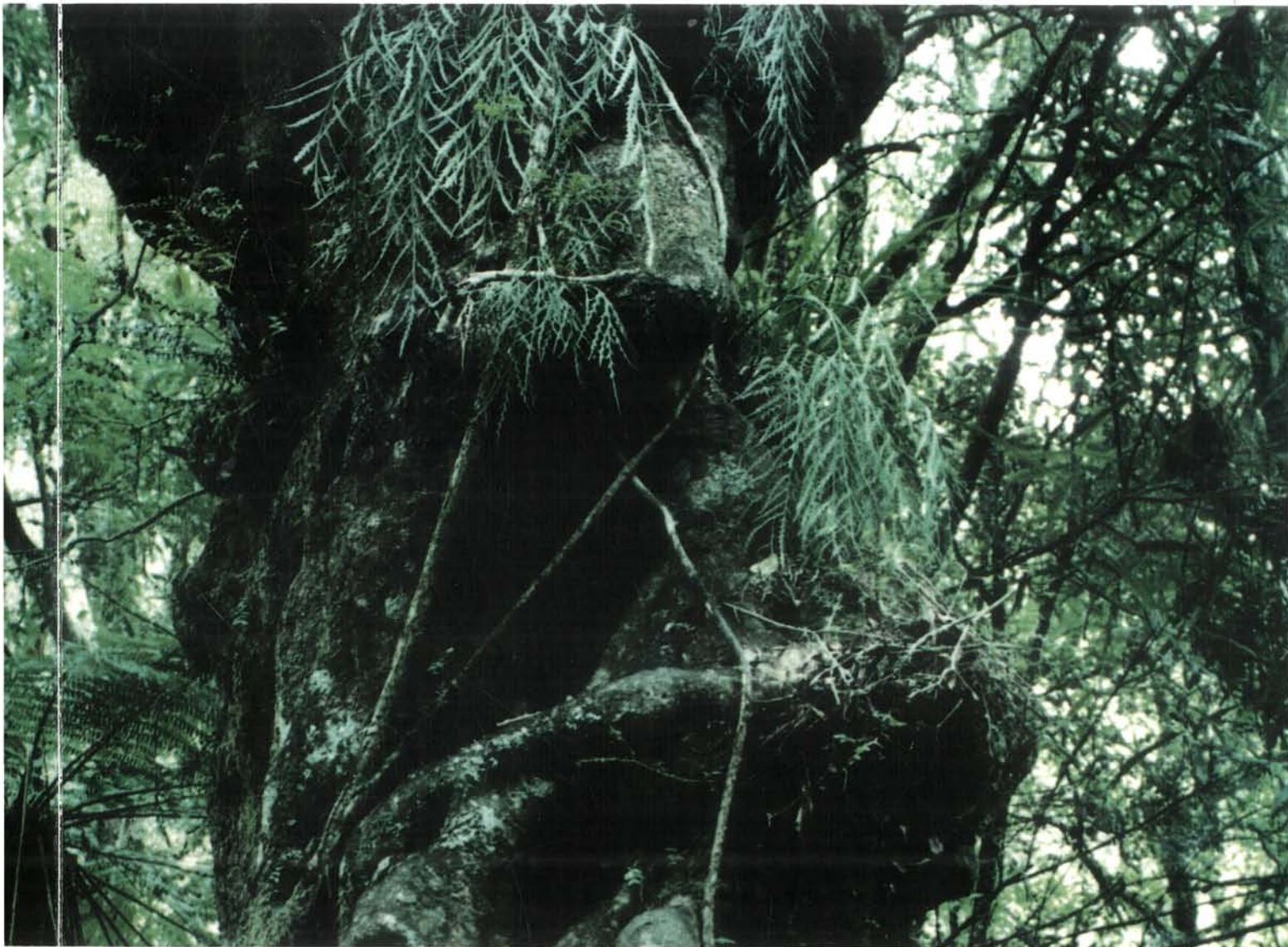


MAUNGAHARURU ECOLOGICAL DISTRICT

Survey Report for the Protected
Natural Areas Programme

1996



Department of Conservation
Te Papa Atawhai

Maungaharuru Ecological District

Survey Report for the Protected Natural Areas Programme

A.J. TOWNSEND



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Foreword

The Maungaharuru Range and its southern tail rear like a great limestone wave out of the northern Hawke's Bay landscape. It forms the spine of the Maungaharuru Ecological District, which is bounded by the biggest rivers in Hawke's Bay - the Mohaka and the Ngaruroro. Lying between the mountains and the lowlands, and full of hidden dells, hanging basins, bluffs and tumbling streams, it has a rugged, yet gentle character all of its own.

Once virtually the whole landscape would have been cloaked in dense forests, alive with birds. Most of that has now gone, but enough remains to give us a good idea of that past, and to give us the chance of restoring some of its natural wealth. We also have the writings of H Guthrie-Smith and a rich Maori history to help guide us.

This survey gives us an up-to-date picture: what natural features are left, and where to focus conservation energy. It identifies 33 Recommended Areas for Protection (RAPs) that best represent the remaining natural features of Maungaharuru Ecological District. All are on private land, so that any future conservation of them will hinge on goodwill and co-operation between landowners and protection agencies.

For anyone with a conservation vision for Maungaharuru or wider Hawke's Bay, this report offers a wealth of reference information.

N M Clifton

Regional Conservator

Department of Conservation, Hawke's Bay

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Summary

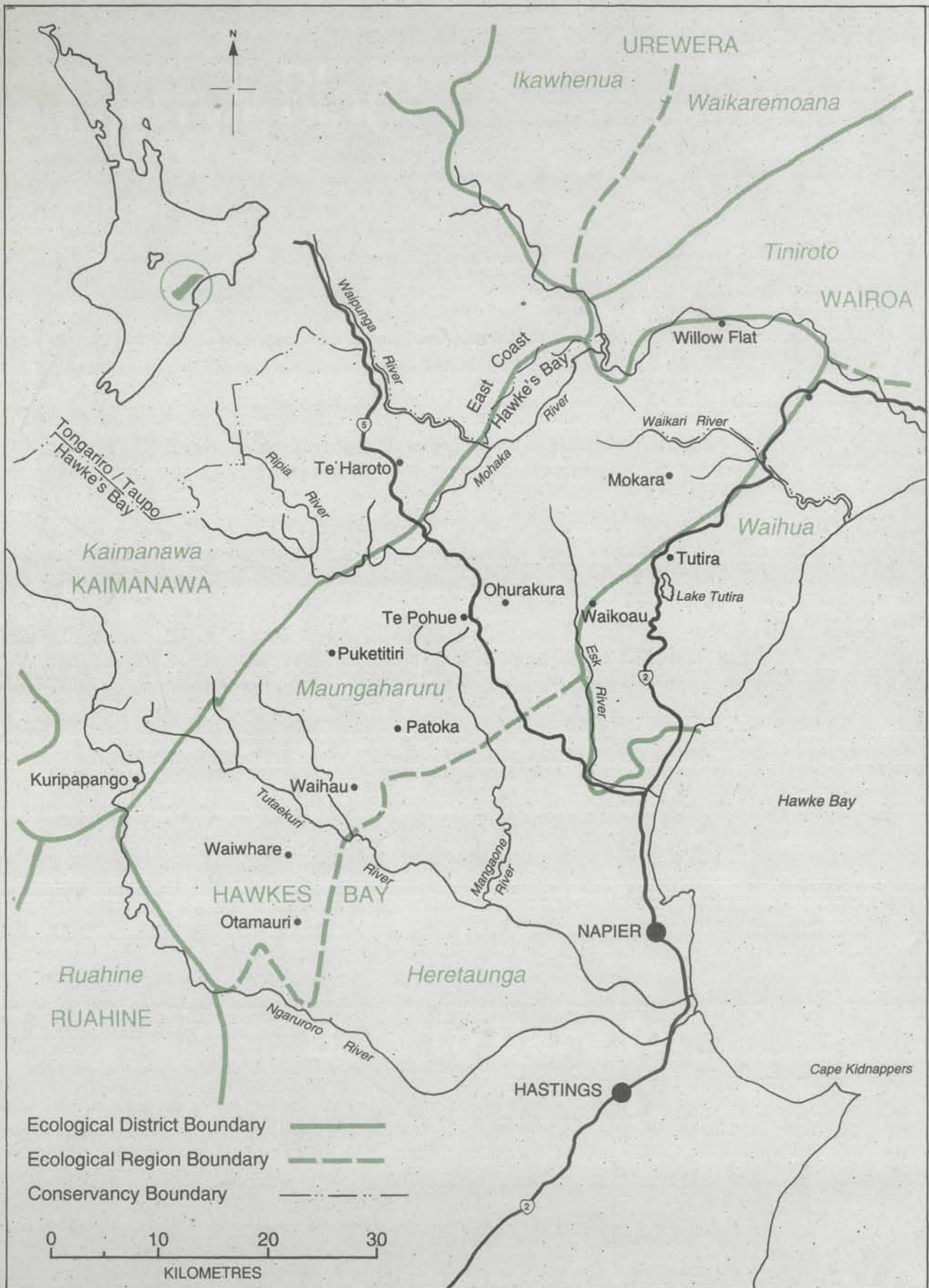
This report is the product of the Protected Natural Areas Programme (PNAP) Survey for the Maungaharuru Ecological District. This programme's aims are to conserve biodiversity through the protection of representative areas of natural vegetation, which are at present poorly represented in existing reserves.

The Maungaharuru Ecological District is an area of mountainous and rolling hill country, with steep bluffs and deep gorges, situated in western Hawke's Bay. The ecological district's vegetation can be described as "diverse, but uniform", in that many of the remaining natural areas within the same ecological system are very similar to one another, but the difference in the vegetation from one system to another, is striking. This vegetation ranges from lowland podocarp-broad-leaved forests of matai, rimu, tawa and titoki, through to alpine shrublands and grasslands of monoao and red tussock.

This ecological district has fared more lightly than the rest of Hawke's Bay, in that approximately 10% of its natural vegetation is protected in reserves already. A further 10% (approximately) of its area has been recommended for protection, through this report. A total of 100 sites were surveyed and 33 were selected as areas recommended for protection (RAPs). These RAPs are the highest-quality examples of the ecological units which remain within the Maungaharuru Ecological District, and complement the existing protected natural areas. A number of RAPs complement each other too, forming corridors from one to another or to an existing protected area.

The physical protection of these RAPs, in perpetuity, will help meet the aims of conserving the biodiversity of the Maungaharuru Ecological District.

FIGURE 1 : LOCALITY MAP



Introduction

The arrival of humans in New Zealand has brought about ecological change. The flora and fauna of this country have had to cope with change and have evolved accordingly. As human technology has increased, the rate of change has increased exponentially.

The arrival of the Maori people in this country (bringing with them kiore and kuri), has commenced a wave of extinctions of our biota. When Europeans arrived, they sought to make this country a "new England". They cleared large tracts of the dark and un-welcoming forests and introduced many plants and animals which we now regard as pests. These also have caused extinctions of the native flora and fauna. The process of land clearance has continued throughout this century, but has virtually ceased now.

We today, are only beginning to appreciate the uniqueness and interconnectedness of the system in which we live and to bring into action programmes to protect those natural areas that remain. This is the reason why the "Protected Natural Areas Programme" (PNAP) exists.

The PNAP aims to create a system of protected areas, which are representative of the New Zealand landscape and which give this country its essential flavour. Central to its concept, has been the division of the country into Ecological Districts. These are areas that have their own distinctive character according to landform, climate, geology and vegetation. This classification produced 268 of these districts. The aim is to survey all the natural areas in each of these districts and identify the best examples of unprotected natural areas for protection. These areas are called "Recommended Areas for Protection" or RAPs. Future stages of the PNA Programme involve implementation, hopefully the protection of RAPs from the recommendations of reports such as this one. This report is the product of the survey of remaining natural areas of the Maungaharuru Ecological District.

The Maungaharuru Ecological District covers an area of 1465 km², ranging from lowland forest zones, up into sub-alpine grassland zones. This district lies in northern Hawke's Bay and has as its boundaries in the north and south, the Mohaka River and the Ngaruroro River, respectively. The western boundary runs up to the Torlesse greywacke of the Ahimanawa, Kaweka and Ruahine Ranges and the eastern boundary of the ecological district runs from Willowflat, via Putorino and Tutira, to the Ngaruroro River near Whanawhana.

Within the Maungaharuru Ecological District, approximately 10% of the total land area is in some form of legal protection. Much of the natural diversity within the Maungaharuru Ecological District, is covered by existing reserves, which means that some of the RAPs have been selected on the merits of how they interact with the surrounding landscape, for example, whether they form a "corridor", or act as "islands of diversity" within an otherwise unnatural landscape.

Of the 33 RAPs selected, 22 are forests, which vary from lowland broad-leaved, to podocarp, to beech, to alpine cloud forests. Three are shrublands of kanuka, kowhai and putaputaweta, and three have both forest and shrubland values. One RAP was selected for its wetland values and another is a treeland of ngaio in a lowland setting. Two are unique tussockland and herbfield associations in the cloud cap zone on the top of the Maungaharuru Range and one was selected purely for its landform values. Permission to visit the sites mentioned in the text was obtained from the landowners

before visiting them. This report in no way provides a 'right of access' for the public to any of the sites without the prior permission of the landowners.

Character and Ecology of the Maungaharuru Ecological District

LANDFORM AND GEOLOGY

The Maungaharuru Ecological District is centred around the spectacular escarpment of the Maungaharuru, Te Waka and Maniaroa Ranges. The flanks of these ranges have numerous streams and rivers flowing off them, which have dissected the land, depending upon the substrate, into deep gorges and either steep or rolling hill country.

The Maungaharuru Range formed as a result of pressure on the continental plates of the Earth's crust. It is a plateau of Pleistocene and late Pliocene (up to 5 million years old) sedimentary material, which has been uplifted, tilted and broken. The break can be seen along the western side of the Maungaharuru, Te Waka and the Maniaroa Ranges, as a series of steep bluffs. The uplift and breaking is the result of tectonic activity, where one continental plate has pushed against another. In this case, pressure from the Pacific Plate against the eastern side of New Zealand, which is mostly on the Australian Continental Plate, has caused a pressure wave (the Maungaharuru Range), which has then cracked and broken along the top to form the bluffs. Massive slumps, talus slopes and bluffs exist along the western side of the Maungaharuru Range, where parts of the bluffs have eroded.

The gentle slopes to the east of these bluffs were once a sea-floor somewhere east of New Zealand, and their main rock types are fossiliferous mudstones (papa) and limestones. Where limestone is the major exposed rock type, a karst landscape with irregular outcrops and dolines in a gently rolling hill country, has formed. This landscape occurs in the Kuripapango-Blowhard district, and on the eastern faces of the Maniaroa, Te Waka and Maungaharuru Ranges.

Further east, where the rock is more recent and weaker, papa mudstones are common. Deep gorges have been carved into these from rivers and streams, forming a landscape of steep hill country. This has typically steep sideslopes, bluffs and slumped gentle sideslopes. A narrow band of papa rock is evident along the Mohaka River on the western side and in the north of the Maungaharuru Ecological District. This papa underlies the limestone and had been exposed due to the fast flow (and therefore high erosive energy) of the Mohaka River. At Willowflat, terraces formed from this river are evident, about 100m above the present height of the river.

In the south of the district, gravels and conglomerates of greywacke have covered over the underlying sediments. These have been formed from the ancestors of the Ngaruroro River and Tutaekuri Rivers, during the relatively more recent glacial periods. Loess, also from this period, has covered the gravels in this part of the ecological district. These gravels and loess deposits are evident around Omahaki and Whanawhana, where the landforms are more terrace-like.

The Maungaharuru Ecological District has not only been modified through tectonic and glacial activity, but also through volcanic activity. Tephra (volcanic ash) and pumice have showered over much of the higher parts of Maungaharuru Range. In places, as much as 15cm of ash from Mount Tarawera and up to half a metre of ash

and pumice from Lake Taupo, has fallen on the Maungaharuru Range in geologically recent times (Suggate, Stevens & Te Punga, 1978).

CLIMATE

The climate of the Maungaharuru Ecological District ranges from a high rainfall mountain climate, where dustings of snow are a common winter event, through to areas with hot summers, dry foehn winds and seasonal droughts. Frosts have been recorded from March to November and their predominance decreases with proximity to the coast.

Wind direction for the Maungaharuru Ecological District is predominantly from the west and north-west. The ranges of this ecological district are exposed to the strong equinoctial winds from this direction and wind-sheared vegetation is not uncommon in exposed sites. Southerlies have the next most important influence on the ecological district and during winter bring snow.

The annual rainfall varies from 1000 mm/yr. in eastern parts of the district, through to 2000 mm/yr. along the crests and western flanks of the three main ranges. Hawke's Bay has one of the sunniest climates in New Zealand; on average, over 2200 hours per year. In the Maungaharuru Ecological District, the hours are lower, around 1800-1900 hours per year, which results from this district's more mountainous topography.

SOILS

The types of soil which form on any one site is a product of its substrate, the climate and the vegetation growing on the substrate. In the Maungaharuru Ecological District, many of the soils have been modified by pumice and tephra. Tephra often contains allophane, which binds up phosphorus, making these soils low in natural fertility and resistant to fertiliser applications. The soil type is further modified by rainfall, the higher the rainfall on a well drained soil, the more leached the soil and the lower its natural fertility. Where the soil is less well drained, chemical reactions occur, which bind iron, causing "gleying" and "mottling". The type of vegetation over the soil is also important as it adds an organic component to soils, which also alters its structure and drainage. Different vegetation types have different proportions of organic components and produce different soils.

Alteration of one of these variables will alter the type of soil produced and the influence the other variables have. In other words, determining the reasons for the types of soil produced on a particular site is a complex process.

In the Maungaharuru Ecological District, "Yellow-brown Pumice Soils" are the commonest type and are developed from tephra. These typically are moderately to strongly leached, which along with a presence of allophane, gives them a low natural fertility. They are young and weakly weathered, which makes their structure light, nutty and friable, which in turn allows them to be well drained. These soils are found on moderately steep and rolling hill-country throughout the district where a moderate rainfall (1200 - 1500 mm/yr.) occurs. Their light structure also makes them prone to wind erosion where "blow-outs" occur. Sheet and gully erosion has occurred on steeper hill-country faces.

The second commonest types of soil in the Maungaharuru Ecological District are a group known as the "Yellow-brown Earths". These soils form on mudstones and sandstones and occur in areas with a low rainfall (1000 - 1500 mm/yr.). They have a low to medium natural fertility, but do not contain allophane and so respond well to fertiliser application. Their structure is fine grained and drainage is also good. These soils are slow to form and equally slow to recover from damage. These soils occur on steep and very steep hill-country (MoW, 1971) around Mokamoka and Otamauri. They are prone to gully and sheet erosion.

Intergrades between these two soil-types occur throughout the ecological district, in areas where the depth of tephra is shallow enough to allow interaction with the underlying sandstones, such as around Patoka. Intergrades have a medium to low natural fertility (depending upon the amount of tephra). They are also well drained and easily wind-eroded. They occur on rolling and moderately steep hill-country.

BIOCLIMATIC ZONES AND ECOLOGICAL SYSTEMS

Within the Maungaharuru Ecological District, three bioclimatic zones were generated (Fromont & Walls, 1988) to classify the ecological district into regions of similarity:

- 1 Lowland dry zone. The Maungaharuru Ecological District closely follows the edge of this zone in the south-east. This zone has a seasonal soil moisture deficit.
- 2 Lowland temperate zone. This covers most of the inland hill-country of the ecological district. This zone is subject to a moisture surplus in the growing season.
- 3 Upland moist zone. This covers the high country along the crest of the Maungaharuru and Te Waka ranges and the foot of the Kaweka Range. This zone is subject to a considerable annual moisture surplus.

Geoff Walls (pers. com.) assisted in developing "ecological systems", which reflect climate, topography and vegetation. They were designed to correspond with the concept of ecological systems currently being developed for use in the updated PNAP programme. For this survey, five of these were developed, to provide a more detailed breakdown of the bioclimatic information:

Maungaharuru cloud cap system

This is the area along the crest of the Te Waka and Maungaharuru ranges. It is regularly swathed in cloud and characterised as a damp landscape with a considerable moisture surplus. This system is closely correlated with the area above the 1000m contour within the Maungaharuru Ecological District. Vegetation in this system is characterised by forests and shrublands of mountain holly and broadleaf. Shrublands of sub-alpine scrub and red tussock grasslands were noted in this system too. The uniqueness of this system suggests that it may be the site where any further endemic or unusual species will be found.

A number of species with disjunct distributions were found in the cloud cap system of the Maungaharuru Ecological District. These included *Pimelea aridula* var. ('drooping', Maungaharuru Ra.), *Myosotis saxosa*, red tussock, *Carex enysii*, *Iphigenia novae-zelandiae* and *Coprosma* aff. *cheesemanii*. This system is also home to the carnivorous giant landsnail *Powelliphanta marchanti*.

Greywacke hill country system

Along the western side of the ecological district, steep hill country on a greywacke substrate was noted. This portion of the ecological district is on the "Torlesse Greywacke backbone" of New Zealand. The climate here is considerably wetter than on the other side of the Maungaharuru Range.

The vegetation of this system is characterised by kanuka scrublands and shrublands, some beech forest, podocarp forests and regenerating broad-leaved forests of putaputaweta, mahoe and houhere. A number of unusual plants occur here too: the shrubs *Hebe* sp. (*Veronica squalida*) and *Hebe* sp. (aff. *V. squalida*) were found on steep bluffs over streams in this system and the carrot relative *Scandia rostrifolia* is common here too, whereas it is uncommon in other parts of the ecological district.

Puketitiri downland system

This system is a basin of gently rolling downland near Puketitiri, and the Maniaroa Range. It is generally above 500m in altitude and the climate here is considerably wetter than the lower country to the east.

On undisturbed sites, the remaining natural vegetation in this system is mostly tall podocarp forests and red beech forests, such as those at Balls Clearing Scenic Reserve. In areas where a greater disturbance has occurred, broad-leaved forests of kowhai, mahoe, tree fuchsia and houhere are the result. In sites where still further disturbance has occurred, shrublands of manuka, kanuka, *Coprosma 'taylorae'*, *Coprosma rugosa* and horopito form the remaining native vegetation. In this area, a number of unusual plants are common. These include the mistletoes *Tupeia antarctica*, *Ileostylus micranthus* and *Alepis flavida*.

Papa hill country system

This system is the band of hill country along the eastern side of the ecological district. The topography is characterised by having steep sideslopes and deep gorges caused by small streams. Many of the sideslopes above the gorges have formed from slumps in the papa mudstone and limestone substrate. The climate of this system is generally drier than most of the other system, as it is most affected by the rainshadow of the Maungaharuru Range, Maniaroa Range and Ruahine Range.

The native vegetation of this system is mostly kanuka and manuka forests and shrublands, although along the stream sides, where more water is available, broad-leaved species are also in the canopy. This system has been the most modified. The bluffs are either open or vegetated with flax and tuhara.

Maungaharuru midland system

This system is the calcareous hill country along the flanks of the main ranges in the Maungaharuru Ecological District. It is characterised by having gently rolling hills, with gentle to steep sideslopes and steep bluffs with some caves and springs. Wetlands are a feature of this system too and have formed on gentle sideslopes and the floors of shallow gullies. Climate varies greatly, due to the influence of the rainshadow of the Maungaharuru Range.

Natural vegetation consists of podocarp forests, beech forests, broad-leaved forests and shrublands of kanuka and manuka. On the bluffs, *Blechnum* ferns, tuhara and flax are common plants and on seepages in the sideslopes, small wetlands are sometimes present.

VEGETATION

The geologically dynamic history of this country has meant every site in New Zealand has been modified at some stage in the past. In the Maungaharuru Ecological District the last big event occurred approximately 1900 years ago, during the Taupo Eruption. During this eruption, tephra and pumice from Taupo lay up to half a metre deep on parts of the Maungaharuru Range and would have been much deeper in gullies, where rain would have transported it. This depth of tephra would have been enough to smother vegetation and may have been hot enough to cause fires, wiping out most of the forest in the district. Wardle (1991) suggests that regeneration after the Taupo Eruption would have been relatively rapid, with podocarp forests appearing about 450 years after destruction. This rejuvenation of the vegetation had a periodic pattern and would have occurred before.

When people arrived in this land, Hawke's Bay would have looked markedly different. Dense podocarp-broadleaved forests would have had time to regenerate from the destruction from Taupo and would have clothed the lowlands, foothills and lower ranges of the district. In the Maungaharuru Ecological District, the diversity of tree species in these forests would have been exceptional. Kamahi, red beech, black beech, rimu, kahikatea, matai, miro, totara, Halls totara, maire, rewarewa, titoki and tawa would all have been locally dominant, depending upon site differences. The understorey of the forest would have contained a great diversity of ferns, tree-ferns, shrubs, herbs, mosses, climbers and epiphytes. Above these forests, on the Maungaharuru Range, forests of sub-alpine shrubs and trees would have grown and in frost hollows, a tussockland of red tussock and monoao may have existed.

Major (and unrecoverable) disturbances to the vegetation have occurred since the arrival of people. Once the Maori people arrived, they burned much of the vegetation for agriculture and food. When Europeans arrived, they were more destructive, clearing large tracts through fire and axe for farmland and forestry, and bringing with them an arsenal of large plant-eating animals.

Today, most Maungaharuru Ecological District is in exotic vegetation and perhaps only 20% of the naturally vegetated area remains. The patterns of present-day vegetation are related to the constraints of the ecological zones and whatever modification has occurred at each site. In the Maungaharuru Ecological District, kanuka is now the commonest canopy species. It occurs in various sites in all parts of the district. On the lowland hill country along the eastern side of the ecological district, kanuka and manuka, along with *Pittosporum ralphii* and kowhai, forms tall forests. Around Kuripapango, fivefinger replaces the *Pittosporum ralphii* and kowhai, due to the wetter climate of this area. These forests are the result of regeneration after fire.

In the lowlands in the north of the ecological district, broad-leaved forests with a canopy dominated by tawa and titoki are the commonest forest types. One plant of *Drymoanthus adversus* was found growing on the limbs of tawa in this forest. This is a small orchid, which is a new record for the Maungaharuru Ecological District. These lowland broad-leaved forests intergrade into rewarewa forests, which are found at slightly higher altitudes.

Forests where rewarewa is the dominant canopy species are common along the eastern flanks of the Maungaharuru Range (in the Maungaharuru Midland Ecological System). As altitude increases within this system, rewarewa begins to share the canopy with kamahi and sometimes kanuka. Kamahi and rewarewa broad-leaved forest is a common component in Boundary Stream Scenic Reserve, Lake Opouahi

Scenic Reserve, and other patches of bush in this vicinity.

Beech forests are another component of the Maungaharuru Midland Ecological System and also extend into the Puketitiri Downland Ecological System. Red beech occupies an area between the rewarewa forest and the broadleaf-mountain holly forest on both the eastern and western flanks of the Maungaharuru Range. It is the dominant forest type in the upper reaches of Boundary Stream Scenic Reserve and Bellbird Bush Scenic Reserve. It also dominates some forest types around Puketitiri. Black beech is also in this same region, however, it only becomes dominant in the south of the ecological district.

Intermittent in the same localities that contain the beech forests on the Maungaharuru Range and around Puketitiri, are podocarp forests where rimu, matai and/or kahikatea emerge over a canopy of mahoe, horopito, putaputaweta and lemonwood. Broadleaf is also in some of these forests, depending upon altitude. The main influence on whether a site supports beech forest or podocarp forests seems to be micro climate. In the Titiokura Saddle vicinity, beech forests grow adjacent to podocarp forests. The podocarp forests are almost in the saddle, while the beech forests are in the rainshadow of Te Waka trig. It appears that the podocarps favour a wetter climate than do the beech forests. This is one of the theories for the "beech gap" on the west coast of South Island (Wardle, 1991; Haase, 1989), however further research is needed to determine whether this may be the case on the Maungaharuru Range.

Above these forests on the Maungaharuru and Te Waka ranges, forests of broadleaf and mountain holly are the dominant vegetation. Dense understories and fernlands of *Polystichum vestitum*, horopito and bush lawyer (*Rubus cissoides*) are a feature of this area where it has been burned. Shrublands where *Coprosma rugosa*, *Coprosma taylorae*, horopito, weeping mapou and *Melicytus alpinus* have regenerated are where subsequent disturbance has been limited. Amongst these shrublands and forests are rock outcrops where sub-alpine shrubs and herbs grow.

In a frost hollow on the crest of the Maungaharuru Range, is a shrubland of red tussock and monao. The Taupo Eruption was probably responsible for the formation of this, as this type of vegetation is typical of the Rangitaiki Plateau, to the northwest, which is similar in climate and shares the same tephra soil types as the crest of the Maungaharuru Range.

In the natural areas that remain, disturbance and degradation continue through the effects of introduced animals and plants. In particular, domestic stock, goats and possums are having the greatest influence on vegetation. Their effects are to browse out the palatable species in a forest, giving the less palatable species an advantage. The prevalence of horopito and tree nettle in sites where introduced animal numbers are high stands as a testimony to this. Also, the broadleaf and mountain holly forests along the crest of the Maungaharuru Range are undergoing a similar change. Broadleaf is extremely palatable to deer, possums and goats and although common in the canopy in sites in this area, very few seedlings were noted during the survey. Mountain holly is not as common in the canopy in the same sites, but its seedlings are relatively common. This suggests that mountain holly has an advantage over broadleaf when browsing animals are present and again, the vegetation is being modified.

That the vegetation is being modified is not necessarily a "bad" thing. Many species in New Zealand require seral habitats to survive and for this reason, secondary sites often have a diversity as high or higher than primary ones. This makes secondary forests and shrublands just as valuable to conservation as primary forests.

Within the Maungaharuru Ecological District, a number of plants are rare, unusual to the district, or common in the district but unusual elsewhere.

Significant or unusual plants in the Maungaharuru Ecological District

The mistletoes *Alepis flavida*, *Tupela antarctica* and *Ileostylus micranthus* all occur in the Puketitiri area. *Tupela antarctica* is even common in this region. It has small green flowers and white fruits with pink blotches, and is found on fivefinger, putaputaweta, and tree lucerne. *Ileostylus micranthus* is the second most common mistletoe in the Puketitiri district. It has small yellowish-green flowers, with a bent style, and yellow fruit. Hosts include putaputaweta, poataniwha, *Coprosma propinqua*, silver birch and tree lucerne. The third mistletoe species to be found in the Maungaharuru Ecological District, is the yellow beech mistletoe, *Alepis flavida*. It is known from a few beech trees at Puketitiri and recently has been found in Boundary Stream Scenic Reserve. The red beech mistletoe, *Peraxilla tetrapetala* is known from beech forests just outside the Maungaharuru Ecological District, on Blackbirch Range in Kaweka Forest Park. Druce (1971), records the minute mistletoe *Korthasella lindsayi* from the Maungaharuru Ecological District, but this survey failed to find it.

Dactylanthus taylorii was recorded historically from Balls Clearing Scenic Reserve and Hutchinson Scenic Reserve. Despite searching, this plant has not been rediscovered either within the reserves, or in other areas in the Maungaharuru Ecological District. However, it has been found recently just south of the ecological district and may well turn up in the ecological district.

Kakabeak was a common vegetation component of the northern Maungaharuru Ecological District prior to European settlement. Guthrie-Smith (1953) mentions "*Cliantbus puniceus* - brilliant in its bright scarlet racemes and at one period, until eaten out by cattle, growing in great quantities on Heru-o-Tureia and much more rarely on Awa-o-totara". Today, one natural plant of kakabeak is known from the Hawke's Bay Conservancy and another is recorded from nearby Te Heru o Tureia Conservation Area, in East Coast Conservancy. These are the only two extant records in the Maungaharuru Ecological District for this once wide-spread plant. A number of RAPs and sites in the northern and eastern part of the ecological district have suitable habitat for this plant and it may yet be found there. At one site, the landowner mentioned having recently seen one on his place, but despite extensive searching, none were found.

Pomaderris ericifolia is common in some other parts of the North Island, but in the Maungaharuru Ecological District, it has a sporadic distribution, occurring on road cuttings and shrublands in the drier north-eastern portion of the ecological district. The ferns *Ophioglossum coriaceum* and *Pleurosorus rutifolius* have been recorded in the Maungaharuru Ecological District, around Kaweka Lakes. Again despite searching, neither of these species were recorded. *Pleurosorus rutifolius* has recently been found near Eskdale, so it is likely that, with more searching, it will be found on outcrops in the Maungaharuru Ecological District.

Teucrium parvifolium and *Olearia bectorii* are shrubs which look superficially like a coprosma. They have been found in this ecological district, at Balls Clearing Scenic Reserve, but their continued presence could not be substantiated on this survey.

Asplenium richardii was recorded from one site near Puketitiri. This fern is common throughout montane regions of South Island, but has an unusual

distribution in North Island, being recorded "only from Mount Ruapehu, the Kaimanawa Mountains and the Raukumara Ranges in the North Island" (Brownsey & Smith-Dodsworth, 1989). The Maungaharuru Ecological District is outside this plant's known distribution, but not by so much that the record seems questionable. Kiekie and nikau occur throughout the west coast of New Zealand, as far south as Greymouth, but on the east coast, they have a disjunct distribution. They are found from East Cape southwards through to Maungaharuru Ecological District, where they are only found sporadically and a southern limit occurs. They are then found locally in the Wairarapa (on limestone around Akitio and in the Whangaehu Valley), around Wellington and at Kaikoura and on Banks Peninsula. This distribution may be climate related, as all of these sites have a higher rainfall than surrounding areas.

A number of plant species have a disjunct distribution, occurring on the Maungaharuru Range, and other higher-altitude areas of the North Island. *Pimelea aridula*. (var. 'drooping' Maungaharuru Range) is one of these (Colin Ogle - pers. Com). Other forms of it occur on Te Mata Peak, on the Central Volcanic Plateau, at Titahi Bay (near Wellington) and throughout the South Island. *Myosotis saxosa* and *Coprosma* sp. aff. *cheesemanti* occur on the Maungaharuru Range, in the cloud cap ecological system.

Potential weed problems in the Maungaharuru Ecological District

Blackberry is becoming troublesome in sites, where the influence of goats allows it to continue to flourish. When goats have been removed from a site, blackberry adopts a seral phase and is eventually replaced by native species. Blackberry is prevalent in many of the sites adjoining pine forests where goat control has been minimal.

Gorse is a second class noxious weed in New Zealand. It is not considered a serious threat to the ecology of forested areas, as it is generally over-topped by native species and then dies out. In wetlands, gorse can be more of a problem, as it may alter the succession and nutrient balance of the wetland.

Of a more serious threat to forested sites, in that it can grow under a closed canopy, is elderberry. This plant produces juicy fruits which are devoured by birds, further dispersing the seeds. Elderberry was noted in a site near Te Pohue.

Another plant which poses a threat in forested areas is wandering jew. This plant readily forms a thick ground cover, which smothers seedlings and other ground-cover plants. In the Manawatu Ecological Region, it has spread along streams from where people have dumped garden refuse and threatens a number of patches of bush (Ravine, 1995 - in press). A small colony of wandering jew was noted in a site on Mangatutu Stream.

Cobblers Pegs is prevalent in most of the forested areas left in the Maungaharuru Midland System. This plant's hooked seeds snag the fur of introduced mammals, and are spread from one site to another. It thrives in the understorey and its presence indicates that some component of the native flora has been reduced to the point where it cannot effectively compete. Animal browse is probably the cause of this and where introduced mammals continue to gain access, this plant will continue to be a problem.

Mouse Ear Hawkweed (*Hieracium pilosella*) is common in the tussocklands of the Maungaharuru Cloud Cap Ecological System. This plant has the potential to be a serious problem as it forms extensive swards, which few other species (including pasture grasses) can compete with. The plant has been given an advantage through a number of management practices. Firstly, goats, sheep, fire and wind erosion

remove the surface vegetation from the soil, providing the ideal niche for this plant to take hold in. The plant's flattened rosettes grow close to the soil, smothering out other vegetation and spreading quickly via axillary rosettes. The flattened rosettes, being close to the soil, are reasonably fire resistant, so when fire is used as a management tool to provide a flush of new growth on the tussocks and other herbs, the undamaged hawkweed is further advantaged. Preliminary investigations throughout Otago (Hunter *et al*, 1990), suggest the best way to control this species is by destocking, allowing the tussock canopy to redevelop and not burning tussocklands.

In a number of ephemeral wetlands on the top and along the western side of the Maungaharuru Range, the sedge *Carex ovalis* has invaded and is competing with the natural wetland vegetation (Colin Ogle, pers com). This plant, in conjunction with browse from cattle, is modifying and reducing the natural values of these areas. *Juncus effusus* was also noted in a number of lowland wetland sites. This plant has similar requirements to the native *Juncus gregiflorus* and has competed with and out-performed it in many parts of the country.

Heather (*Calluna vulgaris*) has colonised most of the Tongariro and Taupo Region further to the west, but appears not yet to have reached the tephra soils of the Maungaharuru Ecological District. The similarity of the tussocklands in the Cloud Cap Ecological System to the Rangitaiki Plateau, would suggest that this plant would thrive here. This plant's arrival in these tussocklands could spell disaster for the natural communities there. Heather's resistance to methods of control would suggest that pasture in the vicinity of the tussocklands would be threatened too.

FAUNA

We can only speculate about how rich and varied the fauna was prior to the arrival of people in this country. The only mammals present were three species of bat and the other fauna here (insects, snails, lizards, fish, reptiles and birds etc) were evolving (and had evolved) to fill the niches normally taken by mammals everywhere else. The bush birds present today would have existed with species now extinct from the district such as, kokako, stitchbird, saddleback and kakapo. Extinct birds such as huia, laughing owl and moas, would have lived here too and tuatara may well have hunted the rocky faces and bluffs of the Maungaharuru Range, on cloudy nights.

When people arrived, they brought kiore and kuri with them, as food sources. The kiore quickly took advantage of the ineffectively filled niches and made a healthy existence on the variety of insects, birds eggs and chicks, flowers and fruits present in the forests. Subjective evidence from the few islands which are free of kiore (Towns, Daugherty & Atkinson, 1990), suggests that the mainland would have had 'eccentric' insects, as unusual in their own right as the kakapo. These are now gone. The Maori name, "Maungaharuru" translates as "rumbling or noisy mountain", which apparently refers to the area noisy with the flight of birds. When the Maori people arrived here, the birdlife in the Maungaharuru Ecological District would have been plentiful, and a welcome supplementary food source.

The competition and predation kiore posed was limited, when compared with that of the efficient predators that arrived with the next wave of human migration. The animals Europeans brought had evolved in a much more competitive regime and were more efficient hunters than kiore. Although a few introductions were successful, those that were (such as stoats, possums and goats) didn't have any

difficulty adapting to the New Zealand environment. Norway rats and ship rats were accidental introductions and due to their extreme efficiency have successfully colonised here. These successful introductions have further decimated the bird, reptile and invertebrate populations.

In the Maungaharuru Ecological District today, many of the smaller bush birds are still common. These include bellbird, grey warbler, fantail, tomtit, silvereye, whitehead, and tui. Kereru were recorded during the survey from areas of tawa and titoki broad-leaved forests and in the podocarp forests of Balls Clearing and Hutchinson Scenic Reserves. In the beech forests throughout the district, North Island rifleman were common and around Kuripapango, North Island robin was noted. Long-tailed cuckoo were heard in one site on the Maungaharuru Range and shining cuckoo were recorded from many sites from November through to March. North Island kaka and North Island brown kiwi are also present within the Maungaharuru Ecological District, however, none were noted during this survey. New Zealand falcon have also been reported to inhabit the outcrops and bluffs along the Maungaharuru Range, but none were seen on this survey. In scrublands and shrublands, New Zealand pipit and fernbird were noted and amongst pasture and in wetlands, spur-wing plover, pukeko and Australasian harrier hawk were common. Paradise shelduck and grey teal were noted on Morrison's Wetland and along stream sides, in a number of sites, kingfisher were noted. A morepork was noted at Ball's Clearing Scenic Reserve. Bats are common in some of the larger reserves (particularly Ball's Clearing and Hutchinson Scenic Reserves) and have also been recorded from other sites within the ecological district. On this survey, no further information on the distribution or presence of bat species within the Maungaharuru Ecological District, was gained other than that already gathered by the Department of Conservation (DoC) and Landcare Research.

The giant landsnail *Powelliphanta marchanti* is found in sub-alpine forest and shrublands on the Maungaharuru Range. Recent studies by DoC suggest that this population is healthy, though restricted to a small area of steep sideslope and bluffs on its western side. *Powelliphanta marchanti* has recently been recorded in the Kaweka Range, and is also known of from the Ruahine Range, the Kaimanawa range, near Lake Waikaremoana, inland from Waitotara and Mount Egmont. The population on the Maungaharuru Range is the furthest-east extant population of this species of landsnail.

A Black flounder was noted in Mangatutu Stream, a Tributary of the Tutaekuri River. This is one of the furthest-inland records for this species. Long-finned eels, redfinned bullies and cockabullies were noted in the streams throughout the district too.

A number of common gecko (*Hoplodactylus maculatus*), were noted in one site in the south of the district and are reported to be plentiful around Kuripapango. In a number of sites, the introduced golden bell frog (*Littoria raniformis*) was noted too. Introduced pest species are also common in many areas of natural vegetation in the Maungaharuru Ecological District. Goats are plentiful along the Maungaharuru Range and possums are common in most sites visited. Stoats increase in prevalence during spring and cats, sika and red deer were also noted in some sites. Evidence of pigs was noted in many sites in the north of the ecological district and it is highly likely that rats, ferrets, weasels and hedgehogs are present in most sites visited too.

Methods

FAMILIARISATION

The first step in familiarisation for the Maungaharuru Ecological District PNAP survey was the sourcing of reading material on the ecological district. This included SSWI¹, WERI², the Hawke's Bay Conservation Management Strategy and Stage One PNAP Survey for the Maungaharuru Ecological District (Fromont & Walls, 1988). The next step was to determine the ecological district boundaries and potential sites, and collate them onto NZMS 260 series topographical maps. Any further potential sites were also identified on the maps at this stage. Discussions with staff in the DoC field centres were undertaken to pin-point any further sites they considered worthy of surveying.

The next step in the process was to visit the existing Protected Natural Areas (PNAs) in the ecological district. Brief notes on flora and fauna were made, as these helped in familiarisation with the district.

Priorities for the selection of sites were those with areas greater than 5ha. Occasionally, sites less than this size were surveyed if time allowed, or if they were of outstanding natural value.

FIELD SURVEY

Surveying the sites found, and assessing them for vegetation and landform, commenced approximately one week into the PNAP survey. All sites were visited on foot or by vehicle, except for three sites, where permission was not granted. Information on one of these was obtained from existing files and the others were extrapolated from surrounding sites.

In all cases where surveys were carried out, approvals were first obtained from the land-owners. In most cases, land-owners were enthusiastic for the survey to be undertaken and were interested to know more about their piece of bush. One or two were a little suspicious of DoC and the way the information may be used in the future.

Once a site had been reached, a walk-through survey was carried out and a survey form completed. A copy of the form used in Hawke's Bay Conservancy is given in Appendix 5. A species list was compiled for both animals and plants which were seen in the site. This provided a subjective estimate of the diversity in each site.

The frequency of plant species was also estimated subjectively and from this, the vegetation patterns of the site were determined. When the cover of a particular species was estimated to be greater than twenty percent, it was considered to be a "dominant" vegetation feature. The occurrence of a plant with a cover between ten and twenty percent was considered to be "present in significant cover percentages" or "at significant proportions" and was signified by brackets in the Ecological Units category. Some plants were "noted" or "occasional"; these were estimated to have a cover lower than ten percent, and did not form part of the "ecological unit" title.

1 Sites of Special Wildlife Interest. (See Appendix 9)

2 Wetlands of Ecological and Representative Importance (See Appendix 9)

These were only mentioned in the text if they were considered to be in some way important to the site. Transects through pieces of natural vegetation were carried out on earlier surveys, which allowed a reasonable degree of accuracy in these estimates. On the species list sheet (see Appendix 5), information was recorded in "height tiers", as this gave a measure of vegetation structure of a site and therefore, the effect introduced animals or other threats were having. These height tiers were recorded as: emergent, canopy, tree, shrub, and herb, and are a modification of the system used on the standard PNAP survey form. This modification allows the height to be changed to suit the vegetation being surveyed. For example, when surveying a tussock grassland, emergent may be everything above 1.3 metres high and a canopy will occur at this height, with the other tiers below this being assigned to "tree", "shrub" and "ground-cover", if they were appropriate. When surveying forested areas, the default values on the PNAP survey form were followed: "Emergent" was the category used for species which emerged through a canopy and referred to the height tier higher than 12 metres high. "Canopy" was the major class of vegetation open to the sky and was usually assigned to the height tier of 5 metres to 12 metres above the ground. "Sub-canopy" referred to the vegetation in the height tier from 2 metres to 5 metres above the ground and "Shrub" was the title given to the plants within the height class from 30 cm to 2 metres above the ground. "Ground-cover" was the title given to plants under thirty centimetres.

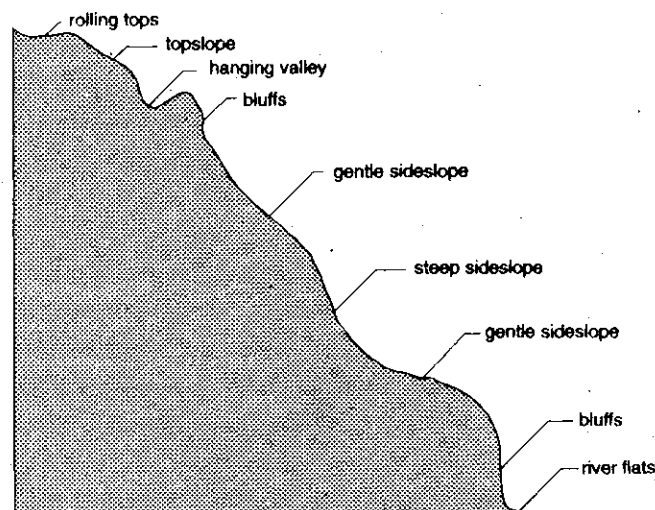
The "ecological units" category follows the format of Myers *et al* (1987), where height tiers were separated by "/" and a number of co-dominant species were linked by "-".

The vegetation was then described in terms of its type, whether a herbfield, fellfield, tussockland, scrubland, shrubland, treeland, forest, or emergent forest. These vegetation types were defined in Myers *et al* (1987) and Atkinson (1985), except that they had further separated forests based on their heights as well. For the Maungaharuru Ecological District, this distinction was not particularly useful. The definition of "fellfield" has been used in this report to describe a herbfield strewn with rocks and boulders. Fellfields are a feature of the sideslopes below the bluffs on the western side of the Maungaharuru Range.

The landforms and topography were then briefly described, using the terminology developed by Whitehouse *et al* (1990), where the terms footslope, sideslope, bluffs, topslope, rolling tops, spur, gully, terrace tread and terrace riser were used. Figure 2 shows typical landforms in the Maungaharuru Ecological District. A number of modifications were made to tailor the landform descriptions to the Maungaharuru Ecological District. The major ones were: a subdivision of sideslopes, based upon their steepness; where those under 30° were classed as gentle, while those over 30° were steep and bluffs were sideslopes over 70°. Another variation was the use of the term "hanging valley", which is usually associated with glacial landscapes. In such a landscape, a glacier carves out the main valley at a rate greater than a side-valley keeps up with, so that the side-valley exit ends up part way up the sideslope of the main valley. In the Maungaharuru Ecological District, "hanging valley" was used to describe unusual, broad, flat valleys found on the top, or part-way up the side of the Maungaharuru Range, which superficially looked like a glacial hanging valley. These appear to be a product of a karst landscape, where limestone gullies have been dissolved by water (rather than being carved by ice) and have then been filled up with pumice and tephra. Slumping is probably another formative mechanism. A further landform variation was added for one RAP, which appeared to be a cave which had eroded to the point that the roof had collapsed. This was termed a

"limestone gorge". The last modification was the distinction of a gully head, at the top of a gully. This area often had different vegetation from the gully, and so warranted its own category.

FIGURE 2 : PROFILE OF A HYPOTHETICAL MOUNTAIN-SIDE IN THE MAUNGAHARURU ECOLOGICAL DISTRICT.



The next part of the site appraisal, was to assess any obvious threats which may have been modifying the site. These were then briefly described and ranked as: negligible, low, medium or high. Also the time period in which the threat was acting was noted, that is, whether the threat was a past phenomenon, a present modifier, or a likely future problem. For a list of these threats, see the survey form in Appendix 5.

For the field appraisal of the site, the categories of "representativeness", "diversity", "special features", "naturalness", "viability", "size and shape", "buffering and surrounds" and "fragility and threat" were ranked from low to medium or high. Added to this was an estimate of the significance of the site, that is: whether it was estimated to be significant at the local, ecological district, regional, or national level. The category of **representativeness** was the most important, as it summarised the overall values of the site. Sites which gained a "high" representative ranking had: a large overall area, were markedly reduced from their former extent and were poorly represented in existing PNAs. **Diversity** was a measure of the number of species in a site. This was estimated from the species list form (sheet 1a of the Hawke's Bay PNAP survey form, Appendix 5). The **Special features** category was used as a measure of the abundance of animals, plants or landforms which were considered rare or unusual in the ecological district. **Naturalness** is a measure of how closely the site reflects its former state, or more accurately, as all natural areas now have a low naturalness when compared to their former states, how it compares with other sites in the ecological district. **Viability** was a measure of the likelihood of the site remaining without the use of any management practices to assist it to do so. **Size and shape** were important factors with respect to the site's diversity and viability. The larger the site and the closer to circular in shape it is, the less likely it is to be invaded by weeds and the greater its expected diversity is likely to be. This is due to the ratios of "circumference of the site to area" and "size of the site to the number of habitats available". **Buffering** is a measure of the protection the site offers to its vulnerable ecological units. A buffer may be a margin of pasture inside a fence, a shrubland surrounding a site, or even a planted shelter-belt. **Fragility and threat** were a measure of the site sensitivity to the changes occurring throughout it. All sites

are sensitive to and continually adjusting to change, making this difficult to assess. Fragility was defined as a measure of the unnatural changes occurring in a site. Once all the sites had been surveyed, these assessments were then revised.

A brief note was made on the landowners attitude towards having their bush visited, and the potential for protection of the site, if it was known. As a rule, most landowners were very helpful and interested in protecting their piece of bush. Most also wanted to know what was of interest in their bush. General comments and recommendations were then made and photographs were sometimes taken.

EVALUATION

The evaluation of the sites began with the categorising of the existing PNAs into a summarising table showing their vegetation, landforms and where they were (see Appendix 3). A second table (Appendix 8) of ecological units (vegetation types and landforms), was then drawn up from the information gathered during survey of the sites and these two tables were compared. It was discovered that the PNAs did not adequately cover the range of ecological units in the district and this was the first criterion for the selection of RAPs. Additional RAPs were then chosen for their high quality using the selection criteria in Myers *et al* (1987).

Table 1 (following pages) is a summary of Appendices 3 and 8 and shows all the sites surveyed, including RAPs and existing PNAs. The limited number of vegetation types tended to clump sites into the same category during this simplification. This is one of the reasons some RAPs and PNAs occur in the same box in this table. The more detailed version of the table used for this selection is shown in Appendix 8. This is the same method used by Lee (1994) and Maxwell, Adams & Walls (1993) for the selection of their RAPs, although this table has more detail than they used. Don Ravine (pers com), also used a similar method for the selection of RAPs in the Manawatu Ecological Region.

Using this system, a total of 33 RAPs were selected, which covered fifteen vegetation types and twelve landforms. Most RAPs contained more than one vegetation type, a number of landforms, and in a few cases, other ecological units occurred as well. These were generally small or poor quality and were insufficient to be included as ecological units.

All sites, not just RAPs, have natural values and are significant at some level. The scale of this significance depends upon what is left within an ecological district. The Protected Natural Areas Programme highlights the best of these sites. With limited funding for protection, prioritisation is needed so that the best sites become protected first if possible. Figure 3 shows a map of the ecological district with the location of the 33 RAPs in the Maungaharuru Ecological District, and Table 2 lists those RAPs. On the pages following Table 2 are plans and brief summaries of the ecological units, vegetation, landforms, threats and significant features of the sites recommended for protection in the Maungaharuru Ecological District.

TABLE 1: ECOLOGICAL UNITS AND SITES REPRESENTED IN THE MANGAHARURU ECOLOGICAL DISTRICT.

VEGETATION TYPE	ROLLING DOWNS	BLUFF	TOPSLOPE	STEEP SIDESLOPE	GENTLE SIDESLOPE	SPUR	GULLY	RIVER FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCK	LAKE MARGIN
Kauka 2° Vegetation			U20.06 V20.33 V20.36 80021 80025 80026 80077 Cons Cov QEH 8/3	U20.07 V19.03 V19.05 V19.08 V19.18 V20.05 V20.06 V20.07 V20.10 V20.13 V20.17 V20.19 V20.20 V20.27 V20.28 V20.29 V20.33 V20.37 V20.40 V20.46 V20.52 V20.53 V20.54 V21.02 W19.01 W19.04 80018 80019 80021 80022 80026 80028 80030 80077 80083 80189 80193 80206 80218 Cons Cov 8 QEH 8/3	U20.06 U21.02 V19.05 V19.09 V19.18 V20.03 V20.12 V20.17 V20.27 V20.30 V20.33 V20.36 V20.46 V20.52 V20.56 80021 80022 80026 80028 80030 80070 80077 80189 80193 80218 Cons Cov 8 Cons Cov 10	W19.01 V21.02 V20.03 U20.06 V20.28 V20.33 V20.39 V20.54 80021 80030 QEH 8/3	U21.02 V20.03 V20.06 V20.28 V20.37 V21.02 W19.01 W19.04 80018 80021 80030 80083 80206 Cons Cov 8	V20.07 80018 80073 80193 80218	V20.56			
				V20.53A U21.01 80167 80196		U21.01	V20.53A U21.01	80196				
				V19.06 V19.07 V20.26 V20.36 80021 Cons Cov 12 QEH 12 PNA 029	V19.14 V19.19 80021 PNA 029 Cons Cov 10				V20.13 V20.52			
				V19.08 V20.01 V20.02 V20.13 V20.16 V20.17 V20.18 V20.36B 80022 PNA 029	V19.06 V20.01 V20.02 V20.09 V19.19 V20.12 V20.16 V20.36B V20.52 80022 CMS 8 PNA 029		V19.06 V20.17 CMS 8		V20.13 PNA 029			
				U21.04 V19.01 V19.02 V19.09 V19.10 V19.12 V20.05 V20.07 V20.14 V20.24 V20.27 V20.38 V20.39 V20.41 V20.46 V20.54 V21.01 80073	U20.06 V19.01 V19.03 V19.09 V19.12 V19.16 V20.27 V20.30 V20.31 V20.46 V20.54 80027 80073 80167 QEH 5/5/26	V19.02 V19.09 V19.10 V20.31	U20.06 V19.01 V19.02 V19.09 V20.14 V20.27 V20.29 V20.31 V20.33 V20.46 V20.49 V20.54 80021 80027 QEH 5/5/26	80167				
2° Forest		V19.10 V20.33 U21.04										

Note: PNAs are referenced to the Conservation Management Strategy (e.g. 80021 is the CMS reference for the Kauka Forest Park) and sites are referenced to the survey forms. RAPs and PNAs are shown in bold lettering.

TABLE 1 (CONT.) : ECOLOGICAL UNITS AND SITES REPRESENTED IN THE MAUNGAHARURU ECOLOGICAL DISTRICT.

VEGETATION TYPE	ROLLING DOWNS	BLUFF	TOPSLOPE	STEEP SIDESLOPE	GENTLE SIDESLOPE	SPUR	GULLY	RIVER FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCK	LAKE MARGIN
Broad leaved Forest		V19.15 V20.32 V20.39 V20.45	V19.16	V19.03 V19.10 V19.15 V19.16 V19.18 V20.05 V20.10 V20.32 V20.38 V20.39 V20.40 V20.43 V20.45 U21.04 80026 80028 QEII 5/5/55 QEII 5/5/15	V19.03 V19.10 V19.15 V19.16 V19.18 V20.04 V20.28 V20.43 W19.04 80026 80028 80070 80027 QEII 5/5/3 QEII 5/5/15	V19.10 W19.02 80028 80070 QEII 5/5/3	V19.10 V19.16 V20.04 V20.07 W19.02 W19.04 80026 80028 QEII 5/5/3 QEII 5/5/15	V20.28 V20.38 V20.43 V20.41 V20.40		V20.32		
Beech Forest			80022 80028	V19.06 V19.08 V20.22 V20.36 V20.53 80021 80022 80026 80028 Cashes Bush PNA 029	V19.04 V19.06 V19.07 V20.12 V20.22 V20.36 80021 80026 80028 Cashes Bush Cons Cov 10 Cons Cov 11 PNA 029 QEII 8/3	V19.04 V19.06 V19.16 V20.22 80021 80022 80026 80028 ConsCov 11	U20.07 V19.04 V19.06 V19.07 V19.08 V20.49 V20.53 80021 80028 Cashes Bush Cons Cov 10 Cons Cov 11 QEII 8/3					
Podocarp Forest	Little Bush 80071 80074	V20.26		V20.10 V20.11 V20.14 V20.17 V20.24 V20.26 V20.36A V20.37 V20.49 W19.06	V20.18 V20.19 V20.21 V20.22 V20.23 V20.26 V20.27 V20.36A V20.36B V20.49 V20.55 W19.05 W19.06 Cons Cov 8 Cons Cov 10 Little Bush QEII 8/3	W19.05	V20.14 V20.17 V20.18 V20.23 V20.26 V20.36A V20.37 V20.55 W19.05 W19.06 Cons Cov 8 QEII 8/3	V20.50 V20.19 V20.28 V20.46	V20.36B			
Treeland	V20.23			V19.17 V20.20 80191 PNA 029	V19.12 V19.17 V20.01 V20.11 V20.20 V20.22 V20.23 V20.36 V20.44 V20.57 80191		V20.48 V20.56					
Wetland Tussockland					V19.12 V19.14 V20.21 V20.31 V20.46 V20.53A		U20.09 V19.09 V19.16 W19.03 80027		V19.16			80019 80021 80027
Alpine Tussockland			V20.51	V20.51					V20.52		V20.52	

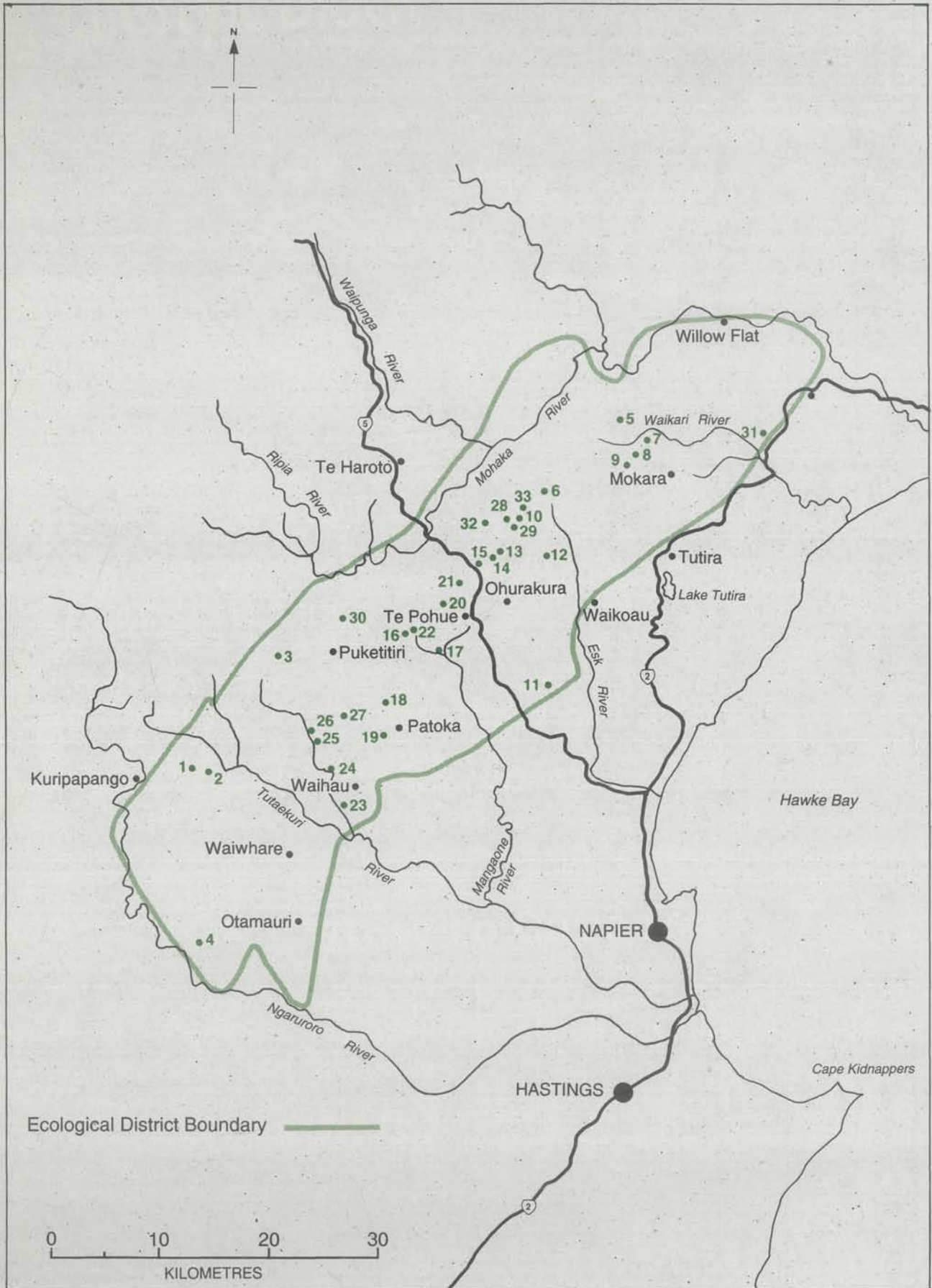
Note: PNAs are referenced to the Conservation Management Strategy (e.g. 80021 is the CMS reference for the Kaueka Forest Park) and sites are referenced to the survey forms. RAPs and PNAs are shown in bold lettering.

TABLE 1 (CONT): ECOLOGICAL UNITS AND SITES REPRESENTED IN THE MAUNGABARURU ECOLOGICAL DISTRICT.

VEGETATION TYPE	ROLLING DOWNS	BLUFF	TOPSLOPE	STEEP SIDESLOPE	GENTLE SIDESLOPE	SPUR	GULLY	RIVER FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCK	LAKE MARGIN
Fernland		V19.03 V20.05 V20.07										
		V19.09 V20.40 W19.04										
Herbfield			PNA 029	V19.14 V20.22 PNA 029	V19.19						V20.51	

Note: PNAs are referenced to the Conservation Management Strategy (e.g. 80021 is the CMS reference for Ibe Kauwaka Forest Park) and sites are referenced to the survey forms. RAPs and PNAs are shown in bold lettering.

FIGURE 3 : LOCATION MAP FOR THE MAUNGAHARURU ECOLOGICAL DISTRICT, AND ITS RAPS.

