumont, Waterloo and the South Braxton area, lie outside the district boundary as presently drawn.

Boundary Definition (possible changes)

The northern, eastern and southern boundaries appear to be logical and no change is considered necessary. The western boundary is not so clearly delineated as it crosses less clearly defined areas. Letham Bush, an isolated north-south trending ridge, could fit into the Takitimu District on the basis of its vegetation but, as shown at present, remains in the Taringatura District. The Waterloo Burn penetrates north into the Takitimu Mountains with silver beech forest on either side so fits logically into the Takitimu District although the valley floor, on the basis of its vegetation, fits easily into the Taringatura District. In the north the boundary crosses the Mt Hamilton-Braxton ridge which is an outlier of the Takitimu Mountains and in the south, an area of rolling hill country is split between the Taringatura and Takitimu Districts.

It is suggested that north of Wairaki River, the western boundary should follow the bush edge along the foot of the Takitimu Mountains as far as the Aparima River, then east around the base of South Braxton to follow northwards along the foot of the Mt Hamilton/ South Braxton ridge to State Highway (SH) 94 just west of Centre Hill as shown in Figure 2). The large area of silver beech forest on Letham Hill, Letham Bush, is separated from the Takitimu District by the Letham Burn and Pleasant Creek and should remain in the Taringatura District as at present.

In the south there are less clear topographical or vegetation boundaries. This country is mostly part of Beaumont Pastoral Lease. It is gently rolling hill country with patchy red and hard tussock and developed pasture with remnant scrub patches. The recommendation for this western boundary is to follow the bush edge south of Wairaki Hut to where a prominent north-flowing tributary joins the Wairaki River then take a direct line to and down the Morley Stream to Gorge Road (Map 2). This line has both a pedological and geological basis. It separates the Taringatura Upland and High Country Yellow-Brown Earths from the Brown Granular Loams and clays to the west and it also separates the Takitimu Permian volcanic rocks from the Triassic Period marine sedimentary rock of the Taringatura District and is the preferred boundary.

An alternative boundary would be to follow the Wairaki River to the Tuatapere District boundary. This would then include all the rolling hill country to the east of the Wairaki River, most of which was not surveyed. This is based mainly on geomorphological values.

Description

The Taringatura Ecological District as proposed above covers approximately 111,000 ha in central Southland. Low ranges of hills characterise the District, with the highest point being North Braxton at 1080 m in the north-west. The broad valley of the Aparima flows almost through the centre of the District separating it into western and eastern sectors. The eastern portion has a northern hilly area consisting

of two parallel, roughly northwest-southeast trending ridges. These are the North Range and the Barn Hill-White Hill and Wether Hill. They form part of the upturned edge of the Southland Syncline. A small but spectacular outcrop of limestone occurs at Castle Rock on the southern edge of White Hill. Nearby a large wetland, the Castle Down swamp, separates these northern hills from the Taringatura Hills (660 m) which run parallel to the Oreti River forming the eastern boundary of the District. These hills are rapidly disappearing under plantation forests. Small remnants of podocarp-broadleaved forests are found at their south-eastern corner where the land drops to below 100 m. To the west, across the river flats of the Aparima, and north of Ohai is rolling hill country, the Wairaki Hills rising to 931 m (Etal Hill) and separated from the Takitimu Mountains by the Wairaki River and the Letham Burn. Much of this country has been developed for pastoral use or is planted in plantation forests. Gowan Hill is the site of extensive forestry activities. Letham Bush covers a long, north-south trending ridge between the Takitimu Mountains and the generally more developed hill country further east. North again lies the Waterloo Burn which separates the outlying Mt Hamilton-South Braxton ridge from the rest of the Takitimu Mountains. The north-west corner of the District contains river terraces and broad, gently sloping, fans falling from Mt Hamilton with Centre Hill standing apart to the west of Mossburn. Several flat valley bottoms to the north contain large wire rush bogs, some with extensive shrub communities. Castle Down Swamp is the largest of these. The Waterloo Burn has the most varied and interesting wetlands which include several large bogs. These bog areas are a feature of the District.

Apart from the three Pastoral Leases, Beaumont, Ardross and Waterloo and small areas of Crown Land, most of the District is freehold with almost all flat land in the broad river valleys, developed, except for some bogs. Sheep farming is the predominant use with some cattle farming. Much of the hill country including most of the Taringatura Hills and large parts of the Wairaki Hills, are being taken for forestry development. The rapid land use changes and its potential for afforestation in this District was the primary reason for this survey. Existing protected areas are few and small and do not protect a representative sample of the Taringatura District's biological communities or the rare and threatened plants here. Because so much of this district has already been developed, almost all of the remaining natural areas are important. Appendix 3 lists the maps which cover the Taringatura District.

Climate

Cool temperate, humid to subhumid with semi-drought experienced some summers; annual average rainfall 800–1000 mm. Very strong NW winds, strong enough to blow over farm buildings, frequently occur along the foot of the Takitimu Mountains (John Minty pers. comm.).

Soils

Soils of the hills above about 250 m are classed as Upland and High country Yellow-Brown Earths (mainly Taringatura soil type) with related steepland soils and were formed under forest in a cold to cool climate (Gibbs 1980). On the lower slopes, where the climate is milder, Lowland Yellow-Brown Earths predominate. These are Kaihiku soils. They also occur along the top of North Range and again at the south-

east corner of the Taringatura Hills but in this latter location, they are Owaka soils and formed under podocarp-broadleaved forest. Flat to gently sloping land along the foot slopes and out on to the flat river terraces are classed as Yellow-Grey to Yellow-Brown Earths Intergrade. They are mainly Mossburn soils, except on the eastern side of the Taringatura Hills and south of Mossburn, where they are Dipton soils. These are drier soils with an annual period of moisture deficiency and formed under a broad-leaved forest or tussock grassland and shrubland. Lowland Yellow-Brown Earths of the Wairaki soil type, are found east of Centre Hill with Organic soils (Otanamomo soils) on the series of bogs here and in the Waterloo Burn and Castle Down Swamp. These are peat soils. Yellow-Brown Loams, Dunton soils of volcanic origin, occur in the Waterloo Burn. Small outcrops of Rendzina soils (limestone) occur at Castle Rock. In the Dunrobin area, Yellow-Brown Earths Intergrade occurs on an old glacial outwash fan (with dry-land red tussock cover). Recent soils from alluvium, are found along major rivers, around Castle Down Swamp and at the lower Braxton Burn (Cutler and Wright 1964, Gibbs 1980).

Landform and Geology

Low rolling Wairaki and Taringatura Hills lie in a north - south orientation, either side of the Aparima River. Both are composed of sedimentary rocks consisting of sandstone, siltstone and mudstone of the Triassic period with fossil beds in places. At Productus Creek (the south-west end of Letham Bush) a series of shell beds and limestone have good examples of lampshells (the productids), fossil sponges, corals and a grey limestone made up entirely of bits of shell. The fossil leaf of a Permian seed-fern, *Glossopteris ampla*, has been found here (Thornton 1995). The brachiopod and molluscan shell beds continue north to Coral Bluff named for the fossil corals found here (Mutch 1972). The North Range and the Barn Hill-White Hill ridge run north-west to south-east across the north of the District. They form the upturned edge or strike-ridges (Wood 1966) of the Southland Syncline with gently sloping south faces and steep scarp faces to the north. They are also composed of sedimentary rocks similar to those of the Taringatura Hills. The Castle Rock limestone is an outlier of the synclinal depression. This is a creamy limestone of early Miocene or Pareoran series with coarse shell debris and occasional whole shells, pectens, brachiopods and rarer sharks teeth. An extensive synclinal basin extends from Centre Hill south-east as far as Castle Down Swamp. It is filled with Quaternary glacial outwash gravels and alluvium with peat bogs occurring in the several extensive depressions between flat topped valley terraces. The township of Mossburn is on one of these terraces. South and west are the Centre Burn, Dunrobin and Braxton terraces, all successively higher. The Waterloo Burn occupies a fault-angle depression to the west of the fault-folded Braxton ridge. The east side of the Braxton ridge alluvial and rock-fan slopes are dissected by the south and north branches of the Braxton Burn and the Hamilton Burn. These are mainly Tertiary sediments overlaying coal measures (Mutch 1972). To the south the hills drop to the extensive Southland Plains. Wide, flat valleys of Tertiary gravels with swamps mark the courses of rivers and major streams.

Landscape Character

The landscape falls into six broad character types (Petrie 1996)(refer figure 3).

Type 1 - lowlands

This area contains the main river valley catchments. These are the Oreti River Valley, the Aparima River Valley (and its tributaries, the Centre Burn/Hamilton Burn) and the Castle Down Swamp. Most of this land is farmland. Some of the northern area has low rolling hill country reaching an altitude of over 450 m.

Type 2 - rolling downland

A small area in the south-east around the foot of the Taringatura Hills. This unit contains the only podocarp-broadleaved forest remnants in the district, but is mainly farmland.

Type 3 - gorge

Squeezed between the Wether Hills and Taringatura Hills is a small gorge containing limestone outcrops on its north side. It runs south from the Castle Down Swamp.

Type 4 - rounded high hills

The Taringatura Hills, Wether Hills, North Range block and Centre Hill form this land unit. The land use has changed from primarily pastoral to plantation forestry. Only a few small remnant native plant communities remain.

Type 5 - mountain foothills

This land unit forms a broad band along the western boundary of the Taringatura district and takes in all the hill country (Wairaki Hills) west of the Aparima River and north to Pleasant Creek and the Aparima River.

Type 6 - steep hills to mountainlands

Mt Hamilton and adjacent Braxton Range in the north-west corner forms this small land unit.

VEGETATION

Pre European

Various pieces of information contribute to the picture that leads to our present suppositions about the vegetation of New Zealand before the arrival of humans about 1000 years ago. After the last glaciation (c. 100,000 - 10,000 years ago) the vegetation was predominantly grassland and shrubland. Forest remnants would have occupied small, scattered sites where there was a favourable microclimate (McGlone, 1985). A major change occurred about 10,000 years ago when the climate appears to have become subtropical and podocarp-broadleaved forest abruptly replaced the grassland and shrubland on all favourable sites. This forest is likely to have covered most of the Taringatura District until a cooling of the climate between 7000 and 1000 years ago. This climate change led to frostier and drier weather and increased wind leading to *Nothofagus* (beech) infiltration with podocarp-broadleaved forest confined to warmer more fertile sites, matai, totara and kahikatea preferring fertile soils. The wet swampy valley bottoms with high water tables and acid soils would have retained the wetland species including red tussock (*Chionochloa rubra* var. *cuprea*) and shrubland of manuka (*Leptospermum scoparium*), bog pine (*Halocarpus bidwillii*), *Dracophyllum* and stunted mountain beech (*Nothofagus solandri* var. *cliffortioides*) (Stevens et. al. 1988). Forest wetlands also occurred. Shrubland would have occurred around bush edges, along river beds and on rocky ground. The small sub-alpine plant species and snow tussock (*Chionochloa rigida*) would have occupied rocky ground and bluffs. Grassland would have been found on river terraces prone to flooding, frost-prone valley floors, steep cliffs, leached shallow soils and recently disturbed areas (McGlone 1989).

Human impact has made drastic changes. Natural and anthropogenic fire throughout the Holocene (last 10,000 years) removed much of the forest. Early surveys in the 1840-1860 period reported much fernland, grassland, scrubland and swamp with forest in the west, but large areas of forest including pockets of podocarp forest would have dotted the land. The demand for pastoral land led to further extensive forest clearance and the draining of wetlands. The tussockland increased. Red tussock and fernland, especially, becoming more extensive both species having the ability to grow from the base or from underground rhizomes. Shrubs were also more extensive, spreading from small pockets and damp gullies which escaped fire and clearance.

Post European

The present vegetation patterns are largely the result of disturbance from fire, farming and more recently, from planted forests. Native forest has decreased significantly, especially the podocarp-broadleaved forest which is now confined to a few remnant pockets in wet gullies on low terraces at the south-east corner of the Taringatura Mountains. Large matai (*Prumnopitys taxifolia*), totara (*Podocarpus hallii*) and kahikatea (*Dacrydium dacrydioides*) with the occasional rimu and miro are the podocarps found in these remnants with a variety of broadleaved species including very large pokaka (*Elaeocarpus hookerianus*), tarata (*Pittosporum eugenoides*) and broadleaf (*Griselinia littoralis*). Small patches of

mature silver beech (*Nothofagus menziesii*) trees also grow within these forest patches. These tiny areas are important as the last of a once more extensive forest community and where fenced, are slowly recovering. The unfenced areas have few seedlings or young trees and will gradually disappear as the older trees die. Some of these areas contain the rare or threatened plants *Melicytus flexuosus**, *Olearia hectorii* and *Pseudopanax ferox*. Silver beech is the dominant forest tree of the district and remnant patches occur throughout but are concentrated in the west, on the Wairaki Hills with an extensive area on Letham Hill and up the Waterloo Burn. Numerous *Coprosma* species and weeping mapou (*Myrsine divaricata*) are the main associated shrubs with a few broadleaf, wineberry (*Aristotelia serrata*), fuchsia (*Fuchsia excorticata*) and kohuhu (*Pittosporum tenuifolium*). Red beech (*Nothofagus fusca*) occur sporadically on a few favourable sites on the western side of the Wairaki Hills and are probably relicts of the podocarp association of earlier times (Mutch 1975). Mountain beech is found in small patches on drier sites in the silver beech forest and a small area occurs on a terrace riser above the Hamilton Burn. It has had stock through it but contains a rich variety of understorey trees and shrubs including the small tree fern *Cyathea colensoi*. Silver beech forest also occurs in small pockets on the south end of the Taringatura Hills, surrounded by conifer plantations.

Broadleaf-ribbonwood-kowhai forest patches are found on the north end of Etal ridge. There are many associated tree and shrub species including *Coprosma wallii*, *C. obconica*, *C. virescens*, *C. rotundifolia*, *C. rhamnoides*, *C. linariifolia*, *Melicope simplex*, tree nettle (*Urtica ferox*), weeping mapou, mountain wineberry (*Aristotelia serrata*), mountain lacebark (*Hoheria glabrata*), kohuhu, putaputaweta (*Carpodetus fruticosus*) and *Melicytus* aff. *alpina*. Very large weeping mapou and old broadleaf standing in tall pasture grasses are a feature of this area also.

Shrubland was probably more dominant in the past but pastoralism and the need for grass has led to its reduction in area, mainly by burning. There are some signs of it increasing at the expense of red tussock where areas have not been burnt for long periods and the seed source remains, especially around Etal Hill and Mt Rouse. *Dracophyllum* shrubland, *Brachyglottis cassinioides* shrublands and mountain holly (*Olearia ilicifolia*) shrublands form extensive stands and appear to be increasing. *Coprosma*, manuka and matagouri (*Discaria toumatou*) shrublands are also extensive on lower slopes in the north. Important shrub communities are found at the north end of the Wairaki Hills where three threatened plants are found. *Coprosma wallii*, *Coprosma obconica* and *Olearia fragrantissima* occur in patches in the broadleaf-ribbonwood-kowhai forest and adjacent shrubland which also contains many divaricating shrubs including eight other small-leaved *Coprosmas*. These are the most important and unusual communities in the district and possibly in Southland. Centre Hill also has good shrubland communities and a small area of three-finger (*Pseudopanax colensoi* var. *ternatus*) forest.

Following the destruction of much forest by fire, red tussock has spread to occupy large areas of the land from the lowlands to the tops of the hills. It was probably always present on wet, poorly drained sites, in frost hollows, on stony river terraces

* Botanical names follow the New Zealand Flora series and recent changes published in the New Zealand Journal of Botany. Use has also been made of the checklist of Indigenous Higher Plants (1992) and Otago/Southland Flora (Druce 1992).

and on leached shallow soils, places not conducive to forest establishment. Most of the flat land is now in pasture and the rolling hill country is rapidly disappearing under planted conifers. Relatively intact areas of red tussock communities remain on the Wairaki Hills, on terraces and fans below the Mt Hamilton/Braxton Mountains, Dunrobin Flats and along the White Hill/Barn Hill area. Associated plants include hard (*Festuca novae-zelandiae*), silver (*Poa cita*) and blue tussock (*Poa colensoi*), small shrubs such as *Coprosma cheesemanii*, *Cassinia vauvilliersii*, *Gaultheria depressa* var. *novaezelandiae*, numerous herbs, the taller shrubs of *Olearia bullata*, *Coprosma* aff. *parviflora* and various native rushes, sedges and ferns. The latter occur in the wetter areas with more shrubs in the drier red tussock. Only a tiny area of this red tussock with shrubland remains at Taringatura trig at the northern end of the Taringatura Hills, and some intact areas surround Letham Burn and occur on river terraces at the head of the Wairaki River. Of particular interest is the red tussockland and associated wetlands in the Waterloo Burn which is still grazed by cattle. This area has rich communities of native plants including two other threatened plants (*Carex tenuiculmis* and *Ranunculus ternatifolius*), both relatively abundant. Not all the red tussock communities are found on wetter ground. On Dunrobin Station, red tussock is found on a stony terrace, above the Aparima River, formed of outwash gravels. As well as the typical associated plants, this community contains a higher percentage of mosses, lichens and introduced plants. There are also ablation hollows, mainly bare of plants. It is here that another rare plant is found. The tiny lily, *Iphigenia novae-zelandiae*. Another tiny, rare plant *Pseudognaphalium* "compactum" is found here also. Other plants of this area are *Pimelea prostrata*, *Viola cunninghamii*, *Botrychium millefolium* and *Craspedia* sp.

The large wire-rush (*Empodisma minus*) and sphagnum (*Sphagnum cristatum*) bogs are a feature of the District. Most have been burnt and are in various stages of being drained. Several, including the large Castle Downs Swamp, are in relatively natural condition, with exotic species present on disturbed areas only, such as along drainage channels. Shrubland with much bog pine, manuka, and *Dracophyllum* sp. was probably more common on these bogs in the past and in some places is making a recovery. This is most noticeable on the So Big Bog adjacent to the Wildlife Management Area, but could be due to the bog becoming drier through draining.

Another feature is the spectacular limestone bluffs of Castle Rock. Limestone is being mined from the south-east end, the rest is mainly covered with a diverse shrubland which includes matagouri, *Coprosma* species, weeping mapou and the threatened shrub *Teuclidium parvifolium*. *Melicope simplex*, complete with the small mistletoe *Korthalsella clavata*, is also here. Deep gullies with cabbage trees (*Cordyline australis*) and flax (*Phormium tenax*), cliffs which protect broadleaf, kowhai (*Sophora microphylla*) and the calcicole fern *Asplenium lyallii*, small caves, spectacular eroded flutings, shells and moa bones add to the value of this area.

THREATENED PLANTS

Eleven of the plants found in the Taringatura District are listed in the New Zealand Threatened and Local Plants List (1995 Revision), (Cameron et al.1995). The following categories are represented :

Endangered

Plants in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included are plants whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Olearia hectorii *Pseudognaphalium* sp. "compactum"

Only one adult tree of *Olearia hectorii* was found in a small patch of forest beside the Taringatura Camp. This patch beside the road, is fenced, but is surrounded by long grass which prevents any seedling establishment. Regarding the decline of *Olearia hectorii*, Rogers (1995) states "Forest clearance in its agriculturally valuable habitat has led to a dramatically contracted range in the period of European colonisation. Intensified pastoral farming of its habitat in the last 30-40 years has eliminated regeneration opportunities, contributing to a recruitment crisis at 75% of its 23 recorded sites".

Pseudognaphalium sp. "compactum" and *Iphigenia novae-zelandiae* (vulnerable) are found in open deflated hollows in a red tussock area on Dunrobin Station which has a QE II Trust Covenant over it. Both are tiny plants easily overlooked. The exact status of *Iphigenia novae zelandiae*, a tiny member of the lily family, is uncertain at present. This is the only known Southland site. It has been seen at one site in North Otago and was originally collected in Canterbury but Given (1981) states that there have been no recent reports of its presence in Canterbury.

Vulnerable

Plants believed likely to move into the Endangered category in the near future if the causal factors continue operating.

Coprosma wallii *Iphigenia novae-zelandiae* *Melicytus flexuosus*

Olearia fragrantissima *Ranunculus ternatifolius* *Teucrium parvifolium*

On Dunrobin, on hills between Kowhai and Kangaroo Creeks are found *Coprosma wallii*, *C. obconica* and *Olearia fragrantissima* in broadleaf - manatu (ribbonwood) - kowhai forest remnants. Habitat disappearance and weed and introduced grass competition appear to be the cause of their vulnerability.

Melicytus flexuosus is a plant of damp, lowland bush margins whose habitat is gradually disappearing. It occurs on the flat terrace at the bottom of the Taringatura Scenic Reserve and adjacent Taringatura Camp area. The tangled, twiggy shrub, *Teucrium parvifolium*, is found in steep, west facing gullies on the Castle Hill limestone area. It has a very restricted distribution, being found in scattered localities in small numbers. *Ranunculus ternatifolius* is a delicate, straggling buttercup mainly found at the base of red tussock on wet ground on low nutrient

sites. It is not uncommon in the Waterloo Burn and is also found in wet red tussock on Barn Hill. Modification of its habitat by grazing and the introduction of aggressive exotic plant species is the reason for its inclusion in the vulnerable category.

Rare

Plants with small populations which are not endangered or vulnerable but are at risk. Usually localised within restricted geographical areas or habitat.

Coprosma obconica subsp. *obconica*

The only Southland record is from the Etal ridge above the Aparima River on Dunrobin Station.

Insufficiently Known

Includes plants about which there is doubt regarding taxonomic status and which require further investigation.

Carex tenuiculmis *Uncinia purpurata* *Uncinia strictissima*

Carex tenuiculmis is found in seepage areas or where water is flowing, in high nutrient sites. It occurs in the Waterloo Burn in wet red tussockland. In dry red tussockland such as that of the Wairaki Hills, *Uncinia purpurata* is occasionally found. It has a restricted distribution, being found in scattered localities in small numbers. *Uncinia strictissima* was only seen in one small area in red tussockland of the Wairaki Hills.

Local

Plants which are sufficiently restricted to warrant noting and some monitoring.

Pseudopanax ferox

One adult and several seedlings of fierce lancewood (*Pseudopanax ferox*) occur in the patch of forest above the Taringatura Camp and also in the adjacent Taringatura Scenic Reserve (young plants) where *Melicytus flexuosus* is also found. Although *Pseudopanax ferox* has a wide distribution, it only occurs sporadically and mainly in small, isolated populations (Given 1981). It prefers open forest, bush margins and is often found on rocky bluffs.

Other Plants of Note

Include the tiny mistletoe *Korthalsella clavata*, found on *Melicope simplex* at Castle Rock. The rare fern *Botrychium millefolium* found on Dunrobin Station and *Carex capillacea* in waterlogged, fertile turf areas of the Waterloo Valley.

FAUNA

Birds

Birds recorded from open country, tussock areas and shrublands are mainly common introduced birds such as skylark (*Alauda arvensis*), yellow hammer (*Emberiza citrinella*), goldfinch (*Carduelis carduelis*), starling (*Sturnus vulgaris*) and spur-winged plover (*Vanellus miles novaehollandiae*). Mallard ducks (*Anas platyrhynchos*) frequent the ponds on Castle Down Swamp while the native Paradise shelduck (*Tadorna variegata*) is widespread. Native species are more common in forest and shrubland. Silvereye (*Zosterops lateralis*), greywarbler (*Gerygone igata*), fantail (*Rhipidura fuliginosa*), South Island tomtit (*Petroica macrocephala macrocephala*), brown creeper (*Mohoua novaeseelandiae*) and bellbird (*Anthornis melanura*) are common species. The introduced redpoll (*Carduelis flammea*), chaffinch (*Fringilla coelebs*) and dunnoek (*Prunella modularis*) are not uncommon. In forest adjacent to the Takitimu Range the occasional yellow-crowned parakeet (*Cyanoramphus auriceps auriceps*) was seen. Tui (*Prothemadera novaeseelandiae novaeseelandiae*) and New Zealand pigeon (*Hemiphaga novaeseelandiae novaeseelandiae*) were less common. An albino pigeon was seen on a large matai tree at the Taringatura Camp. Australian harriers (*Circus approximans*) were common throughout as were blackbird (*Turdus merula*) and song thrush (*Turdus philomelos*). South Island fernbirds (*Bowdleria punctata punctata*) are reported from the Hamilton Burn red tussock-shrubland area (Fish & Game staff pers. comm.). An Australasian bittern (*Botaurus stellaris poiciloptilus*) was seen in the Waterloo Burn and New Zealand falcon (*Falco novaeseelandiae*) have been seen in Beaumont bush (DoC). Black-backed gulls (*Larus dominicanus*) and black-fronted terns (*Chlidonias albobriatus*) nest in colonies along the Aparima River.

Extinct Birds

A fissure in the limestone of Castle Hill has yielded the bones of a number of birds now extinct or no longer found in this district. They include bones of two extinct eagles, *Harpagornis assimilis* and *H. moorei*, numerous bones of duck, kiwi and kakapo and those of a small moa (*Anomalopteryx didiformis*) (Hamilton 1893).

Invertebrates

The only area of the District surveyed in detail is the Waterloo Station, surveyed in late autumn. A diverse range of insect orders was found in the various valley floor communities (Patrick 1997). They include two large moth species, hepialids (*Heloxycanus patricki* and *Aoraia dinodes*) of *Sphagnum* and wirerush bogs which underline the quality of the wetland. A southern endemic moth *Aponotoreas synclinalis* and a noctuid *Tmetolophota alopa* have larvae which feed on wirerush. Larvae of an undescribed diurnal moth *Notoreas* is found under mats of *Pimelea prostrata*. A sleek green grasshopper *Paprides dugdali* and a lygaeid bug *Rhyphodes anceps* are common on peat domes as are bugs in the family Nabidae. Numerous tarns in the peat dome contain back-swimming bugs, tree frog tadpoles and adults.

Streams draining the wetland are inhabited by *Deletidium* mayflies and caddis such as *Hudsonema aliena*. In warmer months, summer, the floristically rich riparian communities and the frost flats of bog pine will produce a large yield of native insects (Patrick 1997). A large mayfly (*Onisigaster sp.*) is found in the Hamilton Burn.

Lizards

Numerous grass skinks (*Oligosoma nigriplantare polycroma*) were seen on sunny, rocky slopes around Etal peak and similar areas. Three other species of skinks have been found on the Waterloo Station, the only area to be surveyed for lizards. Waterloo Station contains the only known population of McCann's skink *Oligosoma maccanni*. This represents the south-western distribution for this species. The green-backed skink *Oligosoma chloronoton* and cryptic skink *Oligosoma inconspicuum* are both found in the Waterloo Valley with the former classed as rare here.

Fish

Native galaxiids (*Galaxias* spp.) were seen in a number of small streams including a culvert in the Waterloo Valley and stream flowing through the red tussock covenant on Dunrobin. The Hamilton Burn/Braxton Burn streams are recognised as important fishery catchments, primarily for introduced brown trout (*Salmo trutta*), but they also contain galaxias. The Waterloo Burn contains round head and flat head galaxias, *Galaxius anomalis* and *Galaxias depressiceps* respectively. The long-finned eel (*Anguilla dieffenbachii*), koura (*Paranephrops zealandicus*) and brown trout are also found here. The galaxiids are confined to the small, tributary streams or the riffles of the main stream while the brown trout fingerlings are almost confined to the main stream pools. The Waterloo Burn is of high conservation value (Neilson 1997).

Feral Mammals

The brush-tailed possum (*Trichosurus vulpecula*) is the most common animal. Feral pig (*Sus scrofa*) rooting was seen along the bush edge on South Braxton. The occasional hare (*Lepus europaeus*) was seen. Red deer (*Cervus elaphus*) may be present in low numbers to the west and stoats (*Mustela erminea*), ferrets (*Mustela putorius*), rats (*Rattus rattus*), mice (*Mus musculus*) and hedgehogs (*Erinaceus europaeus*), are certainly present.

Chapter 2 Survey Method

PREPARATION

The Taringatura District is relatively small and much of the area can be seen from the road so an initial, quick familiarisation was carried out from the road during December 1995. In addition, there was the opportunity to inspect some of the District's red tussockland and shrubland while Brian Rance carried out a rapid survey of Barn Hill property, in the northern part of the District.

In late January 1996, a week was spent looking at maps, existing reports, gleaning information from the National and Southland Computer data bases, in discussion with people with intimate knowledge of the District including Roger Sutton (QEII National Trust field representative for Southland), Gary Morgan, (Southland Regional Council), and several DoC staff. An article was put into The Southland Times, appearing on the 14 February, explaining about the survey and asking for landowners' help in identifying natural values on their property. Several landowners were contacted and the field survey started in February. The survey continued intermittently throughout the summer, autumn and into May 1996, taking about ten weeks in total.

Field Survey

After an initial drive around the District, the few protected natural areas in the district were surveyed first to Document the vegetation already protected and for use as a base line against which other areas could be compared. Then all areas in the district which appeared to contain relatively intact natural vegetation were visited, after obtaining permission from the owners and a walk through survey carried out. Binoculars were used to confirm vegetation too distant to visit or too difficult to walk to. Early on, a fixed wing aircraft was used to fly the whole district to obtain an overview and find areas of natural vegetation which may not have been obvious from the road. A second flight was made in May 1996, primarily to check landscape features. This flight allowed a further check to be made on likely boundary recommendations for protected areas.

