



MATEMATEAONGA ECOLOGICAL DISTRICT

Survey Report for the Protected
Natural Areas Programme

JUNE 1996



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Department of Conservation
Te Papa Atawhai

MATEMATEAONGA ECOLOGICAL DISTRICT

Survey Report For The Protected Natural Areas Programme

D.A. RAVINE



Raupo at Lake Rotokare

New Zealand Protected Natural Areas Programme No.35

ISSN 0112 - 9252

ISBN 0-478-01794-4

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Published by Department of Conservation

Wanganui Conservancy

Private Bag 3016

Wanganui

New Zealand

1996

Printed on recycled paper

Foreword

This report is one of the Protected Natural Areas Programme (PNAP) series of reports which describe recommended areas for protection (RAPs) within ecological districts and regions. There are 85 ecological regions in New Zealand divided into 268 districts. The Taranaki Ecological Region is divided into two ecological districts, North Taranaki and Matemateaonga. The Matemateaonga Ecological District is the largest district in the North Island. The Matemateaonga Ecological District PNAP report has been prepared by D. Ravine of the Department of Conservation, Wanganui, who also carried out the field work in June 1995.

Matemateaonga Ecological District (ED) is mostly rugged hill country which lies between the Tongariro volcanic plateau, in the east, the Egmont/Taranaki volcanic ringplain to the west, the terrace country of Manawatu Plains ED in the south and the North Taranaki and Taumarunui EDs in the north. The region was once almost all forested with a few small wetlands, and even today more than half the District has a cover of native vegetation, of which a considerable amount is secondary forest and scrub, reverting after farming was abandoned. Browsing animals pose the worst threats to these forests, and without control of possum, goats, deer, and livestock there is an uncertain future for much of it, longterm.

The forest is quite uniform in composition across the region, with repeating patterns of gully, hillslope and ridge in forest types. Forest types, such as those that once grew on small areas on fertile river terraces, are now very rare. The district has several plants which are nationally or locally threatened, or which are at their latitudinal distribution limits. These include the mistletoe, *Ileostylus micranthus*, and a semi-woody daisy *Brachyglottis turneri*.

Already protected lands in Matemateaonga Ecological District, include Whanganui National Park, and about 130 smaller areas that include scenic reserves, conservation areas, and private covenants. In total, the protected lands are about one third of the District, and these represent much of the District's natural diversity.

This report identifies 5 key areas (RAPs) which have features not represented in existing reserves. If these are protected and managed with conservation as the primary goal, they will complement the natural areas already formally protected. These protected lands and RAPs together represent the range of natural features which give Matemateaonga ED its unique character. The 5 RAPs total 500 ha.

The RAPs are the starting point for the implementation phase of the PNA Programme. This will involve discussion and consultation, particularly with the landholders involved. The Department of Conservation has a strong commitment to pursue the objectives of the PNA Programme. The 5 RAPs are on privately owned land.

A recommended area for protection is as much a recommendation to the Department of Conservation as from it. Changes in recommendations may occur following the consultation process, or after consideration of other values that the RAP and its surrounding area may possess. The Department will then endeavour to negotiate the proposals resulting from this process with the landholders concerned, to achieve an appropriate form of protection for each area. This can range from no change in existing management through to the Department accepting responsibility for

management. It must be noted, however, that the combined area of the currently protected lands and RAPs leaves considerable tracts of native vegetation without formal protection, almost all privately owned. This land is important for maintaining regional populations of native plants and animals, soil and water values, recreational uses, and the region's landscapes. Species such as the brown kiwi need large areas of native vegetation to maintain viable populations. It is no accident that Matemateaonga ED with among the largest tracts of lowland forest in the North Island, also has one of the country's largest populations of kiwi. The Department will be advocating the general protection of these resources through opportunities provided by the Resource Management Act and other appropriate legislation.

This survey report contains a great deal of information on the ecological values and history of the Matemateaonga Ecological District. It is a substantial reference work as well as a guide to conservation priorities. It will be of wide interest to landholders, conservation managers from the Department of Conservation and other agencies, iwi, scientists, conservation groups and the general public.



Bill Carlin

Regional Conservator

Wanganui Conservancy

Department of Conservation

June 1996

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Acknowledgements

This survey has been very much a team effort over the last seven years. A considerable amount of work was done before I became involved and others have also been involved in the publication of this report. The following people have contributed their time and effort to this project and I am grateful to all of them.

Wayne Baxter, formerly with the Department of Conservation in Wanganui, who compiled a comprehensive inventory of information on the Matemateaonga Ecological District which was the foundation for this survey.

Colin Ogle, Sharon Came, Wayne Hutchinson, John Barkla and Bill Fleury, Department of Conservation, Wanganui, who updated and edited Wayne Baxter's inventory, and Joseph Arand, Department of Conservation, Wellington, who made useful criticisms of a late draft of this report. Colin Ogle was also scientific advisor to the survey. His help has been invaluable.

John Spence, Sue Jones and Peter Lock, draughting section, Department of Conservation, Wanganui, who drew up the maps for this report and provided updated information on boundaries of lands administered by the Department of Conservation.

Karen Boobyer, Department of Conservation, Wanganui, who typed parts of this report.

I would especially like to thank the landowners who I talked to during the survey. They not only allowed me onto their properties but also provided me with useful anecdotal information. Their interest and hospitality was greatly appreciated.

Summary

The Matemateaonga Ecological District was surveyed as part of the New Zealand Protected Natural Areas Programme during 1995. The survey built on an office-based inventory of existing information on the district's natural areas, which was completed in 1991.

Matemateaonga Ecological District and North Taranaki Ecological District (further to the west) comprise Taranaki Ecological Region. This region covers most of inland Taranaki beyond the Egmont ringplain and is dominated by a repeating pattern of steep, ridge-topped hills and narrow valleys. This pattern is more regular in the Matemateaonga Ecological District, which is further distinguished from the North Taranaki Ecological District in that forests on dry ridges are dominated by black beech, rather than hard beech.

Before the influence of people, Matemateaonga Ecological District was almost entirely covered in forest, mostly a mixed broadleaved type with some podocarps, with beech forests on dry ridges and spurs. There was also a number of relatively small wetlands associated with slump-dammed valleys. With the arrival of Europeans, over half the district was cleared for farming, though much of the cleared land has since reverted, to scrub or forest. Steep terrain and difficult access made farming many of these areas uneconomical. A considerable portion of the ecological district remains covered in primary indigenous forest. The bulk of this (170,388ha or 31% of the ecological district) is administered by the Department of Conservation, including 72,000ha of the Whanganui National Park, 51 conservation areas and 49 scenic reserves. There are also many tracts of forest in private ownership, some of which are many hundreds, or even thousands, of hectares in extent.

Most of these natural areas are very uniform, with repeating vegetation patterns across the district. However, some smaller natural areas have landforms or vegetation which do not fit these patterns. Five of these, which are privately owned, have been recommended for protection in this report. Though they collectively make up only around 500ha, or about 0.09% of the total 544,000ha of the Matemateaonga Ecological District, these areas represent the best that remains of some less common types of natural area which are not already adequately protected. Together with the existing protected natural areas, these recommended areas for protection (RAPs) best represent the range of ecological diversity which still remains in the Matemateaonga Ecological District.