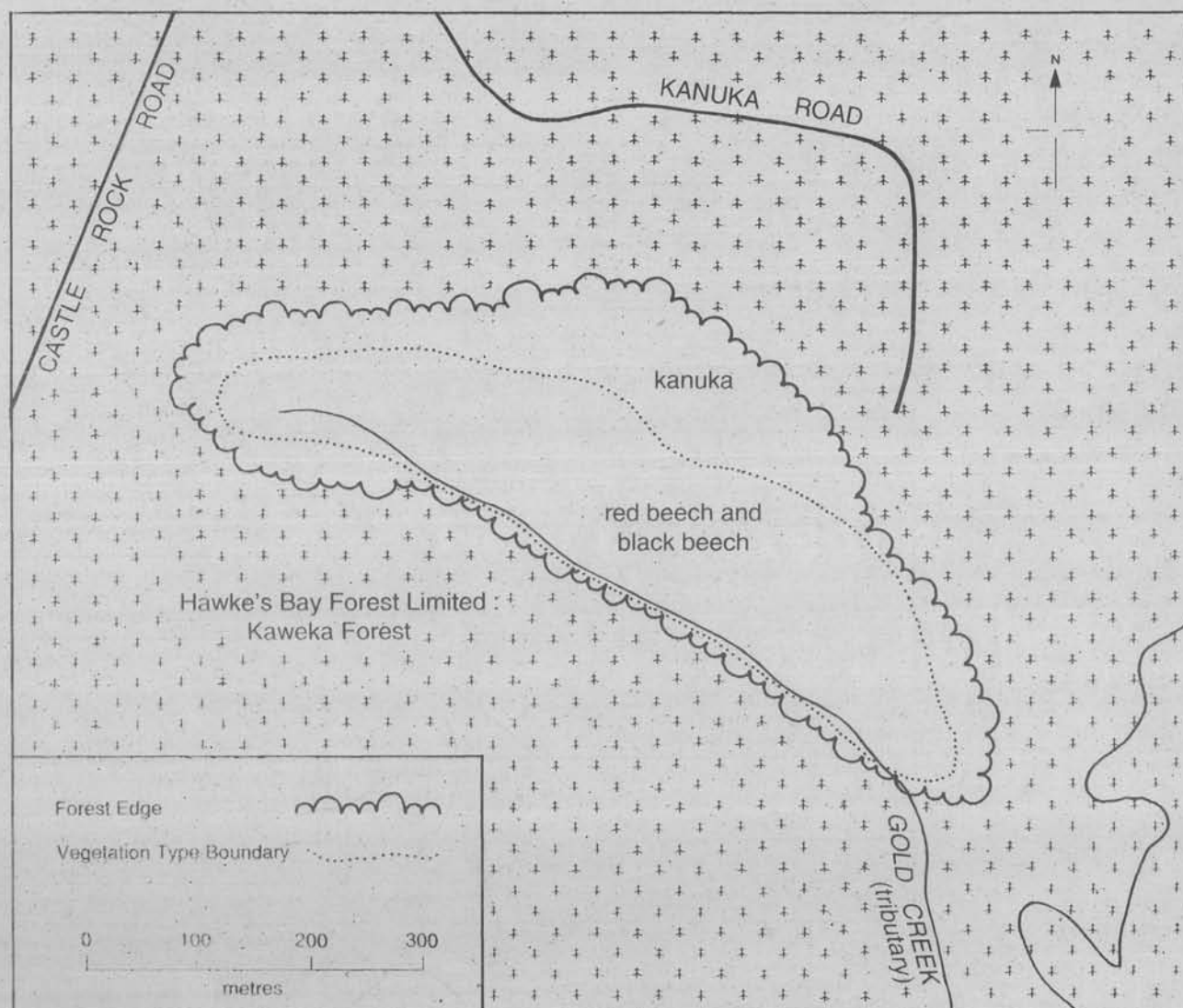
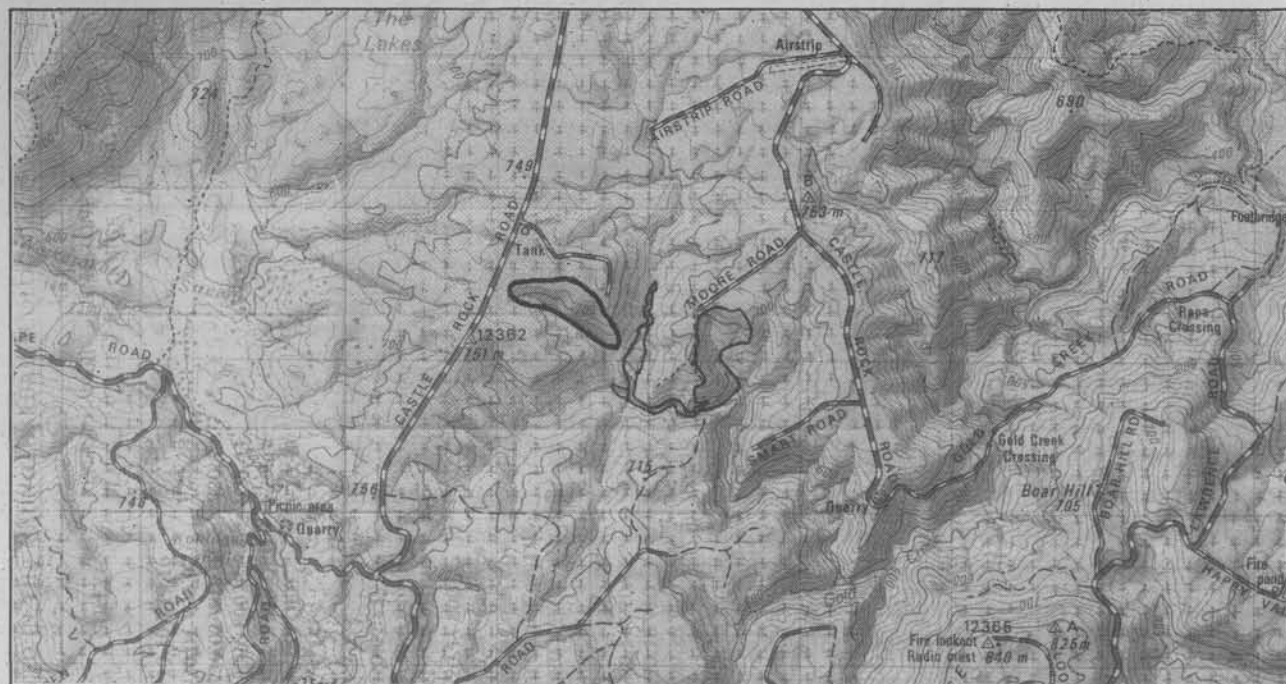


Recommended Areas for Protection

TABLE 2: LIST OF AREAS RECOMMENDED FOR PROTECTION IN THE MAUNGAHARURU ECOLOGICAL DISTRICT

RAP	NAME	SITE	GRID REFERENCE
1	Castle Rock Road Bush	U20.07	NZMS 260 U20 015975
2	Moore Road Bush	U20.08	NZMS 260 U20 024972
3	Whittle Road Wetland	U20.09	NZMS 260 U20 099075
4	Mangarakau Stream Bush	U21.01	NZMS 260 U21 013817
5	Heay's Bush	V19.03	NZMS 260 V19 420285
6	Toronui Bush	V19.08	NZMS 260 V19 342220
7	Rangiora Station Bush	V19.10	NZMS 260 V19 440260
8	Rangiora Station Treeland	V19.12	NZMS 260 V19 430247
9	Maori Stream Bush	V19.16	NZMS 260 V19 420235
10	Rimu Station Bush	V20.02	NZMS 260 V20 325199
11	Otakowhai Stream Bush	V20.07	NZMS 260 V20 344045
12	Manganui Bush II	V20.10	NZMS 260 V20 337164
13	Titiokura Shrubland	V20.13	NZMS 260 V20 310164
14	Titiokura Bush I	V20.16	NZMS 260 V20 298163
15	Titiokura Bush II	V20.18	NZMS 260 V20 285155
16	Carswell Bush	V20.26	NZMS 260 V20 217100
17	Mangaone Stream Bush	V20.28	NZMS 260 V20 266060
18	Opau Stream Bush II	V20.31	NZMS 260 V20 194035
19	The Gorges Bush	V20.32	NZMS 260 V20 190010
20	Te Waka Bush I	V20.36	NZMS 260 V20 250120
21	Te Pohue Bush	V20.36A	NZMS 260 V20 270135
22	Te Waka Bush II	V20.36B	NZMS 260 V20 222109
23	Mangatutu Stream Bush	V20.39	NZMS 260 V20 154933
24	Gorge Stream Bush I	V20.40	NZMS 260 V20 140950
25	Gorge Stream Bush II	V20.41	NZMS 260 V20 125996
26	Te Kowhai Bush	V20.43	NZMS 260 V20 121012
27	Maniaroa Bush	V20.46	NZMS 260 V20 164040
28	Rimu Station Herbfield	V20.51	NZMS 260 V20 315196
29	Rimu Station Tussockland	V20.52	NZMS 260 V20 323193
30	Hukanui Bush	V20.54	NZMS 260 V20 155109
31	Lower Anaura Stream Bush	W19.04	NZMS 260 W19 555265
32	Waitara Station Bush	V20.11	NZMS 260 V20 295198
33	Ahuateatua	V19.19	NZMS 260 V19 332204

RAP 1: CASTLE ROCK ROAD BUSH



RAP 1 : CASTLE ROCK ROAD BUSH

Survey Form: U20.07
Grid Reference: NZMS 260 U20 015 975
Area: 18ha
Altitude: 700m
Ecological System: 5

Ecological Units

1. 40% kanuka forest on gentle sideslope
2. 60% black beech - red beech/(red beech) - (black beech) forest on gentle sideslope and gully

Landform

This site is on a moderately steep sideslope, with a gully below it.

Vegetation

On the sideslope, a closed forest with a canopy dominated by kanuka is found. The understorey is formed from very dense mingimingi (*Leucopogon fasciculatus*) shrubs. Also noted in this unit were the shrub-daisies, *Olearia furfuracea* and *Olearia nummulariifolia*. The shrub tier is so dense, that the ground-cover is mostly leaf litter, with occasional ferns (*Blechnum fluviatile*) scattered throughout it.

On the sideslopes around the gully, a tall closed forest with a canopy dominated by red and black beech is found. The understorey in this unit is mostly scattered mingimingi (*Leucopogon fasciculatus*), crown fern and leaf-litter. In the gully, a greater diversity of ground-cover species is found. These are the ferns *Blechnum procerum*, *Blechnum fluviatile* and crown fern, amongst seedlings of *Coprosma rhamnoides*, *Coprosma tenuifolia* and kanono. The filmy fern *Hymenophyllum sanguinolentum* also forms carpets on the edges of stream-banks in this unit. The orchids *Gastrodia sesamoides*, spider orchid and *Pterostylus* sp. were noted from here.

Fauna

Evidence of possums and deer was noted in this site. Goats may also be here too. Bird-life was diverse, with tomtit, north island robin, tui, whitehead, silvereye, grey warbler, fantail, rifleman, bellbird and blackbird being noted.

Modifiers/Threats

Disturbance through the harvesting of the adjacent pine trees is the major threat to this site.

Invasion of weeds (douglas fir) was noted in the margins of the site, in the kanuka unit.

Deer have opened up the understorey in the beech-unit.

Selection Criteria

Representativeness:	Medium
Diversity:	Medium
Special Features:	Medium
Naturalness:	High
Viability:	Medium-high
Size and shape:	Medium
Buffering:	High
Fragility and Threat:	Medium

Significance

The *Pterostylus* orchid, which has variegated leaves, may be a new record of a new species which has been found near Dannevirke.

This site is one of a number of islands of natural area amongst the CHH Forests' pine plantations. These areas interact with each other, and help to increase the diversity of the seral pine forests.

RAP 2 : MOORE ROAD BUSH

Survey Form: U20.08
Grid Reference: NZMS 260 U20 024 972
Area: 15ha
Altitude: 700m
Ecological System: 5

Ecological Units

beech forest on gully and gully-head

manuka - kanuka forest - shrubland on gully-head, gully, spur and sideslope.

Landform

A series of dissected gully-heads, gullies, sideslopes and spurs.

Vegetation

Tall, kanuka-dominated forest is the major vegetation over most of the site. On exposed spur crests, and dry sideslopes, this gives way to a manuka and mountain flax dominated shrubland. In gullies, fivefinger and mingimingi (*Leucopogon fasciculatus*) are present in great abundance. Under the kanuka canopy and on the steep sideslopes around the gully head, karamu, koromiko, *Gaultheria antipoda*, *Cyatodes juniperina* and mingimingi (*Leucopogon fasciculatus*) form a dense shrub tier under the kanuka.

In one south facing gully, a pocket of tall, closed black beech forest remains. The understorey in this unit is sparse, and formed from scattered mingimingi (*Leucopogon fasciculatus*).

Fauna

Sika deer were heard in this site, and evidence of possums was noted.

The site had a diverse birdlife, with tomtit, rifleman, fernbird, North Island robin, fantail, bellbird, tui, silver eye, grey warbler and chaffinch all being recorded.

Modifiers/Threats

There are no major existing threats to the viability of this site, although control of possums and deer would increase the natural values of the site.

The kanuka forests appear to be the product of regeneration after a relatively recent fire (~100 years ago), whereas the beech forest appears to have escaped this disturbance.

Selection Criteria

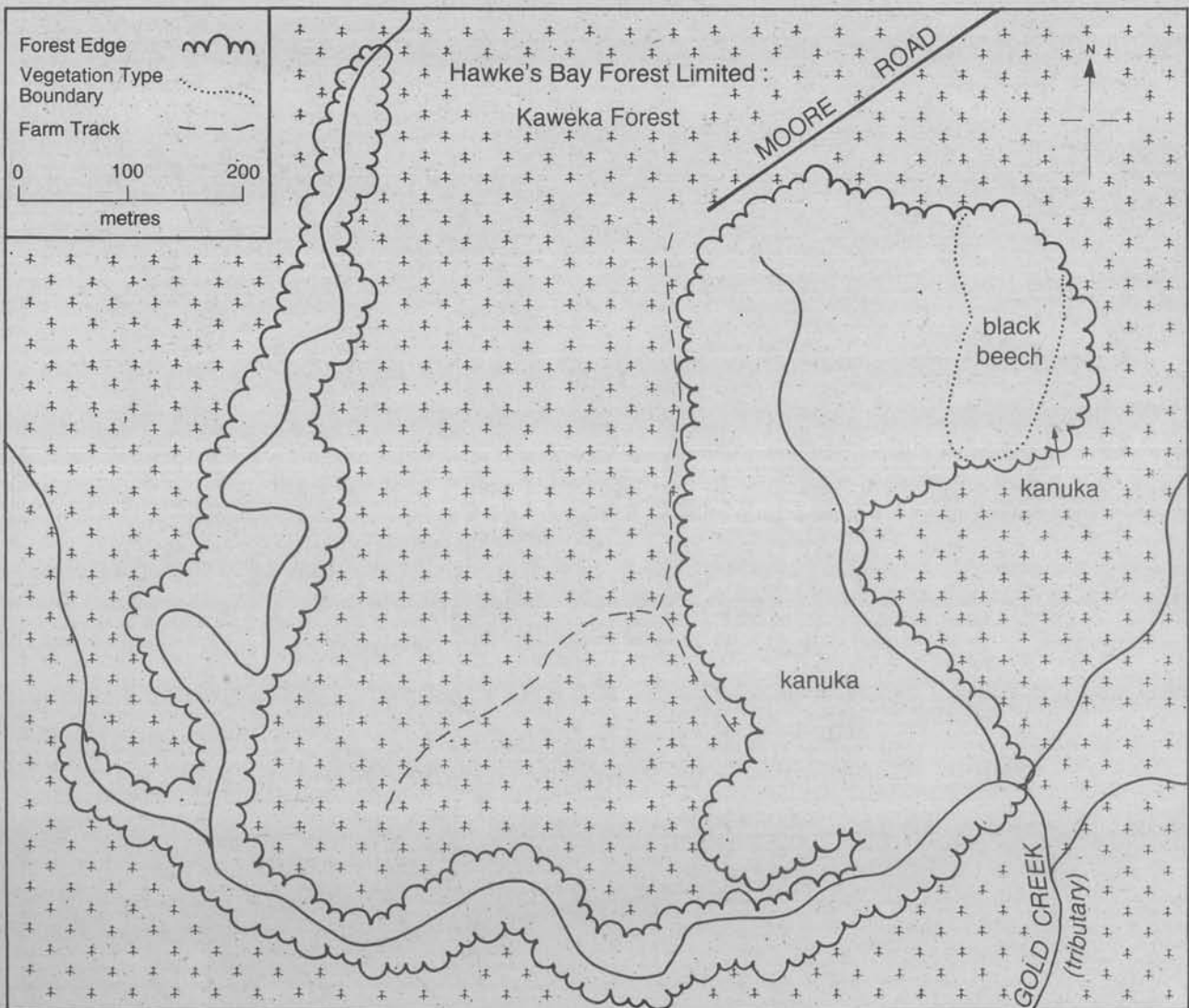
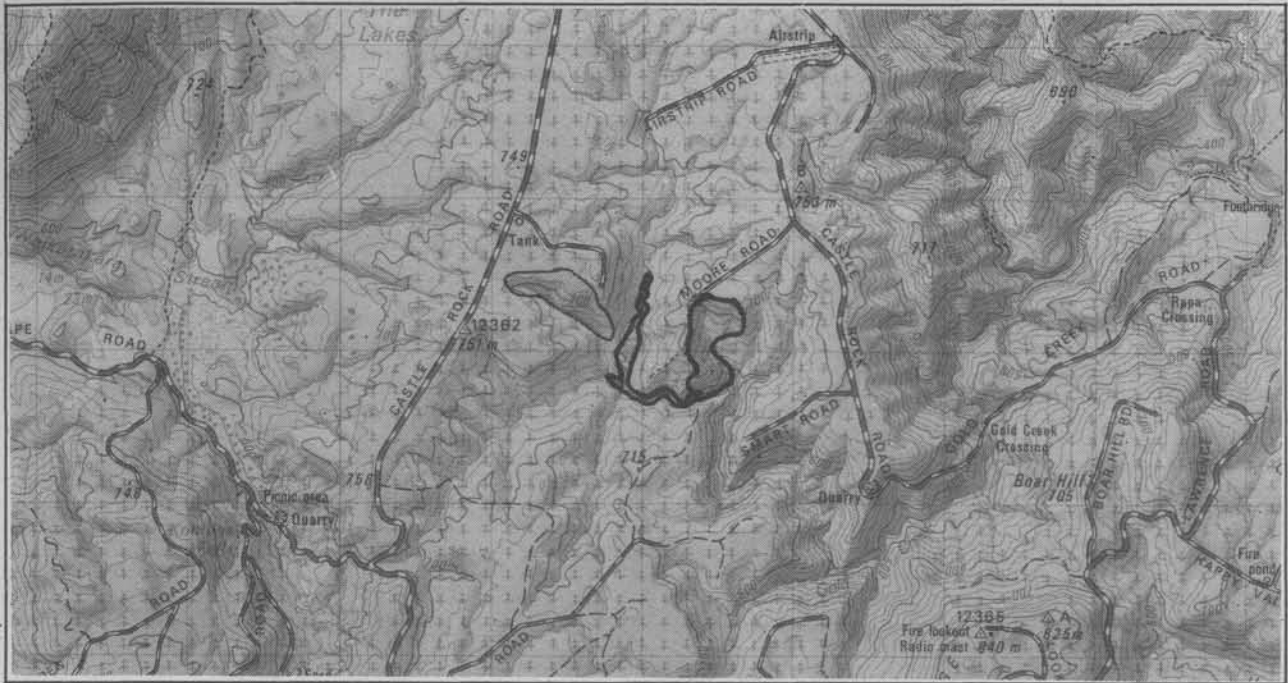
Representativeness:	Medium
Diversity:	High
Special Features:	Medium
Naturalness:	High
Viability:	High
Size and shape:	Medium
Buffering:	Medium
Fragility and Threat:	Medium

Significance

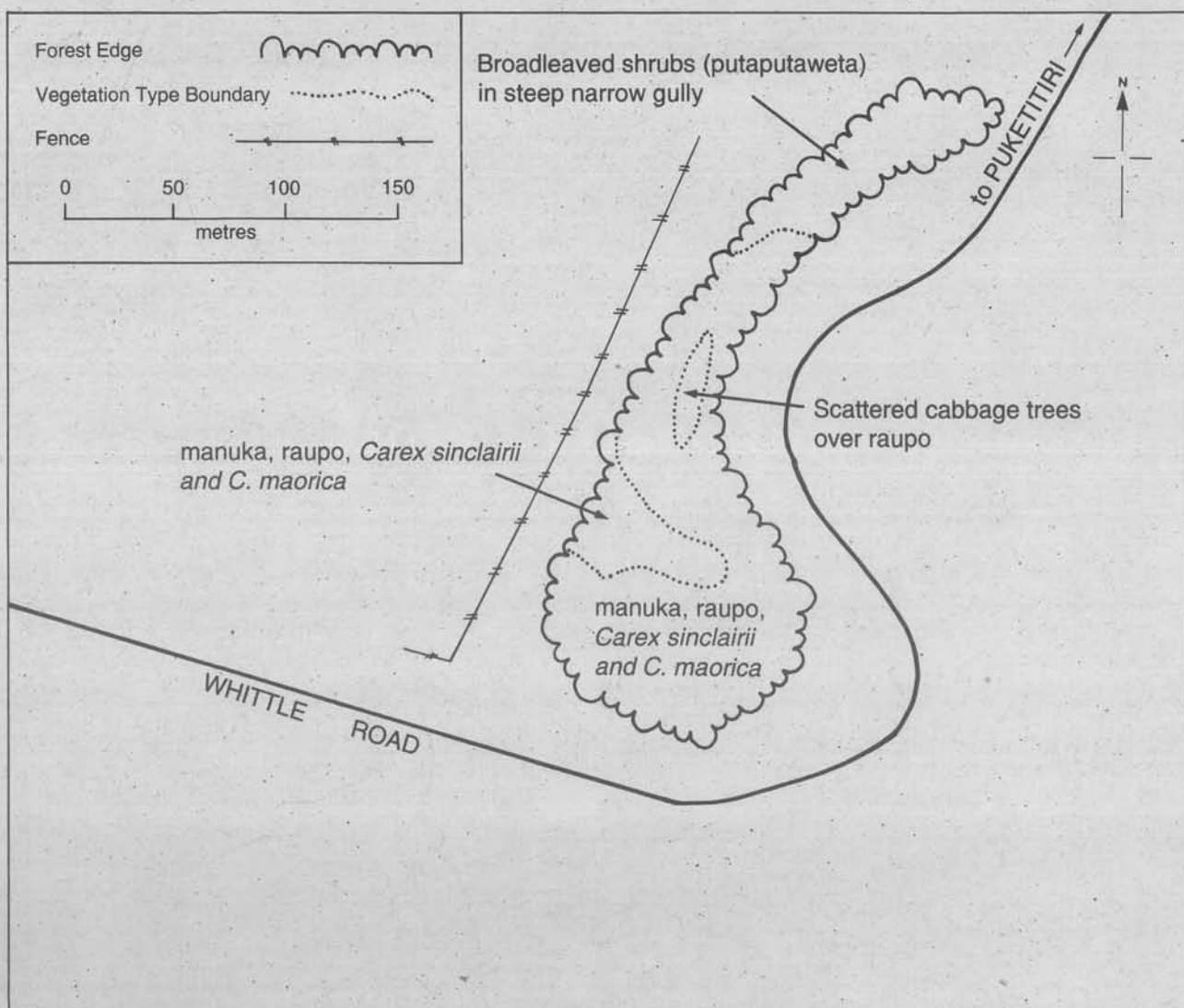
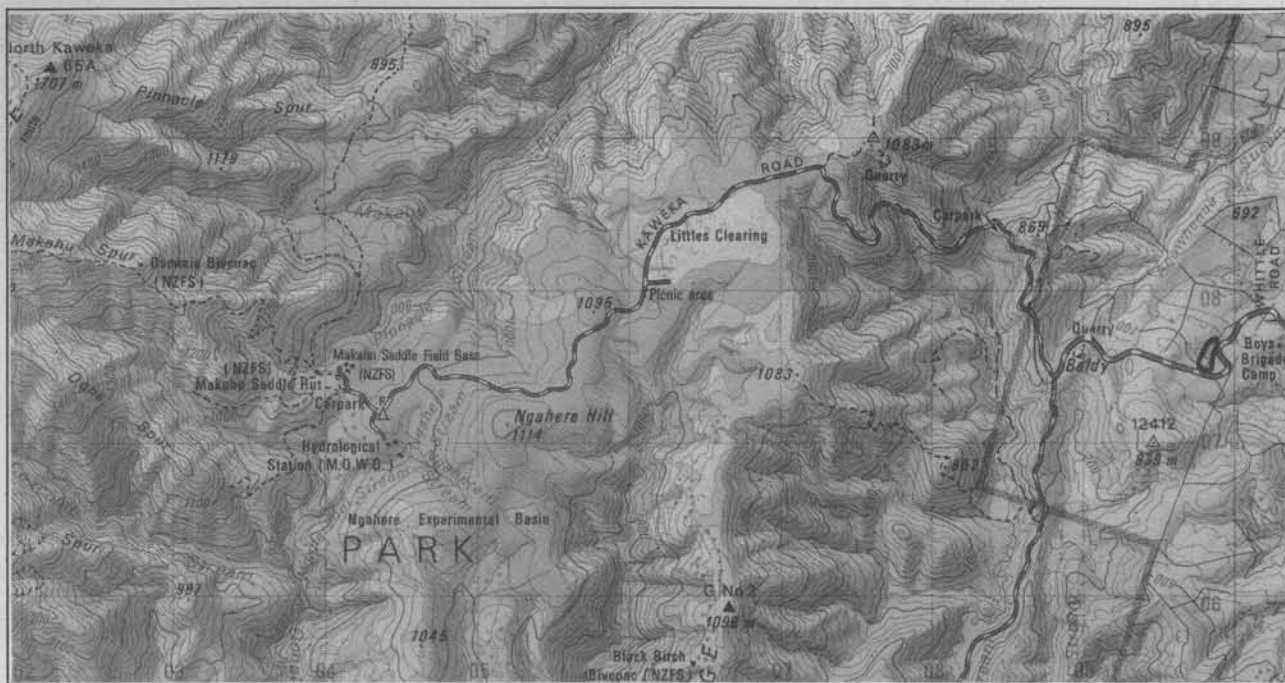
North Island robin and fernbird were recorded from here, these birds were not common in the Maungaharuru Ecological District.

The site is very similar to other protected areas of bush in the Kuripapango area, however, it has values as an island of natural area amongst the CHH Forests' pine plantations. This area, along with RAP 1, interacts with other areas, and helps to increase the diversity of the seral pine forests.

RAP 2 : MOORE ROAD BUSH



RAP 3 : WHITTLE ROAD WETLAND



RAP 3 : WHITTLE ROAD WETLAND

Survey Form: U20.09
Grid Reference: NZMS 260 U20 099 075
Area: 1ha
Altitude: 700m
Ecological System: 3

Ecological Units

90% Raupo - *Carex maorica* - *Carex sinclairii* tussockland on shallow gully
5% (cabbage tree) / raupo - toetoe on shallow gully
5% kanuka - (rimu) - (fivefinger) / *Coprosma rhamnoides* shrubland on gully sideslope

Landform

Wetland in a shallow broad gully and gully head. This has formed because of a tightly restricted gully further downstream, acting as a dam.

Vegetation

Over most of the wetland, raupo, *Carex maorica*, and *Carex sinclairii* are the dominant species. On the eastern side of the wetland, a small submerged peninsular also had manuka and *Coprosma* 'taylorae' noted on it. Further down the slope, (towards the gully) cabbage trees emerge over raupo and toetoe.

At the wetland's outlet, a small shrubland of kanuka, with some rimu and five finger was noted on the steep gully sideslopes. *Coprosma rhamnoides* is the dominant understorey species in this unit.

Fauna

Possums were noted in the shrubland. Sheep and cattle have access to the site. Bird diversity was low, with pukeko and spur-winged plover being the only native ones recorded, and chaffinch was the only introduced one noted.

Modifiers/Threats

Browse and pugging from (especially) cattle and also sheep, is having an effect on the site's viability.

As well, the site has probably has been top dressed, altering its nutrient balance.

Selection Criteria

Representativeness:	Medium-high
Diversity:	Medium-high
Special Features:	Medium
Naturalness:	Medium-low
Viability:	Low
Size and shape:	Medium
Buffering:	Low
Fragility and Threat:	High

Significance

Quite an unusual area, with a diverse range of species, including sphagnum moss, *Carex maorica*, *Carex sinclairii*, *Ranunculus macropus* and *Baumea rubiginosa*, none of which are common in the Maungaharuru Ecological District. Although this site is small, its unusual range of species and its diversity make it significant. Further, wetlands in general are a poorly represented feature of the Maungaharuru Ecological District.

Recommendations

With fencing to remove the pressure of stock trampling, this site has the potential to improve into a high-quality, diverse wetland.

RAP 4 : MANGARAKAU STREAM BUSH

Survey Form: - U21.01
Grid reference: U21 013 817
Area: 100ha
Altitude: 260m
Ecological System: 2

Ecological Units:

- 1) 79% kanuka - kowhai - *Pittosporum ralphii* - mahoe - manuka shrubland on steep sideslopes, spurs and gullies.
- 2) 19% mountain flax - (*Olearia furfuracea*) - (*Pittosporum ralphii*) - (*Hebe parviflora* 'squalida') shrubland on bluffs and steep sideslope
- 3) 2% *Coprosma crassifolia* scrubland / pasture on river flats

Landform

Steep sideslope, with spurs and gullies in the valley of Mangarakau Stream. A number of greywacke bluffs and outcrops are also throughout the site.

Vegetation

Along the stream, on river-flats, and on steep sideslopes, spurs and gullies, a mosaic of kanuka, mahoe, kowhai and manuka is the dominant vegetation. The shrub *Coprosma crassifolia* is the dominant understorey plant in this unit. Also noted were the shrubs koromiko, *Hebe parviflora*, *Coprosma rhamnoides* and rangiora. The ground-cover is mostly a poor-quality pasture, but the fern *Asplenium flabellifolium* was noted in damp rock crevices.

On bluffs along the stream side, a scattered shrubland of manuka, kanuka, mountain flax, *Olearia furfuracea* and *Pittosporum ralphii* is found. Other plants on the bluffs are the herbs *Scandia rosifolia*, tuhara and *Euphrasia cuneata*, and maiden-hair fern. An unusual hebe was noted in this unit too. It appears superficially similar to *Hebe strictissima*, but is probably a form of the variable *Hebe parviflora* 'squalida'. On outcrops in the site, *Coprosma crassifolia* scrub is dominant, over a ground-cover of pasture. The fern *Cheilanthes humilis* was noted in dry sunny sites in this unit too.

Fauna

The site is not fenced, so sheep and cattle at present have access. Evidence of possums in the site was noted too.

Birdlife was reasonably diverse, with bellbird, silvereye, fantail, grey warbler, whitehead and chaffinch being noted in the bush, and grey duck on the stream.

Common gecko, *Hoplodactylus maculatus*, was abundant under loose rocks amongst the outcrops in this site.

Modifiers/Threats

At present, cattle and sheep have browsed the understorey in this site extensively. There is also some threat that scrub-clearing will be undertaken throughout some of the site.

Selection Criteria

Representativeness:	Medium-high
Diversity:	Medium
Special Features:	Medium
Naturalness:	Medium
Viability:	Low-medium
Size and shape:	Medium
Buffering:	Low-medium
Fragility and Threat:	Medium

Significance

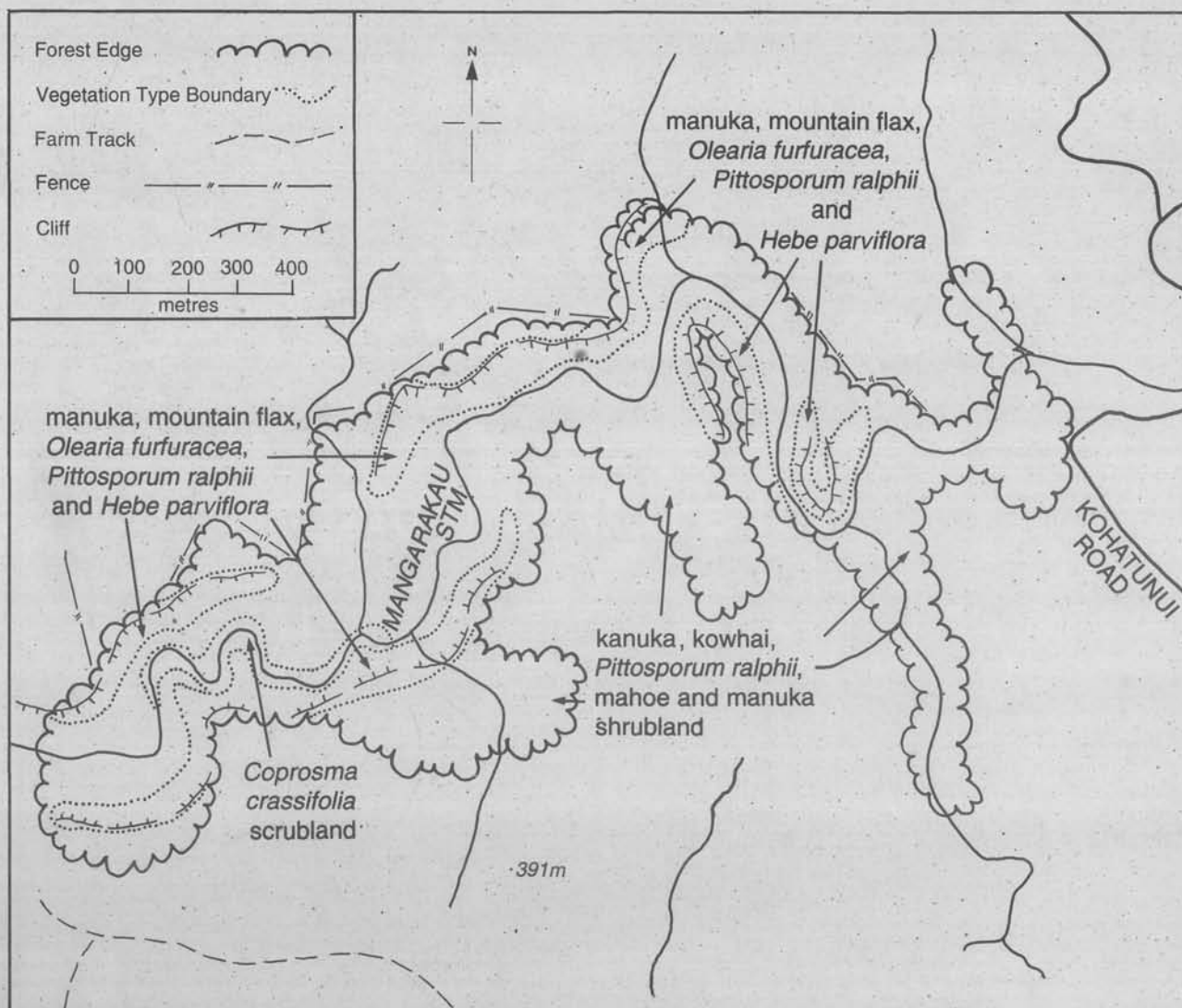
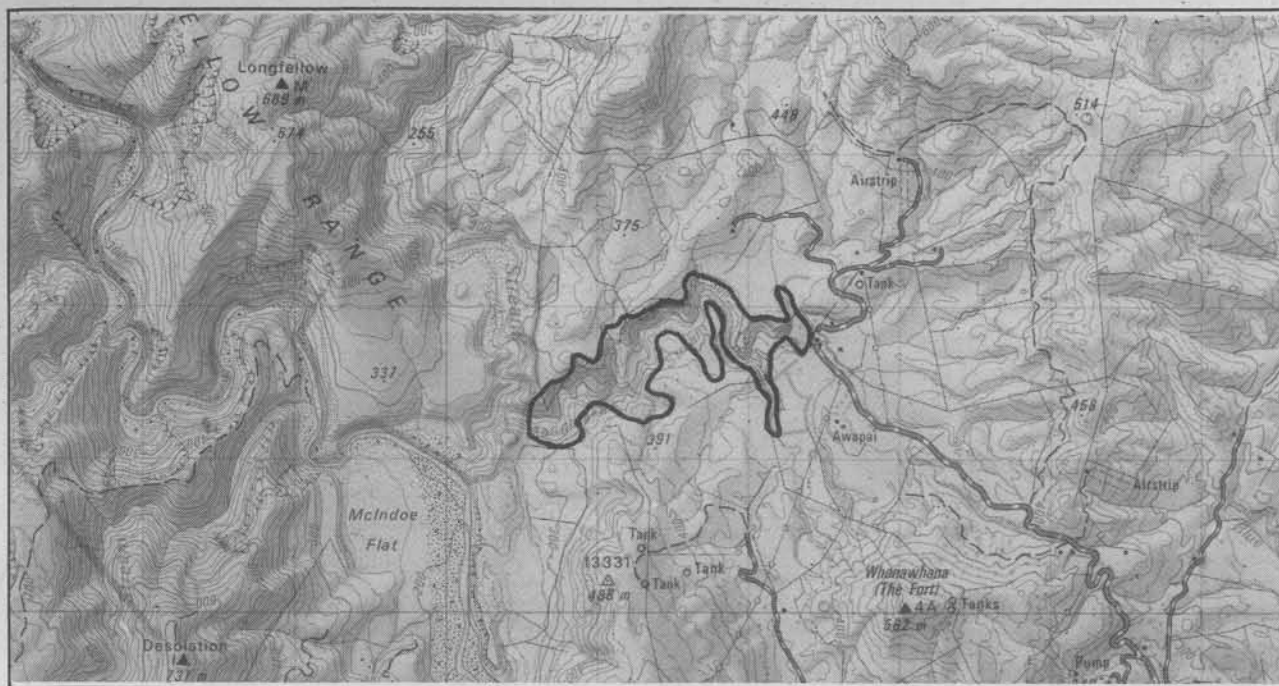
Scandia rosifolia and *Asplenium flabellifolium* are not common in the Maungaharuru Ecological District. The unusual form of *Hebe parviflora* 'squalida', may be taxonomically interesting.

Recommendations

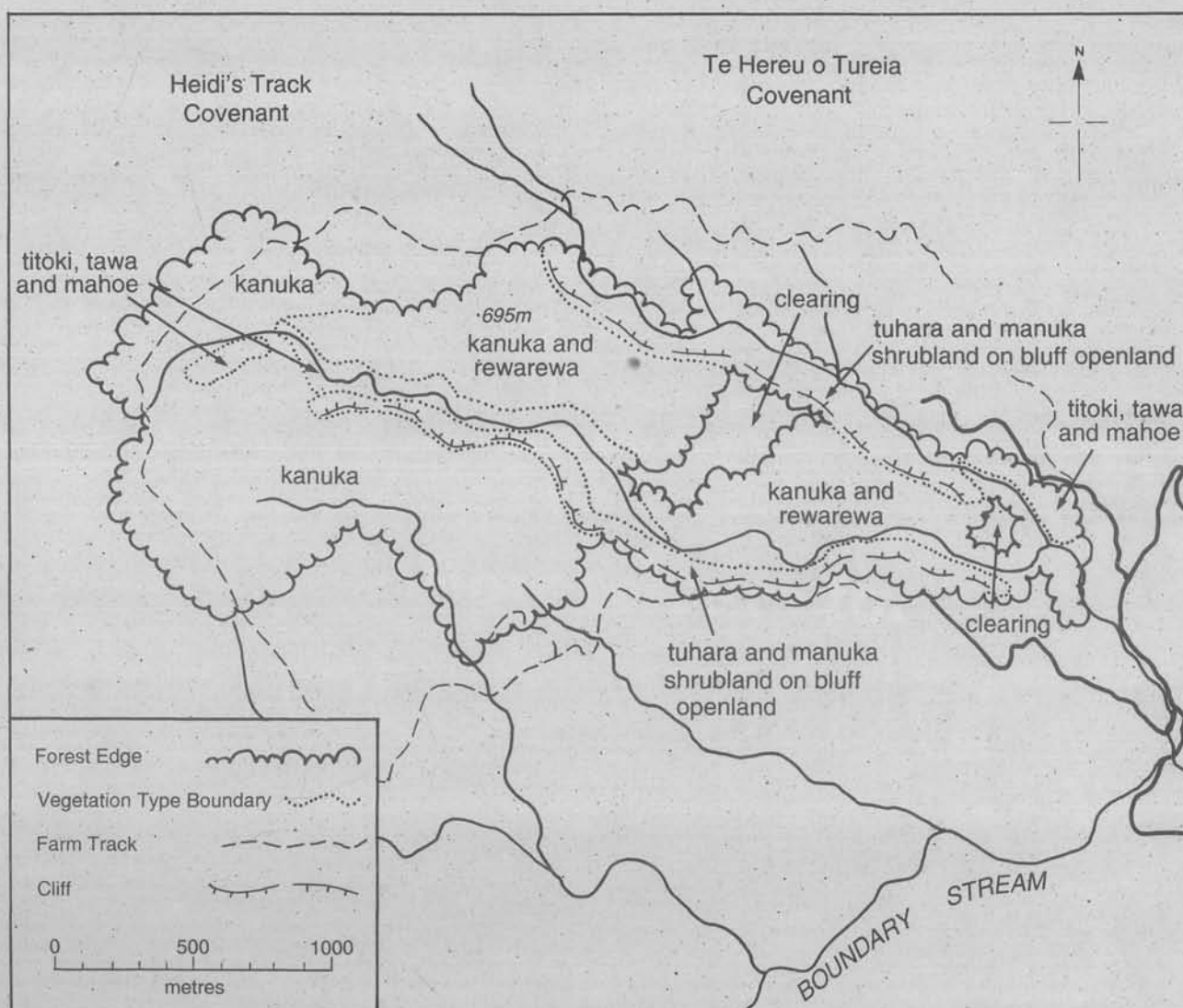
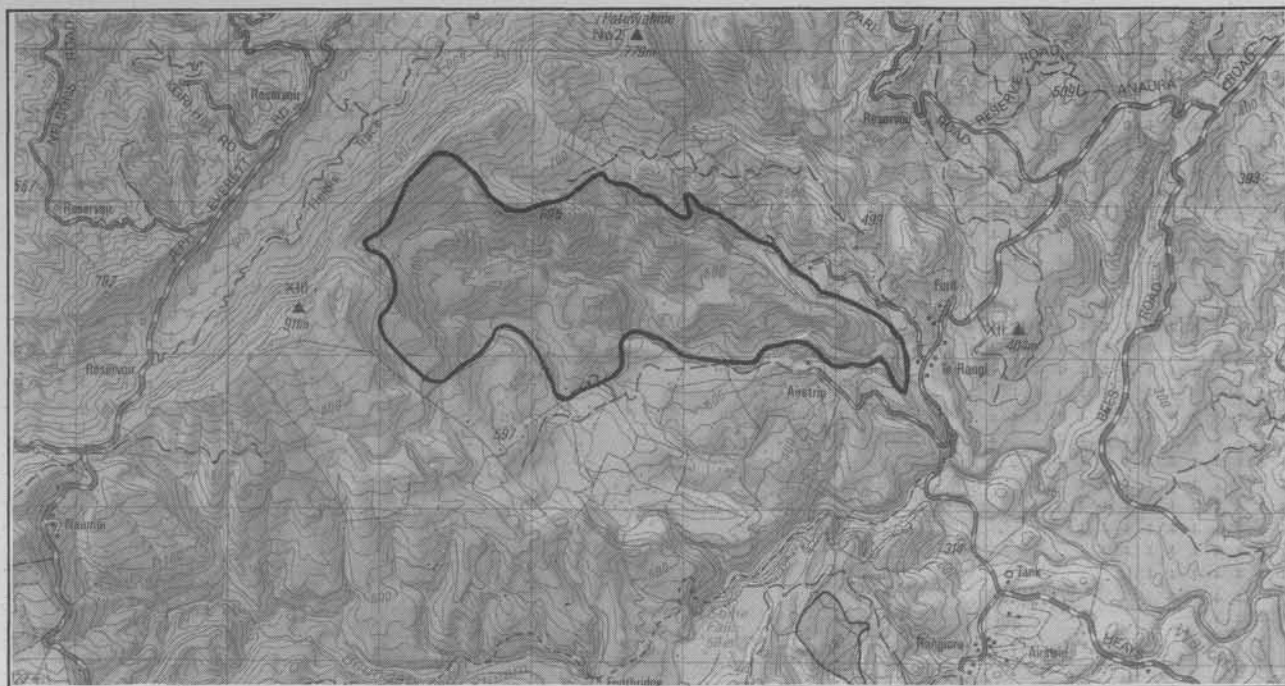
Fencing is the major requirement for this site to survive.

Perhaps explanation to landowners of the value of these "marginal-looking" sites for their species value would increase their chances of survival.

RAP 4 : MANGARAKAU STREAM BUSH



RAP 5 : HEAY'S BUSH



RAP 5 : HEAY'S BUSH

Survey Form: V19.03
Grid Reference: NZMS 260 V19 420 285
Area: 250ha
Altitude: 600m
Ecological System: 5

Ecological Units

- 1a. 40% kanuka - rewarewa / mahoe - kowhai - (ngaio) forest on lower steep and gentle sideslopes
- 1b. 40% kanuka / tree nettle forest on upper steep and gentle sideslopes
2. 10% titoki - tawa / mahoe - wineberry forest on gullies and lower sideslopes
3. 10% tuhara - (manuka) tussockland on bluffs and steep sideslopes

Landform

The site consists of bluffs, steep and gentle sideslopes, along the headwaters of Waikari River. The headwaters of the river are divided up into three small streams, with numerous small spurs and gullies.

Vegetation

Most of the vegetation in this site is secondary forest with a canopy dominated by kanuka.

On lower sideslopes, kanuka and rewarewa are the dominant canopy species, although mahoe, ngaio, titoki, matai and kowhai are also present. This unit also has a sub-canopy dominated by mahoe and kowhai, with a presence of ngaio at significant cover densities. The shrubs tree nettle and kawakawa are the dominant understorey plants. The ground-cover is poorly-developed, being heavily browsed by goats.

On the upper sideslopes, kanuka is the dominant canopy species, although occasional kamahi, red beech, black beech, white maire and narrow-leaved maire were found in, or emerged through, the canopy.

Scattered throughout the kanuka, are small pockets of primary broad-leaved forest, with occasional emergent matai. The canopies of these units are dominated by tawa and titoki, although hinau, white maire, rewarewa and cabbage tree are present in them too. These units are mostly confined to the gully floors.

Steep sandstone bluffs are a feature in this site. These have an occasional shrubland of tuhara, mountain flax, manuka and *Hebe parviflora* on their damper portions and are bare on their drier parts. Akeake (*Dodonaea viscosa*) was noted growing on these too.

Fauna

The site is partially fenced, to form paddocks. Sheep, cattle and deer are farmed here and all have access into the site.

Goats are very common on bluffs and in the bush. Evidence of possums was noted too.

Common bush-birds were present, including grey warbler, whitehead, tui, bellbird, silvereye and chaffinch.

Modifiers/Threats

Historic fires and logging operations have played a part in shaping the vegetation of this site into its present form.

Blackberry is becoming troublesome along the stream-sides in this site.

Browse from introduced mammals is evident throughout the site.

Selection Criteria

Representativeness:	High
Diversity:	High
Special Features:	Low-medium
Naturalness:	Medium
Viability:	Medium-high
Size and shape:	High
Buffering:	Medium
Fragility and Threat:	Low

Significance

This is a large and highly variable RAP. It is also the only place where akeake has been found in the Maungaharuru Ecological District.

Recommendations

Fence to protect some (or all) of the bush.

Control goats and possums.

RAP 6 : TORONUI BUSH

Survey Form: V19.08
Grid Reference: NZMS 260 V19 342 220
Area: 120ha
Altitude: 950m
Ecological System: 1

Ecological Units

- 1) 60% red beech - broadleaf / horopito / *Histiopteris incisa* - horopito forest on gentle sideslope
- 2) 30% manuka scrubland on steep sideslope
- 3) 4% (red beech) / mountain holly - (broadleaf) - (Hall's totara) / horopito / horopito *Coprosma* 'taylorae' / *Polystichum vestitum* tree-shrubland on gentle sideslope
- 3a) 3% (red beech) - (mountain holly) - (broadleaf) - (Hall's totara) - (horopito) treeland on gentle sideslope
- 3b) 3% Hall's totara - (mountain holly) - (broadleaf) - (red beech) - (horopito) treeland on gentle sideslope

Landform

Gentle sideslope, with a number of gullies running across it. At higher altitudes, the sideslopes become steeper.

Vegetation

Just over half of this site is tall closed forest formed from red beech and broadleaf. This unit also has a shrub tier of horopito. *Histiopteris incisa* and horopito are the dominant ground-cover species.

Where early fires have partially destroyed the vegetation, a closed forest of scattered red beech trees over a canopy of mountain holly, broadleaf and Hall's totara has developed. The shrubs horopito, *Coprosma* 'taylorae' and the fern *Polystichum vestitum* are the dominant understorey plants in this unit. In areas which had burned more severely, a treeland of the above canopy species is all that remains.

Where pasture has been neglected, manuka scrub is becoming the dominant vegetation. This is generally on the steeper sideslopes at higher altitude.

Fauna

Sheep and goats were common

Native birds recorded were: rifleman, silvereye, fantail, grey warbler, whitehead and tomtit.

Modifiers/Threats

Goats and possums are present in the site and have modified much of the understorey from its original condition.

The site is not fenced, allowing sheep (and probably cattle), access into the bush.

Site has possibly been top-dressed in the past, as pasture has invaded it in places.

The canopy appears to have been damaged by heavy snowfalls.

Selection Criteria

Representativeness:	Medium
Diversity:	High
Special Features:	Low
Naturalness:	Medium
Viability:	Medium
Size and shape:	Medium-high
Buffering:	Medium
Fragility and Threat:	

Significance

The site shows a change in the vegetation patterns with respect to altitude. This, coupled with the early fires (which have had the effect of opening the canopy up, increasing the number of available niches) has made the site highly diverse.

Even though browsing animals are present, good levels of regeneration were noted - although no seedlings of beech or broadleaf were seen.

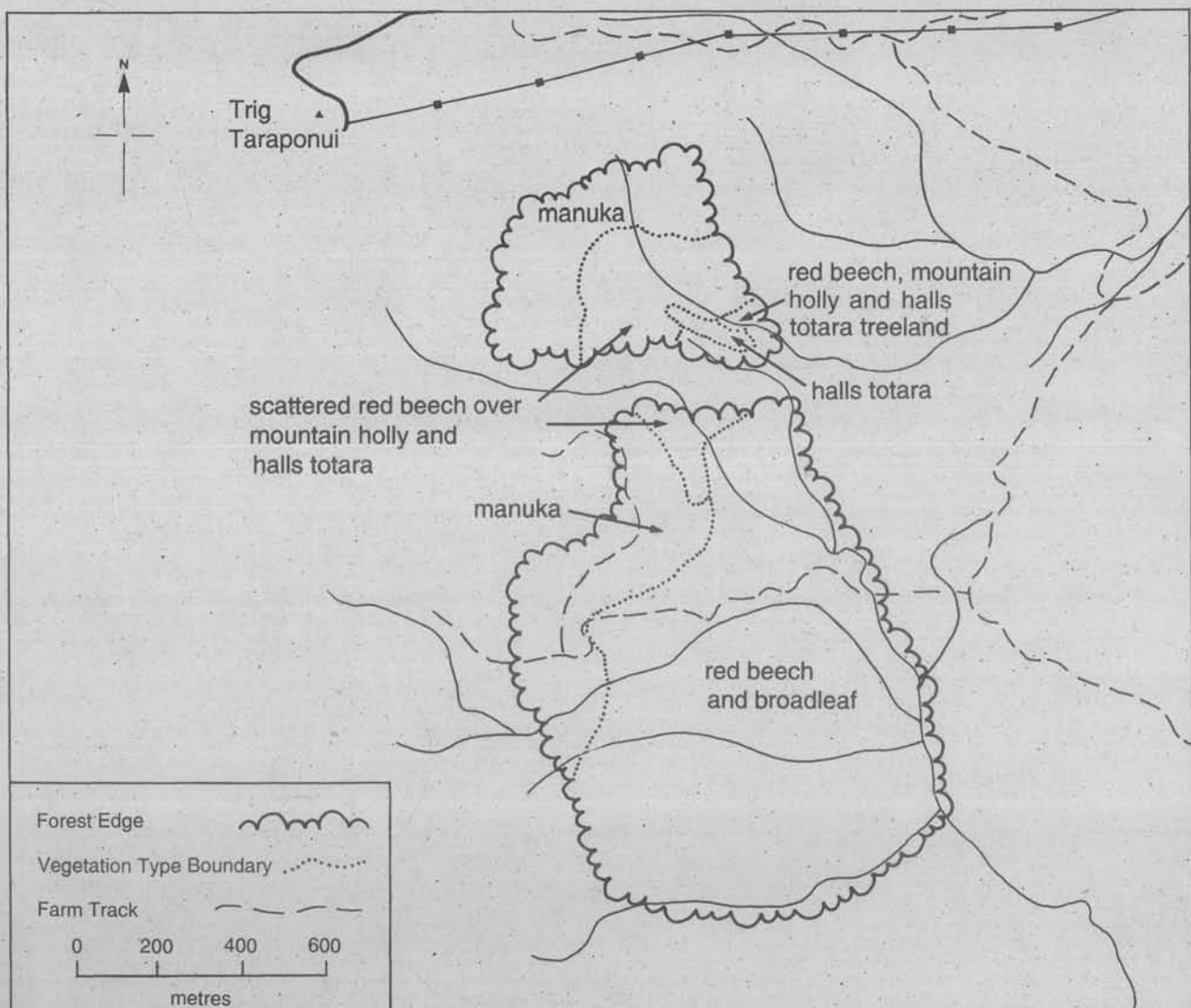
Recommendations

Goats and then possums are the most significant short-term threats to the viability of the site, and therefore, their control should be the highest priority.

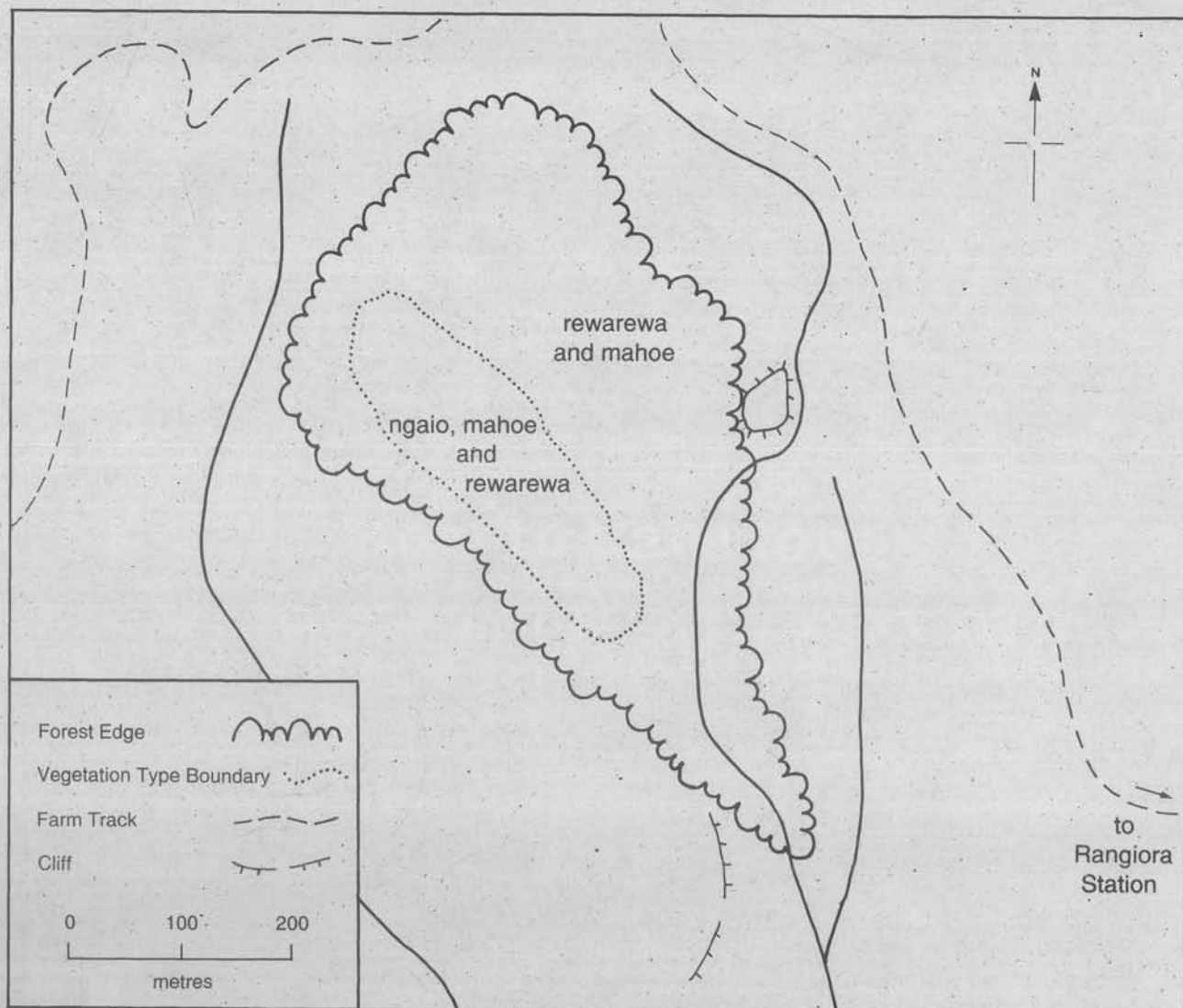
Fencing off the site from sheep and cattle from the site would be the next most important priority for the site after goats and possums.

The occurrence of weeds in places would be expected to diminish once the browse pressure has been removed/reduced.

RAP 6: TORONUI BUSH



RAP 7 : RANGIORA STATION BUSH



RAP 7 : RANGIORA STATION BUSH

Survey Form: V19.10
Grid Reference: NZMS 260 V19 440 260
Area: 40ha
Altitude: 400m
Ecological System: 5

Ecological Units

1. 70% rewarewa /mahoe / kawakawa - (tree nettle) forest on sideslope, topslope and gully
2. 30% ngaio - mahoe - (rewarewa) / kawakawa - (tree nettle) forest on sideslope, bluffs and spur.

Landform

The site consists of a south-east facing valley and valley-head surrounded by steep sideslopes and gentle topslopes. The head of the valley has a number of spurs and gullies on it. On the southern side of the valley are steep, dry, north-facing bluffs and on the northern side are steep damp sideslopes of native bush. Above the valley are gentle topslope, also covered with native bush.

Vegetation

On the south facing sideslopes and on the topslopes, a tall closed forest with a canopy dominated by rewarewa over a sub-canopy of mahoe was noted. This unit also has a dense understorey of shrubs of kawakawa and tree nettle.

On the north and east facing dry sideslopes and on the spurs, a closed forest dominated by ngaio and mahoe, with some rewarewa also present in the canopy, was noted. This unit also has an understorey of tree nettle and kawakawa. Ngaio was noted in greater proportions on the steep faces and tree nettle was more dense in sunny gaps in the forest.

Fauna

Although the site is fenced, sheep may occasionally gain entry into the bush. Goats were common in the site and evidence of possums was noted too.

Bush birds were common in the site and some waterfowl were noted on a small dam on the northern side of the site. These included tui, fantail, grey warbler, Australasian harrier hawk, kereru, chaffinch and paradise shelduck.

Modifiers/Threats

Goats, (and possums) were the major current vegetation modifier, although some disturbance from weed species was noted.

The presence of stumps throughout the site suggests selective logging was an historic vegetation modifier.

Selection Criteria

Representativeness:	High
Diversity:	Medium-high
Special Features:	Medium
Naturalness:	Medium-high
Viability:	High
Size and shape:	Medium-high
Buffering:	Medium
Fragility and Threat:	Medium

Significance

This site is one of the best un-protected examples of lowland rewarewa forest in the Maungaharuru Ecological District.

The landowners have taken an active role in the preservation of this site in that they have planted native species back into the fringes of the forest and fenced it.

Recommendations

Control goats.

RAP 8 : RANGIORA STATION TREELAND

Survey Form: V19.12
Grid Reference: NZMS 260 V19 430 247
Area: 20ha
Altitude: 450m
Ecological System: 5

Ecological Units

1. (ngaio) - (titoki) - (cabbage tree) / pasture - *Carex geminata* treeland on gully and gentle sideslopes
2. kanuka - rewarewa forest on steep sideslopes
3. (tuhara) - (ngaio) - (*Pittosporum ralphii*) - (koromiko) shrubland on bluffs
4. *Carex secta* - *Carex geminata* tussockland on gentle sideslopes

Landform

This site is formed from a south facing gully, which rises through gentle sideslope and then steep sideslopes. Surrounding the gully, are limestone and papa bluffs.

Vegetation

On the gentle sideslopes at the gully mouth, is a treeland of ngaio, interspersed with some titoki and cabbage tree. This unit also has one adult nikau in it. The understorey in this unit is mostly swampy pasture, although a few scattered *Coprosma rhamnoides* were noted.

Further up the gully, on gentle sideslopes, a kanuka-dominated treeland is found. The understorey shrub tier was formed from tree nettle and the ground-cover is either swampy pasture or *Carex geminata*. *Blechnum minus* was noted in this unit too.

Above the previous unit, on steep, drier sideslopes, a forest with a canopy dominated by kanuka and rewarewa is found. The understorey is poorly-developed, with the ground-cover mostly made up of the fern *Blechnum fluviatile* and pasture. The shrub tier is mostly tree nettle with some blackberry also present.

The vegetation on the bluffs varies with aspect. On south-facing sides, a shrubland of koromiko, mountain flax, weeping vine rata and *Pittosporum ralphii* is found; while on the north-facing ones, a shrubland of tuhara, *Pittosporum ralphii*, ngaio and koromiko was noted. The vegetation on the bluffs also varies with altitude, with white rata vine, kawakawa, *Pneumatopteris pennigera* present low down the gully and eyebright (*Euphrasia zelandica*) and *Olearia furfuracea* present near the top.

Fauna

Goats were noted in the site.

The site is not fenced and sheep (and cattle) can gain access.

Few birds were noted in the site, these were chaffinch, grey warbler and fantail.

Both yellow and red admiral butterflies were noted in the site.

Modifiers/Threats

At present, goats and stock are the major threats to the viability of this site.