Data Recording

Each area looked at was divided into its individual ecological units based on vegetation, landform and drainage. Then, depending on the size and complexity of the area, either a sample site card for the vegetation was completed for each unit, or a relevé completed, or in a few areas, a list of all plants seen was made and the plant communities described. Sites were randomly selected and 10 m x 20 m plots were set out with their long axis following the contour. In each plot prominent species were recorded in the height class categories 12 m +, 12 m-5 m, 5 m-2 m, 2 m-30 cm, 30 cm-10 cm, 10 cm-0. A calculation or estimate of the cover was made of the major species for each height class. From this information the vegetation type of the ecological unit was named. Other information on the vegetation cards was

also filled out, with regard to factors likely to influence the indigenous vegetation such as weeds, introduced animals and human disturbance. The naturalness of the area was categorized subjectively with those areas having features such as primary vegetation, good fencing or large area being allocated a high rating. In some places where only small areas of relatively natural vegetation remained, but where there was strong regeneration in the surrounding area, then this also affected the rating particularly where the vegetation type was poorly represented in the district. Sixty-six plot cards were completed. A relevé was completed in a similar manner to plots but without defining the boundaries with a tape. Relevés usually covered a slightly larger area. Rare plants were noted along with any other special features. All bird life was also recorded and any other fauna seen was noted. A good photographic coverage of the whole district was obtained both from the air and on the ground. Both colour prints and slides were used. All plots and major plant communities were recorded on film. Photos, plot cards and other information obtained are held at the Southland Conservancy office of DoC.

Data Analysis

Data from the plot cards were entered into an analysis file by Landcare Research, Lincoln. The data were then analysed using classification (TWINSPAN) which classifies the plots and species by clustering them into groups, and by ordination (DECORANA) programmes developed by Landcare Research (Hall 1992). This latter programme groups plots by environmental variables.

Selection criteria for Recommended Areas for Protection (RAPs)

Selection is based on the PNA survey methodology which recommends selection of areas containing vegetation types which in combination give the most representative, diverse, least modified examples of the indigenous ecosystems remaining in the ecological district with catchment boundaries sought where possible together with the greatest possible altitudinal range. It is generally assumed that protection of the vegetation will safeguard faunal values (Dickinson 1988). The following criteria were used to evaluate and select areas to recommend for negotiated protection.

1. **representativeness** - how well the area shows the overall characteristics of the ecological district, or exemplifies the communities thought to be typical of the pre-European landscape.
2. **naturalness** - how closely the area and vegetation approaches the state which might be expected prior to invasion by introduced animals and plants. Factors include indigenous/exotic content of the vegetation and the extent and impact of human disturbance.
3. **diversity** - the range of species, habitats and landforms in the area.
4. **special features** - such as threatened plants and animals, habitats of importance for wildlife, spectacular, unusual or special landforms.

5. **long-term ecological viability** - the ability of an area to retain its inherent natural values over time. Factors considered include size, shape, regeneration, adjoining land use and whether buffering or active management will be required.
6. **threat** - the sensitivity of the habitats to environmental change, threats from weed invasion and animal damage as well as human interference.

Chapter 3 Results

INTRODUCTION

Not all communities were sampled by using sample cards (plot sheets). Relevés (refer chapter 2) were used to sample some areas. The data from plot sheets was analysed using Two Way Indicator ANalysis (TWINSpan) which is expressed as the Dendrogram, figure 4. The programme DECORANA was also used to indicate environmental variables and is represented by the ordination diagram, figure 5.

TWINSpan Analysis

The TWINSpan analysis using the cover abundance classes, divided the plots on the basis of indicator species and at six levels, into clearly defined plant communities representing the major natural plant communities found in the Taringatura District. There is a gradient from podocarp-broadleaved forest at the top of the dendrogram to wirerush bog at the bottom. The Bog Burn silver beech stands slightly apart from the other silver beech areas due to the presence of matai. The Taringatura Hill silver beech splits off at the 3rd level also and this could be attributable to its location and small size – an old forest remnant in a rocky gully at high altitude. As would be expected, the anomalous *Pseudopanax* forest on Centre hill separates out from the shrubland plots at the 4th level. The next grouping is the mosaic of red tussock and shrubland communities, all similar but differing in the percentage of shrubs present, and with differing species dominant. They separate out at the 5th level. At the bottom end of this group is found silver tussock, speargrass-matagouri and *Coprosma*-matagouri plots with red tussock a minor component. The next grouping is the tussock grassland communities with few shrubs. This is further split into the wet, red tussock with rushes and sedges at the top end and the red tussock and hard tussock of the well drained sites below. The latter Finally there are the wirerush bogs, with shrubs dominant or with few shrubs. A wirerush plot with much harakeke (swamp flax) separates out at the 3rd level, the only plot with harakeke present. Appendix 4 lists the plot numbers and plot names in each group.

DECORANA Analysis

The ordination programme DECORANA shows a similar pattern to that above but also indicates an environmental gradient. Axis 1 shows the trend from low growing bog communities to tall podocarp/broadleaved forest. The forest plots separate clearly into podocarp-broadleaved and silver beech forest with the *Pseudopanax* forest adjacent. Axis 2 shows a trend from low fertility (oligotrophic) bogs to high fertility flush communities. The former are the wirerush bogs of valley bottoms with a varying percentage of sphagnum and shrubs. In the middle are the wirerush-red tussock bogs. A hard tussock plot sits out on its own. At the top are the higher fertility areas. These are also wetland plots but with some movement of water bringing in nutrients. At the very top is plot number 67 which is a flush area with red tussock, rushes and the rare sedge, *Carex tenuiculmis*.

DENDOGRAM OF THE SIXTY FIVE TARINGATURA VEGETATION PLOTS

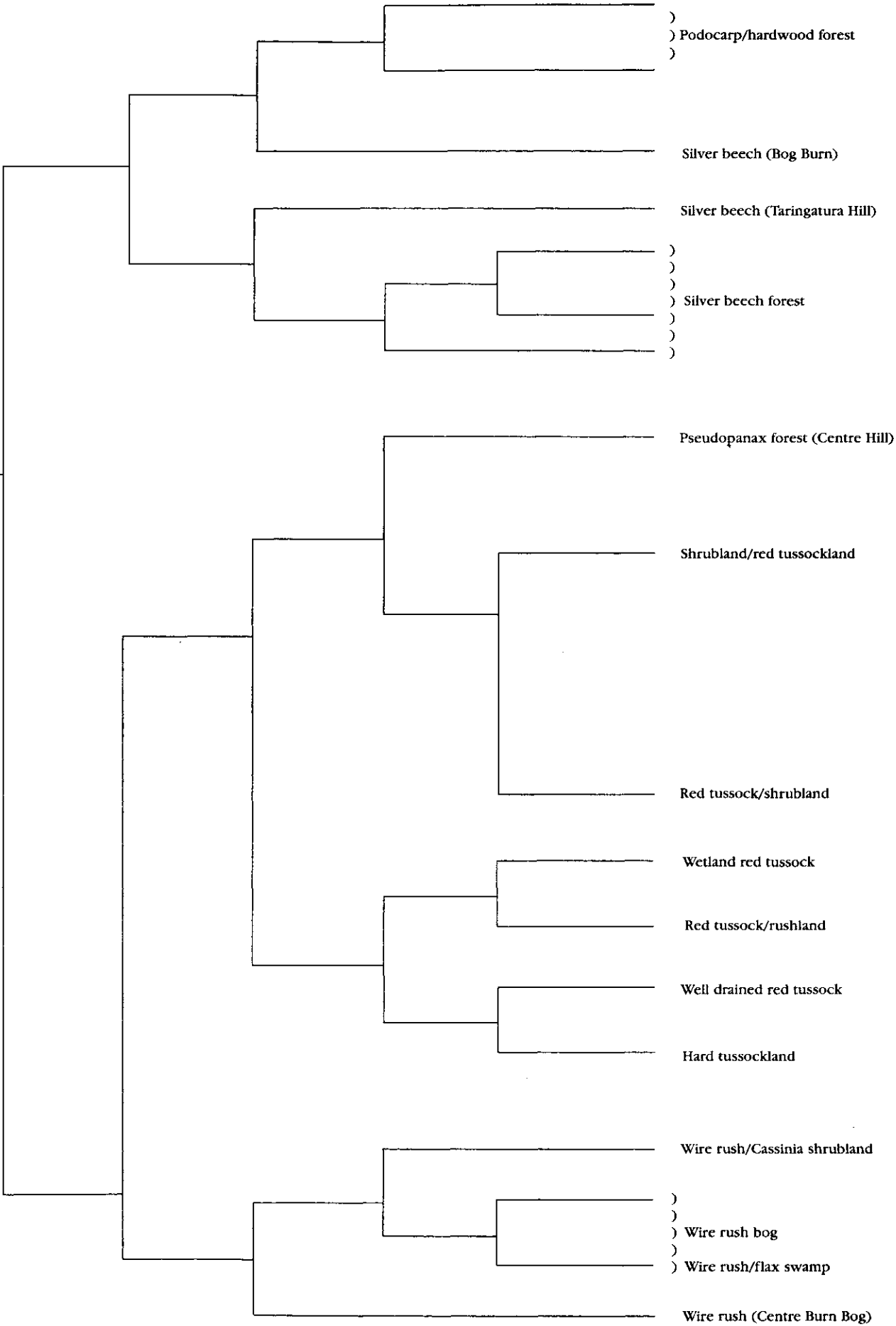
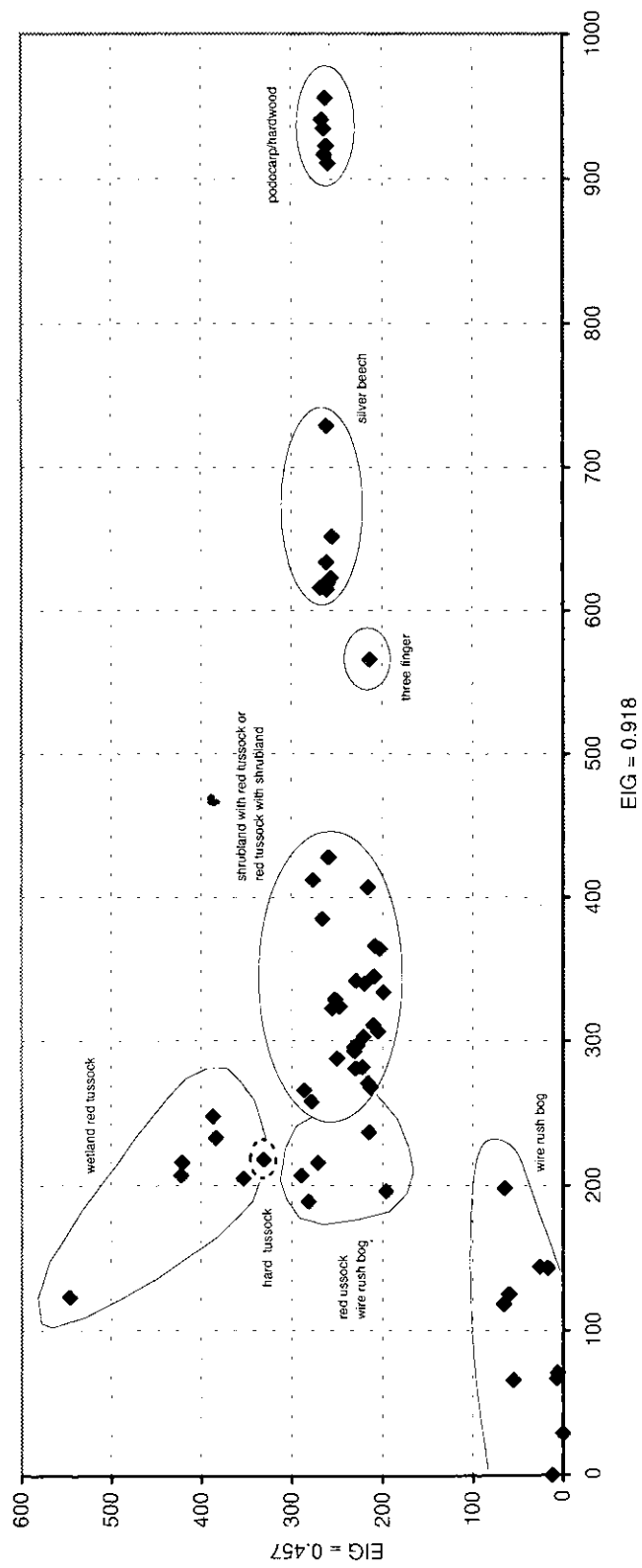


Figure 5. Ordination programme DECORANA showing plot grouping



The Vegetation of the Taringatura District

Although the majority of the 111,000 ha of land in the Taringatura District has been developed, primarily for farming (but increasingly for forestry purposes), approximately 19,000 ha or 17%, remains in natural to semi-natural (with some exotic component) native vegetation. Currently protected areas comprise only 2.25% of the District, or 2496 ha. Of this nearly half is silver beech forest, (refer Table 1). Several small, remnant podocarp-broadleaved forest pockets are protected by QE II Trust Covenants as is one small, red tussock area containing the rare plants *Iphigenia novae-zelandiae* and *Pseudognaphalium* sp."compactum".

Recommended areas for Protection (RAPs) total about 7407 ha or 39% of the total area remaining in natural plant communities, (6.7% of total District area). This represents the best of the unprotected natural areas remaining and includes all known areas with threatened plant species present. There are still sites not identified as RAP's which have importance, both for their natural values and for their landscape values. They were either smaller areas or areas where the natural values were not as high as those areas recommended. Examples are some areas of red tussockland along the eastern foot of the Braxton-Mt Hamilton ridge and areas on Beaumont Station, as well as those areas listed in Appendix 4.

The major natural communities identified by the sample plots are podocarp/broadleaved forest, silver beech forest, mixed shrubland with red tussock, red tussock grassland on drier sites, red tussock grassland on wet sites, red tussock bogs with wire rush and oligotrophic bogs dominated by wire rush (low fertility sites).

Minor communities covering relatively small areas are three-finger forest (Centre Hill), silver tussock grassland, hard tussock grassland, red tussock grassland on very wet, high fertility sites (Waterloo Valley) and Castle Rock shrublands on limestone.

Red tussock grassland forms nearly half of this remaining natural vegetation. Nearly 50% of this grassland community is slightly to severely modified by grazing and oversowing. In places the red tussock has disappeared and is replaced by hard tussock grassland. Silver beech forest forms the next largest plant community followed closely by shrublands and red tussock-shrubland. In the latter community, shrubs appear to be increasing where burning and grazing pressure has reduced. An outcrop of limestone at Castle Rock is covered with shrubland, with broadleaved trees such as broadleaf, kowhai and Hall's totara mainly confined to outcrops, out of reach of stock. The rare shrub, *Teucrium parvifolium* is found here. The limestone has importance not only for its plant communities, but also as a prominent landform. Wirerush bogs occupy several valley bottoms and hollows and are an important natural community and landform. Most of these bogs are modified in some way, by past burning and grazing and most are encircled and traversed by drains. Podocarp-broadleaved forest probably covered a significant part of the low hills and river terraces of the south-east part of the District. Today only small remnant pockets remain, primarily confined to wet gullies and steep terrace risers. On the northern Wairaki Hills, above the Aparima River, the remnants of another important forest type is found. This is a broadleaf-manatu-kowhai community with associated rare plants, *Coprosma wallii*, *C. obconica* and *Olearia fragrantissima*. *Olearia hectorii* and fierce lancewood can also be found in this association as they are at Taringatura Scenic Reserve. Remnants of this community are found throughout Southland, along river and stream edges primarily and it is probable that this riparian community

TABLE 1.

The approximate area of natural plant communities left in the Taringatura Ecological District, the area currently protected and number of sites and the area and number of RAP sites.

Plant community	Approximate remaining		Currently protected (DoC)		Protected QE11		RAPs	
	area (ha)	sites	area (ha)	sites	area (ha)	sites	area (ha)	sites
Silver beech forest	2984	22	1381	3			903	11
Mountain beech forest	16	1					16	1
Broadleaved forest	182	5	13	2			169	3
Podocarp/broadleaved	74	10	7	1	34	3	18	4
Hall's totara forest	1	1			1	1		
Shrubland	2100	23	224	3	4	2	1223	14
Red tussock/shrubland	1114	17	131	3	4	1	479	8
Red tussockland	4790	28	377	4	12	2	2500	16
Red tussock/sedge/rush	56	2					56	2
Red tussock/wirerush	40	4	14	1			22	1
Rush/sedgeland	40	12	5	2	4	2	24	6
Red tussock/exotic grass	4170	14					70	1
Wirerush bog	1468	11	322	3			896	5
Wirerush/flax	100	1					100	1
Wirerush/shrubland	171	3	15	1			156	4
Sphagnum bog	100	1					100	1
Hard tussock	600	9	10	1			293	4
Hard tussock/exotic grass	870	6					171	3
Bracken	203	10			2	1	196	4
Limestone bluffs	15	1					15	1
Total areas ¹	19004		2429.3	6	66.3	5	7407	23
% of total area (111,000 ha)	17%		2.19%		0.06%		6.70%	
% remaining natural area			12.78%		0.35%		39%	

¹ As many sites contain several plant communities the figure in the sites column refers to the number of protected areas or RAPs.

occupied parts of both the Aparima and Oreti valley systems in the past. It appears to be a community that has relied on disturbance in the past and is under threat not only from land development but from competition with exotic weed species.

Description of the major plant communities:

Podocarp/broadleaved forest

Podocarp/broadleaved forest is found on the low altitude terraces and adjacent damp gullies and fertile river flats at the south-eastern end of the Taringatura hills. It is associated with the Kaihiku soils which are lowland yellow-brown earths. Matai is often the main podocarp with miro, rimu, Hall's totara and kahikatea forming a canopy about 18 m tall with tarata and, occasionally, pokaka. In places the podocarps are emergent over a low canopy (5 - 7 m tall) of kaikomako (*Pennantia corymbosa*), pate (*Schefflera digitata*), fuchsia, broadleaf, mapou (*Myrsine australis*), three-finger, putaputaweta, *Lophomrytus obcordata* and wineberry. *Coprosma* species are the main sub-canopy plants. Ferns, hook grass and numerous seedlings form an, at times, thick ground cover. Podocarp seedlings and saplings are common. Small areas of mature silver beech occur within some podocarp patches. It has a similar structure to the podocarp areas with podocarp seedlings present amongst the dense ferns in the ground layer. The silver beech does not appear to be regenerating.

Only small remnants remain of the podocarp-broadleaved community, much of it in various stages of recovery from grazing indicated by the increasing density of the understorey and the numerous seedlings, especially of the canopy and emergent species. Some sign of past milling is also visible. All remnants show good signs of recovery where stock are excluded and are important as they represent the only remaining examples of this forest community in the district. Many are now fenced and protected by covenants and one as Scenic Reserve. Even so, the long-term viability of some of the smaller of these remnants is under threat from the smothering effect of pouhuhue (*Muehlenbeckia australis*) and the encroachment of exotic weeds around the edges.

Silver beech forest

Silver beech forest occurs mainly in the west of the district where extensive areas as well as remnant pockets are found on Gowan Hill, Letham Bush, Waterloo/Braxton area and the Wairaki Hills. Only small pockets remain in the east, on the south Taringatura Hills, surrounded by exotic forest, a tiny patch just south of Taringatura Hill and on Barn Hill. The latter two areas are destined for exotic forestry.

The forest structure is similar throughout the district with a silver beech canopy at 16 m to 20 m and sub-canopy, if any, of beech saplings with an occasional broadleaf, wineberry, *Coprosma linariifolia* and Hall's totara. Small areas of mountain beech occur also, mainly on drier sites within the silver beech. The low understorey (2 m and below) consists of several species of *Coprosma*, weeping mapou and beech saplings with an often dense ground layer of ferns and seedlings. In damp areas such as the gully in the Bog Burn, horopito (*Pseudowintera colorata*), three-finger,

kotukutuku, lancewood, kohuhu, *Neomyrtus pedunculata* and soft tree fern, are found in the understorey with a thick ground cover of moss and occasional *Astelia fragrans*.

Broadleaved forest

On Centre Hill a small, anomalous area of pure three-finger, low forest is found in a stony, west facing, shallow gully and may have originated from one or two remnant trees protected from fire on the small bluff above. It is surrounded by shrubland and red tussock and at present has no other tree seedlings growing under its canopy so is likely to retain its present status for the foreseeable future.

The north end of the Wairaki Hills contains an important broadleaf-kowhai-manatu forest as already mentioned, with a diverse understorey of divaricating shrubs including eleven species of *Coprosma* species, two of which are on the threatened plants list.

Shrublands

Shrublands form perhaps the most important communities in the Taringatura District for their variety and extent. They are primarily transitional between grassland and forest and most areas, in the absence of fire and grazing, will eventually return to forest, either silver beech forest or some form of broadleaved forest with broadleaf dominant in some areas. The most important shrubland areas are on the northern slopes of the Wairaki Hills, north of Etal peak and on the slopes of Etal and Mt Rouse. Important shrublands also occur along the foot of North and South Braxton, on Centre Hill and on Castle Rock.

These shrublands are quite diverse, with inaka (*Dracophyllum longifolium*), mountain holly, *Cassinia* and *Brachyglottis cassinioides* being dominant in places. Generally the shrublands are mixed, being composed of a number of species which include various combinations of *Cassinia*, *Coprosma propinqua*, *Coprosma* sp. aff. *parviflora*, *Coprosma rugosa*, *Coprosma ciliata*, matagouri, manuka, *Hebe rakaiensis*, mountain flax (*Phormium cookianum*), inaka, mountain holly, weeping mapou, *Olearia bullata*, *Brachyglottis cassinioides* and *Brachyglottis revoluta* with red tussock often an important component and generally present. Other associated species invariably present are *Coprosma cheesemanii*, golden Spaniard (*Aciphylla aurea*), *Gaultheria macrostigma*, *Gaultheria crassa* and occasionally *Astelia nervosa*, hard tussock and blue tussock.

Red tussock is dominant in many areas adjacent to the shrublands with scattered shrubs. These two communities (shrubland and red tussock grassland) often merge with no clearly defined boundary and appear to indicate a transition from red tussock grassland to shrubland. Both tend to occur on the better drained to dry slopes and ridge tops but in places can be quite wet with rushes and sedges appearing. Mosses and lichens can be important in the ground layer. Red tussockland is probably an induced community over much of the area, increasing in extent after fire removed the forest.

An important shrubland occurs in the upper Aparima valley on outwash gravels. This is a bog pine-manuka community with numerous other small shrubs and herbs and

large areas of bare, deflated ground. It is similar to the vegetation of the Wilderness Scientific Reserve near Lake Te Anau and represents a community that may have been much more widespread on glacial outwash gravels and moraine.

Grasslands

Red tussock is the dominant species in the remaining undeveloped grasslands throughout the District. On drier land, such as parts of the upper Wairaki catchment, south of Letham Bush, and on the dry gravel terraces of Dunrobin Station, hard tussock becomes important and can dominate. Shrubs are often present as scattered plants. The best of the wetter red tussock grasslands are found in the Hamilton Burn area, upper Waterloo Burn and the Letham Burn. Here red tussock reaches 1.6 m in height with rushes and sedges forming a minor part of the community in the wettest places. The rare sedge *Carex tenuiculmis* occurs in wet red tussock in the Waterloo Burn and the threatened buttercup *Ranunculus ternatifolius* in moist red tussock. Currently, the only protected native grassland is the small Dunrobin red tussock area near the Aparima River.

Wetlands

On relatively flat ground and on some valley bottoms red tussock is associated with small areas of wire rush and sphagnum bogs. There are also extensive areas of wire rush dominated bogs with or without associated red tussock and shrubland. These peat bogs are an important plant community in the Taringatura district. The largest and best preserved bogs are in the Waterloo Valley and at Castle Down swamp. The only protected bog in the district is a small central section of the So Big Bog. Other bogs are in various stages of being drained with drainage ditches around or criss-crossing their surface. Wetland shrubs such as bog pine and the bog *Dracophyllum* aff. *oliveri*, could, in time, return to some of these bogs if drainage was stopped and no further burning occurred.

List of Recommended Areas For Protection

RAP 1 - Wairaki Hills

1a - Dunrobin - Kowhai Creek

1b - Ardross - Etal Hill

1c - Chimney/Etal Stream

RAP 2 - Waterloo Burn

RAP 3 - Castle Rock (limestone)

RAP 4 - Hamilton Burn

RAP 5 - Castle Down Swamp

RAP 6 - Letham Burn

6a - Wairaki red tussock

6b - Coral Bluff

6c - Letham Bog

RAP 7 - Dunrobin Terrace Red Tussock

RAP 8 - Day's Bush

RAP 9 - Chewings Road Bog

RAP 10 - South Braxton

RAP 11 - Barn Hill

RAP 12 - Taringatura Camp

RAP 13 - Lance Wilson's Bush

RAP 14 - Kangaroo Creek - Ardross

RAP 15 - Braxton Downs Bog

RAP 16 - Trig H - Letham Bush

RAP 17 - Bog Burn

RAP 18 - Mr Wilson's Bush

RAP 19 - Waterloo - Aparima Faces

RAP 20 - White Hill

RAP 21 - Centre Burn Bog

RAP 22 - Taringatura Hill

RAP 23 - Hamilton Burn Bush

MAP KEY



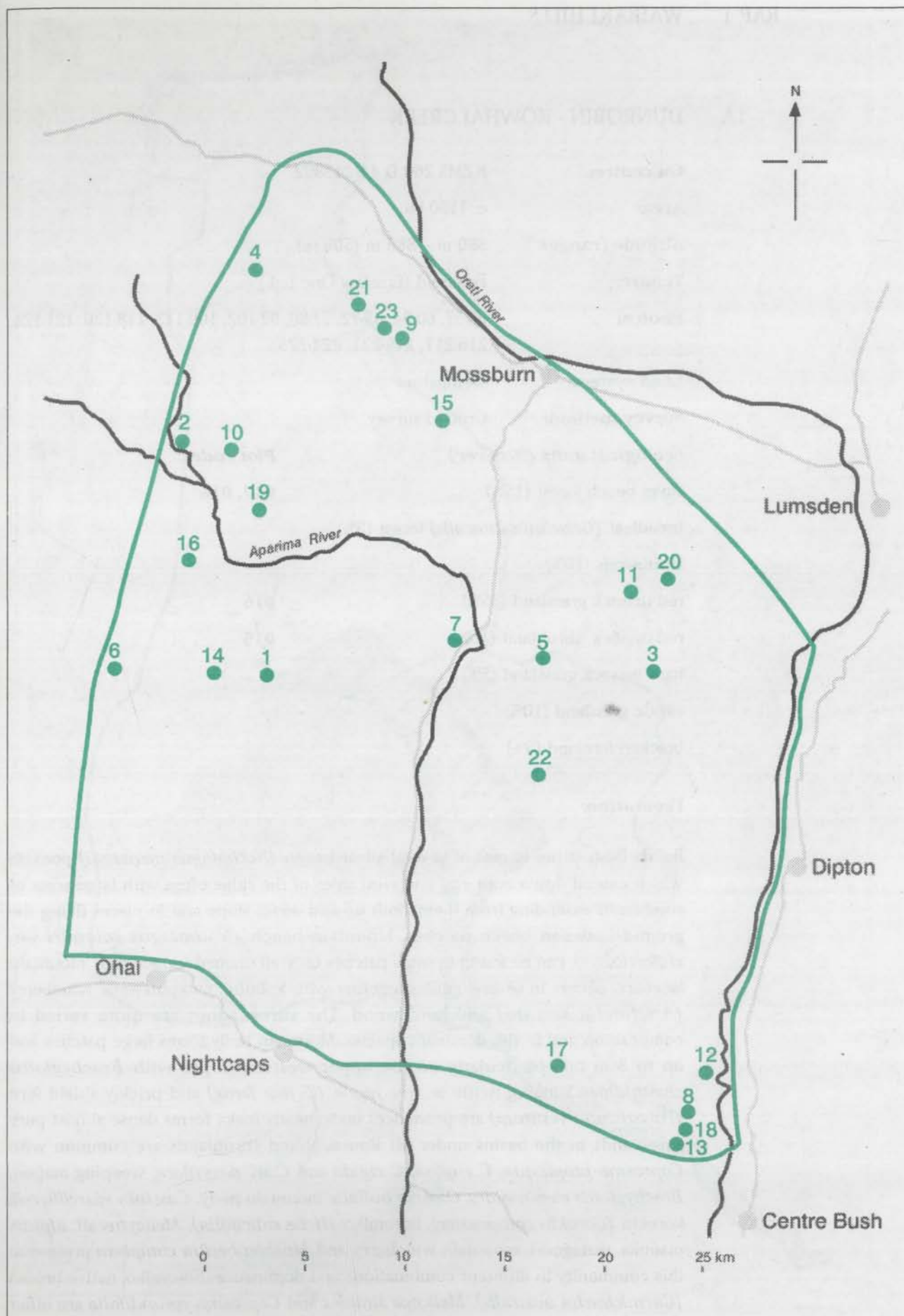
RAP



land administered by DoC



QEII



species present in small numbers. *Clematis marata* can be seen scrambling through some shrubs.

Broadleaved forest occurs in the lower gullies at the northern end towards Trig Z. This is broadleaf, kowhai, lowland ribbonwood or manatu (*Plagianthus regius*) forest. In a typical community broadleaf dominates with about 30% cover with lowland ribbonwood 15%, *Coprosma linariifolia* 25% and weeping mapou 20% and mountain holly 5%. Kowhai, cabbage tree, putaputaweta, kaikomako and mapou are scattered throughout with bush lawyer (*Rubus schmidelioides*), *Urtica ferox*, pouhuhue and native jasmine (*Parsonsia heterophylla*) as other prominent species. The low canopy (4 – 5 m), is uneven and relatively open with broadleaf, manatu, kowhai and cabbage tree standing above the smaller trees and shrubs. The number of *Coprosma* species is a feature of these north end shrublands with two species, *Coprosma obconica* and *C. wallii*, both on the threatened plants list. *Coprosma virescens*, is also here with *C. propinqua*, *C. rugosa*, *C. rigida*, *C. rotundifolia*, *C. rhamnoides*, *C. sp. aff. parviflora* and *C. ciliata*. In the low canopy (3 – 5 m) forest openings or where the canopy thins, another threatened plant is found. A number of mature trees of *Olearia fragrantissima* occur with trunks 10 cm to 50 cm diameter. A ground cover of litter, seedlings, ferns, small herbs and exotic grasses cover rather stony ground, particularly on western slopes. In wetter, east facing gullies, the canopy can be taller, to 15 m with scattered very old, large trunked broadleaf to 90 cm dbh and with putaputaweta (to 30 cm dbh), *Coprosma linariifolia* (to 28 cm dbh), kowhai, wineberry, lancewood, kohuhu and numerous shrubs (mainly *coprosmas*). The climbing fuchsia (*Fuchsia perscandens*), is also occasionally found. Small patches of broom (*Cytisus scoparius*), gorse (*Ulex europaeus*) and red tussock occur on some lower slopes.