All natural areas have some values, including acting as a "store" of ecological diversity. While this report prioritizes natural areas for protection, protection of other natural areas within the ecological district is also encouraged.

Chapter 1

1.0 INTRODUCTION

1.1 *The Protected Natural Areas Programme*

The goals of the Protected Natural Areas Programme (PNAP) are to identify and protect examples of the full range of indigenous biological and landscape features in New Zealand and thereby maintain the distinctive character of the country (Technical Advisory Group 1986). The programme was set up in 1983 in response to section 3(1)(b) of the Reserves Act, 1977, which identifies the need for "the preservation of representative samples of all classes of natural ecosystems and landscapes which, in their aggregate, gave New Zealand its own recognizable character." The Minister of Conservation is charged with ensuring these goals are met.

Existing protected natural areas include national parks, scenic and other reserves, other conservation land administered by the Department of Conservation and private land with covenants or other forms of legal protection. They do not adequately protect all classes of natural ecosystems. For example, lowland forests, low fertility shrublands, sand dunes and wetland ecosystems are poorly represented in the network of existing protected natural areas. It is these gaps that the PNAP seeks to address.

An ecological district is a local part of New Zealand where the features of geology, topography, climate and biology, as well as the broad cultural patterns, interrelate to produce a characteristic landscape and range of biological communities (Technical Advisory Group 1986; Myers et al. 1987). An ecological region encompasses either one distinct ecological district or two or more adjoining districts which have broad similarities in some of these features.

PNAP surveys are based on ecological districts. The purpose of each survey is to identify which types of ecosystems in the ecological district are inadequately protected, to find the best remaining examples of these ecosystems and to recommend them for protection. Ideally, these Recommended Areas for Protection (RAPs), in combination with the existing protected natural area network, would include good examples of all classes of natural ecosystem which occurred in the ecological district prior to human intervention.

The PNAP seeks to protect not only an ecological district's rare and unusual features but also representative biological and landscape features which were/are common or extensive.

1.2 *Matemateaonga Ecological District*

1.2.1 Location and Definition of the District

Taranaki Ecological Region comprises a large tract of very dissected hill country to the east of the volcanic ring plan that makes up Egmont Ecological Region. It is divided into two ecological districts, namely North Taranaki and Mateamateaonga. The former is more diverse in landform and vegetation than the latter, in having coastal cliffs, marine terraces, estuaries and comparatively broad river terraces. The boundary between the two districts is not sharply defined, but it approximates to State Highway 43 between Stratford and Taumarunui. (Figure 1).

Matemateaonga Ecological District, at 544,000ha, is the largest ecological district in the North Island.

The topography and geology of the Taranaki Ecological Region are largely heavily dissected sandstones and siltstones. In the Matemateaonga Ecological District there is a repeating pattern of steep hills with sharp ridges and narrow valleys, with little variation across the district. The neighbouring (and also very dissected) Rangitikei Ecological Region has much limestone, mudstones and fossiliferous siltstone and a less uniform landform pattern. The Taumarunui Ecological District to the east has hill country with broader valley floors and pumiceous alluvium. The volcanic ringplains of the Egmont and Tongariro Ecological Regions and alluvial plains of the Manawatu Plains Ecological Districts differ greatly from the Matemateaonga Ecological district landforms, though the Manawatu Plains has similar origins.

Matemateaonga Ecological District also differs from North Taranaki Ecological District, in regard to native beech distribution. Dry ridges are characterised by beech forest in both districts, the species being hard beech in North Taranaki and black beech in Matemateaonga, though there is some overlap in these species' ranges.

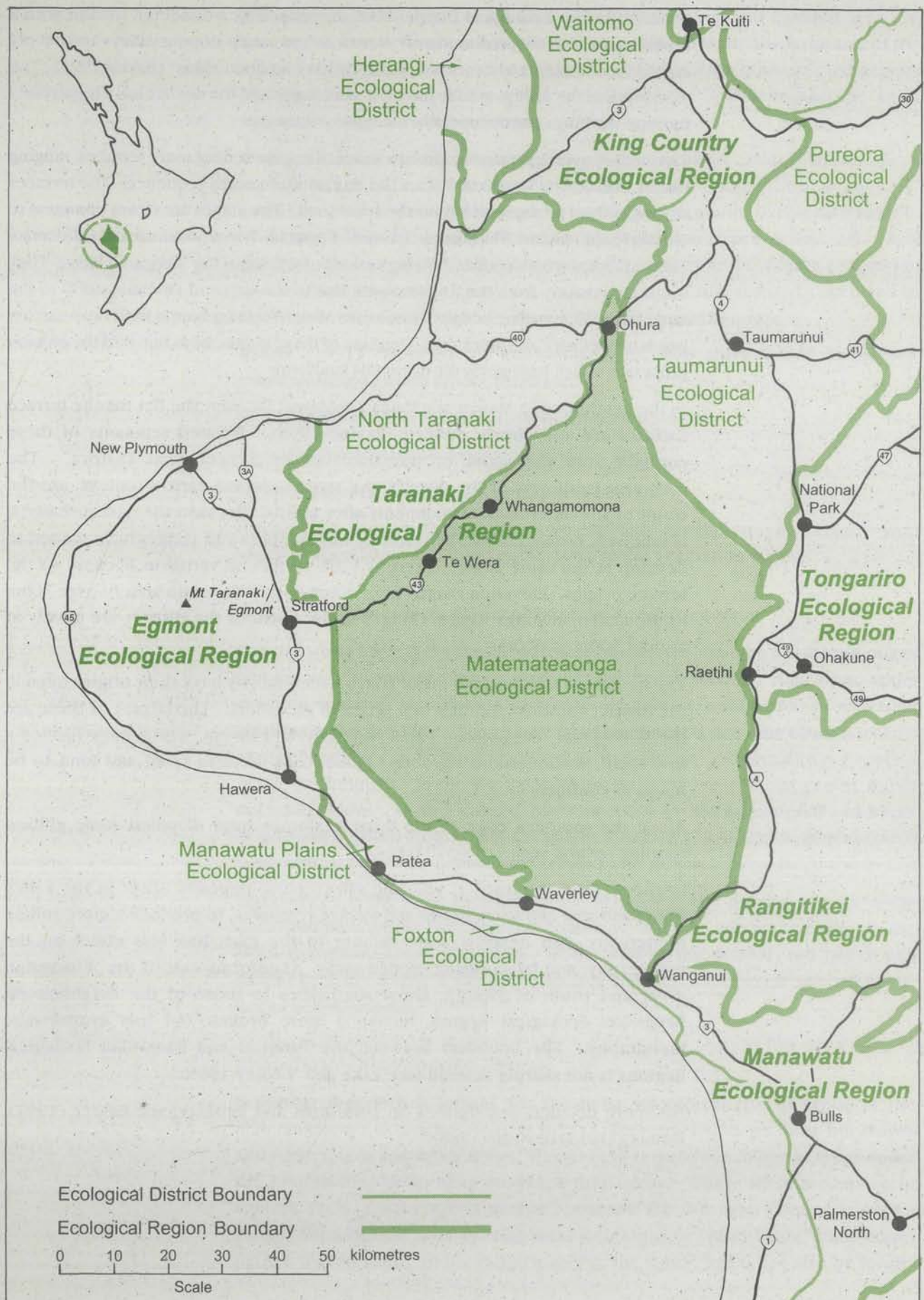
For more detailed descriptions, see Baxter (1991), Bayfield et al. (1991), Bayfield and Benson (1986), Lake and Whaley (1995), McEwen (1987) and Ravine (1992 & 1995).