Selection Criteria

Representativeness:	Medium
Diversity:	High
Special Features:	High
Naturalness:	Medium
Viability:	Medium
Size and shape:	High
Buffering:	Low-medium
Fragility and Threat:	Medium-high

Significance

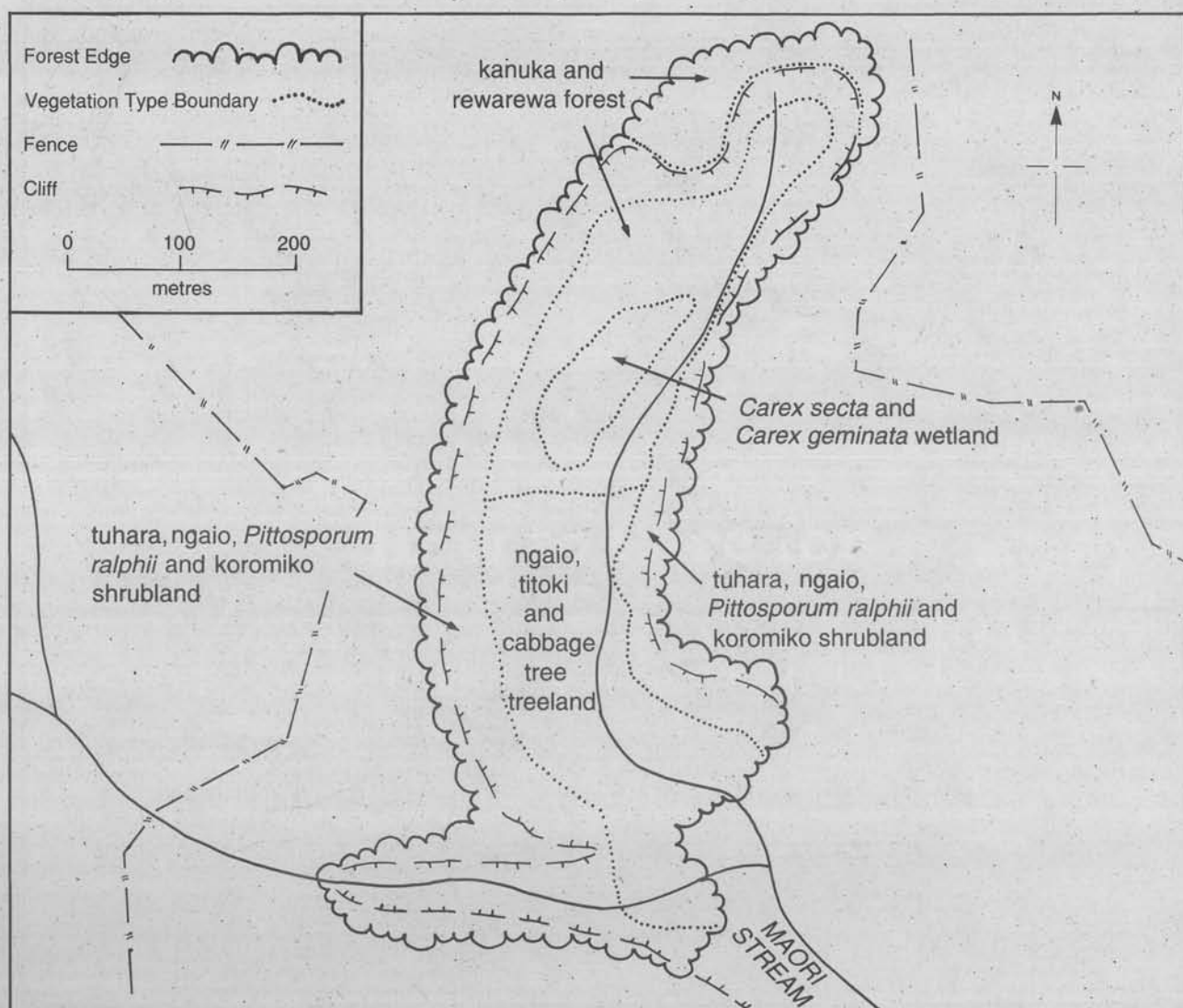
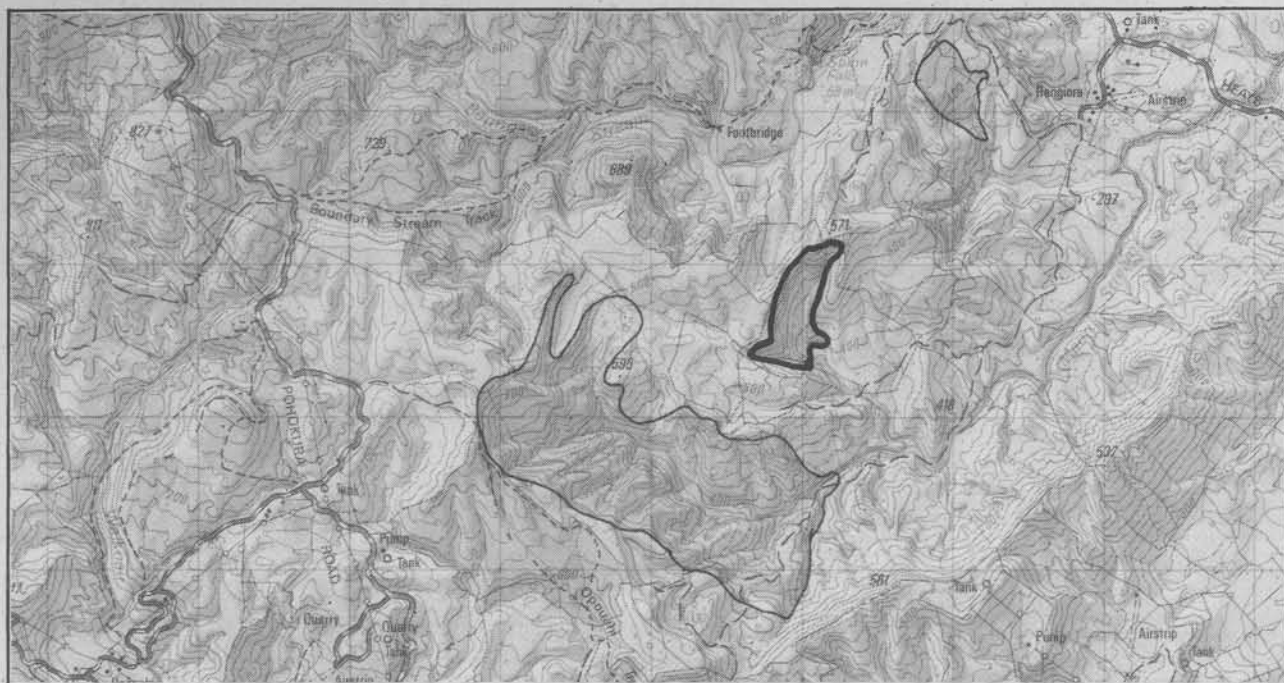
This site has an unusual range of species present in it, including the best example of a ngaio treeland left in the Maungaharuru Ecological District. A number of unusual species for the Maungaharuru Ecological District were noted here too, including nikau, eyebright and *Cordyline banksii*.

It is quite likely that thorough searching will turn up kakabeak on some of the bluffs and gully sides in this RAP.

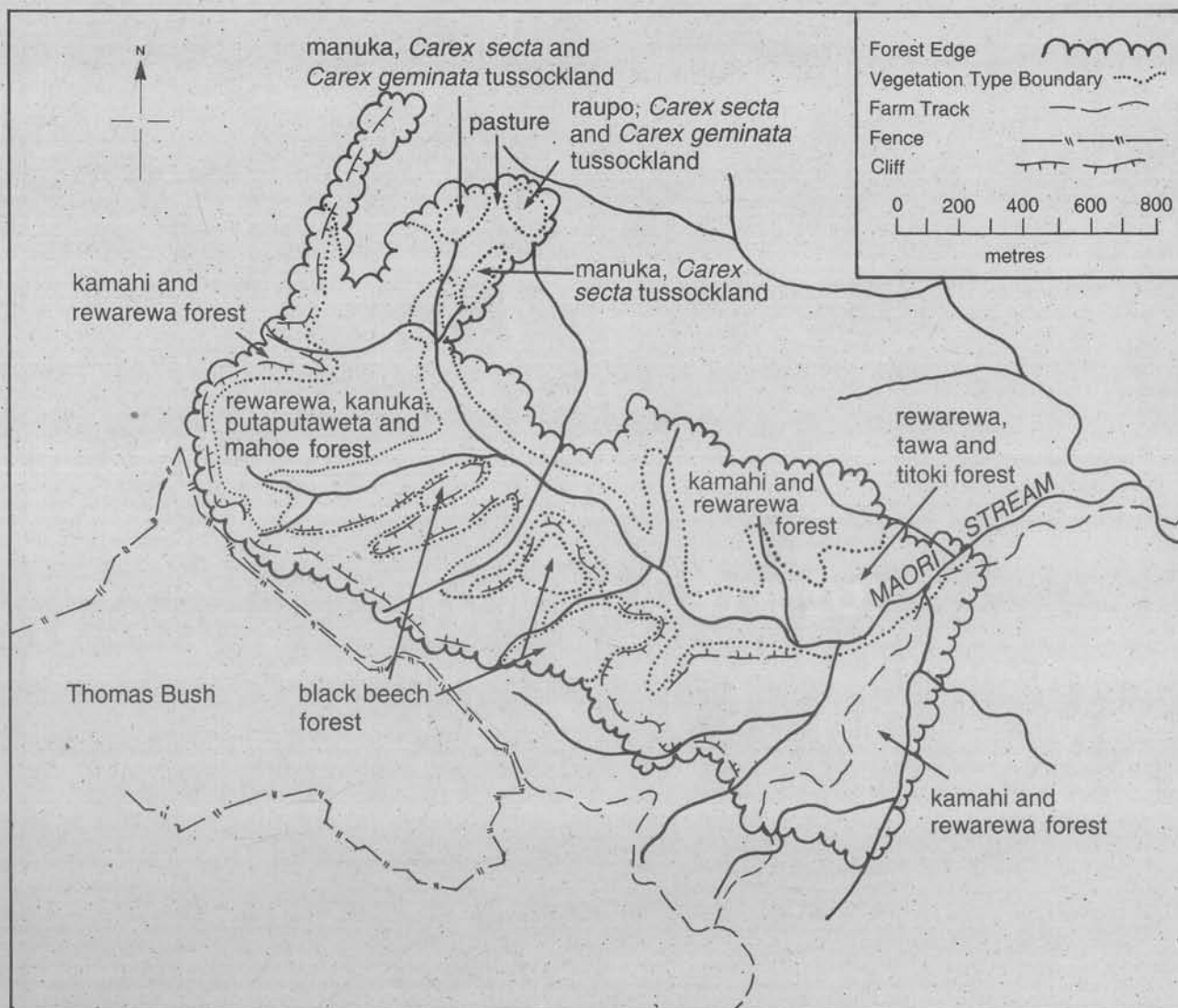
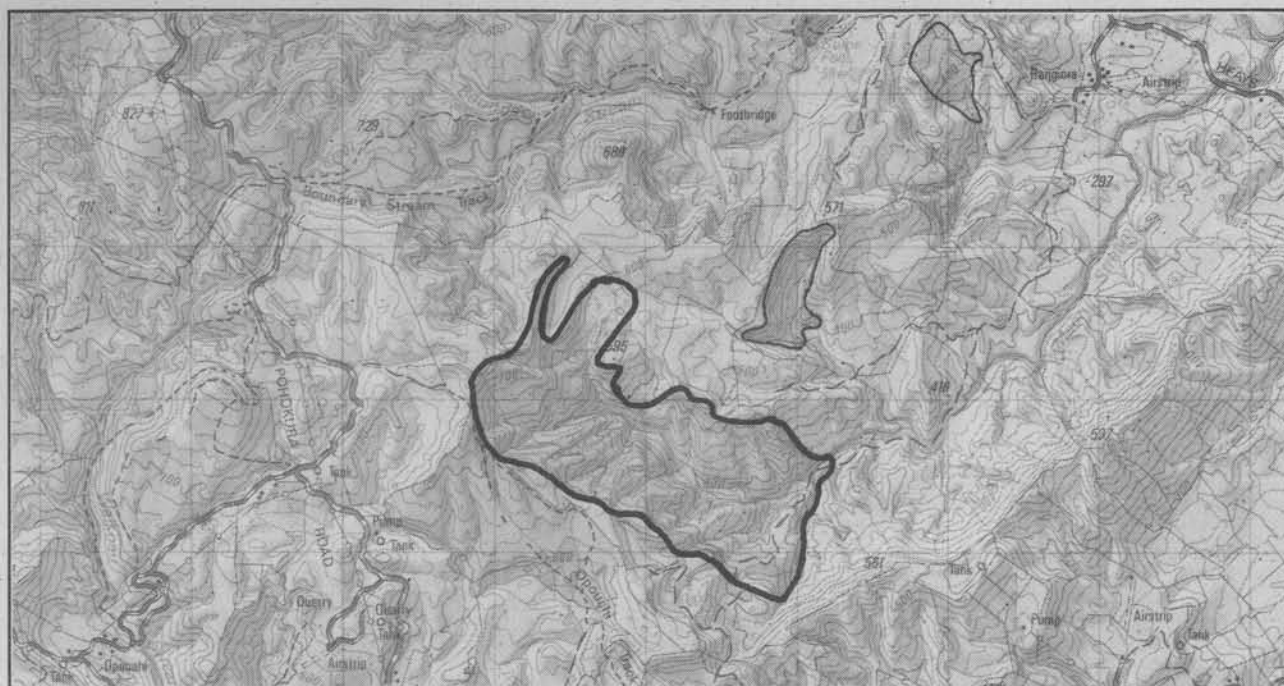
Recommendations

The site needs fencing to remove the threat from sheep and cattle. Also control of goats would help enhance the natural values in this RAP.

RAP 8 : RANGIORA STATION TREELAND



RAP 9 : MAORI STREAM BUSH



RAP 9 : MAORI STREAM BUSH

Survey Form: V19.16
Grid Reference: NZMS 260 V19 420 235
Area: 5ha
Altitude: 500m
Ecological System: 5

Ecological Units

1. 10% black beech forest on sideslopes and topslopes
2. 34% kamahi - rewarewa - (black beech) forest on spurs
3. 20% rewarewa - kanuka / putaputaweta - mahoe forest on sideslope
- 4a. 2% manuka - *Carex secta* - *Carex geminata* shrub-tussockland on valley floor
- 4b. 4% raupo - *Carex secta* - (manuka) shrub-tussockland on valley floor
5. 30% rewarewa - tawa - titoki / wineberry - mahoe / tree nettle forest on gully and footslope

Landform

This site is a gentle sideslope, which climbs in altitude from 350m to 700m. On the northern side a prehistoric slump has formed a series of wetlands in a shallow valley. Surrounding these wetlands are steep cirque-like "slump" sideslopes. The southern part of the sideslope has eroded, to form a valley that drains eastwards. In this valley is a series of deep gullies and steep spurs.

Vegetation

On the gullies and lower sideslopes, a tall closed forest with a canopy dominated by rewarewa, titoki and tawa was noted. This unit also has a sub-canopy of wineberry and mahoe, with an understorey where tree nettle is the only significant plant present.

Further up the valley, the site forms a series of spurs and gullies and the vegetation is more complex. On the sideslopes and topslopes of spurs, a forest composed of kamahi, rewarewa and black beech is found. The spur crests and ends tend to have a canopy of pure black beech, while the vegetation in the gullies has not changed from the previous lowland unit.

On the steep cirque-like sideslopes on the northern part of the site, a forest with a canopy composed of rewarewa and kanuka, is found. This unit has a sub-canopy of putaputaweta and mahoe.

Each of the three wetlands on the valley floor has a slightly different vegetation pattern. The first one has a few emergent kahikatea and cabbage trees over a raupo and manuka shrub-tussockland. *Carex secta* and *Carex geminata* are the dominant species on another and the third also has a shrub-tussockland composed of manuka and *Carex secta*.

Fauna

Sheep and cattle can gain access to the wetlands, but most of the bush is fenced. Goats were common in the bush.

Common bush, and introduced birds were noted in this site too. These included: bellbird, fantail, kereru, grey warbler, tui, chaffinch and magpie.

Modifiers/Threats

Moderate damage to the bush from goats, was recorded.

Fire appeared to be the major previous vegetation modifier, and logging may have been accountable for some of the modification too.

Selection Criteria

Representativeness:	Medium-high
Diversity:	Medium-high
Special Features:	Medium
Naturalness:	Medium-high
Viability:	Medium
Size and shape:	High
Buffering:	High
Fragility and Threat:	Medium

Significance

High levels of regeneration noted even though goats are present in the site.

Site adjoins Thomas Bush (CMS Reference 80027).

Recommendations

Goats are the major present threat to the viability of the site and their control would enhance the viability of the site. Some fencing needs to be completed to exclude stock from the site.

RAP 10 : RIMU STATION BUSH

Survey Form: V20.02
Grid Reference: NZMS 260 V20 325 199
Area: 150ha
Altitude: 950m
Ecological System: 1 or 5

Ecological Units

mountain holly - broadleaf forest on sideslope

Landform

Sideslope, with some footslope and topslope on the side of a broad flat hanging valley. This site is mostly a steep sideslope, which has been modified through erosion of small deep gullies.

Vegetation

Two distinctions between the lower half (footslope and sideslope) and the upper half (sideslope and topslope) of this site were apparent.

On the lower part of the site, the canopy is mostly broadleaf with much mountain holly present in it. The shrubs, manuka, *Coprosma* 'taylorae' and weeping mapou were also noted. Bush lawyer, *Polystichum vestitum* and *Paesia scaberula* are the dominant understorey species. The rare hybrid tree daisy *Olearia ilicifolia* x *O. furfuracea* is present.

On the upper half of the sideslope, the diversity of shrubs is replaced by horopito, and the relative abundance of mountain holly decreases. The only significant understorey plant here is *Polystichum vestitum*.

Fauna

Goats were present in this site, but not at the same proportions as in some of the other sites visited.

Possums were most likely here too, but little evidence of them was noted.

Sheep and cattle also can gain access to the bush.

Low numbers of birds were also noted here, with bellbird being the only native species heard; the other species were chaffinch and blackbird.

Modifiers/Threats

Goats.

Snow appears to have caused damage to the canopy of the site.

Fire.

Selective logging.

Selection Criteria

Representativeness:	Medium-high
Diversity:	Low-medium
Special Features:	Low
Naturalness:	Low-medium
Viability:	Medium
Size and shape:	Medium-high
Buffering:	Medium-high
Fragility and Threat:	Low-medium

Significance

This site is the best un-protected example of this type of vegetation.

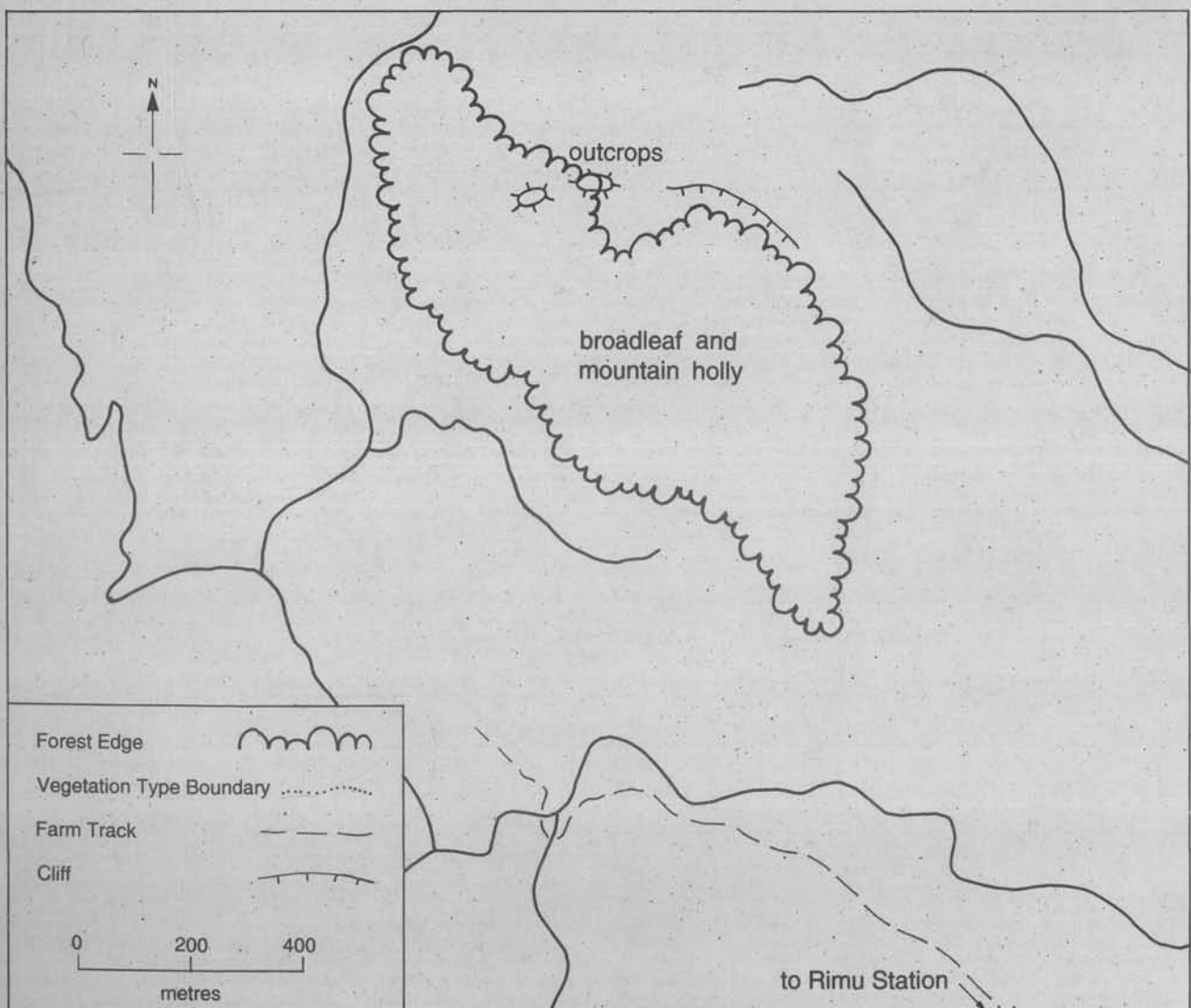
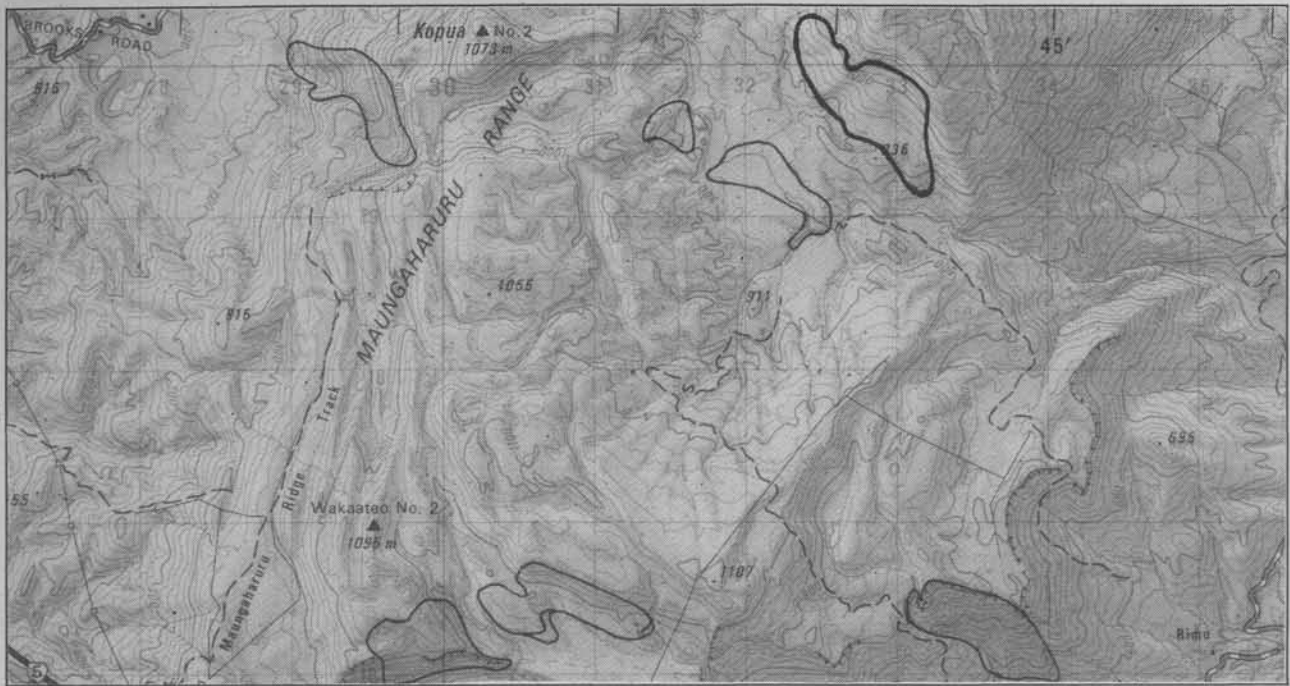
Regeneration of mountain holly (but not broadleaf) was noted in this site.

Recommendations

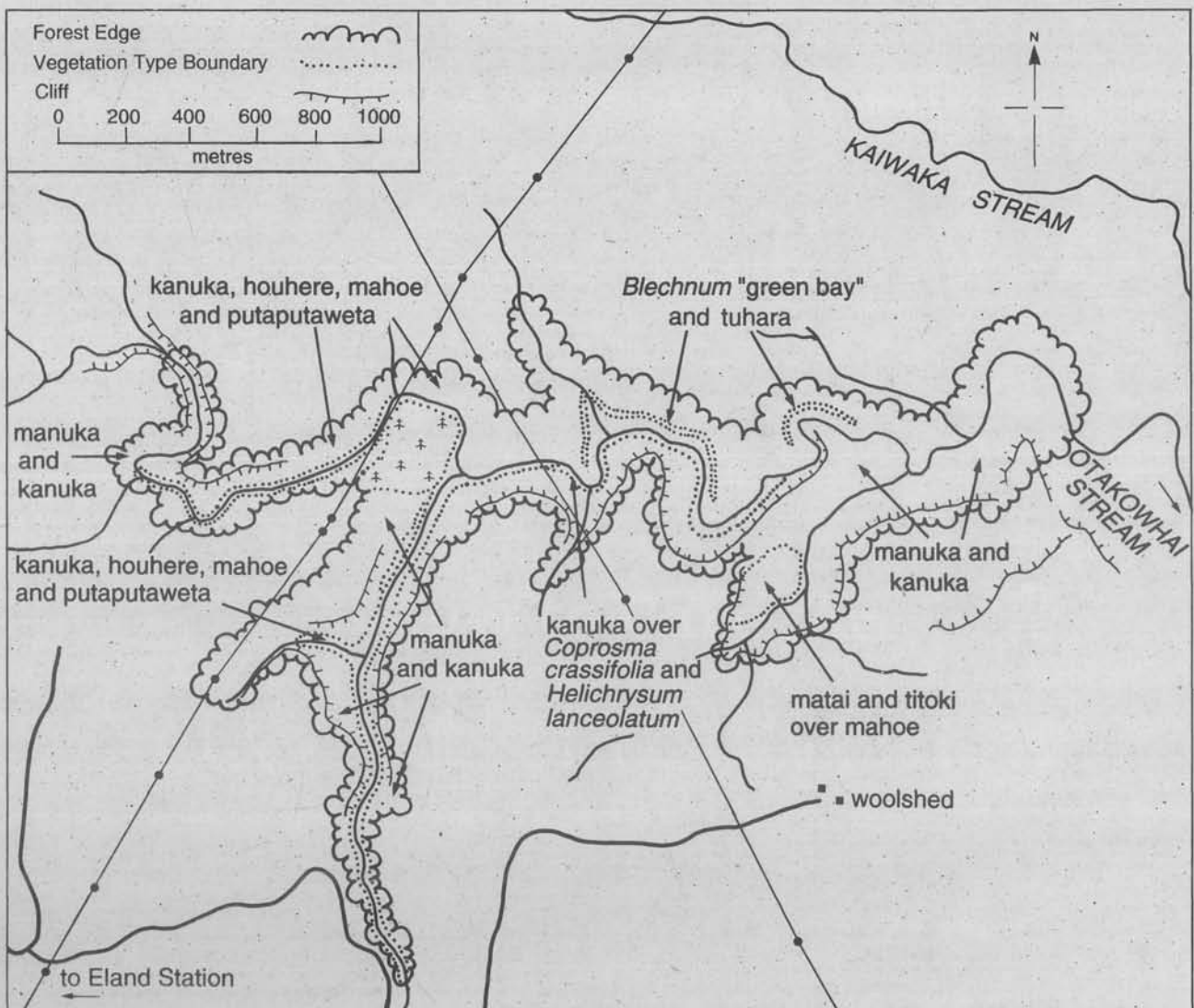
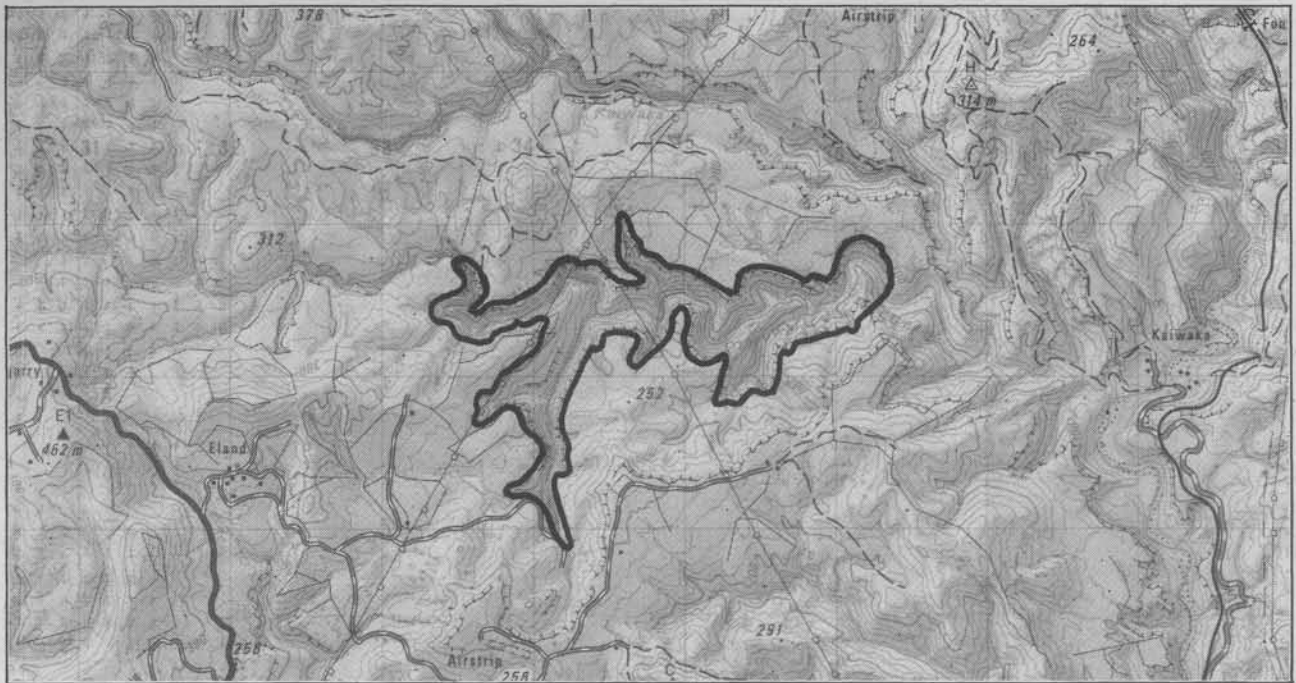
Fencing

Goat control.

RAP 10 : RIMU STATION BUSH



RAP 11 : OTAKOWHAI STREAM BUSH



RAP 11 : OTAKOWHAI STREAM BUSH

Survey Form: V20.07
Grid Reference: NZMS 260 V20 344 045
Area: 110ha
Altitude: 100m
Ecological System: 4

Ecological Units

1. 50% manuka - kanuka scrub on steep sideslope
2. 40% kanuka - houhere - (mahoe) / mahoe - putaputaweta forest on steep and gentle sideslopes
3. 3% (fivefinger) - (*Pittosporum ralphii*) / Green Bay kiokio - tuhara tussockland on bluffs
4. 2% kanuka / gap / *Coprosma crassifolia* - (*Helicbrysum lanceolatum*) forest on river-flats
5. 5% matai - titoki / mahoe / titoki - (tree nettle) - (kanono) forest on steep sideslope

Landform

Steep sideslopes with spurs, gullies and bluffs along the sides of Otakowhai Stream.

Vegetation

On the steep north-facing sideslopes manuka and kanuka scrub is the dominant vegetation. Scattered throughout this unit were *Coprosma rhamnoides*, *Helicbrysum lanceolatum*, native broom (*Carmichaelia arborea*) and *Pittosporum ralphii*. This unit's ground-cover is a poor-quality, dry pasture, with prickly mingimingi throughout it.

The south-facing steep and gentle sideslopes has a forest with kanuka, putaputaweta houhere and mahoe as its dominant canopy species. Other species in the canopy are wheki ponga, kowhai and tree fuchsia. The understorey is relatively open, with *Coprosma rhamnoides* and wheki ponga being the dominant plants in the shrub tier. The ground-cover is mostly moss, *Blechnum penna-marina* and *Nertera depressa* amongst a very poor-quality pasture. Around seepages on bluffs in this unit, occasional fivefinger and *Pittosporum ralphii* emerge over a fernland of Green Bay kiokio and tuhara.

On small river-flats along the sides of the stream, kanuka forms a canopy over *Coprosma crassifolia* and *Helicbrysum lanceolatum*. *Carex geminata* and pasture are the predominant ground-cover species in this unit.

A tall closed forest of matai and titoki over mahoe has survived in a small gully, on a tributary of the main stream. This unit is difficult to access, but appears to have an understorey dominated by titoki, tree nettle and kanono. It is probably this unit's inaccessibility which has allowed it to remain in a relatively good condition.

Fauna

Goats, sheep and evidence of possums were noted within the site. A dead cattle-beast was noted in the stream.

Birdlife within the site is reasonably diverse. Shining cuckoo, grey warbler, fantail, kingfisher, paradise shelduck and spur-wing plover were the native species recorded. Chaffinch, magpie and greenfinch were the introduced ones.

Long-finned eel, and golden bell frogs were noted in the stream.

Modifiers/Threats

Browse from goats and possums would be the most significant threat to the site. The site is not completely fenced, allowing sheep and cattle access.

The site has probably been modified by fire, as most of the vegetation is secondary. The exception is the matai-titoki forest in a small, more isolated gully.

Selection Criteria

Representativeness:	Low
Diversity:	Medium
Special Features:	Low
Naturalness:	Medium
Viability:	Medium-high
Size and shape:	Low
Buffering:	Low
Fragility and Threat:	Low

Significance

Good diversity of forest types. Also a good example of a mixed kanuka forest, with some species which are unusual for this unit.

Recommendations

Control of goats and possums would be the most significant management options to enhance the natural qualities of the site.

The site is mostly fenced, as there is a risk of stock being lost over the bluffs. However, some of the site is not fenced and requires fencing.

RAP 12 : MAUNGANUI BUSH II

Survey Form: V20.10
Grid Reference: NZMS 260 V20 337 164
Area: 40ha
Altitude: 600m
Ecological System: 5

Ecological Units

- 1a. 40% rimu / broadleaf - rewarewa - (lemonwood) - (mahoe) emergent forest on steep sideslope spurs
- 1b. 30% broadleaf - rewarewa - (lemonwood) - (mahoe) forest on steep sideslope and gully
2. 20% manuka - (horopito) shrubland on gully and steep sideslope
3. 10% pasture on bluffs, steep sideslope and gully

Landform

Gentle to steep sideslope transected by small gullies and spurs. A number of rock-shelters and overhangs were noted throughout the site. A stream flows from a cave at the top of the site and flows down along the southern side of the site.

Vegetation

The major vegetation unit is a forest with broadleaf and rewarewa being the dominant species in the canopy. Lemonwood and mahoe are also present in significant numbers, with cabbage tree, houhere and kahikatea also noted in the canopy in localised patches. The understorey is mostly formed from tree nettle, horopito, *Coprosma rhamnoides* and *Polystichum vestitum*. This unit has the appearance of having been selectively logged, as stumps were visible, and the canopy height is quite variable: from a forest to open patches of shrubland and fernland.

On spurs and sideslopes in the site, emergent rimu were noted over the same canopy and understorey species. This is probably the same vegetation type as the previous one, except that it has been less modified.

On steep sideslopes directly above the stream, a shrubland with manuka and lancewood as its dominant species was noted. This unit also has mingimingi (*Leucopogon fasciculatus*), tree fuchsia and rangiora present in it, which forms a buffer between the farmland and the bush. Along the sides of the stream *Jovellana sinclairii*, *Senecio banksii*, *Craspedia minor* and pasture grasses were noted.

On steep sideslopes around bluffs, along the top of the site, *Coprosma rugosa* and manuka over a pasture of browntop is the major vegetation type. The bluffs themselves are bare, but have some scenic value.

Fauna

Goats, sheep and possums were the introduced mammals noted in the site.

Birdlife in the site is reasonably diverse, with grey warbler, fantail, kereru, tui and bellbird being the native species noted in the site, and yellowhammer, chaffinch, blackbird, magpie, and turkey being the introduced ones.

Modifiers/Threats

Goats are having a substantial impact on the quality of the site, browsing out much of the palatable understorey.

Although the site has been fenced, cattle and sheep appear to still have access.

Blackberry was noted in the site.

The site has the appearance of having been selectively logged, with the rimu on the steep spurs being too difficult to be harvested.

Selection Criteria

Representativeness:	Medium-high
Diversity:	Medium-high
Special Features:	Medium
Naturalness:	Medium
Viability:	Medium
Size and shape:	Low-medium
Buffering:	Medium-high
Fragility and Threat:	Medium

Significance

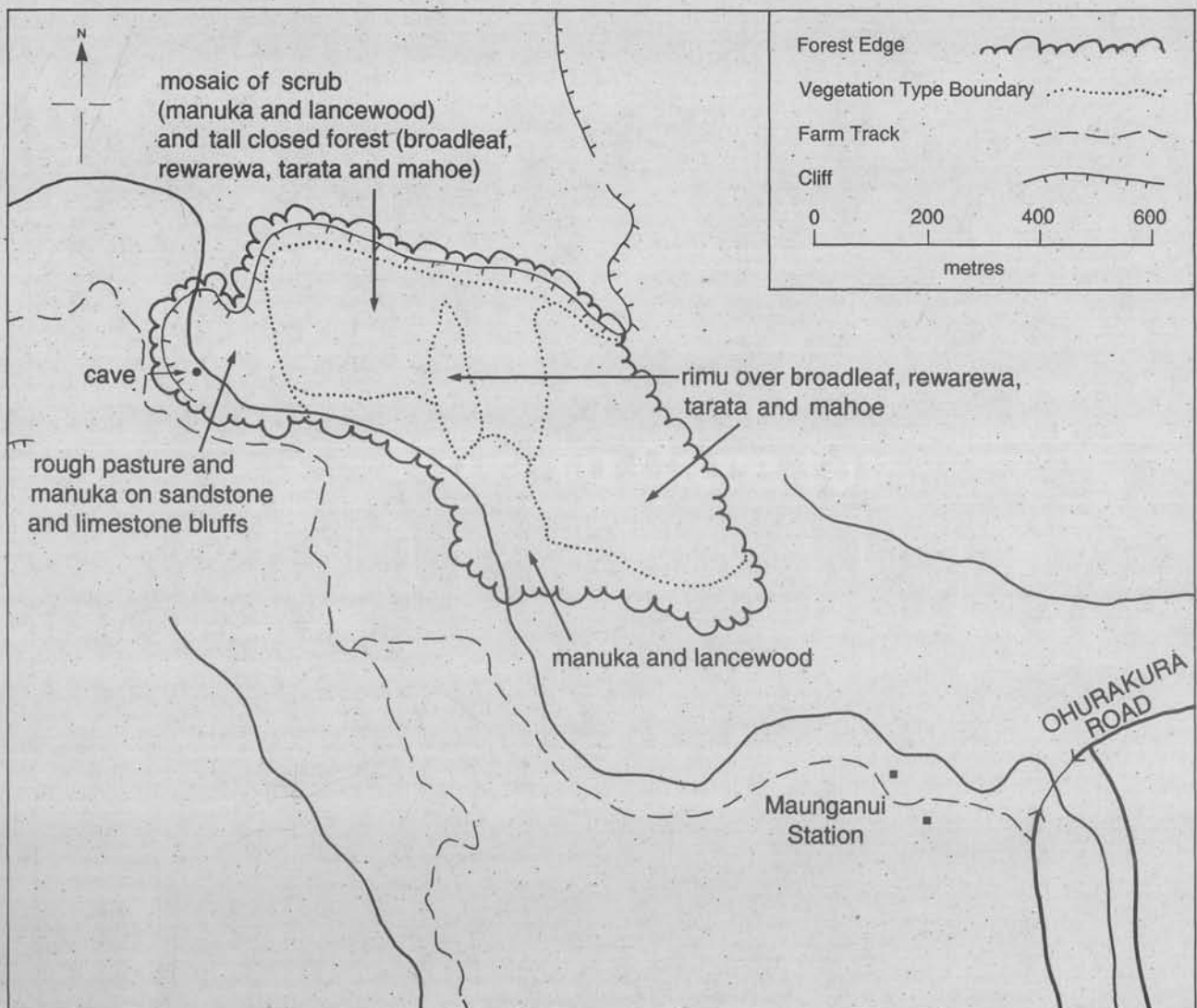
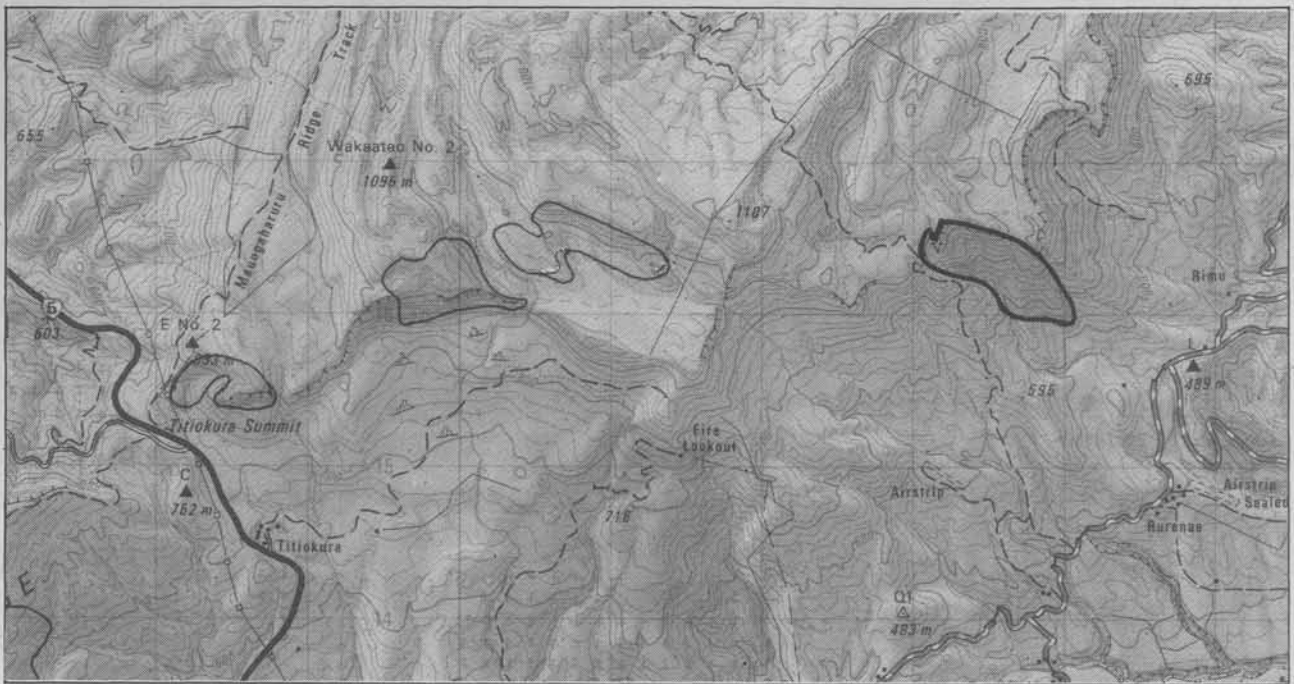
Totara was present as an emergent tree in this site. In many sites it has been logged out and is therefore not common in the Maungaharuru Ecological District.

Puka was also noted in this site, the only site where it was found.

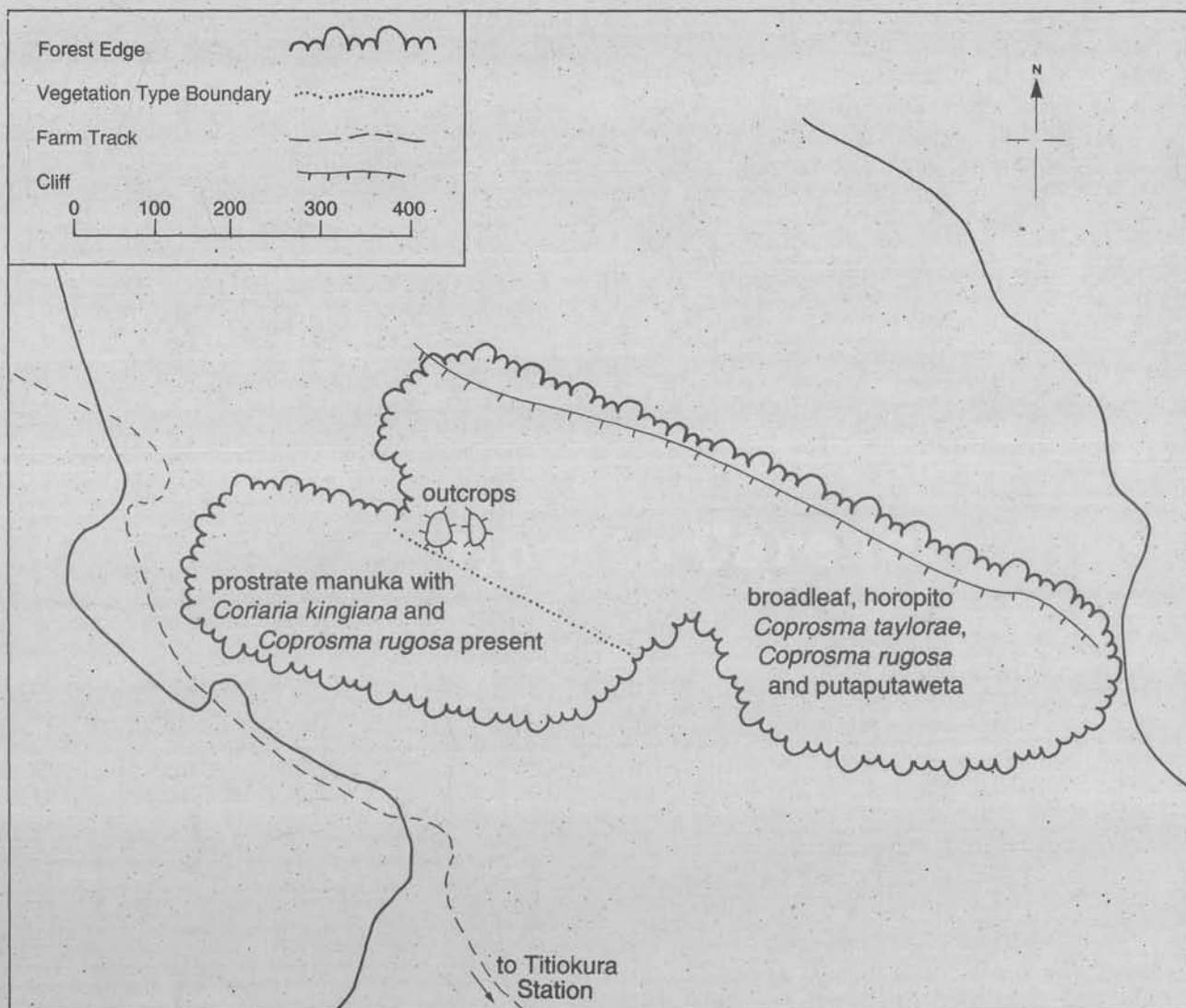
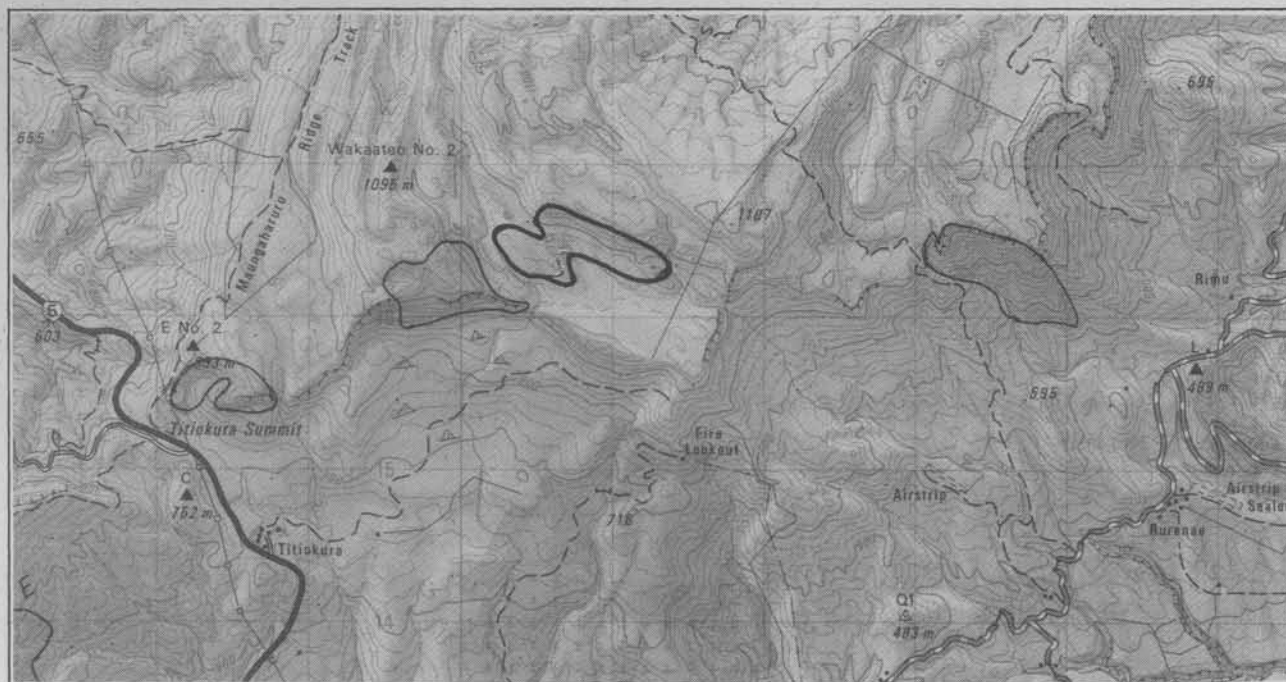
The site also has an unusual mix of montane and lowland species present.

Recommendations

Fencing, and animal control are the two most significant requirements for the continued viability and enhancement of the site.



RAP 13 : TITIOKURA SHRUBLAND



RAP 13 : TITIOKURA SHRUBLAND

Survey Form: V20.13
Grid Reference: NZMS 260 V20 310 164
Area: 16ha
Altitude: 1000m
Ecological System: 1 and 5

Ecological Units

1. 80% broadleaf - horopito - *Coprosma* 'taylorae' - Hall's totara - (weeping mapou) / *Polystichum vestitum* shrubland on footslope and sideslope
2. 20% manuka - *Coprosma rugosa* - *Coriaria kingiana* shrubland on hanging valley floor

Landform

Steep and gentle sideslope, gully bluffs and outcrops in a hanging valley. The site has a number of dolines throughout it, which most of the watercourses drain into.

Vegetation

The major vegetation type of this site is a diverse shrubland of *Coprosma* 'taylorae', Hall's totara, broadleaf and mountain holly. Also noted throughout this unit, in low numbers, were weeping mapou, *Aristotelia fruticosa* and *Melicytus alpinus*. This was found on the footslopes and sideslopes of the hanging valley. A number of outcrops and bluffs also exist in this unit. These support a number of unexpected or browse susceptible plants on their upper reaches. These are the shrubs *Pseudopanax colensoi*, *Olearia furfuracea*, *Coprosma tenuifolia* and *Coprosma foetidissima*; and the herbs *Ourisia macrophylla*, *Parabebe catarractae* ssp. *decora*, *Ranunculus royl*, *R. amphitrichus* and *Oreomyrrhis colensoi*.

On the hanging valley floor, a scrubland of prostrate manuka, *Coriaria kingiana* and *Coprosma rugosa* are found. This unit may be the result of regeneration after relatively recent fires.

Fauna

Goats and sheep were noted in the site. It is also possible that deer are present here too, as evidence of their type of browse was also noted.

A grey warbler was the only bird noted in this site. This may be because the weather was very cold and overcast on the day the site was visited.

Modifiers/Threats

The major threats to this site are grazing by feral goats and sheep. The site is unfenced.

Selection Criteria

Representativeness:	Medium
Diversity:	Medium
Special Features:	Medium
Naturalness:	Low?
Viability:	Low?
Size and shape:	Low
Buffering:	Low
Fragility and Threat:	Medium

Significance

This site has an assemblage of species in it which is uncommon in the ecological district. This is probably due to the bluffs acting as a refuge for browse-susceptible species. This allows a high potential for regeneration to occur once browsing animals have been controlled.

Recommendations

For this site to become viable, fencing and control of feral animals needs to be undertaken.

RAP 14 : TITIOKURA BUSH I

Survey Form: V20.16
Grid Reference: NZMS 260 V20 298 163
Area: 40ha
Altitude: 1020m
Ecological System: 1

Ecological Units

- 1a. 40% broadleaf - (putaputaweta) - (tree fuchsia) forest on sideslope
- 1b. 30% broadleaf - (mountain holly) - (*Coprosma* 'taylorae') - (weeping mapou) - (Hall's totara) forest - shrubland on rolling tops
2. 30% horopito and *Polystichum vestitum* shrubland on steep sideslopes and bluffs

Landform

The site consists of gentle sideslopes to steep sideslopes, rising up from a hanging valley, to a topslope and then rolling tops. The 'tops' are dotted with sink-holes, which have shallow gullies and ridges with small fluted outcrops along them. Beyond the rolling tops, along the south-eastern side of the site, steep bluffs drop away down a steep sideslope to Te Pohue.

Vegetation

Broadleaf forest, with putaputaweta and tree fuchsia are the dominant canopy species on the lower parts of the sideslopes. Under this, horopito is the only shrub present in significant proportions. However, *Coprosma* 'taylorae', tree fuchsia and tree nettle are also present in this unit. *Polystichum vestitum* forms a very dense ground cover throughout this unit.

On the topslopes, mountain holly, *Coprosma* 'taylorae', Hall's totara and weeping mapou form a shrubland on the crests of the small ridges, while broadleaf reaches forest-height in the gullies. The understorey consists of horopito and *Polystichum vestitum*, but not as densely as at lower altitude.

Bluffs and outcrops are host to a number of goat-susceptible plants. *Parabebe catarractae* var. *decora*, *Blechnum chambersii*, *Anisotome aromatica*, *Oxalis magellanicum* and *Gnaphalium subrigidum* were among these.

Fauna

Goats were quite common in the top part of the site.

Native birds noted were bellbird, silvereye and grey warbler; with chaffinch being the only introduced one.

Modifiers/Threats

Goats are the major vegetation modifier, although sheep use the site for shelter and food in winter.

Some weed species were noted (mainly pasture), but these are really a result of the modification by goats and sheep.

Selection Criteria

Representativeness:	Medium
Diversity:	Low-medium
Special Features:	Low
Naturalness:	Medium
Viability:	Low-medium
Size and shape:	Medium-high
Buffering:	Medium
Fragility and Threat:	Medium

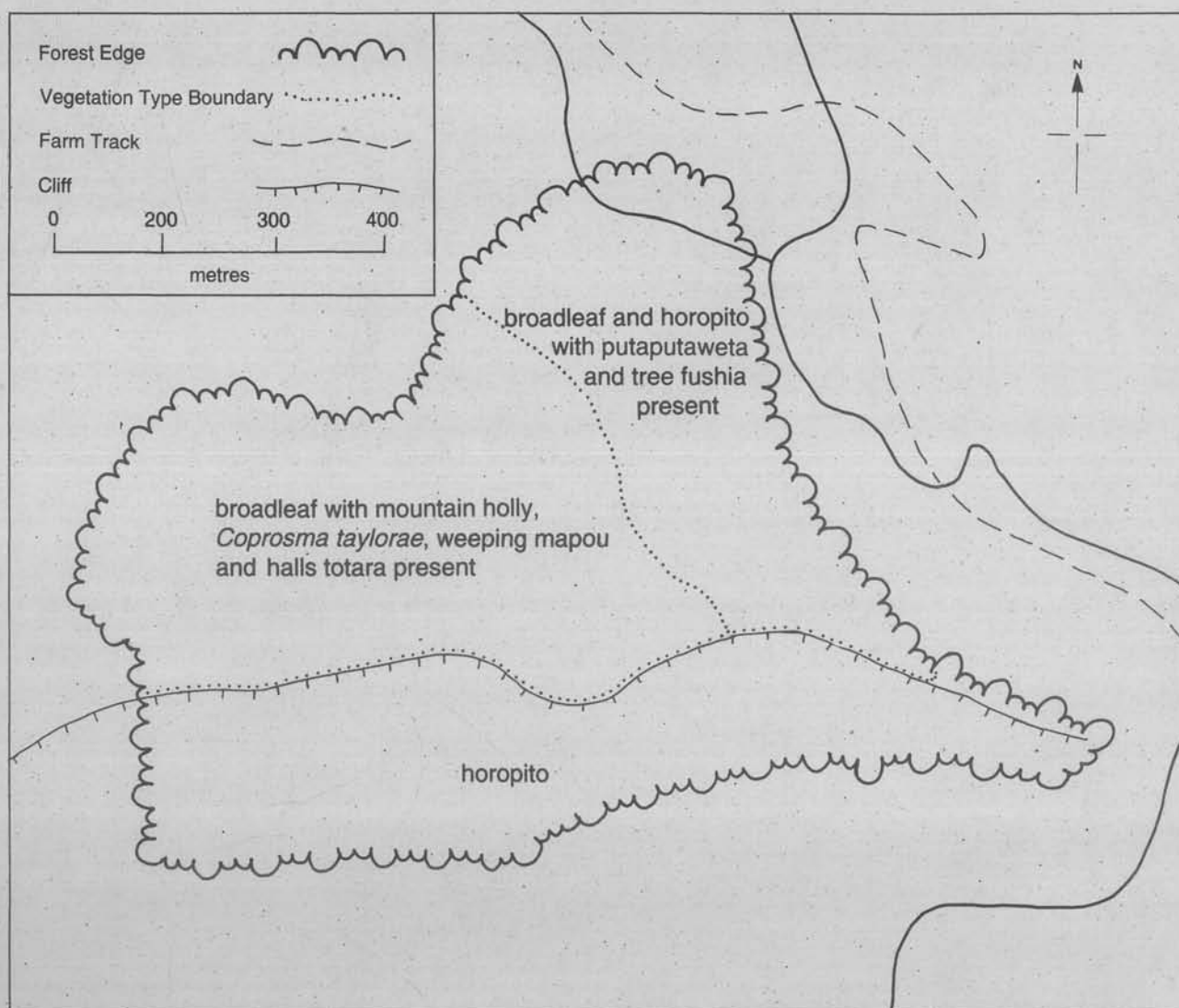
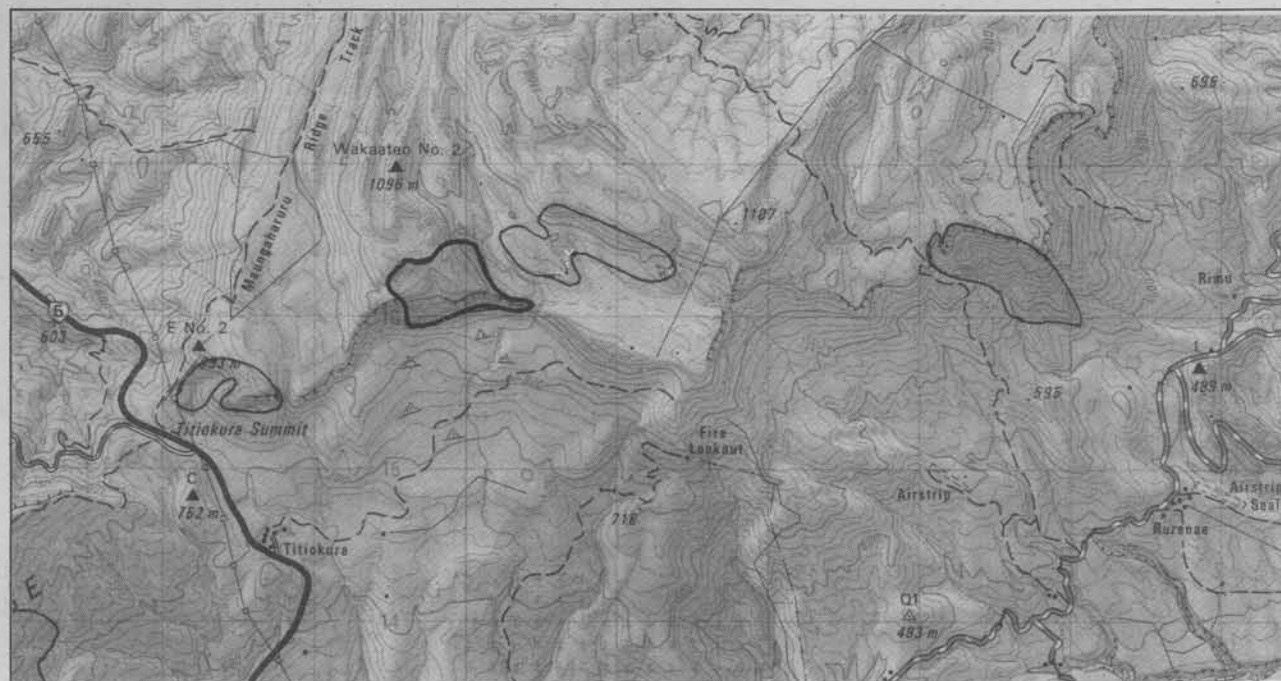
Significance

Site forms part of a "corridor" between other sites in the area.