Red tussock dominates all the upper slopes. On the often stony western slopes it is shorter (50 cm) and more open (about 25% cover) with hard tussock and numerous shrubs, mainly *Coprosma cheesemanii* and *Gaultheria* spp., and golden speargrass. Eastern slopes are generally wetter and here the tussock is more dense, from 50% to 80% cover and 80 cm to 120 cm tall. Hard tussock 2 - 6%, blue tussock (*Poa colensoi*) 10 - 15% and matagouri 1 - 5% are other important species present. Drier or stony sites such as along the ridge top and west faces are dominated by *Coprosma cheesemanii*, snowberry (*Gaultheria novae zelandiae*), *Gaultheria macrostigma*, *Coprosma* aff. *parviflora*, *Cassinia vauvilliersii*, inaka and manuka. The herbs *Celmisia densiflora*, *Celmisia semicordata*, golden Spaniard (with numerous seedlings) and *Celmisia sessiliflora* are prominent. Shrubland increases in extent towards the south.

The upper, western side of Etal ridge is very open and stony in places with moss (*Racomitrium* sp.) 20 - 75%, lichens 2 - 5%, stones 0 - 2%, cats ear to 5%, brown top 2 - 5% and numerous native herbaceous plants and small shrubs such as *Coprosma petriei* and *Leucopogon fraseri*.

Lower slopes contain a mosaic of hard tussock or hard tussock/exotic grassland and open to dense matagouri shrubland with patches of *Cassinia* and manuka. In places bracken (*Pteridium esculentum*) is coming through the grassland to form large areas. Silver tussock (*Poa cita*) occurs locally. At the northern end and parts of the eastern slopes above Kowhai Creek, exotic grassland dominates with patches of shrubland. Very large weeping mapou, with trunks 30 cm in diameter, are a feature of the northern grassland.

Modifiers/threats:

Grazed by sheep. Surrounding area likely to be planted in conifers.

Significance:

This area, particularly when combined with the adjacent areas, is probably the most important in the district because of its size, its rich plant communities, in particular its shrub communities, its rare and threatened plants, its landform, the range of aspects, altitude and drainage types and its relative lack of development/management.

It contains the western headwaters of Kowhai Creek running northwards from Mt Rouse at 886 m down a long, undulating ridge to trig Z and the Aparima river beyond at 370 m. The ridge separates Kowhai Creek from Kangaroo Creek.

Selection Criteria:

Representativeness	H	Extensive shrublands including several rare species not represented elsewhere in the district.
Diversity	H	Large range of ecological units
Special Features	H	Contains rare and endangered species of plants, some not found elsewhere in the district: <i>Olearia fragrantissima</i> , <i>Coprosma wallii</i> , <i>Coprosma obconica</i> .
Naturalness	M	Patches of beech forest, red tussock grassland and some of the shrublands are fairly natural. There is good regeneration of shrubland and broadleaved forest as well as areas of exotic grassland which have the potential to return to forest.
Viability	H	A relatively large area. Its viability will be increased with the addition of the adjoining land and fencing.
Size and Shape	H	A large area with relatively clearly defined boundaries.
Buffering	M-H	Mostly fenced with a stream along the eastern boundary.

1B ARDROSS - ETAL HILL

GR centre: NZMS 260 D 44 250768
Area: c. 990 ha
Altitude (range): 310 m - 931m (621m)
Tenure: Ardross Pastoral Lease (lessee Mr S Minty)
Photos: 50-51, 56-57, 78, 216-217, 109-113
Survey method: Ground survey
Land system: Taringatura

Ecological units (% cover)	Plot codes:
silver beech forest (10%)	035
broadleaf forest (5%)	
shrublands (20%)	036
red tussock-shrubland (15%)	038
red tussock grassland (20%)	
hard tussock grassland (10%)	
bracken fernland (10%)	
grassland (including native and exotic species) (10%)	

Description:

This area takes in the headwaters of Etal Stream, Etal Hill and its western slopes above Kangaroo Stream. The Etal Conservation area lies along its eastern flank. It is a mosaic of plant communities reflecting past management. Patches of silver beech forest in gullies with isolated patches above and extensive mixed shrub zones around indicate that the original primary cover was forest, probably with some shrubland and red tussock.

Vegetation:

Silver beech remnant and regenerating forest typical of the local area with well developed understorey and ground cover once away from the forest edge. Animal damage is noticeable in most perimeter areas except some of the Etal catchment where animal damage is slight.

Shrublands are extensive with diverse communities and with various species dominant, giving a mosaic of texture and colour. *Cassinia vauvilliersii*, *Hebe anomala*, inaka, *Coprosma propinqua* with *C. aff. parviflora*, mountain holly and *Brachyglottis cassinioides* can all form dominant communities usually with other species present. Other less prominent species often present include weeping mapou, *Gaultheria macrostigma*, lancewood, *Olearia bullata*, *Coprosma rugosa* and matagouri with the ferns, prickly shield fern and *Blechnum procerum*. Patches of manuka shrubland occur in the Etal catchment. In places young silver beech can be seen coming up through the shrubland. In lower gullies broad-leaved species.

such as broadleaf, putaputaweta, wineberry and kohuhu, kotukutuku, three finger, horopito, soft tree fern and narrow-leaved mahoe (*Melicytus lanceolatus*) are important.

In the Etal catchment a patchwork of grasslands occupies the space above and around the shrublands. Red tussock is dominant in wetter areas often merging into wet rushland/sedgeland. On drier ground hard tussock dominates with brown top (*Argrostis capillaris*) and sweet vernal (*Anthoxanthum odoratum*) common as well as many small native plants including *Uncinia purpurata* and scattered shrubs of *Cassinia* and matagouri. Small areas of silver tussock are found on more fertile soils.

Western faces above Kangaroo Creek are primarily red tussock on lower slopes with, on drier more stony ground up slope, increasing *Celmisia densiflora* and small shrubs such as *Gaultheria macrostigma*, *G. novae zelandiae*, *Coprosma* aff. *parviflora*, *C. cheesemanii*, *Pimelea oreophila*, *Cassinia*, matagouri and hard tussock.

Modifiers/threats:

The removal of grazing animals, especially cattle will allow this area to return to a more natural state and allow the forest edges to recover. Fencing will be required, especially along the western boundary.

Significance:

This area bounds the Etal Conservation area and includes the whole upper Etal catchment with excellent and diverse shrublands, beech forest, regenerating forest and red tussock grasslands. Etal Hill is the highest point of the Wairaki Hills and with the inclusion of the Kowhai Creek catchment to the north (1a above) gives an altitudinal sequence from 310 m to 931 m with a range of aspects and moisture regimes.

Selection Criteria:

Representativeness	H	Beech forest, shrublands, red tussock grassland of drier slopes and good regeneration of all communities.
Diversity	H	A range of ecological units and diverse shrublands.
Special Features	M	The diverse shrublands and red tussockland with <i>Uncinia purpurata</i> .
Naturalness	M	The area has been burnt and grazed in the past but much natural vegetation remains and there is strong regeneration over much of the area. Grazing is light and mainly around the fringes.
Viability	M	A large area and complete catchment. Fencing will increase its viability.
Size and Shape	H	A large block with more or less circular shape.
Buffering	H	Conservation land to the east with fencing required along the western edge.

1C CHIMNEY/ETAL STREAM

GR centre:	NZMS 260 D 44 270780
Area:	c. 595 ha
Altitude (range):	330 m – 760 m (430 m)
Tenure:	Freehold (The Chimney, Mr McFarlane)
Photos:	77, 121, 123, 52, 73-75, 218, 106-108, 114-117
Land system:	Taringatura
Survey method:	part ground, aerial and binocular survey

Ecological units (% cover)	Plot codes:
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silver beech forest (5%)

broad-leaved forest (10%)

shrubland (50%)

red tussock grassland (15%)

011, 012

hard tussock grassland (15%)

bracken fernland (5%)

Description:

This takes in the eastern slopes of Chimney above Back Creek and adjoins the Etal Conservation area over the ridge to the south. Etal Stream is a continuation of the Etal Hill Conservation area downstream. It covers a steep, south-west facing hill slope on the north side of Etal Stream. This flattens out as it drops to Back Creek. A low, rocky and shrub covered terrace face continues down Etal Creek. It has all been burnt and grazed in the past.

Vegetation:

Small patches or groups of silver beech trees remain in the bottom of some gullies. There are extensive areas of shrubland (matagouri, manuka, *Coprosma* species, and *cassinia*) or areas returning to shrubland via bracken fernland. Red tussock and/or hard tussock cover the upper ridge tops with much speargrass on stony sites. Lower, wet terraces at the southern end still contain good red tussock with exotic grassland near Back Creek.

The Etal Stream face contains a mix of bracken fernland, extensive shrubland and small pockets of silver beech with a few small areas of grassland, mainly hard tussock with exotic grasses.

Along the ridge top red tussock dominates in wetter places with hard tussock, bracken and shrubs on drier, rocky areas. Small patches of manuka occur on the lower ridge and sedges and rushes are present where drainage is poor.

The shrubland above Etal Stream contains a large range of species intermixed or with one species dominating in small areas. These include *Cassinia vauvilliersii*, mountain holly, *Coprosma* aff. *parviflora*, *C. rugosa*, *C. propinqua*, korokio, *Olearia*

bullata, weeping mapoa, maka, *Brachyglottis cassinioides*, *Melicytus* aff. *alpina*, matagouri with prickly shield fern, lowland flax and golden Spaniard and often with numerous seedlings of tree species underneath, particularly those of broadleaf. The shrubland merges into regenerating broadleaf forest with broadleaf, putaputaweta, tarata, kohuhu, cabbage tree, mapou, *Olearia arborescens*, kowhai and three finger and occasional silver beech.

The rocky face below Back Creek contains kowhai, matagouri, native broom, mountain flax, cabbage tree, korokio, broadleaf and *Coprosma virescens*, a shrub rare in the district. There is some gorse.

Silver tussock grows on the river flats.

Notes:

Indications are that this area will return to broadleaf and silver beech forest in time, through shrubland and bracken with red tussock remaining on the wettest sites. While the conservation values are not different to adjacent areas, this area has a good cover of secondary vegetation which has the potential to recover to something like its original forest and shrubland state. It extends the total area of the Etal/Mt Rouse proposed protected area and acts as a buffer for the Etal Conservation Area.

Modifiers/threats:

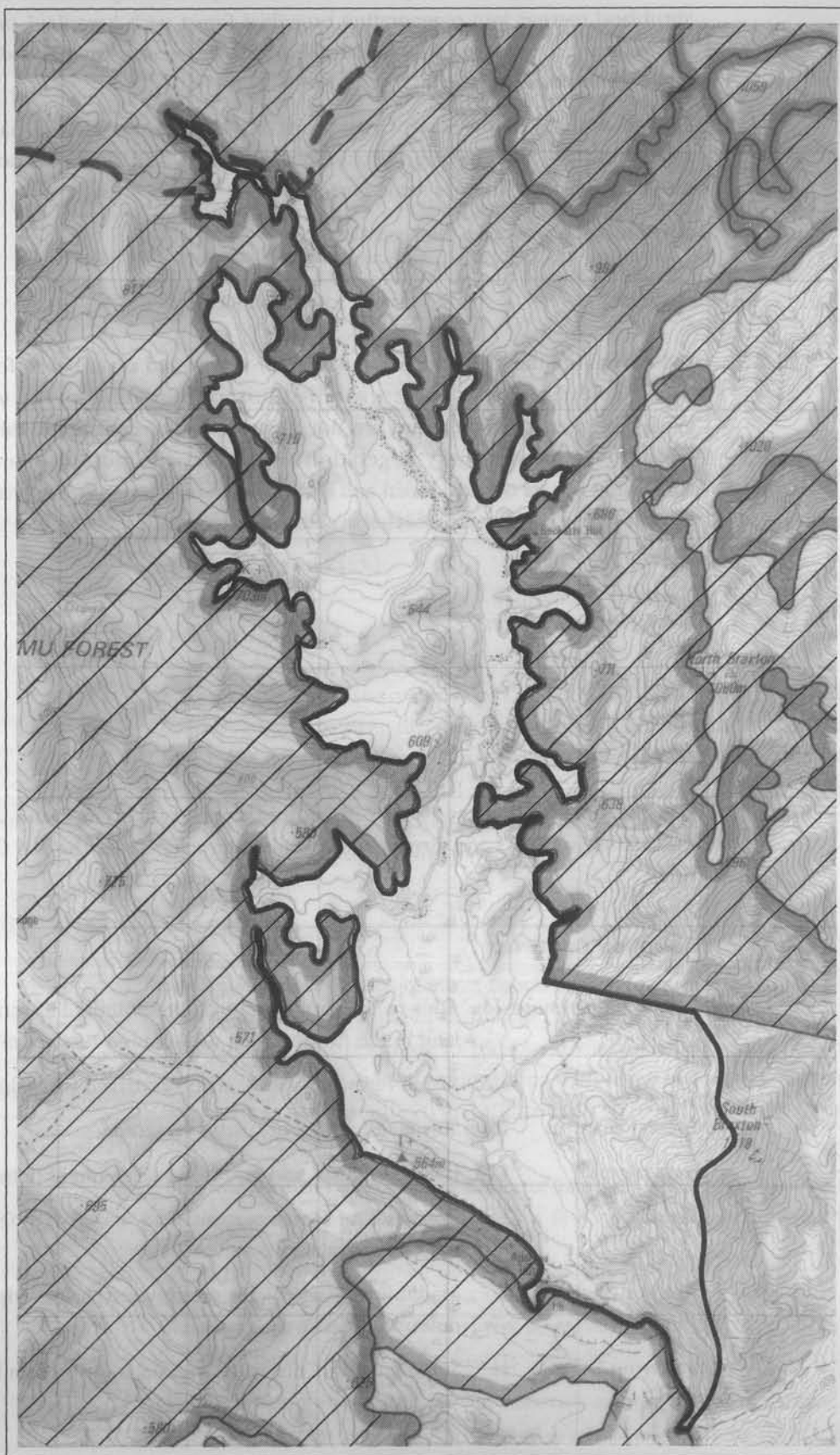
Burning and grazing.

Significance:

Has the potential to recover to forest and dense red tussockland. Adds to the preceding two RAP's and forms a buffer and eastern aspect for the Etal Conservation Area.

Selection Criteria:

Representativeness	M	Adds to the shrubland with the potential to return to forest land in the future. Good wetland red tussock of hill slopes.
Diversity	L-M	Beech forest remnants, shrublands, red tussockland.
Special Features	M	Shrubland with <i>Coprosma virescens</i> .
Naturalness	L-M	Has been burnt and grazed. Small remnant natural areas.
Viability	M	Bounds Etal Conservation area and partly fenced along eastern boundary
Size and Shape	H	Medium size with long, narrow extension (riparian strip) down the Etal Stream
Buffering	H	Some fencing, Conservation Area, steep stream bank.



RAP 2 WATERLOO BURN

GR centre: NZMS 260 D 44 200910
Area: c. 1800 ha
Altitude (range): 440 m – 1018 m (578 m)
Tenure: Waterloo Pastoral Lease (lessee Mr J. Minty)
Photos: 228, 231, 233-234, 244-246
Land system: Taringatura
Survey method: Ground survey

<i>Ecological units (% cover)</i>	<i>Plot codes:</i>
silver beech forest (15%)	000
shrubland (10%)	
red tussock grassland (30%)	021
red tussock - rushland – sedgeland (20%)	067
rushland – sedgeland (5%)	
hard tussockland (10%)	
wire rush bog (10%)	068

Description:

The Waterloo Burn meanders southwards from the Takitimu Mountains to join the Aparima River. The valley bottom contains extensive wetlands of red tussock, rushland - sedgeland and cushion bogs. Rounded, glaciated knobs protrude from the valley floor with a cover of silver beech forest, shrubland or grassland. Grassland and shrubland extend up the slopes of South Braxton in the lower valley where past burning is more evident. Burnt beech stumps in some forest patches, burnt bog pine remnants on the valley floor and the irregular surrounding bush line show the effect of past fires.

Cattle graze the valley bottom and shelter along the forest edge. Trampling in wet areas and a maze of cattle tracks have caused damage to the vegetation but generally this area is still in excellent condition with a good diversity of plants including two species on the threatened plant list. This valley probably contains the largest Southland population of both *Ranunculus ternatifolius* (classed as Vulnerable) and *Carex tenuiculmis* (Insufficiently Known).

Fauna:

An Australasian Bittern (*Botaurus stellaris poiciloptilus*) was recorded from the Waterloo Burn.

Freshwater fauna:

The Waterloo Burn contains round head and flat head galaxiids, *Galaxias anomalus*

and *Galaxias depressiceps* respectively. The long-finned eel (*Anguilla dieffenbachii*), koura (*Paranephrops zealandicus*) and brown trout are also found here. The galaxiids are found in the small, tributary streams or the riffles of the main stream while the brown trout fingerlings are almost confined to the main stream pools. The Waterloo Burn is of high conservation value (Neilson 1997).

Lizards:

Waterloo Station contains the only known population of McCann's skink *Oligosoma maccanni*. This represents the south-western distribution for this species. The green-backed skink *Oligosoma chloronoton* and cryptic skink *Oligosoma inconspicuum* are both found in the Waterloo Valley with the former classed as rare here.

Invertebrates:

A diverse range of insect orders was found in the various valley floor communities (Patrick 1997). They include two large moth species, hepialids (*Heloxycanus patricki* and *Aorata dinodes*) of *Sphagnum* and wirerush bogs which underline the quality of the wetland. A southern endemic moth *Aponotoreas synclinalis* and a noctuid *Tmetolophota alopa* have larvae which feed on wirerush. Larvae of an undescribed diurnal moth *Notoreas* is found under mats of *Pimelea prostrata*. A sleek green grasshopper, *Paprides dugdali*, and a lygaeid bug, *Rhyodes anceps*, are common on peat domes as well as bugs in the family Nabidae. Numerous tarns in the peat dome contain back-swimming bugs, tree frog tadpoles and adults. Streams draining the wetland are inhabited by *Deleatidium* mayflies and caddis such as *Hudsonema aliena* among many other species. In warmer months of summer, the floristically rich riparian communities and the frost flats of bog pine will produce a large yield of native insects (Patrick 1997).

Vegetation:

Silver beech forest is fairly typical of the district with canopy cover of 90%, little sub-canopy, mainly silver beech with few broadleaf, putaputaweta, occasional Hall's totara and *Pseudopanax simplex*. *Coprosma* form the main cover below 2 m, with weeping mapou and large prickly shield fern. Ground cover consists of mosses, filmy ferns, hook grasses, numerous seedlings and small creeping herbs such as *Nertera villosa* and *Lagenifera strangulata*. Cattle damage in the form of browsed beech saplings and lack of shrubs and ground layer, occurs along the edges.

Shrubland occurs on the valley sides as patches of manuka with *Coprosma*, matagouri and korokio and along river banks and the edge of bogs where bog pine is sometimes prominent with *Brachyglottis cassinioides*, mountain wineberry, *Melicytus* aff. *alpina*., *Coprosma* species, inaka and *Cassinia vauvilliersii*.

Drier valley sides are a mixture of hard tussock with brown top, sweet vernal, some mouse-ear hawkweed (*Hieracium pilosella*) and numerous native herbs and small shrubs such as *Gaultheria macrostigma* and *Muehlenbeckia axillaris* and red tussock grassland with hard tussock. Silver tussock occurs on valley fans and on fresh alluvial material along stream banks.

Red tussock occurs on wetter sites mainly along the valley bottom but also in

patches along valley hill slopes and terraces with about 50 - 60% cover. A wide diversity of native plants grow amongst the tussock (>40 species) including *Ranunculus ternatifolius*, found at the base of tussocks. There are a few scattered shrubs such as manuka, bog pine, *Olearia bullata* and the sprawling *Coprosma* aff. *intertexta*. Rushes and sedges are common on the wettest sites and can dominate. In places the red tussock merges in to wire rush bog with *Sphagnum cristatum* or into rushland - sedgeland often with open water patches. *Carex tenuiculmis* is found in fertile valley floor swamps and seepage areas with open water 5%, *Carex gaudichaudiana* 45%, *Juncus articulatus* 30%, red tussock 10%, *Ranunculus cheesemanii*, *Potamogeton cheesemanii*, *Carex coriacea* and Yorkshire fog (*Holcus lanatus*) all common.

Wirerush peat bogs tend to be dominated by wire rush at 60 - 80% cover with *Sphagnum* species mainly *S. cristatum* 5 - 10%, other mosses 2 - 5%, red tussock 5%, *Dracophyllum* sp. aff. *oliveri* 2 - 5%, *D. prostratum* 1 - 5%, *Carex echinata* 2%, *Carpha alpina* 1%, *Celmisia glandulosa* 1%, and occasional *Cyathodes empetrifolia* and bog pine. Where wetter, then wire rush 40%, sphagnum 50% with *Dracophyllum* aff. *oliveri* 5%, red tussock, bog pine, *Celmisia* sp., *Lycopodium ramulosum* and *Abrotanella caespitosa* dominate. *Hebe pauciramosa* forms open patches in places. The lower valley contains a large raised peat dome of about 200 ha. in area.

Modifiers/threats:

Cattle grazing. Mouse-ear hawkweed invasion on open areas and dry grassland.

Significance:

Probably the most intact red tussock valley floor system remaining in Southland. Forms the lower end of the mountain top to valley floor vegetation sequence with the adjoining DoC land (Takitimu Mountains).

Selection Criteria:

Representativeness	H	Red tussockland of wet valley floor and large wirerush bog systems.
Diversity	H	Red tussockland, wirerush bog, silver beech forest, manuka shrubland, terrace shrubland.
Special Features	H	Valley floor red tussockland with <i>Ranunculus ternatifolius</i> and <i>Carex tenuiculmis</i> .
Naturalness	M-H	Large areas are still in their natural state.
Viability	H	Bounded by Takitimu forest and the Aparima river.
Size and Shape	H	Large.
Buffering	H	Almost completely enclosed. Well buffered.

RAP 3 CASTLE ROCK (LIMESTONE)

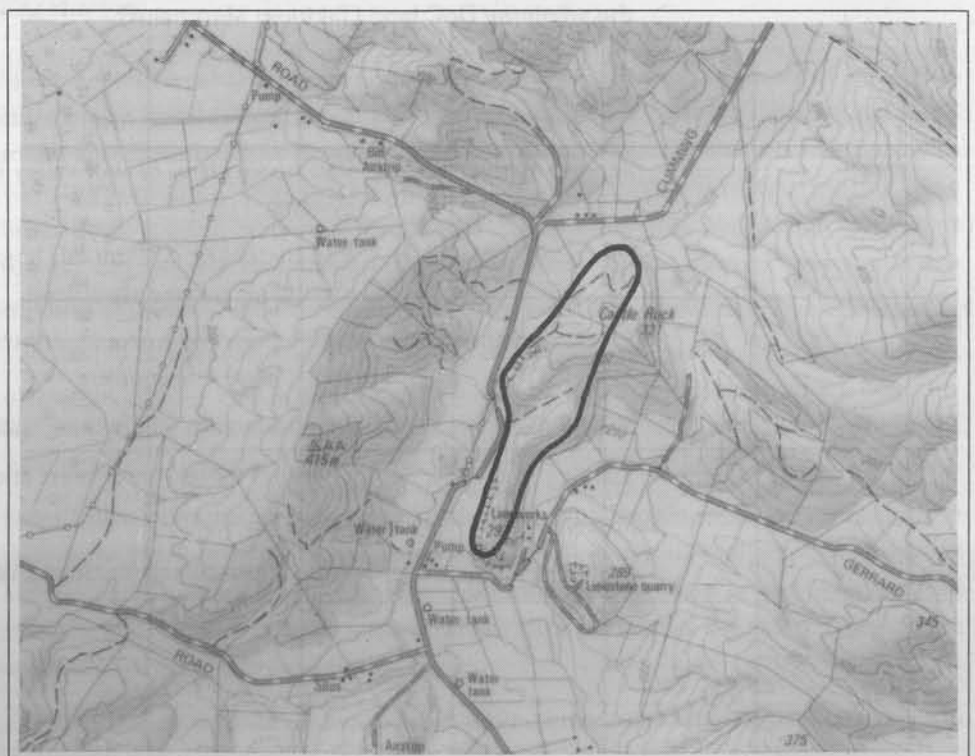
GR centre:	NZMS 260 E 44 435782
Area:	c. 100 ha
Altitude (range):	200 m – 321 m (120 m)
Tenure:	Freehold (Mr K. Buchanan)
Photos:	195-211, 239
Land system:	Taringatura
Survey method:	Ground survey

Ecological units (% cover)

shrubland (55%)
grassland (20%)
limestone bluffs (15%)
rushland (10%)

Description:

A significant limestone outcrop with a mining operation at its southern end and which has recently been extended northwards along the top. Open, mixed shrubland with a number of divaricating shrubs, covers most of the top and west faces of this outcrop with exotic grassland underneath and in the open areas. In places, the shrubland is very thick. In the steep sided gullies and on the outcropping rock, large *Griselinia littoralis*, cabbage tree, Hall's totara and kowhai grow. The



rare shrub *Teucrium parvifolium*, which is classed as vulnerable in the National Threatened Plant List, is found along the western gullies. Sheep graze most of the area.

Fossil bones of extinct (moa and eagle) and existing birds (duck, kiwi) have been found in a fissure at Castle Rock (Hamilton, 1893).

Vegetation:

Shrubland is the major plant community on Castle Rock. The most common species are matagouri, korokio, *Coprosma propinqua*, *Melicactus* aff. *alpina* and *Raukawa anomalous* (*pseudopanax anomalous*). Tree nettle, is common in the gullies where large broadleaf are also found as is the rare plant *Teucrium parvifolium*. Other shrubs include *Melicope simplex*, often with the tiny parasitic mistletoe *Korthalsella clavata* growing on it, *Coprosma rugosa*, *C. rigida*, weeping mapou, and *Carmichaelia* sp. Kowhai, Hall's totara, kohuhu and cabbage trees are scattered through the shrubland, especially at the northern end on ledges on the bluffs and in the many small gullies. Seedling broadleaf appear to be confined to bluffs where they are out of reach of stock. Hawthorn (*Crataegus monogyna*) and gooseberry (*Ribes una-crispa*) occur sporadically in the shrubland. *Rubus schmidelioides*, *Parsonsia heterophylla*, *Muehlenbeckia complexa*, *M. australis*, *Clematis marata* and *Fuchsia perscandens* are climbers found here. Native ferns and herbs grow with hard tussock, blue tussock and exotic grasses under the shrubs.

Many of the shrubland plants can be found on shelves and ledges of the bluffs but a number of plants are confined to these areas, either because of grazing pressure or from preference. In the later category is *Anisotome* sp., the maiden hair fern *Adiantum cunninghamii*, *Asplenium terrestre* and *Asplenium lyallii*, a calcicole (confined to limestone).

On wet ground around the base of the rock and along the stream edge, harakeke (*Phormium tenax*) and a variety of rush and sedge species grow. Also present are silver tussock, toe toe (*Cordarteria richardii*), koromiko and gorse, as well as exotic grasses including large, coarse clumps of cocksfoot (*Dactylis glomerata*). This latter covers some of the steep southern slopes where large boulders have fallen from above, making access difficult.

Modifiers/threats:

Mining for lime. Grazing. The shrubland and forest species will regenerate if grazing is removed and will eventually return to forest.

Significance:

The only area of limestone in the district. A spectacular landform. The rare plant *Teucrium parvifolium* found here, also the only site within the ecological district for the calcicole *Asplenium lyallii*. Site of fossil bones.

Selection Criteria:

Representativeness	H	The only limestone area.
Diversity	M-H	A Diverse native shrubland with calcicoles present.
Special Features	H	Limestone, fossil bones, the rare plant <i>Teucrium parvifolium</i> .
Naturalness	M-L	Mainly regenerating vegetation except for a few old trees.
Viability	M-H	Requires fencing.
Size and Shape	M	Small area
Buffering	H	Vertical bluffs on the south side.

RAP 4 HAMILTON BURN

GR centre: NZMS 260 D 44 255975
Area: c. 820 ha
Altitude (range): 390 m – 560 m (170 m)
Tenure: Freehold (M Hamilton Farm, Mr T. Roughan, manager)
Photos: 131-139, 140-141, 143, 218-220, 229, 230
Land system: Taringatura
Survey method : Ground survey

Ecological units (% cover)

red tussock grassland (55%)
 wire rush bog (5%)
 red tussock - manuka shrubland (10%)
 sedgeland - rushland with red tussock (5%)
 shrubland (15%)
 exotic grassland (10%)

Plot codes:

028, 030, 031

029

031



Description:

Alluvial terraces and fans along the eastern foot slopes of Mount Hamilton with numerous streams feeding the Hamilton Burn, which is important for its fisheries values. Although the area has been burnt and grazed (except for some fenced off riparian strips), it has an excellent cover of red tussock over most of the area with manuka shrubland creeping back along the upper edge, abutting the forested and shrub-covered slopes of Mount Hamilton and extending along the dry terrace sides.