1.2.2 Climate

Matemateaonga Ecological District has a generally equable climate, reflecting a disturbed westerly airflow with interspersed anticyclones. Polar and tropical storms occasionally affect the region. Mean annual temperatures are between 12°C and 13.5°C, with annual maxima around 28°C to 30°C. Average annual minima are more variable, between -6°C and 0°C. Rainfall ranges from 900mm near Wanganui to over 2,300mm along the main Matemateaonga Range.

Wind comes mainly from the west, north or north-east, with local variation dictated by the topography. Inland parts of the district have more westerly winds. Ridges are subject to strong winds while the valleys are considerably more sheltered. Frosts are frequent on the valley floors but rare on ridges. Heavy fog is a feature of the district, e.g. up to 128 days per year at the Lower Returuke Meteorological Station.

FIGURE 1: MATĒMATEAONGA ECOLOGICAL DISTRICT



1.2.3 Landform and Geology

Matemateaonga Ecological District is characterized by a dissected upland with a repeating pattern of "predominantly narrow ridges, steep-sloping valleys and deeply entrenched streams and rivers which mostly have no floodplains" (Baxter 1991). The sideslopes of the valleys tend to have the same angle and the district has a remarkably uniform landform pattern overall.

The surface geology is derived from a series of marine sedimentary terraces, ranging from 1,000,000 to 38,000,000 years old, in a south to north sequence. The terraces slope gently at an angle of 3.8° to the south-east. The stages are (from youngest to oldest) Nukumaruan, Waitotaran, Opoitian, Kapitean, Tongaporutuan and Clifdenian. The sediments were deposited during periods of sinking of the Wanganui Basin. They originated mainly from the Ruahine anticline to the east and volcanic uplift to the north-east. The marine beds are a mixture of sedimentary bands with only narrow bands of shellrock and limestone. Uplifting of these marine beds initiated the erosion processes which have given the district its landforms.

In the neighbouring Manawatu Plains Ecological District, the flat marine terrace surfaces are still clearly defined (Ravine 1995). Isolated remnants of these continue into the south of the Matemateaonga Ecological District. The dominant landforms of the district, the steep hills and narrow valleys, are the result of stream erosion of sediments after uplifts. Because the parent material is relatively homogenous, the resulting ridges, spurs and valleys have tended to develop at the same angle. There is little altitudinal variation because of the terrace origins. Elevation ranges from 400m in the Waitotara area to over 700m in the Matemateaonga Range. Ridges in the north of the district are mostly at around 500m to 600m.

The numerous streams feed major rivers which mostly have their origins outside the district and flow through in a series of meanders. The largest of these are the Whanganui, Tangarakau, Patea and Waitotara Rivers, which have formed a few small, discontinuous terraces. Floodplains are also small and tend to be found at confluences.

Along the southern edge of the district, slumps have dammed some gullies, forming several series of small lakes.

In the west of the district, volcanic ash (tephra) deposits occur in the valley floors and also cap some ridges and terrace remnants, to produce a more rolling topography. Ash deposits were thinner to the east, had less effect on the topography, and have mostly eroded away. Landforms east of the Whanganui River and south of Pipiriki, show similarities to those of the neighbouring Rangitikei Ecological Region, having a more broken and less symmetrical topography. The boundary between the Taranaki and Rangitikei Ecological Regions is not sharply defined (see Lake and Whaley 1995).

For more detailed descriptions on landforms and geology, see Baxter (1991), Fleming (1953) or Neall (1988).

1.2.4 Vegetation

Before human settlement, nearly all the ecological district was covered in forest, except in a few wetlands and on near-vertical cliffs. Despite the large size of the district, there would have been a small range of vegetation types and indigenous plant species, a result of the uniform nature of the landforms and the small altitudinal range across the district.

Over half of the district has been cleared for agriculture, mainly by European settlers. Much of this has reverted to forest or scrub. There is little information available on what the vegetation of the district was like prior to this disturbance. It is reasonable to assume that current vegetation types reflect the early patterns, because of the uniform nature of the country and the large proportion that remains uncleared. However, vegetation types that formerly occurred in fertile valleys in the west of the district may no longer be present.

Baxter (1991) classified the remaining forest into three broad categories, encompassing 32 forest types. These are:

- i) ten beech and beech-podocarp-broadleaved forest types;
- ii) twenty broadleaved-podocarp forest types; and
- iii) two kahikatea dominated podocarp-broadleaved

forest types. He also distinguished two cliff/bluff vegetation types, lake/swamp wetland vegetation, and four regenerating forest vegetation types.

Beech and beech-podocarp-broadleaved forests

Beech forests are largely confined to weathered, free-draining sandstone ridges and spurs with low fertility. Generally, the beech forested ridges and spurs separate stands of broadleaved and podocarp forests, a reflection of repeating patterns in the landform. The change from one forest type to the other is usually abrupt but there can be some gradation, with podocarp and broadleaved species being co-dominant. In the Waverley-Waitotara area, beech forest can be found on valley floors. As an example, black beech is on slump material and bluffs beside some of the Moumahaki Lakes (see Chapter 3, RAP 2). Regeneration of beech forest following disturbance seems to be slow.

Black beech is the most abundant of the beeches in the district, except in the north and west where hard beech is dominant. The two species hybridize in the Whangamomona-Tangarakau area. In the east of the district, red beech and silver beech are found in the Retaruke area and mountain beech and red beech occur near Orautoha.

Broadleaved-podocarp forest

Broadleaved-podocarp forests are the most widespread forest types in the Matemateaonga Ecological District today. They are found on most hill slopes and some ridges and valley floors. Baxter (1991) listed the different types under the principal landform units on which they occur. Where there are emergent species, rimu, northern rata and/or rewarewa are the most common, over a canopy dominated by tawa, kamahi, hināu and/or mahoe. Black maire, white maire, narrow-leaved maire, titoki, pukatea and, in the south, ngaio can also be locally

common. Miro, matai, rimu and Hall's totara are sometimes found in the canopy. Tawa tends to be replaced by kamahi and hinau above 600m.

Most of these forests have a dense understorey with numerous tree-ferns and a range of broad-leaved species, mainly mapou, hangehange, pigeonwood, marbleleaf, rangiora, various coprosmas and, sometimes, tree fuchsia, pate, mingimingi or *Gaultheria* species. There is much variation in understorey composition across the district. Though the groundcover tends to be sparse, *Blechnum* ferns, bush rice grass and hook sedges are locally abundant. Parataniwha can be dense in seepages.

Most of the broadleaved-podocarp forests fit the pattern outlined above. There is some variation in moist areas where kahikatea can be common and pukatea is co-dominant in the canopy. In some northern parts of the district, quintinia can be a co-dominant species in the canopy.