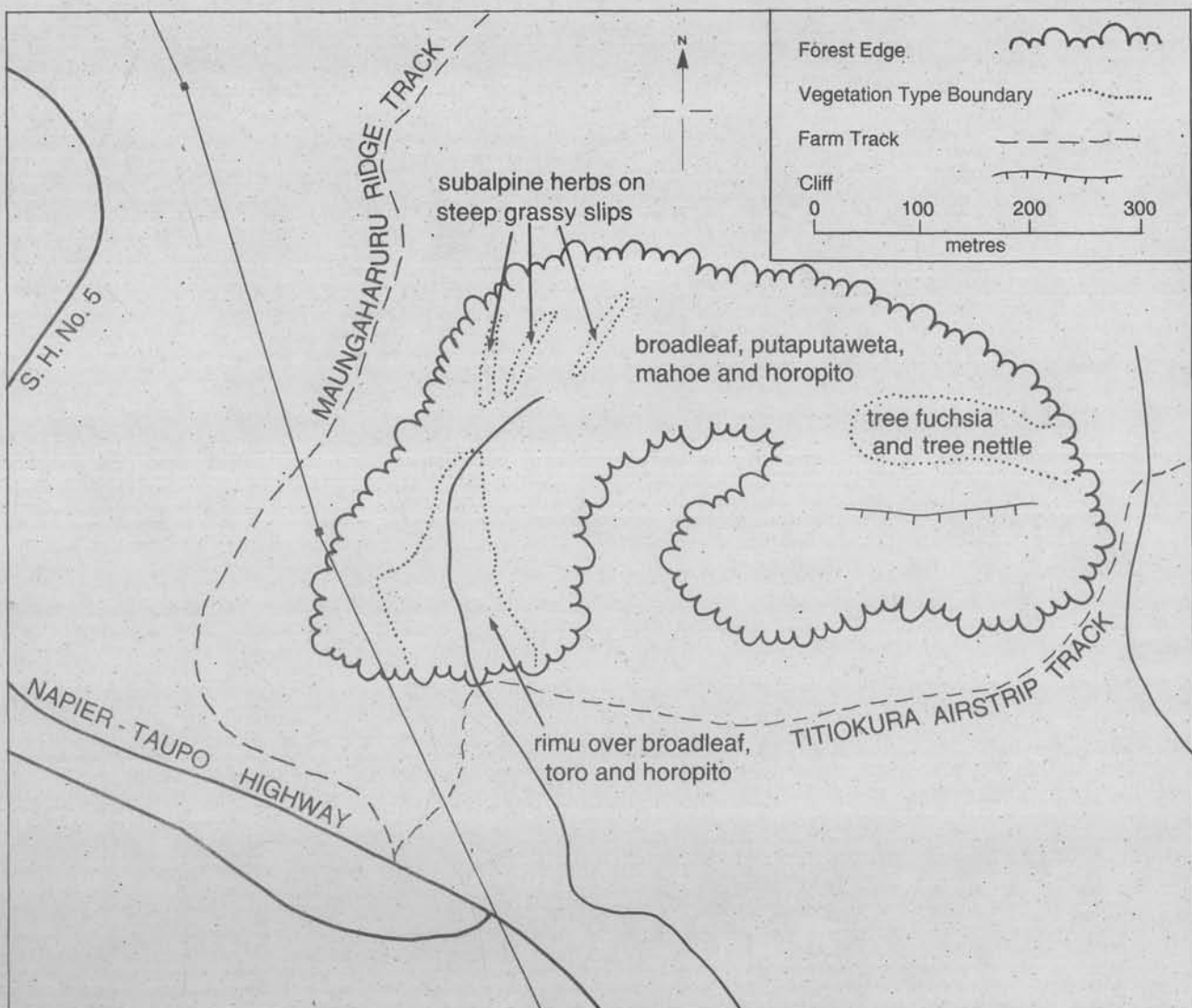
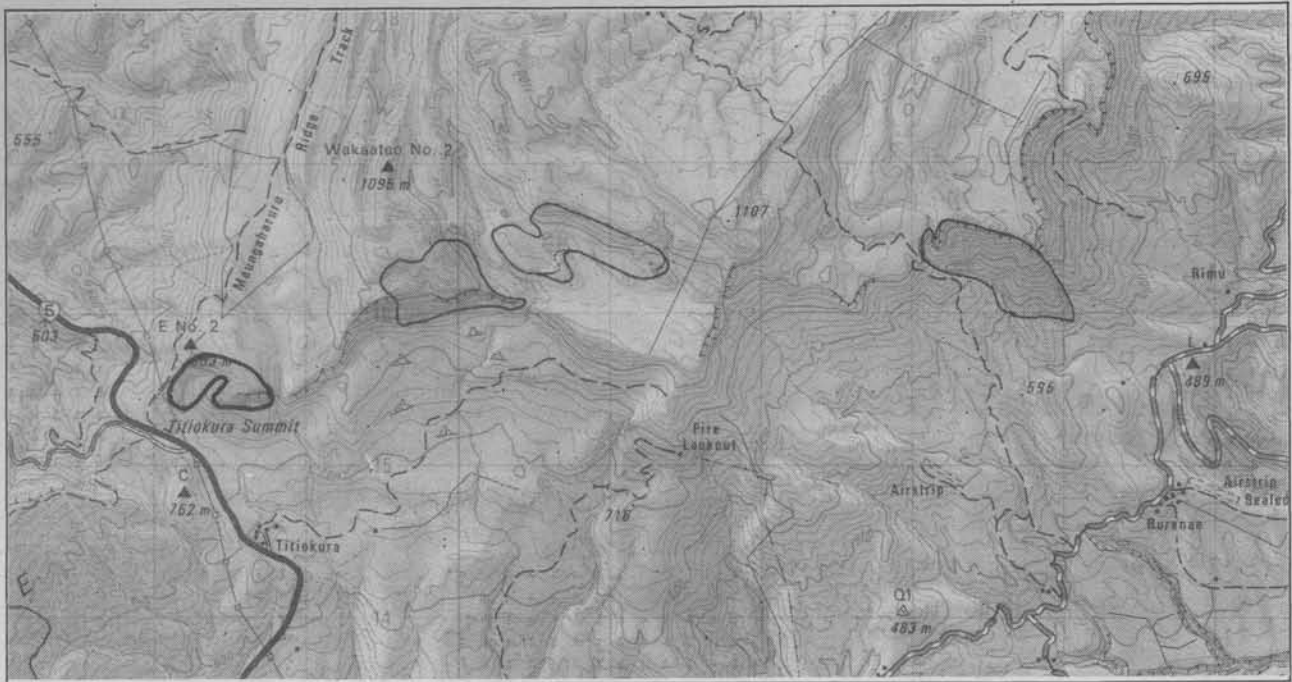
Recommendations

Fencing and animal control are the most significant actions required to make this site viable.

RAP 14 : TITIOKURA BUSH I



RAP 15 : TITIOKURA BUSH II



RAP 15 : TITIOKURA BUSH II

Survey Form: V20.18
Grid Reference: NZMS 260 V20 285 155
Area: 30ha
Altitude: 800m
Ecological System: 1 and/or 5

Ecological Units

- 1a. 20% (rimu) / toro - broadleaf emergent podocarp forest on gentle sideslope
- 1b. 65% broadleaf - putaputaweta - mahoe - / horopito forest on gentle and steep sideslope
2. 10% tree fuchsia treeland (- open forest) on gully
3. 5% sub-alpine herbs and grasses on steep sideslope and gully

Landform

Gentle sideslope in a saddle (Titiohora Summit), extending up on to steep sideslope and topslope.

The site is transected by a number of small gullies and spurs. Erosion slips are evident along some of these gullies.

Vegetation

On the gentle sideslopes, an emergent forest of rimu over a canopy of toro and broadleaf is the dominant vegetation. A shrub tier of horopito was noted in this unit. On the sides of gullies in this unit, seedlings and saplings of wineberry, *Coprosma tenuifolia*, karamu, tree fuchsia and pate are growing where they are out of reach from goats. Some small herbs, such as *Senecio minimus*, *S. wairauensis*, *Urtica incisa*, *Nertera* aff. *dichondrifolia* and *Asplenium bookerianum*, are also found here.

On the steep sideslope, a forest of broadleaf, putaputaweta and mahoe exists over shrubs of horopito and tree nettle. Scattered throughout this unit are other less common shrubs such as *Coprosma linariifolia* and *Coprosma rugosa*.

In a small hanging valley near the top of the site a treeland of tree fuchsia and tree nettle was found. The canopy height in this unit varied considerably, from ground level to about four metres. The understorey was poorly developed, with tree nettle being the only shrub and *Hydrocotyle novae-zelandiae* forming a ground-cover.

On the steep slips in the gullies, a herbfield of sparse pasture with *Helicbrysum bellidioides*, *Ranunculus royi*, *R. amphitrichus*, *Craspedia minor*, moss and other alpine herbs was found.

Fauna

Goats, possums and hares were all noted in the site.

Cattle and sheep also have access to the site.

A quite diverse range of birds were noted in the site including: tui, grey warbler, pipit, tomtit, silvereye, bellbird, Australasian harrier, chaffinch, blackbird and skylark.

Modifiers/Threats

Goats are a significant threat to the site. There is a lack of regeneration (and understorey), in the units which they can access. Combined with goats, climate is a significant vegetation modifier. Heavy snows on the site have damaged some of the canopy trees, forming gaps. In an undisturbed site this would be a natural process. However, where regeneration is not occurring due to browse, this threatens the viability of the site.

Parts of the site appear to have been burned in the past. These areas have regenerated to some extent, but this is now static.

Cattle pugging was evident in unit 2.

Selection Criteria

Representativeness:	Medium
Diversity:	High
Special Features:	Medium
Naturalness:	Low-medium
Viability:	Low-medium
Size and shape:	Medium
Buffering:	Low
Fragility and Threat:	Medium

Significance

Diversity in this site is high. This was the only site in the Maungaharuru Ecological District where *Coprosma linariifolia* and a number of species of ferns were found.

Recommendations

With goat control, this site will be well on the road to recovery. Fencing to remove cattle and sheep would be the next most important step for this sites viability.

RAP 16 : CARSWELL BUSH

Survey Form: V20.26
Grid Reference: NZMS 260 V20 217 100
Area: 40ha
Altitude: 750m
Ecological System: 5

Ecological Units

1. 90% (rimu) / mahoe - putaputaweta - broadleaf - (cabbage tree) forest on steep sideslope, spur and gully
2. 10% manuka - *Coprosma* 'taylorae' - (*Coprosma rugosa*) shrubland on spur and sideslope

Landform

The site is composed of a small valley, gullies and gully heads in a steep sideslope. It is separated from the surrounding farmland by a spur on the southern side and topslopes along the northern side. The site also has a number of outcrops and bluffs in it.

Vegetation

Most of the site is a forest of occasional emergent rimu over a canopy dominated by mahoe, putaputaweta and broadleaf. In a gully head, cabbage trees are locally dominant in the canopy. Even though goats are present in large numbers, the understorey is quite diverse. Tree nettle, horopito and putaputaweta are the dominant shrubs, with kaikomako, hangehange and *Coprosma rhamnoides* notable. *Blechnum fluviatile* and *Polystichum vestitum* are the dominant ground-cover species. On rock outcrops in this unit, a shrubland of tree nettle, koromiko, mountain flax, cabbage tree and rangiora are found. On parts which are inaccessible to goats, a ground cover of maiden hair fern, *Asplenium lyallii*, *Ranunculus royi*, *Blechnum chambersii* and *Asplenium hookerianum* grows.

On clearings in the site, regeneration of the shrubs manuka, *Coprosma* 'taylorae', *Coprosma rugosa* and mingimingi (*Leucopogon fasciculatus*) is occurring over pasture. The site is also buffered by a shrubland of these species. This unit occurs on the spur on the southern side of the site.

Fauna

Large numbers of goats were present in the site. Possums were also noted. Sheep and occasionally cattle could also gain access.

Bird-life was reasonably diverse, with Australasian harrier hawk, grey warbler, bellbird, whitehead and shining cuckoo being the native species recorded, and blackbird and chaffinch being the introduced ones.

Modifiers/Threats

Regeneration was poor due to goat (and sheep) browse.

Totara was the dominant canopy species in this area in the past and may have been selectively logged out from this site. However, there is little evidence (stumps, skid roads etc.) left on site to support this.

Selection Criteria

Representativeness:	Medium-high
Diversity:	Medium
Special Features:	Low-medium
Naturalness:	High
Viability:	Medium
Size and shape:	Medium
Buffering:	High
Fragility and Threat:	High

Significance

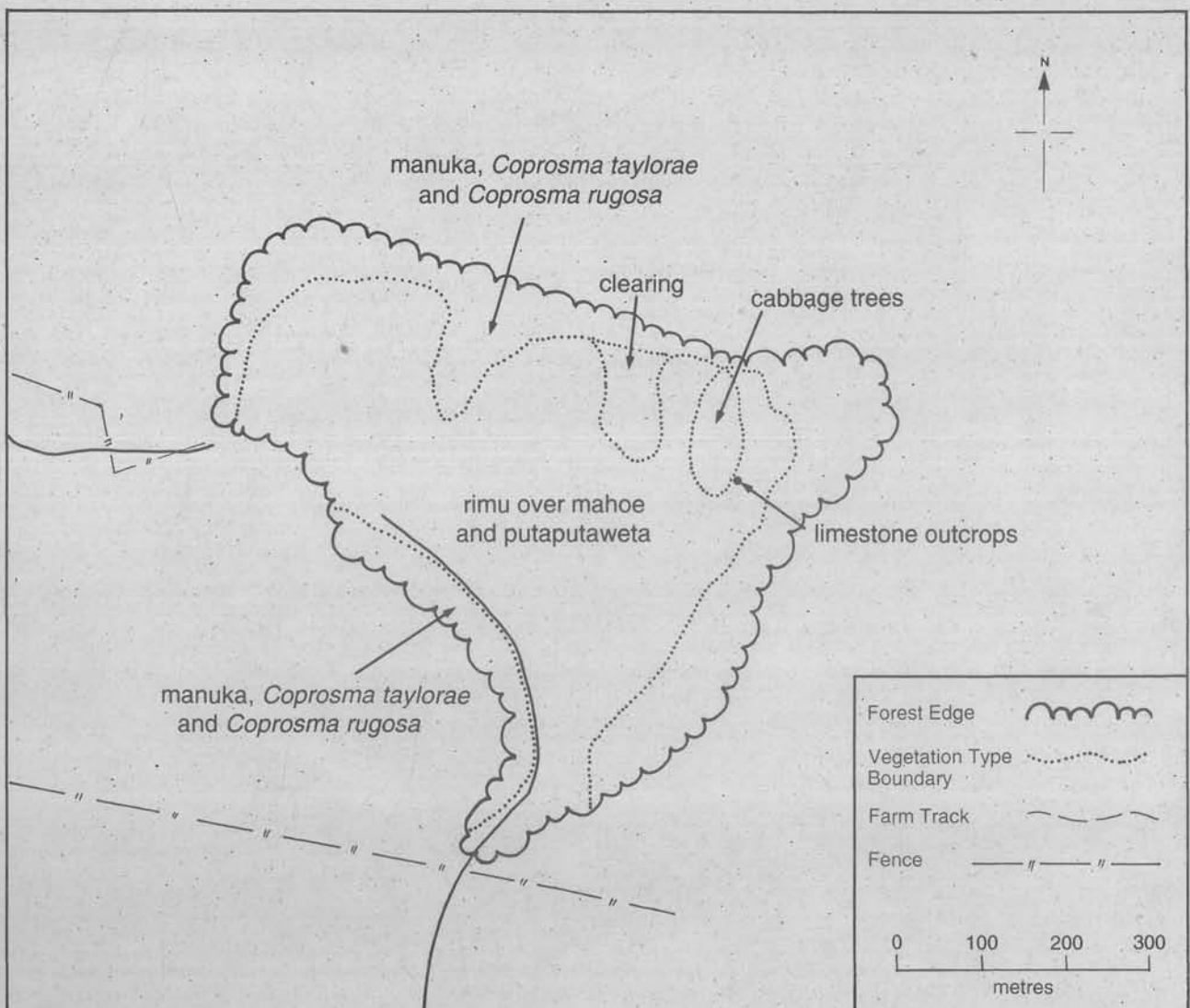
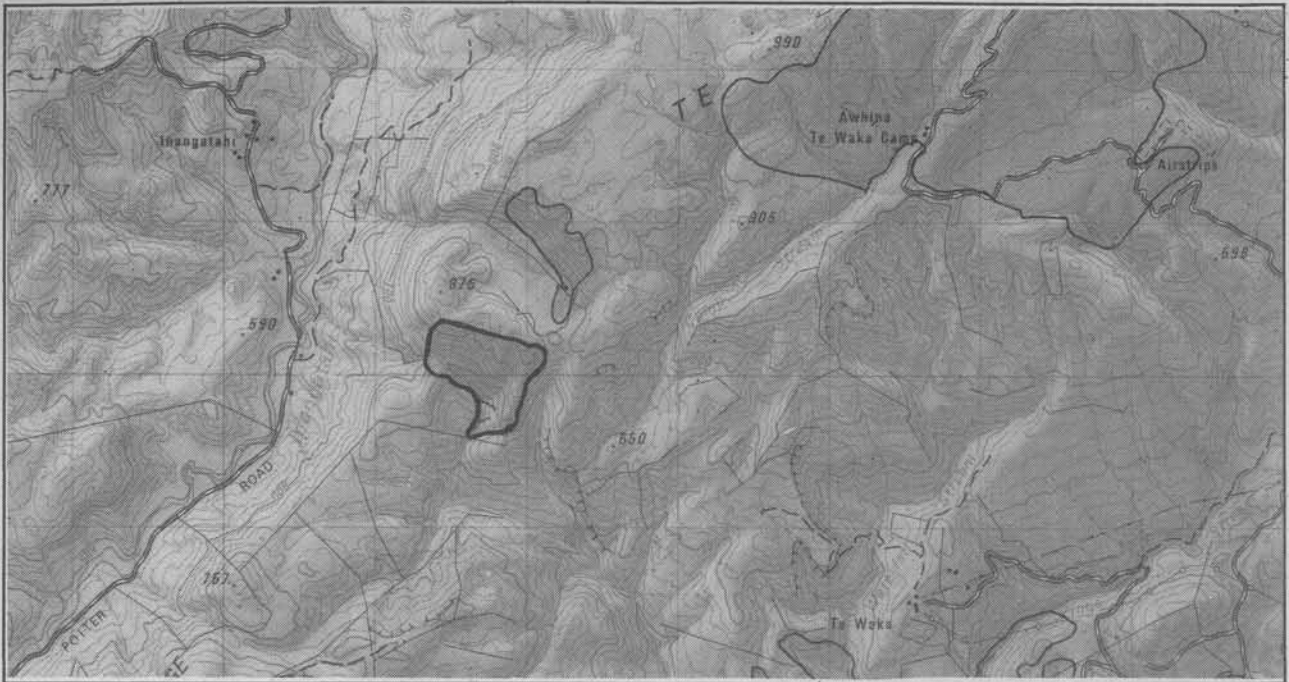
Even though this site had large numbers of goats, regeneration has not yet been greatly affected, and the site's natural values are "high". This site also has an interesting range of lowland and montane species present in it.

Recommendations

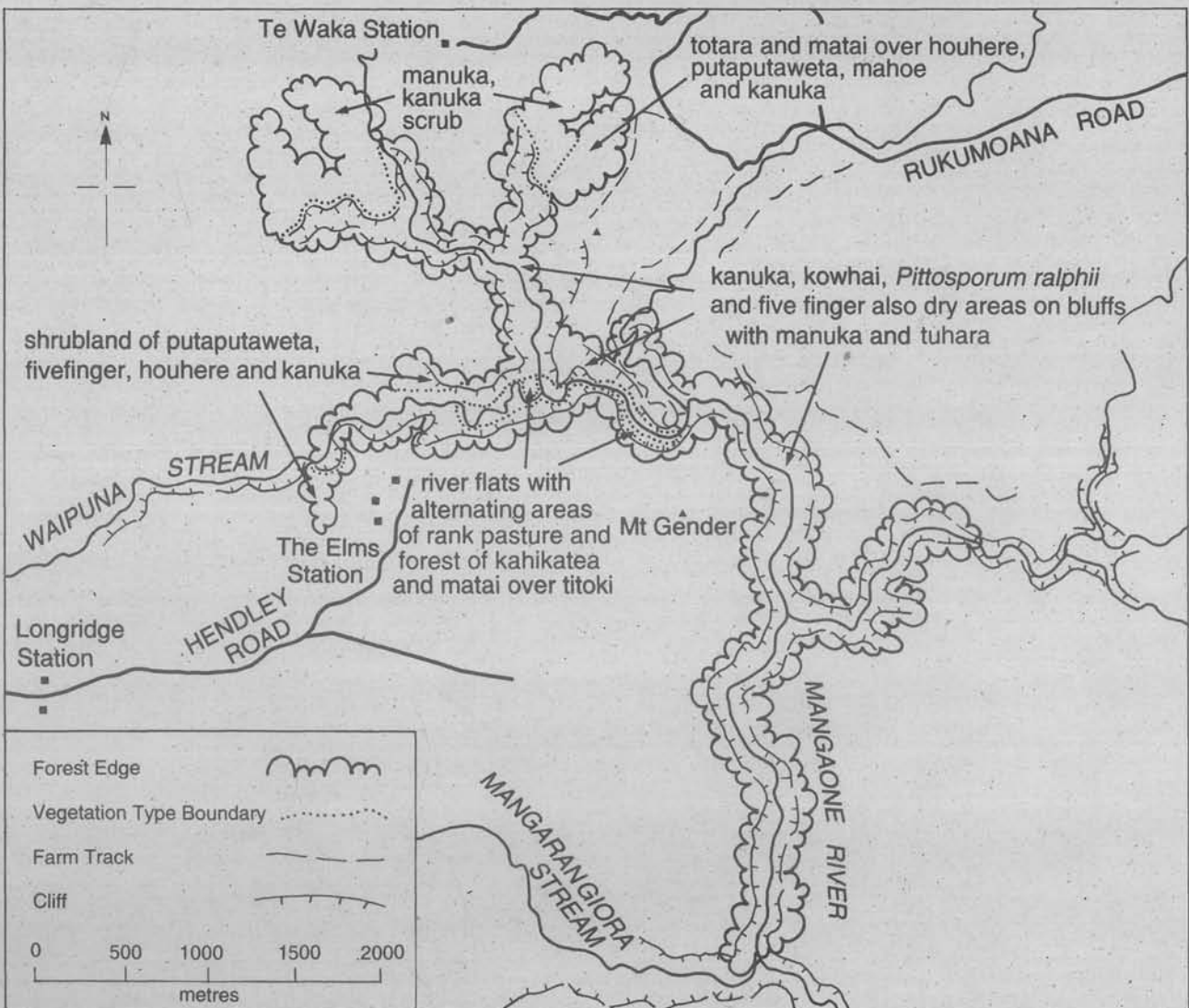
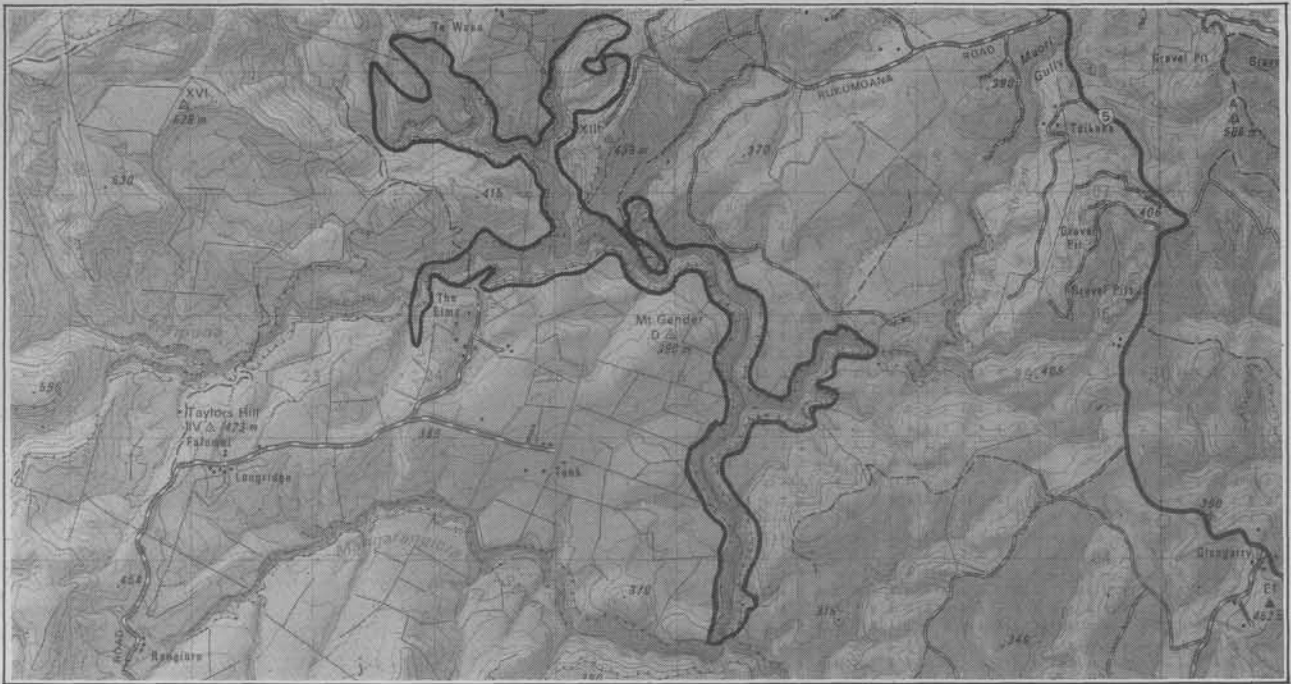
Goats were prevalent in the site, at this stage, understorey diversity has not been greatly affected, however, for this diversity to remain, goat control needs to be carried out.

The site needs fencing to be viable in the long term.

RAP 16 : CARSWELL BUSH



RAP 17 : MANGAONE STREAM BUSH



RAP 17 : MANGAONE STREAM BUSH

Survey Form: V20.28
Grid Reference: NZMS 260 V20 266 060
Area: 325ha
Altitude: 250m
Ecological System: 4 and 5

Ecological Units

1. 40% kanuka - kowhai - *Pittosporum ralphii* - (fivefinger) forest on stream sides and flats
2. 5% kahikatea - matai / titoki / (poataniwha) / blackberry forest and rank pasture on river-flats
3. 10% totara - matai / houhere - putaputaweta - mahoe - kanuka forest on gentle sideslope
4. 20% manuka - kanuka scrub on gentle sideslope
5. 10% putaputaweta - fivefinger - houhere - kanuka shrubland on steep sideslope and gully
6. 15% tuhara - manuka shrubland and openland on bluffs

Landform

The site consists of river flats along the sides of Mangaone Stream, with steep sideslope and bluffs forming a gorge around them. Upstream, the watercourse opens out into a series of gullies with gentle sideslopes.

Vegetation

Vegetation on the river-flats alternates between emergent podocarp forest and rank weedy pasture. The podocarp forest is dominated by, kahikatea and matai, which emerge over a canopy of titoki. In the understorey, the shrubs *Melicope simplex* and *Coprosma rhamnoides* are present. Blackberry is the dominant ground-cover species, although some ferns and seedlings were noted.

The secondary forest's canopy is dominated by kanuka, kowhai and *Pittosporum ralphii* with fivefinger also present in significant proportions. The dominant understorey shrubs in this unit are wineberry, rangiora and tree nettle, while the ground-cover is the ferns *Blechnum chambersii* and *Pneumatopteris pennigera*. This unit is found on damp, steep sideslopes and gullies along the stream.

On the bluffs, mountain flax, tuhara, *Pittosporum ralphii*, kowhai and manuka forms a sparse shrubland between expanses of bare papa rock. This unit also has numerous small herbs in it.

On gentle sideslopes upstream from the gorge, a forest of emergent totara and matai over a canopy of houhere, putaputaweta, mahoe and kanuka is found in a gully. This area was known locally as 'Totara Reserve' and is one of the few places in the Maungaharuru Ecological District where totara is dominant.

On gentle sideslopes around Kings Stream and Waterfall Stream, a scrubland of manuka and kanuka, with some putaputaweta also has regenerated. This alternates with pasture and a secondary forest of putaputaweta, fivefinger, houhere and kanuka.

Fauna

Goats were common in the site and dead sheep and cattle were noted in the stream. Birds noted were shining cuckoo, bellbird, kereru, fantail, grey warbler, kingfisher, chaffinch and blackbird.

Modifiers/Threats

Willows (*Salix fragilis*) were noted along the stream and may alter the river's dynamics.

Goats have browsed out the understorey, allowing blackberry to become troublesome. The site has been fenced where a threat to stock exists, but the presence of dead animals in the stream suggests that they can gain access.

Selection Criteria

Representativeness:	Medium-high
Diversity:	Medium-high
Special Features:	Medium
Naturalness:	Low-medium
Viability:	Medium
Size and shape:	Low-medium
Buffering:	Low
Fragility and Threat:	Medium

Significance

The site joins up with Mangaone Marginal Strip (CMS Reference 80206), an 8.5ha area of similar vegetation, down-stream. This site would be a useful addition to this PNA. This is one of few sites where *Lophomyrtus obcordata* has been found.

Recommendations

Control of goats is the most feasible option to increase the naturalness of this area. This would allow regeneration, reducing blackberry in the long run.

RAP 18 : OPAU STREAM BUSH II

Survey Form: V20.31
Grid Reference: NZMS 260 V20 194 035
Area: 20ha
Altitude: 550m
Ecological System: 3 or 5

Ecological Units

1. 85% putaputaweta - houhere - mahoe forest on spur, steep and gentle sideslope
2. 15% manuka - *Carex secta* - *Carex geminata* tussockland on gentle sideslope and gully

Landform

The site is situated on a tributary of Opau Stream, on a sideslope, which has a spur, gully and gully head in it. In the gully, a wetland has formed where water seeps out through a gravel layer in the sideslope.

Vegetation

In the forest, the dominant species in the canopy is putaputaweta, houhere and mahoe. The mistletoe *Tupeta antarctica* is common on putaputaweta on the spur in this unit. Broadleaf, kanuka, cabbage tree, rewarewa, kahikatea, mamaku and tree fuchsia are all present in low numbers in the canopy too. In the understorey, the few shrubs which are present are mostly confined to steep gully sides. These are, tree nettle, koromiko, rangiora and kanono, interspersed with the ferns *Pneumatopteris pennigera*, *Blechnum chambersii* and *Asplenium bookerianum*. Mingimingi (*Leucopogon fasciculatus*) and manuka are common along the fence around the outside of the site and in other areas with a greater amount of light. The ground cover in this unit is formed from *Coprosma rhamnoides* and dense knee-to-thigh-high hooksedge.

On the lower sides of the sideslope, a wetland is situated. This has a tussockland of *Carex secta*, *Carex geminata* and manuka. The sedge *Carex secta* in this site is more open than usual, and may be Druce's hybrid: *Carex secta* X *Carex diandra*. This wetland is quite weedy and has buttercup, ragwort, pasture grasses and gorse present in it.

Fauna

About ten red deer were noted in the site. Evidence of possums was noted too. Birdlife in the site was poorer than in some other sites and consisted of grey warbler, fantail, tui, chaffinch and magpie.

Modifiers/Threats

Possums are a threat to the survival of mistletoe.

Although gorse is considered by many to be a good "nurse crop" for native forests, it poses a serious threat in wetlands, where it can "choke out" the natural species. The site may have been selectively logged or burned, as there is a lack of emergent podocarps in it.

Deer browse was quite extensive in this site. This doesn't appear to have hampered regeneration as severely as if there had been goats.

The site is fenced, but stray stock may occasionally gain access.

Selection Criteria

Representativeness:	Medium
Diversity:	Medium-high
Special Features:	Medium-high
Naturalness:	Low-medium
Viability:	Medium
Size and shape:	Medium
Buffering:	Low-medium
Fragility and Threat:	Low-medium

Significance

The mistletoe *Tupeia antarctica* is common in this site on putaputaweta.

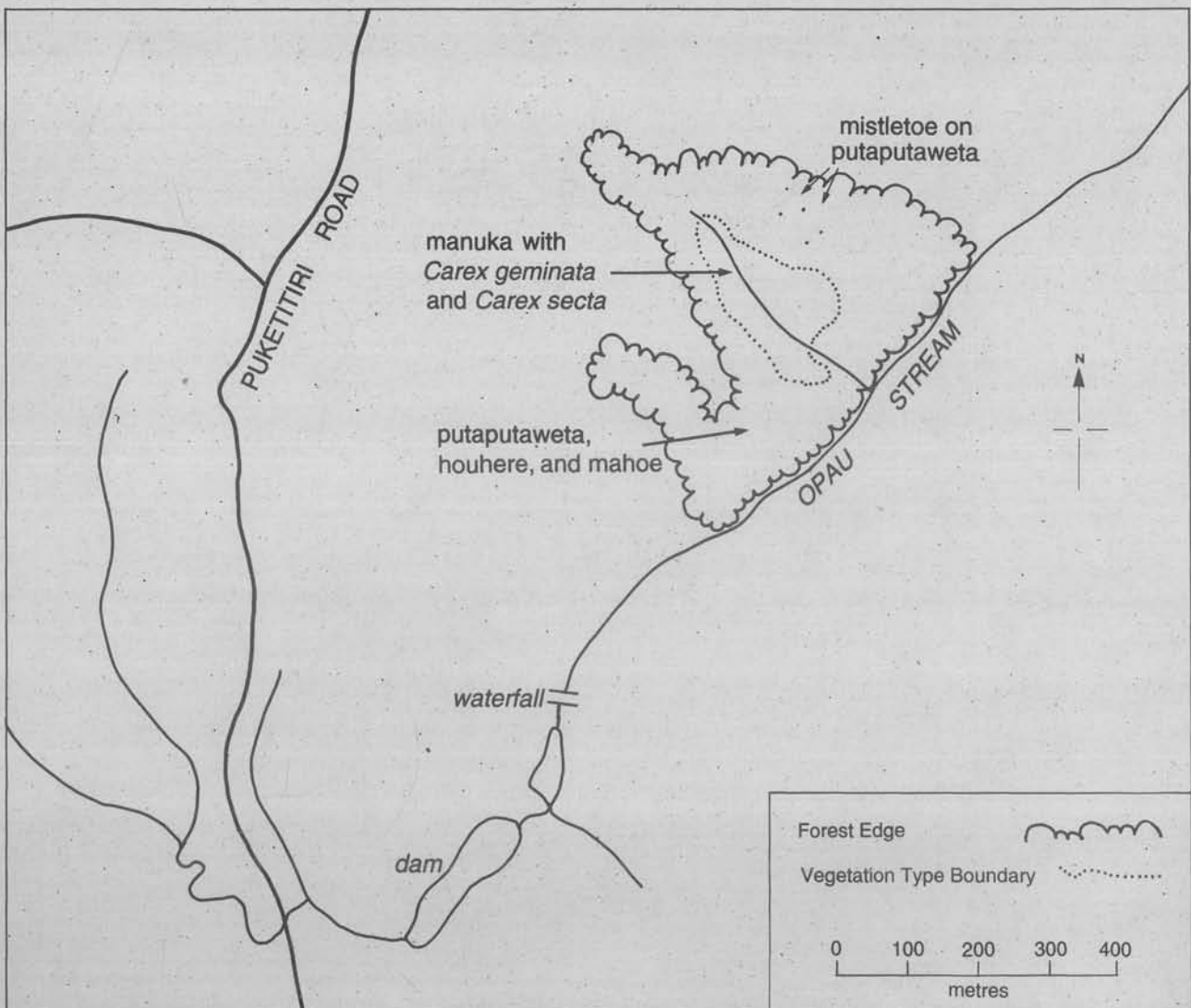
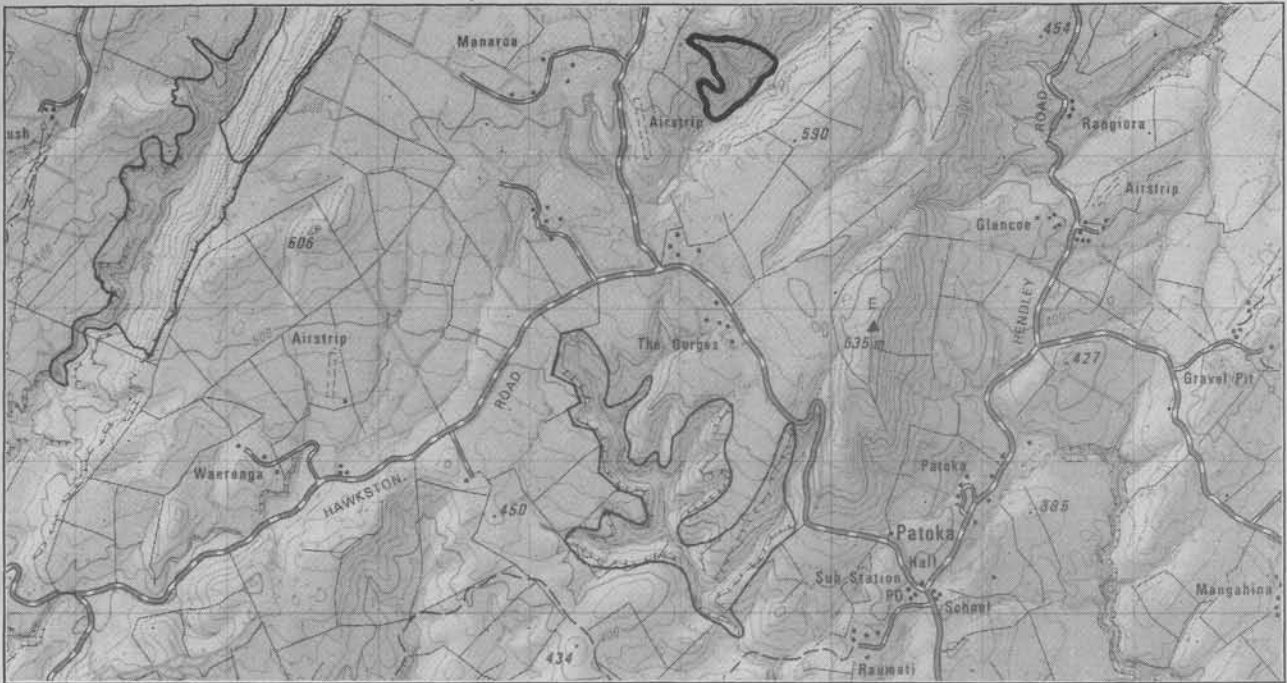
Recommendations

Place bands around putaputaweta trees so that possums have more difficulty reaching the mistletoe. Trap or poison possums to reduce their numbers.

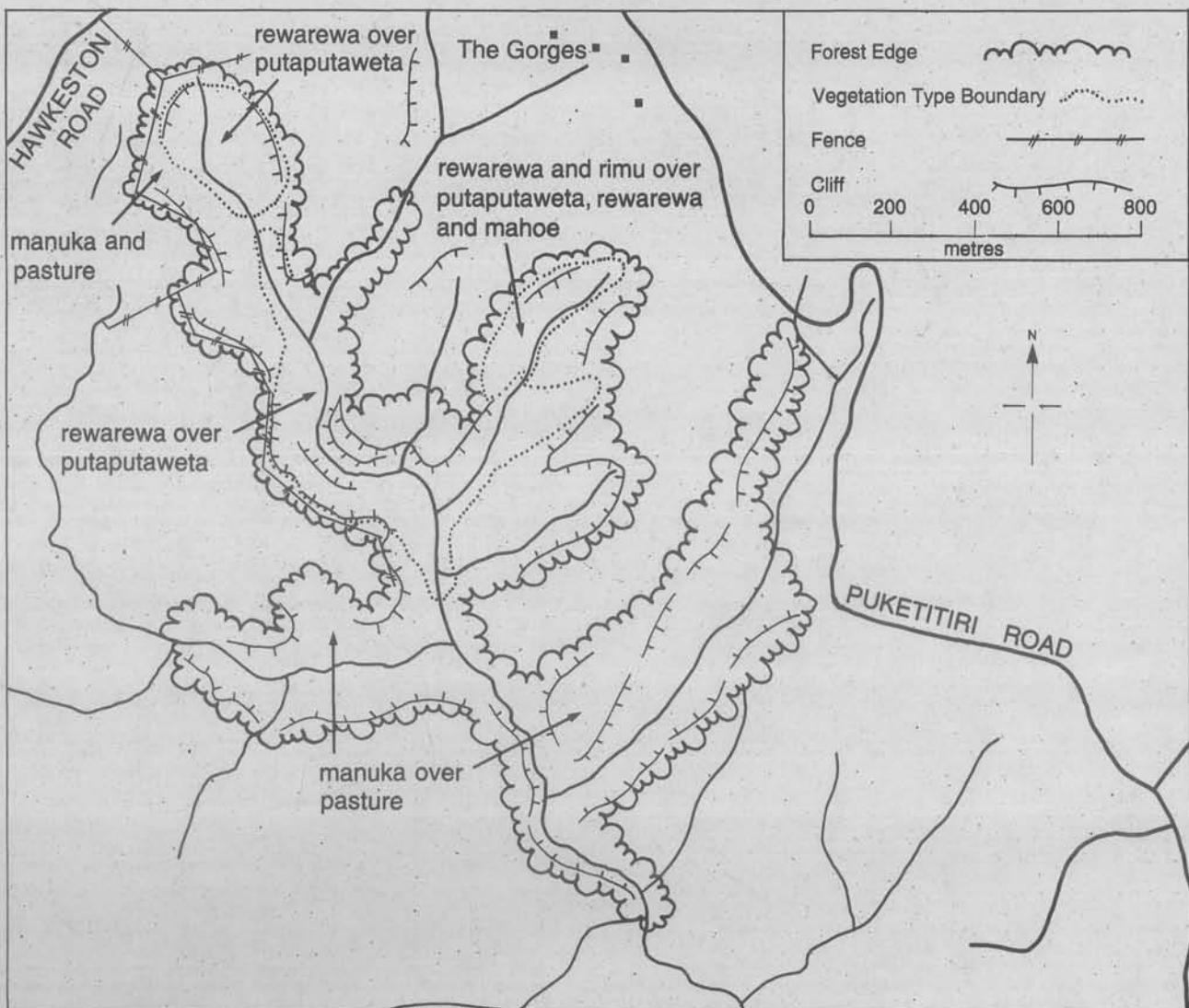
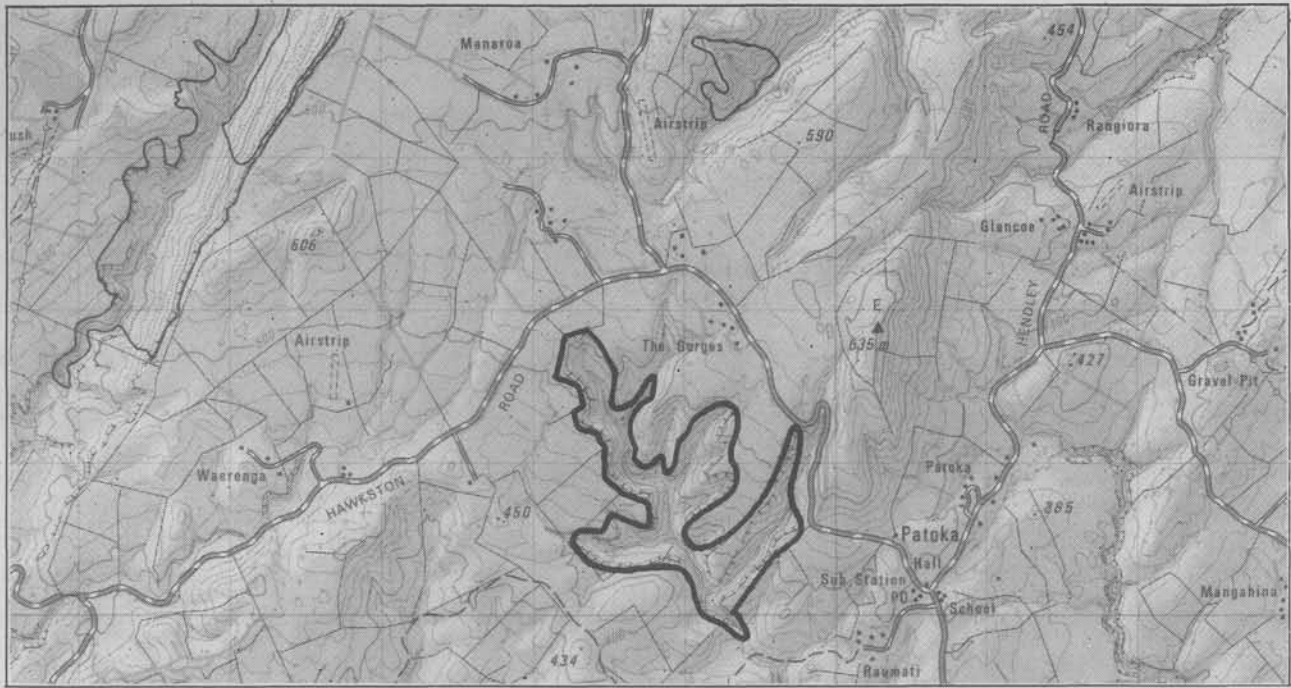
Control or attempt to remove gorse from the site.

The landowner likes having deer in the bush, so these may have to be accepted, or their population reduced to a level which causes negligible amount of damage to the bush.

RAP 18 : OPAU STREAM BUSH II



RAP 19 : THE GORGES BUSH



RAP 19 : THE GORGES BUSH

Survey Form: V20.32
Grid Reference: NZMS 260 V20 190 010
Area: 40 ha
Altitude: 410 m
Ecological System: 3

Ecological Units

rewarewa / putaputaweta - rewarewa - mahoe forest on steep and gentle sideslopes

Landform

Gully and gully heads in a series of gorges. Surrounding the gorges are steep and (almost flat) gentle sideslopes.

The gorge sides are formed from limestone and have stalactites, stalagmites and columns on them. This site appears to be a cave which has had its roof collapse.

Vegetation

Mostly a scattered treeland with some low quality forest in the gully heads and along the gorge. This forest is the densest on gentle sideslopes away from the stream. The dominant species are a canopy of rewarewa and putaputaweta over an understorey of tree nettle and supplejack. *Tupeia antarctica* is present here on putaputaweta, but is not very common. The perching orchid *Earina mucronata* was also noted. A few emergent rimu (not enough to merit significance) were noted amongst this vegetation as well.

In the gorge, tree nettle and supplejack grow amongst limestone boulders and often formed the canopy. Weeping vine rata hang down from the sides of the gorge and grow over boulders in the shade. On the higher sides of the gorge, a forest with the same dominant species as the gentle sideslopes grows. However, this site is more difficult for goats and sheep to access and has a greater diversity: other canopy species noted here include white maire, titoki, kanuka and houhere. The understorey also has a greater diversity, with hen-and-chicken fern, *Lastreopsis glabella* and *Blechnum chambersii* being common amongst supplejack and tree nettle.

Fauna

Goats were throughout this site. Possums were also noted.

Sheep and cattle had free access to the site too.

Birdlife was quite diverse, even though there was quite a lot of wind disturbance, and stream noise to make hearing difficult. Species noted were grey warbler, kingfisher, silvereye, Australasian harrier hawk, blackbird, chaffinch, skylark and magpie.

Modifiers/Threats

Goats are a major threat to the vegetation.

The site was not fenced and sheep and cattle access to the site.

The site appears to have been logged and parts of it have been burned in the past.

Selection Criteria

Representativeness:	Low
Diversity:	Medium-high
Special Features:	Medium
Naturalness:	Medium
Viability:	Low
Size and shape:	Low
Buffering:	Low
Fragility and Threat:	Medium-high

Significance

This site was selected for its landforms. The presence of limestone columns, stalagmites and stalactites is unusual in the Maungaharuru Ecological District. Even though the bush is in a highly disturbed state, the site still has high scenic values and the bush is potentially viable.

Recommendations

Control goats.
Fence off gorges and forest.

RAP 20 : TE WAKA BUSH I

Survey Form: V20.36
Grid Reference: NZMS 260 V20 250 120
Area: 395ha
Altitude: 800m
Ecological System: 5

Ecological Units

1. 60% red beech / (Hall's totara) forest on gentle sideslope
- 2a. 10% red beech - (kamahi) - (rimu) / red beech - (putaputaweta) - (broadleaf) forest on gully
- 2b. 10% (red beech) - (kamahi) - (rimu) treeland on gentle sideslope
3. 10% (*Coprosma* 'taylorae') / pasture grasses shrubland on topslope
4. 8% manuka - Hall's totara shrubland on gentle sideslope and topslope
5. 2% *Pittosporum ralphii* - mountain flax - broadleaf shrubland on bluffs

Landform

Gentle sideslope dissected by small streams, with steep gullies.
Small limestone bluffs and dolines occur throughout the site.

Vegetation

On the top slope, early fires have destroyed the vegetation leaving a shrubland of scattered *Coprosma* 'taylorae', with *Polystichum vestitum* and *Coprosma rugosa* over a pasture of browntop. There are also bluffs, which have a shrubland of broadleaf, *Pittosporum ralphii* and mountain flax. These bluffs are out of reach of goats and sheep and have a number of interesting plants on them, with native broom (*Carmichaelia arborea*), *Pseudopanax colensoi*, *Asplenium lyallii*, *Jovellana sinclairii*, *Clematis foetida*, *Gnaphalium subrigidum* and *Brachycome radicata* being among these.

On the upper parts of the gentle sideslope, red beech forms a canopy over a less well-developed sub-canopy of Hall's totara. Broadleaf, cabbage tree and tree fuchsia are also present in the sub-canopy, but not in significant proportions. The dominant shrub in the understorey is horopito, with *Coprosma rhamnoides* and tree nettle occasionally present too. The ground-cover tier is formed from *Polystichum vestitum* with *Blechnum fluviatile* and *Hypolepis ambigua* also occasionally present.

On the lower portions of the sideslope a forest with a canopy dominated by red beech, with significant proportions of kamahi and rimu, grows. A sub-canopy of red beech, putaputaweta and broadleaf is also evident. The understorey shrubs are horopito, with tree nettle present. *Polystichum vestitum* is the dominant ground-cover plant, with *Histiopteris incisa* and cobbler's pegs present too.

Below this, a treeland of red beech, kamahi and rimu remains where selective logging and farming has removed the other species.

On the gentle sideslope and topslope, where a relatively recent fire has occurred, a shrubland of manuka and Hall's totara has regenerated. Around limestone rock outcrops in this unit, *Celmisia spectabilis*, *Celmisia gracilentia*, *Geranium microphyllum*, *Gentiana bellidifolia*, mouse-ear hawkweed and *Coriaria kingiana* have formed a small herbfield.

Fauna

Goats, possum, cats, sheep and cattle were noted in the site.

Bird-diversity on the day the site was visited was surprisingly low. Those noted were: rifleman, tui, grey warbler, silvereye and chaffinch.

Modifiers/Threats

The site now has very little regeneration due to the presence of large numbers of goats.

Fire and selective logging have both played a role in modifying this site in the past.

Selection Criteria

Representativeness:	Medium-high
Diversity:	Low-medium
Special Features:	Medium-high
Naturalness:	Low-medium
Viability:	Medium-high
Size and shape:	High
Buffering:	Medium
Fragility and Threat:	Medium

Significance

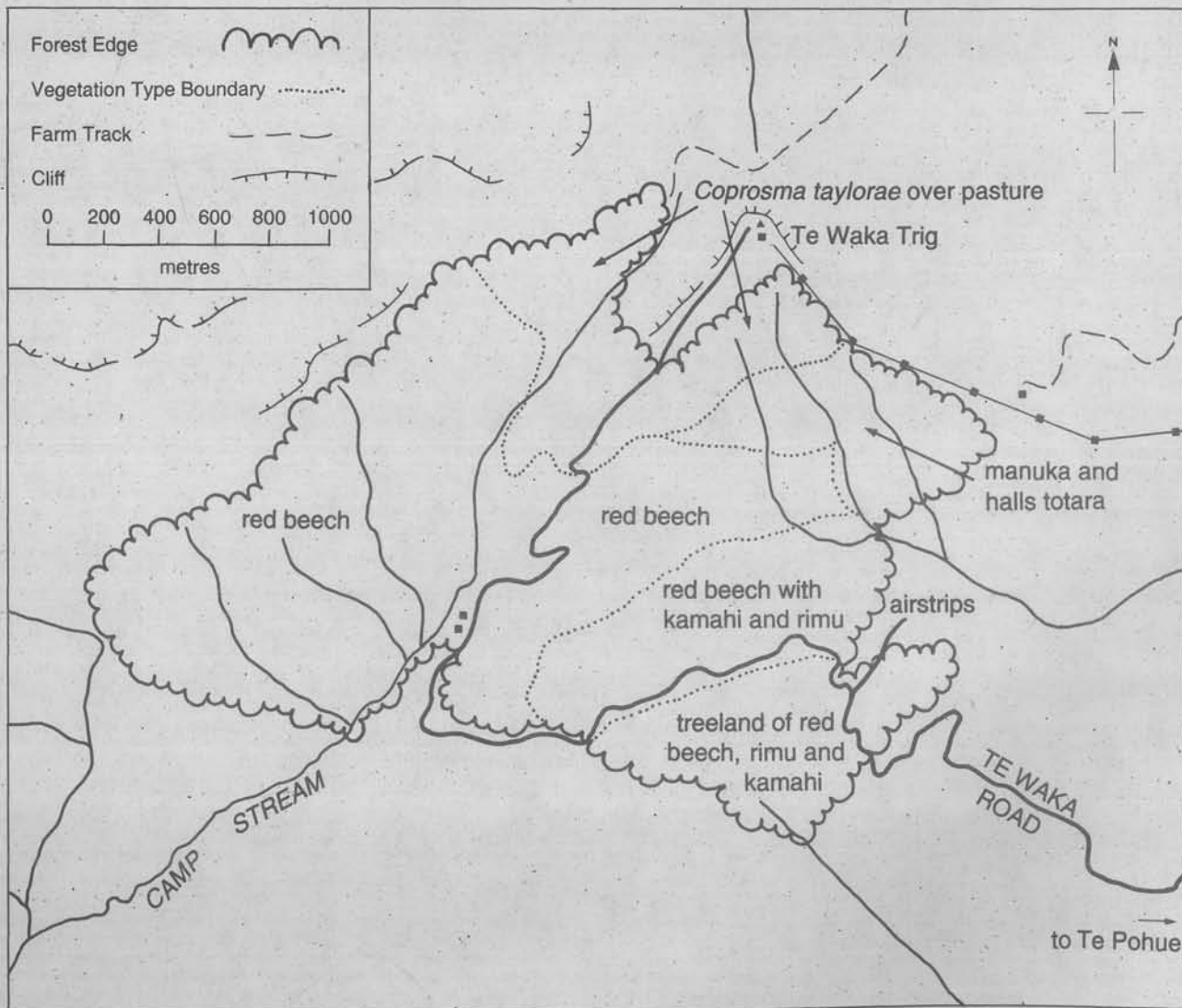
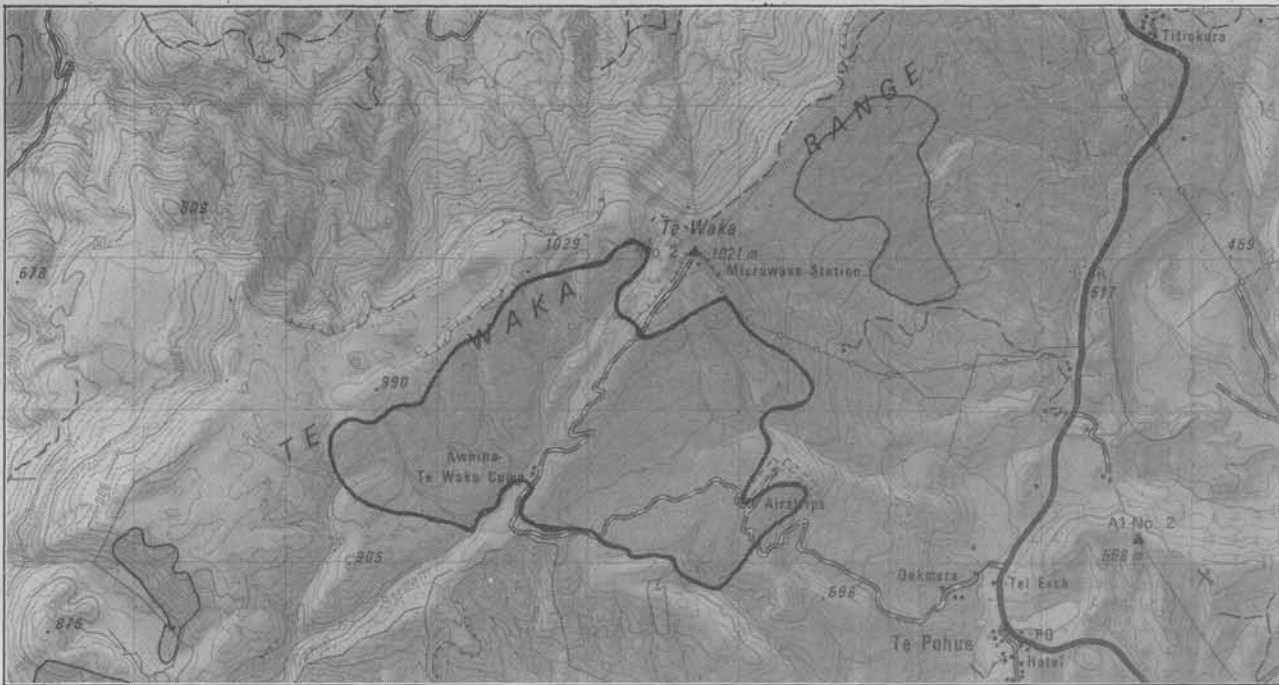
A number of plants unusual for the ecological district occur in this site.

The site extends from a lowland bioclimatic zone up to a sub-alpine one. This diversity of niches has allowed a diverse array of habitats. Human modification has further increased the range of habitats, by providing "canopy gaps".

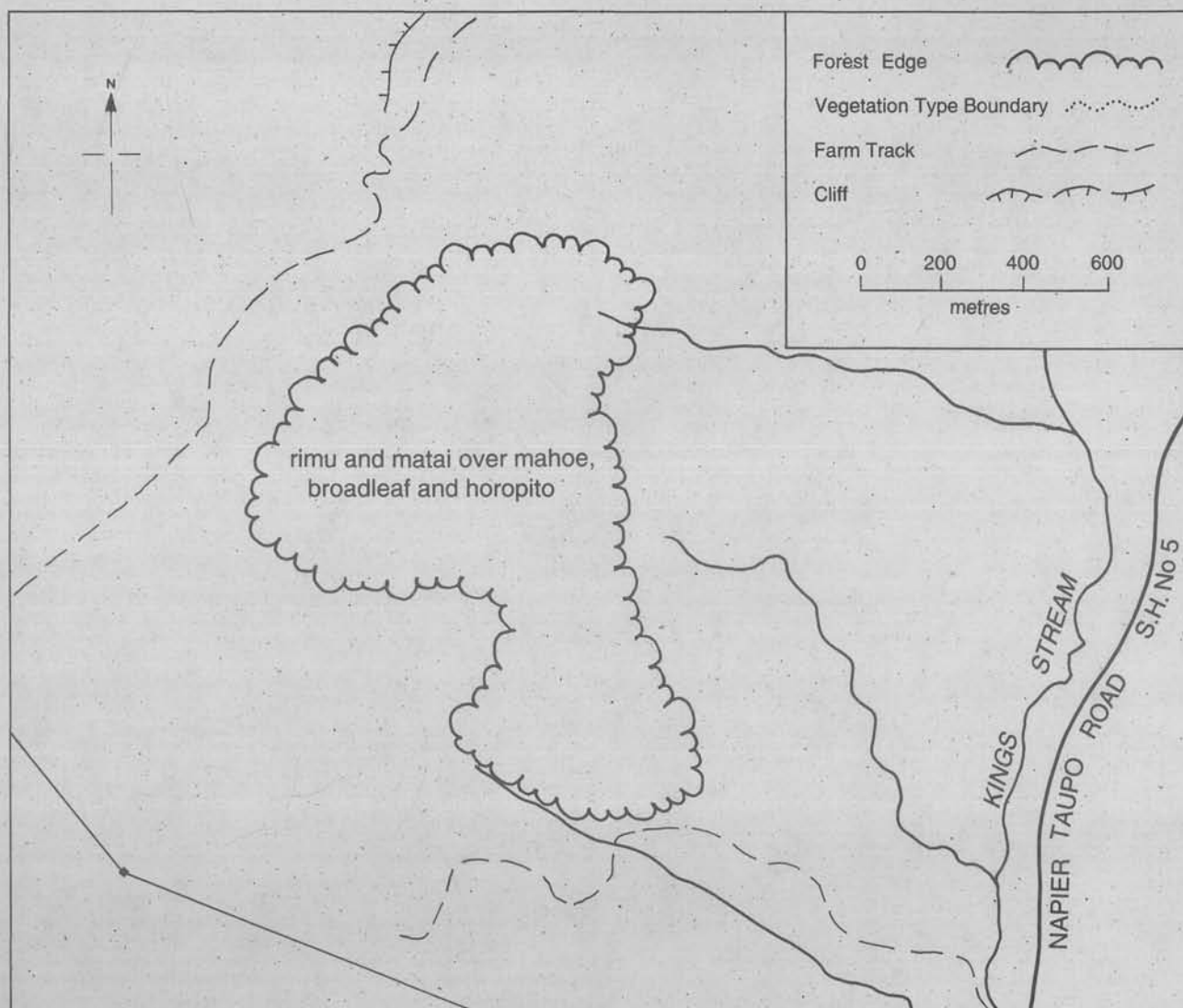
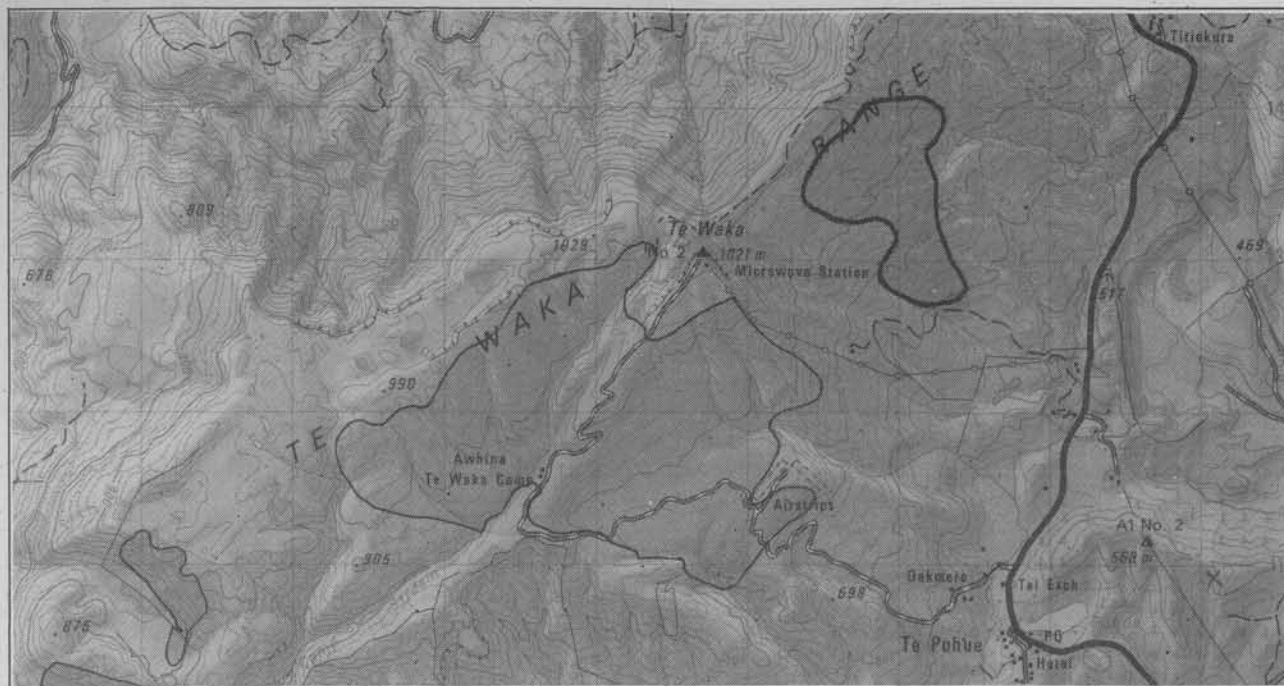
The site's relatively large size (395 ha) also makes it a significant feature of the Maungaharuru Range.