The most extensive area of wet, lowland red tussock in Southland.

Vegetation:

Red tussock communities cover much of the area. On drier terrace faces red tussock varies from 10% to 50% with brown top 15-25%, mouse-ear hawkweed 15-25%, mosses 25%, blue tussock 1-5% and *Gaultheria macrostigma* 5-25%. Some faces also include shrubs such as matagouri, *Olearia bullata*, *Coprosma* aff. *parviflora*, *C. propinqua*, and tutu (*Coriaria sarmentosa*). Hard tussock is generally present with silver tussock in patches. On wetter sites red tussock becomes more dominant with the sedge *Carex coriacea*, the latter forming dense patches in hollows. Numerous native herbs and sedges fill inter-tussock spaces. Open red tussock communities are found on terrace slopes nearer the Mount Hamilton foot slopes. Here the community is dominated by numerous small shrubs such as *Gaultheria macrostigma* 25%, *Coprosma cheesemanii*, and *Pentachondra pumila*, herbs (about 15 species), ferns, grasses (*Rytidosperma* 5-15%), rushes and sedges with mosses 5-25% and scattered large shrubs such as manuka, *Cassinia*, *Dracophyllum uniflora*, *D. sp. aff. oliveri* and red tussock 5% to 25%. Bracken fern is present in small areas.

Small areas of sedgeland-rushland are composed of *Carex coriacea* 25-50%, *Juncus gregiflorus* 10-25%, brown top 10-25% with Yorkshire fog, *Carpha alpina*, mosses, *Coprosma* aff. *intertexta* and *C. cheesemanii*. Manuka can be present and, where disturbed, the exotic *Juncus articulatus* is prominent.

Red tussock grades into wire rush bog which forms part of the red tussock mosaic. Wire rush 50-75%, *Sphagnum cristatum* 15-50%, with patches of red tussock and Yorkshire fog 15-30%. Other species include *Cassinia vauvilliersii*, *Helichrysum bellidioides*, *Carex echinata*, *Gonocarpus micranthus*, *Schizeilema cockaynei* and *Uncinia* aff. *rubra* (tufted, fine-leaved form). *Olearia bullata* and *Coprosma* aff. *intertexta* occur as scattered plants. Or wire rush 50-75%, *Carpha alpina* 15%, mosses 25% and sedges 5-25% with sundew (*Drosera spatulata*) and *Cyathodes empetrifolia*.

Manuka shrubland forms extensive areas on rolling ground at the foot of Mount Hamilton and on the larger north facing terrace slopes. Other shrubs present are matagouri, *Hebe anomala*, *Coprosma* aff. *parviflora*, *C. propinqua*, *C. rugosa*, inaka and *Melicytus* aff. *alpina*. Bracken and speargrass can also be a component.

Exotic grassland mainly brown top and sweet vernal with patches of red tussock occur on some dry terrace tops such as near the road and on some stony, alluvial stream beds. Exotic species only become prominent on drier sites and the more disturbed ground and are otherwise a minor component of native communities.

Modifiers/threats:

Sheep and cattle grazing have modified some parts of this area allowing exotic grasses to dominate.

Significance:

The most significant area of wet, lowland red tussock in Southland. It complements the other lowland red tussock areas, on Dunrobin, Waterloo Burn, Beaumont and Wairaki Hills.

Selection Criteria:

Representativeness	H	Excellent red tussockland, (tall and dense with a variety of inter-tussock species) of wet terrace and outwash fans. The only red tussock of this type in the District.
Diversity	H	A range of plant communities – bog, red tussockland, shrubland, stream bank.
Special Features	H	Only red tussock of wetland on till and outwash gravels.
Naturalness	M	Largely natural.
Viability	M-H	Partly fenced.
Size and Shape	H	Large area but with narrow riparian strip south to the Hamilton Burn.
Buffering	H	Bounded by the Mt Hamilton ridge and footslopes to the west and the road along the eastern boundary. Farmland to the north and south.

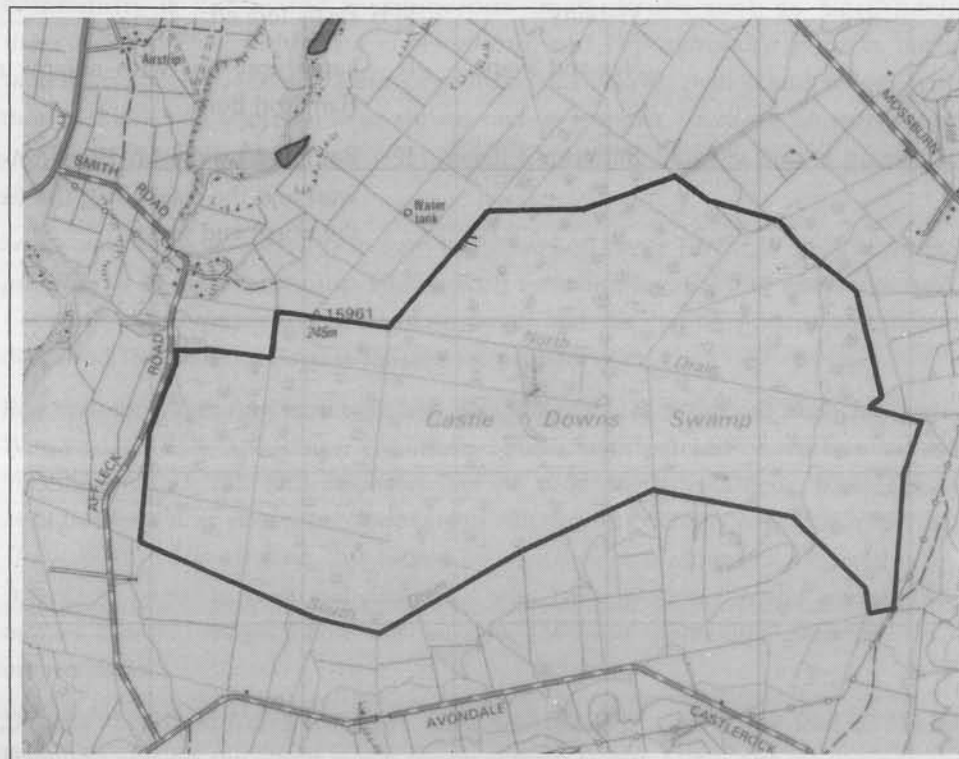
RAP 5 CASTLE DOWN SWAMP

GR centre: NZMS 260 E 44 385795
Area: 1000 ha
Altitude (range): 245 m – 245 m (1 m)
Tenure: Freehold (Consortium – contact Mr M. Saunders)
Photos: 77,175-184, 186, 212-217, 240
Land system: Taringatura
Survey method: Ground survey

Ecological units (% cover)

wire rush bog (60%)	069
red tussock- wire rush bog (15%)	
wire rush - flax bog (10%)	070
wire rush - sphagnum bog with <i>Dracophyllum</i> (5%)	071, 072
sphagnum bog (10%)	

Plot codes:



Description:

This a very extensive wire rush bog (more than 1000 ha) with red tussock, shrublands, swamp flax and sphagnum areas. Two or three small lakes lie within the bog with duck shooting maimais along their edge. A large drain has been cut along the south edge and separates the bog from pasture land belonging to the Ryan Family. North drain flows quite fast through the centre of the bog with several side drains feeding into it. The area is owned by a consortium and used primarily for

duck shooting. *Sphagnum* moss has been gathered from some areas with numerous vehicle tracks. Drying out of the ground is noticeable along the main drains and exotic species are often dominant here. It will be necessary to block or partially fill in these drains if the bog is to be protected. A large green area of exotic species, mainly Yorkshire fog, occurs in one place. This may previously have been a black-backed gull colony.

Vegetation:

Wire rush at 90% cover with *Sphagnum* 10% and up to 25% in patches, forms the main cover. A fringe of red tussock with wire rush runs along the edge of the bog but red tussock then thins out to scattered tussocks. *Dracophyllum* occurs sporadically while *Carex echinata* and *Juncus gregiflorus* form small patches in wet hollows. In larger, wetter areas sphagnum increases to 50% with wire rush 30 - 50%. *Carex echinata* 10%, *Juncus* sp. 10%, moss (*Polytrichum* sp.) and inaka 10% are often present.

Near the largest (jellybean-shaped) lake, swamp flax becomes quite dense with wire rush, rushes, sedges and a few shrubs such as *Cassinia*, *Coprosma* aff. *parviflora* and *C.* aff. *intertexta*.

Further out from the lake red tussock becomes important with wire rush and sedges with clumps of harakeke (flax).

Where *Dracophyllum* aff. *oliveri* shrubland occurs its cover can increase to about 25% with wire rush 45% and sphagnum 30%.

Sphagnum can be dominant, usually where it is very wet, with rushes and wire rush and a few herbs.

Modifiers/threats:

Moss harvesting, drainage.

Significance:

The largest peatland in the ecological district.

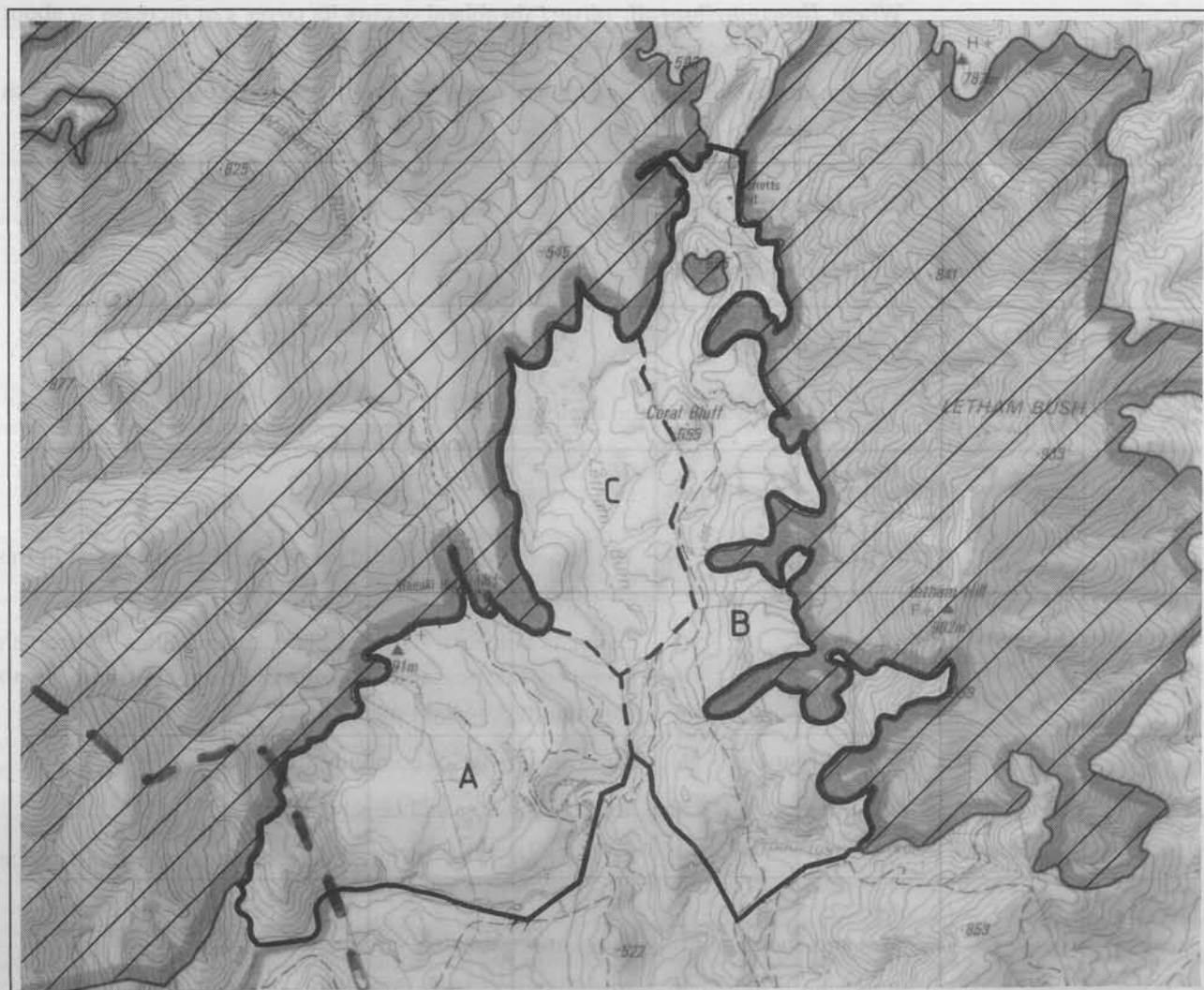
Selection Criteria:

Representativeness	H	The largest and the most diverse peatland vegetation in the district.
Diversity	H	Contains a diverse range of plant communities – wirerush bog, red tussockland, <i>Sphagnum</i> bog, flax and shrub communities, several small lakes.
Special Features	M	Large area, range of communities, lakes.
Naturalness	M-H	Much of the area still largely natural.
Viability	M	At least some of the drainage ditches will need to be blocked off to restore the integrity of this area.
Size and Shape	H	Large, approximately circular area.
Buffering	H	Surrounded by ditches and fenced off from farmland.

RAP 6 LETHAM BURN

6A WAIRAKI RED TUSSOCK

GR centre: NZMS 260 D 44 165785
Area: c. 350 ha
Altitude (range): 400 m – 545 m (145 m)
Tenure: Beaumont Pastoral Lease (lessee Mr S. Minty)
Photos: 45, 126, 213-215
Land system: Taringatura
Survey method: Ground survey
Ecological units (% cover)
red tussock grassland (75%)
hard tussock grassland (20%)
exotic grassland (5%)



Description:

Red tussock dominates these terraces, spreading from the foot slopes of the Takitimu Mountains. Small areas of exotic grassland occur where the tussock cover has been removed by past burning, stock camps, grazing pressure or river erosion. Hard tussock grassland is found on drier or better drained areas. Adjoins Coral Bluff and Letham Bog RAP's.

Vegetation:

A high diversity of small native herbs, sedges, rushes and grasses are found between and under the tussock (>20 species) with these communities varying depending on how wet the ground is. Exotic grasses and white clover (*Trifolium repens*) are also found here. The occasional native broom (*Carmichaelia* sp.) is also found.

The hard tussock grassland also has a good diversity of inter tussock species, mainly native (>25), being more open than the red tussock. There is also a greater number of exotic species (10) but these form only a minor component overall. Scattered red tussock and some silver tussock, the latter tending to be on fresher or more fertile soils especially on river flats, are found in this community. *Gaultheria macrostigma* is often common.

Exotic grassland is patchy and merges with the red tussock. Brown top, sweet vernal and, in wetter areas, Yorkshire fog are the main grasses. Other small herbs and grasses also occur, both native and exotic.

Modifiers/threats:

Land development and grazing, especially by cattle.

Significance:

This area contains some of the best red tussock of alluvial terraces, remaining on Beaumont Station. It also provides additional ecological variation to the adjacent beech forest of the Takitimu Mountains.

Selection Criteria:

Representativeness	M	A good example of alluvial terrace red tussockland.
Diversity	L-M	
Special Features	M	
Naturalness	M-H	Good natural red tussockland except for disturbed areas mainly along the river edge.
Viability	M	Would be increased with fencing.
Size and Shape	H	Large area of even shape.
Buffering	M	Takitimu Forest along the western edge, the Wairaki River along the south and east and Letham RAP to the north.

RAP 6B BEAUMONT - CORAL BLUFF

GR centre: NZMS 260 D 44 185810
Area: c. 435 ha
Altitude (range): 438 m – 959 m (521 m)
Tenure: Beaumont Pastoral Lease (lessee Mr S. Minty)
Photos: 41 - 46, 126, 212 – 215, 222
Land system: Taringatura
Survey method: Ground survey

Ecological units (% cover)	Plot codes:
silver beech forest (5%)	034
red tussock grassland (70%)	033
hard tussock grassland (15%)	032
exotic grassland (8%)	
shrubland (2%)	

Description:

This area lies along the western flanks of Letham Hill and Letham Bush, from above Barrett's hut south to Productus Creek. It is an area dominated by tall, dense red tussock with patches of silver beech forest, matagouri shrubland, exotic grassland and hard tussock. Past burning has left an irregular and artificial valley bottom tree line which, south of Letham Hill, extends to the ridge top at 959 m. The forest edge is very open in many places for up to 100 m in from the edge due to trampling and browsing of animals. Cessation of grazing will lead to a marked improvement in the forest understorey and will allow the forest to return to a natural lower edge.

Vegetation:

The forest and forest patches are typical of the surrounding forest being silver beech with occasional mountain beech or mountain beech patches mainly on drier ridge tops. There is a relatively dense understorey of *Coprosma* species, weeping mapou and beech saplings. Broadleaf, putaputaweta and fuchsia are sub-canopy trees. Moss and ferns clothe the floor and lichens abound. A variety of birds are found including parakeet, bellbird, tui, tomtit, greywarbler, fantail and rifleman. Deer, possums, stoats (seen) and hares are present. A large kowhai tree grows on a rocky knob near Coral Bluff.

The grassland areas are similar in composition to those described in the Wairaki block. There is a large area of exotic grassland around Barretts hut and patches along some of the lower slopes.

Patches of shrublands are primarily matagouri with *Coprosma propinqua* and *C. aff. parviflora* but rocky knobs and steep stream banks contain also inaka, *Olearia bullata*, *Hebe rakaiensis*, karokio and *Coprosma rugosa*. In places along the forest

edge the shrubland contains montain holly and *Brachyglottis cassinioides*. *Aciphylla glaucescens*, golden Spaniard and *Astelia nervosa* also occur here.

Productus Creek is known for its fossil finds.

Modifiers/threats:

Stock, especially cattle, graze the forest edge and shelter in the forest.

Significance:

Joins the Takitimu Forest with Letham Bush and protects both forest edges. Tall, dense red tussock on wet terraces with diverse shrublands on terrace risers and forest edges in places.

Selection Criteria:

Representativeness	M	An area of hill slope red tussock on a westerly aspect.
Diversity	M	Reasonably diverse.
Special Features	M	Fossils in Productus Creek.
Naturalness	M	Modified by grazing.
Viability	H	Would be increased with fencing to allow bush edge and shrublands to recover.
Size and Shape	H	A long, relatively narrow area but part of a larger RAP.
Buffering	H	Letham bush forms the western and northern edge with Takitimu Forest and RAP 6c along the eastern flank.

RAP 6C BEAUMONT-LETHAM BOG

GR centre:	NZMS 260 D 44 175805
Area:	c. 235 ha
Altitude (range):	438 m – 510 m (72 m)
Tenure:	Beaumont Pastoral Lease (lessee Mr S. Minty)
Photos:	125, 215
Land system:	Taringatura
Survey method:	Part ground survey, binocular survey

Ecological units (% cover)

red tussock grassland (70%)

wire rush bog (20%)

hard tussock grassland (10%)

Description:

This area sits between Wairaki and Coral Hill and, except for the large wire rush bog in the centre of the block, is similar to Wairaki in community composition. The three blocks described are contiguous and could be also be included as one.

Vegetation:

The bog was only inspected from a distance due to time constraints but appeared similar to other bogs found nearby which were surveyed on the ground. A smaller bog on the adjacent Ardross Station is typical of these, containing a diverse number of species although wire rush was completely dominant. Other plants present are *Oreobolus pectinatus*, *Nertera balfouriana*, *Pratia angulata*, *Lycopodium ramulosum*, *Cyathodes empetrifolia*, *Forstera tenella*, *Kelleria laxus*, *Pentachondra pumila*, *Blechnum penna-marina*, *Rytidosperma nigricans*, *R. gracile*, *Trisetum antarcticum* var. *tenellum* and several mosses and lichens.

The red tussock cover is often dense but also forms a mosaic with hard tussock and small areas of exotic grassland with scattered red tussock.

Modifiers/threats:

Cattle and sheep grazing.

Significance:

Is contiguous with the Wairaki red tussock and Coral Bluff RAP to form a large red tussock block between the Takitimu Forest and Letham bush. The bog adds to the diversity of this area.

Selection Criteria:

Representativeness	M	Typical valley-bottom red tussock and wire rush bog.
Diversity	M	Red tussock, bog and forest edge communities.
Special Features	M	Relatively large bog near the forest edge. Joins 6a and 6b.
Naturalness	M	Modified by grazing.
Viability	H	Part of a large area. Fencing will increase viability.
Size and Shape	H	Part of a large RAP.
Buffering	H	Forest edge and other RAP.

RAP 7 DUNROBIN RED TUSSOCK (ADDITION)

GR centre: NZMS 260 E 44 338804

Area: c. 24 ha

Altitude (range): 220 m (0 m)

Tenure: Freehold

Photos: 185,235

Land system: Taringatura

Survey method: Ground survey

Ecological units (% cover)

Plot codes:

Riparian community/exotic grassland (10%)

dense red tussock grassland (15%)

043

open red tussock/moss-herbfield (60%)

blow-out sites (<5%)

flax/sedge riparian swamp (<5%)

red tussock-scrub grassland (10%)

044

Description:

This is a continuation of the Dunrobin QEII Covenant area and suggested addition to this red tussockland. The communities and species are similar. An increase in size would greatly enhance this protected area, add to its integrity and create some buffering for the rare species.

This is the largest and most significant area of lowland red tussock on alluvial outwash gravels in Southland.



Vegetation:

Refer Dunrobin Station Open Space Covenant Management Statement. Similar to the covenant area, see Appendix 1.

The rare plants *Iphigenia novae-zelandiae* and *Pseudognaphalium* sp. "compactum" (both on the NZ Threatened Plants List), are found on the bared soils of the blow-out sites, (the latter species needs to be confirmed when in flower)

Modifiers/threats:

Grazing, weeds particularly broom (*Cytisus scoparius*).

Significance:

The only red tussock grassland on relatively dry, well drained, silty to stony river terrace within the Taringatura Ecological District and thought to be the best in Southland (B. D. Rance pers. comm.).

Selection Criteria:

Representativeness	H	The only red tussock grassland of its type in the ecological district.
Diversity	M-H	Diverse range of habitats.
Special Features	H	Rare plants <i>Iphigenia-novae zelandiae</i> , <i>Gnaphalium</i> sp. "compactum".
Naturalness	M-H	A natural red tussock grassland but with exotic species present.
Viability	M-H	The area is fenced. The addition of this area would increase the viability of the area in QE II covenant.
Size and Shape	M-H	A square, fenced block.
Buffering	H	Fenced.

RAP 8 DAY'S BUSH

GR centre: NZMS 260 E 45 455574

Area: c. 18 ha

Altitude (range): 150 m – 210 m (60 m)

Tenure: Freehold (Mr W. Day)

Photos: 1-3, 5-8, 12, 22-24

Land system: Taringatura

Survey method: Ground survey

Ecological units (% cover)

Plot codes:

Podocarp-broadleaved forest (30%)

001, 002

shrubland (10%)

bracken fernland (45%)

sedgeland/rushland (15%)

Description:

Two adjacent, fenced areas totalling about 18 ha, on a west-facing hillside and surrounded by pasture. They are west of the Day's Forest QE II covenanted remnants, see Appendix 1.

Vegetation:

The smaller northern area has old podocarp species (matai, kahikatea) emergent over a variety of broadleaved species, similar in composition to the already covenanted areas (refer Appendix 1) with dense shrubland of *Coprosma* species



and manuka along its uphill and southern edge with some fernland. A narrow, grassed corridor separates this from the larger block to the south.

The larger, more diverse southern area, has an old farm track through its upper edge which is now mainly clothed in rank exotic grassland. Below this extends an area of podocarp forest with matai, miro and totara (*Podocarpus totara*) emergent over a low canopy of broadleaved species, relatively open underneath. Downhill this forest gives way to bracken covered slopes with emergent podocarps, some large (photo 5), and other broadleaved species of trees and shrubs. The northern side of this block is more open beneath with more Hall's totara. Kaikomako is the other dominant canopy species. *Streblus heterophyllus* is also here, the only tree of this species seen in the district. Boulders and surface rooting indicate shallow soils here. Along the upper edge the understorey is dense with a diversity of shrubs and canopy seedlings and saplings.

There is a wet area of sedgeland with dense, tall *Carex coriacea*, *C. secta*, flax and red tussock with gorse, broom and other exotic species. This wet-land forms a narrow strip down a shallow gully with regenerating forest on the south facing slopes above.

Modifiers/threats:

Grazing by sheep and cattle, weed invasion by the native climber pohuehue around the edges.

Significance:

These two forest blocks are the best of the freehold podocarp-broadleaved communities in the District, left unprotected.

Selection Criteria:

Representativeness	H	A representative remnant sample of this forest type with the potential to return to a largely natural state.
Diversity	H	A good diversity of forest plants.
Special Features	M-H	Large podocarps, broadleaf and <i>Streblus heterophyllus</i> .
Naturalness	M	Has had stock through it but regenerating well now fenced.
Viability	M	Fenced and most species present, regenerating well.
Size and Shape	M	A larger area and smaller oblong patch separated by a narrow strip of pasture.
Buffering	H	Fenced.

RAP 9 CHEWINGS ROAD BOG (SO BIG)

GR centre: NZMS 260 E 44 310957

Area: 140 ha

Altitude (range): 360 m - 375 m (15 m)

Tenure: Freehold

Photos: 148-150, 152-155

Land system: Taringatura

Survey method: Ground survey

Ecological units (% cover)

Plot codes:

wire rush bog (with shrubs) (75%) 064

wire rush - Cassinia bog (15%) 065

red tussock - wire rush bog (10%) 066

Description:

This area adjoins Chewings Road and provides access to the So Big Bog Wildlife Management Area further inland. It is criss-crossed by drains and has been frequently burnt as can be seen by the burnt-through fence posts. In spite of this it is still in a largely natural state with a much better shrub component than the Wildlife Management area (refer appendix 1, So Big Bog) and would make an excellent addition, particularly if some of the drains were blocked off. Exotic species are present only along the drains and drained areas with the most extensive area of exotic species lying between the two areas of bog.

Vegetation:

Wire rush covers the whole area with a cover of 75-90%. In places it is 60 cm tall,



scrambling around the base of shrubs. *Carex sinclairii* 5%, *C. coriacea* (near drains), *C. echinata*, mosses, lichens, *Gonocarpus micranthus*, *Drosera spathulata*, *Celmisia* aff. *alpina*, *Carpha alpina* and exotic grasses (brown top, sweet vernal, Yorkshire fog) are the other main species of this community.

Shrubs are prominent over much of the area with a mosaic or irregular pattern of manuka or *Cassinia*, or *Dracophyllum* aff. *oliveri* and *Coprosma* aff. *intertexta*. They occur in patches of one species or as scattered mixed, open shrubland, generally of low stature (40-80 cm). Wire rush cover reduces to about 60% but is taller. Rush species and occasional red tussock occur in wet hollows.

Along drain edges harakeke, *Hebe rakaiensis*, inaka and the water fern, *Histiopteris incisa* and prickly shield fern are found as well as many exotic grasses, thistles and herbs.

Red tussock to 1.5 m tall, with 50-75% cover, with wire rush 25% and Yorkshire fog occurs in small parts of the area.

Modifiers/threats:

Fire, drainage and grazing.

Significance:

The presence of a diverse bog shrub community in this area would add to the value and viability of the adjacent So Big Bog protected area. This area has one of the best remaining bog shrub associations in the Taringatura district.

Selection Criteria:

Representativeness	H	Excellent bog shrubland.
Diversity	H	Good, diverse bog communities.
Special Features	M	The bog shrub community.
Naturalness	M-H	Relatively natural, few exotic species.
Viability	M	Fenced but large drains will eventually dry it out unless blocked.
Size and Shape	M-H	A square area adjoining the long, narrow So Big Bog, Wildlife Management area.
Buffering	H	Fenced.

RAP 10 SOUTH BRAXTON

GR centre: NZMS 260 D 44 227887
Area: c. 520 ha
Altitude (range): 460 m – 1018 m (558 m)
Tenure: Waterloo Pastoral Lease (lessee Mr J. Minty)
Photos: 226-228, 232, 243
Land system: Taringatura
Survey method: Ground survey

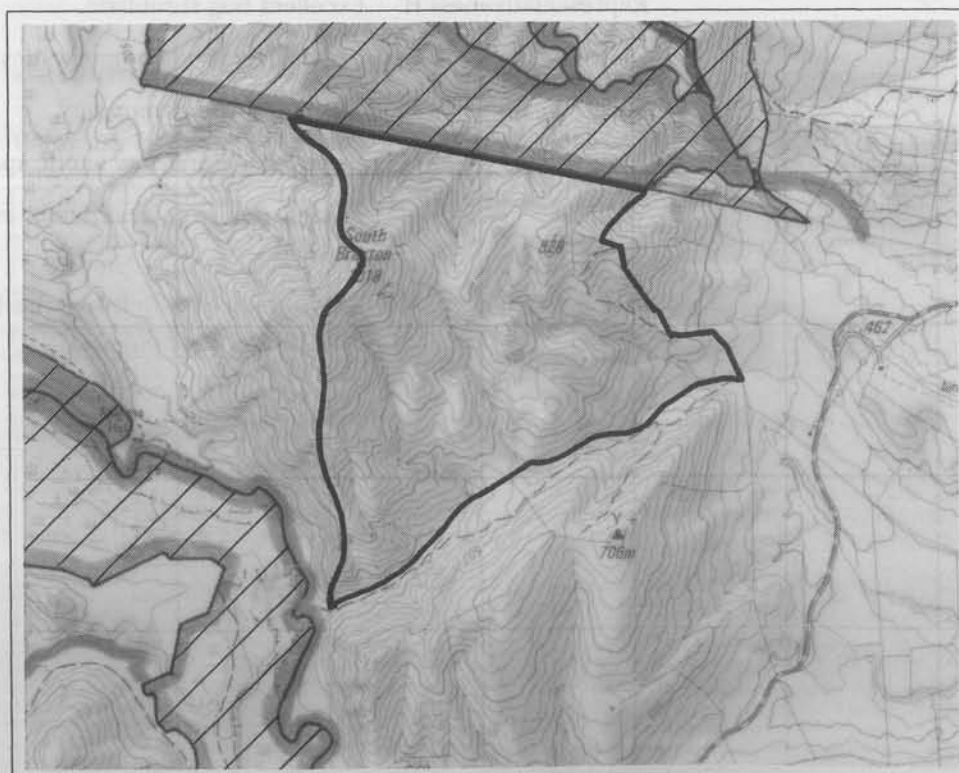
Ecological units (% cover)

Plot codes:

silver beech forest (25%)	
red tussock – shrubland (20%)	026, 025, 027
red tussock grassland (15%)	
Cassinia shrubland (10%)	010
mixed shrubland (20%)	
hard tussock-exotic grassland (10%)	

Description:

South Braxton is covered in large patches of silver beech forest, mainly in the gullies, with extensive areas of regenerating shrubland, red tussock grassland and some hard tussock-exotic grassland. The patchy nature of this vegetation indicates frequent fires



in the past. The return of this secondary vegetation to beech forest is likely to be comparatively fast if grazing and fire do not intervene. Seedlings and saplings around the edges show healthy regeneration. Most of the area is fenced and does not appear to have been grazed for a lengthy period.