Kahikatea-dominated podocarp-broadleaved forest

Kahikatea dominated podocarp-broadleaved forests are confined to valley floors, mostly in the west of the district. These tend to be fertile but poorly drained sites. The main emergent and canopy species today tend to be kahikatea, pukatea and swamp maire, with some tawa and rimu, though freer draining sites may also have had some matai, titoki and lowland ribbonwood. Common species in the understorey are usually kaikomako, ramarama, *Coprosma rotundifolia*, supplejack and kiekie. The groundcover is dominated by a range of sedges, *Blechnum* ferns and bush rice grass.

Cliff/bluff vegetation

Throughout the ecological district, there are cliffs and faces which are too steep to support large trees. Baxter (1991) differentiated between wet cliff/river gorge vegetation and dry cliff vegetation. Tuhara, kiokio, parataniwha and several spider orchids are species typically found on the wet faces. Species found on the drier faces include toetoe (*Cortaderia fulvida*), mountain flax, tutu, *Gaultheria* species and sometimes a number of small shrubs and ferns.

Lake/swamp wetland vegetation

Wetland vegetation is probably the most depleted in the Matemateaonga Ecological District today, mainly because wetlands tend to lie on flatter, more easily cleared land. Wetlands are most numerous around the many small lakes that dot the southern parts of the district. These have yet to be fully studied across the district, though descriptions of several wetland vegetation types are included in this report (RAPs 1,2 and 5). More disturbed lake edges appear to be fringed by raupo, while less disturbed areas tend to have more sedges (particularly giant umbrella sedge and a number of *Carex* species, such as *C. secta*, *C. virgata* and *C. geminata*) and rushes. Small shrubs, particularly manuka, *Coprosma robusta* and *C. rotundifolia*, as well as toetoe (*Cortaderia toetoe*), wheki-ponga and other tree ferns and smaller ferns can also be common over relatively small areas. On valley floors, these wetland associations may merge into neighbouring forest through a zone of swamp forest, dominated by stunted kahikatea, pukatea and marbleleaf. On the valley sides, the change from one vegetation type to another is usually abrupt.

Regenerating forest

The Matemateaonga Ecological District has many thousands of hectares covered in regenerating vegetation. Two main factors have caused the disturbance of the original vegetation cover.

One is the unstable nature of the landform in which slips and slumps continually occur removing anything from a few square metres of forest to many hectares. Construction of roads and tracks has accelerated this process. The other factor has been clearance for farming. Because of the steep nature of the country, difficulty in adding fertilizer and poor access, it has not always been possible to keep the land open for farming and now a considerable area of the ecological district is covered in regenerating vegetation.

By far the majority of these sites are dominated by manuka and tree ferns. Sites in drier places can have almost pure manuka or manuka with a range of other shrubs and ferns. Wetter places can have a mixture of manuka and tree ferns, particularly ponga. Sometimes these vegetation types grade into mixed hardwood shrublands, dominated by species such as five-finger, rangiora, karamu, mahoe, marbleleaf, mingimingi and kaikomako.

Advanced regeneration is seen in areas with a canopy of tawa, kamahi or rewarewa over a subcanopy of the successional species noted above. In rarer cases, succession is seen as stands of pole kahikatea and rimu on river terraces, coppicing kamahi on the Matemateaonga Range or rewarewa over *Cyathea* treeferns on Whanganui River terraces.

For a more detailed account of vegetation types within Matemateaonga Ecological District, see Baxter (1991).

Flora

Only about 370 indigenous vascular plant species have been recorded in the ecological district (Appendix III) and no species are endemic there. Only three of these species are regarded as threatened. The tall, herbaceous daisy, *Brachyglottis turneri* is classified as "local" in Cameron et al. (1995) and is found in the Whanganui River Gorge and on the banks of the Tangarakau River. It is uncertain whether the parasitic herb, *Dactylanthus taylorii*, which is classified as "endangered" in Cameron et al. (1995), has been found in the district, but there is much suitable habitat and it is known in adjoining districts to the north and east. The mistletoe, *Ileostylus micranthus*, is in the east of the district at Aberfeldy Hill (Barkla and Ogle, in press). Five species, *Olearia townsonii*, *Gaultheria oppositifolia*, *Pseudopanax laetus*, *Lycopodium deuterodensum* and *Dracophyllum strictum*, are at their southernmost known limits within the district. Four others are at their southernmost North Island limits within the district: tanekaha, tree dracophyllum, *Quintinia serrata* and *Astelia trinervia*.

Weeds and pests

No weeds appear to pose any major threats in the short to medium term, though some are a problem in particular areas. These include Himalayan honeysuckle in the Mangapurua Valley, wattles along the Manganui-o-te-Ao River and willows in some waterways and wetlands (J.Barkla pers. comm.). However, the vegetation of the Matemateaonga Ecological District is under intense pressure from introduced mammalian herbivores. Population densities of Australian brush-tailed possums and

feral goats are now very high. Though these species have been in the district since the early part of this century, their effects have only recently become obvious as die-back, particularly of rata and kamahi, and as a marked opening up of the understorey. The problem has been quantified in plots in the west of the district (Blaschke 1992). Personal observation indicates that the effect of these species, together with feral pigs and, in places, domestic stock, has been to open up the forest canopy and impede regeneration. The effect is clearly seen in forest that adjoins cleared areas, where flatter ridge tops and spurs are now grassed and the forest is retreating at the edges. Rogers (1995) suggests that the ultimate result of this process would be replacement of forest by grassland. Control of these introduced herbivores is highly desirable but difficult because of the enormous size of the area, the large numbers of animals involved and difficult access.

1.2.5 Fauna

Matemateaonga Ecological District contains some of the largest tracts of indigenous forest remaining in the North Island. Consequently, it still retains relatively large populations of forest-dwelling animals which are no longer common in other parts of the country, such as brown kiwi.

Birds

Fifty bird species have been recorded in the ecological district, including 33 indigenous species (Appendix 4) and 17 introduced species. Baxter (1991) describes the distribution of most of these through the district. Nankeen night herons were confirmed as breeding in the Jerusalem area in 1995 (Department of Conservation files Wanganui). Notable forest species include North Island robin, New Zealand falcon, brown kiwi (all widespread but possibly in decline) and yellow-crowned parakeet (which is declining). North Island kokako may no longer be present and kaka are no longer common. Four notable wetland bird species are found in the district. These are North Island fernbird (several scattered but apparently healthy populations), New Zealand dabchick (found on lake margins near Waitotara), spotless crane (scattered distribution through the district) and blue duck (in the Manganui-o-te-Ao and Waitotara River catchments). The national threat status of these birds, as given by Bell (1986), is endangered (kokako), vulnerable (North Island brown kiwi, New Zealand falcon, North Island kaka, New Zealand dabchick, blue duck) and regionally vulnerable (North Island fernbird).

Bats

Bats have long been known to inhabit the ecological district. Work in Wanganui Conservancy with bat detectors since 1994 has shown that bats are still widespread in native forests. Long-tailed bats appear more common than short-tailed bats. Because bat detection work is still in its infancy, the numbers and exact distribution of these species are unknown.