Recommendations

Fencing and goat control are the major priorities for the continued viability of this site.



RAP 21 : TE POHUE BUSH



RAP 21 : TE POHUE BUSH

Survey Form: V20.36A
Grid Reference: NZMS 260 V20 270 135
Area: 100ha
Altitude: 800m
Ecological System: 5

Ecological Units

(rimu) - (matai) / mahoe - broadleaf - horopito - (lemonwood) - (putaputaweta) forest on gentle sideslope with spurs and gullies

Landform

This site consists of narrow, deep gullies and spurs on a gentle sideslope. There are also a number of dolines and possibly a few caves in this site.

Vegetation

Vegetation consists of emergent rimu and matai over a canopy dominated by mahoe, broadleaf and horopito. Present within this canopy are significant proportions of lemonwood and putaputaweta. Lemonwood is more common on the lower parts of the sideslope, while putaputaweta is more common at higher altitude. Other plants which were noted in the canopy were tree fuchsia, toro, houhere and black maire. The height of the forest ranges from a shrubland on the spurs, through to a tall closed forest in the gullies. In the forest, the understorey has a dense shrub tier of horopito and tree nettle. Amongst these shrubs, *Neomyrtus pedunculata*, wheki ponga and *Cyathea smithii* were noted. In the ground-cover tier, *Polystichum vestitum* is the dominant plant. Cobbler's pegs is present at a significant cover percentage too. On the sides of rock outcrops in the gullies, *Blechnum chambersii*, *Ranunculus royi*, *Asplenium hookerianum*, *Blechnum colensoi* and *Jovellana sinclairii* form a ground-cover under tree nettle.

Fauna

Goats, sheep, cattle, cats, rabbits and possums were all noted in the site. Birds noted in the site were: grey warbler, tui, kereru, Australasian harrier hawk, fantail, bellbird, starling, chaffinch and blackbird.

Modifiers/Threats

Little regeneration was noted due to large numbers of goats, and sheep. The site is unfenced, and forms part of a paddock, browse and animal trails were noted throughout the site. This site has been selectively logged and one part has the appearance of having regenerated after burning.

Selection Criteria

Representativeness:	Medium-high
Diversity:	Medium
Special Features:	Medium-high
Naturalness:	Low-medium
Viability:	Medium
Size and shape:	Medium
Buffering:	Low-medium
Fragility and Threat:	Medium

Significance

There are historical records of kakabeak from this site.

Neither *Neomyrtus pedunculata* nor *Cyathea smithii* are common in the Maungaharuru Ecological District. *Blechnum colensoi* was only found in this site. No beech trees were found in this RAP, whereas in RAP 20 (one-and-a-half kilometres to the south), red beech is dominant. This may be due to climate: RAP 20 is in the rain-shadow of Te Waka trig, while this site is influenced by the wetter weather coming through from Titiokura Saddle. The lack of beech trees makes this site quite different from other remnants in its vicinity.

Requirements

The site needs fencing and reduction of goat numbers to become viable.

RAP 22 : TE WAKA BUSH II

Survey Form: V20.36B
Grid Reference: NZMS 260 V20 222 109
Area: 30ha
Altitude: 860m
Ecological System: 5

Ecological Units

1. 20% rimu - (kahikatea) / lemonwood - putaputaweta - horopito - (broadleaf) / horopito forest on valley floor and gentle sideslopes
2. 79% lemonwood - broadleaf - horopito - (putaputaweta) / horopito forest on steep sideslope
3. 1% mountain flax shrubland on outcrops

Landform

This site is found in a hanging valley south west of Te Waka Trig.

The site varies from the valley floor, to gentle sideslopes, to steep sideslopes. The valley floor is large and relatively flat, possibly seasonally wet (although quite dry when visited). The sideslopes are well drained.

Vegetation

On the valley floor, rimu and kahikatea emerge over a canopy where lemonwood, putaputaweta and horopito are dominant. The canopy height in this unit is quite variable and in places where it was higher, horopito forms a sub-canopy. Horopito is also the only understorey plant present in significant proportions, however, *Neomyrtus pedunculata*, *Coprosma rotundifolia* and *Coprosma rhamnoides* were also noted here. No ground-cover plants are significant here, although *Urtica incisa*, *Hypolepis millefolium*, *Hydrocotyle novae-zelandiae*, *Blechnum fluviatile* and *Polystichum vestitum* were noted in this unit.

On the steep sideslope, forest with a canopy dominated by lemonwood, putaputaweta, broadleaf and horopito is found. The relative proportions of horopito and broadleaf increases as altitude increases and the canopy height varies from a tall forest to a shrubland. In areas where the canopy is higher, horopito forms an understorey. It is the only shrub present in significant cover percentages and *Polystichum vestitum* and *Blechnum fluviatile* are the only significant ground-cover plants.

A number of outcrops near the site support a shrubland where mountain flax is the dominant plant amongst small herbs.

Fauna

Cattle, sheep, possums and goats were noted in this site.

Few birds were recorded in this site. These were tui, silvereye, grey warbler, blackbird and chaffinch.

Modifiers/Threats

Introduced mammals have severely reduced regeneration in this site and threaten its viability. Browse and compaction from hooves (pugging) was evident on the valley floor.

Selection Criteria

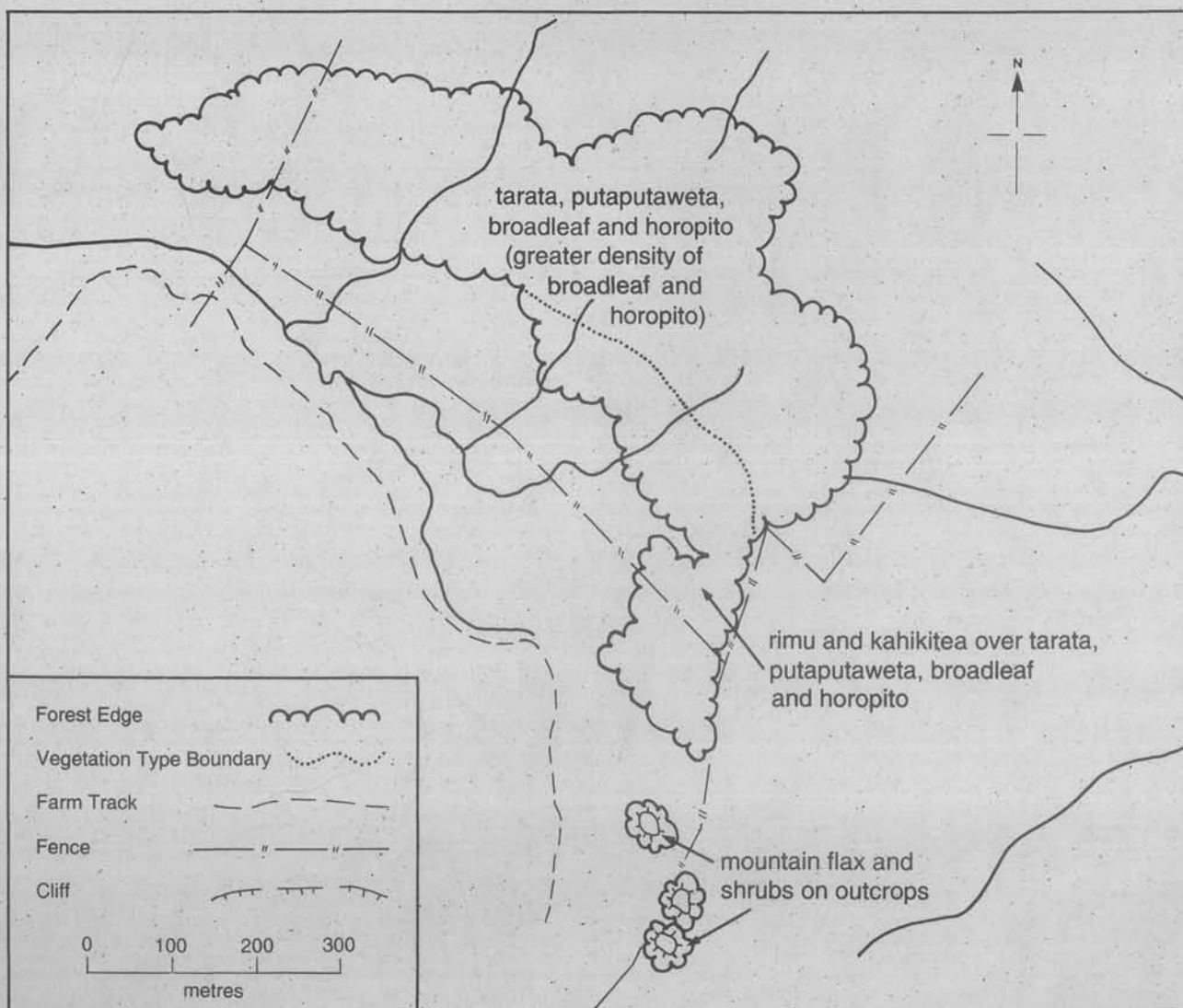
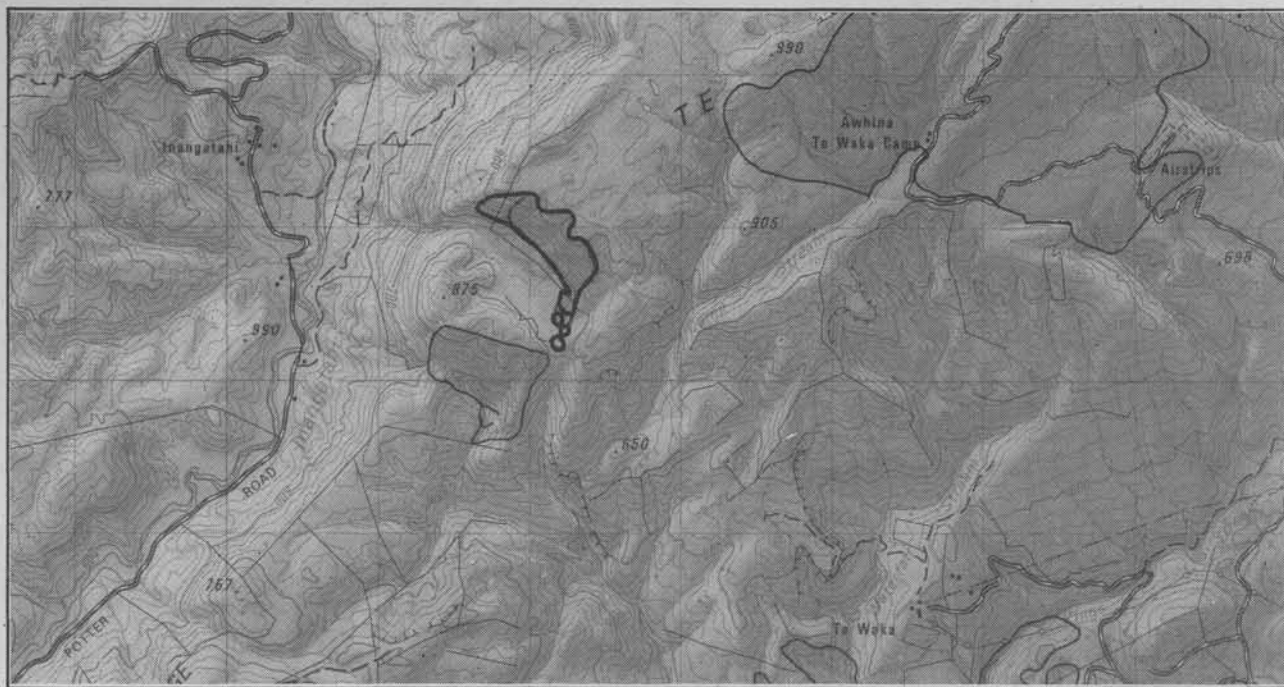
Representativeness:	Medium
Diversity:	Low-medium
Special Features:	Low-medium
Naturalness:	Low
Viability:	Low-medium
Size and shape:	Low
Buffering:	Low
Fragility and Threat:	High

Significance

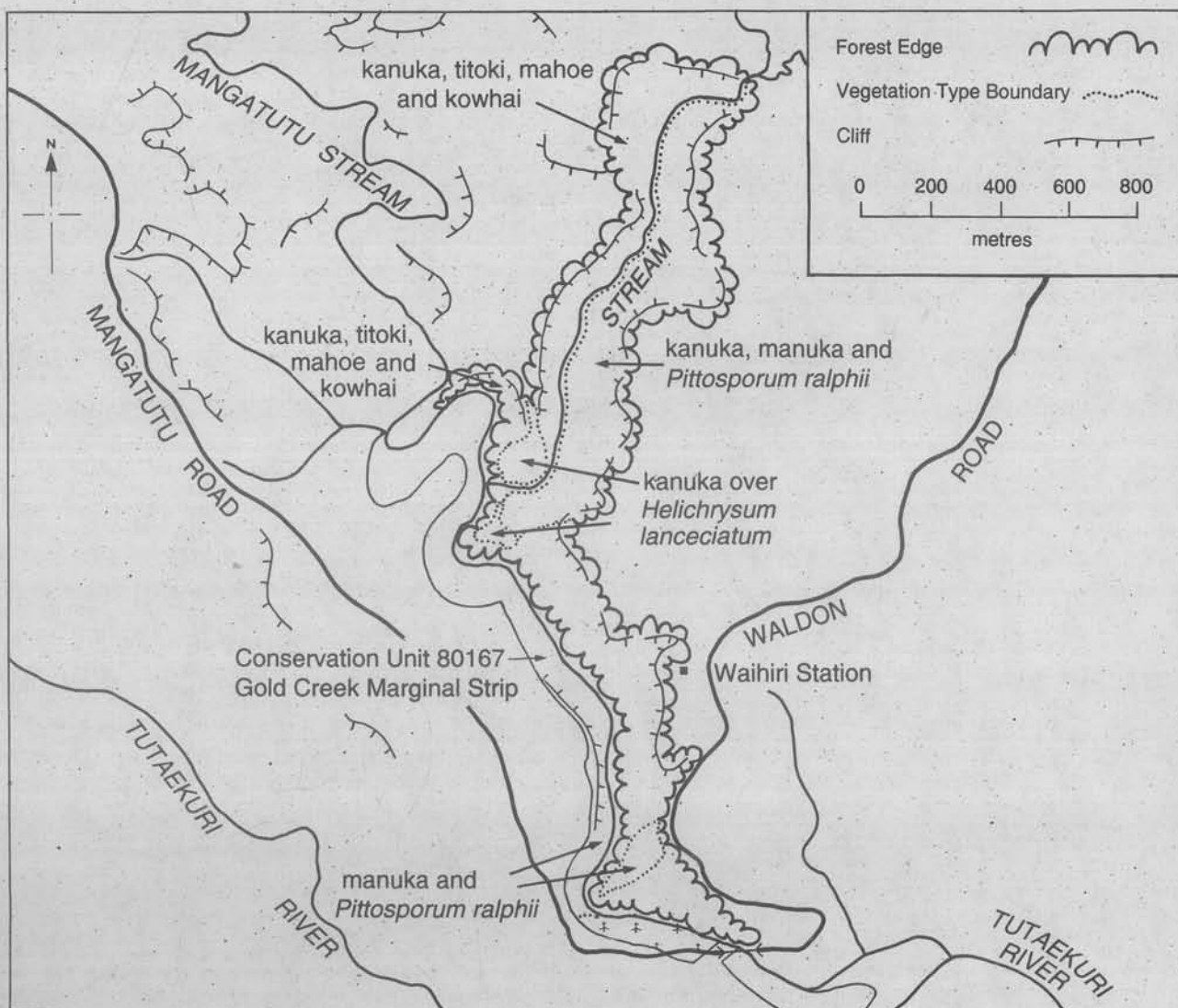
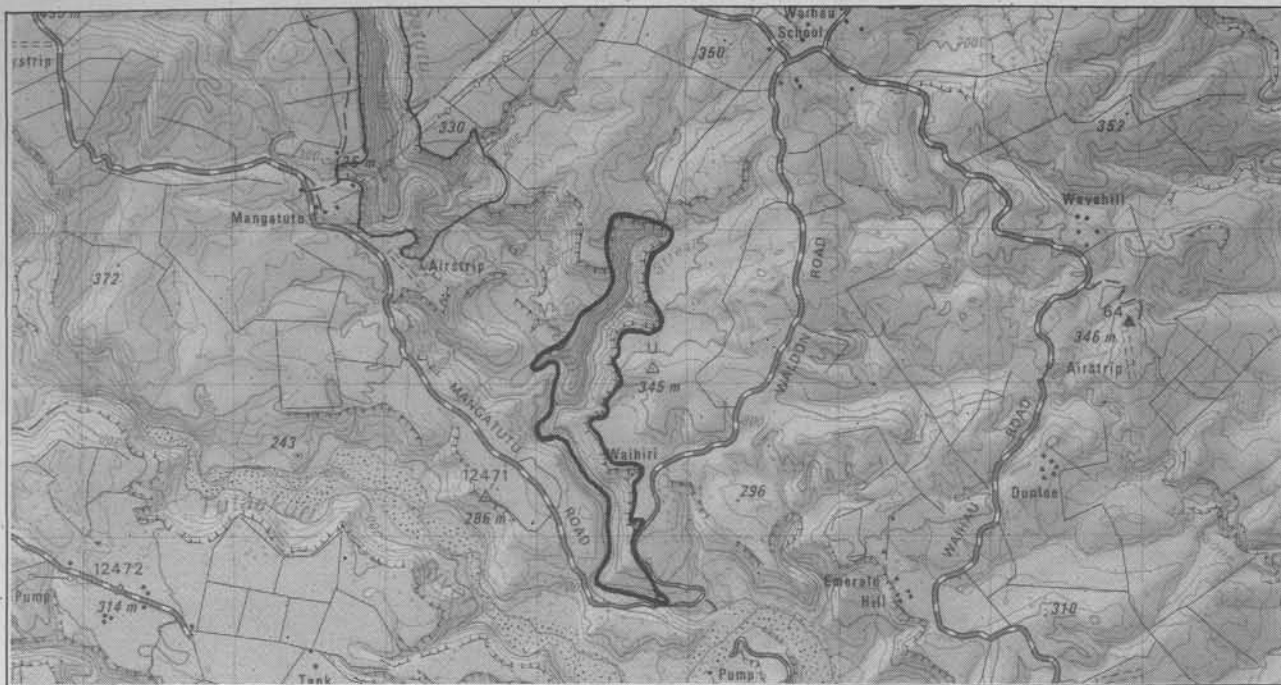
Neomyrtus pedunculata, *Coprosma rotundifolia* and *Hypolepis millefolium* were noted here. These plants are not common in the Maungaharuru Ecological District.

Recommendations

Control of goats would enhance the natural values of this site.



RAP 23 : MANGATUTU STREAM BUSH



RAP 23 : MANGATUTU STREAM BUSH

Survey Form: V20.39
Grid Reference: NZMS 260 V20 154 933
Area: 50ha
Altitude: 200m
Ecological System: 4

Ecological Units

1. 40% kanuka - titoki - (mahoe) / rangiora forest on steep sideslope
2. 45% kanuka - manuka - (*Pittosporum ralphii*) shrubland on steep sideslope
3. 15% kanuka / gap / (*Helicbrysum lanceolatum*) forest on spur

Landform

This site is formed from steep sideslopes and bluffs on either side of the Mangatutu Stream Valley. A number of small steep spurs and tributaries of the main stream run into this valley.

Vegetation

On the north-facing bluffs and steep sideslopes, patches of shrubland formed from manuka, *Pittosporum ralphii* and occasional kanuka is the dominant vegetation, between areas of open dry bluffs.

On the south facing sideslopes is a forest with a canopy where kanuka, titoki and mahoe are dominant but with significant proportions of kowhai also present. An understorey of kawakawa and tree nettle also exist here.

On a small south facing spur, kanuka forms a canopy over *Helicbrysum lanceolatum*. *Coprosma rhamnoides* is also present, but not at a significant cover percentage. It is likely that the spur has a better drainage than the sideslope, accounting for the formation of this unit.

On the wetter south facing portions of the bluffs, a tussockland of mountain flax and tuhara is found. In places, this unit extends down to the stream, where herbfields of maiden-hair fern, *Jovellana sinclairii* and *Senecio banksii* are found amongst boulders and in the flood zone. This vegetation type is becoming invaded by pastoral weeds.

Fauna

Cattle, sheep, possums and rabbits were seen in the site. Goats may be present too, although none were seen.

Silvereye, fantail, tui, bellbird, kingfisher and welcome swallow were seen in the site. A black flounder was noted in the shallows of the stream.

Modifiers/Threats

Wandering jew was noted in this site. This plant is a serious threat. It propagates vegetatively and can grow under a closed canopy, where it will smother seedlings and understorey species, eliminating viability. Blackberry was noted here too and is not considered as serious a threat as wandering jew, as it will eventually die out. Introduced mammals were noted in the site and are also hindering regeneration.

Selection Criteria

Representativeness:	Medium-high
Diversity:	High
Special Features:	Medium
Naturalness:	Medium
Viability:	Medium
Size and shape:	Medium-high
Buffering:	Medium
Fragility and Threat:	Medium

Significance

Kawakawa was noted in this site and although common in other parts of the country, is not common in the Maungaharuru Ecological District.

A black flounder was noted in the stream in this site. This new record is one of the furthest inland records for this species in Hawke's Bay.

Recommendations

This site requires fencing and weed control for it to remain in its present state. Possum control would be beneficial for the site to increase its natural values.

RAP 24 : GORGE STREAM BUSH I

Survey Form: V20.40
Grid Reference: NZMS 260 V20 140 950
Area: 100ha
Altitude: 300m
Ecological System:

Ecological Units

1. 60% kanuka forest on steep sideslope
2. 15% titoki - mahoe forest on steep sideslope
3. 20% titoki - matai / (titoki) - mahoe forest on river-flats
4. 5% tuhara - mountain flax - (manuka) tussockland on bluffs

Landform

Steep sideslopes above bluffs along the sides of Mangatutu and Gorge Streams.

Vegetation

Kanuka is the dominant canopy tree on the upper parts of the sideslopes. Ngaio was also noted in the canopy in this unit. The understorey is mostly grass, in places up to a height of one-and-a-half metres.

On the lower parts of the sideslopes, titoki and mahoe become the dominant canopy species. In this unit, the understorey increases in diversity as light decreases. Supplejack is dominant throughout the unit, with kiekie confined to seepages and kawakawa on the drier portions.

Bluffs below these steep sideslopes support a sparse tussockland of mountain flax and tuhara.

Along the stream sides, matai is emergent over a canopy where titoki and mahoe are dominant. Nikau was noted in this canopy as well. This unit was impossible to access within the allotted time, so no understorey information was obtainable.

Fauna

Introduced mammals noted in the site were: possum, deer, goats and cats.

Low numbers of birds were heard, these were bellbird, fantail, silvereye and Indian mynah.

Modifiers/Threats

Regeneration was evident under the forested areas, but was poor under the kanuka on the steep sideslopes. Here, the amount of light present appeared to allow pasture grasses to dominate.

Selection Criteria

Representativeness:	High
Diversity:	High
Special Features:	High
Naturalness:	Medium-high
Viability:	High
Size and shape:	Low-medium
Buffering:	Medium
Fragility and Threat:	Medium

Significance

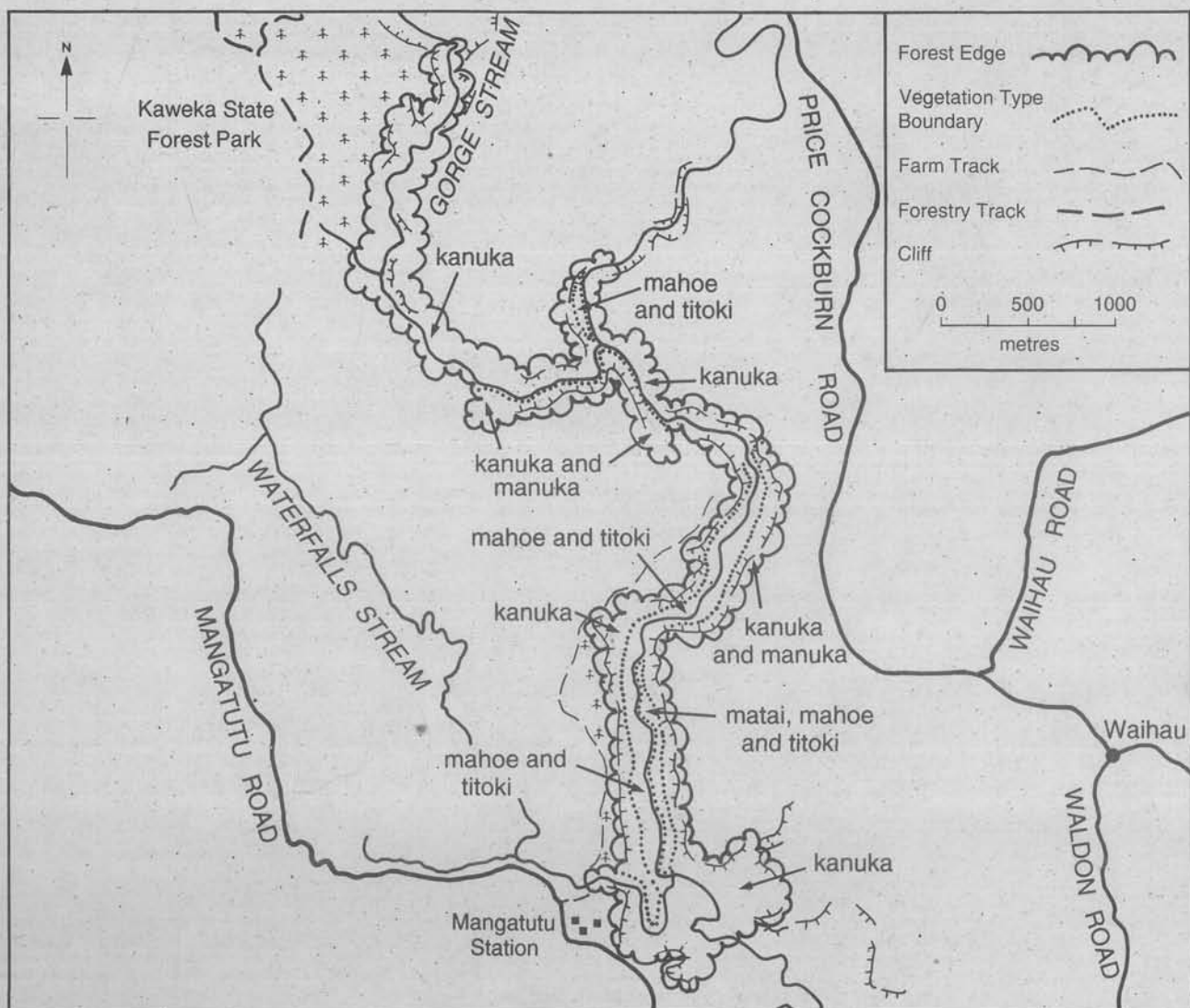
An extremely interesting site of lowland vegetation with coastal elements well inland. Kiekie, ngaio, supplejack and nikau are all very unusual in the Maungaharuru Ecological District.

This site links into RAP 25 and RAP 26 to form one long corridor of vegetation.

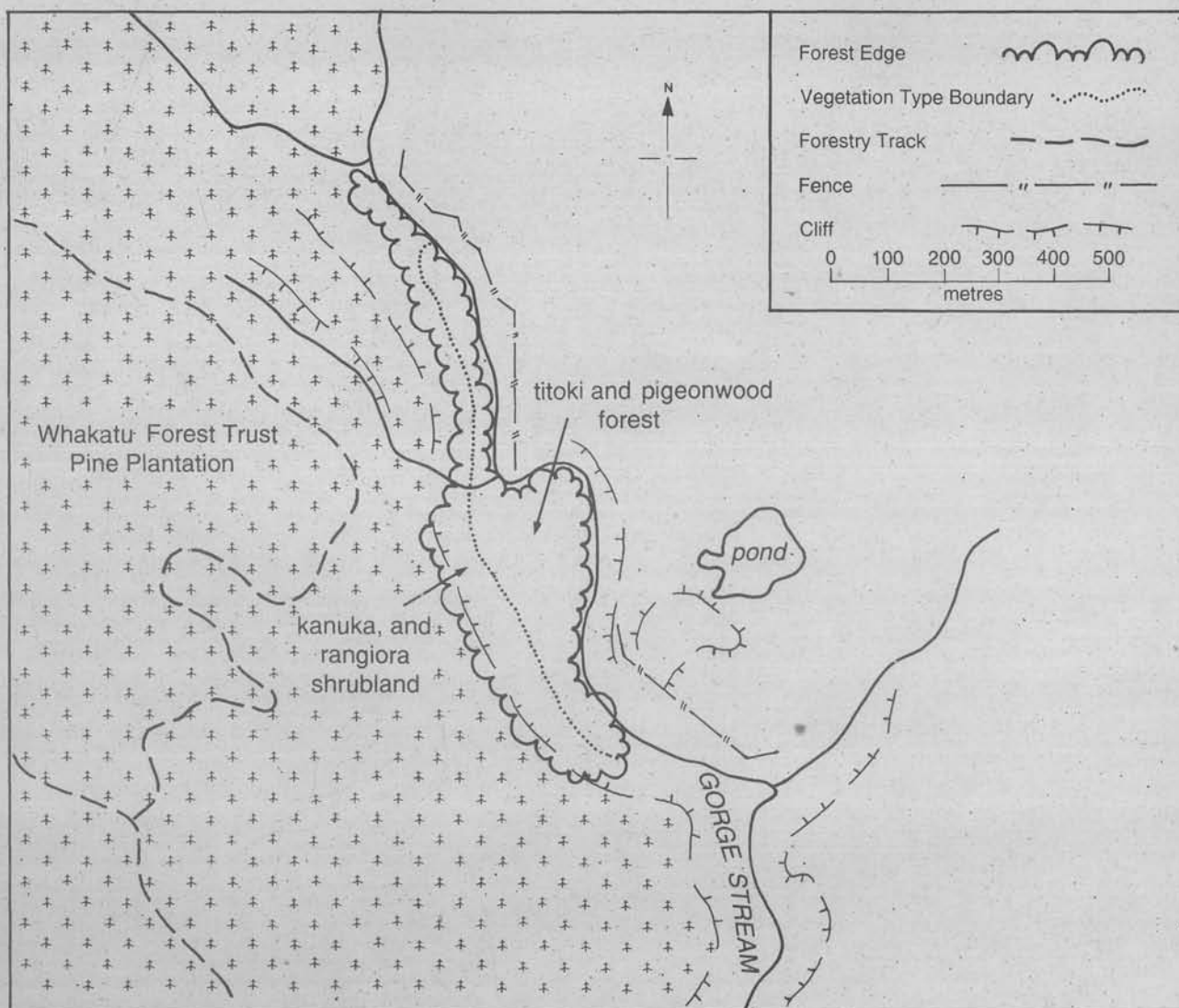
Recommendations

Most of the site has already been fenced, as it is a risk to stock.

Some control of possums may be an advantage to the site.



RAP 25 : GORGE STREAM BUSH II



RAP 25 : GORGE STREAM BUSH II

Survey Form: V20.41
Grid Reference: NZMS 260 V20 125 996
Area: 245 ha
Altitude: 300 m
Ecological System: 4

Ecological Units

1. titoki / pigeonwood forest on river-flats and gentle sideslope
2. kanuka / rangiora shrubland on steep sideslope and bluffs

Landform

The site consists of steep sideslope and bluffs above a gentle sideslope and river-flats on Gorge Stream. The river-flats are just above the flood zone and prone to occasional flooding.

Vegetation

On the river-flats, emergent totara and matai were noted over a canopy dominated by titoki. In this unit, a sub-canopy of pigeonwood, totara and red mapou was also noted. In the understorey, tree nettle, supplejack and red mapou are the dominant shrubs, with a presence of titoki, ponga, wheki ponga, *Melicope simplex* and kowhai. Weeping mapou was noted in a small clearing amongst this unit. No ground-cover species are present at significant cover percentages, however, hen-and-chicken fern, *Asplenium lucidum*, *Hypolepis ambigua*, *Lastreopsis hispida* and *Polystichum silvaticum* were noted in this unit.

On steep sideslopes and bluffs between the river-flats and the Whakatu Trust's pine plantation, a shrubland of kanuka over rangiora is found. This unit also extends down onto the river-flats in places and has areas of dense toetoe, tutu and mountain flax in its understorey.

Fauna

Cattle occasionally gain entry to the site (usually when they break through a fence). Possum trails were noted in the site, but they were quite over-grown.

Few birds were heard in this site. This may be due to the high levels of back-ground noise from the stream. The species noted were: bellbird or tui, grey warbler, chaffinch and blackbird.

Modifiers/Threats

Few threats to the site were noted. Introduced animals pose a low threat to the site, as it is fenced, although goats may be present here in low numbers.

The site is relatively intact and weeds have only penetrated where flooding has exposed new ground. Of these, none which seriously threaten the viability of the site were noted.

Selection Criteria

Representativeness:	Medium-high
Diversity:	Medium-high
Special Features:	Medium
Naturalness:	High
Viability:	High
Size and shape:	High
Buffering:	Medium
Fragility and Threat:	Medium

Significance

This site is a good example of podocarp-titoki forest. It is relatively intact and also relatively protected at present. It forms part of a "vegetation corridor" in conjunction with RAPs 24 and 26.

Recommendations

Goats may be present in the site and their control would further improve the natural values of this site. Some gorse and blackberry were noted along the stream sides, control of these may be a future consideration.

RAP 26 : TE KOWHAI BUSH

Survey Form: V20.43
Grid Reference: NZMS 260 V20 121 012
Area: 20ha
Altitude: 450m
Ecological System:

Ecological Units

1. 95% kowhai - titoki forest on river-flats, gentle and steep sideslope
2. 5% blackberry - toetoe - willow on river-flats

Landform

This site consists of river-flats which extend onto steep sideslopes and bluffs along the side of Gorge Stream.

Vegetation

A tall, closed forest with a canopy of titoki and kowhai being the dominant vegetation on all landforms in this site. A greater proportion of kahikatea and matai were noted in the canopy on the river-flats and houhere and black mapou are more common on the sideslopes. Other species noted in the canopy were cabbage tree, tree fuchsia and totara. A well-developed sub-canopy was recorded from this unit. It is made up of wineberry, putaputaweta, *Lophomyrtus obcordata* and *Melicope simplex*. Wheki ponga is present but not in significant percentages. The understorey is well-developed in this unit. The shrub tier has pate, karamu, tree nettle, rangiora, matai, *Streblus heterophyllus*, koromiko and blackberry. Blackberry has overwhelmed the understorey in small clearings amongst this unit. The ferns hen-and-chicken and *Hypolepis ambigua* were present in significant proportions in this blackberry dominant unit.

On the bluffs, fivefinger was the dominant canopy species; this unit was not large enough to be significant. The fern *Blechnum chambersii* was the ground-cover in this unit.

Also on the river flats, a scrubland of willow, blackberry, manuka and toetoe was recorded. A few saplings of kowhai were noted here too. This unit is low in natural values; but it is likely to continue to regenerate, as it has high-quality units nearby to act as seed sources.

Fauna

No exotic mammals were noted, but possums were probably in the site.

Birdlife in the site was quite diverse, with fantail, silvereye, tui, grey warbler, kereru, kingfisher, shining cuckoo, whitehead, thrush and chaffinch being recorded.

Modifiers/Threats

Blackberry was rampant in this site, especially in "canopy gaps". As the canopy regenerates, this plant will be replaced by more efficient understorey species.

Selection Criteria

Representativeness:	Medium
Diversity:	Medium-high
Special Features:	Medium
Naturalness:	Low-medium
Viability:	Medium-high
Size and shape:	Medium
Buffering:	Medium
Fragility and Threat:	Medium

Significance

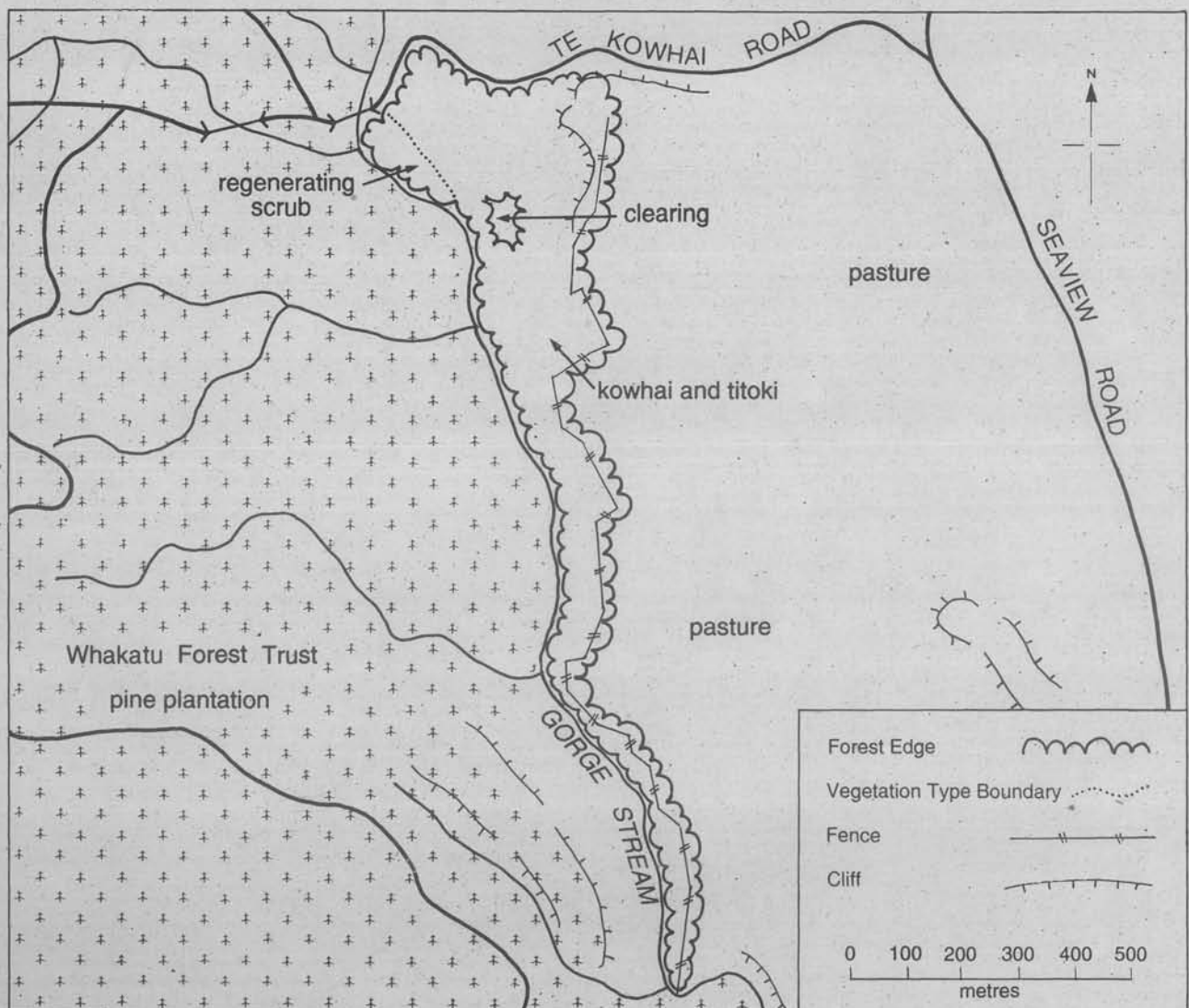
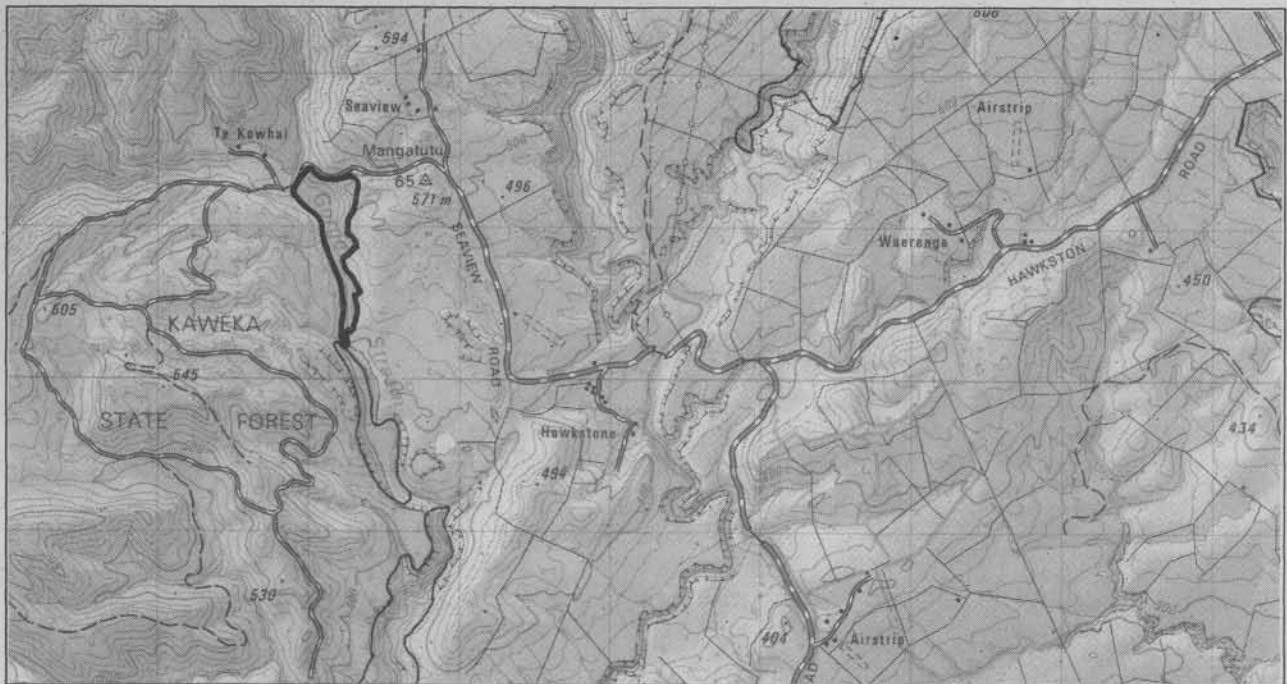
This site is typical of riparian vegetation in other parts of the country, but is unusual in the Maungaharuru Ecological District. Also, a number of plants which are unusual in this ecological district were noted here. These include *Streblus heterophyllus* (the fiddle-leaved milk tree) and *Lophomyrtus obcordata*.

This RAP also links up with RAPs 24 and 25, to form a long corridor of natural vegetation.

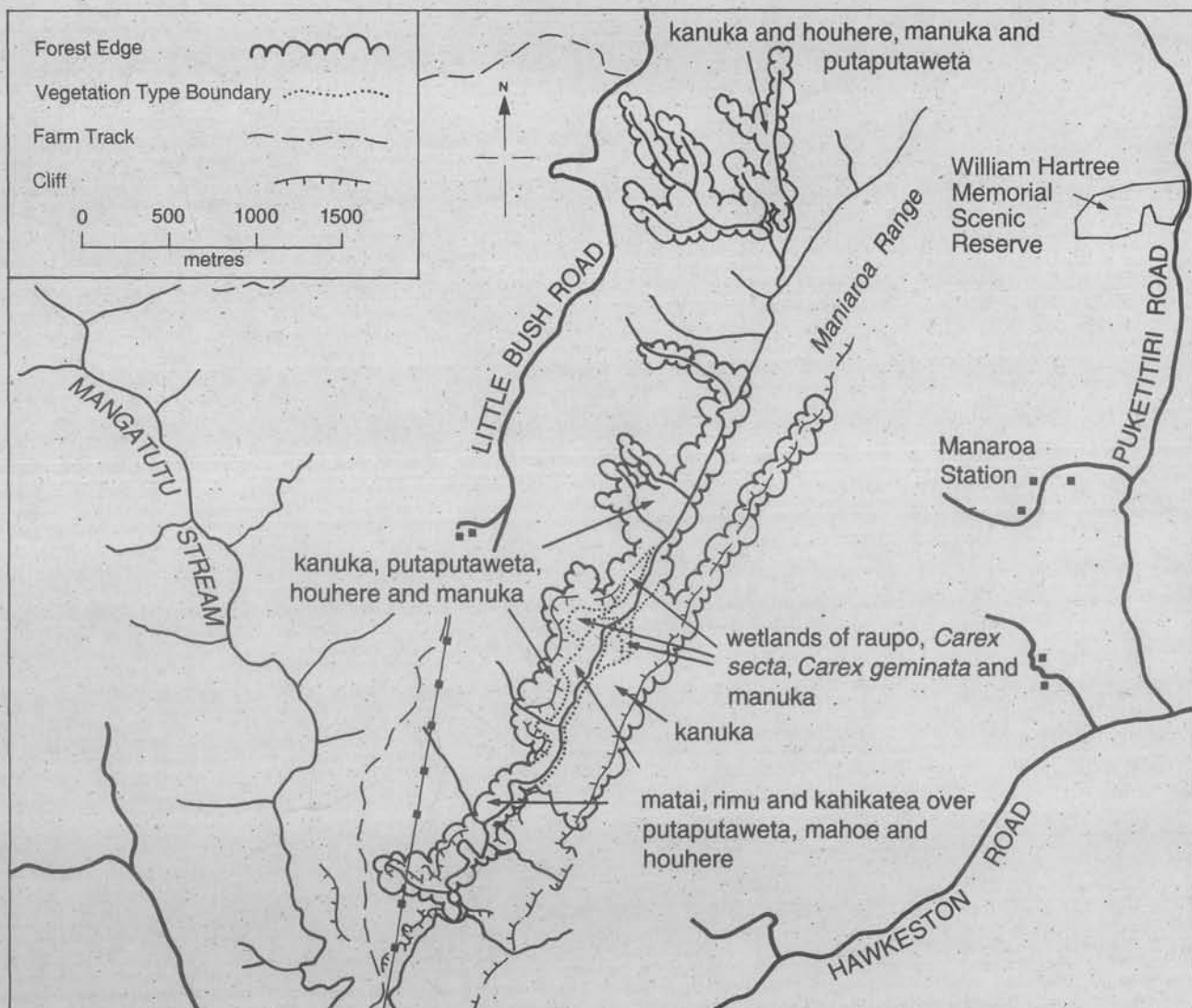
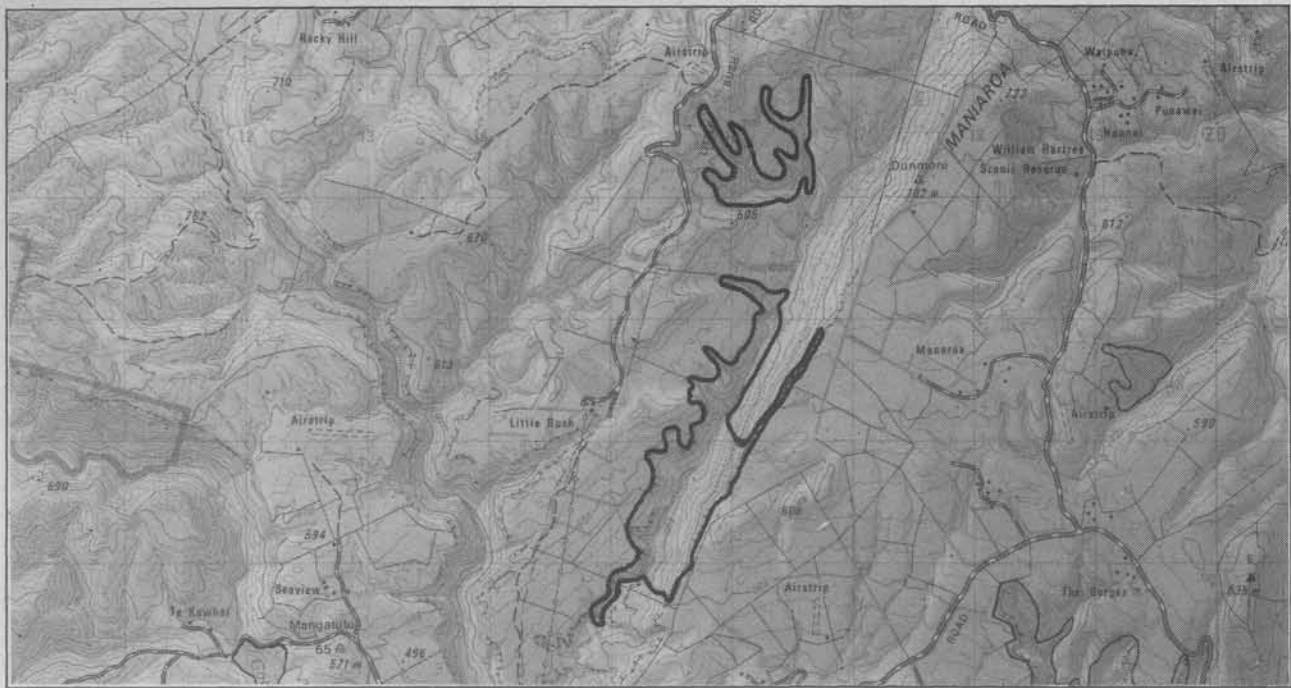
Recommendations

Time for the canopy to improve, with some possum control to assist this process, are the major influences which will enhance the natural values of this site.

RAP 26 : TE KOWHAI BUSH



RAP 27 : MANIAROA BUSH



RAP 27 : MANIAROA BUSH

Survey Form: V20.46
Grid Reference: NZMS 260 164 040
Area: 130ha
Altitude: 500m
Ecological System: 3

Ecological Units

40% kanuka forest on steep and gentle sideslope

15% matai - kahikatea - (rimu) / matai - putaputaweta - houhere - (mahoe) forest on river flats

35% kanuka - manuka - houhere - (putaputaweta) shrubland on gentle sideslope

10% raupo - *Carex secta* - *Carex geminata* - manuka tussockland on gentle sideslope

Landform

The site is situated in a valley which is a rift of the Mohaka Fault. It is composed of gentle and steep sideslopes below sandstone bluffs. Wetlands are a feature on the gentle sideslopes and a number of small gullies run into the main stream.

Vegetation

A tall, closed forest dominated by kanuka extends from the base of the bluffs down to the stream on the eastern side. The understorey has been depleted, leaving *Coprosma rhamnoides*, mingimingi (*Leucopogon fasciculatus*) and *Helichrysum lanceolatum* as the dominant shrubs. The ground-cover is an extremely poor pasture.

Along the stream, matai and kahikatea emerge over a canopy where putaputaweta, matai and houhere are dominant. This unit's canopy is quite diverse, and a number of other species are present in low numbers. This unit also has a well developed understorey where kanono and rangiora are the dominant shrubs. Hooksedge (*Uncinia uncinata*) is the dominant ground-cover plant amongst scattered ferns of *Blechnum fluviatile*, *Blechnum vulcanicum* and *Pneumatopteris pennigera*.

Along the eastern side of the site, the shrubs *Gaultheria antipoda*, *Olearia furfuracea*, *Haloragis erecta* and koromiko form a scattered shrubland along the bluffs. Forming a ground-cover under these shrubs are the ferns *Asplenium terrestre*, maiden-hair fern, *Pyrrosia elaeagnifolia*, *Polystichum richardii*, hounds-tongue fern, *Blechnum ex. capense* sp. and weeping vine rata. Due to its small size, this unit is not significant.

On the western side of the valley, on gentle sideslopes, a mosaic of three units was found: manuka scrub with the fern ally *Lycopodium scariosum* is the dominant vegetation on the driest parts, while a forest of houhere, kanuka and putaputaweta is on damper parts. Wetlands of raupo, *Carex secta*, *Carex geminata* and manuka, have formed on seepages.

Fauna

Evidence of deer and possums were noted in the site. Sheep and cattle also have gained access.

Few birds were noted in the site (tui and grey warbler), this was due to the high levels of back-ground noise from cicadas and the stream.

Modifiers/Threats

The west-facing sideslope under the kanuka unit, has been extensively grazed by cattle and sheep and was used as shelter for them. The understories in the forested areas have been modified by deer as well as sheep and cattle. Plants which were preferred by possums also showed browse-damage, although the mistletoe *Tupelia antarctica* was found here, which suggests that possum densities aren't high.

Selection Criteria

Representativeness:	High
Diversity:	High
Special Features:	Medium
Naturalness:	Medium
Viability:	High
Size and shape:	Medium-high
Buffering:	Medium
Fragility and Threat:	Medium

Significance

Regeneration in this site is high, with seedlings and saplings common along the stream. *Tupelia antarctica* was noted on putaputaweta. The diversity of the landforms in the site allows a correspondingly diverse number of species. Habitats range from xerophytic, through to palustrine.

A spectacular shear-zone of the Mohaka Fault was noted, giving this RAP high landform values too.

Recommendations

This site is being fenced by the owner as time and money become available. It is important that this fence be finished to protect the values of the site.

Control of feral animals would also enhance the natural values of this RAP.

RAP 28 : RIMU STATION HERBFIELD

Survey Form: V20.51
Grid Reference: NZMS 260 V20 315 196
Area: 1.1ha.
Altitude: 900m
Ecological System: 1

Ecological Units

1. 90% (red tussock) / pasture on topslope
2. 10% (*Oreobolus pectinatus*) - (*Mazus radicans*) - (*Stackhousia minima*) - (mouse-ear hawkweed) - (*Racomitrium lanuginosum*) on gully hummocks on gully floor

Landform

Gully floor, sideslope, and topslope. The gully is deep enough to form a frost hollow on its floor. This gully has a series of small hummocks and troughs running across it, which are about 70cm high and are undulating. These troughs are at least seasonally wet, while the hummocks appear to be dry.

Vegetation

On the hummocks in the gully floor, a low growing (about 5 cm high), close clipped turf, of *Oreobolus pectinatus*, *Mazus radicans*, *Stackhousia minima*, mouse ear hawkweed and snow moss (*Racomitrium lanuginosum*) was found. Even though the hummocks are small, a vegetational difference is distinguishable between their north facing and south facing sides. Snow moss, with *Mazus radicans*, *Wahlenbergia albomarginata*, *Oreobolus pectinatus*, *Coprosma pumila* and mouse ear hawkweed, are the dominant species on the north facing sides while on the south facing sides, a green moss (*Bryum* sp.), *Pratia angulata*, *Herpolirion novae-zelandiae* and *Stackhousia minima* are the dominant species. Also in this unit is the daisy, *Celmisia gracilentia*, the orchids *Chiloglottis cornuta*, *Microtis unifolia* and *Aporostylus bifolia*, and other alpine herbs.

On the sideslope and topslope a poor quality tussockland of red tussock over pasture was noted. The fern *Polystichum vestitum* is present in low numbers on sideslopes, and also amongst this unit.

Fauna

Hares, rabbits and goats were all noted in the vicinity of the site. The site is not fenced, and sheep can also gain access.

New Zealand pipit and a skylark were the only birds recorded from the site.

Modifiers/Threats

Mouse ear hawkweed is epidemic throughout the site, and may be considered to be a significant threat to the turf unit under the present management regime.

This turf could be induced. Fire has removed the dominant forest vegetation and hares, rabbits (and sheep) have browsed pastoral vegetation to a close clipped turf. The climate, (and landform), also play a role in the modification of the vegetation, in that they form a frost hollow where these alpine species can compete.

Selection Criteria

Representativeness:	Medium
Diversity:	Medium
Special Features:	High
Naturalness:	Low-medium
Viability:	Low
Size and shape:	Low
Buffering:	Low
Fragility and Threat:	High

Significance

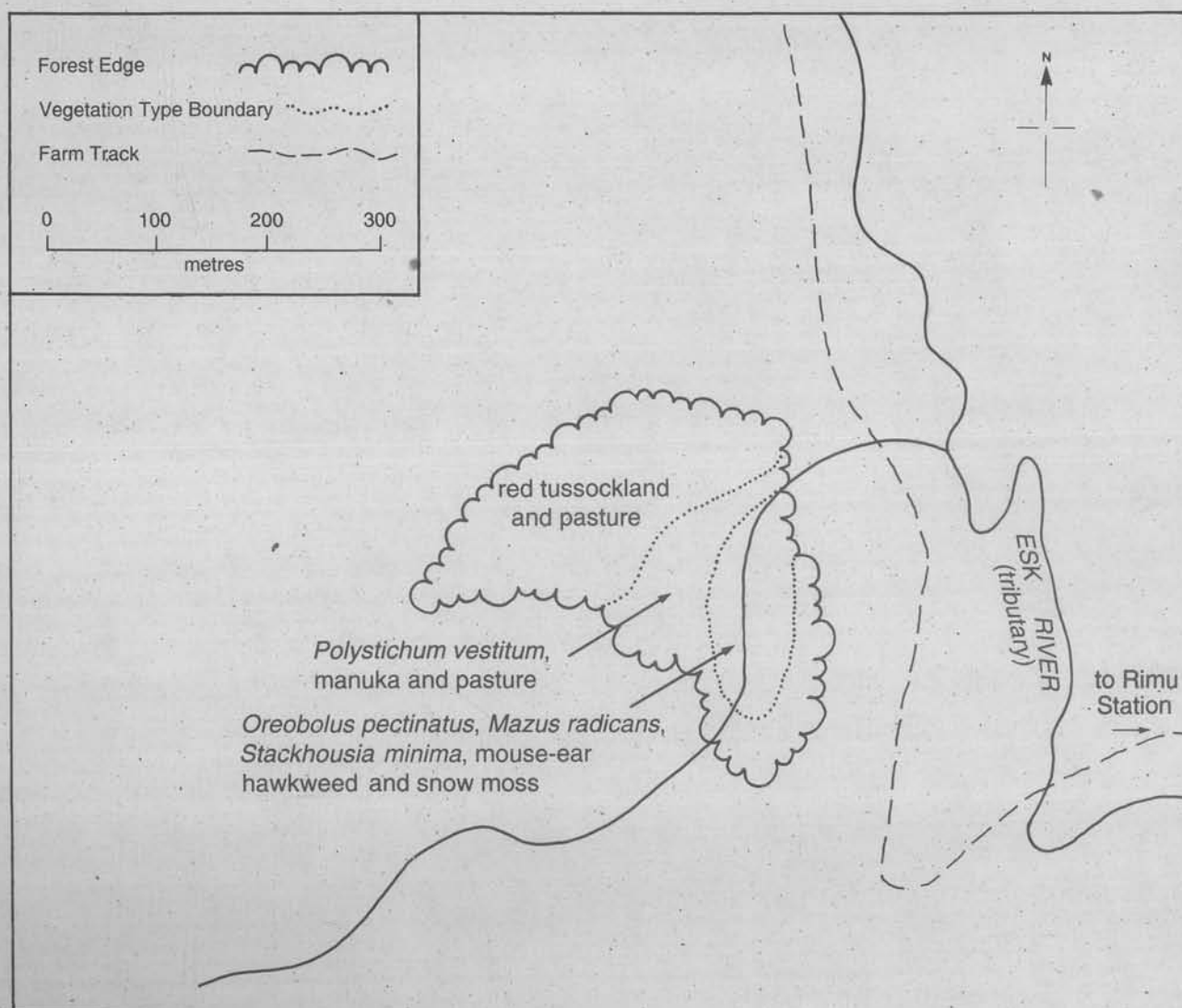
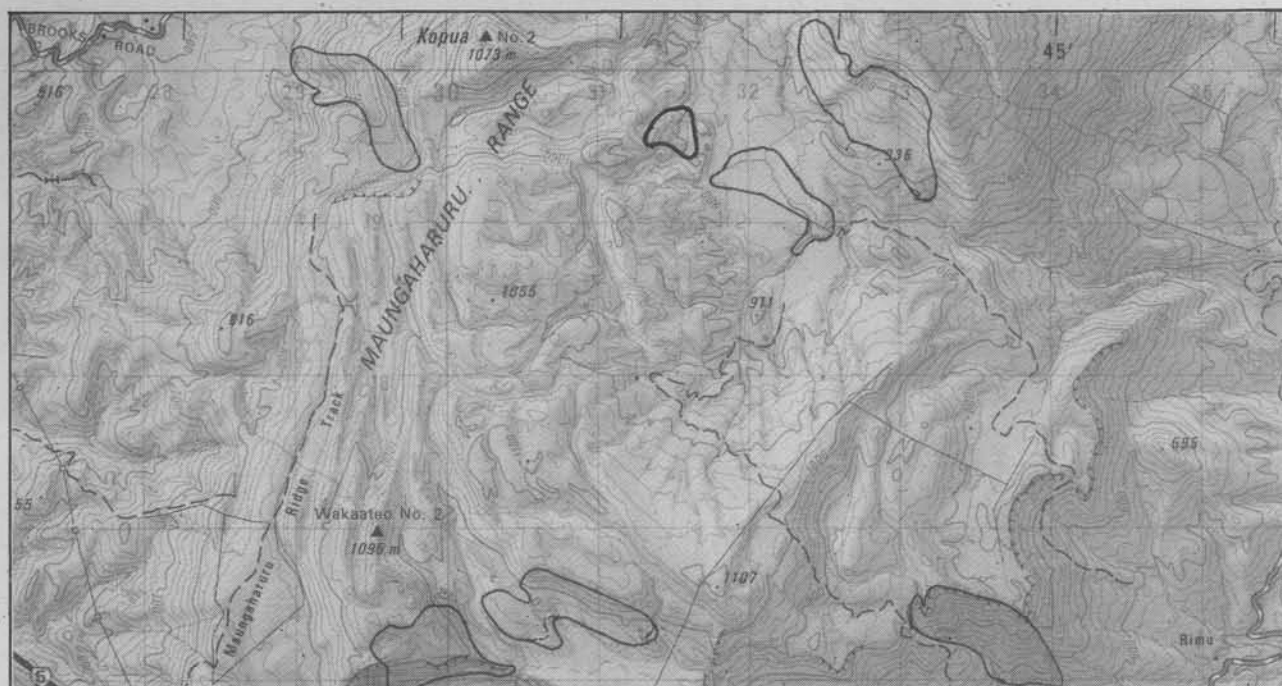
This site is highly significant: a number of unusual species were noted in this site. *Mazus radicans*, *Coprosma pumila* and the orchids *Chiloglottis cornuta* and *Aporostylus bifolia*, were only found in this site.

This site is unique in the Maungaharuru Ecological District, and worthy of further study.