Vegetation:

Silver beech forest occupies most gullies with some red beech on lower slopes. Pig rooting occurs around the forest edge in places.

Shrublands are extensive and appear to be increasing. Composition varies from *Cassinia* 60%, *Hebe anomala* 25%, red tussock 10%, *Coprosma* aff. *parviflora*, and inaka to inaka 25%, red tussock 20% with manuka, *Cassinia*, *Coprosma* aff. *parviflora*, *C. cheesemani*, *Hebe anomala* and numerous herbs and grasses. In places mountain holly and *Brachyglottis cassinioides* are prominent whereas on wetter or poorly drained sites red tussock is more important with *Sphagnum*, rushes/sedges, scattered shrubs and mountain flax.

Red tussock is present on poorly drained and infertile sites with many of the shrubs already mentioned and with the addition of *Olearia bullata* and *Coprosma* aff. *intertexta* on the wettest sites where *Schoenus pauciflorus*, *Juncus gregiflorus* and *Carex coriacea* can be important. *Astelia nervosa* is also present.

Hard tussock and exotic grassland are found on some lower, well drained sites and some ridge tops. Mosses and lichens associated with bare ground also occur on these latter sites.

Modifiers/threats:

Fire and grazing.

Significance:

A relatively large area of regenerating beech forest, shrubland and red tussockland.

Selection Criteria:

Representativeness	M-H	Adjoins extensive silver beech forest and has natural and diverse shrublands.
Diversity	H	Moderate to high diversity of ecological units and species diversity.
Special Features	M	Mainly natural plant communities with good regeneration.
Naturalness	M	Modified by burning and past grazing.
Viability	H	Adjoins Conservation Area and RAP 2 and fenced along the tussock boundary.
Size and Shape	H	Large area, compact shape.
Buffering	H	Adjoins forest and fenced.

RAP 11 BARN HILL

GR centre: NZMS 260 E 44 425846

Area: c. 160 ha

Altitude (range): 480 m – 659 m (180 m)

Tenure: Freehold (Ernslaw One Ltd)

Photos: 128-130

Land system: Taringatura

Survey method: Ground survey

Ecological units (% cover)

red tussockland (100%)

Description:

Along the top of the Barn Hill property there remains extensive areas of tall, 1.2 m, dense, to 90% cover, red tussock now under threat from exotic forestry. There is little of this plant community left in the district and this is the best example of relatively intact red tussockland on mid altitude rolling country with poor drainage. (refer also Rance report to DoC, Dec 1995).

Vegetation:

Red tussock community 60 - 90% cover and to 1.2 m tall with a moderate to high diversity of native plant species present - grasses, rushes, sedges, small shrubs and herbs, the composition depending on the density of the tussock and the drainage pattern. Of special note is the presence of *Ranunculus ternatifolius*, a species rated vulnerable on the National Threatened Plant List, 1995.



Modifiers/threats:

Grazing, forestry.

Significance:

Excellent, tall, red tussockland. This is the most intact and extensive red tussock in the Taringatura Hills (north-eastern ED)

Selection Criteria:

Representativeness	H	The only remaining red tussock grassland in the northern part of the district.
Diversity	H	Red tussock with moderate to high diversity of associated plants in this ecological unit.
Special Features	M-H	The rare plant <i>Ranunculus ternatifolius</i> .
Naturalness	H	Largely natural with few exotic species present.
Viability	M	Would be increased with fencing.
Size and Shape	H	Relatively large.
Buffering	H	Needs fencing. May be surrounded by exotic forest in the future.

RAP 12 TARINGATURA CAMP

GR centre:	NZMS 260 E 45 467587
Area:	c. 4 ha
Altitude (range):	95 m – 110 m (25 m)
Tenure:	Freehold
Photos:	24, 26, 27, 29
Land system:	Taringatura
Survey method:	Ground survey

Ecological units (% cover)

podocarp-broadleaved forest (remnant) (70%)

exotic grassland (25%)

sedgeland (5%)

Description:

The site contains a small forest remnant immediately north of Taringatura Scenic Reserve and occupying a similar aspect and landform, a terrace edge and alluvial flat below, extending out to the South Hillend - Dipton road.

Vegetation:

This is an important small remnant with several rare or threatened species present. These are *Melicytus flexuosus* and *Olearia hectorii* (one old tree), both on the Threatened Plants List and both also found in the adjacent Taringatura Scenic Reserve, fierce lancewood a relatively rare and local small trees (found also in the adjacent Taringatura Scenic Reserve), and *Coprosma virescens*, not seen elsewhere in the district. The tiny mistletoe (*Korthalsella clavata*) is found in this area and a scrambling plant, *Fuchsia perscandens* is also here. Both are uncommon in Southland.



Podocarps are represented by matai and Hall's totara, but there is a good representation of broadleaved species with kowhai, kaikomako, pate, fuchsia, broadleaf, *Melicope simplex* (on which is found the tiny mistletoe mentioned above), *Lophomyrtus obcordata*, tarata, horopito and lowland ribbonwood.

Along the foot of the slope is a narrow, wet area with *Carex* species and harakeke. Most of the flat land is covered in rank exotic grassland with a few sheep grazing on it.

A white (albino) kukupa (*Hemiphaga novaeseelandiae*) was seen in a large matai, here.

Notes:

This area is partly used as an adventure playground by camp users. It also has a rough walking track through it.

Modifiers/threats:

Uncontrolled human use. Weeds. The native vine, pohuehue is spreading rampantly along the forest edges and smothering both small and large trees.

Significance:

Contains rare and threatened plants.

Selection Criteria:

Representativeness	H	A small podocarp/broadleaved remnant with rare plants present.
Diversity	M-H	Contains a diversity of forest and forest edge plants
Special Features	H	The plants <i>Olearia hectorii</i> , <i>Melicytus flexuosus</i> , <i>Coprosma virescens</i> and fierce lancewood.
Naturalness	M-H	Areas of regeneration present but the terrace vegetation is largely natural.
Viability	M	Is fenced but needs some control on public use (i.e., interpretative signs, upgraded track).
Size and Shape	M	A small, long area occupying an alluvial flat and terrace riser.
Buffering	M-H	It is fenced.

RAP 13 LANCE WILSON'S BUSH

GR centre: NZMS 260 E 45 450551

Area: c. 7 ha

Altitudinal range: 120 m – 180 m (60 m)

Tenure: Freehold (Mr L. Wilson)

Photos: 10, 11, 13, 14, 15, 21, 22

Land system: Taringatura

Survey method: Ground survey

Ecological units (% cover)

Plot codes:

podocarp-broadleaved forest (80%) 009

riparian vegetation (20%)

Description:

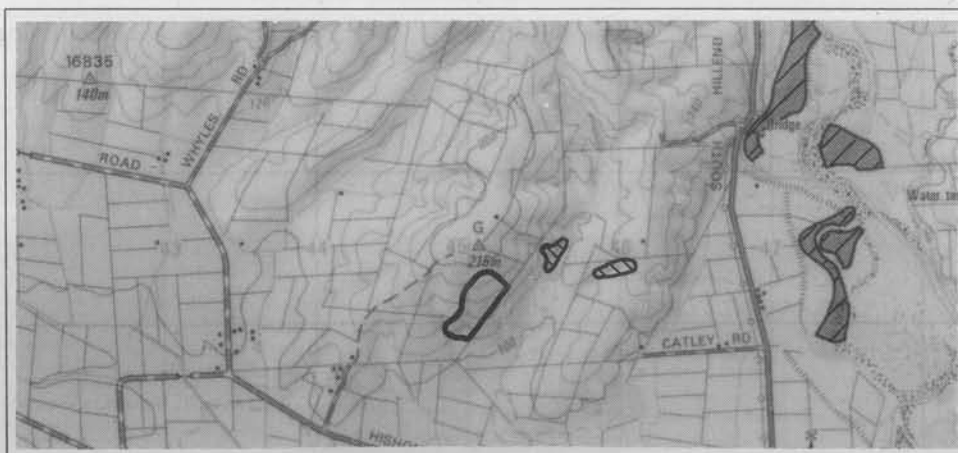
An important podocarp-broadleaved forest which is in good condition as a consequence of having been fenced for 14 years. It has *Eucalyptus* sp., *Lawsoniana* sp., *Picea* sp. and *Pinus* sp. planted around some edges. Some gorse and broom patches also around the outer edge with tall exotic grasses and native shrubs.

Vegetation

Emergent kahikatea, very large pokaka, 15 to 18 m tall, totara, matai, rimu with large, old broadleaf, tarata, kotukutuku, kaikomako, kohuhu, narrow-leaved mahoe, wineberry, cabbage tree and pate.

Pohuehue is dense and smothering the native trees and shrubs along some edges and in canopy gaps is a real threat to the regeneration and some of the existing forest.

Understorey is dense with good ground cover. *Coprosma linariifolia*, *C. crassifolia*, *C. aff. parviflora*, *C. propinqua*, *C. areolata*, *C. rotundifolia*, *C. rhamnoides*, Koromiko, horopito, three finger, lancewood, weeping mapou, mapou, *Lophomyrtus*



obcordata, *Neomyrtus pedunculatus* and putaputaweta are all present. Canopy species are well represented in the seedling and sapling stages. The ground cover includes a range of common ferns with numerous seedlings in canopy gaps. Native jasmine (*Parsonsia heterophylla*) and bush lawyer (*Rubus schmidelioides*) are less aggressive climbers present.

Notes

Early photos of this part of the Taringatura Hills show forest covering the whole lower slopes of the area with red tussock along the tops (Paul Wilson pers. comm.).

Modifiers/threats:

Weeds, especially around the fenced edge and the native vine pohuehue.

Significance:

Podocarp/broadleaved remnant with several very large, old trees.

Selection Criteria:

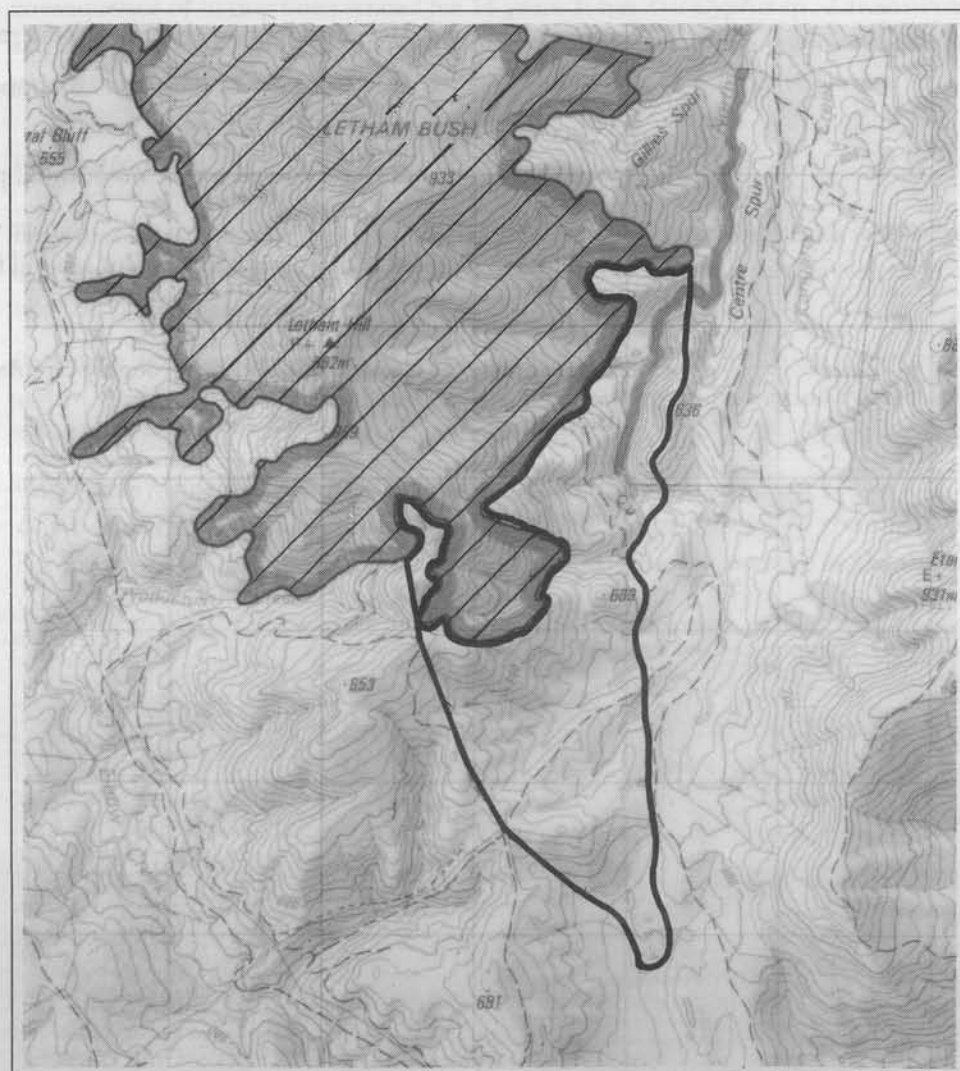
Representativeness	M	Small podocarp/broadleaved remnant.
Diversity	M	Has most of the plant components necessary to recover to its natural state.
Special Features	M-H	Very large totara, miro, rimu, pokaka, broadleaf, tarata and fuchsia.
Naturalness	M	Largely natural except around the edges.
Viability	M	Totally fenced.
Size and Shape	M	Relatively small roughly circular area.
Buffering	H	Fenced.

RAP 14 KANGAROO CREEK-ARDROSS

GR centre: NZMS 260 D 44 215780
Area: c. 300 ha
Altitude (range): 550 m – 820 m (270 m)
Tenure: Ardross Pastoral Lease (lessee Mr S. Minty)
Photos: 47-49, 54-57, 60
Land system: Taringatura
Survey method: Ground survey

Ecological units (% cover)

silver beech forest (20%)
red tussock grassland (60%)
hard tussock grassland (15%)
red tussock wetland (5%)



Description:

This area takes in several patches of silver beech forest adjacent to the southern end of Letham Bush, red tussock and hard tussock grassland mosaic and a small wetland with a diversity of species.

Vegetation:

The silver beech patches are typical for the area but quite intact with an excellent ground cover of ferns such as *Blechnum procerum*, prickly shield fern, crown fern, (*Blechnum discolor*), filmy fern (*Hymenophyllum multifidum*) and mosses. The large, feathery looking moss, *Dendroligotrichum dendroides* forms large patches. The edges have some cattle damage but this is generally minor.

The small wetland is dominated by red tussock with rushes and sedges. It also contains a number of shrubs including *Olearia bullata*, *Hebe anomala*, *Gaultheria macrostigma* and *Coprosma* aff. *intertexta*. *Carpha alpina*, *Ranunculus cheesemanii*, *Carex berggrenii*, *Schizeilema cockaynei*, *Plantago raoulii* and *Microseris scapigera* are other wetland plants found here.

Red tussock dominates this area, dense in places and where more open, with hard tussock and exotic grasses between. Many small herbs and shrubs also occur with scattered *Cassinia vauvilliersii*, matagouri and *Coprosma* species.

Modifiers/threats:

Grazing, land development.

Significance:

An area of diverse vegetation adjoining Letham Bush and including beech forest, red tussockland and shrubland all in good condition.

Selection Criteria:

Representativeness	H	Contains a good range of plant communities on east facing slopes.
Diversity	H	A range of ecological units present.
Special Features	M	Intact ground cover.
Naturalness	H	Mainly natural with few exotic species.
Viability	M	Would be increased with fencing.
Size and Shape	H	A large area.
Buffering	M	Backs on to Letham Bush but requires some fencing.

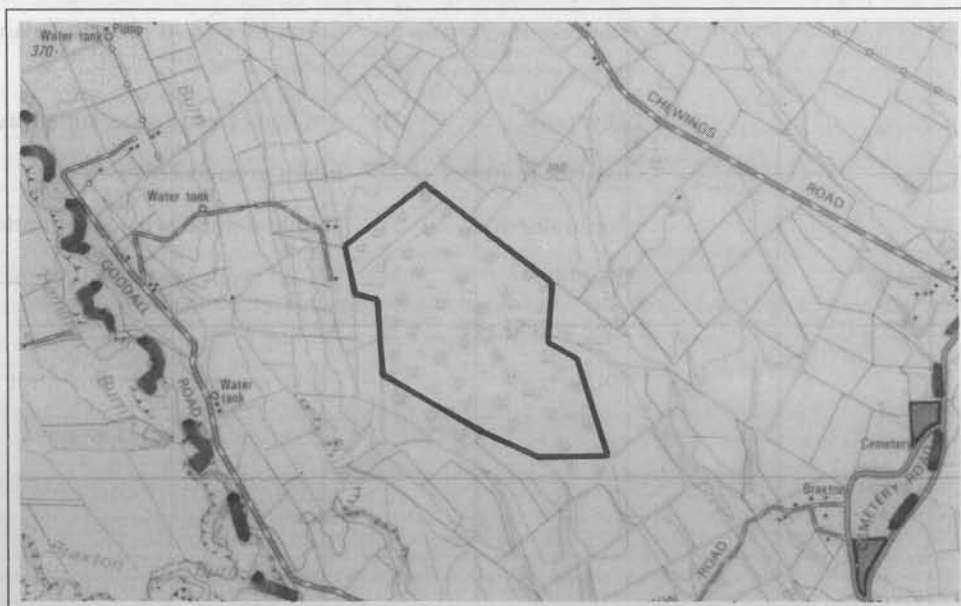
RAP 15 BRAXTON DOWNS BOG

Area:	185 ha
Altitude (range):	340 m – 355 m (15 m)
Tenure:	Freehold (part owner, Mr J. Douglas)
Photos:	163-174
Land system:	Taringatura
Survey method:	Ground survey

Ecological units (% cover)	Plot codes:
wire rush bog with shrubland (10%)	062
shrubland - wire rush bog (10%)	063
rushland-sedgeland (5%)	
wire rush bog (55%)	060
shrubland (10%)	
red tussockland (10%)	

Description:

Primarily a wire rush bog with *Sphagnum* and scattered shrubland and patches of rushland/sedgeland. Shrubland with some exotic grassland extends above a small stream which drains eastwards from the eastern side of the bog. In the centre of the bog is a wetter area with standing water, exotic grasses and rushes, mosses and *Carex gaudichaudiana*. This could have been the site of an old gull colony. Originally part of Braxton Downs Station the bog is now divided between two neighbouring properties.



Vegetation:

Typical of much of this bog is wire rush at 90% cover and *Sphagnum cristatum* 10% with a few lichens, liverworts, clumps of *Juncus effusus* and occasional *Dracophyllum* aff. *oliveri* and *Cyathodes empetrifolia* shrubs. Mounds of *Sphagnum* may indicate previous shrub sites.

Where shrubs are more prominent the wire rush is reduced to about 70% cover with manuka 10%, *Dracophyllum* aff. *oliveri* 10% and *Sphagnum* 10-20%. There are numerous dead shrubs but seedling manuka are present. Above the stream the shrubland is taller and thicker with *Dracophyllum* aff. *oliveri* 25-50%, manuka 1-20%, red tussock 1-2%, *Coprosma* aff. *intertexta* 1-5%, *Carex* species 1-15%, mosses 15-25% and wire rush 25-50%.

Red tussock grassland occurs along the small stream and extends northwards from here until merging with wire rush bog.

Modifiers/threats:

Grazing, trampling, drainage and fire.

Significance:

Peat bogs are an ecological unit gradually disappearing from the district. This one is largely natural with few exotic species present.

Selection Criteria:

Representativeness	H	A typical example of a lowland peat bog.
Diversity	M	A range of plant communities including wire rush bog, sphagnum bog, red tussockland and shrubland.
Special Features	M	
Naturalness	M	
Viability	M	Already fenced.
Size and Shape	M	Relatively small, roughly circular area.
Buffering	H	Fenced.

RAP 16 TRIG H - LETHAM BUSH

GR centre: NZMS 260 D 44 203838
Area: 75 ha
Altitude (range): 460 m – 787 m (327 m)
Tenure: Freehold (Pleasant Valley Co., Mr I. Grant)
Photos: 90, 91
Land system: Taringatura
Survey method: Ground survey

Ecological units (% cover)	Plot codes:
red tussock grassland (80%)	041
shrubland (20%)	042

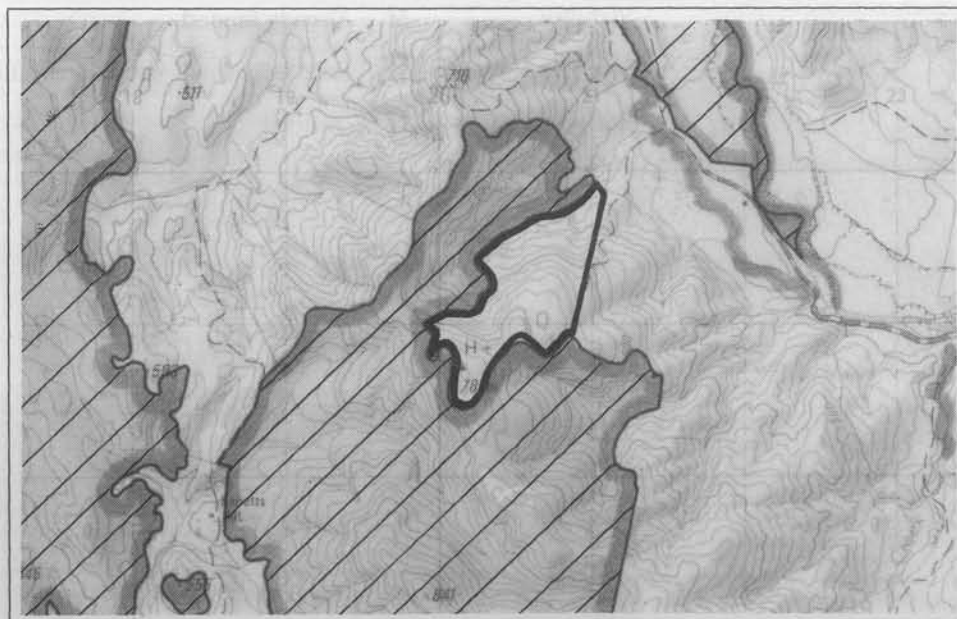
Description:

An area of tall, relatively dense red tussock on poorly drained ground around trig H and surrounded on three sides by silver beech forest. It extends downhill into increasing hard tussock, silver tussock and exotic grassland with scattered shrubs of matagouri, korokio and *coprosma* species.

Vegetation:

Dense red tussock 60-80% and 70 cm to 1.3 m tall with hard tussock 5%, brown top to 25% and *Coprosma cheesemanii* 5% to 25% and numerous inter-tussock species. Moss can be prominent and patches of mouse-ear hawkweed are present. Inaka forms a thick fringe to the beech forest in places.

A few, relatively small patches of dense shrubland occur with matagouri 30% and



Coprosma rugosa 30% as the main species with korokio, native broom, *Coprosma* aff. *parviflora*, *C. propinqua*, manuka, *Olearia bullata*, *Melicytus* aff. *alpinus*, speargrass and bracken fern.

Notes: The tussock area is grazed. Stock also graze into the forest edge and have a well used route through the forest to the western grassland slopes.

Modifiers/threats:

Grazing.

Significance:

Excellent tall, red tussockland and shrubland along the Letham Bush edge. It would improve the Letham Bush boundary and with fencing, stop stock intrusion into the beech forest.

Selection Criteria:

Representativeness	H	An area of tall, dense, hill top red tussock on poorly drained soils with shrubland on the better drained lower slopes.
Diversity	M-H	A diverse range of ecological units and plant species.
Special Features	M	Tall, dense, wetland red tussock.
Naturalness	M-H	Mainly natural although some induced hard tussock on lower slopes.
Viability	M	Would be significantly improved with fencing.
Size and Shape	M-H	Small area contained on three sides by beech forest, Letham Bush, refer Appendix 1.
Buffering	M	Would be improved with fencing.

RAP 17 BOG BURN - TARINGATURA FOREST

GR centre: NZMS 260 E 45 398595
Area: c. 10 ha
Altitude (range): 190 m – 260 m (50 m)
Tenure: Crown Forest licence (lessee – Rayonier NZ Ltd)
Photos: 33-35
Land system: Taringatura
Survey method: Ground survey

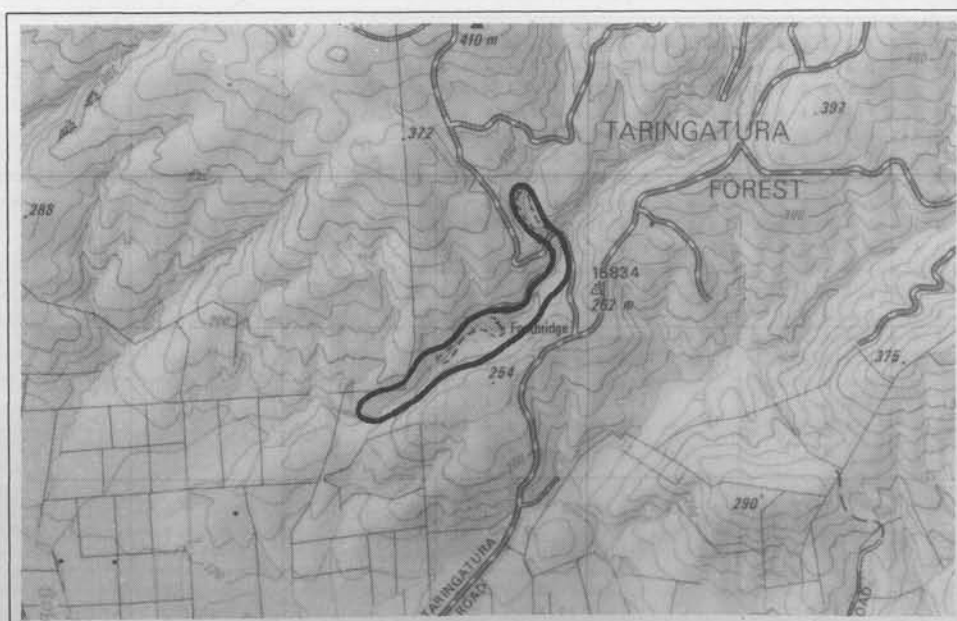
Ecological units (% cover)	Plot codes:
silver beech forest (65%)	007
sedgeland/grassland (15%)	
shrubland (15%)	
red tussockland (5%)	

Description:

These two small areas of silver beech forest were part of the original Taringatura State Forest with public nature walks and a picnic area. Both still exist but are not being maintained by Rayonier who now own this forest. The lower area has a fringe of manuka shrubland and some wet sedgeland frequented by fern birds. Tall Douglas fir and pine plantations surround both areas.

Vegetation:

The upstream (above road), relatively narrow strip occupies a steep-sided gully with



large (18 m tall) silver beech with Hall's totara, wineberry and *Coprosma linariifolia* under. There is a thick understorey of *Coprosma* species, weeping mapou, lancewood and three finger, with pokaka, silver beech and broadleaf saplings. Mosses, ferns and seedlings cover the forest floor. A red flowered mistletoe (*Peraxilla colensoi*) can be found high in the silver beech.

The lower or downstream forest is separated from the road by a half kilometre of wetland red tussock, grassland, shrubland and sedgeland with pockets of silver beech along the stream. Fernbirds (*Bowdleria punctata*) are found in this area. The forest here is more extensive, not so confined either by the planted forest or the valley sides but is otherwise similar in composition. Miro occurs here.

Shrublands are quite extensive especially down valley where they form a large buffer zone. Manuka, *Coprosma* species, especially *C. propinqua*, *Cassinia vauvilliersii*, *Corokia cotoneaster* and cabbage tree are common plants in this community. Red tussock and bracken fern form patches, the former in the wet valley bottom where there are large areas of sedgeland composed mainly of several *Carex* species. *Ranunculus ternatifolius* is present (B. Rance pers. comm).

Modifiers/threats:

Forestry operations and wilding tree spread.

Significance:

This is the only silver beech forest left on the Taringatura Hills, a forest community that would once have clothed a large percent of these hills. The area is subject to a Crown forestry licence and leased to Rayonier N.Z. Ltd.

Selection Criteria:

Representativeness	H	The last area of silver beech forest on the northern Taringatura Hills.
Diversity	M-H	Remnant silver beech forest with podocarps, manuka shrubland, sedgeland and red tussock.
Special Features	H	Fernbirds, the red flowered mistletoe and <i>Ranunculus ternatifolius</i> are all present.
Naturalness	M-H	The silver beech forest area is quite natural, the shrubland modified but will return to forest on the drier sites.
Viability	M	May depend partly on future forestry activities.
Size and Shape	M	A relatively narrow gully in its upper part but widening lower down valley.
Buffering	M	Surrounded by exotic forest.