Lizards and Amphibians

Baxter (1991) lists five species of skink and five species of gecko which are known or thought to inhabit the ecological district (Appendix IV). These include the nationally

threatened striped skink and rare gold-stripe gecko. Very little survey work has been done for lizards in the district, and there is no known information on amphibian distribution.

Fish and Aquatic Crustaceans

Data on fish in the Matemateaonga Ecological District is limited to 28 sites on National Institute of Water and Atmospheric Research fish distribution database. Twenty-two species have been recorded, 16 indigenous freshwater fish, four indigenous estuarine fish and two introduced species. Amongst these are short-jawed kokopu, giant kokopu and lamprey, listed in the Department of Conservation's priority species for conservation management (Molloy and Davis 1992). The database also lists two freshwater invertebrates, freshwater crayfish or koura (abundant in the ecological district) and freshwater shrimps.

Invertebrates

Information on terrestrial invertebrates is very limited, considering the study potential in the large areas of indigenous vegetation in the ecological district. Two shells of a giant land snail, identified as *Powellipbanta marchanti*, were collected in the Waitotara Valley (Dell 1955) but there are no recent records, despite a public awareness campaign run by the Department of Conservation in 1990. Collections of invertebrates have been made privately but the information gained has not often been published. There is every chance that *Powellipbanta* snails still occur in other sites, as may other invertebrates such as giant weta. A list of insects, collected by J. Skipworth and I Stringer in 1983, near John Coull hut on the Whanganui River is given by Baxter (1991).

Introduced mammals

Introduced mammals have caused declines in many indigenous species of wildlife in New Zealand, through predation or competition. Matemateaonga Ecological District has many of these mammals, and it is to be expected that they will have had similar effects on wildlife there. Particularly common in Matemateaonga Ecological District, are possums, goats and pigs. Red deer occur in the district in only low numbers in the east and in a few locations elsewhere where they may have escaped from farms. Fallow deer are found in the south and east. There is little information on other introduced mammals, though cats, ferrets, stoats, ship rats, mice and hedgehogs at least were either seen or described by landowners during this survey.

The fauna of the ecological district has been very poorly studied and is less known than the vegetation. This is no doubt a reflection of the remoteness of much of the area. However, some work is being done. This includes monitoring for possum poisoning operations, ongoing kiwi monitoring and one kiwi research project and bat, fish and lizard (mainly striped skink) surveys (Department of Conservation 1996). This work is turning up some useful information. These studies are limited in extent but will greatly increase knowledge of the Matemateaonga Ecological District.

Chapter 2

2.0 METHOD

2.1 *Preparation*

Initial reconnaissance for this survey was undertaken by Wayne Baxter, Department of Conservation Wanganui in 1987/88. This work was updated by staff from Wanganui Conservancy of the Department of Conservation and collated into an unpublished report (i.e. Baxter 1991). Based on information found in files, reports, aerial photographs and maps, this report identified 52 sites as priority survey sites. These 52 sites were mainly chosen because they were thought to have landform or vegetation patterns which were under-represented in protected natural areas.

More recent information, available following investigations of proposed additions to the Whanganui National Park (Department of Conservation 1993), showed that several of these priority sites are now managed for conservation purposes. Other, similar, sites were therefore no longer priority areas for survey. A flight over the southern part of the district in June 1994 showed that some sites were in very poor condition. This was not immediately apparent from maps and photos. At this stage, 23 of the original 52 priority survey sites were still considered to need surveying.

These 23 sites were studied on stereo aerial photographs for more information prior to survey. It was found that many had either been cleared of their original vegetation or were in a poor or fragmented condition. Consequently, only 11 of these sites were identified as actually needing field survey.

Two additional natural areas, not identified by Baxter (1991), were considered to have high representative value (Colin Ogle, pers. comm.). After the 13 priority areas had all been surveyed, one other site (Lake Rotokohu), identified as protected by Baxter (1991), was found to lie partly on private land. It, too, has since been surveyed.

2.2 *Field Survey*

Field survey of all sites was carried out in June and July 1995. Areas were surveyed using the procedures outlined in Myers et al. (1987) and Ravine (1995), using modified versions of standard field cards. The main modification was that a simple sheet was used to record plant species in sample sites, replacing the back of the standard "green" card. This sheet lists species in two columns with ticks recording presence in the various tiers. The reverse side of the sheet has space to record up to five dominant species in each tier and an estimate of their percentage cover (as well as general notes). This allows an efficient and robust description of forest structure and is easily modified for wetland and other habitats. This system is quick in the field and allows easy interpretation of data later.

2.3 Evaluation

Because of the small number of sites surveyed and the limited information available on protected natural areas within the ecological district, a checklist of ecological units as used in most PNAP surveys (e.g. Lake and Whaley 1995; Maxwell et al. 1994; Ravine 1992 and 1995) was not considered a practical reference for evaluation purposes. Surveyed areas were evaluated using criteria listed in Myers et al. (1987), particularly representativeness and viability.

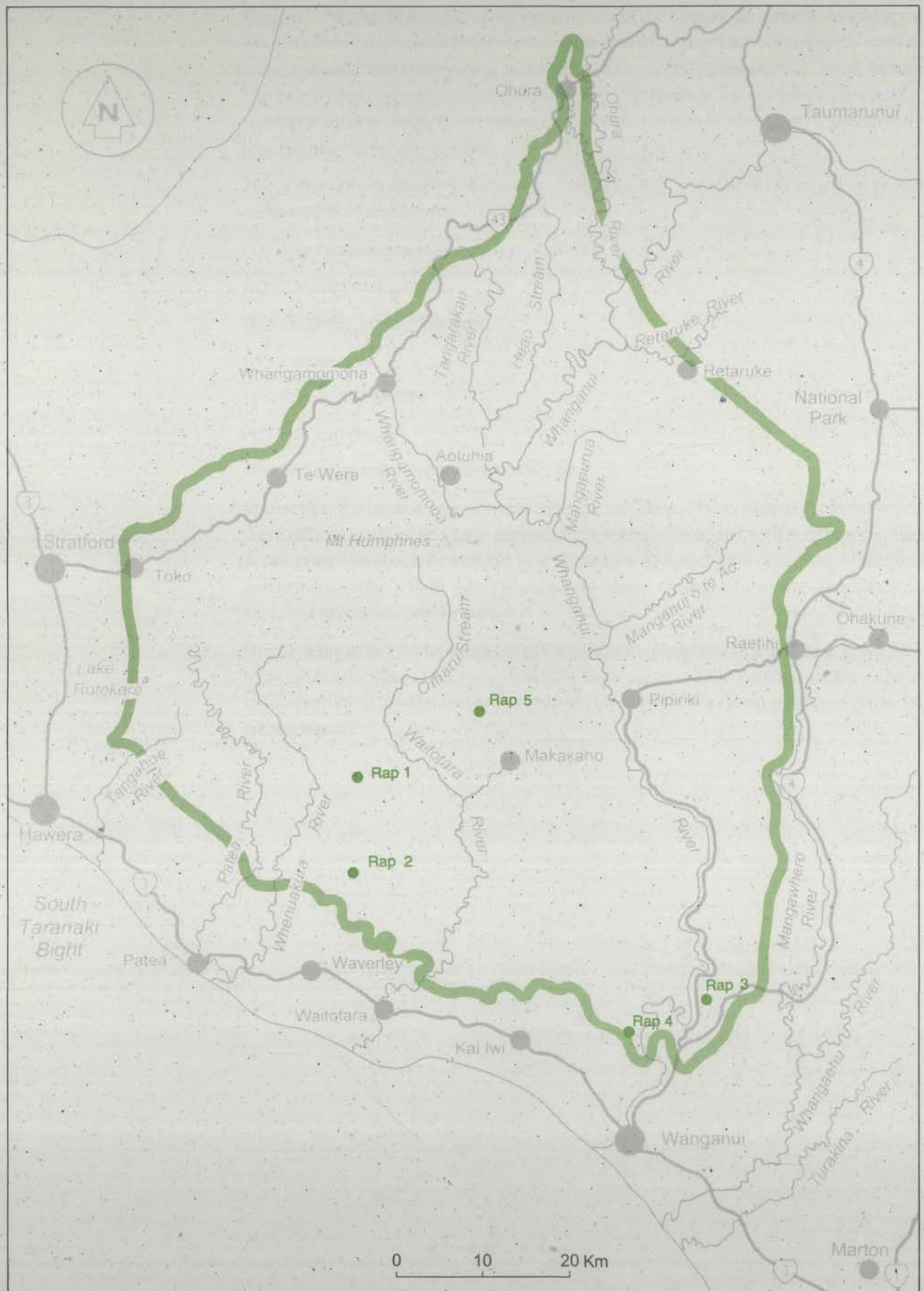
The seven criteria listed by Myers et al. (1987) for the "evaluation of natural areas and defining priorities for protection" are:

- (i) representativeness, the primary criterion
- (ii) diversity and pattern
- (iii) rarity and special features
- (iv) naturalness
- (v) long-term viability
- (vi) size and shape
- (vii) buffering and surrounding landscape

In practice, evaluation was very straightforward. Most of the natural areas surveyed were either clearly of very high representative value, viable and well worth protecting or, in poor condition or similar to more intact or larger protected areas and not considered to be a high priority for protection. Only three of the natural areas surveyed needed detailed evaluation.

Finally, a list of Recommended Areas for Protection was produced. These areas best represent those natural ecosystems which were present in the ecological district prior to human habitation and are not adequately protected in the existing protected natural area network.

FIGURE 2: LOCATION OF RECOMMENDED AREAS FOR PROTECTION



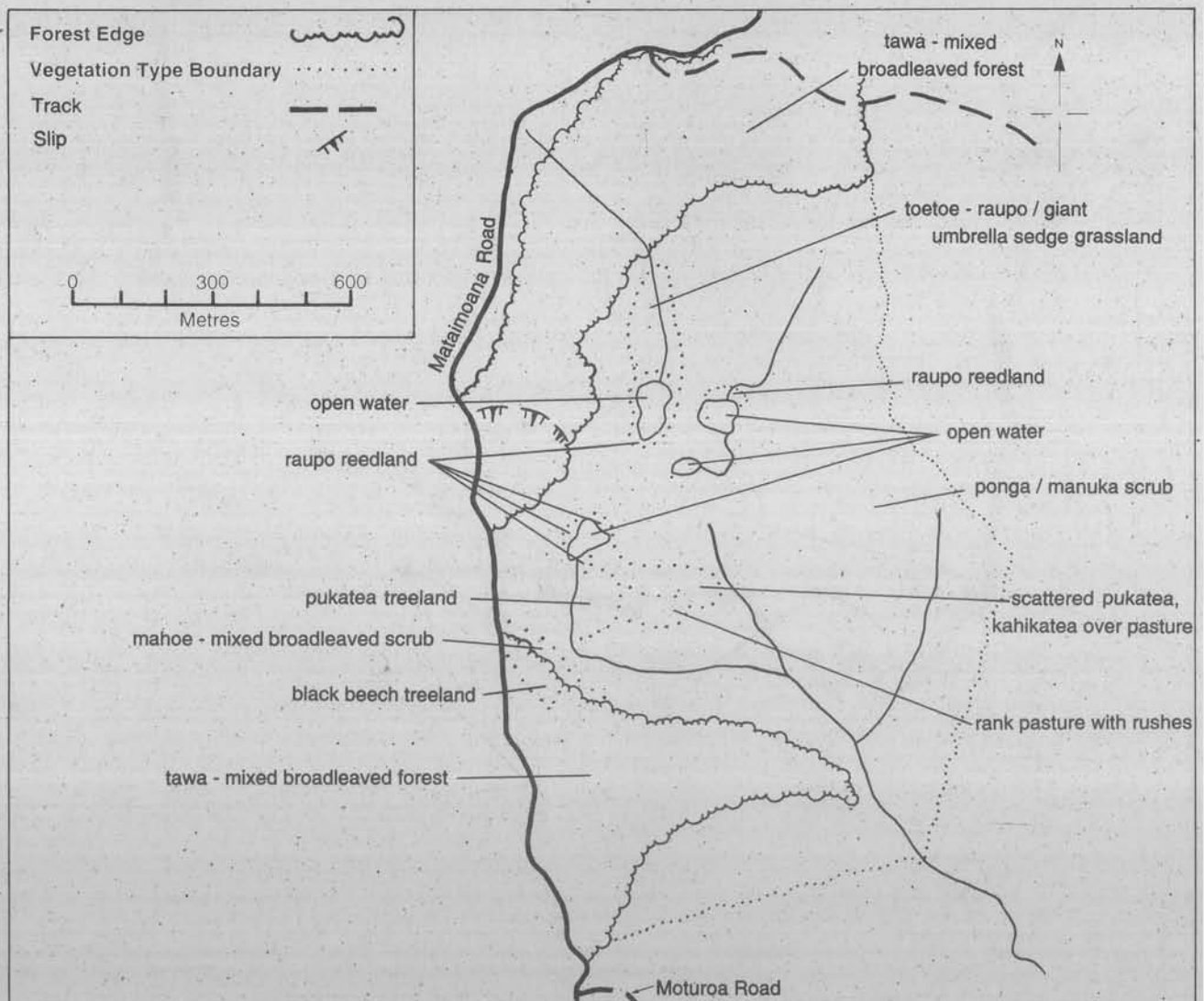
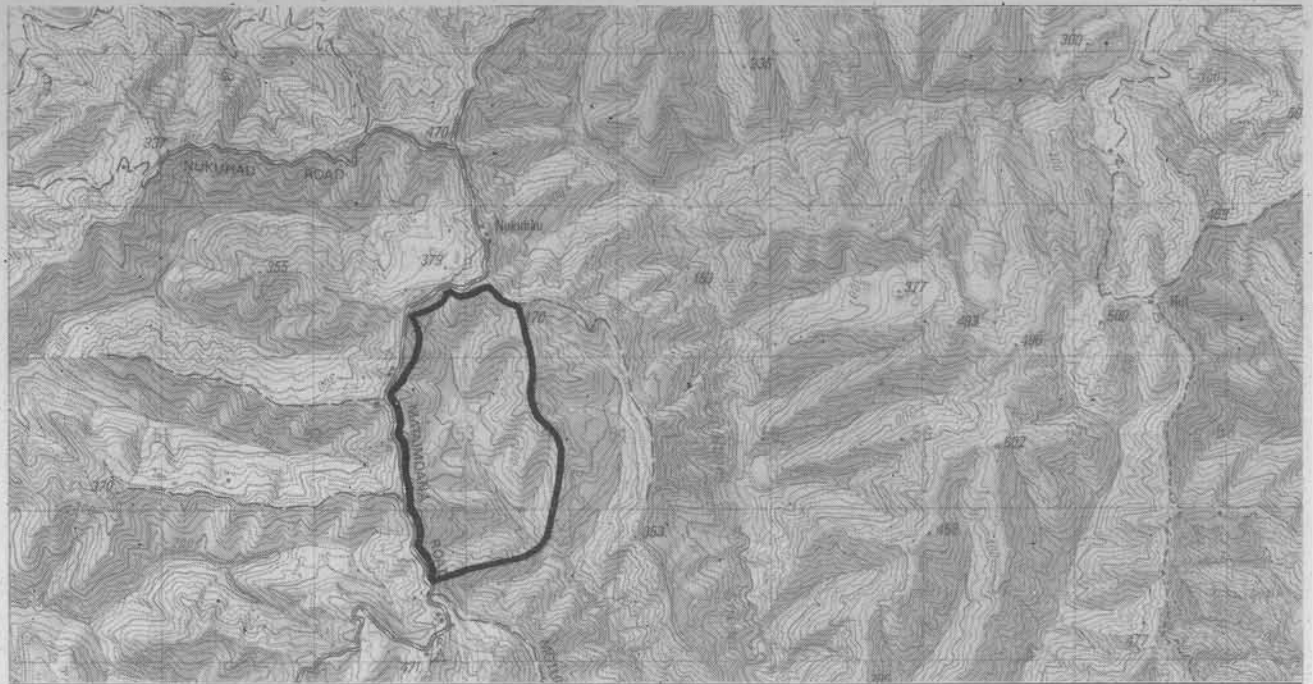
Chapter 3