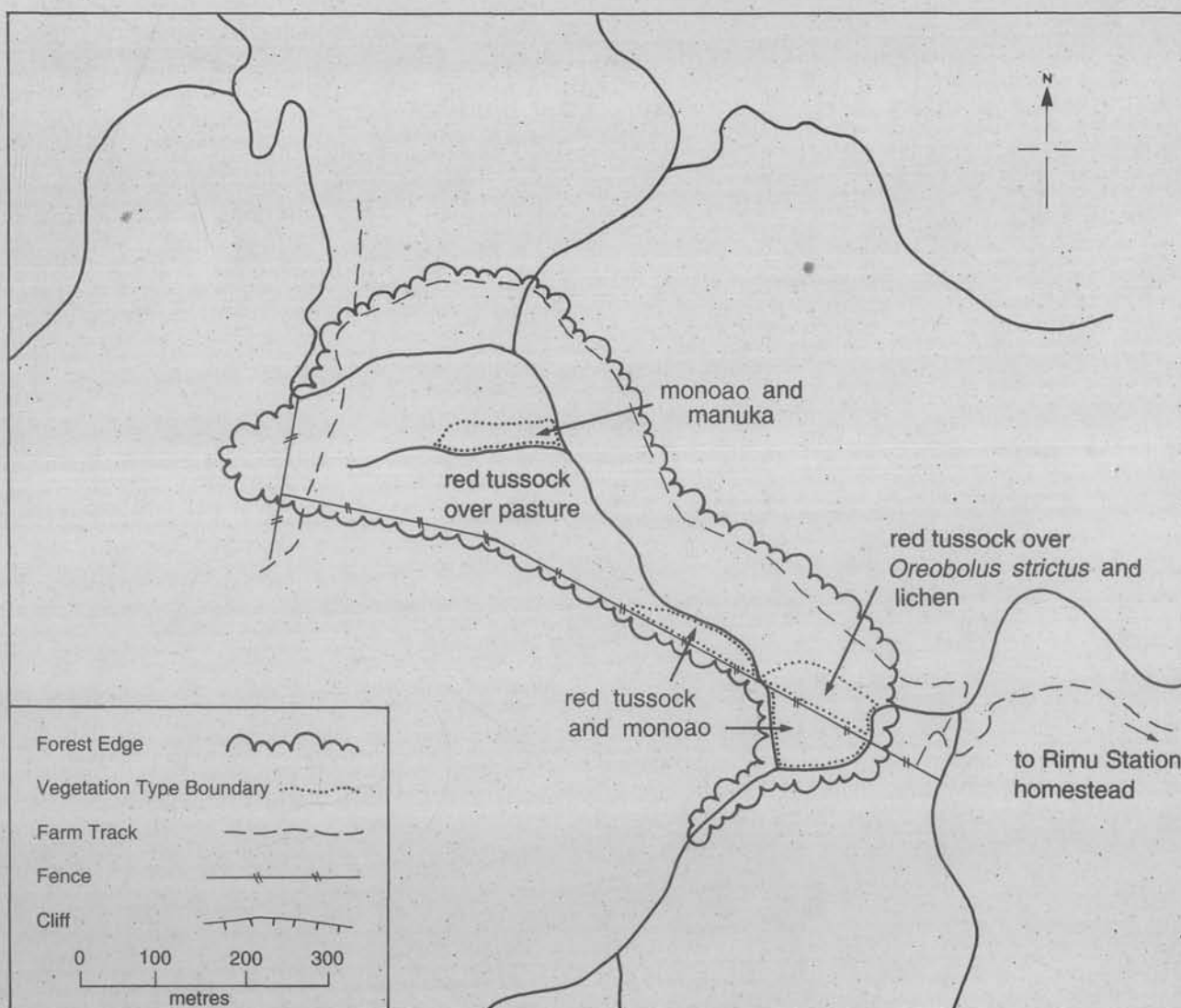
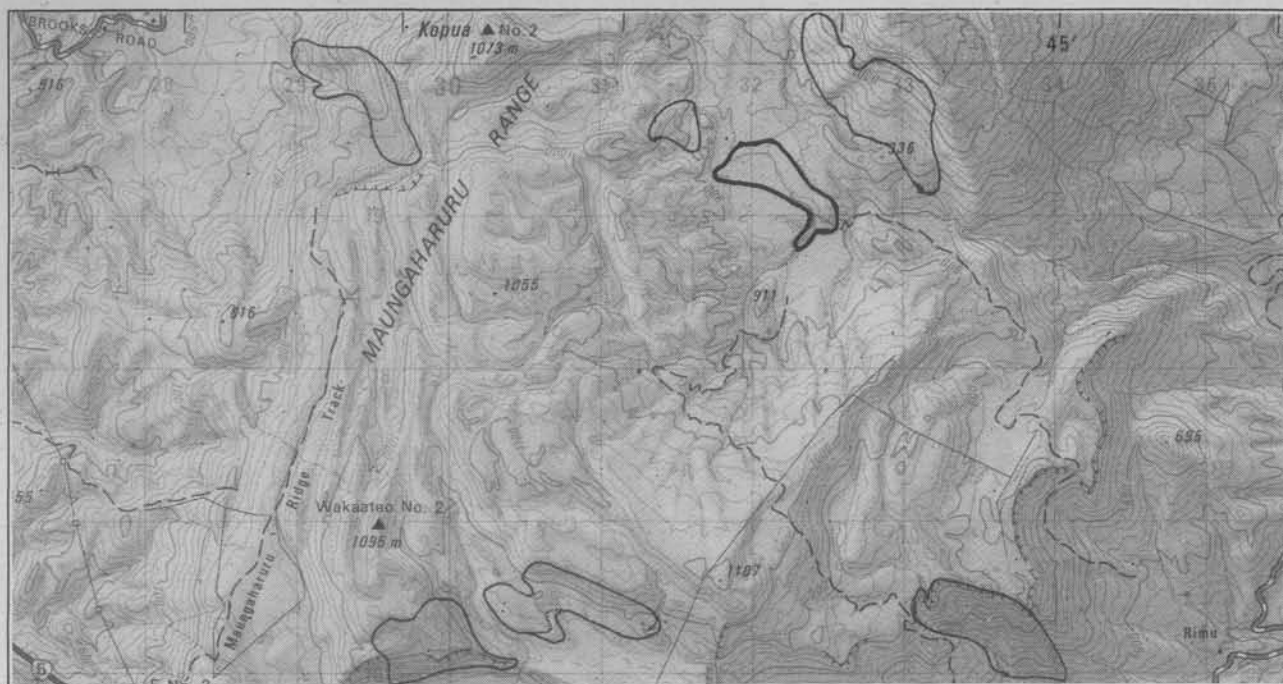
Recommendations

Control of mouse-ear hawkweed. To achieve this, further research is required. The most effective method of control of mouse-ear hawkweed is to remove grazing animals. However, in this case, the removal of this browse pressure may allow pasture to over-grow the site.

RAP 28 : RIMU STATION HERBFIELD



RAP 29 : RIMU STATION TUSSOCKLAND



RAP 29 : RIMU STATION TUSSOCKLAND

Survey Form: V20.52
Grid Reference: NZMS 260 V20 323 193
Area: 15ha
Altitude: 850m
Ecological System: 1

Ecological Units

- 1a. 5% red tussock - (monoao) shrub-tussockland on stream banks and hanging valley floor
- 1b. 90% (red tussock) - (monoao) - pasture tussockland on hanging valley floor
- 1c. 2.5% red tussock / *Oreobolus pectinatus* on hanging valley floor
2. 2.5% monoao - (manuka)

Landform

This site is in a large, open hanging valley surrounded by footslopes and sideslopes. The site is situated along the banks of a stream on the floor of the hanging valley, in a gently rolling landscape.

Vegetation

On a headland and on the crests of rolling hill-slopes over-looking the stream, a tussockland dominated by red tussock and monoao was found. The troughs of the hill-slopes are occupied by a shrubland of monoao, *Coprosma 'taylorae'* and *Coprosma cheesemanii*.

On the crests of hill slopes further away from the stream, where stock has access, a tussockland of scattered red tussock over *Oreobolus pectinatus*, mouse-ear hawkweed and alpine herbs was found. Sheep probably allow this unit to survive by reducing the amount of regrowth of red tussock and shrubs.

On sideslopes in a relatively sheltered gully, a shrubland of monoao and manuka over red tussock and pasture occurs. The shrubs *Coprosma 'taylorae'*, *Olearia virgata*, the sedge *Lepidosperma australe* and the ferns *Polystichum vestitum* and umbrella fern are also present in this unit in low numbers.

Over most of the rest of the site, red tussock forms a scattered tussockland over pasture. This unit also has *Olearia virgata* and *Coprosma 'taylorae'* in it.

Fauna

Evidence of hares (or rabbits - droppings and grazing), was noted in the site. Goats were noted in the vicinity of the site.

Some of the site was in paddocks, where sheep and cattle have access.

Bird diversity in the site was poor, with skylark and blackbird being the only species noted.

Modifiers/Threats

Mouse-ear hawkweed formed quite large swards in the site, where disturbance has been greatest. The disturbances of this site have been similar to those in the Mackenzie Basin, where management for the production of stock-units, has allowed rabbits and mouse-ear hawkweed to thrive.

This site is similar to the Rangitaiki Plateau, although no heather (*Calluna vulgaris*) was noted here. If heather were to reach here, it may spell disaster for the natural values of the site, and may even threaten farming practices.

Selection Criteria

Representativeness:	High
Diversity:	Medium
Special Features:	High
Naturalness:	Medium-high
Viability:	Medium
Size and shape:	Medium
Buffering:	Low
Fragility and Threat:	High

Significance

This is the only site in the Maungaharuru Ecological District, where a healthy red tussock grassland has been found.

The shrubs, *Coprosma cheesemanti*, *Olearia virgata* and *monao*, have only been recorded in this site in the Maungaharuru Ecological District.

Recommendations

The site has been preserved by the fence beside the stream which has disallowed sheep access to one of the headlands. Fencing off the rest of the site should allow its natural values to reach that of the unit which is already fenced.

Control of hares (or rabbits) would also enhance the natural values of the site.

RAP 30 : HUKANUI BUSH

Survey Form: V20.54
Grid Reference: NZMS 260 V20 155 109
Area: 25ha
Altitude: 800m
Ecological System: 3

Ecological Units

1. 50% lemonwood - houhere - tree fuchsia - kowhai / (*Coprosma tenuifolia*) - (horopito) - (tree nettle) / *Blechnum fluviatile* - *Polystichum vestitum* forest on steep sideslope
2. 45% manuka - *Carex secta* - (*Coprosma* 'taylorae') shrubland on gentle sideslope
3. 5% (manuka) - (*Coprosma* 'taylorae') / pasture on sideslope and topslope
4. mountain flax - karamu - koromiko shrub-tussockland on bluffs

Landform

This site consists of a spur and gully on a gentle sideslope, which extends up to a steep sideslope, where the gully becomes a gully head.

Along the top of the site, are bluffs, separated from the main part of the site by pasture.

Vegetation

On the bluffs, a shrubland of mountain flax, kanono and koromiko was found. Speargrass, New Zealand foxglove, Green Bay kiokio and the daisy *Senecio banksii* were also found growing here.

On the sideslope and gully is a tall closed forest of lemonwood, houhere, tree fuchsia and kowhai. The proportion of tree fuchsia in the canopy is substantially greater in the gully heads, although this unit is not large enough to be significant. A well-developed understorey was noted in this unit. The ground-cover is formed from a presence of the ferns *Blechnum fluviatile* and *Polystichum vestitum*. Also, Green Bay kiokio, hen-and-chicken fern and *Pneumatopteris pennigera* were noted. The shrub tier is also well-developed and is dominated by *Coprosma tenuifolia*, horopito and tree nettle.

A small wetland is associated with the gully. This has a shrubland of manuka, *Carex secta* and *Coprosma* 'taylorae'. The fern *Blechnum minus* was noted here too.

Along the top of the site, in the gully to the east and on the spur, a shrubland of manuka and *Coprosma* 'taylorae' exists where the original vegetation has been cleared.

Fauna

The site is not fenced, so stock can gain access. Browse in the site was consistent with deer, although none were seen.

Bird diversity was average, with silvereye, tui, grey warbler, Australasian harrier-hawk, thrush and chaffinch being recorded.

Modifiers/Threats

Some weeds were noted in the site, cobbler's pegs was the most troublesome.

Some browse from sheep, cattle and possibly deer were noted too.

The site has probably been selectively logged, as few large podocarps remain and some stumps were noted in the site.

Selection Criteria

Representativeness:	Medium-high
Diversity:	Medium-high
Special Features:	Medium
Naturalness:	Medium
Viability:	Medium
Size and shape:	Low-medium
Buffering:	Low
Fragility and Threat:	Low-medium

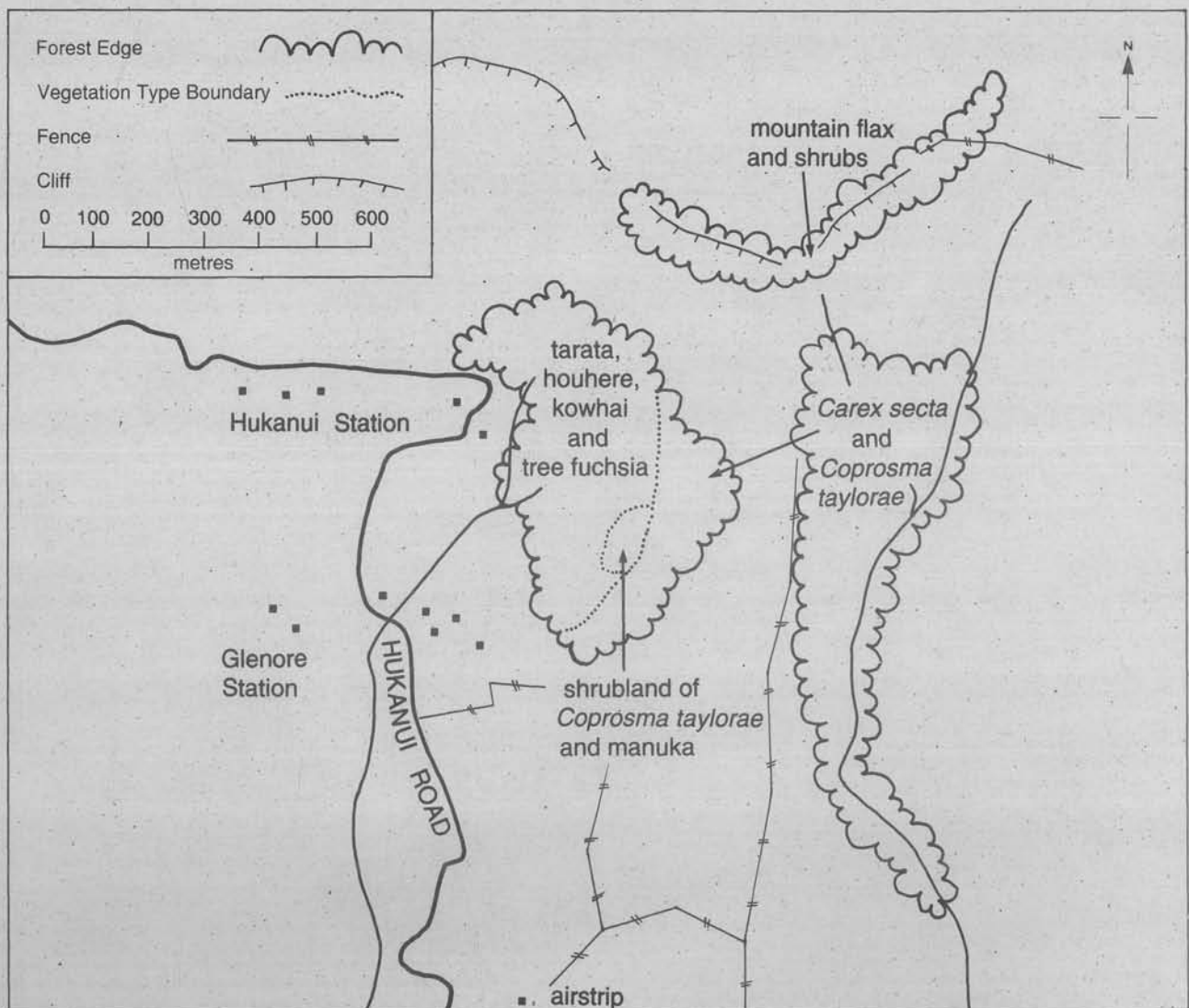
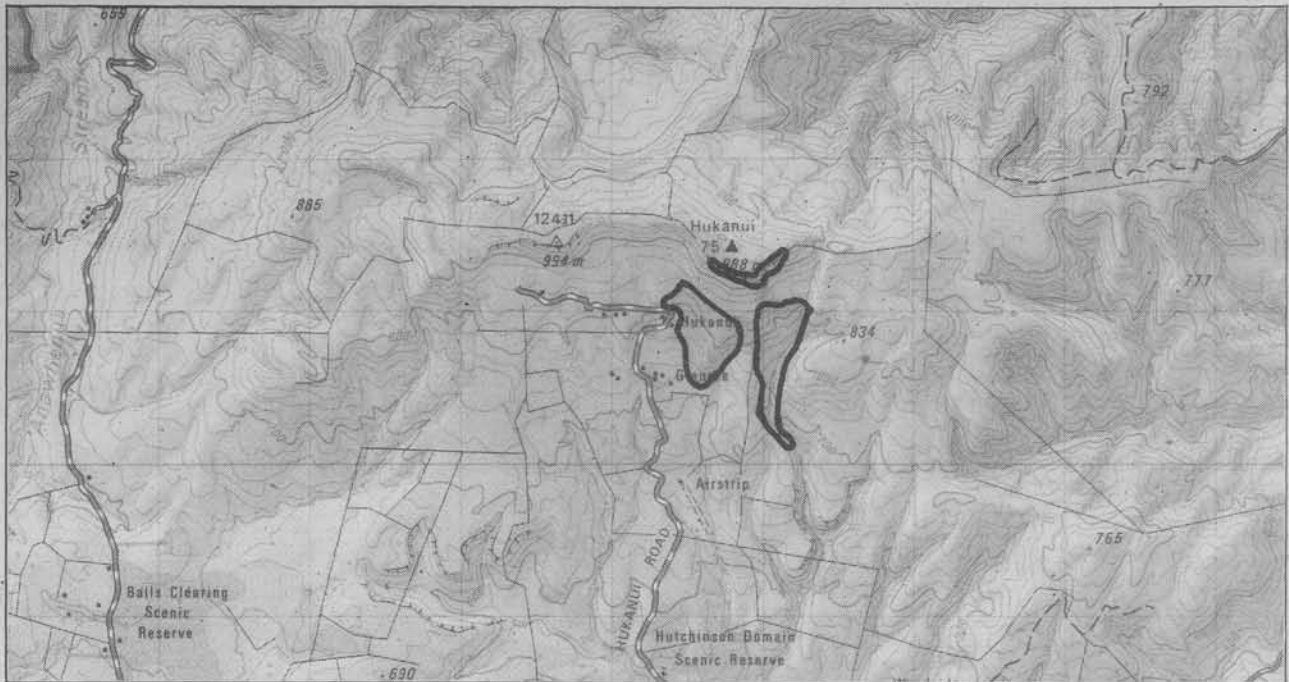
Significance

This site has an unusual mix of lowland and alpine species present in it. This was the only site where speargrass was found. *Coprosma tenuifolia* is uncommon in the Maungaharuru Ecological District too.

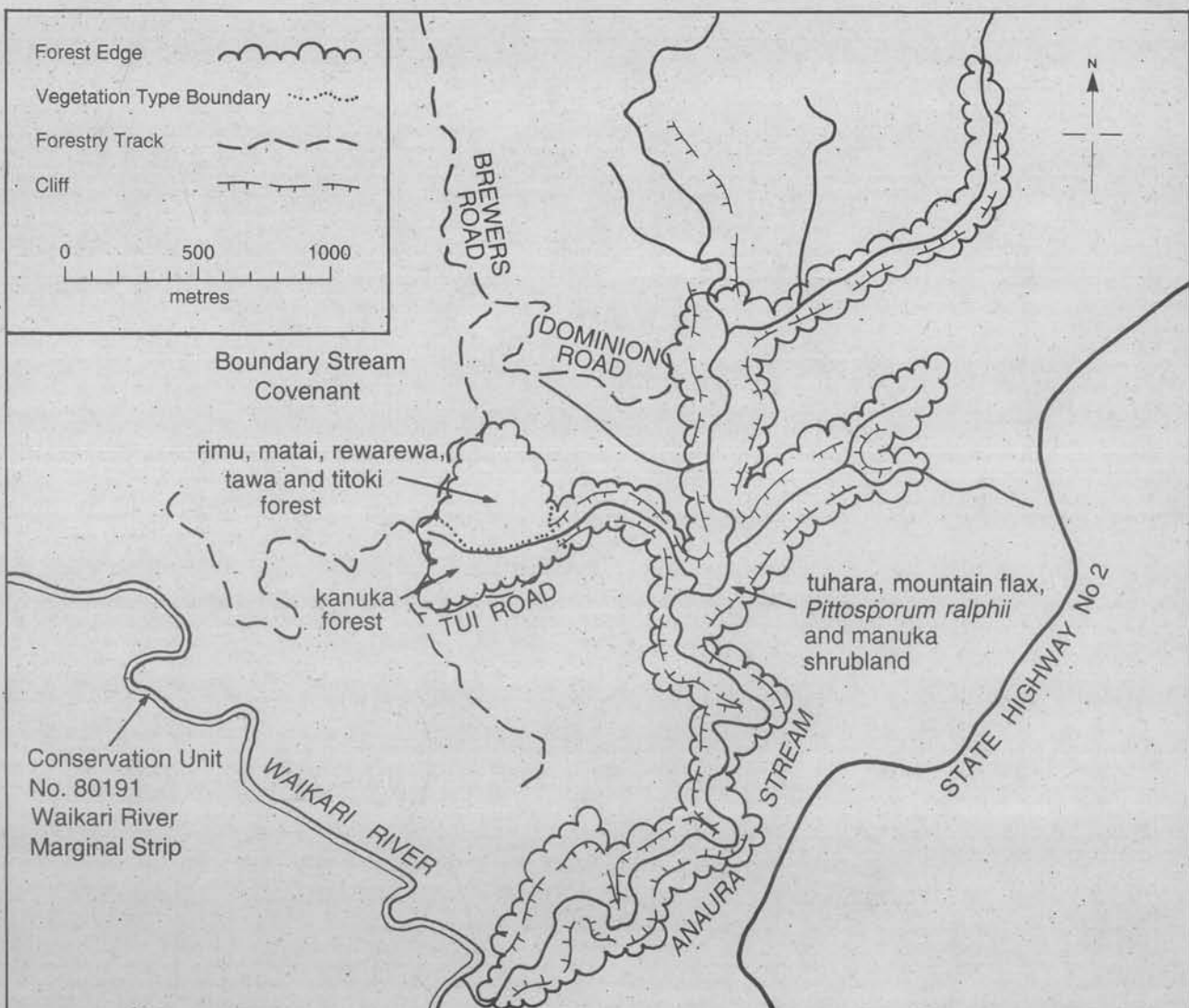
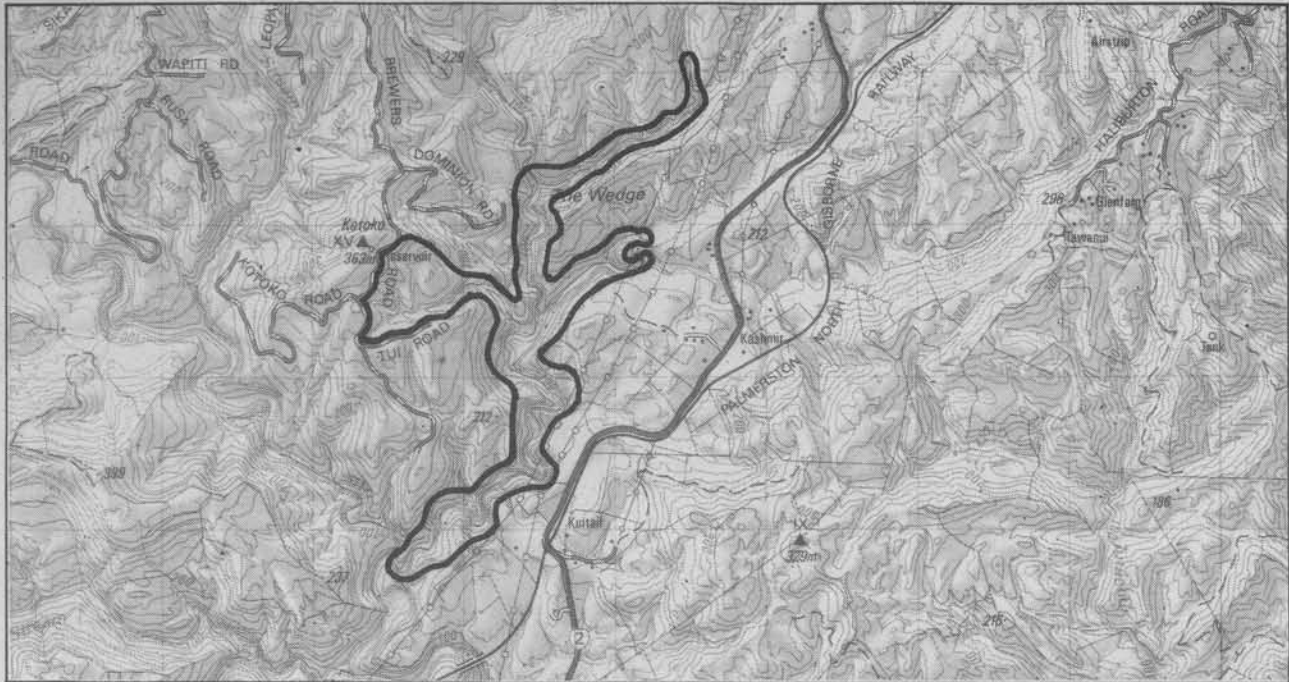
Recommendations

Fencing is the major requirement of this site to enhance its natural values. This should reduce the amount of animal browse and also control the weed problem.

RAP 30 : HUKANUI BUSH



RAP 31 : LOWER ANAURA STREAM BUSH



RAP 31 : LOWER ANAURA STREAM BUSH

Survey Form: W19.04
Grid Reference: W19 555 265
Area: 130ha
Altitude: 150m
Ecological System: 4

Ecological Units

kanuka forest on gully-head, spur, gentle and steep sideslope
rimu - matai / rewarewa - tawa - titoki forest on gully head and gentle sideslope
tuhara - mountain flax - (*Pittosporum ralphii*) - (manuka) shrubland on bluffs and steep sideslope

Landform

The highest quality part of this site is situated on a relatively large gully and gully head amongst pine trees on a tributary of the Anaaura Stream. Down the gully, a waterfall forms an entrance to a very steep sided gorge which joins up with Anaaura Stream. Access into this area was considered impossible, without serious risk of injury. The site also includes the steep sideslope and bluffs on the lower parts of Anaaura Stream.

Vegetation

Despite high levels of browse from goats, the vegetation is relatively intact in this site.

On the eastern side of the gully-head and steep sideslope, a podocarp forest of emergent rimu and matai is found. Titoki, tawa and rewarewa forms the canopy. Mahoe is sometimes present in this tier, but generally forms a sub-canopy. In the understorey, the shrub tier is dominated by *Coprosma rhamnoides*, tree nettle and silver ponga. The dominant ground-cover species is hooksedge. This makes the unit look particularly attractive, but the tree nettle and hooksedge make movement through it difficult!

Along Anaaura Stream, many of the bluffs and steep sideslopes are open faces of papa with scattered kanuka and manuka. On wetter bluffs and along the steep sided gorge, is a shrubland where tuhara and mountain flax are dominant. Manuka and *Pittosporum ralphii* are also present in this unit. This unit may also possess kakabeak on steep faces which are inaccessible to goats.

On the western side of the gully-head, western sideslope and spur, is a forest where kanuka is the only canopy species. The understorey in this unit has been degraded by cattle and goats and is mostly formed by shrubs of *Coprosma rhamnoides* and mingimingi (*Leucopogon fasciculatus*), although blackberry and manuka are present here too.

Fauna

Goats were noted in the site. Evidence of pigs, cattle, possums and deer was also recorded.

The site had a reasonable diversity of bird species in it. Bellbird, tui, whitehead, grey warbler, silvereye, fantail, pipit and chaffinch were all noted. Long-tailed bats may be present here too, as the emergent trees provide potential "roosting sites" for them.

Modifiers/Threats

Blackberry is becoming common in the kanuka unit and will be likely to alter the successional pathway.

Extensive pig rooting was noted in the forested unit. Browse from deer and goats was also evident.

Along the gully, a number of fallen, rotting trees have choked the stream. These may have fallen during Cyclone Bola.

Cattle have been let in to the pine plantation and as there is no fence between the site and the plantation, they are able to gain access to it.

Selection Criteria

Representativeness:	Medium-high
Diversity:	High
Special Features:	Medium
Naturalness:	Medium-high
Viability:	High
Size and shape:	Medium-high
Buffering:	Low-medium
Fragility and Threat:	Medium

Significance

This site has a range of the types of vegetation which were found in the northern Maungaharuru Ecological District.

Recommendations

Fence the site so that cattle cannot gain entry.

Control of goats and (especially) pigs will help to enhance the natural values of this RAP.

RAP 32 : WAITARA STATION BUSH

Survey Form: V20.11
Grid Reference: NZMS 260 V20 295 198
Area: 40ha
Altitude: 800m
Ecological System: 5

Ecological Units

houhere treeland on gentle sideslope

rimu - (matai) / houhere - putaputaweta - mahoe emergent forest on steep sideslope
manuka - *Coprosma rugosa* - *Coriaria kingiana* shrubland on steep sideslope

(*Carex secta*) - (*Carex geminata*) / *Eleocharis gracilis* - moss - pasture grasses "flush wetland" on gentle sideslope

Landform

The site is formed from gentle sideslopes and swampy, gently sloping flats surrounded by steep sideslopes and bluffs. The bluffs form a natural amphitheatre around the flats.

On the flats (and also on the steep sideslope), a wetland is supported by springs, which continually flush water through it.

Vegetation

On the flats, a tussockland of *Eleocharis gracilis*, moss and pasture form the principal components of the wetland. A few *Carex secta* and *Carex geminata* were also noted on sheltered parts of the unit.

The gentle sideslopes support a treeland of houhere. This the dominant vegetation over pasture on the drier areas.

The steep sideslopes have a tall closed forest of houhere, putaputaweta and mahoe in its canopy, with rimu and matai emergent through it. The understorey is comprised of *Blechnum fluviatile* and *Polystichum vestitum*. *Pneumatopteris pennigera* is present on wetter parts of the unit, around small stream gullies.

Also on the steep sideslopes a shrubland of manuka, *Coprosma rugosa* and *Coriaria kingiana* has formed. Wetter areas of this landform also have *Carex secta* and *Carex geminata* on it, which seemed to be quite unusual.

The bluffs are either bare or have a shrubland of mountain flax and tuhara on them. *Pimelea aridula* var. ('drooping', Maungaharuru Ra.) and *Gnaphalium subrigidum* were also noted in this unit.

Fauna

Evidence of possums and goats were noted in this RAP and sheep and cattle have continual access.

A few birds were noted in this RAP. They were fantail, grey warbler, spur-wing plover and Australasian harrier hawk.

Modifiers/Threats

Although this site is weedy with pasture species, no obvious weed threats to the site were noted. The major threat to this site is posed by the presence of stock. Compaction and browse damage was noted in the wetland areas. Browse from introduced animals was noted too.

There is some threat that the wetland could be drained in the future, although no plans of this sort were mentioned by the owner.

Selection Criteria

Representativeness:	Medium
Diversity:	Medium
Special Features:	High
Naturalness:	Low-medium
Viability:	Low-medium
Size and shape:	Medium
Buffering:	Low-Medium
Fragility and Threat:	High

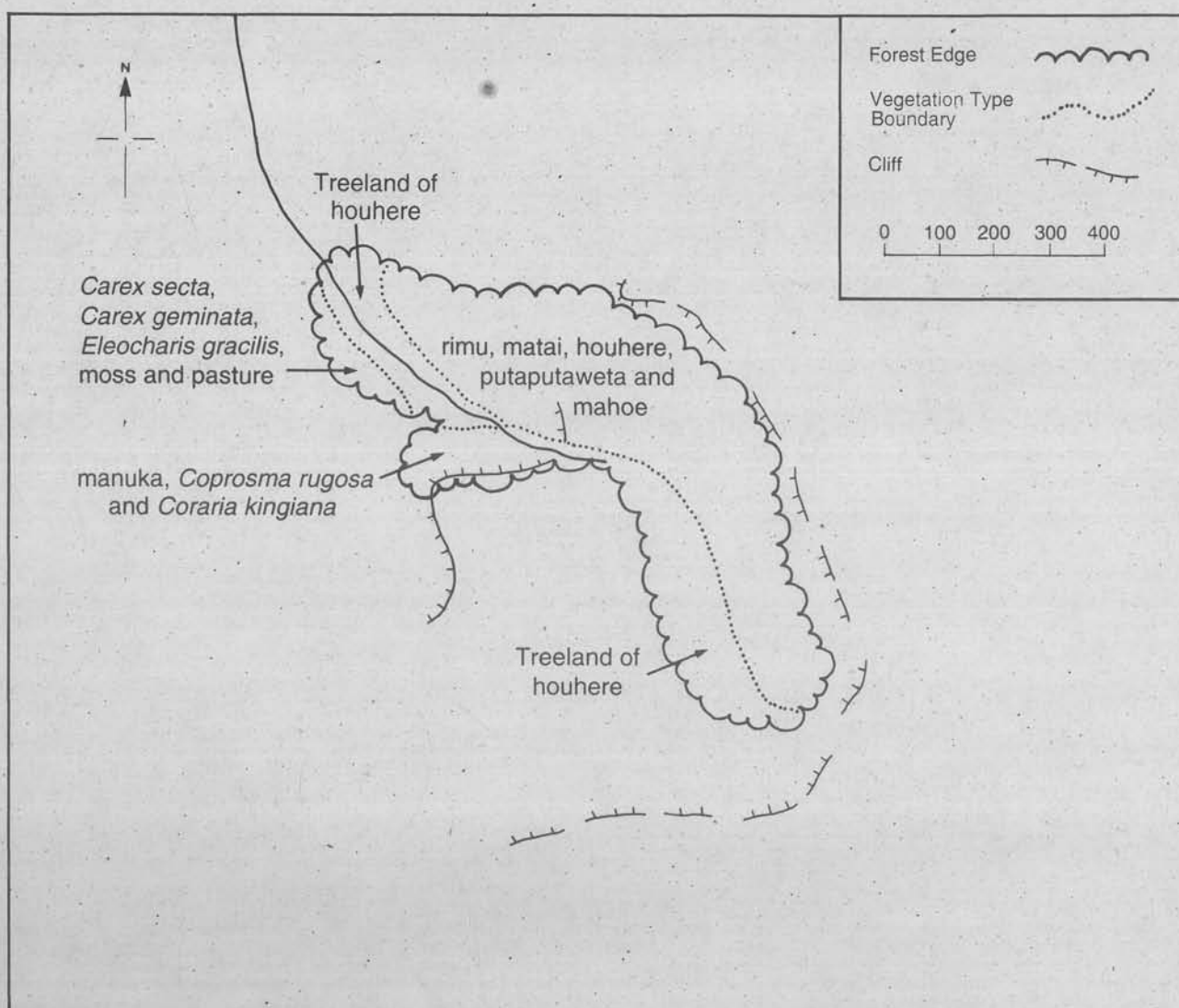
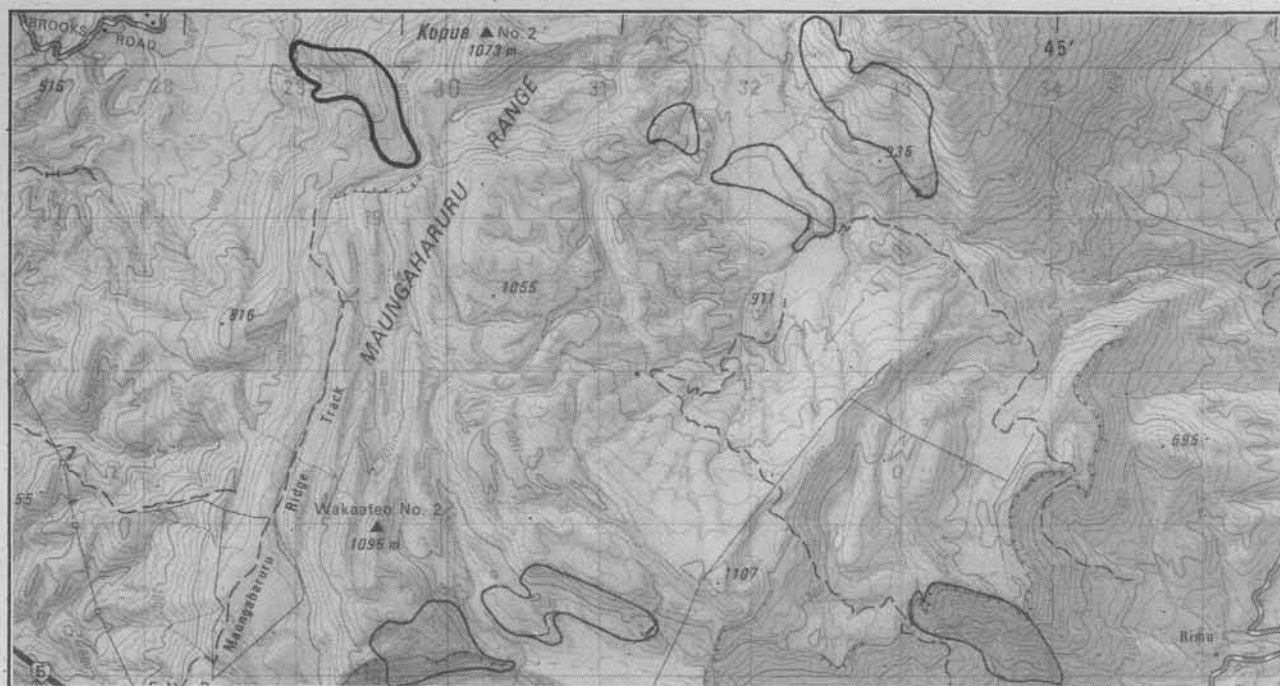
Significance

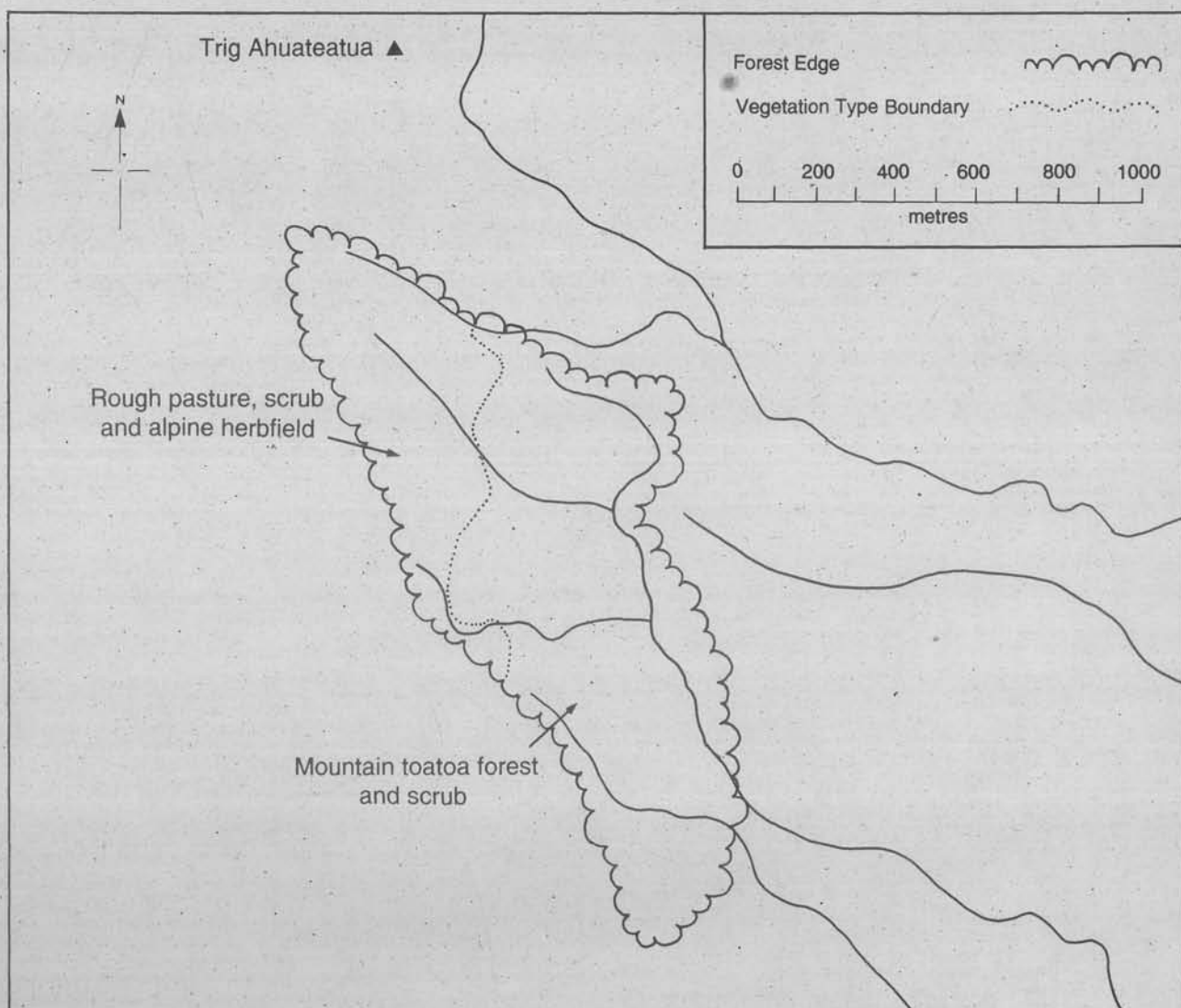
This type of area is a feature of the western side of the Maungaharuru Range, and few such sites are protected at present. Although this site is low in quality at present, it is the best example of a "flush wetland" left in the ecological district.

Recommendations

With fencing and animal control, this site has the potential to be highly viable, and unique in the Maungaharuru Ecological District.

RAP 32 : WAITARA STATION BUSH





RAP 33 : AHUATEATUA

Survey Form: V19.19
Grid Reference: NZMS 260 V19 332 204
Area: 70ha
Altitude: 1000 -1240m
Ecological System: 1

Ecological Units

1. Mountain toatoa forest and mixed scrub on gentle sideslopes (70%).
2. Rough pasture, scrub and alpine herbfields on ridge crest, rock outcrops and gentle sideslope (30%).

Landform

Prominent crest of ridge with rock outcrops. Gentle hillslope with several incised streams.

Vegetation

Mountain toatoa is dominant in a low forest on much of the site. Broadleaf is common, and there are smaller amounts of mountain holly, akepito and Hall's totara. Mossy carpets and puniu (shield fern) are common on the ground. The understorey is browsed out by feral and domestic animals. Fringing the forest, and scattered within it, is scrub dominated by monoao, manuka, *Coprosma "taylorae"* and *Aristotelia fruticosa*.

Above the forest is a combination of rough pasture, scrub as above and alpine herbfields dominated by the showy daisy *Celmisia spectabilis*. On rock outcrops the nationally uncommon native forget-me-not *Myosotis saxosa* is plentiful.

Fauna

Sign of feral goats, pigs, possums, red deer, rabbits and hares was seen. Domestic cattle and sheep are periodically present. No record was made of other fauna present.

Modifiers/Threats

Browsing mammals are preventing regeneration of palatable plants and keeping the vegetation structure sparse and simple. Fire and tree cutting have been used in the past to clear the site for farming: this threat not only remains but appears to be now severe, as the current leasee has expressed the intention of clearing the site as soon as possible in order to graze more domestic stock.

Selection Criteria

Representativeness:	High
Diversity:	Medium
Special Features:	High
Naturalness:	High
Viability:	High
Size and shape:	High
Buffering:	Medium
Fragility and Threat:	High Threat/Low Fragility

Significance

The forest is outstanding. There is no other forest like it in the whole of the Ecological District or in Hawke's Bay. The alpine herbfields are distinctive, particularly in association with the forest. The presence of the native forget-me-not *Myosotis saxosa* gives the site added conservation importance.

Recommendations

Discussions with the owner and leasee are essential. If the whole site is not available for protection, then protecting a representative portion of it would still be worthwhile considering. Fencing and periodic goat control would be ongoing conservation management requirements. This RAP needs to be considered in conjunction with RAPs 10 and 29.

Acknowledgements

My thanks go firstly to the farmers and land managers of the Maungaharuru Ecological District who assisted me with much useful information and gave me permission to survey their natural areas. They are far too numerous to name individually but without their interest and cooperation it would not have been possible to carry out this survey.

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Appendix 1

LIST OF COMPLETED SURVEY FORMS FOR THE MAUNGAHARURU ECOLOGICAL DISTRICT.

(Areas which have been selected as RAPs have their RAP numbers in the right hand column.)

SITE NUMBER	NAME OF SITE	GRID REFERENCE	RAP NUMBER
U20.01	Ngaruroro River Bush	NZMS 260 U20 960930	
U20.02	Miroroa Bush	NZMS 260 U20 995920	
U20.03	Waikarakara Stream Wetland	NZMS 260 U20 000980	
U20.06	Tutaekuri Bush	NZMS 260 U20 080980	
U20.07	Castle Rock Road Bush	NZMS 260 U20 015975	RAP 1
U20.08	Moore Road Bush	NZMS 260 U20 024972	RAP 2
U20.09	Whittle Road Wetland	NZMS 260 U20 099075	RAP 3
U21.01	Mangarakau Stream Bush	NZMS 260 U21 013817	RAP 4
U21.04	Otaurangi Stream Bush I	NZMS 260 U21 065810	
V19.01	Mohaka River Bush	NZMS 260 V19 405325	
V19.02	Waitere Bush	NZMS 260 V19 330300	
V19.03	Heays Bush	NZMS 260 V19 420285	RAP 5
V19.04	Boundary Stream Bush	NZMS 260 V19 403275	
V19.05	Woodstock Shrubland	NZMS 260 V19 353256	
V19.06	Opouahi Station Bush I	NZMS 260 V19 365255	
V19.07	Opouahi Station Bush II	NZMS 260 V19 260245	
V19.08	Toronui Bush	NZMS 260 V19 342220	RAP 6
V19.09	Boundary Stream Bush II	NZMS 260 V19 425254	
V19.10	Rangiora Station Bush	NZMS 260 V19 440260	RAP 7
V19.12	Rangiora Station Treeland	NZMS 260 V19 430247	RAP 8
V19.14	Waitara station Wetland	NZMS 260 V19 322213	
V19.15	Willowflat Bush	NZMS 260 V19 460362	
V19.16	Maori Stream Bush	NZMS 260 V19 420235	RAP 9
V19.17	Rangiwhakaharoa River Bush	NZMS 260 V19 310230	
V19.18	Waikari River Bush	NZMS 260 V19 435273	
V19.19	Ahuatetua	NZMS 260 V19 332204	RAP 33
V20.01	Esk River Shrubland I	NZMS 260 V20 340196	
V20.02	Rimu Station Bush	NZMS 260 V20 325199	RAP 10
V20.03	Esk River Shrubland II	NZMS 260 V20 357180	
V20.04	Toronui Bush	NZMS 260 V20 360200	

APPENDIX 1 (CONT). : LIST OF COMPLETED SURVEY FORMS FOR THE
MAUNGAHARURU ECOLOGICAL DISTRICT.

SITE NUMBER	NAME OF SITE	GRID REFERENCE	RAP NUMBER
V20.05	Waikoau River Bush	NZMS 260 V20 401160	
V20.06	Kaiwaka Stream Bush	NZMS 260 V20 340060	
V20.07	Otakowhai Stream Bush	NZMS 260 V20 344045	RAP 11
V20.09	Maunganui Bush I	NZMS 260 V20 325170	
V20.10	Maunganui Bush II	NZMS 260 V20 337164	RAP 12
V20.11	Waitara Station Wetland	NZMS 260 V20 295198	RAP 32
V20.12	Maunganui Bush III	NZMS 260 V20 314182	
V20.13	Titiokura Shrubland	NZMS 260 V20 310164	RAP 13
V20.14	Ohurakura Bush I	NZMS 260 V20 312146	
V20.16	Titiokura Bush I	NZMS 260 V20 298163	RAP 14
V20.17	Mimiha Stream Bush	NZMS 260 V20 285180	
V20.18	Titiokura Bush II	NZMS 260 V20 285155	RAP 15
V20.19	Inangatahi Stream Bush	NZMS 260 V20 213150	
V20.20	Gorge Stream Bush	NZMS 260 V20 213112	
V20.21	Inangatahi Bush	NZMS 260 V20 223124	
V20.22	Crohane Bush I	NZMS 260 V20 242135	
V20.23	Waipunga Bush	NZMS 260 V20 189070	
V20.24	Maniaroa Range Bush	NZMS 260 V20 220085	
V20.25	Te Waka Tarn	NZMS 260 V20 228120	
V20.26	Cariswell Bush	NZMS 260 V20 217100	RAP 16
V20.27	Camp Stream Bush	NZMS 260 V20 228100	
V20.28	Mangaone Stream Bush	NZMS 260 V20 266060	RAP 17
V20.29	Mangahina Bush	NZMS 260 V20 255999	
V20.30	Opau Stream Bush I	NZMS 260 V20 205050	
V20.31	Opau Stream Bush II	NZMS 260 V20 194035	RAP 18
V20.32	The Gorges	NZMS 260 V20 190010	RAP 19
V20.33	Mohaka Shrubland	NZMS 260 V20 180140	
V20.34	McVicar Scrubland	NZMS 260 V20 209168	
V20.35	Geddes Bush	NZMS 260 V20 223173	
V20.36	Te Waka Bush I	NZMS 260 V20 250120	RAP 20
V20.36A	Te Pohue Bush	NZMS 260 V20 270135	RAP 21
V20.36B	Te Waka Bush II	NZMS 260 V20 222109	RAP 22
V20.37	Crohane Bush	NZMS 260 V20 260140	
V20.38	Willowford Bush	NZMS 260 V20 140903	
V20.39	Mangatutu Bush	NZMS 260 V20 154933	RAP 23
V20.40	Gorge Stream Bush I	NZMS 260 V20 140950	RAP 24

APPENDIX 1 (CONT). : LIST OF COMPLETED SURVEY FORMS FOR THE
MAUNGAHARURU ECOLOGICAL DISTRICT.

SITE NUMBER	NAME OF SITE	GRID REFERENCE	RAP NUMBER
V20.41	Gorge Stream Bush II	NZMS 260 V20 125996	RAP 25
V20.43	Te Kowhai Bush	NZMS 260 V20 121012	RAP 26
V20.45	Waiiti Stream	NZMS 260 V20 210974	
V20.46	Maniaroa Bush	NZMS 260 V20 164040	RAP 27
V20.47	Te Wairiri Bush	NZMS 260 V20 146051	
V20.48	Puketitiri Bush	NZMS 260 V20 130100	
V20.49	Carswell Road Bush	NZMS 260 V20 175095	
V20.50	Te Waka Tam	NZMS 260 V20 238124	
V20.51	Rimu Station Herbfield	NZMS 260 V20 315196	RAP 28
V20.52	Rimu Station Tussockland	NZMS 260 V20 323193	RAP 29
V20.53	Inangatahi Bush	NZMS 260 V20 189117	
V20.53A	Potter Road Bush	NZMS 260 V20 194094	
V20.54	Hukanui Bush	NZMS 260 V20 155109	RAP 30
V20.55	Maunganui Bush IV	NZMS 260 V20 344151	
V20.56	Titiokura Wetland	NZMS 260 V20 297144	
V20.57	Kings Stream Bush	NZMS 260 V20 263097	
V21.01	Waikonini Shrubland	NZMS 260 V21 130880	
V21.02	Whanawhana Shrubland	NZMS 260 V21 108783	
W19.01	Waikari Scrubland	NZMS 260 W19 531255	
W19.02	Mangarara Stream Bush	NZMS 260 W19 510240	
W19.03	Putorino Road Wetland	NZMS 260 W19 539235	
W19.04	Lower Anauro Stream Bush	NZMS 260 V20 555265	RAP 31
W19.05	Rongomaipapa Bush	NZMS 260 W19 546318	
W19.06	Heruheru Stream Bush	NZMS 260 W19 579345	

Appendix 2

A BRIEF DESCRIPTION OF SITES SURVEYED, BUT NOT RECOMMENDED FOR PROTECTION.

Ngaruroro River Bush

Survey Form: U20.01
Grid Reference: NZMS 260 U20 960 930
Area: 1000ha
Altitude: 600m
Ecological System: 5
Landform: Foothills, sideslope and topslope, with spurs and gullies.
Vegetation: Mostly a shrubland of kanuka and manuka, with some pockets of tall, closed forest of red beech in the gullies.
Quite a high diversity of alpine plants on the topslopes amongst manuka scrub. This site was probably induced by fires.
Comments: This site is now within the Kaweka Forest Park boundary, so already a PNA (CMS Reference 80021).

Mitoroa Bush

Survey Form: U20.02
Grid Reference: NZMS 260 U20 995 920
Area: 400ha
Altitude: 700m
Ecological System: 5
Landform: Spur and gully in a sideslope.
Vegetation: Radiata pine and manuka and kanuka forests.
Comments: This site is partially owned by CHH Forests (who own the pines), and DOC (Kaweka Forest Park - CMS Reference 80021).

Watkarakara Stream Wetland

Survey Form: U20.03
Grid Reference: NZMS 260 U20 000 980
Area: ha
Altitude: 600m
Ecological System: 5
Landform: The site is composed of a large swampy terrace tread, below a sideslope with spurs and gullies.
Vegetation: The site was a kanuka and manuka shrubland, which has now been planted in radiata pine.
Some wetland remained on the flats, where a tussocklands of raupo, *Carex secta* and *Carex geminata* was found.
Comments: This site is largely owned by CHH Forests

Tutaekurt Bush

Survey Form: U20.06
Grid Reference: NZMS 260 U20 080 980

Area: 400ha
 Altitude: 500m
 Ecological System: 5 and 2
 Landform: Site consists of topslopes, sideslopes, spurs and gullies. This site is on the boundary between torlesse greywacke and limestone geological systems.
 Vegetation: A kanuka canopy clothed the spurs, sideslopes and gullies. Increased proportions of putaputaweta, rangiora and houhere were noted in the gullies. On the spurs and sideslopes, a dense shrub tier of mingimingi (*Leucopogon empetrifolia* and *L. fasciculatus*) and *Olearia furfuracea* was noted under the kanuka canopy.
 Comments: Over the topslopes, manuka, tutu and five-finger, form a dense shrubland with localised patches of *Gaultberia antipoda*. This site bounds onto Tutaekuri Climatic Reserve and Kaweka Forest Park, and is very similar in character to these PNAs. This site is quite diverse, with relatively few weeds. Levels of regeneration are good, with kanuka beginning to be replaced by broad-leaved species. Numerous red admiral butterflies were noted on the river bed.

Otamauri Stream Bush I

Survey Form: U21.04
 Grid Reference: NZMS 260 U21 065 810
 Area: 150 ha
 Altitude: 200m
 Ecological System: 4
 Landform: This site has steep sideslopes and bluffs surrounding deeply incised gullies along Otamauri Stream. In the upper reaches of the site, a 12m waterfall was noted.
 Vegetation: Kanuka is the dominant canopy species at this site. Manuka and kowhai along with kanuka form the vegetation on the north-facing steep sideslopes and bluffs. Kowhai and *Pittosporum ralphii* with kanuka are on the south facing damper faces. Along the base of the sideslopes, totara is also present in the canopy on very narrow "river-flats" covered with *Carex geminata*.
 Comments: Germination and recruitment of seedlings in this site appears to be poor due to the presence of stock (the stream is their water supply during droughts). Broad-leaves appear to be becoming dominant over kanuka on the South facing slopes of the site. Sheep and cattle, deer, goats, possums and cats were noted, or evidence of their presence, was noted from the site.

Mobaka River Bush

Survey Form: V19.01
 Grid Reference: NZMS 260 V19 405 325
 Area: 130ha
 Altitude: 270m
 Ecological System: 2 and 4
 Landform: The site consists of a stream, gully, steep sideslopes and bluffs on

the true right of the Mohaka River. "Te Heru o Turcia Conservation Area" adjoins this site and includes the bluffs and steep sideslopes on the Mohaka River directly downstream of the site.

Vegetation: Vegetation ranges from manuka scrub on the more recent slips, to a closed forest with a kanuka canopy on the sideslopes and down to the stream where putaputaweta and *Olearia rant* are more common. The kanuka unit has a well-developed shrub tier of mostly manuka and akeake (*Olearia paniculata*), with some *Helicbrysum lanceolatum* also present.

Comments: Regeneration within the site appears to be between two definable phases (i.e. broad-leaves appear to be becoming the dominant vegetation type, replacing kanuka). Goats are common in the site. Few birds were noted.

Wattere Bush

Survey Form: V19.02

Grid Reference: NZMS 260 V19 330 300

Area: 120ha

Altitude: 350m

Ecological System: 4

Landform: Steep sideslopes, bluffs, spur and gully. The site has a waterfall in it at the eastern end.

Vegetation: The site is mainly a closed kanuka forest with some kowhai, lancewood and akeake (*Olearia paniculata*) also present within the canopy. In the understorey the shrub mingimingi (*Leucopogon fasciculatus*) is dominant, with canopy gaps filled by manuka; the ferns *Polystichum vestitum* and *Blechnum fluviatile* are the dominant herbs.

The dry north facing papa bluffs have a greater proportion of *Pittosporum ralphii* along the tops, but are otherwise bare.

In areas that have been cleared, manuka, kanuka and totara form a shrubland.

Comments: The site has quite a high diversity of birds within it. Grey warbler, fantail, whitehead, bellbird, kereru, tomtit, silvereye, Australasian harrier and chaffinch were all noted.

Boundary Stream Bush

Survey Form: V19.04

Grid Reference: NZMS 260 V19 403 275

Area: 10ha

Altitude: 800m

Ecological System: 5

Landform: Gentle sideslope incised by two quite deep gullies. Up to two metres depth of pumice and tephra overlies the limestone and papa substrate in places.

Vegetation: The vegetation in this site has a canopy dominated by red beech and kamahi.

Comments: Most of this site has now been absorbed into Boundary Stream Scenic Reserve.

A small block of forest (the piece above the farm track) is still privately owned.

One of few sites where prince-of-wales-feather fern has been found.

Regeneration was good despite modification of understorey by goats.

Woodstock Shrubland

Survey Form: V19.05

Grid Reference: NZMS 260 V19 353 256

Area: 50ha

Altitude: 800m

Ecological System: 5

Landform: Gullies in a gentle-to-steep sideslope and some of the sideslope itself.

Vegetation: Occasional cabbage trees and red beech over low quality manuka and kanuka scrub amongst pasture was the major vegetation type.

Opouabi Statton Bush I

Survey Form: V19.06

Grid Reference: NZMS 260 V19 365 255

Area: 30ha

Altitude: 950m

Ecological System: 5

Landform: Steep and gentle sideslope; spur and gully.

Vegetation: The site consists mostly of a tall, closed forest with a canopy of red beech. Other species noted in the canopy were Hall's totara, mountain holly, and broadleaf. The site is buffered by a low-quality shrubland composed mostly of horopito and *Coprosma 'taylorae'*.

Comments: Regeneration levels were poor due to the presence of large numbers of goats. The site also appeared to have been modified by fire and selective logging.

Opouabi Statton Bush II

Survey Form: V19.07

Grid Reference: NZMS 260 V19 260 245

Area: 15ha

Altitude: 980m

Ecological System: 5

Landform: Gentle and steep sideslopes, incised by small gullies, which when visited, were dry.

Vegetation: A tall closed forest with a canopy composed completely of red beech. Red beech was also the only species present in the sub-canopy tier. Within the shrub tier, horopito and broadleaf are the dominant species and horopito is the only significant ground-cover plant.

On the banks of gullies, out of reach by goats, prince-of-wales-feather fern, *Blechnum fluviatile*, *Blechnum procerum*, *Nertera dichondrifolia* and other small herbs were noted.

Comments: This is one of only two sites where prince-of-wales-feather fern has been found.

Boundary Stream Bush II

Survey Form: V19.09
Grid Reference: NZMS 260 V19 425 254
Area: 70ha
Altitude: 600m
Ecological System: 5
Landform: Sideslope, spur and gully/valley in a natural amphitheatre of bluffs. Areas of the valley floor are flat and waterlogged and swampy.
Vegetation: The vegetation on the gully floor is a wetland-tussockland of *Carex secta*, *Carex geminata* and manuka.
On the lower sideslopes, a treeland of kanuka forms a buffer around a tall, closed forest of kanuka and rewarewa, with some kamahi also present in it.
The bluffs were either bare where dry, or had a shrubland of mountain flax, tuhara and toetoe where they were wet. Along the top edges of the bluffs, a shrubland of *Pittosporum ralphii*, kanuka and manuka was noted.
Comments: An interesting and diverse site.
The wetland areas appear to have been burned.

Wattara Statton Wetland

Survey Form: V19.14
Grid Reference: NZMS 260 V19 322 213
Area: 20ha
Altitude: 1060m
Ecological System: 1
Landform: A hanging valley in a amphitheatre of steep bluffs. A talus scree slope has built up below the bluffs. The site also extends eastwards onto less steep sideslopes.
The lower sideslopes and valley floor are a wetland which appears to be formed from springs in the talus sideslope. These have caused erosion scars on which a successional herbfield was found.
Vegetation: Areas of fellfield, shrubland fernland and wetland are the principal vegetation components. The shrubland is quite degraded, merging into a *Polystichum vestitum* fernland, which appears to have been caused as a result of repeated burning.
On the lower sideslope on erosion scars, a wetland-herbfield was noted. A carpet of *Juncus novae-zelandiae*, *Gentiana bellidifolia*, *Anisotome aromatica* and *Brachycome sinclairii* amongst moss, is the dominant vegetation in this unit.
Between these erosion scars and on the talus sideslopes, a shrubland of *Coriaria kingiana* amongst boulders forms a fellfield. In this unit, *Celmisia gracilentia*, *Anisotome aromatica* and mouse ear hawkweed were also noted.
Comments: Further down the hanging valley, the wetlands become degraded

where pasture and stock have had a greater influence.

Little regeneration was noted due to the presence of goats, cattle and sheep.

Willowflat Bush

Survey Form: V19.15
Grid Reference: NZMS 260 V19 460 362
Area: 140ha
Altitude: 160m
Ecological System: 4
Landform: Steep bluffs and sideslopes along the true right of the Mohaka River.
Vegetation: Areas of tall, closed kanuka forest interspersed with occasional kowhai and *Pittosporum ralphii*. The understorey is poorly developed and consists of manuka or mingimingi (*Leucopogon fasciculatus*) with significant areas of pasture. On the higher dry steep sideslopes, some areas of manuka scrub were noted.
Comments: This site links into Te Heru o Tureia Conservation Area upstream. The site has reached the stage where manuka and kanuka is beginning to be out-competed by broad-leaved species.

Rangitwhakaharoa River Bush

Survey Form: V19.17
Grid Reference: NZMS 260 V19 310 230
Area: 100ha
Altitude: 700m
Ecological System: 5
Landform: Gentle and steep sideslopes in the valley of Rangitwhakaharoa Stream. This stream has also produced some relatively large terrace treads, which are swampy.
Vegetation: On the lower part of the site, the stream-sides and sideslopes support a treeland of houhere, kowhai and putaputaweta. On the terrace treads, away from the stream, localised patches of titoki and mahoe form treelands. Further up the valley, the regenerating manuka scrub links the treelands, forming a tree-shrubland of houhere, putaputaweta and lancewood. A few tall kahikatea, matai and rimu were also noted within this unit. The swampy terrace treads have been severely modified, and now support a swampy pasture with moss and *Eleocharis gracilis* present in it. Some *Carex secta*, *Carex geminata* were noted in this unit and formed a small tussockland.
Comments: The farmer has seen kakabeak in this site, however, despite extensive searching, no plants were noted on this survey.