RAP 18 MR WILSON'S BUSH

GR centre: NZMS 260 E 45 455557
Area: c. 5 ha
Altitudinal range: 160 m – 190 m (30 m)
Tenure: Freehold (Mr Wilson)
Photos: 17,19,20
Land system: Taringatura
Survey method: Ground survey and binocular.

Ecological units (% cover)

Podocarp-broadleaved forest (90%)
 sedgeland (10%)

Description/vegetation:

Two small remnants in wet gullies and extending on to wet, flat sedgeland. Partly fenced. Kahikatea, pokaka, totara, matai, rimu, tarata, kohuhu, kaikomako, fuchsia, makomako or wineberry, putaputaweta, *Coprosma* species, horopito, broadleaf, pate, fibrous tree fern, (*Dicksonia fibrosa*), soft tree fern and silver beech.

Pohuehue is rampant along the edges and there is virtually no understorey where stock have not been excluded by fencing. Nearby, relatively recently fenced areas testify to the rapid recovery of the understorey once stock are excluded.

Pines have been planted on an adjacent flat area.

Modifiers/threats:

Grazing, weeds including pohuehue.

Significance:

Only small remnants of podocarp/broadleaved forest remain in the Taringatura



District. These and the other nearby podocarp remnants are important for kukupa (*Hemiphaga novaeseelandiae*) and tui (*Prothemadera novaeseelandiae*) which are not uncommon in the area.

Selection Criteria:

Representativeness M-H A small, relatively intact sample of this forest type which has almost disappeared from the District.

Diversity H High species diversity.

Special Features M Large podocarps and tree ferns.

Naturalness M A deep, damp gully is quite natural but some areas are open to stock access.

Viability M Fencing will improve its viability.

Size and Shape M Small areas in gully and valley bottom.

Buffering M Some fencing.

RAP 19 WATERLOO - APARIMA FACES

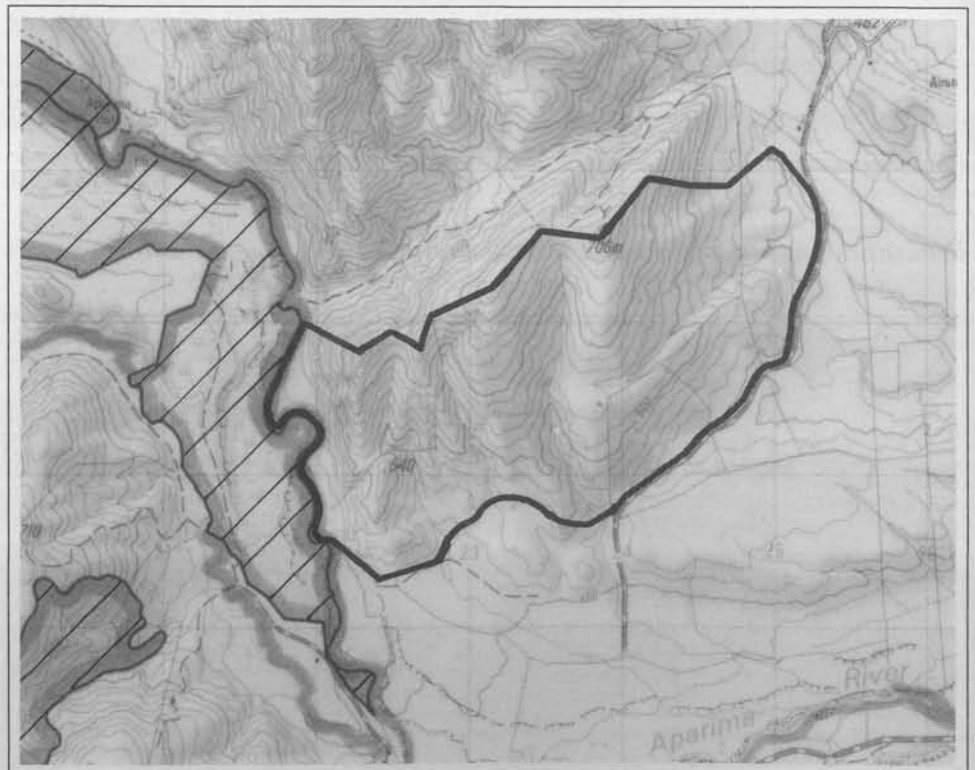
GR centre:	NZMS 260 D 44 230865
Area:	c. 350 ha
Altitude (range):	420 m – 786 m (366 m)
Tenure:	Waterloo Pastoral lease (lessee Mr J. Minty)
Photos:	68, 85
Land system:	Taringatura
Survey method:	Ground survey

Ecological units (% cover)

silver and red beech pockets in gully bottom (with few mountain beech) (10%)
shrubland (65%)
exotic grassland (25%)

Description:

This is a predominantly south facing hillside which has been frequently burnt. It is quite rocky and shrubland is regenerating strongly over most of the area. Manuka as a successional stage in the return to beech forest can be expected to swiftly take over much of this block with the removal of grazing and fire. The beech forest will gradually expand from the small pockets which now remain. Broadleaf is locally abundant.



Vegetation:

The shrubland is dominated by dense manuka with some matagouri, mountain wineberry, mountain flax, *Olearia bullata* and *Coprosma* species. The glaucous speargrass, *Aciphylla glaucescens* is found here.

Small pockets of silver and red beech remain in deep gullies and on a steep west face above the Aparima river. Broadleaf is locally abundant.

The still quite extensive exotic grassland has shrubs scattered through it and appears to be changing with a successional trend to woody vegetation.

Modifiers/threats:

Fire, grazing.

Significance:

Mixed beech forest in pockets and extensive shrubland.

Selection Criteria:

Representativeness M

Diversity M

Special Features M

Naturalness M Original forest remains in damp gullies.

Viability M Would be improved with fencing.

Size and Shape H Comparatively large area.

Buffering M Will require fencing.

RAP 20 WHITE HILL

GR centre: NZMS 260 E 44 444833
Area: c. 100 ha
Altitude (range): 420 m – 736 m (316 m)
Tenure: Freehold (Ernslaw One Ltd)
Photos: 189-194
Land system: Taringatura
Survey method: Ground survey

Ecological units (% cover)

Plot codes:

red tussock grassland with exotic grassland (70%)

red tussock grassland – shrubland (15%)

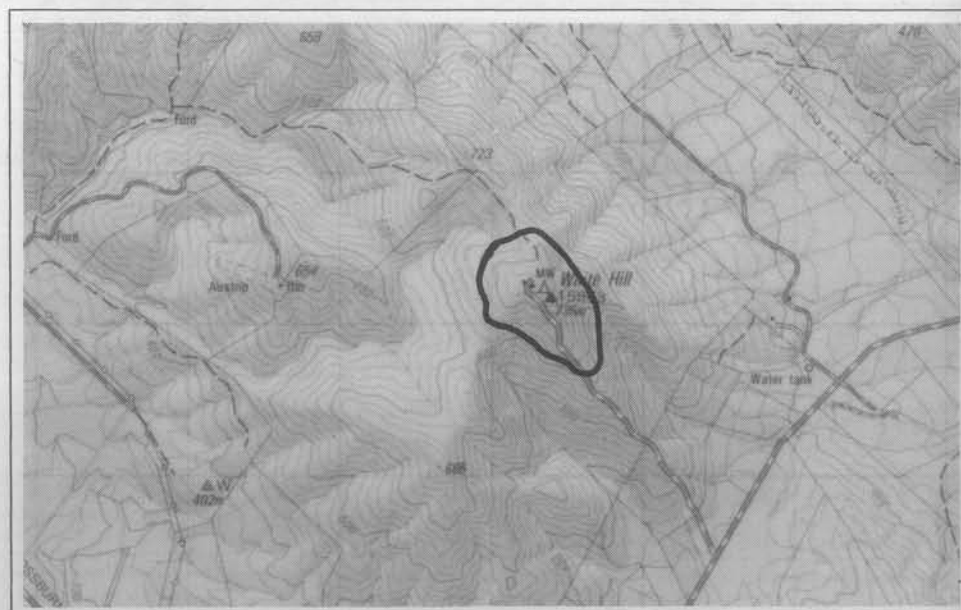
red tussock – mossland (5%)

058

shrubland (10%)

Description:

A microwave station sits on the top of White Hill with a steep metalled road leading up to it. The area immediately around the station is highly disturbed, but beyond this area and radiating downhill on all aspects lies tall red tussock grassland which has increasing amounts of brown top underneath, as the altitude decreases. On rocky ridge tops mosses are an important element of the community with *Celmisia densiflora* while the gullies and south and east facing slopes contain matagouri and *Coprosma* shrublands which appear to be recuperating after past fire.



Vegetation:

Red tussock grassland to 1.3 m tall with hard tussock and blue tussock and numerous small herbs and native grasses. Exotic grasses, mainly brown top and sweet vernal, are generally present and become more prominent, to 25%, below the summit slopes or where the red tussock is less dense.

On rocky ground along the ridge top red tussock cover varies from 30% to 60% with mosses 25 - 40%, *Coprosma* aff. *parviflora* 5% and hard tussock 5% with lichens, *Celmisia densiflora* and *Gaultheria macrostigma* prominent.

Shrublands are mainly matagouri with *Coprosma* species, *Melicytus* aff. *alpinus*, *Cassinia* and mountain wineberry. A few individual silver beech remain in the bottom of an east facing gully.

Modifiers/threats:

Grazing, forestry.

Significance:

Most of the higher altitude, hillslope red tussockland in the eastern Taringatura District has disappeared or will disappear soon under exotic forestry so it is important to preserve a few key representative areas.

Selection Criteria:

Representativeness	M	Dry hilltop red tussock and shrubland.
Diversity	M	
Special Features	M	Edge of the Southland Syncline.
Naturalness	M	Disturbed areas around the microwave station have introduced plants and exotic grasses, but much of the red tussockland is largely natural.
Viability	M	Fencing will improve viability.
Size and Shape	M	Moderate.
Buffering	L	Area grazed.

RAP 21 CENTRE BURN BOG

GR centre:	NZMS 260 D 44 285975
Area:	65 ha
Altitude (range):	380 m – 400 m (20 m)
Tenure:	Freehold (Mt Hamilton Station, manager, Mr T. Roughan)
Photos:	158-162, 241-242
Land system:	Taringatura
Survey method:	Ground survey

Ecological units (% cover)

wire rush - *Dracophyllum* bog (75%)

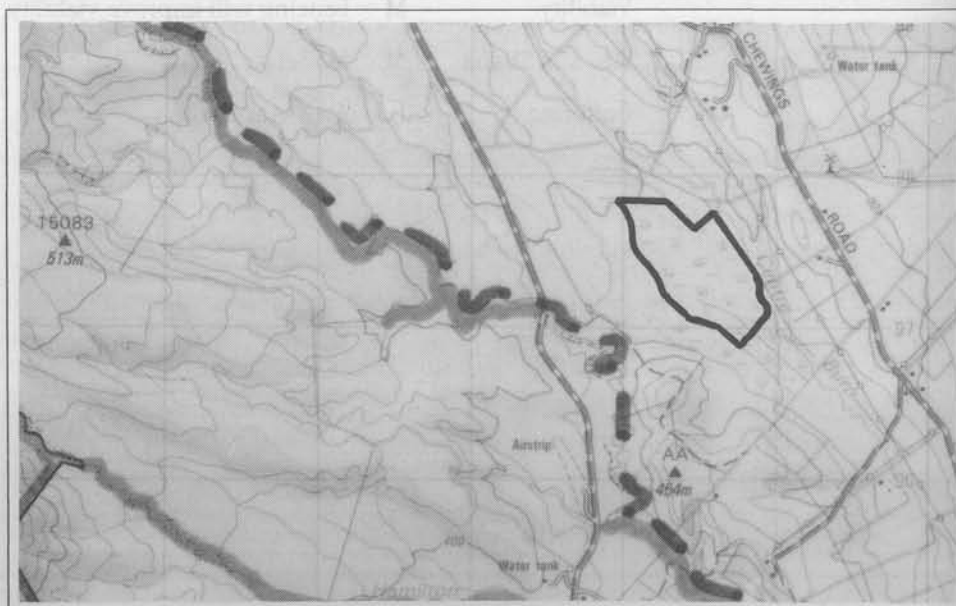
red tussockland (25%)

Description:

This bog occupies part of the valley bottom of the Centre Burn, between Chewings and Mt Hamilton roads. It has been partly drained and the lower end has dried out sufficiently to kill much of the wire rush and in places, the *Dracophyllum*. However, the upper or north-western end is in nearly natural condition with wire rush and a few bog pine. The bog is surrounded by red tussockland both along the Centre Burn and where the land rises on either side. A range of shrubs grows along the stream edge.

Vegetation:

Both the red tussockland and the wire rush - *Dracophyllum* bog are similar to



others in the district. In the drier/drained parts exotic species are appearing but over a large part of the area there is a good cover of wire rush and one of the best sites for *Dracophyllum* aff. *oliveri*. Bog pine is present here while it has disappeared from surrounding bogs although it is present in the Waterloo Burn and upper Aparima.

Modifiers/threats:

Drainage, grazing, fire.

Significance:

A peat bog with bog pine and red tussock, a community disappearing from the District.

Selection Criteria:

Representativeness	M-H	Peat bogs are a feature of this district but are gradually disappearing.
Diversity	M	Wire rush bog, red tussockland and bog pine communities.
Special Features	M	
Naturalness	M	
Viability	M	Would be increased with reduced drainage and removal of stock.
Size and Shape	M	Moderate size and compact shape.
Buffering	M	Fenced but surrounded by pasture.

RAP 22 TARINGATURA HILL

GR centre:	NZMS 260 E 44 378734 and 379731
Area:	c. 8 ha
Altitude (range):	600 m – 660 m (60 m)
Tenure:	Freehold (Rayonier)
Photos:	185-186, 188, 237
Land system:	Taringatura
Survey method:	Ground survey

Ecological units (% cover)

Plot codes:

red tussock grassland (80%)	056
silver beech pocket (10%)	057
shrubland (10%)	

Description:

The northern Taringatura Hills are either covered in plantation pine forest or being prepared for planting with most of the natural plant cover now ploughed up. A tiny area of red tussock grassland remains just north of the trig point on Taringatura Hill. It is in good condition with few exotic species.

An even smaller pocket of silver beech forest surrounded by shrubland exists in a bouldery gully immediately south of the hill and above a logging road. Both are representative of the original pre-European vegetation and are important because of this and the existing development of the area.

Vegetation:

Red tussock with a cover of about 70% and 1 - 1.2 m tall covers a fenced off area. A number of shrubs are present and include *Cassinia*, inaka, *Gaultheria macrostigma* 10%, *Coprosma cheesemanii*, and *Pimelea oreophila*. Brown top and



mosses are important components of this community and there is a range of other species including *Aciphylla subflabellata*.

Silver beech, large, gnarled, spreading trees of low stature, about 10 m tall and 70% cover grow with broadleaf 10% amongst large boulders covered in ferns. There is an understorey of three finger 10%, *Coprosma* aff. *parviflora* 5%, *C. rugosa*, and mountain holly. Prickly shield fern, 1.5 m tall occupies about 60% of the ground with *Astelia nervosa* and *Polystichum richardii*. There are several climbers and epiphytes.

A thick shrub layer encircles the forest with *Cassinia vauvilliersii*, mountain holly, *O. bullata*, mountain flax, inaka, *Coprosma* species and *Aciphylla glaucescens*.

Modifiers/threats:

Forestry activities.

Significance:

The last natural remnant red tussock area and silver beech pocket on the northern Taringatura Hills.

Selection Criteria:

Representativeness	H	Representative of the red tussockland which covered the top of the Taringatura Hills before planted forest.
Diversity	M	Species diversity typical of these plant communities.
Special Features	M	
Naturalness	M-H	A natural remnant with few exotic species present.
Viability	M	May depend on how close the future forest comes.
Size and Shape	M	A relatively small, compact unit.
Buffering	M	Tussock area fenced. Large band of exotic grassland before reaching mature forest.

RAP 23 HAMILTON BURN BUSH

GR centre:	NZMS 260 D 44 290954
Area:	20 ha
Altitude (range):	370 m – 415 m (45 m)
Tenure:	Freehold (Mt Hamilton Farm, manager, Mr T. Roughan)
Photos:	157
Land system:	Taringatura
Survey method:	Ground survey

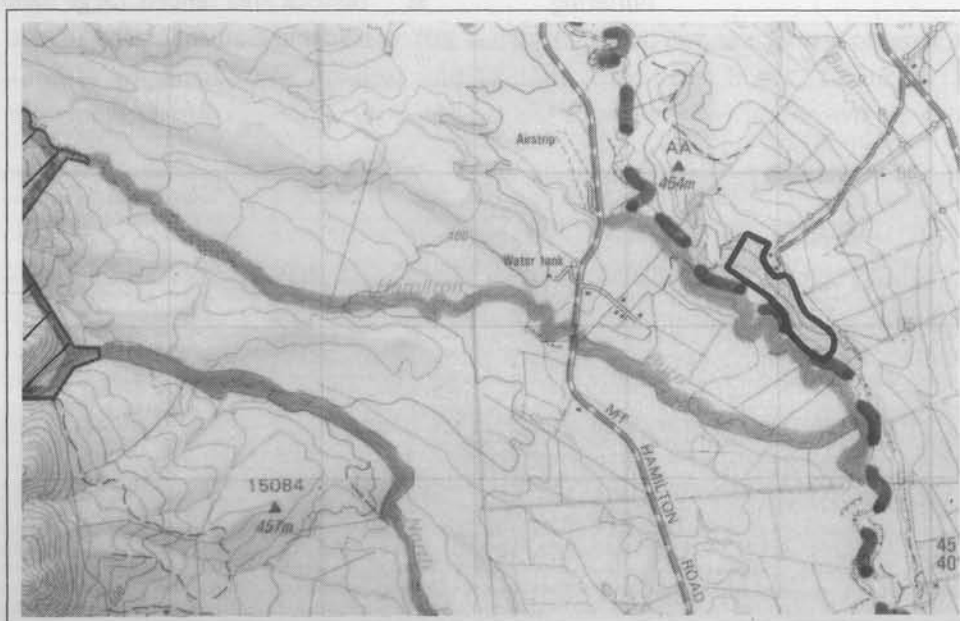
Ecological units (% cover):

mountain beech forest (80%)

exotic/red tussock grassland/shrubland (20%)

Description:

A small mountain beech forest remnant on a well drained, stony, terrace face above a north branch of the Hamilton Burn. It is accessed by a private road into the Mt Hamilton Station manager's house (Mr Trevor Roughan), off Chewings road. The forest backs on to this house. The area is partly fenced but stock have free access to it, so much of the forest is open underneath, especially along the top of the terrace. A small, deep gully runs down the northern end and an access track runs through the middle splitting the forest into two with the southern part more open and drier. The area below the road is wet and contains red tussock and shrubland with manuka, several *Coprosma* species, *Cassinia*, and *Olearia bullata*. There is a diversity of native plants in this patch of forest as well as numerous exotic species.



Vegetation:

Pure mountain beech forest is unusual in the district. It is usually a minor component of the silver beech forest. As well as the more common species present throughout the district the following are present:- Hall's totara, inaka, soft tree fern, the orchids *Gastrodia cunninghamii*, *Pterostylis australis* and *Corybas trilobus*, *Schizeilema trifoliolatum*, the small grasses *Poa matthewsii* and *P. breviglumis* and climbers *Rubus cissoides*, *Clematis paniculata* and *C. forsteri*.

Exotic grasses with red tussock and shrubs including manuka, *Coprosma* species, *Olearia bullata*, *Cassinia vauvilliersii* and matagouri occupy a wet, poorly drained slope below the access track.

Modifiers/threats:

Stock shelter within forest. Weeds present.

Significance:

The only pure mountain beech forest in the district.

Selection Criteria:

Representativeness	M-H	The only area of pure mountain beech forest in the Taringatura District.
Diversity	M	Has a range of plant species.
Special Features	M	
Naturalness	M	The vegetation of the damp gully is relatively natural but much of the rest is open underneath and stock can roam freely. Numerous weeds are present.
Viability	M	Would be considerably improved with fencing.
Size and Shape	L-M	Small but relatively compact area.
Buffering	L	Backs on to the manager's house and garden. Partly fenced.

Chapter 4 Discussion

Most of the plant communities which would have been found in the Taringatura Ecological District appear to be still represented here, but some, such as the podocarp-broadleaved forest, have only tiny remnants left. These communities are therefore of particular importance. They grow on lowland sites with higher fertility, areas which were developed early in the days of settlement. The small remaining pockets occupy very wet, shallow, valley bottoms and deep gullies, areas difficult to farm. Although the podocarp-broadleaved remnants are very fragmented, they lie within a relatively small area. In places they are joined by modified forest and shrubland, along gullies and terrace risers. If these areas could be linked in some way and fenced, then corridors for wildlife could be retained and the integrity of the whole collection of remnants, improved. Where these forest pockets are fenced, regeneration is excellent with numerous podocarp seedlings present. Another important factor affecting the integrity of these areas, including the adjacent Taringatura Scenic Reserve, is the edge effect. Small remnants tend to have large edges relative to the area. The edges contain numerous weeds such as hawthorn (*Crataegus monogyna*), broom, elder (*Sambucus nigra*) and the native vine, pohuehue, which can invade the forest where light gaps occur. Pohuehue, in particular, can smother large trees along the edge as well as from within the forest openings, eventually killing the supporting trees and shrubs and making further regeneration difficult. The growth of seedlings which has already occurred in the forest pockets which have been fenced, demonstrates the potential these areas have for regeneration, particularly if some control of weeds takes place.

The broadleaf-manatu-kowhai forest remnant on the north Wairaki Hills is another community which has almost disappeared from the District. It is primarily a riparian community of disturbed sites such as river edges and was probably spread along both the Aparima and Oreti river valleys at one time. Nothing is left in the Aparima valley, but a small remnant occurs in the Taringatura Scenic Reserve/Taringatura Camp area in the Oreti valley. Associated plants include a number of threatened species including *Olearia hectorii*, *O. fragrantissima*, *Coprosma wallii*, and *Melicytus flexuosus* and fierce lancewood. The open nature of the canopy of this community means that it is susceptible to invasion by many weed species which prevent the regeneration of the threatened species. Land development and grazing are other threats.

Red tussock, which probably increased in area as the forest disappeared due to fire and land development, and hard tussockland, which is an induced community (the result of removal of red tussock by burning and grazing), still form extensive areas on all the undeveloped hill country and the rolling downlands in the west. Large areas are also found on the poorly drained terraces and outwash fans beneath the North Braxton/Mt Hamilton massif, while small pockets are found in other areas where the land has been too wet to develop economically. The main threat to the hill country today comes from the growth of the forestry industry.

The various bog communities are a feature of the District. Throughout Southland, these areas have been, or are being drained, to be turned into pasture or mined, so it is a landform and plant community which will eventually disappear if protection does not take place. All areas which are still in a relatively natural state (with no, or few exotic species), have therefore been recommended for protection. In some

instances, the shrubs which would have been a part of this community, have disappeared. In other cases, the shrubs appear to be gradually returning, and will continue to increase if not burnt. The *Dracophyllum* and bog pine, in particular, are highly flammable. Some of the increase in shrubs could be attributable to drainage and the consequent drying out of the bog.

Castle Rock is another special area. Mining of limestone is taking place at the southern end of the outcrop, but the best of the shrubland, the threatened plant *Teucrium parvifolium*, and the most spectacular landforms, lie along the west face and northern two thirds of the outcrop. Stock are able to wander freely over all but the steepest bluffs and thickest shrubland so much of the ground layer is exotic grassland, but numerous native species are found underneath as well. The larger trees such as kowhai and broadleaf are virtually confined to the bluffs and if the area was retired from grazing, then these species and others are likely to increase causing a decrease in the exotic ground cover.

Shrublands form a mosaic of form and texture with various species dominating. In all the lower country where grazing pressure is light, shrubland appears to be increasing at the expense of the red tussock-exotic grassland, with numerous young plants present. In places, young beech can be seen spreading out from the edges of adjacent beech forest. In these areas, the forest will no doubt continue to increase with an equivalent decrease in shrubland.

Where possible the recommendations encompass a large area with logical or practical boundaries or whole catchments. Practical boundaries include existing fencelines where they seem appropriate, stream edges, ridgelines and property boundaries. Large areas have greater viability and the edge effect is much reduced, especially if they have an even shape. Allowance has been made for seral communities, such as some shrublands, to allow a continuation of successional trends. This applies to the Wairaki Hills area in particular, where there is a large area in its natural state with seral communities, threatened communities and plants and altitudinal sequences on differing aspects. It also contains many of the communities found in the District. Another consideration has been with linkages between areas to allow the free movement of wildlife and plant succession. This is possible between Letham Bush and the Takitimu Mountains via red tussockland and bog, RAP's 6b and 6c. It would be possible to eventually join this large area with the Wairaki Hills by taking in part of the narrow corridor of Kangaroo Creek between RAP 14 (Kangaroo Creek) and RAP 1b (Ardross-Etal Hill).

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Appendix 1

EXISTING PROTECTED AREAS

Within the Taringatura District only a few small areas are protected and administered by the Department of Conservation. Additionally, there are several small but important areas protected by QE II Covenants. Apart from Letham Bush, all areas are small. None have a complete altitudinal sequence of plant communities or range of aspects and moisture regimes. There are no red tussock communities on hill slopes, but there is a non-representative wire rush bog, still being drained, and a poor range of shrublands. The podocarp-broadleaved remnants are very small with no room for expansion and this reduces their viability.

Some of the smaller protected areas, particularly the regenerating podocarp-broadleaved areas are under threat from the suffocating attention of the weedy, native, scrambling climber, pohuehue. This plant can grow thickly along disturbed bush edges and in bush openings, climbing to the tops of tall podocarps in places. It has the potential to eventually kill trees and shrubs over which it is scrambling either by sheer weight and/or by cutting off the light. It should be treated as a weed in these situations to both protect the forest edge and to allow further regeneration. Additionally, restoration planting of the edges of these small remnants is important for their long-term viability.

AREAS ADMINISTERED BY THE DEPARTMENT OF CONSERVATION

1. TARINGATURA SCENIC RESERVE.

A small patch (14.3 ha) of podocarp-broadleaved forest with silver beech, located on the South Hillend Dipton Road, 25km north of Dipton. It rises up a low, dissected terrace from a young alluvial river flat of the Oreti River. Rank grassland and swampy ground lie at the foot of the terrace. This the most intact remnant of this type of forest community in the district.

GR centre:	NZMS 260 E 45 583465
Area:	14.3 ha
Altitude (range):	92 m – 137 m (45m)
Tenure:	Scenic Reserve
Photos:	24, 25, 27, 28, 29

Ecological units (% cover)**Plot codes:**

silver beech forest (14%)	003
podocarp/broadleaved forest (44%)	004
broadleaved low forest (16%)	
forest edge (7.5%)	
Carex swamp (4.5%)	
Pasture (14%)	

Description/vegetation:

A small area of podocarp-broadleaved forest with silver beech. Rimu, matai, miro and totara with several large pokaka emergent over fuchsia, peppertree, and tarata with a good understorey of *Coprosma* species, pate, *Melicope simplex* and *Lophomyrtus obcordatus*. Ferns, hook grasses and herbs clothe the ground. Two small, shaded gullies increase the habitat diversity and plant communities.

Flat land at the foot of the terrace riser contains rank grass, a swampy area of rushland/sedgeland and shrubby vegetation with some bracken. The shrubland contains *Melicytus flexuosus* and *Pseudopanax ferox*.

This is the only area of broadleaved-podocarp forest in public protected land in this Ecological District so it is an important reserve. (Refer Reserves report - Southland Biological Survey of Reserves.)

Notes

This reserve has a good diversity of native species and plant communities. It is often visited by the public. A number of native trees have been planted in the lower pasture area including flax, kohuhu, silver beech and the threatened species *Olearia hectorii*, *Teucrium parvifolium*, with varying success. The long, rank grass would make it difficult for plants to become established and contributes to the impression of neglect which this area has. It would help the integrity of this reserve and enhance its long term viability if a planting plan was implemented for the large area of exotic grassland between the road and the bush edge.

The original vegetation of this flat area would probably have been kahikatea-matai forest, shrubland and sedge-flax wetland, communities which are poorly represented in the Ecological District and considered a priority for restoration.

A walking track is overgrown and the boardwalk is broken.

2. APARIMA VALLEY, DUNROBIN ROAD.

(Conservation Land)

An area (340 ha) of wet shrubland (manuka, bogpine, etc.) and red tussockland, wirerush bog and sparse bog pine on old moraine surface. An access road to Aparima hut passes through this area. It adjoins the Takitimu Forest.

GR centre: NZMS 260 E 44 215860
Area: 340 ha
Altitude (range): 420 m – 465 m (45 m)
Tenure: Conservation land
Photos: 225, 226, 227, 232, 244

Ecological units (% cover):

manuka shrubland (20%)
wirerush bog (50%)
bog pine association (15%)
red tussock grassland (15%)

Description/vegetation:

Extensive areas of wire rush bog with occasional bog pine, *Dracophyllum* aff. *oliveri*, *D. longifolium*, *Hebe odora* and with a manuka fringe. *Lycopodium ramulosum* creeps under the wire rush. Open areas contain *Sphagnum cristatum*, *Centrolepis ciliata*, *Carpha alpina* and *Drosera spathulata*. The tangle fern, *Gleichenia dicarpa*, grows around the edges.