3.0 RESULTS

3.1 *Recommended Areas for Protection (Figure 2)*

RAP 1	Nukuhau Lakes
RAP 2	Moumahaki Lake Catchments
RAP 3	Parikino Swamp Forest
RAP 4	Tokomaru West Bush
RAP 5	Rotokohu Wetlands

FIGURE 3: NUKUHAU LAKES RAP 1



RAP 1 Nukubau Lakes

Study Area: 8
Grid Reference: R21 530 755
Size: 200 ha
Altitude: 90-470 m
Survey Date: 15th June 1995

Ecological Units

- 1) pukatea treeland on lake margin
- 2) raupo reedland on lake margin
- 3) toetoe-raupo/giant umbrella sedge grassland on lake margin
- 4) tawa-mixed broadleaf forest on slope
- 5) mahoe-mixed broadleaf scrub on slope
- 6) ponga-manuka scrub on slope
- 7) black beech treeland on spur/ridge crest

Landform

Geology

Andesitic tephra on massive or jointed siltstone, mudstone or sandstone;

Soils

Yellow-brown earths; yellow-brown loams; steepland soils related to yellow-brown earths and yellow-brown loams.

Nukuhau Lakes RAP encompasses four lakes, together with their catchment. It is in a steep-sided bowl at the head of a broad gully, which drains to the south-east. A large slump and several smaller slips have dammed the gully near its head, impeding drainage and forming the lakes.

These lakes are all around one to two hectares in extent. The edges tend to be abrupt as the surrounding land is mostly steep. This implies the lakes are deep, relative to their size. In the north and north-east the lakes have shallow arms which have become eutrophic.

On three sides of the gully head, the landform is steep and of an even slope, though partly broken into spurs. The slopes rise 120 metres, ending as ridges, mostly of a "razor-back" form. Mataimoana Road has been formed along the crest of the western ridge and this has probably been the cause of two major slips.

The slump that originally dammed the gully has stabilized as a series of hummocks to the south of the lakes. There are a few flat areas near the base but the topography is mostly rolling. These lakes do not all share a common outlet, the south-west lake draining independently of the other three.

Vegetation

Much of the vegetation surrounding the Nukuhau Lakes has been cleared in the past and is now secondary, though a little pasture remains in the south-west of the RAP. This secondary vegetation continues up the eastern slopes but the north and west still have tall forest higher up.

For the most part, the lake edges have a fringe of raupo only one or two metres wide. In one or two places and particularly towards the north-west, this is gradually replaced by a community dominated by toetoe and giant umbrella sedge. In the south-west, where some pasture persists, *Carex secta* is also common. It is also in this south-west corner that a small remnant of swamp forest persists, in the form of a stand of pukatea with a very few kahikatea. Wheki is also common in this part of the RAP.

Only in part of the western edge does the wetland vegetation merge into primary forest. Elsewhere, it merges into secondary vegetation which is strongly dominated by tree ferns, mainly ponga, and manuka. The distribution of these two plants is slightly patchy because, though ponga is more common overall, manuka is locally dominant on several spurs. In places, particularly higher up, these scrubby areas contain a range of other species, such as mountain flax, koromiko, karamu, hangehange, mapou, heketara and bracken fern. High up in the south-west, ponga and manuka are replaced by mahoe and there is much rangiora, lancewood and mapou as well.

The forest on the higher slopes is a mixed broadleaf forest dominated by tawa and typical of that found throughout much of the Matemateaonga Ecological District. As well as tawa, the canopy also contains hinau and rewarewa, with some Hall's totara. There is a poorly defined sub-canopy, with some mahoe, mapou, mamaku, kaikomako, karamu and pate. The understorey contains such common species as kawakawa and hangehange and a few saplings of kamahi. Climbers noted include bush lawyer, supplejack, kiekie and red rata vine.

On a few ridge and spur crests, vestiges of black beech forest persist. These are depleted to the extent there is no longer a closed canopy and mostly there are just a few isolated trees. Other species associated with the black beech include heketara and mingimingi.

Some gorse was noted during the survey but it is unlikely to become well established as the vegetation is mostly too dense. No other potentially troublesome weeds were seen. Goats are present and have the potential to prevent continued regeneration of the seral communities as well as causing considerable damage to forested areas. However, goat damage in the parts surveyed was less than in much of the ecological district.

Access to the Nukuhau lakes is difficult because of the steep sides and because the vegetation surrounding the lakes is dense. Consequently, much of this area was surveyed from a distance with binoculars, though some sampling was done within surrounding forest.