Watkari River Bush

Survey Form: V19.18
Grid Reference: NZMS 260 V19 435 273
Area: 50ha
Altitude: 380m
Ecological System: 5

Landform: The site is composed of steep sideslope and limestone bluffs.

Vegetation: The area of forest is comprised of rewarewa, titoki and tawa with a few emergent matai and rimu throughout.

Comments: The site lies on the true left of the Waikari River, downstream and adjacent to Boundary Stream Scenic Reserve.

This is an area the land-owner has suggested should be added into Boundary Stream Scenic Reserve, as he keeps losing stock over the edge of the bluffs.

The site appears to have been selectively logged, and regeneration is now hampered by stock and goats.

Esk River Shrubland I

Survey Form: V20.01

Grid Reference: NZMS 260 V20 340 196

Area: 25ha

Altitude: 900m

Ecological System: 1 or 5

Landform: Site consists of a steep and gentle sideslope, crossed by two small streams and their associated gullies.

Vegetation: Closed forest of broadleaf on the lower steep sideslopes and a shrubland of horopito over *Polystichum vestitum* on the higher and more gentle sideslopes. A treeland of cabbage trees over *Polystichum vestitum* was noted at the southern end of the site, interspersed with pasture.

Comments: The site is at present unfenced, allowing sheep to gain access. Goats were noted in the site and attributed to the poor levels of regeneration.

The site has been selectively logged and burned in the past and probably these are the major causes for the vegetation differences.

Esk River Shrubland II

Survey Form: V20.03

Grid Reference: NZMS 260 V20 357 180

Area: 12ha

Altitude: 530m

Ecological System: 5

Landform: Gully, sideslope and large flattish spur.

Vegetation: Shrubland of manuka, fivefinger and putaputaweta.

Comments: Site acts as a buffer to QEII5/5/3.

Toronut Bush

Survey Form: V20.04

Grid Reference: NZMS 260 V20 360 200

Area: 4ha

Altitude: 550m

Ecological System: 5

Landform: Gentle sideslope with a small stream flowing across it.

Vegetation: Tall closed forest of rewarewa, totara and hinau with a poorly developed but dense understorey of tree nettle!

Comments: Site at present used as part of a deer shelter paddock.

Common bush birds noted as well as kereru.

Watkoau River Bush

Survey Form: V20.05

Grid Reference: NZMS 260 V20 401 160

Area: 100ha

Altitude: 250m

Ecological System: 4

Landform: Steep sideslope and bluffs above some narrow river-flats. Because of the way the stream twists back on itself, the sideslopes occasionally form steep narrow spurs and gullies which run down into the river.

Vegetation: On the river-flats, is an emergent forest of matai over a canopy of tawa and titoki interchanged with rank pasture. A wetland comprised of *Carex secta*, *Carex geminata*, toetoe and blackberry is also here. The forest unit has a sub-canopy and shrub tier of titoki and *Melicope simplex*; while the understorey has been browsed out by sheep and possibly goats. South facing steep sideslopes and bluffs are covered with broad-leaved forest consisting of kowhai, kanuka and *Pittosporum ralphii* over a shrub tier of rangiora and mahoe in the 'gullies'. On the bluffs, a shrubland of tutu, *Blechnum* 'green bay', tuhara and mountain flax are the dominant vegetation. North facing sideslopes and bluffs have a closed forest of kanuka and kowhai over a shrub tier of mingimingi (*Leucopogon fasciculatus*) and rangiora. In places, only this shrub tier remains and in others, open bluffs exist. On the steep sideslopes above the bluffs, douglas fir and radiata pine have seeded in amongst the manuka and kanuka from neighbouring plantations.

Comments: Very little regeneration was occurring in the forested areas. Birdlife within the site was not diverse, with silvereye, tui, fantail, grey warbler, mallard, magpie, and chaffinch being noted. Possum trails were evident in the site and sheep and cattle occasionally gain access. Goats were probably present in the site too.

Katwaka Stream Bush

Survey Form: V20.06

Grid Reference: NZMS 260 V20 340 060

Area: 80ha

Altitude: 200m

Ecological System: 4

Landform: Deeply incised gully, with high steep sideslopes and bluffs.

Vegetation: Kanuka forest ranging through to a shrubland with putaputaweta and mahoe also present in the canopy in places, is the dominant vegetation. The only significant understorey plant is rangiora. The steep bluffs also support a shrubland of mountain flax, *Senecio banksii* and manuka in places.

Comments: Succession appears to be hampered by browse from goats and sheep.
A large number of birds were noted including welcome swallow, shining cuckoo, grey warbler, blackbird, thrush, tui, kingfisher, Australasian harrier, and chaffinch.

Maunganui Bush I

Survey Form: V20.09
Grid Reference: NZMS 260 V20 325 170
Area: 4ha
Altitude: 885m
Ecological System: 1 or 5
Landform: Sideslope and gully.
Vegetation: This site is a poor quality closed forest of broadleaf, putaputaweta and cabbage tree. A shrubland forms a buffer to this site and is comprised of horopito.
Comments: This site is secondary, probably the result of fire. It is also not fenced and introduced mammals including goats, sheep and cattle browse it.

Maunganui Bush III

Survey Form: V20.12
Grid Reference: NZMS 260 V20 314 182
Area: 30ha
Altitude: 850m
Ecological System: 1 or 5
Landform: A series of deep gullies which alternate with flattish spurs (with steep ends) on a gentle sideslope and topslope.
The site also has a number of dolines and tomos, with at least one cave system within it. The site is relatively well drained, with most of the watercourses entering dolines.
Vegetation: The site is mostly a closed forest of broadleaf, tree fuchsia and mountain holly over a sparse shrub tier of horopito. A very dense tier of *Polystichum vestitum* forms the ground-cover.
Surrounding this unit, on the steep sideslope spur ends and sideslopes, a shrubland of manuka and *Polystichum vestitum* exists.
One small area of red beech, which had escaped fire and other vegetation clearance was also noted.
Comments: Regeneration is restricted to the steep faces around the tomo entrances due to the presence of goats, cattle and sheep. No beech seedlings were noted.

Oburakura Bush I

Survey Form: V20.14
Grid Reference: NZMS 260 V20 312 146
Area: 30ha
Altitude: 900m
Ecological System: 5
Landform: Steep sideslope transected by a gully.
Vegetation: The steeper parts of the sideslopes have a closed forest of

putaputaweta and Hall's totara over a shrub tier of horopito. On the less steep sideslopes and gullies, an emergent tier of rimu is scattered over the canopy species.

Comments: Pines have been planted into this site and the gully has a unit of radiata pine, wine berry and houhere. Lower down the slope on a flattish spur, an emergent unit of rimu over radiata pine also exists.

Goats were noted in this site.

Mtmtba Stream Bush

Survey Form: V20.17

Grid Reference: NZMS 260 V20 285 180

Area: 30ha

Altitude: 800m

Ecological System: 5

Landform: The site consists of two gullies in the Mimiha Catchment, each with discrete patches of native vegetation, separated by a ridgeline of pasture.

The northern portion of the site consists of steep and gentle sideslopes around a gully and a gully head which forms a hanging valley. This site has a number of picturesque waterfalls and small caves in it.

The southern portion is formed from a gully head and gully in steep sideslopes.

Vegetation: In the northern portion, a tree-shrubland of low numbers of cabbage tree, putaputaweta, rewarewa, kanuka, mahoe, houhere and manuka is dominant on the steep sideslopes and hanging valley. This unit is probably a primary remnant which has been selectively logged. On the steep sideslopes above the stream, a tree-shrubland of manuka, kanuka and totara was found. This unit has the appearance of being secondary, having regenerated after fire. In the gully, a primary remnant of Hall's totara emerges over a canopy of houhere, putaputaweta and broadleaf. This unit has significant proportions of horopito forming a shrub tier.

In the southern portion of the site is a tall closed forest with emergent trees of rimu and matai growing over a canopy of lancewood, kohuhu and putaputaweta. Where logging has removed the emergent trees, the same canopy species are found forming a tall closed forest. Where an historic fire and clearing has removed the vegetation, a dense shrubland of manuka, kanuka and totara has regenerated.

Comments: Goats and possums along with sheep and cattle were noted in the site and attributed to the low diversity of the understorey. Regeneration levels were good, but low in diversity when compared to the canopy.

Inangatabi Stream Bush

Survey Form: V20.19

Grid Reference: NZMS 260 V20 213 150

Area: 30ha

Altitude: 400m

Ecological System: This site is on the border between 2 and 5, and shows characteristics of both systems.

Landform: The site consists of river-flats and steep sideslopes along Inangatahi Stream. Also a gully and spur on a tributary of Inangatahi Stream was within the site.
Site appears to suffer from poor drainage on the river-flats, as (at least) a seasonal wetland is noted there.

Vegetation: On the river-flats, a small stand of emergent forest of kahikatea over a canopy of houhere with a few lancewood, was noted. Surrounding this site, are clearings and manuka scrub. A shrubland of kanuka, houhere and manuka covers the steep sideslope downstream from the tributary. On the spur near where it joins the stream is a shrubland of the above species and manuka scrub further up, where the greywacke substrate appears to have a greater influence.

Comments: The clearings were undergoing succession and were quite weedy.

Gorge Stream Bush

Survey Form: V20.20

Grid Reference: NZMS 260 V20 213 112

Area: 5ha

Altitude: 700m

Ecological System: 3

Landform: Steep sideslope and gully below a hanging valley.
This site has small caves, springs and a waterfall in it.

Vegetation: Putaputaweta, houhere, and cabbage tree form a treeland over rough pasture and scrub on the lower sideslopes and a manuka scrubland covering the upper sideslopes.

Comments: Most of the canopy of this site has been disturbed and is broken, open and scrubby.
Regeneration is severely limited due to browse from sheep, cattle and goats.

Inangatahi Bush

Survey Form: V20.21

Grid Reference: NZMS 260 V20 223 124

Area: 90ha

Altitude: 800m

Ecological System: 5

Landform: Steep and gentle sideslope.

Vegetation: The vegetation consists of emergent matai over a canopy of lemonwood and putaputaweta with occasional mahoe, broadleaf and houhere on sideslope. Cabbage tree dominates the canopy in places.
Also on the sideslope, a treeland of lemonwood, putaputaweta, mahoe, broadleaf, houhere and manuka is found.
In a hanging valley below the site, a highly modified wetland was noted, which is now almost completely pasture, except for a

small gully in the gentle sideslope, where a wetland of *Coprosma rugosa* and *Carex secta* was noted.

Comments: Because there is the small wetland to act as a seed source for the larger area, the whole wetland may be retrievable.

Portions of this site have recently been fenced, and some regeneration is beginning to occur.

Both goats and possums were noted in the site, although not in high numbers.

Crobane Bush I

Survey Form: V20.22

Grid Reference: NZMS 260 V20 242 135

Area: 100ha

Altitude: 700m

Ecological System: 5

Landform: Steep sideslope, spur and gully, with steep bluffs along the top.

Vegetation: Within a gully in the northern portion, a treeland of cabbage tree and broadleaf exists over rough pasture. This portion was referred to as "Cabbage Tree Reserve" at Carter-Holt Harvey Forests.

On sideslopes within the site, occasional red beech emerge through a canopy of lemonwood, broadleaf, houhere and manuka. The shrub tier is formed from *Coprosma rhamnoides*, *Helicbrysum lanceolatum* and manuka.

The forests on the spur crests are comprised of almost pure red beech; however, this may have been modified by the presence of goats.

On steep sideslope, at the southern end of the site, an emergent forest of matai over a canopy of broadleaf, putaputaweta and lemonwood was noted.

On the bluffs and in a boulder field below them, a shrubland of *Coriaria kingiana*, and *Gnaphalium subrigidum*, grows amongst rough pasture.

Comments: Goats were common in the site and on the adjacent bluffs.

A complex and unusual site due to the presence of large sandstone and limestone bluffs (c. 100m high).

Watpunga Bush

Survey Form: V20.23

Grid Reference: NZMS 260 V20 189 070

Area: 20ha

Altitude: 650m

Ecological System: 3

Landform: Gully and gentle sideslopes.

Vegetation: Rimu, matai and kahikatea emerge through a canopy of kahikatea, matai, houhere and putaputaweta, in the gully. Wine berry and mahoe form a canopy over wine berry, kanono and *Polystichum vestitum*, on gentle sideslopes. This block of bush is fenced, and shows vigorous regeneration.

The above portions were discrete blocks of bush, which are

linked by a treeland of kahikatea, rimu and matai

Comments: Mistletoe (*Tupela antarctica*) is present on putaputaweta. The site consists of three discrete blocks of bush surrounded by a paddock and linked by a treeland. Where the site was not fenced, the understorey has been browsed out by sheep and cattle. Rabbits were also noted in the bush.

Mantaroa Range Bush

Survey Form: V20.24

Grid Reference: NZMS 260 V20 220 085

Area: 14ha

Altitude: 620m

Ecological System: 5

Landform: Steep sideslope, gully and topslope.

Vegetation: A canopy of putaputaweta and houhere was noted on the sideslope, while the gully has the same canopy, but with a few emergent trees of rimu and kahikatea as well. On the topslope, a canopy of broadleaf exists.

Comments: This unit has suffered from browse from sheep and goats and now has no understorey, however, the site is showing some signs of regeneration.

Te Waka Tarn

Survey Form: V20.25

Grid Reference: NZMS 260 V20 228 120

Area: 0.5ha

Altitude: 970m

Ecological System: 1

Landform: Three tarns amongst rolling tops.

Vegetation: Widely scattered manuka over pasture.

Comments: Cattle have pugged all three tarns. Not significant in its present state; but with removal of cattle and control of goats, the site would have some wetland potential.

Camp Stream Bush

Survey Form: V20.27

Grid Reference: NZMS 260 V20 228 100

Area: 10ha

Altitude: 650m

Ecological System: 5

Landform: Gentle sideslope, spur and gully, extend up to steep sideslopes and bluffs on the Te Waka Range.

Vegetation: Vegetation is mostly a shrubland of manuka and kanuka on the sideslopes. On a small spur near the stream, a forest of emergent rimu over a canopy of rewarewa and rimu was found. On the steep sideslope, forest of putaputaweta, horopito, mahoe and lemonwood was noted.

Comments: Very little regeneration due to recent use of the area by cattle and a thick ground-cover of weeds. The site has recently had radiata pine planted around it, which

will act as a buffer around the bush, however, they may threaten it when they are harvested.

One mistletoe (*Tupeia antarctica*) was found on a putaputaweta near the stream in this site.

Mangahina Bush

Survey Form: V20.29
Grid Reference: NZMS 260 V20 255 999
Area: 40ha
Altitude: 250m
Ecological System: 4
Landform: Steep sideslope, gully and gully head of Mangahina Stream.
Vegetation: Mostly a shrubland of kanuka and mingimingi (*Leucopogon fasciculatus*), with some mahoe also present in the canopy. The understorey is comprised of mingimingi.
In the gully heads, more broad-leaved species were evident; mingimingi being replaced by mahoe, kanono and rangiora.
Comments: Goat, possum sheep and occasionally cattle gain entry to the site. This site links up with Mangahina Stream Marginal Strip (CMS Reference 80194), and Heretaunga PNA Report RAP 4.

Opau Stream Bush I

Survey Form: V20.30
Grid Reference: NZMS 260 V20 205 050
Area: 30ha (20ha + 10ha)
Altitude: 500m
Ecological System: 5 or 3
Landform: Sideslope, gully and gully head (of a tributary of Opau Stream)
This tributary has a small waterfall on it.
Vegetation: The forested portion of this site comprised of putaputaweta interspersed with some houhere.
On the lower part of the sideslope, a wetland has formed of manuka, kanuka and gorse. *Carex solandri* and *Carex dissita* were also found in this unit.
Comments: *Gastrodia cunninghamii* was found in the forest near the waterfall.
Some regeneration occurring.
Goats were noted in the site.

Mobaka Shrubland

Survey Form: V20.33
Grid Reference: NZMS 260 V20 180 140
Area: 900ha
Altitude: 600m
Ecological System: 2
Landform: Steep sideslope, topslope, spur and gully. Area comprised of poor quality greywacke, with slips and small screes or erosion scars throughout it.
Vegetation: The site is comprised mostly of a manuka, kanuka and bracken scrubland with a few tall kanuka and beech trees as well. Along the stream side an area of regenerating broad-leaved forest was

found. This unit was comprised of mahoe, houhere and kowhai, with a few *Pittosporum ralphii*, but was very small.

Comments: The site had been completely cleared about twelve years ago, and is in the process of being cleared again.

McVicar Scrubland

Survey Form: V20.34

Grid Reference: NZMS 260 V20 209 168

Area: 15ha

Altitude: 370m

Ecological System: 2

Landform: Two terrace treads of the Mohaka River, separated by a small terrace riser.

Vegetation: Mostly scattered radiata pines amongst manuka scrub. Radiata pine planted along the outer edge of the terrace tread.

Comments: Not significant.

Geddes Bush

Survey Form: V20.35

Grid Reference: NZMS 260 V20 223 173

Area: 15ha

Altitude: 430m

Ecological System: 2

Landform: Gully in a gentle sideslope which then extends up onto steeper sideslopes and spurs. From the gully mouth, a small fan extends out onto a terrace tread above the Mohaka River.

Vegetation: The gully mouth or fan landform has a tree shrubland of scattered houhere over a shrubland of *Coprosma* 'taylorae'. The understorey is mostly pasture or blackberry.

The spur in the upper sideslope has a shrubland of scattered kanuka over dense mingimingi (*Leucopogon fasciculatus*), *Coprosma rhamnoides* and scattered manuka.

In the gully, a closed forest with a canopy of fivefinger, putaputaweta and kanuka was found. This unit has an understorey of blackberry and wheki ponga.

Comments: Due to the presence of stock, the site has poor regeneration levels.

This site does not appear to be in the ecological district. It has landforms not found elsewhere in the ecological district, and it is on the true right of the Mohaka River.

Crobane Bush

Survey Form: V20.37

Grid Reference: NZMS 260 V20 260 140

Area: 80ha

Altitude: 800m

Ecological System: 4 and 5

Landform: Gentle to steep sideslope, dissected by streams and small spurs. Limestone bluffs above the site appear to be unstable and have strewn the sideslope with boulders.

The stream is fast flowing, with a bouldery bed and numerous

- small waterfalls.
- Vegetation:** On the northern side of the site, a tall closed emergent forest of occasional rimu over a canopy of broadleaf, lemonwood, cabbage tree and mahoe has escaped destruction. The understorey tiers of this site are a shrub tier of horopito, and a ground cover of *Polystichum vestitum* and *Blechnum fluviatile*. On the southern side of the site, a shrubland of manuka and lancewood has regenerated.
- Comments:** Goats, sheep, possums, deer and pig rooting were noted from this site.
- Even though a relatively large diversity of herbivorous mammals were noted from this site, it seems to have reasonable levels of regeneration in the bush. Other areas (e.g. along the streams etc.) have been extensively pig rooted and browsed. Horopito is probably at a higher-than-natural proportion than it would have been in the absence of mammalian herbivores.
- The shrubland area appears to be successional, undergoing a change, which is increasing the proportion of broad-leaved species in it.
- A large number of bird species were noted here including grey warbler, fantail, bellbird, silvereye, shining cuckoo, kereru, chaffinch and blackbird.

Willowford Bush

- Survey Form:** V20.38
- Grid Reference:** NZMS 260 V20 140 903
- Area:** 230ha
- Altitude:** 300m
- Ecological System:** 4
- Landform:** Steep sided gully and steep sideslope.
- Vegetation:** On the upper portion of the site, a closed forest of kanuka and kowhai is found, with some manuka scrub regenerating on disturbed sites. The understorey in this unit is formed from tree nettle, *Helicbrysum lanceolatum* and black mapou.
- On the lower portion of the site, a tall closed kanuka forest exists. Also in the canopy are kowhai and *Pittosporum ralphii*, with some mahoe. The understorey shrubs are rangiora, black mapou and tutu. Wild lemonbalm forms the ground cover in this unit and is the only significant plant present.
- Comments:** The site is very weedy, with blackberry, lemonbalm, *Stachys silvatica* and *Muehlenbeckia australis* throughout the lower portion of the site.
- Sheep and cattle have access to the site. Goats and possums were likely to be present here too.
- This site also encompasses U20.04 and U20.05.

Waititi Stream

- Survey Form:** V20.45
- Grid Reference:** NZMS 260 V20 210 974
- Area:** 5ha of natural vegetation.

Altitude: 240m
 Ecological System: 4
 Landform: Gully, with steep sideslopes and bluffs.
 Vegetation: Now mostly a radiata pine plantation, with a thin strip of natural vegetation remaining along Waiiti Stream. This consists of a kanuka and rangiora shrubland, with some *Pittosporum ralphii*.

Te Watriri Bush

Survey Form: V20.47
 Grid Reference: NZMS 260 V20 146 051
 Area: 6ha
 Altitude: 400m
 Ecological System: 3
 Landform: Sideslope, gully and spur.
 Vegetation: On the sideslopes, matai, kahikatea and black maire emerge over a canopy of houhere and putaputaweta. Areas of kanuka and manuka shrublands also exist in this unit.
 In the gullies, matai, kahikatea and rimu emerge over a canopy of red beech, houhere and kanuka. Also areas of manuka shrubland exist.
 The spurs are covered with a shrubland of manuka and kanuka.
 Comments: Adjoins Conservation Covenant 8, and a number of small Open Space Covenants, administered by QEII National Trust.

Puketitiri Bush

Survey Form: V20.48
 Grid Reference: NZMS 260 V20 130 100
 Area: 25ha
 Altitude: 700m
 Ecological System: 3
 Landform: Two long thin shallow gullies in a gentle sideslope, which become steeper near their heads.
 Vegetation: The vegetation on the sideslope is a very sparse treeland of matai, rimu and kahikatea amongst pasture and recently planted radiata pines. Patches of forest in the gullies are dominated by tree fuchsia, kowhai and houhere.
 Comments: The pasture surrounding the site has recently been planted with radiata pines. Due to exclusion of stock for the pines, the forest in the gullies is of a reasonably good quality (although small in size).

Carswell Road Bush

Survey Form: V20.49
 Grid Reference: NZMS 260 V20 175 095
 Area: 12ha (A: 2ha+B: 10ha)
 Altitude: 600m
 Ecological System: 3
 Landform: Two patches of bush. One on gentle sideslope and the other in a gully and gully head.
 Vegetation: A: Podocarp forest. This is comprised of emergent forest of kahikatea, rimu and matai over a canopy of putaputaweta and

mahoe; with a sub-canopy of *Melicope simplex* and putaputaweta. The understorey is well developed; with a shrub tier of *Melicope simplex* and a herb layer of *Blechnum fluviatile* and *Polystichum vestitum*.

B: Secondary forest. This unit has the appearance of having been selectively logged. The vegetation is comprised of a mosaic of putaputaweta and matai interspersed with horopito, which has regenerated in the gaps left after logging. The unit is now part of a paddock and has a very poorly developed understorey, with the only significant plants being horopito and wheki ponga in the shrub tier.

Comments: Regeneration in both sites now appears to be occurring. Seedlings of matai and kahikatea were common amongst broad-leaved species in both sites. Originally, both units in this site would have been the same. However, selective logging in the larger of the units, has altered the regeneration pathway now making both units quite different. Both sites show signs of recently having had stock in them. An unusual fern was noted in this site (*Asplenium richardii*). It is endemic to the central North Island region.

Te Waka Tarn

Survey Form: V20.50
Grid Reference: NZMS 260 238 124
Area: 1ha
Altitude: 975m
Ecological System: 1
Landform: Small tarn in a shallow gully.
Vegetation: Pasture (browntop).

Inangatahi Bush

Survey Form: V20.53
Grid Reference: NZMS 260 V20 189 117
Area: 100ha
Altitude: 700m
Ecological System: 2
Landform: Steep gully and gully head surrounded by steep sideslope.
Vegetation: A manuka and mingimingi (*Leucopogon fasciculatus*) scrubland with some *Coprosma* 'taylorae' and Hall's totara present on steep sideslopes. This unit is destined to be cleared. Red beech forest with an understorey of mingimingi in the gully and gully head. Broad-leaved shrubland of fivefinger, manuka and broadleaf with some *Pittosporum ralphii* and mountain flax also present on sideslopes above the gully head.

Comments: Rabbit sheep and goats were also present in this site. Birds noted were fantail, shining cuckoo, grey warbler, bellbird, silvereye, yellow hammer, thrush and chaffinch.

Potter Road Bush

Survey Form: V20.53A
Grid Reference: NZMS 260 V20 194 094

Area: 40ha
 Altitude: 600m
 Ecological System: 3
 Landform: Gully head and gully with a small stream in a steep sideslope above gentle sideslopes along the sides of Inangatahi Stream. The gentle sideslope is poorly drained and has formed a wetland where the stream flows over it.
 Vegetation: In the gully head, a scrappy podocarp forest remains which intergrades with a shrubland on the steep sideslopes. In this unit, kahikatea and rimu emerge over a canopy of *Pittosporum ralphii*, houhere, lancewood and putaputaweta. The canopy height in this unit is variable, with the canopy in some places being formed from mountain flax, *Blechnum* 'green bay' and *Polystichum vestitum*. In other places in this unit, these plants form the understorey.
 On the gentle sideslope, a tussockland of raupo and *Carex geminata*, with some *Carex secta* has formed. This unit also has significant areas of pasture, *Eleocharis gracilis* and some manuka.
 Comments: The area has quite a high diversity, but is also very weedy and degraded as well.

Maunganui Bush IV

Survey Form: V20.55
 Grid Reference: NZMS 260 V20 344 151
 Area: 3ha
 Altitude: 410m
 Ecological System: 5
 Landform: Gentle sideslope and gully.
 Vegetation: Podocarp forest. Rimu and matai emerge over a canopy of rewarewa and titoki. A sub-canopy of mahoe and pigeonwood, over an open understorey suggests that this site has been browsed by cattle and sheep for some time. This is the only site in the Maungaharuru Ecological District, where the small tree orchid *Drymoanthus adversus* was noted.
 Comments: This site may have been selectively logged for totara, although no stumps were noted.
 Very little regeneration was noted, due to stock. Goats and possums were also noted.
 This site is at the stage that it can be restored with fencing and animal control.
 Kereru, paradise shelduck, Australasian harrier, tui, grey warbler, fantail, shining cuckoo, thrush, blackbird, and starling were all noted in the site.

Tittokura Wetland

Survey Form: V20.56
 Grid Reference: NZMS 260 V20 297 144
 Area: 2ha (1ha + 1ha)
 Altitude: 630m

Ecological System: 5

Landform: Small wetland formed in a gentle sideslope or shallow hanging valley. The wetland appears to drain into a sinkhole underneath it and has no outlet.

Vegetation: Half of the wetland is covered with a tussockland of *Carex geminata*, interspersed with manuka. The remainder of the wetland is covered with a manuka shrubland, with cabbage trees emerging through it.

The wetland is fringed with a treeland of houhere, on gentle sideslopes at the northern and southern ends.

Kings Stream Bush

Survey Form: V20.57

Grid Reference: NZMS 260 V20 263 097

Area: 10ha

Altitude: 540m

Ecological System: 5

Landform: Sideslope with a number of small gullies running across it.

Vegetation: Tall closed forest tending towards a treeland of rewarewa, titoki and mahoe. The canopy is mostly open, or broken allowing increased windfalls. A well developed shrub tier of almost pure tree nettle also exists in this site.

Comments: This site appears to have been selectively logged, and now has very little regeneration due to the presence of stock, feral goats and possums. Elderberry was also noted from this site, this plant can be troublesome to eradicate as it can germinate and grow under a closed canopy.

This site appears to be used by a number of birds: 4 pairs of kereru were seen here, along with bellbird, grey warbler, fantail, tui, yellow hammer, blackbird and magpie being noted.

Waikonini Shrubland

Survey Form: V21.01

Grid Reference: NZMS 260 V21 130 880

Area: 100ha

Altitude: 230m

Ecological System: 4

Landform: Gully with steep sideslopes, tributary gullies and spurs. Waikonini Stream has a number of small waterfalls on it.

Vegetation: Vegetation is divided into three main types, depending upon aspect and drainage. The north facing slopes have a scrubland of mostly kanuka with some kowhai also present. Mahoe, rangiora and *Coprosma rhamnoides* form a poorly developed sparse understorey amongst pasture.

The south facing slopes are covered with a broad-leaved forest consisting of putaputaweta, kanuka and fivefinger. Present within this canopy are some kowhai and lancewood. The understorey in this unit is made up of the shrubs rangiora, mahoe and putaputaweta; with ferns (*Blechnum fluviatile* and *Blechnum* 'green bay') and hooksedge being the most

predominant herbs. Blackberry is also throughout this unit. On the dry areas of the south facing slopes, bracken and manuka scrub is the dominant vegetation type, while the north facing dry slopes are bare papa, with the occasional *Hebe parviflora* 'squalida'.

Comments: The site is unfenced, and sheep and cattle can gain access to the site. Goats may have been in the site, but were not noted. Birds noted in the site were kingfisher, grey warbler, silvereye, fantail, bellbird, blackbird, yellow hammer, and chaffinch. The holes of the puriri moth caterpillar were noted in kanuka (as well as more common hosts).

Whanawhana Shrubland

Survey Form: V21.02
 Grid Reference: NZMS 260 V21 108 783
 Area: 12ha
 Altitude: 260m
 Ecological System: 4
 Landform: Steep sideslope above narrow gullies. The site is made up of a series of gullies, and therefore has small spurs between them.
 Vegetation: Consists of a tall closed forest with a canopy of kanuka, manuka and *Pittosporum ralphii*. The understorey is comprised of *Helicbrysum lanceolatum* or pasture. Along the stream where the ground is slightly damper, houhere and putaputaweta are also present in the canopy.
 Comments: Much of the site has been cleared, leaving a kanuka and manuka scrubland on the steepest faces. A significant proportion of the site is over pasture, where no regeneration is occurring. The greatest diversity occurs on the steep stream banks, where goats, sheep and cattle cannot reach. Possums were noted in the site.

Watkart Scrubland

Survey Form: W19.01
 Grid Reference: NZMS 260 W19 531 255
 Area: 60ha
 Altitude: 250m
 Ecological System: 4
 Landform: The site consists of steep sideslope and gullies on the south side of the Waikari River
 Vegetation: Degenerated tall, closed forest of kanuka over *Coprosma rhamnoides*
 Comments: The seral kanuka successional phase is drawing to a close with no broad-leaved species beginning to replace it. Extensive browsing has been detrimental to the understorey of almost pure *Coprosma rhamnoides*, which in places, has been cleared. This site gives the impression of having once been of high natural value, but now in the process of degenerating into a kanuka treeland over pasture.

Mangangarara Stream Bush

Survey Form: W19.02
Grid Reference: NZMS 260 W19 510 240
Area: 120ha
Altitude: 240m
Ecological System: 5
Landform: Steep sideslopes and bluffs over a gully with some gentle sideslopes.
Vegetation: Site used to have massive kahikatea and totara prior to logging in 1928. Now an emergent forest of rimu and matai over a canopy of tawa, titoki and rewarewa, with a poorly developed sub-canopy of mahoe and a few lemonwood. Understorey of wheki ponga, silver ponga *Coprosma rhamnoides* and hook-sedge.
Comments: Presence of karaka is unusual in the Maungaharuru Ecological District.
The site was not visited as access was not allowed.

Putorino Road Wetland

Survey Form: W19.03
Grid Reference: NZMS 260 W19 539 235
Area: 3ha
Altitude: 140m
Ecological System:
Landform: The site appears to have been caused from about four springs in various parts of a shallow valley in papa hill country forming a 'clover leaf' shaped wetland.
Vegetation: This is the only site where *Schoenoplectus validus* has occurred; where it forms an extensive tussockland over most of the area. *Juncus articulatus* and *Eleocharis gracilis* form a ground cover or sward under the *Schoenoplectus*.
Comments: The site has also been extensively modified in the past, with one spring of the wetland having been dammed and subsequently bursting.
The wetland is quite degraded, with blackberry becoming a serious threat to its viability.
Sheep and cattle have access, and have browsed and pugged the site.

Rongomatapa Bush

Survey Form: W19.05
Grid Reference: NZMS 260 W19 546 318
Area: 12ha
Altitude: 340m
Ecological System:
Landform: This site is mostly sideslope, with some small spurs and gullies in it.
Vegetation: A tall closed emergent forest. Rewarewa with some rimu emerge over a canopy of tawa and rewarewa with the odd titoki also present. A sub-canopy of mamaku was evident in the gullies. Around the fringes, kanuka forms a buffer.

Comments: This site was not visited, it was surveyed through binoculars, so no understorey information was collected.
Goats were noted in the site.

Heruberu Stream Bush

Survey Form: W19.06
Grid Reference: NZMS 260 W19 579 345
Area: 10ha
Altitude: 300m
Ecological System:
Landform: Gully, sideslope and spur with a small portion of the site in a gully head.
Vegetation: Consists of a tall closed forest of emergent rimu over a canopy of tawa over a sub-canopy of mahoe. The understorey has been browsed out and was quite open.
Comments: Forest floor is quite open, but with good regeneration at the seedling height tier. The site appears to have been stocked about one or two years ago, as this is about the age of the seedling pines now planted around the site.
The site is low quality at present, but has potential to be better.

Appendix 3

EXISTING PROTECTED AREAS IN THE MAUNGAHARURU ECOLOGICAL DISTRICT

The table follows on pages 155 to 160.

CF: Closed Forest,

TCF: Tall Closed Forest

TCFE: Tall Closed Forest with Emergent Podocarps

APPENDIX 3 : EXISTING PROTECTED AREAS IN THE MAUNGAHARURU ECOLOGICAL DISTRICT.
(CF: Closed Forest, TCF: Tall Closed Forest with Emergent Podocarps)

CMS REFERENCE	NAME	AREA (ha)	MAP REF. (NZMS 260)	VEGETATION	LANDFORM	COMMENT
Cons Covenant 10	Blowhard Bush	63	U20 040 935	TCF: black beech / <i>Cyatodes empetrifolia</i> - (broadleaf) - (five finger) - (<i>Coprosma robusta</i>)	gully, sideslope	Kereru, bellbird and North Island robin, grey warbler, harrier
				TCF: kanuka	ridge crest	
				TCFE: (matai) - (rimu) / mahoe - (<i>Pittosporum eugenoides</i>) - (hoheria) - (putaputaweta) / (<i>Coprosma grandifolia</i>) - rangiora. Shrubland: manuka - (<i>Epacris alpina</i>) - (mountain flax)	sideslope footslope, sideslope	
80025	Waikouau Bush	260	V19 395 215	TCF: shrubland: kanuka - manuka, with pockets of titoki, tawa, nikau and manuka. Herb-field: <i>Jovellana sinclairii</i>	sideslope, spur and gully, stream banks and debris cones	New Zealand Falcon possibly present. Interesting limestone features.
80027	Lake Opouahi Scenic Reserve	6	V19 410 233	Tussockland: raupo - <i>Carex geminata</i> - <i>Juncus</i> sp.	lake margin	Limestone outcrops and tomos on site.
		87	V19 415 215	TCF: kamahi - (tawa) - (rewarewa)	sideslope	Waterfowl common on lake.
		9	V19 408 220	CF: putaputaweta - hoheria - kanuka CF: rewarewa - putaputaweta Shrub-tussockland: manuka / <i>Blechnum minus</i> - <i>Carex secta</i> - <i>Carex geminata</i>	sideslope gully and gully head gully wetland	Weed sp. prevalent around lake.
80205	Matahourua Stream Marginal Strip	31	V19 470 214	manuka - kanuka (houhere)	gorge, foot-slopes and sideslopes	
80026	Bellbird Bush Scenic Reserve	181	V19 390 235	TCF: red beech - black beech - (maire) - (podocarps)	sideslope, spur-line	Kiwi possibly present. Falcon and kereru present: <i>Botrychium biforme</i> recorded here by Druce.
				TCF: kamahi	sideslope, gully	
				Scrubland: manuka	sideslope, spur-line	
				Tussockland	topslope	
80019	Morrisons Lake Wildlife Refuge	6	V19 297 227	Shrubland: manuka - kanuka	footslope, (lake margin)	Paradise shelduck moulting site
				Raupo - <i>Carex geminata</i>	lake margin	
80022	Cashes Bush	187	V19 320 240	TCF: red beech - (rimu) - (matai) - (kahikatea)	footslope, sideslope, gully	Kiwi and Falcon present.
				CF: broadleaf - (mountain holly)	sideslope, topslope, gully	
				Shrubland: manuka	sideslope	
80070	Waitere Kiwi Reserve	1, 662	V19 345 315	CF: kanuka - manuka	sideslope, gully	Densest population of kiwi in Hawke's Bay
				TCF: kamahi	(sideslope), (spur line)	
				Shrubland: manuka	sideslope	

APPENDIX 3 (CONT.): EXISTING PROTECTED AREAS IN THE MAUNGAHARURU ECOLOGICAL DISTRICT.

CMS REFERENCE	NAME	AREA (ha)	MAP REF. (NZMS 260)	VEGETATION	LANDFORM	COMMENT
80028	Boundary Stream Scenic Reserve	702	V19 410 315	TCF: tawa - titoki - rewarewa	footslope, sideslope, gully	Kiwi present. <i>Botrychium bifforme</i> and <i>Scandii rosifolia</i> noted by Druce. <i>Clanibius puniceus</i> recorded from site (Walls).
				TCF: kamahi	sideslope, spur line	
				TCF: black beech - red beech - (Hall's totara) / horopito	upper slopes and topslope	
				TCF: kanuka		
Cons. Covenant 11	Birches Bush	189	V19 355 235	TCF: red beech - (black beech)	sideslope, spur, gully	
Cons. Covenant 12	Woodstock Shrubland	132	V19 365 265	Shrubland: fivefinger - hebe - bracken	sideslope, topslope, ridge crest	Survey required.
80077	Limestone Ridge Cons. Area	162	V19 410 290	TCF: kanuka	sideslope, topslope	Falcons present. <i>Clanibius puniceus</i> recorded from near here (Walls).
80189	Mohaka River No.1 Bush	22	V19 265 228	manuka	sideslope	2 ^o bush (lemonwood, <i>Pittosporum</i> sp., cabbage tree, manuka, etc).
80167	Gold Creek Marginal Strip	18	U20 075 965	TCF: kanuka / (hoheria) - (black mapou) / <i>Coprosma crassifolia</i> - Black mapou - rangiora - <i>Helicbrysium lanceolatum</i> .	flood plain, footslope, steep side slope - bluffs	Silver eye, whitehead, tui, shining cuckoo, chaffinch, greenfinch and yellowhammer.
				Shrubland: kowhai - mountain flax		
80073	Tutaekuri Climatic Reserve	197	U20 085 965	CF: kanuka - kowhai / (rangiora) - (tree nettle)	side slope, river flats	Kereru recorded from here.
				Shrubland: manuka - kanuka	side slope - bluffs	
80074	Hutchinson Scenic Reserve	45	V20 155 089	TCFE: kahikatea - rimu - matai	gentle sideslope and topslope	Historical records of <i>Dactylanthus taylorii</i> from here.
				CF: manuka - kanuka		
80075	William Hartree Memorial Scenic Reserve	14	V20 185 050	Shrubland: manuka - kanuka	spur, sideslope, gully	<i>Tupeia anarctica</i> , <i>Botrychium biforme</i> and <i>Thelymira formosa</i> recorded from here (Rotorua Bot. Soc. species list, 1989).
				TCF: putaputaweta - houhere - kanuka	sideslope	
CMS 8 QEII 8/3	Hartree Wildlife Refuge (open space covenant)	213	V20 135 043	TCFE: (rimu) - (kahikatea) - (matai) / putaputaweta - mahoe - houhere - (fivefinger) / horopito - rangiora	gully and river flats	Historical records of North Island robin, kiwi and kaka. <i>Tupeia anarctica</i> common here.
				TCF: (red beech) / kanuka - manuka / horopito - manuka - mingimiri - (<i>Leucopogon fasciculatus</i>)	spur and sideslope	
				TCF: putaputaweta - houhere - kanuka	gentle sideslope	
				Shrubland: bracken - (manuka) - (cabbage tree) - (horopito) - (koromiko)	topslope	
80083	Mangaone Shrubland	89	V20 268 030	Shrubland: kanuka - manuka - (cabbage tree) - (putaputaweta)	steep sideslope, bluffs, river flats	

APPENDIX 3 (CONT.): EXISTING PROTECTED AREAS IN THE MAUNGAHARURU ECOLOGICAL DISTRICT

CMS REFERENCE	NAME	AREA (ha)	MAP REF. (NZMS 260)	VEGETATION	LANDFORM	COMMENT
80206	Mangaone River Marginal Strip	8	V20 280 006	Shrubland: kanuka - manuka - (cabbage tree) - (putaputaweta)	steep sideslope, bluffs, river flats	
80194	Mangahina Stream Marginal Strip	10	V20 245 980	Shrubland: manuka - kanuka - (houhere) - (putaputaweta)	steep sideslope and river flats	
PNA 029	Wood / Park Covenants	128	V19 330 230	CF: mountain holly - broadleaf / <i>Polystichum vestitum</i> (bush lawyer)	gentle and steep sideslope	<i>Pimelea aridula</i> var. (drooping), Maungaharuru Ra.), <i>Carex ensifolia</i> , <i>Hieracium redolens</i> , <i>Aciphylla squarrosa</i> , Kereru, falcon and kiwi present. <i>Powelliphanta marcanti</i> : also present at site.
				TCF: red beech - Hall's totara / horopito - <i>Polystichum vestitum</i>		
				Treeland: (houhere) - (black maire) - (kowhai) - (putaputaweta) - (cabbage tree) - (rimu) - (matai)		
				Shrubland: <i>Coprosma "taylorae"</i> - <i>Aristotelia frutescens</i> - weeping mapou - <i>Olearia nummularifolia</i> - <i>Phyllocladus asplenifolius</i> - Hall's totara	sideslope	
				Herbfield: <i>Celmisia gracilentia</i> - <i>Ranunculus roylei</i> - <i>Myosotis</i> sp. - speargrass - gentian	sideslope, topslope	
80193	Mohaka River Conservation Area	35	V20 170 150	Tussockland: (<i>Poa cita</i>)		
80218	Mohaka River Marginal Strip	5	V20 235 174	Scrubland: manuka / pasture		
80076	Glenfalls Scenic Reserve	3	V20 373 100	Scrubland: manuka		
80196	Esk River Conservation Area	106	V20 373 100	Houhere, and areas of bracken and blackberry	Gully	
80191	Waikari River Marginal Strip	15	W19 535 257	CF: manuka - kanuka - kowhai - mahoe - <i>Pittosporum ralphii</i>	steep sideslope, bluffs (river flats)	
80030	Fernbird Bush Scenic Reserve	30	U20 020 935	TCF: kanuka - (manuka) - (titoki) - (tawa)	steep sideslope, gentle sideslope	
80018	Omahaki Esplanade Reserve	33	U21 020 875	Shrubland: manuka - kanuka - (black beech) - <i>Pinus contorta</i>	sideslope	<i>Pinus contorta</i> invading area.
80021	Kaweka Forest Park	6200	T20 U19 U20 U21 V20	CF: manuka - kowhai	steep sideslope	
				TCF: mountain beech - red beech	sideslope, spur, gully	This Forest Park extends into Maungaharuru Ecological District in a number of places along its western edge (Kohinga, Miroroa, Longfellow, etc.).
				Shrubland: manuka - kanuka	sideslope	Tui, long-tailed cuckoo, grey warbler, whitehead, chaffinch.
				TCF: kanuka / (houhere) - (black mapou) - <i>Pinus contorta</i>	gully	

APPENDIX 3 (CONT.) : EXISTING PROTECTED AREAS IN THE MAUNGAHARURU ECOLOGICAL DISTRICT.

CMS REFERENCE	NAME	AREA (ha)	MAP REF. (NZMS 260)	VEGETATION	LANDFORM	COMMENT
80021	Kaweka Lakes	150	U20 999 995	Shrubland: manuka - kanuka / <i>Leucopogon empetrifolia</i> - (<i>Coprosma "taylorae"</i>) - (<i>Olearia furfuracea</i>)	sideslope, spur, gully	<i>Pleurosorus rufifolius</i> (unconfirmed) recorded from here. Grey warbler, whitehead, pipit, bellbird.
				Shrubland: manuka	footslope, gully: wetland	
				Tussockland: <i>Carex</i> sp. - (<i>Lepidosperma australe</i>)	lake-head seasonal: wetland	
80021	Lizard Bush	1000	U20 020 910	TCF: manuka - kanuka / <i>Olearia furfuracea</i> - (<i>Carmichealia arborea</i>)	upper sideslope, spur, gully	Spectacular wind-formed sandstone and limestone formations.
				TCF: manuka - kanuka - fivefinger		
				Shrubland: (<i>Olearia furfuracea</i>)	lower sideslope, gully	
80071	Balls Clearing Scenic Reserve	135	V20 122 090	<i>Pinus radiata</i> : planted.	ridge crest	Historical records of <i>Dactyloctenium aegyptium</i> (Elder, 1950). <i>Ilex</i> spp. <i>micrantha</i> , <i>Kortbasella linasayii</i> , <i>Tupeta antarctica</i> , <i>Olearia bectorii</i> , <i>Pittosporum divaricatum</i> , <i>Coprosma acerosa</i> , <i>Botrychium bifurcatum</i> , <i>B. australe</i> , <i>Herpotherium novae-zelandiae</i> and <i>Mentha cunninghamii</i> recorded by Druce, (27). Kererū and Long-Tailed Bat also present.
				TCFE: kahikatea - matai - rimu / mahoe - lemonwood - (horopito)		
				TCFE: matai / red beech	gentle sideslope and topslope	
				Tussockland: <i>Chionochloa rubra</i>		
				Shrubland: manuka - <i>Coprosma rugosa</i> - (<i>Olearia virgata</i>)		
Cons. Covenant 8	Te Wairere Bush	6	V20 146 051	TCFE: matai - kahikatea - (rimu) / red beech - kanuka - hoheria - manuka - (putawetaweta)	gully	Distinctive plants on limestone bluffs. CMS.
				TCFE: matai - kahikatea - black maire / kanuka - hoheria - manuka - (putawetaweta)		
				Shrubland: manuka - kanuka		
W19038	Boundary Stream Covenant	68	W19 535 270	TCFE: matai - rimu	gully and river flats	
				TCF: kanuka / <i>Helicobryum lanceolatum</i> - <i>Coprosma rhomboides</i>	sideslopes	
W19036	Anaura Stream Conservation Area	253	W19 540 304	TCF: kanuka	sideslope and gully	
				TCFE: rimu - matai - kahikatea	gully	
W19042	Kakariki Conservation Area	28	W19 584 325	Sedge/land: raupo	lake margin	
				TCFE: kahikatea / tawa - titoki	sideslope	

APPENDIX 3 (CONT.): EXISTING PROTECTED AREAS IN THE MAUNGAHARURU ECOLOGICAL DISTRICT.

CMS REFERENCE	NAME	AREA (ha)	MAP REF. (NZMS 260)	VEGETATION	LANDFORM	COMMENT
W19013 W19034	Kakariki Scenic Reserve and Willowflat Scenic Reserve	523	W19 603 337	TCF: rewarewa - kanuka / mamaku - kanono	gully	
				TCF: tawa - titoki - rewarewa	gentle slope	
				CF: kanuka - kowhai	steep slope	
W19037	Rewarewa Conservation Area	75	W19 565 320	TCF: rewarewa / rewarewa	sideslope and gully	Very dense stand of almost pure rewarewa.
V19501	Te Heru o Tureia Conservation Area	1652	V19	TCF: kamahi - tawa - rewarewa	sideslope and gully	
				TCF: kanuka - rewarewa	sideslope	
				TCF: kanuka / mingimingi (<i>Leucopogon fasciculatus</i>)	sideslope and topslope	
				Shrubland: bracken - whekiponga - manuka	steep sideslope	
QEII 5/5/26	Open Space Covenant	7	V20 153 057 V20 154 061	CF: putaputaweta - houhere	gully, sideslope, topslope	
QEII 5/5/25	Open Space Covenant	49	V20 207 980	TCF: kanuka - putaputaweta - mahoe - (<i>Ptilosporum ralphi</i>)	gully	
QEII 5/5/55	Open Space Covenant	35	V20 184 046	TCF: tawa - mahoe - kanuka	steep sideslope and bluffs	<i>Pleurosorus rufifolius</i> may be present on limestone bluffs within the site.
QEII 5/5/3	Open Space Covenant	12	V20 357 180	TCFE: (totara) - (rimu) - (matai) / titoki - tawa - rewarewa - (hinau) / <i>Coprosma areolata</i> - pigeonwood	sideslope, gully	A high quality remnant. One of only two sites where nikau have turned up. <i>Dactyloctenium aegyptium</i> has also been reported from here.
QEII 5/5/15	Open Space Covenant	12	U21 014 835	TCF: titoki - kowhai / kowhai / supplejack - (tree nettle)	sideslope, gully	The canopy varied in height from a shrubland, to a tall forest, this is probably the result of previous damage to the site by stock.
V20.08	Deep Stream Kiwi Reserve	200	V20 345 075	TCF: kanuka - houhere	gully, steep sideslope, spur and bluffs	The bluffs were generally not vegetated.
TOTAL AREA		14,628				

Appendix 4

SITES WHICH WERE NOT ABLE TO BE SURVEYED

Willowford Bush

Survey Form: U20.04

Grid Reference: NZMS 260 U20

Area:

Altitude: 400m

Ecological System: 4

Landform: Gully and sideslope.

Vegetation: A tall closed forest formed from kanuka, *Pittosporum ralphii*, kowhai and mahoe over an understorey of rangiora and tutu.

Comments: Incorporated into V20.38

Willowford Bush

Survey Form: U20.05

Grid Reference: NZMS 260 U20

Area:

Altitude: 400m

Ecological System: 4

Landform: Gully and sideslope.

Vegetation: Tall closed forest formed from kanuka, *Pittosporum ralphii*, kowhai and mahoe over an understorey of rangiora and tutu.

Comments: Incorporated into V20.38

Otamauri Stream Bush II

Survey Form: U21.05

Grid Reference: NZMS 260 U21 050 845

Area: 100ha

Altitude: 400m

Ecological System: 4

Landform: Sideslope, spur and gully of a tributary of Otamauri Stream.

Vegetation: It was not possible to visit the site, but a local farmer described it as a totara treeland amongst kanuka.

Comments: The farmer did not allow access to the site as he had deer in it, and he didn't want them disturbed.

Glenross Site

Survey Form: U21.06

Grid Reference: U21 074 888

Area: 5ha

Altitude: 380m

Ecological System: 3

Landform: Sideslope

Vegetation: Exotic trees around the homestead.

Maori Stream Bush

Survey Form: V19.11
Grid Reference: NZMS 260 V19 450 250
Area: 10ha
Altitude: 250m
Ecological System: 5
Landform: Stream banks along Maori Stream.
Vegetation: Low quality shrubland of manuka with some mountain flax and *Pittosporum ralphii* present, was the major vegetation. *Carex geminata* and *Carex secta* with raupo form a small wetland-tussockland near Waikari River.
Comments: Long thin strip of discontinuous vegetation amongst pasture. Site was considered too poorly degraded to be worth spending much time surveying.

Walongawabine Stream Bush

Survey Form: V19.13
Grid Reference: NZMS 260 V19 430 220
Area: 110ha
Altitude: 500m
Ecological System: 5
Landform: Steep sideslope, topslope and bluffs.
Vegetation: Vegetation appeared to be a shrubland of manuka and kanuka. It is also likely that red beech, kamahi and rewarewa would have been present here too.
Comments: This site was not visited, as the owners were not able to be contacted.

Oburakura Bush II

Survey Form: V20.15
Grid Reference: NZMS 260 V20 289 133
Area:
Altitude: 470m
Ecological System: 5
Landform: Gentle sideslope
Vegetation:
Comments: Reduced to pasture.

Te Kowhai Scrubland

Survey Form: V20.42
Grid Reference: NZMS 260 V20 105 985
Area:
Altitude: 500m
Ecological System: 5
Landform: Spur, gully and sideslope.
Vegetation: Formerly a large area of manuka and kanuka scrub bordering onto Kaweka Forest Park, now converted into radiata pines.
Comments: Thin riparian strips of kanuka forest may remain

Waihau Stream Shrubland

Survey Form: V20.44
Grid Reference: NZMS 260 V20 176 965
Area:
Altitude: 300m
Ecological System: 4
Landform: Gentle sideslope with some gullies crossing it.
Vegetation: Mostly pasture, with some scattered clumps of kanuka remaining.
Comments: A few of the gullies form wetlands on their flatter areas, however, these too, are extremely degraded.

Kikowhero Road Site

Survey Form: V21.03
Grid Reference: NZMS 260 V21 111 816
Area: 5ha
Altitude: 280m
Ecological System: 4
Landform: Gully.
Vegetation: Mostly black wattle with some radiata pine. Toetoe and manuka scrub also present.
Comments: Not significant as a natural area.

Appendix 5

HAWKE'S BAY PNAP SURVEY FORM.

HAWKES BAY PNAP SURVEY FORM

BACKGROUND

1. ECOLOGICAL DISTRICT:
2. SITE NAME:
3. SITE NO:
4. Location:
5. Map ref:
6. Area:
7. Altitude:
8. Aspect:
9. Photos: Aerial
Other
10. Recorder:
Date:
11. Time spent:
Conditions:
12. Landform description/Topography:
13. Geology/Soil parent material:
14. Soils:
15. Drainage/Hydrology:
16. Landuse (productive, recreational etc):
Surrounds:
17. Tenure:
18. Landowner:
19. Contact person:
20. Address:
21. Phone no:
22. Legal access (yes/no):
23. Legal description:
24. Nearest public road:
25. Other background comments:

Sheet 1 of 7

Site name:

Site number:

[illegible]

Sheet 2 of 7

VEGETATION

Site Name: _____

Site No: _____

26. Vegetation description (types, structure): _____ % area

27. Vegetation dynamics (circle): Primary, Secondary, Induced, Don't know

28. Comments on dynamics:

29. Native plant list:

30. Exotic plant list:

Sheet 3 of 7

FAUNA

Site Name: _____

Site No: _____

31. Native mammals:

32. Exotic mammals:

33. Birds:

34. Reptiles/Amphibians:

35. Fish:

36. Invertebrates:

Sheet 4 of 7

CULTURAL,ISSUES

Site Name: _____

Site No: _____

37. History/Archaeology:

38. Cultural significance:

39. Modifiers/Threats:

Degree
(NLMH)

Time frame
(past,present,future)

Comments

Weeds

Animals

Flooding

Drainage

Erosion

Climate

Mining

Fire/burning

Logging/cutting

Grazing/browsing(stock)

Topdressing

Pollution

Other

Sheet 5 of 7

ASSESSMENT

Site Name: _____

Site No: _____

- | | | | | |
|--|------------------------------------|----------------|----------|---------------------|
| 40. Representativeness: | High | Medium | Low | Don't know |
| 41. Diversity and pattern: | High | Medium | Low | Don't know |
| 42. Rarity, special features: | High | Medium | Low | Don't know |
| 43. Naturalness: | High | Medium | Low | Don't know |
| 44. Long-term viability: | High | Medium | Low | Don't know |
| 45. Size and shape: | High | Medium | Low | Don't know |
| 46. Buffering, surrounds: | High | Medium | Low | Don't know |
| 47. Fragility and threat: | High | Medium | Low | Don't know |
| 48. Significance: | Local | Ecol. District | Regional | National Don't Know |
| 49. Other values: (recreational, educational, economic, historical, spiritual etc) | | | | |
| 50. Protection requirements: | <u>Urgency</u> (High, Medium, Low) | | | |
| Fencing | | | | |
| Weed control | | | | |
| Animal control | | | | |
| Covenant | | | | |
| Acquisition | | | | |
| Other | | | | |
| 51. Landowner attitude: | | | | |
| 52. Other comments: | | | | |
| 53. Recommendations: | | | | |

Sheet 6 of 7

MAPS/DIAGRAMS

Site Name: _____

Site No: _____

Sheet 7 of 7

Appendix 6

CHECKLIST OF PLANTS FOR THE MAUNGAHARURU ECOLOGICAL DISTRICT

* collated from existing species lists (Druce, 1971, 1972, 1974, 1985; Rotorua Bot. Soc. etc.).