The dirt road crosses a raised area of outwash gravels with open bog pine association and much bare, stony ground. This has a rich assemblage of shrubs and small trees including *Coprosma* species, *Dracophyllum longifolium*, *D. uniflorum*, korokio, *Cyathodes empetrifolia*, three finger, *Cassinia vauvilliersii*, broadleaf and numerous small herbs, grasses and mosses.

Thick manuka shrubland covers a large area of wet land at the south end of the Reserve adjacent to the Aparima river.

Red tussock grassland fringes the bog areas.

Notes:

This Conservation area has diverse communities in good condition. The frost flat, bog pine association on outwash gravels is an uncommon community. Although it is similar to the vegetation of the Wilderness Reserve near Te Anau, the proximity of wirerush bog, red tussock and low shrub vegetation with the moss *Racomitrium* sp. makes this area much more diverse and therefore more important. It will support a highly distinctive insect fauna including an undescribed *Notoreas* moth (Patrick, 1997).

3. ETAL HILL

(Conservation Land)

200 ha of regenerating silver beech and broadleaf forest with red tussock grassland and *Dracophyllum* and *Olearia* shrubland on a south-west face above the head of Etal stream

GR centre: NZMS 260 D 44 260775

Area: 200 ha

Altitude (range): 315 m – 886 m (171 m)

Tenure: Conservation land

Photos: 124, 72, 76, 77, 111-114

<i>Ecological units (% cover)</i>	<i>Plot codes:</i>
<i>Aciphylla</i> - matagouri shrubland (15%)	045
<i>Dracophyllum</i> shrubland (20%)	013
<i>Cassinia-Hebe</i> shrubland with red tussock (15%)	048
<i>Brachyglottis cassinioides</i> shrubland (10%)	049
Red tussock – shrubland (15%)	014
Silver tussock grassland with shrubs (5%)	046
Red tussock grassland with shrubs (10%)	047
Silver beech forest (10%)	

Description:

This takes in the south and east facing, steep slopes below Mt Rouse (886 m) and Chimney (764 m), part of the northern branch of Etal Stream and part of the larger Etal catchment contained in Ardross Pastoral Lease and described elsewhere.

Vegetation:

These slopes are primarily in a mosaic of shrublands with patches of silver beech forest, mainly confined to the valley bottom. The uppermost slopes are red tussock with shrubs invading up-slope. *Aciphylla aurea* - matagouri shrubland on well drained, rocky slopes along main ridge with bracken, *Gaultheria macrostigma* and hard tussock.

Silver tussock (*Poa cita*) grows on the flat ridge top with *Aciphylla aurea*, *Olearia bullata*, matagouri and bracken.

Red tussock grassland contains *Hebe anomala*, *Cassinia vauvilliersii*, *Dracophyllum longifolium*, *Coprosma cheesemanii*, blue tussock and mosses.

There is also *Cassinia* - *Hebe anomala* - *Coprosma ciliata* shrubland with red tussock. *Brachyglottis revoluta* and *Coprosma cheesemanii* on a damp east facing slope.

Dracophyllum longifolium shrubland on very rocky, well drained south face with mountain flax (*Phormium cookianum*), *Cassinia*, *Coprosma ciliata*, *Hebe anomala*, *Coprosma cheesemanii*, *Celmisia densiflora*, *Gaultheria novae-zelandiae*, *Hymenophyllum multifidum*, mosses and lichens.

4. LETHAM BUSH

(Conservation land, Pt Takitimu Forest).

This is a large area of silver beech forest surrounding Letham Hill and bounded by Beaumont Station to the west, Ardross Station to the south and farmland above North Etal Creek on the East. It is not fenced so sheep and cattle browse and trample the edges in many places.

GR centre: NZMS 260 D44 200815
Area: 1510 ha
Altitude (range): 480 m – 787 m (307 m)
Tenure: part Takitimu Forest
Photos: 47, 58-60, 90-91, 222-223

Ecological units (% cover)

Plot codes:

Silver beech forest (90%) 034, 039, 040
 Red tussock grassland (10%)

Description/vegetation:

This is a large area of silver beech forest with good understorey and some large trees up to 110 cm dbh. Patches of mountain beech occur but are only a minor component of the forest.

Tall red tussock occurs around Letham Hill and at Trig 787 m. The latter is described as RAP 16 – Trig H, Letham Bush.

Good bird life with yellow-crowned parakeet (*Cyanoramphus auriceps*), brown creeper (*Mohoua novaeseelandiae*), rifleman (*Acanthisitta chloris*), fantail (*Rhipidura fuliginosa*), tomtit (*Petroica macrocephala*), bellbird (*Anthornis melanura*) and grey warbler (*Gerygone igata*) all recorded.

Notes:

Stock shelter along the edges of the forest in places, especially cattle on Beaumont station in the Coral Bluff area and here there is virtually no understorey for 10 – 20 m into the forest. A well used stock track wanders through the forest north of trig 787 m but generally the forest is in good condition.

5. CENTRE HILL

(Conservation land)

This takes in the southern portion of Centre Hill and includes small silver beech filled gullies, a patch of pure three-finger forest, *Dracophyllum* shrubland, red tussock-shrubland, *Coprosma-Dracophyllum-Cassinia-Hebe* shrubland and other interesting communities. This variety of vegetation types is the reason for a large number of native species being recorded here.

GR centre: NZMS 260 D 43 270015
Area: 219 ha
Altitude (range): 460 m – 800 m (340 m)
Tenure: Conservation land
Photos: 137, 142, 144 - 147

Ecological units (% cover)

Plot codes:

Red tussock - *Cassinia* - *Dracophyllum uniflorum*
- *Hebe rakaiensis* shrubland (15%) 050

Coprosma rugosa - matagouri shrubland (15%) 051

Dracophyllum uniflorum - red tussock shrubland (40%) 052

Pseudopanax forest (5%) 055

Dracophyllum uniflorum shrubland (15%) 054

Silver beech forest (10%) 053

Description/vegetation:

Centre Hill has a diverse range of communities mainly derived from past clearance and grazing activities. Pockets of silver beech remain in sheltered gullies and testify to its past vegetative cover, while a variety of shrubland communities and regenerating forest cover large parts of the remaining Conservation land. Red tussock, generally with various percentages of cover from shrubs and a range of species, is found along the upper slopes. Main shrub communities include manuka, matagouri, various *Coprosma* species, *Dracophyllum* (2 spp.), *Cassinia*, *Hebe rakaiensis*, *Gaultheria* species, mountain flax with *Astelia*, *Aciphylla aurea* and ferns including *Polystichum vestitum*, *Blechnum procerum* and *Blechnum novae-zelandiae*.

The block has been fenced for several years so is in excellent condition with no stock present, but possums and hares are found.

This stand is healthy, with excellent regeneration.

6. SO BIG BOG

(Conservation land)

Only the centre of this bog and a long narrow strip down stream is protected. There is a considerable area of surrounding peatland in various stages of drainage. This drainage is likely to affect the integrity of the protected area in time and lessen its value. The drains allow in weeds which grow on the disturbed ground alongside the drains.

GR centre: NZMS 260 E 44 315960
Area: 146 ha
Altitude (range): 375 m – 340 m (35 m)
Tenure: Wildlife Management Reserve
Photos: 148-150, 152-155

Ecological units (% cover)

Plot codes:

wirerush bog (70%)

wirerush – *Cassinia* shrubland (10%)

red tussock wetland (15%)

066

exotic grassland (5%)

Description

This hour-glass shaped reserve occupies the centre of a much larger bog. On the north edge a large area is being actively drained while to the south, old drains are slowly drying out a large area with good wire rush and shrubland. Although the reserve occupies the lowest, central part of this bog, drainage proceeding on either side will eventually affect its integrity to some extent. A large drain runs down the centre of the bog and it is along this better drained area that exotic grassland is found with other exotic species including the odd patch of broom. Burnt fence posts show that there has been burning in the past.

Vegetation:

Most of the reserve is wire rush and/or red tussock. The shrubs here are few and scattered. There are good shrub communities to the south outside the reserve communities (refer RAP 9) which include *Cassinia vauvilliersii*, *Dracophyllum* sp. aff. *oliveri*, *Coprosma* sp. aff. *intertexta*, and manuka. Exotic grasses and herbaceous plants are prominent along the main drain with native *Hebe rakaiensis* and prickly shield fern.

Notes

Open drains still flow through and across this reserve while the surrounding land is slowly being drained also. This will lead to the bog drying out in time and the present vegetation dying out. The internal drains need to be blocked if the integrity of this bog is to be retained.

7. MARGINAL STRIPS

Marginal strips are found along parts of the Hamilton Burn, North Braxton Burn, Centre Burn, Upper Aparima, North Etal stream and Etal Stream. Most have good red tussock and intermittent shrubland along their edges. They are protected under the Conservation Act 1987.

QEII OPEN SPACE COVENANTS

QEII open space covenants cover several small but important areas. Pockets of podocarp-broadleaved forest in the south-east Taringatura District are protected on three properties. These covenants are made up of several small forest-clad gullies, the last remnants of the forest which previously clothed this area. Past grazing is evident and probably some milling of podocarps but these areas are now fenced and contain a good to very good diversity of plants with often dense understorey and with some modified areas now returning to forest. Only tiny areas of this type of forest are left in this district. Dry land red tussock is protected on Dunrobin.

1. DAY'S FOREST

GR centre:	NZMS 260 E 45 458575
Area:	22.3 ha
Altitude (range):	100 m – 205 m (105 m)
Tenure:	Freehold
Photos:	1,7,24,27,32

Ecological units (% cover):

podocarp-broadleaved forest (10%)
mixed podocarp-broadleaved-silver beech forest (20%)
regenerating broadleaved-podocarp forest
(with a few emergent mature podocarps) (50%)
shrubland (including gorse) (10%)
bracken fernland (10%)

Description:

Four mature and regenerating podocarp-broadleaved forest remnants in damp south and east facing gullies.

Podocarps include kahikatea, miro, matai, rimu, totara and Hall's totara. Other large trees include pokaka, *Streblus heterophyllus*, broadleaf and small patches of silver beech. Some of the podocarps are large with matai to 90 cm diameter at breast height (dbh) and rimu to 104 cm dbh, but less common. Understorey and ground cover are generally well developed, but less dense under silver beech, and seedlings of canopy species are often numerous. Kohuhu, tarata, mapou, putaputaweta, narrow-leaved mahoe, fuchsia and several *Coprosma* species are common understorey plants with numerous ferns and the climbers, native jasmine and *Clematis* species.

Notes:

All areas have been modified by past grazing and there has probably been some logging of large podocarps. All areas are fenced. These wet gullies are the last areas to be cleared for pasture. Exotic species are mainly confined to the forest edges and include some gorse.

2. MCDONALD'S BUSH

GR centre: NZMS 260 E 45 467563
Area: 10.5 ha
Altitude (range): 100 m – 185 m (85 m)
Tenure: Freehold
Photos: 4, 9, 30, 31, 32

Ecological units (% cover)	Plot codes:
Hall's totara forest (15%)	
Podocarp-broadleaved forest (85%)	005

Description:

A small area of pure Hall's totara forest, of low stature (4-6 m), is found on the flat upper terrace surface of McDonald's roadside reserve. The understorey here is almost non-existent possibly due to stock sheltering, although the area is fenced. Numerous seedling native jasmine, mapou, coprosma and kahikatea grow on the relatively bare forest floor.

The terrace riser contains mature but modified podocarp-broadleaved forest with Hall's totara, matai, kahikatea, miro and tarata forming an uneven canopy with elder, fuchsia, mapou, wineberry, kohuhu, kaikomako, putaputaweta, *Coprosma* species (including *C. virescens*), *Lophomyrtus obcordata* and *Melicope simplex* in the subcanopy and understorey. There is good seedling growth especially of broadleaf, with fern communities, including *Asplenium hookerianus*, in the ground layer.

Another two sections of the covenant occur on rolling hill slopes and in a gully above the terrace. This is regenerating podocarp-broadleaved forest with a few emergent podocarps and some silver beech.

Notes

There are small areas of broom and gorse around the edges and in forest openings. Two plants of the introduced climber, Chilean flame creeper (*Tropaeolum speciosum*), were removed.

3. MCPHERSON'S

GR centre: NZMS 260 E 45 457554
Area: c. 7 ha
Altitude (range): 140 m - 165 m (25 m)
Tenure: Freehold
Photos: 17, 18

Ecological units (% cover):

Podocarp-broadleaved remnants (100%)

Description:

Small remnants (two pieces) of podocarp-broadleaved forest in a wet gully and wet, flat valley bottom. One patch with kahikatea and pokaka is very open due to stock access and have *Coprosma* species, horopito, eider, kohuhu, wineberry, broadleaf, kaikomako, totara and *Lophomrytus obcordatus* in the understorey.

The second, larger patch is dominated by kahikatea and totara and silver beech. *Carex secta* grows in the wet valley bottom. Pate, lancewood, putaputaweta, weeping mapou and *Fuchsia perscandens* are other species present.

Notes

The native climbing "weed", pohuehue, covers most of the edge of the first remnant and is all over a large kahikatea. It is so thick that it is likely to swamp many of the plants along the edge and hinder or even prevent further regeneration. This native vine poses a threat to this and other similar small forest patches in this area.

The addition of the down-stream wetland area to the second remnant, although with more open canopy at present, would improve the value of this patch. It has the potential to regenerate back to forest.

4. DAY'S WETLAND, QE II OPEN SPACE COVENANT

GR centre:	NZMS 260 E 45 392575
Area:	c. 6 ha
Altitude (range):	230 m – 230 m (2 m)
Tenure:	Freehold
Photos:	33

Ecological units (% cover):

sedgeland/rushland (30%)

exotic grassland with shrubs (40%)

red tussock grassland (30%)

Description:

A small lake is surrounded by good rushland/sedgeland with exotic grassland and red tussockland on the drier sites. There are numerous exotic species but also good diversity of native species including *Carex secta*, *C. echinata*, *C. gaudichaudiana*, *C. diandra*, *Baumea tenax*, *Lepidosperma australe*, *Centella uniflora*, toe toe, *Triglochin striata*, *Coprosma* aff. *intertexta*, manuka, cabbage tree, red tussock, and harakeke. Gorse is also present.

Birds present include, fernbird (*Bowdleria punctata*), marsh crake (*Porzana pusilla*), New Zealand scaup (*Aythya novaeseelandiae*), Mallard duck (*Anas platyrhynchos*) and hedge sparrow or dunnoek (*Prunella modularis*).

5 DUNROBIN QE II OPEN SPACE COVENANT (RED TUSSOCK)

GR centre: NZMS 260 E 44 340801
Area: 20.5 ha
Altitude (range): 220 m (0 m)
Tenure: Freehold
Photos: 185, 235

<i>Ecological units (% cover)</i>	<i>Plot codes:</i>
Riparian community (10%)	
dense red tussock grassland (15%)	043
open red tussock/moss-herbfield (35%)	
blow-out sites (5%)	
flax/sedge riparian swamp (10%)	
red tussock/wire rush bog (5%)	
red tussock-scrub grassland (20%)	044

Description:

This is the only dry river terrace, red tussock in this ecological district. The soils are shallow, stony, silty to sandy loams on a flat, intermediate river terrace of the Aparima River valley.

The rare plants *Iphigenia novae-zelandiae* and *Pseudognaphalium* sp. "compactum" (both on the NZ Threatened Plants List) are found on the bared soils of the blow-out sites, (the latter needs to be confirmed when in flower).

Red tussock occurs in all communities: with *Carex secta* and *Juncus gregiflorus* in riparian areas, with swamp flax and various sedges and rushes in wet swampy areas and with wire rush, cabbage tree, *Coprosma* aff. *intertexta*, manuka, *Cassinia* and *Astelia fragrans* on small bog areas. Drier sites contain the greatest diversity with hard tussock and several shrub species, numerous herbs including a number of exotic species and large areas of *Racomitrium* moss.

Notes

Refer Dunrobin Station Open Space Covenant Management Statement. Possibilities exist to significantly increase the size of this small area as similar red tussock surrounds this Covenant (refer RAP 7).

Appendix 2

SUMMARY OF AREAS SURVEYED AND NOT RECOMMENDED FOR PROTECTION

DAY'S - RED TUSSOCK

GR centre:	NZMS 260 E 45 434584
Area:	5 ha
Altitude (range):	280 m – 305 m (25 m)
Tenure:	Freehold
Photos:	10 (distant)

<i>Ecological units (% cover)</i>	<i>Plot Codes:</i>
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red tussockland (100%)	006
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Description:

This is an unfenced area of red tussock on a hill top and south-west slope which is bisected by a farm track. It is grazed by sheep and cattle. The hill slope is quite wet and has been considered by the owners for a Conservation Covenant with the QEII Trust. A group of pine trees and fence line run along the top of this block.

Vegetation:

The red tussock varies in cover from 50 to 90% and in height from 1.5 m to 1.9 m where at its most dense. There is a good variety of both native (>25 species) and exotic species in the inter tussock spaces with *Lotus pedunculatus*, white clover, brown top, sweet vernal and Yorkshire fog all prominent. Rushes and sedges occur in the wettest sites and shrubs are scattered throughout. They include gorse, manuka, broom, *Coprosma rugosa*, *C. sp. aff. parviflora* and *Cassinia vauvillersii*.

Notes

One of the last remnants of red tussock grassland in the south-east of the Taringatura Ecological District.

TARINGATURA HILLS - RED TUSSOCK/SHRUBLAND

GR centre:	NZMS 260 E 45 392600
Area:	c. 3 ha
Altitude (range):	300 m – 340 m (40 m)
Tenure:	Freehold (Rayonier)
Photos:	36, 37

Ecological units:

red tussock/manuka shrubland (90%)

silver beech forest (10%)

Description:

A shallow valley beside the logging road which has been left primarily due to the wet valley bottom and rough, bouldery hillside above.

A few small, remnant patches of silver beech remain surrounded by manuka and *Coprosma propinqua* with patches of bracken fern and tall red tussock.

Red tussock in the valley bottom with flax (*Phormium tenax*) clumps. Some willow and other exotic species found here also.

Notes

This area would eventually return to beech forest through manuka with some red tussock left in the wettest part of the valley.

OTHER AREAS WITH CONSERVATION VALUES (NOT SURVEYED)

BARNHILL SHRUBLAND

GR centre: NZMS 260 E 44 428833
Area: c. 20 ha
Altitude (range): 500 m – 654 m (154 m)
Tenure: Freehold (Ernslaw One Ltd)
Photos:

Ecological units:

shrubland
red tussockland

Description:

Good *Cassinia vauvilliersii* shrubland with *Coprosma* species and native broom on a damp, south-east slope above Barnhill Creek. Red tussock grassland fills areas in and around the shrubland.

PODOCARP REMNANTS, CATLEY/HISHON RD.

GR centre: NZMS 260 E 45 462535
Area: c. 5 ha
Altitude: 80 m
Tenure: Freehold (Mr A. Paul)
Photos:

Ecological units:

podocarp/broadleaved forest.

Description:

Podocarp/broadleaved remnants on alluvial flats. Mainly tall, mature trees with virtually no understorey and unfenced so stock have access. If fenced then it is likely that the understorey would regenerate as it has done in other similar areas nearby. With a good seed source above, it is expected that the podocarps would also regenerate in time.

WETHER HILL

The Wether Hill is an extension of the Barn Hill-White Hill ridge but lower in altitude. All the western end is planted in the conifers. A few small areas of red tussock with much exotic grassland remains on the south-eastern end. The tussock appears fragmented, although some relatively intact areas do appear to remain.

NORTH RANGE

North Range runs parallel to the Barn Hill-White Hill ridge. It is mainly developed exotic grassland with small areas of shrubland around rocky places along the low summit ridge.

This area also has important landscape values when viewed from the Lumsden-Mossburn road. It is part of the Southland Syncline with the parallel lines of outcropping rock being a notable feature.

AREAS PROTECTED BY THE NATIVE FOREST ACCORD

GOWAN HILLS FOREST

GR centre:	NZMS 260 D 45 255685
Area:	4397 ha
Altitude (range):	220 m – 841 m (620 m)
Tenure:	Freehold (Ernslaw One Ltd)
Photos:	106, 114-117, 119, 120

Ecological units:

silver beech forest

plantation forest (Douglas fir, *Pinus* sp.)

shrubland

red tussockland

Description:

Gowan Hills has been bought by Ernslaw One Ltd. specifically for exotic forestry but the several pockets of silver beech are protected under the Government's Native Forest Accord. Thirteen pockets of varying sizes exist, in all about 458 ha (refer Forest Heritage Trust Fund Application - Gowan Hills (Rance 1989) and Botanical Report (Rance 1989).

The MacDonald family hold a 25 year logging right to the largest areas of beech forest. They have an approved sustainable Forest Management Plan.

Permission to visit these beech pockets was declined, but their composition would be very similar to those throughout the district. Some of these stands (including the main Beaumont Bush stand) and adjacent areas of shrubland and the red tussock, have previously been inspected by Brian Rance.

Some red tussock remains on the highest points, above the plantings of Douglas fir.

BARN HILL BUSH

GR centre: NZMS 260 E 44 410843
Area: c. 160 ha
Altitude (range): 400 m – 480 m (80 m)
Tenure: Freehold (Ernslaw One Ltd)
Photos:

Ecological units:

red tussockland grassland
silver beech forest

Description:

A small patch (about 10 ha) of intact silver beech forest and associated red tussockland/shrubland which lies in a shallow gully just below a red tussock area identified as RAP 11. This is the best remaining remnant of silver beech forest in the Barh Hill - White Hill - North Range area of the district.

Modifiers/threats:

Forestry activities.

Appendix 3

TOPOGRAPHIC MAPS COVERING THE TARINGATURA ECOLOGICAL DISTRICT.

NZMS 260	Sheet D43	Te Anau
NZMS 260	Sheet D44	Takitimu
NZMS 260	Sheet E44	Lumsden
NZMS 260	Sheet D45	Ohai
NZMS 260	Sheet E45	Winton
NZMS 262	Sheet 16	Invercargill

Appendix 4

LIST OF COMPLETED SURVEY FORMS FOR THE TARINGATURA DISTRICT.

Areas selected as RAPs have their RAP numbers in the right column. Survey form numbers with grid reference (GR) at left.

* indicates areas that are already protected and managed by DOC

^ indicates areas already protected by QE II Trust Covenant.

NZMS 260, Sheet E44

Survey Form No	GR	Name of Area	RAP No.
043	340805	^ Dunrobin Red Tussock	
056	378732	Taringatura Hill	RAP 22
057	379731	Taringatura Hill	RAP 22
058	445830	White Hill	RAP 20
060	333905	Braxton Downs Bog	RAP 15
061	331908	Braxton Downs Bog	RAP 15
063	334909	Braxton Downs Bog	RAP 15
064	308956	Chewings Road Bog	RAP 9
065	312958	Chewings Road Bog	RAP 9
066	318964	Chewings Road Bog	RAP 9
069	378784	Castle Down Swamp	RAP 5
070	385794	Castle Down Swamp	RAP 5
071	381788	Castle Down Swamp	RAP 5
072	384790	Castle Down Swamp	RAP 5

NZMS 260, Sheet E 45

Survey Form No	GR	Name of Area	RAP No.
001	455573	Day's Bush	RAP 8
002	452572	Day's Bush	RAP 8
003	465584	* Taringatura Scenic Reserve	
004	464584	* Taringatura Scenic Reserve	
005	468564	^ McDonald's Bush	

006	435584	Day's Red Tussock	
007	393597	Bog Burn	RAP 17
009	450551	Lance Wilson's Bush	RAP 13

NZMS 260, Sheet D 43

Survey Form No	GR	Name of Area	RAP No.
050	266008	* Centre Hill	
051	266008	* Centre Hill	
052	269014	* Centre Hill	
053	273008	* Centre Hill	
054	268008	* Centre Hill	
055	267010	* Centre Hill	

NZMS 260, Sheet D44

Survey Form No	GR	Name of Area	RAP No.
008	289968	Centre Burn Bog	RAP 21
010	225886	South Braxton	RAP 10
011	276745	Chimney/Etal Stream	RAP 1c
012	275746	Chimney/Etal Stream	RAP 1c
013	254788	Dunrobin/Kowhai Creek	RAP 1a
014	252789	Dunrobin/Kowhai Creek	RAP 1a
015	252804	Dunrobin/Kowhai Creek	RAP 1a
016	243801	Dunrobin/Kowhai Creek	RAP 1a
017	246799	Dunrobin/Kowhai Creek	RAP 1a
018	245805	Dunrobin/Kowhai Creek	RAP 1a
021	208890	Waterloo Burn	RAP 2
025	225886	Waterloo Burn	RAP 2
026	231883	Waterloo Burn	RAP 2
027	228888	Waterloo burn	RAP 2
028	272974	Hamilton Burn	RAP 4
029	270975	Hamilton Burn	RAP 4
030	253978	Hamilton Burn	RAP 4
031	247978	Hamilton Burn	RAP 4

032	184756	Letham Burn/Coral Bluff	RAP 6b
033	186815	Letham Burn/Coral Bluff	RAP 6b
034	191814	Letham Burn/Coral Bluff	RAP 6b
035	230755	Ardross/Etal Hill	RAP 1c
036	249758	Ardross/Etal Hill	RAP 1c
037	219765	Ardross/Etal Hill	RAP 1c
038	235777	Ardross/Etal Hill	RAP 1c
039	199845	* Letham Bush	
040	198842	* Letham Bush	
041	202839	Trig H – Letham Bush	RAP 16
042	204854	Trig H – Letham Bush	RAP 16
045	259783	* Etal Hill (Conservation Area)	
046	248786	* Etal Hill (Conservation Area)	
047	250786	* Etal Hill (Conservation Area)	
048	249787	* Etal Hill (Conservation Area)	
049	251787	* Etal Hill (Conservation Area)	
067	208885	Waterloo Burn	RAP 2
068	200905	Waterloo Burn	RAP 2
000	208917	Waterloo Burn	RAP 2

Notes:

Site Card 000 was not included in the computer analysis due to an oversight.

Site cards 145 – 149 sample similar ecological units to those found in adjacent RAPs 1a and 1b.

Appendix 5

Summary of Twinspan Data showing the relationship of plots to the Dendrogram, figure 6.