Native species

Ferns

<i>Adiantum cunninghamii</i>	
<i>Asplenium bulbiferum</i>	hen-and-chicken fern
<i>Asplenium gracillimum</i>	
<i>Asplenium flabellifolium</i>	
<i>Asplenium hookerianum</i>	
<i>Asplenium lyallii</i>	
<i>Asplenium oblongifolium</i>	
<i>Asplenium polyodon</i>	
<i>Asplenium richardii</i>	
<i>Asplenium</i> sp (<i>A. trichomanes</i> agg.) *	
<i>Asplenium terrestre</i> ssp. <i>terrestre</i>	
<i>A. bulbiferum</i> x <i>A. flaccidum</i> *	
<i>A. bulbiferum</i> x <i>A. hookerianum</i> *	
<i>A. flaccidum</i> x <i>A. hookerianum</i> *	
<i>A. flaccidum</i> x <i>A. lyallii</i> *	
<i>A. flaccidum</i> x <i>A. terrestre</i> *	
<i>A. hookerianum</i> x <i>A. lyallii</i> *	
<i>Azolla filiculoides</i> ssp. <i>rubra</i>	
<i>Blechnum chambersii</i>	
<i>Blechnum colensoi</i>	
<i>Blechnum discolor</i>	crown fern
<i>Blechnum ex. capense</i> sp 2	kiokio
<i>Blechnum ex. capense</i> sp 3	Green Bay kiokio
<i>Blechnum fluviatile</i>	
<i>Blechnum membranaceum</i> *	
<i>Blechnum minus</i>	
<i>Blechnum penna-marina</i>	
<i>Blechnum procerum</i>	
<i>Blechnum vulcanicum</i>	
<i>Botrychium australe</i>	parsley fern
<i>Botrychium bifforme</i>	parsley fern
<i>Cheilanthes humilis</i>	
<i>Ctenopteris heterophylla</i>	
<i>Cyathea dealbata</i>	silver ponga
<i>Cyathea medullaris</i>	mamaku
<i>Cyathea smithii</i>	
<i>Cystopteris tasmanica</i> *	
<i>Dicksonia fibrosa</i>	wheki ponga

<i>Dicksonia lanata</i>	
<i>Dicksonia squarrosa</i>	ponga
<i>Gleichenia dicarpa</i>	
<i>Grammitis billardierei</i> *	
<i>Grammitis magellanica</i> ssp. <i>nothofagei</i> *	
<i>Grammitis patagonica</i> *	
<i>Grammitis poeppigiana</i> *	
<i>G. patagonica</i> x <i>G. poeppigiana</i> *	
<i>Histiopteris incisa</i>	mata, water fern
<i>Hymenophyllum bivalve</i>	filmy fern
<i>Hymenophyllum cupressiforme</i> *	filmy fern
<i>Hymenophyllum demissum</i>	filmy fern
<i>Hymenophyllum dilatatum</i>	filmy fern
<i>Hymenophyllum flabellatum</i> *	filmy fern
<i>Hymenophyllum minimum</i> *	filmy fern
<i>Hymenophyllum multifidum</i>	filmy fern
<i>Hymenophyllum pulcherrimum</i>	filmy fern
<i>Hymenophyllum rarum</i> *	filmy fern
<i>Hymenophyllum revolutum</i> *	filmy fern
<i>Hymenophyllum sanguinolentum</i>	filmy fern
<i>Hymenophyllum scabrum</i> *	filmy fern
<i>Hymenophyllum villosum</i>	filmy fern
<i>Hypolepis millefolium</i>	
<i>Hypolepis ambigua</i>	
<i>Hypolepis rufobarbata</i>	
<i>Lastreopsis glabella</i>	
<i>Lastreopsis hispida</i>	
<i>Lastreopsis microsora</i> var. <i>pentangularis</i> *	
<i>Lastreopsis velutina</i>	
<i>Leptolepia novae-zelandiae</i> *	
<i>Leptopteris hymenophylloides</i>	
<i>Leptopteris superba</i>	prince-of-wales-feather fern
<i>L. hymenophylloides</i> x <i>L. superba</i>	
<i>Ophloglossum coriaceum</i> *	adders' tongue fern
<i>Paesia scaberula</i>	
<i>Pellaea eleagnifolia</i>	
<i>Phymatosorus pustulatus</i>	hounds tongue fern
<i>Phymatosorus novae-zelandiae</i> *	
<i>Pleurosorus rutifolius</i>	
<i>Pneumatopteris pennigera</i>	
<i>Polystichum richardii</i>	pikopiko
<i>Polystichum silvaticum</i>	
<i>Polystichum vestitum</i>	puniu
<i>P. richardii</i> x <i>P. vestitum</i> *	
<i>Pteridium esculentum</i>	bracken
<i>Pteris macilenta</i> (of New Zealand authors)	
<i>Pteris tremula</i>	
<i>Pyrrosia elaeagnifolia</i>	
<i>Rumohra adiantiformis</i> *	

<i>Sticberus cunninghamii</i>	umbrella fern
<i>Trichomanes venosum</i> *	filmy fern

Fern Allies

<i>Lycopodium australianum</i> *
<i>Lycopodium cernuum</i>
<i>Lycopodium fastigiatum</i>
<i>Lycopodium scariosum</i>
<i>Lycopodium varium</i>
<i>Lycopodium volubile</i>
<i>Tmesipteris elongata</i>
<i>Tmesipteris tannensis</i>

Podocarps

<i>Dacrycarpus dacrydioides</i>	kahikatea
<i>Dacrydium cupressinum</i>	rimu
<i>Phyllocladus aspleniifolius</i> var. <i>alpinus</i>	mountain toatoa
<i>Podocarpus hallii</i>	Hall's totara
<i>Podocarpus totara</i>	totara
<i>P. hallii</i> x <i>P. nivalis</i>	
<i>Prumnopitys ferruginea</i>	miro
<i>Prumnopitys taxifolia</i>	matai

Dicots

<i>Acaena anserinifolia</i>	bidi-bid, piripiri
<i>Acaena microphylla</i> *	bidi-bid, piripiri
<i>Acaena novea-zelandiae</i> *	bidi-bid, piripiri
<i>Acaena</i> sp (unnamed; aff. <i>Acaena anserinifolia</i>)*	bidi-bid, piripiri
<i>Aciphylla colensoi</i> *	speargrass
<i>Aciphylla squarrosa</i>	speargrass
<i>Alectryon excelsus</i>	titoki
<i>Alepis flavida</i>	yellow mistletoe
<i>Alseuosmia pusilla</i>	
<i>Anaphiles</i> sp (<i>Helicbrysum bellidioides</i>)	
<i>Anisotome aromatica</i>	
<i>Aristotelia fruticosa</i>	
<i>Aristotelia serrata</i>	wineberry
<i>Beilschmiedia tawa</i>	tawa
<i>Brachycome radicata</i>	
<i>Brachyglottis elaeagnifolia</i>	
<i>Brachyglottis lagopus</i>	
<i>Brachyglottis repanda</i>	rangiora
<i>Calystegia tuguriorum</i> *	
<i>Cardamine corymbosa</i> agg. *	
<i>Cardamine debilis</i> agg. *	bittercress
<i>Carmichaelia arborea</i> var.	native broom
<i>Carmichaelia odorata</i> *	scented broom
<i>Carpodetus serratus</i>	putaputaweta
<i>Cassinia vauvilliersii</i>	
<i>Celmisia glandulosa</i> *	

<i>Celmisia gracilentia</i>	
<i>Celmisia spectabilis</i>	
<i>Celmisia setacea</i> *	
<i>C. gracilentia</i> x <i>C. spectabilis</i>	
<i>Centella uniflora</i>	
<i>Clematis foetida</i>	
<i>Clematis forsteri</i> *	
<i>Clematis paniculata</i>	New Zealand clematis
<i>Clematis quadribacteolata</i> *	
<i>Clanthus puniceus</i>	kakabeak
<i>Colobanthus apetalus</i> *	
<i>Colobanthus strictus</i> *	
<i>Coprosma acerosa</i>	
<i>Coprosma areolata</i>	
<i>Coprosma cheesemantii</i>	
<i>Coprosma crassifolia</i>	
<i>Coprosma depressa</i> *	
<i>Coprosma foetidissima</i>	
<i>Coprosma grandifolia</i>	kanono
<i>Coprosma linartifolia</i>	
<i>Coprosma lucida</i>	
<i>Coprosma perpusilla</i> *	
<i>Coprosma petriei</i> *	
<i>Coprosma propinqua</i>	
<i>Coprosma pumila</i>	
<i>Coprosma rhamnoides</i>	
<i>Coprosma rigida</i> *	
<i>Coprosma robusta</i>	karamu
<i>Coprosma rotundifolia</i>	
<i>Coprosma rubra</i>	
<i>Coprosma rugosa</i>	
<i>Coprosma tenuifolia</i>	
<i>Coprosma</i> sp. (<i>C. aff. cheesemantii</i> : lf. width > <i>C. cheesemantii</i>) * = <i>C. 'oreophila'</i>	
<i>Coprosma</i> sp. (<i>C. aff. parviflora</i>) = <i>C. 'taylorae'</i>	
<i>C. propinqua</i> x <i>C. robusta</i> *	
<i>C. propinqua</i> x <i>C. tenuifolia</i> *	
<i>C. robusta</i> x <i>C. rugosa</i> *	
<i>Coriaria arborea</i>	
<i>Coriaria kingiana</i>	
<i>C. arborea</i> x <i>C. kingiana</i>	
<i>C. arborea</i> x <i>C. pteridoides</i> *	
<i>Corokia cotoneaster</i>	
<i>Corynocarpus laevigatus</i>	karaka
<i>Cotula australis</i> *	
<i>Craspedia minor</i>	
<i>Craspedia viscosa</i> *	
<i>Craspedia</i> sp. (unnamed; summer-green bog plant; capitula 1.0 - 1.5 cm dia.)	
<i>Crassula sieberiana</i> *	
<i>Cyathodes empetrifolia</i>	mingimingi
<i>Cyathodes juniperina</i>	

<i>Dactylanthus taylorii</i> *	wood rose
<i>Daucus glochidiatus</i> *	
<i>Dichondra brevifolia</i> *	
<i>Dichondra repens</i> *	
<i>Dichondra</i> sp (cf. <i>D. brevifolia</i>) *	
<i>Dodonaea viscosa</i>	akeake
<i>Dracophyllum strictum</i>	
<i>Dracophyllum subulatum</i>	monoao
<i>Drosera binata</i>	sun-dew
<i>Drosera peltata</i> ssp. <i>auriculata</i> *	sun-dew
<i>Elaeocarpus dentatus</i>	hinau
<i>Elaeocarpus bookerianus</i>	pokaka
<i>Epacris alptna</i>	
<i>Epilobium alsinoides</i> *	
<i>Epilobium atriplicifolium</i> *	
<i>Epilobium billardioreanum</i> *	
<i>Epilobium brunnescens</i> *	
<i>Epilobium chionanthum</i> *	
<i>Epilobium chlorifolium</i> *	
<i>Epilobium cinereum</i> *	
<i>Epilobium cockayneum</i> *	
<i>Epilobium glabellum</i> *	
<i>Epilobium gracilipes</i> *	
<i>Epilobium insulare</i> *	
<i>Epilobium komarovianum</i> *	
<i>Epilobium linnaeoides</i> *	
<i>Epilobium melanocaulon</i> *	
<i>Epilobium microphyllum</i> *	
<i>Epilobium nerteroides</i> *	
<i>Epilobium nummularifolium</i>	
<i>Epilobium pallidiflorum</i> *	
<i>Epilobium pedunculare</i> *	
<i>Epilobium pubens</i> *	
<i>Epilobium rotundifolium</i>	
<i>Epilobium tenuipes</i> *	
<i>Epilobium</i> sp (unnamed; included in <i>E. brunnescens</i> as ssp. <i>minutiflorum</i>) *	
<i>E. billardioreanum</i> x <i>E. pallidiflorum</i> *	
<i>Euphrasia cuneata</i>	eye-bright
<i>Euphrasia zelandica</i>	eye-bright
<i>Fuchsia excorticata</i>	tree fuchsia
<i>F. perscandens</i> x <i>F. excorticata</i> *	
<i>Galium perpusillum</i> *	
<i>Galium proptinquum</i>	
<i>Galium trilobum</i> *	
<i>Gaultheria antipoda</i>	
<i>Gaultheria</i> sp. (Unnamed = <i>G. depressa</i> var. <i>novae-zelandiae</i> of franklin)	
<i>Gaultheria oppositifolia</i>	
<i>G. antipoda</i> x <i>G. depressa</i> *	
<i>G. antipoda</i> x <i>Pernettya macrostigma</i> *	
<i>G. depressa</i> x <i>Pernettya macrostigma</i> *	

<i>Geniostoma rupestre</i> var. <i>ligustrifolia</i>	hangehange
<i>Gentiana bellidifolia</i>	gentian
<i>Gentiana grisebachii</i>	gentian
<i>Geranium microphyllum</i>	
<i>Geranium potentilloides</i> var. <i>potentilloides</i> *	
<i>Geranium sessiliflorum</i> var. <i>novae-zeelandiae</i>	
<i>Glossostigma elatinioides</i> *	
<i>Gnaphalium audax</i>	
<i>Gnaphalium delicatum</i> *	
<i>Gnaphalium gymnocephalum</i> *	
<i>Gnaphalium involucratum</i> *	
<i>Gnaphalium keriensis</i>	
<i>Gnaphalium limosum</i> *	
<i>Gnaphalium luteo-album</i>	
<i>Gnaphalium polylepis</i> *	
<i>Gnaphalium ruabanicum</i> *	
<i>Gnaphalium sphaericum</i> *	
<i>Gnaphalium subrigidum</i>	
<i>Gnaphalium traversii</i> *	
<i>Gnaphalium</i> sp (unnamed; aff. <i>G. keriense</i> ; lvs shorter, & capit. < <i>G. keriense</i>)*	
<i>Gonocarpus aggregatus</i> *	
<i>Gonocarpus micranthus</i> *	
<i>Gratiola sexdentata</i> *	
<i>Griselinia littoralis</i>	
<i>Griselinia lucida</i>	puka
<i>Gunnera monoica</i>	
<i>Gunnera prorepens</i> (incl. <i>G. flavida</i>) *	
<i>Haloragis erecta</i>	
<i>Hebe colensoi</i> *	
<i>Hebe odora</i> *	
<i>Hebe parviflora</i>	
<i>Hebe stricta</i> var. <i>egmontiana</i> *	
<i>Hebe stricta</i> var. <i>stricta</i>	koromiko
<i>Hebe</i> sp. (<i>Veronica squalida</i>)	
<i>Hebe</i> sp. (aff. <i>Veronica squalida</i>)	
<i>Hedycarya arborea</i>	pigeonwood
<i>Helicbrysum aggregatum</i> *	
<i>Helicbrysum filicaule</i>	
<i>Helicbrysum lanceolatum</i>	
<i>Helicbrysum</i> sp (unnamed; aff <i>H. bellidioides</i> ; lvs and capit. > <i>H. bellidioides</i>)*	
<i>Hoberia populnea</i> var. (<i>H. sextylosa</i>)	houhere
<i>Hydrocotyle elongata</i> *	
<i>Hydrocotyle heteromeria</i> *	
<i>Hydrocotyle hydrophila</i> *	
<i>Hydrocotyle microphylla</i> *	
<i>Hydrocotyle moschata</i>	
<i>Hydrocotyle novae-zeelandiae</i>	
<i>Hydrocotyle japonicum</i> *	
<i>Hydrocotyle pterocarpa</i> *	
<i>Hydrocotyle sulcata</i> *	

<i>Hypericum japonicum</i> *	
<i>Hypsela rivularis</i> *	
<i>Ileostylus micranthus</i>	
<i>Ixerba brexioides</i> *	
<i>Jovellana repens</i>	
<i>Jovellana sinclairii</i>	
<i>Kellertia</i> sp (K laxa?) *	
<i>Knightia excelsa</i>	rewarewa
<i>Korthasella lindsayi</i> *	
<i>Kunzea ericoides</i>	kanuka
<i>Lagenifera montana</i> *	
<i>Lagenifera pinnatifida</i> *	
<i>Lagenifera pumila</i> *	
<i>Lagenifera strangulata</i> *	
<i>Leptinella pusilla</i> *	
<i>Leptinella squalida</i> ssp.*	
<i>Leptospermum scoparium</i>	manuka
<i>Leucopogon fasciculatus</i>	mingimingi
<i>Leucopogon fraseri</i>	prickly mingimingi
<i>Lilaeopsis ruthiana</i> *	
<i>Lilaeopsis</i> sp (cf. <i>L. novae-zelandiae</i>)	
<i>Limosella lineata</i> *	
<i>Linum monogynum</i> *	
<i>Lophomyrtus obcordata</i>	rohutu
<i>Macropiper excelsum</i>	kawakawa
<i>Mazus radicans</i>	
<i>Melicope simplex</i>	poataniwha
<i>Melicytus alpinus</i>	
<i>Melicytus lanceolatus</i>	mahoe wao
<i>Melicytus micranthus</i>	
<i>Melicytus ramiflorus</i>	mahoe
<i>Mentha cunninghamii</i> *	
<i>Metrosideros colensoi</i>	weeping vine rata
<i>Metrosideros diffusa</i>	white vine rata
<i>Metrosideros perforata</i>	
<i>Microseris scapigera</i> *	
<i>Mida salicifolia</i> *	
<i>Montia fontana</i> *	
<i>Muehlenbeckia australis</i>	
<i>Muehlenbeckia axillaris</i>	
<i>Muehlenbeckia ephedroides</i> *	
<i>M. australis</i> x <i>M. axillaris</i>	
<i>Myoporum laetum</i>	ngaio
<i>Myosotis forsteri</i> *	forget-me-not
<i>Myosotis petiolata</i> ssp. <i>petiolata</i> *	forget-me-not
<i>Myosotis pygmaea</i> var. <i>pygmaea</i> *	forget-me-not
<i>Myosotis saxosa</i> *	forget-me-not
<i>Myosotis spathulata</i> *	forget-me-not
<i>Myriophyllum pedunculatum</i> ssp. <i>novae-zelandiae</i> *	
<i>Myriophyllum propinquum</i> *	

<i>Myriophyllum triphyllum</i> *	
<i>Myrsine australis</i>	mapou
<i>Myrsine divaricata</i>	weeping mapou
<i>Myrsine salicina</i>	toro
<i>Neomyrtus pedunculata</i>	rohutu
<i>Nertera ciliata</i> *	
<i>Nertera depressa</i> (incl. <i>N. cunninghamii</i>)	
<i>Nertera</i> sp. (aff. <i>N. dichondrifolia</i>)	
<i>Nertera setulosa</i>	
<i>Nestegis cunninghamii</i>	black maire
<i>Nestegis lanceolata</i>	white maire
<i>Nestegis montana</i>	narrow-leaved maire
<i>Nothofagus fusca</i>	red beech
<i>Nothofagus solandri</i>	black beech
<i>N. fusca</i> x <i>N. solandri</i> *	
<i>Olearia arborescens</i>	
<i>Olearia furfuracea</i>	akepiro
<i>Olearia hectorii</i> *	
<i>Olearia ilicifolia</i>	mountain holly
<i>Olearia nummulariifolia</i>	
<i>Olearia paniculata</i>	akiraho
<i>Olearia rani</i>	
<i>Olearia virgata</i> var. <i>virgata</i>	
<i>Olearia</i> sp (unnamed; lvs narrower than <i>O. virgata</i> var. <i>virgata</i>)*	
<i>O. furfuracea</i> x <i>O. ilicifolia</i> *	
<i>Oreomyrrhis colensoi</i>	
<i>Oreomyrrhis ramosa</i> *	
<i>Oreomyrrhis</i> sp (unnamed; incl. in <i>O. colensoi</i> as var. <i>delicatula</i> , by Allan 1961)*	
<i>Ourisia macrophylla robusta</i>	New Zealand foxglove
<i>Oxalis exilis</i> *	
<i>Oxalis magellanica</i>	
<i>Parabebe catarractae</i> spp. <i>decora</i>	
<i>Parabebe diffusa</i>	
<i>Parabebe olsenii</i>	
<i>Parsonsia capsularis</i> *	New Zealand jasmine
<i>Parsonsia heterophylla</i>	New Zealand jasmine
<i>P. heterophylla</i> x <i>P. capsularis</i>	
<i>Passiflora tetrandra</i>	
<i>Pelargonium inodorum</i> *	New Zealand passionflower
<i>Pennantia corymbosa</i>	kaikomako
<i>Pentachondra pumila</i> *	
<i>Pernettya macrostigma</i> *	
<i>Pimelea aridula</i> var. ('drooping', Maungaharuru Ra.)	
<i>Pimelea longifolia</i> *	
<i>Pimelea prostrata</i>	
<i>Pittosporum colensoi</i> *	
<i>Pittosporum divaricatum</i> *	
<i>Pittosporum eugenioides</i>	tarata, lemonwood
<i>Pittosporum ralphii</i>	karo
<i>Pittosporum tenuifolium</i>	kohuhu, black mapou

<i>P. ralpbii</i> x <i>P. tenuifolium</i> *	
<i>Plagianthus regius</i>	
<i>Plantago raoultii</i> var. (lvs. narrowly elliptic)*	
<i>Plantago triandra</i> *	
<i>Polygonum salicifolium</i> *	
<i>Pomaderris ericifolia</i>	
<i>Potentilla anserinoides</i>	
<i>Pratia angulata</i>	
<i>Pratia perpusilla</i> *	
<i>Pseudopanax anomalus</i>	
<i>Pseudopanax arboreus</i>	five finger
<i>Pseudopanax colensoi</i>	
<i>Pseudopanax crassifolium</i>	lancewood
<i>Pseudopanax edgerleyi</i> *	
<i>Pseudopanax simplex</i>	
<i>Pseudowintera axillaris</i> *	
<i>Pseudowintera colorata</i>	horopito
<i>Quintinia serrata</i> *	
<i>Ranunculus amphotrichus</i>	native buttercup
<i>Ranunculus glabrifolius</i> *	native buttercup
<i>Ranunculus hirtus</i>	native buttercup
<i>Ranunculus insignis</i> *	native buttercup
<i>Ranunculus limosella</i> *	native buttercup
<i>Ranunculus macropus</i>	native buttercup
<i>Ranunculus reflexus</i>	native buttercup
<i>Ranunculus royi</i>	native buttercup
<i>Raoulia albosericea</i> *	
<i>Raoulia australis</i>	
<i>Raoulia glabra</i>	
<i>Raoulia tenuicaulis</i> *	
<i>Rorippa palustris</i> *	
<i>Rubus australis</i> *	bush lawyer
<i>Rubus cissoides</i>	bush lawyer
<i>Rubus schmidelioides</i>	bush lawyer
<i>Rubus squarrosus</i> *	bush lawyer
<i>Rumex flexuosus</i>	
<i>Scandia rosifolia</i>	
<i>Schefflera digitata</i>	pate
<i>Schizellema colensoi</i> *	
<i>Schizellema trifoliolatum</i> *	
<i>Scleranthus biflorus</i> *	
<i>Scleranthus brockiei</i> *	
<i>Scleranthus uniflorus</i> *	
<i>Senecio banksii</i>	
<i>Senecio glaucophyllus</i> *	
<i>Senecio minimus</i>	
<i>Senecio quadridentatus</i> *	
<i>Senecio rufiglandulosus</i> *	
<i>Senecio</i> sp (unnamed; aff <i>S. glaucophyllus</i> ; capit. discoid)	
<i>Senecio wairauensis</i>	

<i>Solanum aviculare</i>	poroporo
<i>Sophora microphylla</i> *	
<i>Sophora tetraptera</i>	kowhai
<i>S. microphylla</i> x <i>S. tetraptera</i> *	
<i>Stackhousia mintma</i>	
<i>Stellaria decipiens</i> *	
<i>Streblus heterophyllus</i>	turepo
<i>Taraxacum magellanicum</i>	dandelion
<i>Tupeta antarctica</i>	mistletoe
<i>Urtica ferox</i>	tree nettle
<i>Urtica incisa</i>	nettle
<i>Viola cunninghamii</i>	native violet
<i>Viola filicaule</i>	native violet
<i>Viola lyallii</i> *	native violet
<i>Vittadina australis</i> *	
<i>Wahlenbergia albomarginata</i>	
<i>Wahlenbergia colensoi</i> *	
<i>Wahlenbergia</i> sp. (cf <i>W. gracilis</i>)*	
<i>Weinmannia racemosa</i>	kamahi

Monocots

<i>Acianthus sinclairii</i>
<i>Agrostis</i> sp (cf. <i>perennans</i>) *
<i>Amphibromus fluitans</i> *
<i>Aporostylis bifolia</i>
<i>Arthropodium candidum</i> *
<i>Astelia fragrans</i>
<i>Astelia solandri</i>
<i>Baumea rubiginosa</i>
<i>Baumea tenax</i> *
<i>Caladenia catentata</i> *
<i>Carex acicularis</i> *
<i>Carex breviculmis</i> *
<i>Carex cirrhosa</i> *
<i>Carex colensoi</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 enysii</i> *
<i>Carex flagellifera</i> *
<i>Carex forsteri</i> *
<i>Carex gaudichaudiana</i> *
<i>Carex geminata</i>
<i>Carex inversa</i> *
<i>Carex lessoniana</i> *
<i>Carex maorica</i>
<i>Carex rubicunda</i> *

<i>Carex secta</i>	
<i>Carex sinclairii</i>	
<i>Carex solandri</i>	
<i>Carex spinirostris</i> *	
<i>Carex testacea</i> *	
<i>Carex virgata</i> *	
<i>Carex</i> sp (cf. <i>C. coriacea</i> and <i>C. geminata</i>)*	
<i>C. dipsacea</i> x <i>C. rubicunda</i> *	
<i>C. comans</i> x <i>C. dipsacea</i> *	
<i>C. comans</i> x <i>C. rubicunda</i> *	
<i>C. diandra</i> x <i>C. secta</i>	
<i>Carpha alpina</i> *	
<i>Chiloglottis cornuta</i>	
<i>Chionochloa flavicans</i> *	
<i>Chionochloa pallens</i> *	
<i>Chionochloa rubra</i>	red tussock
<i>Collosperrum microspermum</i>	
<i>Cordyline australis</i>	cabbage tree
<i>Cordyline banksii</i>	banks' cabbage tree
<i>C. australis</i> x <i>C. banksii</i>	
<i>Cordyline indivisa</i>	mountain cabbage tree
<i>Cortaderia fulvida</i>	toetoe
<i>Corybas macranthus</i>	spider orchid
<i>Corybas oblongus</i> *	spider orchid
<i>Corybas orbiculatus</i>	spider orchid
<i>Corybas rivularis</i>	spider orchid
<i>Corybas trilobus</i>	spider orchid
<i>Cyperus ustulatus</i>	
<i>Cyrtostylis reniformis</i> *	
<i>Dendrobium cunninghamii</i> *	
<i>Deschampsia novae-zelandiae</i> *	
<i>Deyeuxia aucklandica</i> *	
<i>Deyeuxia avenoides</i> *	
<i>Dianella nigra</i>	
<i>Dichelachne crinata</i> *	
<i>Drymoanthus adversus</i>	
<i>Earina autumnalis</i>	
<i>Earina mucronata</i>	
<i>Echinopogon ovatus</i> *	
<i>Eleocharis acuta</i> *	
<i>Eleocharis gracilis</i>	
<i>Eleocharis sphacelata</i>	
<i>Elymus multiflorus</i> *	
<i>Elymus solandri</i> *	
<i>Elymus</i> sp. (<i>E. aff. rectisetus</i>)*	
<i>Festuca multinodis</i> *	
<i>Festuca novae-zelandiae</i>	
<i>Freycinetia baueriana</i> ssp <i>banksii</i>	kiekie
<i>Gabnia pauciflora</i>	
<i>Gastrodia cunninghamii</i> *	

Gastrodia minor *
Gastrodia sp. (aff. *G. sesamoides*)
Genioplesium (*Prasophyllum*) *nudum* *
Hierochloa recurvata *
Hierochloa redolens
Herpotherium novae-zelandiae
Iphigenia novae-zelandiae *
Isachne globosa *
Isolepis caligenis *
Isolepis cernua *
Isolepis distigmatica *
Isolepis fluitans *
Isolepis habra
Isolepis nodosa
Isolepis pottsii *
Isolepis prolifer
Isolepis reticularis *
Isolepis subtilissima *
Juncus caespiticus *
Juncus gregiflorus
Juncus novae-zelandiae
Juncus pallidus
Juncus planifolius
Juncus pusillus *
Lachnagrostis filiformis *
Lachnagrostis striata *
L. filiformis x *L. striata* *
Lemna minor
Lepidosperma australe
Libertia grandiflora mikoikoi
Libertia ixoides *
Luzula decipiens *
Luzula migrata *
Luzula picta *
Luzula subclavata *
Luzuriaga parviflora *
Machaerina sinclairii tuhara
Microlaena avenacea bush rice grass
Microlaena stipoides *
Microtis oligantha *
Microtis unifolia
Morelotia affinis *
Oreobolus pectinatus
Orthoceras novae-zeelandiae
Phormium cookianum mountain flax
Phormium tenax *
Poa anceps *
Poa breviglumis *
Poa cita *
Poa colensoi *

<i>Poa imbecilla</i> *	
<i>Poa matthewsii</i> *	
<i>Poa pusilla</i> *	
<i>Potamogeton cheesemantii</i>	
<i>Potamogeton suboblongus</i> *	
<i>Prasophyllum colensoi</i> *	
<i>Pterostylus alobula</i>	
<i>Pterostylus banksii</i>	tutukiwi
<i>Pterostylus patens</i> *	
<i>Pterostylus cardiostigma</i>	
<i>Pterostylus foliata</i> *	
<i>Pterostylus</i> (P. aff. <i>graminea</i>) *	
<i>Pterostylus micromega</i> *	
<i>Pterostylus montana</i>	
<i>Pterostylus tristis</i> *	
<i>Rhopalostylis sapida</i>	nikau
<i>Rytidosperma buchananii</i> *	
<i>Rytidosperma clavatum</i> *	
<i>Rytidosperma gracile</i> *	
<i>Rytidosperma setifolium</i> *	
<i>Rytidosperma viride</i> *	
<i>Ripogonum scandens</i>	supplejack
<i>Schoenoplectus validus</i>	
<i>Schoenus apogon</i> *	
<i>Schoenus maschalinus</i> *	
<i>Schoenus pauciflorus</i> *	
<i>Spiranthes sinensis</i> *	
<i>Stenostachys gracilis</i> *	
<i>Thelymitra decora</i> *	
<i>Thelymitra hatchii</i>	
<i>Thelymitra longifolia</i>	
<i>Thelymitra pauciflora</i> *	
<i>Thelymitra venosa</i> *	
<i>Trisetum</i> sp (unnamed; aff. <i>T. antarcticum</i> ; lf. sheath hairy) *	
<i>Trisetum</i> sp (unnamed; aff. <i>T. antarcticum</i> ; lf. sheath glab, tubular but soon splitting) *	
<i>Trisetum</i> sp (unnamed; plant slender lf. sheath glab. or nearly so) *	
<i>Triglochin striatum</i> *	
<i>Typha orientalis</i>	raupo
<i>Uncinia banksii</i> *	hooksedge
<i>Uncinia caespitosa</i> *	hooksedge
<i>Uncinia clavata</i> *	hooksedge
<i>Uncinia distans</i> *	hooksedge
<i>Uncinia divaricata</i> *	hooksedge
<i>Uncinia egmontiana</i> *	hooksedge
<i>Uncinia ferruginea</i> *	hooksedge
<i>Uncinia gracilentia</i> *	hooksedge
<i>Uncinia laxiflora</i> *	hooksedge
<i>Uncinia rubra</i> *	hooksedge
<i>Uncinia rupestris</i> *	hooksedge
<i>Uncinia scabra</i> *	hooksedge

<i>Uncinia uncinata</i>	hooksedge
<i>Uncinia viridis</i>	hooksedge
<i>Uncinia zotouli</i> *	hooksedge
<i>Zoysia minima</i> *	

Mosses mentioned in the text:

<i>Bryum</i> sp	
<i>Racomitrium lanuginosum</i>	snow moss
<i>Sphagnum cristatum</i>	sphagnum moss

Adventive plants found in sites, or mentioned in existing species lists*

Pines

<i>Pinus contorta</i>	contorta pine
<i>Pinus radiata</i>	radiata pine
<i>Pseudotsuga menziesii</i>	douglas fir

Dicots

<i>Acaena agnifolia</i> *	
<i>Agnalis arvensis</i> *	
<i>Amaranthus hybridus</i> *	
<i>Anthemits cotula</i> *	
<i>Aphanes interspectata</i> *	
<i>Archillea millefolium</i>	
<i>Arctium minus</i> *	
<i>Arenaria serpyllifolia</i> *	
<i>Argyranthemum frutescens</i>	marguerite daisy
<i>Bellis perennis</i>	
<i>Bidens pilosa</i>	cobblers pegs
<i>Brassica</i> sp *	
<i>Callitriche stagnalis</i> *	
<i>Calystegia sylvatica</i>	
<i>Cardamine hirsuta</i> *	
<i>Carduus nutans</i>	nodding thistle
<i>Centaurum erythraea</i> *	
<i>Centipeda cunninghamii</i> *	
<i>Cerastium fontanum</i> *	
<i>Chenopodium murale</i> *	
<i>Cirsium arvense</i>	scotch thistle
<i>Cirsium vulgare</i>	scotch thistle
<i>Conyza albiba</i> *	
<i>Crataegus monogyna</i>	hawthorn
<i>Crepis capillaris</i> *	
<i>Dianthus armeria</i> *	
<i>Digitalis purpurea</i>	foxglove
<i>Digitalis purpurea</i>	foxglove
<i>Dipsacus fullonum</i> *	
<i>Epilobium ciliatum</i> *	
<i>Epilobium obscurum</i> *	

<i>Epilobium parviflorum</i> *	
<i>Erodium cicutarium</i> *	
<i>Galega officinalis</i>	goats rue
<i>Galium aparine</i>	cleaver
<i>Geranium molle</i> *	
<i>Gnaphalium spicatum</i> *	
<i>Gnaphalium ustulatum</i> *	
<i>Hieracium pilosella</i>	mouse hawkweed
<i>Hypericum humifusum</i> *	
<i>Hypochoeris radicata</i> *	
<i>Lactuca serriola</i> *	
<i>Lapsana communis</i> *	
<i>Leontodon taraxacoides</i> *	
<i>Linum bienne</i> *	
<i>Linum catharticum</i> *	
<i>Lotus pedunculatus</i>	lotus major
<i>Lupinus arboreus</i>	tree lupin
<i>Marrubium officinale</i> *	
<i>Matricaria matricarioides</i> *	
<i>Medicago lupulina</i> *	
<i>Medicago polymorpha</i> *	
<i>Melilotus alba</i> *	
<i>Melissa officinalis</i>	lemon balm
<i>Mimulus guttatus</i>	
<i>Mimulus moschatus</i>	
<i>Mycelis muralis</i> *	
<i>Myosotis laxa</i> ssp <i>caespitosa</i> *	
<i>Navarretia squarrosa</i> *	
<i>Nymphaea alba</i> *	
<i>Orobanche minor</i>	
<i>Parentucellia viscosa</i> *	
<i>Pastinaca sativa</i>	
<i>Plantago hirtella</i> *	
<i>Plantago lanceolata</i> *	
<i>Plantago major</i>	
<i>Polycarpon tetraphyllum</i> *	
<i>Polygonum aviculare</i>	
<i>Polygonum hydropiper</i> *	
<i>Polygonum prostratum</i> *	
<i>Prunella vulgaris</i>	
<i>Racosperma decurrens</i>	green wattle
<i>Racosperma melanoxylon</i>	Tasmanian blackwood
<i>Ranunculus acris</i> *	buttercup
<i>Ranunculus repens</i>	buttercup
<i>Ranunculus sceleratus</i>	buttercup
<i>Ribes uva-crispa</i> *	
<i>Rorippa microphylla</i> *	nasturtium
<i>Rosa rubiginosa</i> *	
<i>Rubus fruticosus</i>	blackberry
<i>Rumex acetosella</i> *	

<i>Rumex acetosella</i> *	dock
<i>Rumex crispus</i>	dock
<i>Rumex obtusifolius</i> *	dock
<i>Sagina apetala</i> *	
<i>Sagina procumbens</i> *	
<i>Salix fragilis</i>	crack willow
<i>Sarothamnus scoparius</i> *	
<i>Senecio jacobaea</i>	ragwort
<i>Senecio sylvaticus</i> *	
<i>Sisymbrium officinale</i> *	
<i>Solanum dulcamara</i> *	
<i>Solanum nodiflorum</i> *	
<i>Solvia sessilisa</i> *	
<i>Sonchus asper</i> *	
<i>Stachys silvatica</i>	
<i>Stellaria media</i> *	
<i>Trifolium arvense</i>	
<i>Trifolium dubium</i> *	
<i>Trifolium pratense</i>	
<i>Trifolium repens</i>	white clover
<i>Ulex europaeus</i>	gorse
<i>Urtica urens</i>	
<i>Verbascum creticum</i> *	
<i>Verbascum thapsus</i>	lamb ear
<i>Verbena officinalis</i> *	
<i>Veronica anagallis-aquatica</i>	water speedwell
<i>Veronica arvensis</i> *	
<i>Veronica serpyllifolia</i> *	
<i>Wahlenbergia marginata</i> *	

Monocots

<i>Agrostis capillaris</i>	browntop
<i>Aira caryophyllea</i> *	
<i>Alopecurus geniculatus</i> *	
<i>Anthoxanthum odoratum</i> *	
<i>Bromus bordeaceus</i> *	
<i>Bromus sterilis</i> *	
<i>Carex ovalis</i> *	
<i>Cynodon dactylon</i> *	
<i>Cynosurus cristatus</i>	
<i>Dactylus glomerata</i>	
<i>Elodea canadensis</i>	
<i>Elymus rectisetus</i> *	
<i>Festuca arundinacea</i>	tall fescue
<i>Festuca nigrescens</i> *	
<i>Holcus lanatus</i>	yorkshire fog
<i>Hordeum murianum</i> *	
<i>Hydrilla verticillata</i>	
<i>Isolepis setacea</i> *	
<i>Juncus articulatus</i>	

Juncus bufonius *
Juncus effusus
Juncus inflexus *
Juncus tenuis *
Lolium perenne *
Ottelia ovalifolia *
Poa annua *
Poa pratensis *
Poa trivialis *
Potamogeton crispus *
Rytidosperma paniculatum *
Rytidosperma racemosum *
Tradescantia fluminensis wandering jew
Vulpia bromoides *

Appendix 7

ANIMALS ENCOUNTERED IN THE MAUNGAHARURU ECOLOGICAL DISTRICT

North Island rifleman	<i>Acanthisitta chloris</i>
Indian mynah	<i>Acridotheres tristis</i>
white-faced heron	<i>Adria novaebollandiae</i>
skylark	<i>Alauda arvensis</i>
grey teal	<i>Anas gibberifrons</i>
mallard	<i>Anas platyrhynchos</i>
New Zealand shoveller	<i>Anas rhynchos</i>
long-finned eel	<i>Anguilla dieffenbachii</i>
bellbird	<i>Anthornis melanura</i>
New Zealand pipit	<i>Anthus novaeseelandiae</i>
North Island brown kiwi	<i>Apteryx australis mantelli</i>
cattle	<i>Bos taurus</i>
fernbird	<i>Bowdleria punctata</i>
feral goat	<i>Capra hircus</i>
goldfinch	<i>Carduelis carduelis</i>
greenfinch	<i>Carduelis chloris</i>
redpoll	<i>Carduelis flammea</i>
red deer	<i>Cervus elaphus scoticus</i>
sika deer	<i>Cervus nipon</i>
long-tailed bat	<i>Chalinolobus tuberculatus</i>
shining cuckoo	<i>Chrysococcyx lucidus</i>
Australasian harrier hawk	<i>Circus approximans</i>
rook	<i>Corvus frugilegus</i>
yellow hammer	<i>Emberiza citrinella</i>
European hedgehog	<i>Erinaceus europaeus occidentalis</i>
long-tailed cuckoo	<i>Eudynamis taitensis</i>
New Zealand falcon	<i>Falco novaeseelandiae</i>
house cat	<i>Felis domesticus</i>
chaffinch	<i>Fringilla coelebs</i>
grey warbler	<i>Gerygone igata</i>
redfinned bully	<i>Gobimorphus butonii</i>
Australian magpie	<i>Gymnorhina tibicen</i>
New Zealand kingfisher	<i>Halcyon sancta vagans</i>
kereru	<i>Hemiphysalis novaeseelandiae</i>
pied stilt	<i>Himantopus himantopus leucocephalus</i>
welcome swallow	<i>Hirundo tahitica neoxena</i>
forest gecko	<i>Hoplodactylus granulatus</i>
common gecko	<i>Hoplodactylus maculatus</i>
pacific gecko	<i>Hoplodactylus pacificus</i>
southern black-backed gull	<i>Larus dominicus</i>
brown hare	<i>Lepus europaeus occidentalis</i>
golden bell frog	<i>Littoria raniformis</i>

spur-wing plover
 California quail
 turkey
 whitehead
 stoat
 ferret
 green gecko
 North Island kaka
 morepork
 rainbow trout
 rabbit
 sheep
 house sparrow
 pheasant
 New Zealand dabchick
 pukeko
 marchant's landsnail
 tui
 hedgesparrow
 North Island robin
 tomtit
 kiore
 Norway rat
 ship rat
 fantail
 black flounder
 brown trout
 starling
 feral pig
 paradise shelduck
 brushtail possum
 cockabully
 blackbird
 song thrush
 silvereye

Lobibyx novaehollandiae
Lophortyx californica
Meleagris gallopavo
Mobua albigilla
Mustela erminea
Mustela furo
Naultinus elegans punctatus
Nestor meridionalis
Ninox novaeseelandiae
Oncorhynchus mykiss
Oryctolagus cuniculus cuniculus
Ovis aries
Passer domesticus
Phasianus colchicus
Podiceps rufopectus
Porphyrio porphyrio melanotus
Powelliphanta marchanti
Prothemadera novaeseelandiae
Prunella modularis
Pteroca australis
Pteroca macrocephala toitoi
Rattus exulans
Rattus norvegicus
Rattus rattus
Rhipidura fuliginosa
Rhombosolea retiarda
Salmo trutta
Sturnus vulgaris
Sus scrofa
Tadorna variegata
Trichosurus vulpecula
Trypterygion nigrifrons
Turdus merula
Turdus philomelos
Zosterops lateralis

Appendix 8

TABLE OF ECOLOGICAL UNITS USED FOR THE SELECTION OF RAPS FOR THE MAUNGAHARURU ECOLOGICAL DISTRICT PNAP.

THE UNITS IN BOLD LETTERING INDICATE EXISTING STUDY AND/OR PROTECTION.

APPENDIX 8 : ECOLOGICAL UNITS USED FOR THE SELECTION OF RAPS IN THE MAUNGABARURU ECOLOGICAL DISTRICT PNAP.

VEGETATION	DOWN	BLUFFS	TOPSLOPE	SIDESLOPE (STEEP)	SIDESLOPE (GENTLE)	SPUR	GULLY	RIVER-FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCKS	LAKE MARGIN
Scrubland: Kuneri - Lepscs				80021 V19.05 V20.07 V20.27	80021 V19.05 V20.27 U21.02		U21.02					
CF: Kuneri - Lepscs			80021 80025	V21.02 80021 80030	80021 80030 80070	V21.02 80030	V21.02 80030					
TCF: Kuneri			80077 Cons Cov 10	U20.07 V19.03 V20.29 V20.46 V20.40 W19.01 W19.04 80028 80077	V19.09 V20.46 80028 80077 Cons Cov 10	U20.06 W19.01 V20.39	W19.01 W19.04	V20.07				
Scrubland: Kuneri - Lepscs - Pteesc			V20.33	V20.33		V20.33		80193				
Scrubland: Lepscs			80026	80022 80026 80189 80193 V20.13 V20.19 V20.20 V20.33	80022 80026 80189 80193 V20.33			80193				
Scrubland: Lepscs - Leufas				V20.05 V20.52 V20.53	V20.52							
Scrubland: Lepscs - Coraus					V20.56				V20.56			
Shrubland: Pteesc - (Lepscs) - (Coraus) - (Pswcol) - (Hebstr)			QH 8/3	QH 8/3		QH 8/3						
Shrubland: Lepscs	V19.08 80021 80019 20218		80021 80218			80021		80218				
Shrubland: Lepscs - (Pswcol)				V20.10								
Shrubland: Lepscs - Polves					V20.12							
Shrubland: Lepscs - Pswarb - Carser					V20.03	V20.03	V20.03					
Shrubland: Lepscs - Pswarb - (Coprob) - (Pteesc) - (Phoco) - (Corab)				V19.18	V19.18							

Kanuka
and
Manuka
2ndVege-
tation

APPENDIX 8 (CONT) : ECOLOGICAL UNITS USED FOR THE SELECTION OF RAPS IN THE MAUNGABARURU ECOLOGICAL DISTRICT PNAP.

	VEGETATION	DOWNS	BLUFFS	TOPSLOPE	SIDESLOPE (STEEP)	SIDESLOPE (GENTLE)	SPUR	GULLY	RIVER-FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCKS	LAKE MARGIN
Kanuka and Manuka 2° Vegetation	Shrubland : Lepscs - Corab - Psxarb - (Gauant)			U20.06									
	Shrubland : Lepscs - Psxcra				V20.37			V20.37					
	Shrubland : Lepscs - Soptet				80018			80018	80018				
	Shrubland : Lepscs - Carsc - Coptay				V20.54		V20.54						
	Shrubland : Lepscs - Podhal			V20.36		V20.36							
	Shrubland : Lepscs - Kumeri				Cons Cov 8 80021	Cons Cov 8 80021		Cons Cov 8					
	Shrubland : Lepscs - Kumeri - (Podtot)				V20.17	V20.17							
	Shrubland : Lepscs - Kumeri - (Carsc)				V20.28		V20.28	V20.28					
	Shrubland : Lepscs - Kumeri - (Coraus) - (Carsc)				80083 80206			80083 80206					
	Shrubland : Lepscs - Kumeri - Uleaur					V20.30							
	Shrubland : Lepscs - Luparb								80073				
	Shrubland : Kumeri - Lepscs/Leuemp - (Coptay) - (Olefur) - (Cararb)				80021	80021	80021	80021					
	Shrubland : Kumeri - Carsc - Melram		V20.06		V20.06			V20.06					
	Shrubland : Kumeri - Hohpop - Lepscs				V20.19								

APPENDIX 8 (CONT.): ECOLOGICAL UNITS USED FOR THE SELECTION OF RAPS IN THE MAUNGABARURU ECOLOGICAL DISTRICT PNAP.

	VEGETATION	DOWNNS	BLUFFS	TOPSLOPE	SIDESLOPE (STEEP)	SIDESLOPE (GENTLE)	SPUR	GULLY	RIVER-FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCKS	LAKE MARGIN
Lowland Shrub-land	Shrubland : Pitral - Myolac - Hebstr		V19.12										
	Shrubland : (Pitral) - (Corkin) - (Grilic) - (Phocoo)		V20.36										
	Shrubland : Pitral - Phocoo - (Olefur) - (Hebsqu)		U21.01										
	Shrubland : (Pitral) - (Hotipop) - (Pscra) - (Caser) - (Phocoo) - (Coptay) - (Lepscoc)				V20.53A		V20.53A						
	Shrubland : Kuneri - Soptet - Melram - Pitral - Lepscoc		80196		80196 U21.01		U21.01	U21.01	80196				
	Shrubland : Phocoo - Lepscoc - Soptet - (Olefur) - (Hebpar)		U21.04										
	Shrubland : (Soptet) - (Phocoo)		80167		80167								
Montane Shrub-land	Shrubland : (Grilic) - (Olelit) - (Fuccex) / (Coptay) - (Myrdiv) - (Arifu)					V19.14							
	Shrubland : Coptay - Arifu - Myrdiv - Olenum - Phyas - Podhal			PNA 029	PNA 029	PNA 029							
	Shrubland : Pscarb - Hebstr - Pteesc			Cons Cov 12	Cons Cov 12								
	Shrubland : Drasub - (Lepscoc) - etc.					V19.19				V20.52			
	Shrubland : (Epapau) - (Phocoo)					Cons Cov 10							
	Shrubland : Lepscoc - Coprug - Corkin		V20.11		V20.11					V20.13			

APPENDIX 8 (CONT.): ECOLOGICAL UNITS USED FOR THE SELECTION OF RAPS IN THE MAUNGABARURU ECOLOGICAL DISTRICT PNAP.

	VEGETATION	DOWNS	BLUFFS	TOPSLOPE	SIDESLOPE (STEEP)	SIDESLOPE (GENTLE)	SPUR	GULLY	RIVER-FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCKS	LAKE MARGIN
Montane Shrubland	Shrubland : Coptay - Lepso - (Coprug)				V20.26								
	Shrubland : Coptay - Lepso - (Coprug) - (Olevir)	80071											
	Shrubland : (Coptay)			V20.36	V19.16 V19.07 V20.36								
	Shrubland : Olefur			80021	80021	80021							
	Shrubland : Pswcol			V20.16	V20.16	V20.01 V20.09							
Montane Forests	Shrubland : Grilit - Pswcol - Coptay - Oleili - Podhal - (Myrdiv)			V20.16	V20.13					V20.13			
	Shrubland : Grilit - Pswcol - (Pitral) - (Lepso)					V20.52							
	Phyasp					V19.09							
	CF: Grilit			V20.24	V20.01								
	CF: Grilit - Carser - Coraus					V20.09							
	CF: Grilit - Carser - Melram				V20.18	CMS 8		CMS 8					
	CF: Grilit - (Carser) - (Fucexc) / (Pswcol)				V20.16	V20.16							
	CF: Grilit - (Fucexc) - (Oleili) / Pswcol					V20.02 V20.12							
	CF: Grilit - Pitug - Pswcol - (Carser)				V20.36B	V20.36B							
	CF: Grilit - (Oleili)			80022	80022	80022							
	CF: Oleili - Grilit				V20.02 PNA 029	V20.02 PNA 029				PNA 029			

APPENDIX 8 (CONT): ECOLOGICAL UNITS USED FOR THE SELECTION OF RAPS IN THE MAUNGABARURU ECOLOGICAL DISTRICT PNAP.

	VEGETATION	DOWN	BLUFFS	TOPSLOPE	SIDESLOPE (STEEP)	SIDESLOPE (GENTLE)	SPUR	GULLY	RIVER-FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCKS	LAKE MARGIN
Montane Forests	CF: (Notus) / Oleli - (Podhal) - (Grilit) / Pswcol				V19.08								
	Shrubland : (Podhal) / Pswcol - (Oleli)					V19.06		V19.06					
Secondary Forest	CF: Myolac - Melram - (Knicxc)		V19.10		V19.10		V19.10						
	Treeland: (Myolac) - (Alexc) - (Coratus) / Cangem - Pasture					V19.12							
	TCF: Pitug - Fuccxc - Soptet - Hohpop				V20.54	V20.54		V20.54					
	CF: Hohpop - Ariser - Pinrad				V20.14								
	CF: Soptet - Hohpop - Melram		V20.33					V20.33					
	CF: Kumeri - Soptet - (Lepsco)		U21.04		U21.04 V20.05 V20.38 V21.01 80073	80073							
	CF: Kumeri/Brarep				V20.41								
	CF: Kumeri - Melram - Copgra							V20.29					
	CF: Kumeri - Carser - Pssarb - (Pssara) - (Soptet) / Brarep - Melram - Carser				V21.01								
	CF: Kumeri - (Soptet) - (Pssara) - (Olepan) / Lepsco - Leufas				V19.02		V19.02	V19.02					
	CF: Kumeri / Olepan - Lepsco				V19.01	V19.01		V19.01					

APPENDIX 8 (CONT.): ECOLOGICAL UNITS USED FOR THE SELECTION OF RAPS IN THE MAUNGAHARURU ECOLOGICAL DISTRICT PNAP.

	VEGETATION	DOWNS	BLUFFS	TOPSLOPE	SIDESLOPE (STEEP)	SIDESLOPE (GENTLE)	SPUR	GULLY	RIVER-FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCKS	LAKE MARGIN
Second -ary Forest	TCF: Kuneri - Carser - Brarep - Hohpop					U20.06		U20.06					
	TCF: Kuneri - Aleexc - Melram				V20.39								
	TCF: Kuneri - Hohpop - Lepso - (Carser)				V20.46	V20.46		V20.46					
	TCF: Kuneri / (Hohpop) - (Pitten)					80167		80021	80167				
	TCF: Kuneri - Hohpop - (Melram) / Melram - Carser				V20.07								
	CF: Carser - Knitexc							80027					
	CF: Carser - Purtax / Pswcol - (Dicfib)							V20.49					
	CF: Kuneri - Carser - Hohpop					80027 80075							
	CF: Carser - Hohpop				V20.24	QEH 5/5/26		QEH 5/5/26					
	TCF: Carser - (Hohpop)					V20.30							
	TCF: Carser - Hohpop - Melram					V20.31	V20.31	V20.31					
	TCF: Carser - Podhal				V20.14			V20.14					
	TCF: Carser - Pswcol - Melram - Piteug				V20.27	V20.27		V20.27					
	TCF: Kuneri - Knitexc / Carser - Melram					V19.16							
	TCF: Kuneri - Knitexc / Melram - Soptet					V19.03							
	TCF: Kuneri - Knitexc				V19.09 V19.12	V19.09	V19.09	V19.09					

APPENDIX 8 (CONT). : ECOLOGICAL UNITS USED FOR THE SELECTION OF RAPS IN THE MAUNGABARURU ECOLOGICAL DISTRICT PNAP.

	VEGETATION	DOWNS	BLUFFS	TOPSLOPE	SIDESLOPE (STEEP)	SIDESLOPE (GENTLE)	SPUR	GULLY	RIVER-FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCKS	LAKE MARGIN
Broad leaved Forest I	TCF: Weirac				80026 80028	80026 80070	80028 80070	80026					
	TCF: Weirac - Kniexc - (Notsol)			V19.16	V19.16								
	TCF: Weirac - (Beitaw) - (Kniexc)					80027							
	TCF: Beitaw - Melram - Kunciri				QEII 5/5/55	QEII 5/5/55		QEII 5/5/55					
	TCF: Kniexc / Melram				V19.10	V19.10	V19.10	V19.10					
	TCF: Kniexc - (Podtot) - (Eladen)					V20.04		V20.04					
	TCF: Kniexc / Carser - Kniexc		V20.32		V20.32						V20.32		
	TCF: Kniexc - Grilit - (Pireug) - (Melram)				V20.10								
	TCF: Aleexc - Soptet				V20.43 QEII 5/5/15	V20.43 QEII 5/5/15		QEII 5/5/15	V20.43				
	TCF: Aleexc / Hedarb								V20.41				
Broad leaved Forest II	TCF: Aleexc - Melram				V20.40								
	TCF: Aleexc - Beitaw - Kniexc					80028		80028					
	TCF: Aleexc - Beitaw - Kniexc / Melram				V19.18	V19.18							
	TCF: Aleexc - Beitaw - Kniexc / Melram - Ariser					V19.16		V19.16					
	TCF: Aleexc - Beitaw / Melram - Ariser				V19.03	V19.03							
	TCF: Aleexc - Prutax / (Aleexc) - Melram							V20.07	V20.40				

APPENDIX 8 (CONT.) : ECOLOGICAL UNITS USED FOR THE SELECTION OF RAPS IN THE MAUNGGAHARURU ECOLOGICAL DISTRICT PNAP.

	VEGETATION	DOWNS	BLUFFS	TOPSLOPE	SIDESLOPE (STEEP)	SIDESLOPE (GENTLE)	SPUR	GULLY	RIVER-FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCKS	LAKE MARGIN
Broad leaved Forest II	TCFE: Daccup - Prutax / Kniexc - Beitaw - Aleexc / Melram					W19.04	W19.02	W19.02					
	TCFE: (Podtot) - (Daccup) - (Prutax) / Aleexc - Beitaw - Kniexc - (Eladen) / Copare - Hedarb					QEII 5/5/3	QEII 5/5/3	QEII 5/5/3					
Broad leaved Forest III	Shrubland : Kunceri - Pitral - (Brarep) - (Lepscs)		V20.45 V20.39		V20.45 V20.39								
	TCF: Kunceri - Soptet - (Pitral)				U21.04								
	TCF: Kunceri - Soptet - Pitral - (Pexarb)					V20.28			V20.28				
	TCF: Kunceri - Soptet - Pitral		V19.15		V19.15	V19.15							
	TCF: Kunceri - Soptet - Pitral - (Melram)				V20.38				V20.38				
	TCF: Kunceri - Soptet - Pitral - (Pinrad) - (Psemen)				V20.05								
Beech Forest	TCF: Notfus				V19.06 V20.53	V19.06 V19.07 V20.12	V19.06 V20.22	V19.06 V20.49 V20.53					
	TCF: Notsol						V19.16						
	TCF: Notfus - Notsol				80021	80021 Cons Cov 11	80021 Cons Cov 11	80021 Cons Cov 11					
	TCF: Notfus - Notsol - Kunceri				80021	80021		80021					
	TCF: Notfus - Notsol - (Neslan)				80026	80026	80026						
	TCF: Notsol - Notfus - (Podhal)			80028	80028	80028							
	TCF: Notfus - Podhal				PNA 029	PNA 029 V20.36							

APPENDIX 8 (CONT): ECOLOGICAL UNITS USED FOR THE SELECTION OF RAPS IN THE MAUNGABARURU ECOLOGICAL DISTRICT PNAP.

	VEGETATION	DOWNS	BLUFFS	TOPSLOPE	SIDESLOPE (STEEP)	SIDESLOPE (GENTLE)	SPUR	GULLY	RIVER-FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCKS	LAKE MARGIN
Beech Forest	TCF: (Norfus) / Kureri - (Grilit) - (Ariser)				Caches Bush	Caches Bush		Caches Bush					
	TCF: Notsol / Cyajun - (Grilit) - (Pszarb) - (Coprob)					Cons Cov 10		Cons Cov 10 Cons Cov 11					
	TCF: (Norfus) / Kureri - Lepso					QE II 8/3		QE II 8/3					
	TCF: Norfus / Piteug - Hohpop - Grilit				V20.22	V20.22							
	TCF: Norfus - (Daccup) - (Prutax) - (Dacdac)			80022	80022		80022						
	TCF: Norfus - Grilit / (Pswcol)				V19.08			V19.08					
	TCF: Norfus / Weirac					V19.04 80028	V19.04 80028	V19.04 80028					
	TCF: Norfus - (Weirac) - (Daccup) / Norfus - (Carser) - (Grilit)				V20.36								
	TCF: Daccup / Grilit - Knixc - (Piteug) - (Melram)				V20.10								
	TCF: Daccup / Knixc - Daccup					V20.27							
Podocarp Forest	TCF: Daccup / Carser - Podhal				V20.14			V20.14					
	TCF: Daccup / Beitaw - Daccup / Melram - (Dicsqu)	Little Bush				Little Bush							
	TCF: Daccup / Beitaw / Melram				W19.06	W19.06		W19.06					
	TCF: (Daccup) / Myrsal - Grilit / Pswcol					V20.18		V20.18					
	TCF: (Daccup) / Melram - Carser - Grilit		V20.26		V20.26	V20.26		V20.26					
	TCF: (Daccup) / Grilit - Piteug - Coraus - Melram				V20.37			V20.37					

APPENDIX 8 (CONT): ECOLOGICAL UNITS USED FOR THE SELECTION OF RAPS IN THE MAUNGABARURU ECOLOGICAL DISTRICT PNAP.

	VEGETATION	DOWNS	BLUFFS	TOPSLOPE	SIDESLOPE (STEEP)	SIDESLOPE (GENTLE)	SPUR	GULLY	RIVER-FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCKS	LAKE MARGIN
Podocarp Forest	TCFE: Daccup Dacdac - Prutax / Dacdac - Prutax - Hohpop - Ariser - Melram	80074				V20.23		V20.23					
	TCFE: Daccup - Dacdac - Prutax / Melram - Melram - Melram - Piteug - Pswcol	80071											
	TCFE: (Daccup) - (Dacdac) - (Prutax) / Carser - Melram - Dacdac / Melram - Carser				V20.49	V20.49							
	TCFE: (Daccup) - (Dacdac) / Carser - Hohpop				V20.24								
	TCFE: (Daccup) - (Dacdac) / Piteug - Carser - Pswcol - (Grilit) / Pswcol					V20.36B				V20.36B			
	TCFE: (Daccup) - (Prutax) / Melram - Grilit - Pswcol / Pswcol				V20.36A	V20.36A		V20.36A					
	TCFE: (Daccup) - (Prutax) - Melram - (Piteug) - (Hohpop) - (Carser) / Copgra - Brarcp					Cons Cov 10							
	TCFE: (Daccup) - (Prutax) / Pscra - Pitten - Carser				V20.17			V20.17					
	TCFE: (Daccup) - (Prutax) / Kniexc - Aleexc / Melram - (Hedarb)					V20.55		V20.55					
	TCFE: (Daccup) - (Dacdac) - (Prutax) / Carser-Melram - Hohpop - (Pscarb) / Pswcol-Brarcp					QEH 8/3		QEH 8/3					
	TCFE: Prutax - Dacdac - (Daccup) / Notfus - Kineri - Hohpop - Lepso - Carser					Cons Cov 8		Cons Cov 8	V20.46				
	TCFE: Dacdac - Prutax / Aleexc								V20.28				
	TCFE: Poptot - Prutax / Hohpop - Carser - Melram - Kineri								V20.28				

APPENDIX 8 (CONT.): ECOLOGICAL UNITS USED FOR THE SELECTION OF RAPS IN THE MAUNGAHARURU ECOLOGICAL DISTRICT PNAP.

	VEGETATION	DOWNS	BLUFFS	TOPSLOPE	SIDESLOPE (STEEP)	SIDESLOPE (GENTLE)	SPUR	GULLY	RIVER-FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCKS	LAKE MARGIN
Podocarp Forest	TCFE: Daccup - (Prutax)/ Hohpop - Carscr - Melram				V20.11								
	TCFE: Dacdac/ Hohpop - (Pscra)					V20.19			V20.19				
	TCFE: Prutax / Notfus	80071											
	TCFE: Prutax / Piteug - Carscr - (Grilit) - (Melram) - (Hohpop)					V20.21 V20.22							
	TCFE: Prutax / Beitaw - (Aleexc) / Aleexc - Melsim								V20.05				
	TCFE: Kniexc - (Daccup)/ Beitaw - Kniexc / Cyamed					W19.05	W19.05	W19.05					
Treelands	(Dacdac) / Pasture	V20.23				V20.23							
	(Kuneri) / Pasture					V19.12 V20.44							
	(Hohpop) / Pasture					V20.11							
	(Daccup) - (Prutax) - (Hohpop) - (Nescun) - (Soptet) - (Carscr) - (Coraus) / Pasture				PNA 029								
	(Notfus) - (Weirac) - (Daccup) / Pasture					V20.36							
	(Coraus) / Pelves					V20.01							
	(Coraus) - (Grilit) / Pasture					V20.22							
	(Carscr) - (Hohpop) - (Coraus) / Pasture				V20.20	V20.20							
	(Fuccxc) - (Hohpop) - (Soptet) / Pasture							V20.48					

APPENDIX 8 (CONT.) : ECOLOGICAL UNITS USED FOR THE SELECTION OF RAPS IN THE MAUNGABARURU ECOLOGICAL DISTRICT PNAP.

	VEGETATION	DOWNS	BLUFFS	TOPSLOPE	SIDESLOPE (STEEP)	SIDESLOPE (GENTLE)	SPUR	GULLY	RIVER-FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCKS	LAKE MARGIN
Treelands	(Kneixc) - (Aleexc) - (Melram) / Gap / Urfter					V20.57		V20.56					
	(Hohpop) - (Soptet) - (Carser) / Lepsc - Pasture				V19.17	V19.17							
	(Aleexc) - (Beitaw) / (Lepsc) - Pasture				80191	80191							
	Tussockland: Junsp. - (Genbel) - (Ariaro) - (Brarad)					V19.14							
Wetland Tussock-land	Tussockland: Schval - (Carsec) / Junnov - (Elegra)							W19.03					
	Tussockland: Typori - Carmao - Carsin							U20.09					
	Tussockland: Typori - Cargem - (Carsec)					V20.53A							80019
	Tussockland: Typori - Cargem - Junsp.												80027
	Tussockland: Typori - Carsec - (Lepsc)									V19.16			
	Tussockland: Typori - Carsec - Cargem - Lepsc					V20.31 V20.46		V19.09 V19.16 80027		V19.16			
	Tussockland: Carsec - Coprug / Pasture					V20.21							
	Tussockland: Carsec - Cargem					V19.12							
	Tussockland: Cargem - Lepsc												
	Tussockland: Carsin - Lepaus - Junsp.												80021
	Tussockland: Schval - Elegra												80021

APPENDIX 8 (CONT.): ECOLOGICAL UNITS USED FOR THE SELECTION OF RAPS IN THE MAUNGABARURU ECOLOGICAL DISTRICT PNAP.

	VEGETATION	DOWNS	BLUFFS	TOPSLOPE	SIDESLOPE (STEEP)	SIDESLOPE (GENTLE)	SPUR	GULLY	RIVER-FLATS	HANGING VALLEY	LIMESTONE GORGE	GULLY HUMMOCKS	LAKE MARGIN
Alpine Tussock-land	Tussockland: Chirub - (Drasub)									V20.52			
	Tussockland: Chirub / Orepec											V20.52	
	Tussockland: (Chirub) / Pasture			V20.51	V20.51								
	Tussockland: Chirub - (Drasub) / Pasture									V20.52			
Fernland	Fernland: (Pxsarb) - (Pitral) / Blecap - Macsin		V20.07										
	Fernland: Corarb - Blecap - (Macsin)		V20.05										
	Fernland? Macsin - (Blecap) - (Lepsco)		V19.03										
	Fernland: Polves												
Bluff Tussock-land	Tussockland? Macsin - Phooco - (Pitral) - (Lepsco)		W19.04										
	Tussockland? Macsin - Phooco - (Lepsco)		V20.40										
	Tussockland? Macsin - Phooco - Cortoc		V19.09										
	Fellfield: (Corkin) - (Epilobium) - (Gnasub)				V20.22								
Herbfield	Fellfield: (Corkin) / Pasture				V19.14								
	Fellfield: Celgra - Ransp - Myosp - Acisqu - Genbel			PNA 029	PNA 029								
	Turfland: (Orepec) - (Mazrad) - (Stamin) - (Heipil) - (Rancian)											V20.51	
	Herbfield: Celspe - pasture etc. With Myosax on rock outcrops					V19.19							

Appendix 9

CRITERIA FOR SSWI AND WERI RANKINGS.

1. Sites of Spectral Wildlife Interest (SSWI)

Begun in the late 1970's by the Fauna Survey unit of the Wildlife Service, the SSWI inventory is the result of a nation wide survey to identify and rank areas of remaining habitat important to native fauna. This information, gathered on a regional basis, provides for improved management of these remaining areas of wildlife habitat. The criteria for ranking SSWI is listed below.

Outstanding

- (a) Presence of a breeding population of a highly endangered or rare endemic species.
- (b) A population of an endemic species of very restricted distribution and which could become endangered.
- (c) Areas essential to species from (a) and (b) for purposes other than breeding.
- (d) Areas of vital importance to internationally uncommon species (breeding and/or migratory).
- (e) Areas of vital importance to internally migratory species with very limited distribution or abundance.
- (f) Largely unmodified ecosystem or example of original habitat type not represented elsewhere in the country, of large size and containing viable populations of all or almost all species which are typical of the ecosystem or habitat type.

High

- (a) Habitat containing an indigenous species which has declined significantly through man's influence.
- (b) One of few or the only breeding area for a non-endemic indigenous species of limited abundance.
- (c) Habitat of an uncommon discontinuously distributed species not adequately represented in a particular ecological region.
- (d) Example of a largely unmodified habitat which is not represented to the same extent elsewhere in the ecological region and is used by most species which are typical of that habitat type for the region.
- (e) Presence of a species of an endemic family which is of limited abundance throughout the country although adequately represented in one ecological region but whose habitat is at some risk.

Moderate - High

- (a) Presence of a species which is still quite widely distributed but whose habitat has been and still is being significantly reduced or modified through man's influence.
- (b) Areas containing high numbers of breeding or moulting birds, or where breeding or moulting areas are of inter-regional significance to wildlife.
- (c) A large and fairly unmodified habitat or ecosystem which is represented elsewhere in the ecological region and contains all or almost all species typical of that habitat type for a particular region.

- (d) An area where any particular species is exceptional in terms of, say, abundance or behaviour but which is otherwise widespread.

Moderate

All habitats supporting good numbers of species which are typical of that particular habitat within an ecological region and which have not been heavily modified by man's influence.

Potential

All areas of some wildlife significance which are limited by size, heavy modification or other reasons, but are of potential wildlife value if left to regenerate or are managed or developed for wildlife. (May include habitat which functions as a corridor or is sub-optimal habitat which is necessary for maintaining genetic diversity.

2. Wetlands of Ecological and Representative Importance (WERI)

WERI is an inventory of existing information on the important remaining wetland resources in New Zealand. The objective of the inventory is to identify representative or otherwise important examples of all types of wetlands of international, national, regional and local ecological significance.

In the publication "Wetlands: A Diminishing Resource (A Report for the Environmental Council)" Water and Soil Miscellaneous Publication No.58 (1983), the following definition was proposed:

"Wetlands" is a collective term for permanently or temporarily wet areas, shallow water and land-water margins. Wetlands may be fresh, brackish or saline, and are characterised in their natural state by plants and animals that are adapted to living in wet conditions.

The significance rating for the wetland is given. It serves as a summary based on values, quality and sometimes size of the wetland.

Where two ratings appear for one wetland, there has been disagreement over its significance.

The options for significance are:

1. Insufficient information.
2. Nothing special.
3. Local significance.
4. Regional significance.
5. National significance.
6. International significance.

Catchment Authority regions have been used to determine regional significance and Ecological Districts to determine local significance.