Plot No.	Location	Community	Reference
1	Day's Bush	Podocarp/broadleaved forest remnant	Appendix 1
2	Day's Bush	Podocarp/broadleaved forest remnant	Appendix 1
9	L. Wilson's Bush	Podocarp/broadleaved forest remnant	Appendix 1
3	Taringatura S.R	Podocarp/broadleaved forest (+ silver beech)	Appendix 1
4	Taringatura S.R.	Podocarp/broadleaved forest	Appendix 1
5	McDonald's Bush	Podocarp/broadleaved forest (+ Halls totara)	Appendix 1
7	Bog Burn	Silver beech (some matai)	RAP 17
57	Taringatura Hill	Silver beech remnant	RAP 22
18	Dunrobin/Etal ridge	Silver beech	RAP 1a
39	Letham Bush	Silver beech, east face	Appendix 1
17	Dunrobin/Bairds Bush	Silver beech	RAP 1a
35	Ardross Station	Silver beech with shrubland	RAP 1b
40	Letham Bush	Silver beech, west face	Appendix 1
34	Beaumont/Coral Bluff	Silver beech	RAP 6b
37	Ardross/Kangaroo Ck	Silver beech	RAP 14
53	Centre Hill	Silver beech, young stand	Appendix 1
55	Centre Hill	<i>Pseudopanax</i> forest, induced	Appendix 1
50	Centre Hill	Red tussock- <i>Cassinia-Dracophyllum</i>	Appendix 1
51	Centre Hill	<i>Coprosma-Dracophyllum</i> -red tussock	Appendix 1
54	Centre Hill	<i>Dracophyllum uniflorum</i> shrubland	Appendix 1
10	Waterloo (Sth Braxton)	<i>Cassinia-Hebe</i> shrubland-red tussock	RAP 10
13	Mt Rouse	<i>Dracophyllum longifolium</i> shrubland	RAP 1a
25	Waterloo (Sth Braxton)	<i>Hebe anomala</i> -red tussock	RAP 10
48	Mt Rouse (Etal Hill)	<i>Cassinia-Hebe</i> shrubland-red tussock	Appendix 1
49	Mt Rouse (Etal Hill)	<i>Brachyglottis cassinioides</i> shrubland	Appendix 1
52	Centre Hill	<i>Dracophyllum</i> -moss-red tussock shrubland	Appendix 1
14	Mt Rouse	Red tussock-shrubland	RAP 1a
15	Dunrobin	Red tussock- <i>Coprosma cheesemanii</i> shrubland	RAP 1a
16	Dunrobin	Red tussock-shrubland	RAP 1a
26	Waterloo (Sth Braxton)	Red tussock-shrubland	RAP 10
27	Waterloo (Sth Braxton)	Red tussock- <i>Hebe-Dracophyllum</i> shrubland	RAP 10
30	Hamilton Burn	Manuka- <i>Gaultheria</i> -red tussock shrubland	RAP 4

36	Ardross (South Etal)	Mixed shrubland-red tussock	RAP 1b
38	Ardross (South Etal)	Red tussock-shrubland	RAP 1b
41	Letham Bush	Red tussock- <i>Coprosma cheesemantii</i>	RAP 16
43	Dunrobin QE II	Red tussockland with matagouri	RAP 7
44	Dunrobin QE II	Hard tussock-red tussock-matagouri	RAP 7
47	Mt Rouse	Red tussock/shrubland	RAP 1a
56	Taringatura Hill	Red tussock/shrubland	RAP 22
58	White Hill	Red tussock/mossland with <i>Coprosma</i>	RAP 20
42	Letham Bush	<i>Coprosma</i> -matagouri shrubland	Appendix 1
45	Mt Rouse (Etal Hill)	Speargrass-matagouri shrubland	Appendix 1
46	Mt Rouse	Silver tussock-shrubland	RAP 1a
11	South Etal	Red tussock/rushland (wet slope)	RAP 1c
66	Chewings Road Bog	Red tussock/wirerush bog	RAP 9
21	Waterloo Burn	Red tussock-rushland with shrubs	RAP 2
28	Hamilton Burn	Red tussock with wirerush bog	RAP 4
29	Hamilton Burn	Red tussock-wirerush/rushland	RAP 4
67	Waterloo Burn	Red tussock-rushland	RAP 3
6	Day's Property	Red tussock grassland with exotic species	Appendix 4
12	South Etal	Red tussock/rushland	RAP 1c
31	Hamilton Burn	Red tussockland/rushland	RAP 4
33	Beaumont	Red tussock at Coral Bluff	RAP 6b
32	Beaumont	Hard tussockland with red tussock	Appendix 4
64	Chewings Road Bog	Wirerush bog with shrubs	RAP 9
65	Chewings Road Bog	Wirerush bog with <i>Cassinia</i>	RAP 9
60	Braxton Downs Bog	Wirerush bog	RAP 15
61	Braxton Downs Bog	Wirerush- <i>Sphagnum</i> bog with shrubs	RAP 15
63	Braxton Downs Bog	Wirerush- <i>Dracophyllum</i> bog	RAP 15
68	Waterloo Burn	Wirerush bog (few shrubs, red tussock)	RAP 2
69	Castle Down Swamp	Wirerush bog	RAP 5
71	Castle Down Swamp	Wirerush- <i>Sphagnum</i> bog with few shrubs	RAP 5
72	Castle Down Swamp	Wirerush- <i>Sphagnum-Dracophyllum</i> bog	RAP 5
70	Castle Down Swamp	Wirerush-harakeke bog	RAP 5
8	Centre Burn Bog	Wirerush- <i>Dracophyllum</i> bog (drained)	RAP 21

Appendix 6

Maori and common plant names used in the text.

blue tussock	<i>Poa colensoi</i>
bog pine	<i>Halocarpus bidwillii</i>
bracken (fern)	<i>Pteridium esculentum</i>
broadleaf	<i>Griselinia littoralis</i>
broom	<i>Cytisus scoparius</i>
browntop	<i>Agrostis capillaris</i>
cabbage tree, ti	<i>Cordyline australis</i>
Chilean flame creeper	<i>Tropaeolum speciosum</i>
cocksfoot	<i>Dactylis glomerata</i>
cutty grass	<i>Carex coriacea</i>
elder	<i>Sambucus nigra</i>
fierce lancewood	<i>Pseudopanax ferox</i>
filmy fern	<i>Hymenophyllum species</i>
fuchsia, kotukutuku	<i>Fuchsia excorticata</i>
glaucous speargrass	<i>Aciphylla glaucescens</i>
golden speargrass	<i>Aciphylla aurea</i>
gorse	<i>Ulex europaeus</i>
Hall's totara	<i>Podocarpus hallii</i>
harakeke	<i>Phormium tenax</i>
hard tussock	<i>Festuca novae zelandiae</i>
hawthorn	<i>Crataegus monogyna</i>
hook grass	<i>Uncinia species</i>
horopito, pepper tree	<i>Pseudowintera colorata</i>
inaka	<i>Dracophyllum longifolium</i>
jointed rush	<i>Juncus articulatus</i>
kahikatea, white pine	<i>Dacrycarpus dacrydioides</i>
kaikomako	<i>Pennantia corymbosa</i>
kohuhu	<i>Pittosporum tenuifolium</i>
korokio	<i>Corokia cotoneaster</i>
koromiko	<i>Hebe salicifolia</i>
kotukutuku	<i>Fuchsia excorticata</i>
kowhai	<i>Sophora microphylla</i>

lancewood	<i>Pseudopanax crassifolius</i>
lowland ribbonwood	<i>Plagianthus regius</i>
makomako	<i>Aristotelia serrata</i>
manatu	<i>Plagianthus regius</i>
manuka	<i>Leptospermum scoparium</i>
mapou	<i>Myrsine australis</i>
matagouri	<i>Discaria toumatou</i>
matai, blackpine	<i>Prumnopitys taxifolius</i>
miro	<i>Prumnopitys ferrugineus</i>
mountain beech	<i>Nothofagus solandri</i> var. <i>cliffortioides</i>
mountain holly	<i>Olearia ilicifolia</i>
mountain lacebark	<i>Hoheria lyallii</i>
mountain wineberry	<i>Aristotelia fruticosa</i>
mouse-ear hawkweed	<i>Hieracium pilosella</i>
narrow-leaved mahoe	<i>Melicytus lanceolatus</i>
native broom	<i>Carmichaelia</i> species
native jasmine	<i>Parsonsia heterophylla</i>
pate	<i>Schefflera digitata</i>
pepper tree	<i>Pseudowintera colorata</i>
pohuehue	<i>Muehlenbeckia australis</i>
pokaka	<i>Elaeocarpus hookerianus</i>
prickly shield fern	<i>Polystichum vestitum</i>
putaputaweta, marble leaf	<i>Carpodetus serratus</i>
red flowered mistletoe	<i>Peraxilla colensoi</i>
red tussock	<i>Chionochloa rubra</i> var. <i>cuprea</i>
ribbonwood	<i>Plagianthus regius</i>
rimu	<i>Dacrydium cupressinum</i>
silver tussock	<i>Poa cita</i>
snow berry	<i>Gaultheria depressa</i> var. <i>novaezelandiae</i>
snow tussock	<i>Chionochloa rigida</i>
speargrass	<i>Aciphylla aurea</i>
stinging nettle	<i>Urtica ferox</i>
sundew	<i>Drosera spathulata</i>
swamp flax, harakeke	<i>Phormium tenax</i>
sweet vernal	<i>Anthoxanthum odoratum</i>
tangle fern	<i>Gleichenia dicarpa</i>

tarata, lemonwood	<i>Pittosporum eugenioides</i>
three finger	<i>Pseudopanax colensoi</i> var. <i>ternatus</i>
toetoe	<i>Cordarteria richardii</i>
totara	<i>Podocarpus totara</i>
tree nettle	<i>Urtica ferox</i>
water fern	<i>Histiopteris incisa</i>
weeping mapou	<i>Myrsine divaricata</i>
white clover	<i>Trifolium repens</i>
wineberry	<i>Aristotelia serrata</i>
wirerush	<i>Empodisma minor</i>
Yorkshire fog	<i>Holcus lanatus</i>

Appendix - 7

LIST OF INDIGENOUS VASCULAR PLANTS OF THE TARINGATURA ECOLOGICAL DISTRICT

Gymnosperm trees and shrubs

<i>Dacrycarpus dacrydioides</i>	kahikatea, white pine
<i>Dacrydium cupressinum</i>	rimu
<i>Halocarpus bidwillii</i>	bog pine, mountain pine
<i>Phyllocladus alpinus</i>	mountain toa toa
<i>Podocarpus hallii</i>	Hall's totara
<i>Podocarpus totara</i>	totara
<i>Prumnopitys ferrugineus</i>	miro
<i>Prumnopitys taxifolius</i>	matai

Monocot trees and shrubs

<i>Cordyline australis</i>	ti, cabbage tree
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Dicot trees and shrubs

<i>Androstoma empetrifolia</i> (<i>Cyathodes empetrifolia</i>)	
<i>Aristotelia fruticosa</i>	mountain wineberry
<i>Aristotelia serrata</i>	makomako, wineberry
<i>Aristotelia fruticosa</i> x <i>A. serrata</i>	
<i>Brachyglottis cassinioides</i>	
<i>Brachyglottis rotundifolia</i>	
<i>Brachyglottis revoluta</i>	
<i>Carmichaelia petriei</i>	native broom
<i>Carmichaelia vexillata</i>	dwarf broom
<i>Carpodetus serratus</i>	putaputaweta, marble leaf
<i>Cassinia vauvilliersii</i>	
<i>Coprosma acerosa</i>	
<i>Coprosma areolata</i>	
<i>Coprosma cheesemanii</i>	
<i>Coprosma ciliata</i>	
<i>Coprosma colensoi</i>	

<i>Coprosma crassifolia</i>	
<i>Coprosma linariifolia</i>	
<i>Coprosma lucida</i>	shining karamu
<i>Coprosma petriei</i>	
<i>Coprosma obconica</i>	
<i>Coprosma pseudocuneata</i>	
<i>Coprosma propinqua</i>	
<i>Coprosma rhamnoides</i>	
<i>Coprosma rigida</i>	
<i>Coprosma rotundifolia</i>	
<i>Coprosma rugosa</i>	
<i>Coprosma virescens</i>	
<i>Coprosma wallii</i>	
<i>Coprosma</i> sp. aff. <i>intertexta</i> (Eagle sp. f)	
<i>Coprosma</i> sp. aff. <i>parviflora</i> (Eagle sp. t)	
<i>Coriaria arborea</i>	tree tutu
<i>Coriaria plumosa</i>	
<i>Coriaria sarmentosa</i>	tutu
<i>Corokia cotoneaster</i>	korokio
<i>Cyathodes juniperina</i>	mingimingi
<i>Discaria toumatou</i>	matagouri
<i>Dracophyllum longifolium</i>	inaka
<i>Dracophyllum prostratum</i>	
<i>Dracophyllum uniflorum</i>	
<i>Dracophyllum</i> sp. aff. <i>oliveri</i>	swamp grass tree
<i>Elaeocarpus hookerianus</i>	pokaka
<i>Fuchsia excorticata</i>	kotukutuku, fuchsia
<i>Fuchsia excorticata</i> x <i>F. perscandens</i>	
<i>Gaultheria antipoda</i>	
<i>Gaultheria crassa</i>	
<i>Gaultheria depressa</i> var. <i>novae zelandiae</i>	snowberry
<i>Gaultheria macrostigma</i>	
<i>Gaultheria nubicola</i>	
<i>Gaultheria macrostigma</i> x <i>G. novae-zelandiae</i>	
<i>Griselinia littoralis</i>	puka, broadleaf
<i>Hebe anomala</i>	

<i>Hebe hectori</i>	
<i>Hebe pauciramosa</i>	
<i>Hebe rakaiensis</i>	
<i>Hebe salicifolia</i>	
<i>Helichrysum aggregatum</i>	
<i>Hoheria lyallii</i>	mountain ribbonwood
<i>Ileostylus micranthus</i>	mistletoe
<i>Korthalsella clavata</i>	
<i>Leptospermum scoparium</i>	manuka
<i>Leucopogon fraseri</i>	patotara
<i>Leucopogon suaveolens</i>	
<i>Lophomyrtus obcordata</i>	
<i>Melicope simplex</i>	
<i>Melicytus alpinus</i>	porcupine shrub
<i>Melicytus flexuosus</i>	
<i>Melicytus lanceolatus</i>	narrow-leaved mahoe
<i>Melicytus ramiflorus</i>	mahoe
<i>Melicytus</i> sp. aff. <i>alpinus</i>	
<i>Myrsine australis</i>	mapou
<i>Myrsine divaricata</i>	weeping mapou
<i>Neomyrtus pedunculatus</i>	
<i>Nothofagus fusca</i>	red beech
<i>Nothofagus menziesii</i>	silver beech
<i>Nothofagus solandri</i> var. <i>cliffortioides</i>	mountain beech
<i>Olearia arborescens</i>	
<i>Olearia avicenniaefolia</i>	
<i>Olearia bullata</i>	
<i>Olearia cymbifolia</i>	
<i>Olearia fragrantissima</i>	
<i>Olearia hectorii</i>	
<i>Olearia ilicifolia</i>	mountain holly
<i>Olearia moschata</i>	
<i>Olearia lineata</i>	
<i>Olearia ilicifolia</i> x <i>O. arborescens</i>	
<i>Pennantia corymbosa</i>	kaikomako
<i>Pentachondra pumila</i>	

<i>Peraxilla colensoi</i>	red mistletoe
<i>Pimelea traversii</i>	
<i>Pimelea oreophila</i>	
<i>Pimelea prostrata</i>	
<i>Pittosporum eugenioides</i>	tarata, lemonwood
<i>Pittosporum tenuifolium</i>	kohuhu
<i>Plagianthus regius</i>	manatu, lowland ribbonwood
<i>Pseudopanax colensoi</i> var. <i>ternatus</i>	three finger
<i>Pseudopanax crassifolius</i>	lancewood
<i>Pseudopanax ferox</i>	fierce lancewood
<i>Pseudowintera colorata</i>	horopito, pepperwood
<i>Raukaua anomalus</i> (<i>Pseudopanax anomalus</i>)	
<i>Raukaua simplex</i> (<i>Pseudopanax simplex</i>)	haumakaroa
<i>Schefflera digitata</i>	pate
<i>Solanum laciniatum</i>	poroporo
<i>Sophora microphylla</i>	kowhai
<i>Streblus heterophyllus</i>	small-leaved milk tree
<i>Teucrium parvifolium</i>	
<i>Urtica ferox</i>	tree nettle, stinging nettle

Dicot Lianes

<i>Calystegia tuguriorum</i>	convolvulus
<i>Clematis foetida</i>	
<i>Clematis marata</i>	
<i>Clematis paniculata</i>	
<i>Fuchsia perscandens</i>	
<i>Muehlenbeckia australis</i>	
<i>Muehlenbeckia axillaris</i>	
<i>Muehlenbeckia complexa</i>	
<i>Parsonsia capillaris</i>	NZ jasmine
<i>Parsonsia heterophylla</i>	NZ jasmine, native jasmine
<i>Rubus cissoides</i>	bush lawyer
<i>Rubus schmidelioides</i>	lawyer

Lycopods

<i>Lycopodium australianum</i>	
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Lycopodium fastigiatum
Lycopodium ramulosum
Lycopodium scariosum
Lycopodium varium
Lycopodium volubile

Ferns

<i>Adiantum cunninghamii</i>	maidenhair fern
<i>Asplenium bulbiferum</i>	
<i>Asplenium flabellifolium</i>	
<i>Asplenium flaccidum</i>	
<i>Asplenium gracillimum</i>	
<i>Asplenium hookerianum</i>	
<i>Asplenium lyallii</i>	
<i>Asplenium richardii</i>	
<i>Asplenium terrestre</i>	
<i>Blechnum chambersii</i>	
<i>Blechnum discolor</i>	crown fern
<i>Blechnum fluviatile</i>	
<i>Blechnum minus</i>	swamp kiokio
<i>Blechnum penna-marina</i>	
<i>Blechnum procerum</i>	
<i>Blechnum vulcanicum</i>	
<i>Blechnum novae-zelandiae</i>	kiokio
<i>Blechnum montanum</i>	mountain kiokio
<i>Botrychium millefolium</i>	
<i>Ctenopteris heterophylla</i>	
<i>Cyathea colensoi</i>	
<i>Cyathea smithii</i>	soft tree fern, katote
<i>Cystopteris tasmanica</i>	
<i>Dicksonia fibrosa</i>	wheki-ponga
<i>Dicksonia squarrosa</i>	
<i>Gleichenia dicarpa</i>	
<i>Grammitis billardiarei</i>	
<i>Grammitis magellanica</i>	
<i>Histiopteris incisa</i>	water fern

<i>Hymenophyllum demissum</i>	
<i>Hymenophyllum multifidum</i>	filmy fern
<i>Hymenophyllum sanguinolentum</i>	
<i>Hypolepis ambigua</i>	
<i>Hypolepis millefolium</i>	
<i>Leptopteris hymenophylloides</i>	
<i>Phymatosorus pustulatus (P. diversifolius)</i>	
<i>Pneumatopteris pennigera</i>	
<i>Polystichum richardii</i>	
<i>Polystichum vestitum</i>	prickly or hard shield fern
<i>Pyrrosia eleagnifolia</i>	
<i>Pteridium esculentum</i>	bracken

Orchids

<i>Aporostylis bifolia</i>	
<i>Chiloglottis cornuta</i>	
<i>Corybas orbiculatus</i>	spider orchid
<i>Corybas trilobus</i>	spider orchid
<i>Gastrodia cunninghamii</i>	
<i>Microtis oligantha</i>	onion-leaved orchid
<i>Microtis uniflora</i>	onion-leaved orchid
<i>Prasophyllum colensoi</i>	
<i>Pterostylis australis</i>	green hood orchid
<i>Pterostylis banksii</i>	
<i>Thelymitra longifolia</i>	sun orchid
<i>Thelymitra venosa</i>	

Grasses

<i>Chionochloa conspicua</i>	bush tussock
<i>Chionochloa rigida</i>	narrow-leaved snow tussock
<i>Chionochloa rubra</i> var. <i>cuprea</i>	red tussock
<i>Cordateria richardii</i>	toe toe
<i>Deyeuxia avenoides</i>	
<i>Dichelachne crinita</i>	plume grass
<i>Elymus solandri</i>	wheat grass
<i>Elymus tenuis</i>	

<i>Festuca novae-zelandiae</i>	hard tussock
<i>Hierochloe redolens</i>	
<i>Lachnogrostis lyallii</i>	
<i>Microlaena avenacea</i>	bush rice grass
<i>Microlaena stipoides</i>	meadow rice grass
<i>Poa breviglumis</i>	
<i>Poa cita</i>	silver tussock
<i>Poa colensoi</i>	blue tussock
<i>Poa imbecilla</i>	
<i>Poa matthewsii</i>	
<i>Rytidosperma gracile</i>	
<i>Rytidosperma nigricans</i>	
<i>Rytidosperma pumilum</i>	
<i>Rytidosperma setifolium</i>	
<i>Trisetum antarcticum</i> var. <i>tenellum</i>	
<i>Trisetum</i> sp.	

Sedges

<i>Carex berggrenii</i>	
<i>Carex breviculmis</i>	
<i>Carex comans</i>	
<i>Carex coriacea</i>	
<i>Carex diandra</i>	
<i>Carex dipsacea</i>	
<i>Carex dissita</i>	
<i>Carex echinata</i>	
<i>Carex flagelliformis</i>	
<i>Carex flaviformis</i>	
<i>Carex gaudichaudiana</i>	
<i>Carex geminata</i>	
<i>Carex secta</i>	purei
<i>Carex sinclairii</i>	
<i>Carex testacea</i>	
<i>Carex wakatipu</i>	
<i>Carex tenuiculmis</i>	
<i>Carpha alpina</i>	

<i>Eleocharis acuta</i>	
<i>Elaeocharis gracilis</i>	
<i>Isolepis cernuus</i>	
<i>Isolepis aucklandica</i>	
<i>Lepidosperma australe</i>	
<i>Oreobolus pectinatus</i>	comb sedge
<i>Oreobolus strictus</i>	
<i>Schoenus concinnus</i>	
<i>Schoenus pauciflorus</i>	
<i>Uncinia clavata</i>	hook grass
<i>Uncinia ferruginea</i>	
<i>Uncinia fuscovaginata</i>	hook grass
<i>Uncinia gracilentia</i>	
<i>Uncinia purpurata</i>	hook grass
<i>Uncinia rubra</i>	hook grass
<i>Uncinia rupestris</i>	
<i>Uncinia silvestris</i>	
<i>Uncinia strictissima</i>	
<i>Uncinia uncinata</i>	hook grass
<i>Uncinia</i> sp. aff. <i>rubra</i> (fine)	hook grass

Rushes

<i>Centrolepis ciliata</i>	
<i>Empodisma minor</i>	wire rush
<i>Juncus antarcticus</i>	
<i>Juncus gregiflorus</i>	
<i>Juncus novae-zelandiae</i>	
<i>Luzula limosa</i>	
<i>Luzula migrata</i>	wood rush
<i>Luzula rufa</i>	

Monocot herbs (other than orchids, grasses, sedges, rushes)

<i>Arthropodium candidum</i>	
<i>Astelia fragrans</i>	
<i>Astelia nervosa</i>	
<i>Iphigenia novae-zelandiae</i>	

<i>Libertia ixioides</i>	native iris
<i>Phormium cookianum</i>	mountain flax, whararika
<i>Phormium tenax</i>	swamp flax, harakeke
<i>Potamogeton cheesemanii</i>	
<i>Potamogeton suboblongus</i>	
<i>Typha orientalis</i>	raupo, bull rush

Composite herbs

<i>Abrotanella caespitosa</i>	
<i>Anaphalioides bellidioides</i> (<i>Helichrysum bellidioides</i>)	
<i>Brachyglottis bellidioides</i>	
<i>Brachyglottis southlandica</i>	
<i>Celmisia densiflora</i>	
<i>Celmisia glandulosa</i>	
<i>Celmisia gracilentia</i>	
<i>Celmisia lyallii</i>	
<i>Celmisia sessiliflora</i>	
<i>Celmisia semicordata</i>	
<i>Celmisia</i> sp. (aff. <i>C. gracilentia</i> rhizomatous)	
<i>Celmisia</i> sp. (<i>C.</i> "Taratua" of Druce 1992)	
<i>Craspedia</i> sp. (2 unnamed species)	
<i>Dolichoglottis lyallii</i>	
<i>Gnaphalium audax</i>	
<i>Gnaphalium mackayii</i>	
<i>Gnaphalium polylepis</i>	
<i>Gnaphalium ruahinicum</i>	
<i>Gnaphalium traversii</i>	
<i>Helichrysum filicaule</i>	
<i>Lagenifera barkeri</i>	
<i>Lagenifera cuneata</i>	
<i>Lagenifera pinnatifida</i>	
<i>Lagenifera strangulata</i>	
<i>Lagenifera petiolata</i>	
<i>Leptinella squalida</i> var. <i>mediana</i>	
<i>Microseris scapigera</i>	
<i>Raoulia glabra</i>	

<i>Raoulia subsericea</i>	
<i>Raoulia tenuicaulis</i>	
<i>Senecio glomeratus</i>	
<i>Senecio minimus</i>	
<i>Senecio wairauensis</i>	
<i>Taraxacum magellanicum</i>	native dandelion

Dicot herbs (other than Composites)

<i>Acaena anserinifolia</i>	bidibidi
<i>Acaena caesiiglauc</i>	bidibidi
<i>Acaena juvenca</i>	bidibidi
<i>Acaena inermis</i>	bidibidi
<i>Acaena novae-zelandiae</i>	bidibidi
<i>Acaena profundeincisa</i>	bidibidi
<i>Acaena saccaticupula</i>	bidibidi
<i>Acaena inermis</i> x <i>A. novae-zelandiae</i>	
<i>Aciphylla aurea</i>	golden speargrass
<i>Aciphylla glaucescens</i>	blue speargrass
<i>Aciphylla subflabellata</i>	speargrass
<i>Anemone tenuicaulis</i>	
<i>Anisotome aromatica</i> var. <i>flabellifolia</i>	
<i>Anisotome flexuosa</i>	
<i>Anisotome haastii</i>	
<i>Anisotome</i> sp. (limestone)	
<i>Bulbinella angustifolia</i>	maori onion
<i>Callitriche petriei</i>	
<i>Cardamine debilis</i> agg.	
<i>Cardamine</i> aff. <i>bilobata</i>	
<i>Cardamine</i> sp.	
<i>Centella uniflora</i>	
<i>Crassula pedunculatus</i>	
<i>Dichondra repens</i>	
<i>Drosera arcturi</i>	sundew
<i>Drosera spathulata</i>	sundew
<i>Epilobium alsinoides</i>	willowherb
<i>Epilobium atriplicifolium</i>	willowherb

Epilobium billardioreanum
Epilobium brunnescens
Epilobium chionanthum
Epilobium chlorifolium
Epilobium cinereum
Epilobium insulare
Epilobium macropus
Epilobium melanocaulon
Epilobium microphyllum
Epilobium minutiflorum
Epilobium nerteroides
Epilobium nummularifolium
Epilobium pallidiflorum
Epilobium pedunculare
Epilobium pubens
Epilobium rotundifolium
Epilobium tenuipes
Euphrasia zelandica
Forstera tenella
Galium perpusillum
Galium propinquum
Geranium microphyllum
Geranium sessiliflorum
Gentiana grisebachii
Gentiana sp.
Geum leiospermum
Geranium microphyllum
Geranium sessiliflorum
Gingidia decipiens
Gingidia montana
Gonocarpus aggregatus
Gonocarpus micranthus
Gonocarpus montanus
Gunnera monoica
Gunnera prorepens
Hydrocotyle heteromeria

Hydrocotyle hydrophila
Hydrocotyle moschata
Hydrocotyle novae-zeelandiae
Hydrocotyle novae-zeelandiae var. *montana*
Hydrocotyle sulcata
Kelleria dieffenbachii
Kelleria laxus
Mazus radicans
Mentha cunninghamii New Zealand mint
Myriophyllum triphyllum
Montia fontana
Nertera balfouriana
Nertera ciliata
Nertera depressa
Nertera dichondraefolia
Nertera setulosa
Nertera villosa
Oxalis canaliculatus
Oxalis exilis
Oreomyrrhis colensoi
Oreomyrrhis ramosa
Oreomyrrhis sp. ("rhizomatous")
Oreostylidium subulatum
Plantago raoulii New Zealand plantain
Plantago uniflora
Potentilla anserinioides
Pratia angulata
Ranunculus cheesemanii
Ranunculus foliosus
Ranunculus glabrifolius
Ranunculus multiscapus
Ranunculus royi
Ranunculus reflexus
Ranunculus ternatifolius
Rumex flexuosus
Schizeilema cockaynei

Schizeilema nitens
Schizeilema trifoliatum
Scleranthus brockiei
Scleranthus uniflora
Stellaria decipiens
Stellaria gracilentia
Urtica incisa
Viola cunninghamii
Viola filicaulis
Wahlenbergia albomarginata

Appendix 8

CHECKLIST OF VERTEBRATE WILDLIFE SPECIES IN TARINGATURA ECOLOGICAL DISTRICT

Birds

Australasian bittern	<i>Botaurus poiciloptilus</i>
Australasian harrier, kahu	<i>Circus approximans</i>
bellbird, korimako	<i>Anthornis melanura</i>
* blackbird	<i>Turdus merula</i>
black-backed gull	<i>Larus dominicans</i>
black-fronted tern	<i>Sterna albostrata</i>
brown creeper, pipipi	<i>Mohoua novaeseelandiae</i>
* chaffinch	<i>Fringilla coelebs</i>
* dunnock (hedgesparrow)	<i>Prunella modularis</i>
fantail, South Island: piwakawaka	<i>Rhipidura fuliginosa fuliginosa</i>
fern bird, South Island	<i>Bowdleria punctata punctata</i>
falcon, New Zealand; karearea	<i>Falco novaeseelandiae</i>
* goldfinch	<i>Carduelis carduelis</i>
* greenfinch	<i>Carduelis chloris</i>
grey duck, parera	<i>Anas superciliosa superciliosa</i>
grey warbler, riroriro	<i>Gerygone igata</i>
heron, white-faced	<i>Ardea novaehollandiae</i>
* house sparrow	<i>Passer domesticus</i>
keruru (see NZ pigeon)	
* magpie, white-backed	<i>Gymnorhina tibicen</i>
* mallard	<i>Anas platyrhynchos</i>
morepork, ruru	<i>Ninox novaeseelandiae novaeseelandiae</i>
paradise shelduck, putangitangi	<i>Tadorna vaeriegata</i>
parakeet, yellow-crowned, kakariki	<i>Cyanoramphus auriceps auriceps</i>
pigeon, New Zealand; keruru	<i>Hemiphaga novaeseelandiae novaeseelandiae</i>
pipit, pihoihoi	<i>Anthus novaeseelandiae novaeseelandiae</i>
pukeko, swamp hen	<i>Porphyrio porphyrio</i>
* red poll	<i>Carduelis flammea</i>
rifleman, South Island; titipounamu	<i>Acanthisitta chloris chloris</i>
shag, black; kawau	<i>Phalacrocorax carbo novaehollandiae</i>

shining cuckoo, pipiwhararoa	<i>Chrysococcyx lucidus lucidus</i>
silveryeye, tauhou	<i>Zosterops lateralis</i>
* skylark	<i>Alauda arvensis</i>
* song thrush	<i>Turdus philomelos</i>
spur-winged plover	<i>Vanellus miles novaehollandiae</i>
* starling	<i>Sturnus vulgaris</i>
tomtit, South Island; miromiro	<i>Petroica macrocephala macrocephala</i>
tui	<i>Prothemadera novaeseelandiae novaeseelandiae</i>
* yellow hammer	<i>Emberiza citrinella</i>

Fish

brown trout	<i>Salmo trutta</i>
eel, long-finned	<i>Anguilla dieffenbachii</i>
flat-head galaxias	<i>Galaxias anomalus</i>
round-head galaxias	<i>Galaxias depressiceps</i>

Crustacea

koura, fresh water crayfish	<i>Paranephrops zelandicus</i>
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Introduced mammals

brush-tailed possum	<i>Trichosurus vulpecula</i>
cat	<i>Felis cattus</i>
cattle	<i>Bos taurus</i>
feral pig	<i>Sus scrofa</i>
hare	<i>Lepus europaeus</i>
hedgehog	<i>Erinaceus europaeus</i>
mouse	<i>Mus musculus</i>
rabbit	<i>Oryctolagus cuniculus</i>
rat, ship	<i>Rattus rattus</i>
red deer	<i>Cervus elaphus</i>
sheep	<i>Ovis aries</i>
stoat	<i>Mustela erminea</i>

Lizards

cryptic skink	<i>Oligosoma inconspicuum</i>
grass skink	<i>Oligosoma nigriplantare polycroma</i>

green-backed skink

Oligosoma chloronoton

McCann's skink

Oligosoma maccanni

Invertebrates

Ephemeroptera (mayflies)

Hemiptera (bugs)

Onisigaster sp.

Rhypodes anceps

Deletidium spp.

Lepidoptera (moths and butterflies)

Orthoptera (grasshoppers)

Aoraria dinodes

Paprides dugdali

Aponotoreas synclinalis

Heloxycanus patricki

Trichoptera (caddisflies)

Notoreas sp. (unnamed)

Tmetolophota alope

Hudsonema aliena

* denotes introduced species