Special Features

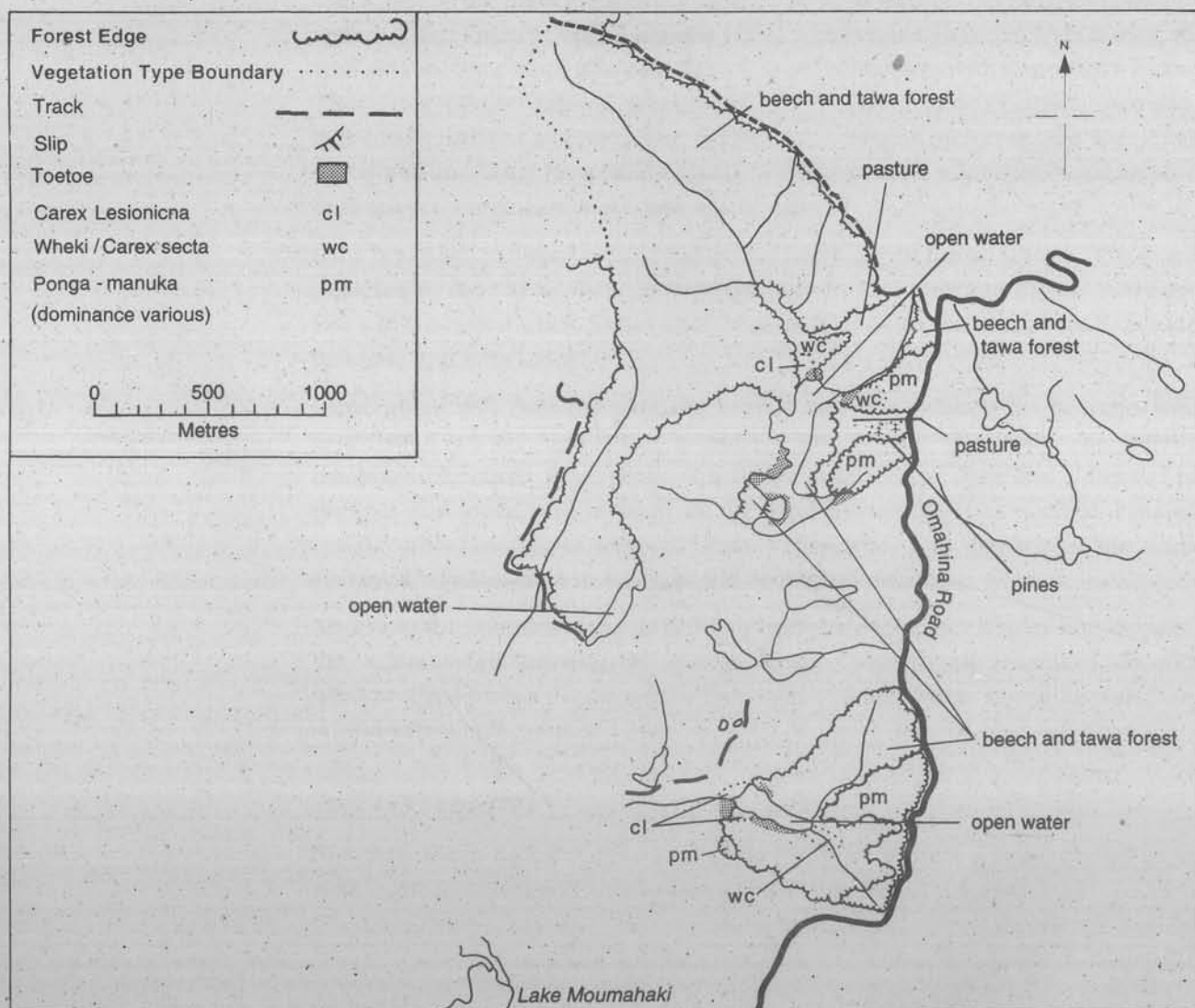
Nukuhau Lakes RAP affords a rare opportunity to protect a sequence of lakes with associated wetland vegetation, and their entire catchment.

Selection Criteria

Representativeness	M
Diversity/Pattern	M
Rarity/Special Features	M
Naturalness	M
Viability	H
Size/Shape	H
Buffering	H

Nukuhau Lakes are unique among the district's lakes in providing an opportunity to preserve a complete catchment for a series of slump-formed lakes and associated representative vegetation. Though much of the vegetation is secondary, there is good scope for continued regeneration. The area is large and well buffered and viable in the long term with the minimum of management.

FIGURE 4: MOUMAHAKI LAKE CATCHMENTS RAP 2



RAP 2 Moumahaki Lake Catchments

Study Area: 9
Grid Reference: R21 550 690
Size: 200 ha
Altitude: 90-395 m
Survey Date: 16th June 1995

Ecological Units

- 1) tawa-mixed broadleaf forest on slope
- 2) black beech forest on slope
- 3) black beech forest on slump terrace
- 4) ponga-manuka scrub on slope
- 5) manuka scrub on slope
- 6) raupo reedland on lake margin
- 7) *Carex lessoniana* sedgeland on lake margin
- 8) toetoe-manuka/giant umbrella sedge sedgeland on lake margin
- 9) wheki/*Carex secta* fernland on lake margin

Landform

Geology

Andesitic tephra on massive or jointed siltstones, mudstones or sandstones.

Soils:

Yellow-brown earths; yellow-brown loams.

The Moumahaki Lakes are a chain of lakes running north to south along the Moumahaki Stream and an unnamed tributary. They include Lake Moumahaki itself (approximately 30ha), seven smaller unnamed lakes (each between three and ten hectares) and a number of smaller ponds. The lakes are in adjoining valleys which have been formed by the streams cutting down through marine terraces. A series of slips has dammed these valleys, forming the lakes.

For the most part, particularly in the north and east and to a lesser extent in the south, the sides of the valleys containing the lakes rise steeply (around 30°) to ridges 100 m or more above the lake edges. These valley sides are in a series of gentle spurs. The western and central parts of the valley system are characterized by slump topography which is generally of a gentler slope but very uneven. Between the lakes there are some eutrophied, flatter areas but these only occupy a few hectares at most.

Most of the beds of the smaller lakes and a small part of the main lake are already administered by the Department of Conservation as Lake Beds Conservation Area. Two parts of the Moumahaki Lakes catchment have been recommended

for protection in this report. These are both in the valley of the tributary stream, and include the entire catchment north of the northern lake ("Lake 1" in Ogle and Baxter, 1990), and most of the land bounding the east and west of that lake (and extending south, to the west of a smaller, western lake), as well as the bulk of the catchment of the lake three lakes further south ("Lake 4" in Ogle and Baxter, 1990 - see the adjoining maps for a more exact location of the RAP.) These include mostly slope landforms, with less of the slump landforms.

An interesting feature of the RAP is a flat area which protrudes into the west of the northern lake. This appears to have arisen from a slump which has come down in one more or less intact piece (C.Ogle, pers comm.). The rim of this flat area is not solid, but appears to float on the water and is held together by the vegetation.

Vegetation

To the north of the RAP is indigenous, tall forest. Otherwise, the vegetation outside the RAP is principally pasture, particularly on the gentler slump topography. On the steeper slopes, there is also a range of seral communities dominated by either ponga, manuka or both. Lake Moumahaki is bounded mostly by pasture with little scrub, while the lakes further north have considerably more scrub around them. To the south and east of the southern part of the RAP, there are two stands of exotic pine trees.

The most common vegetation type around the lake margins is an association dominated by giant umbrella sedge, toetoe and manuka. Generally manuka is the least common of these and giant umbrella sedge the most common but the relative proportions of these species varies considerably. At the time of survey this vegetation was all emergent; that is, there was water round the base of the plants. Other common species in these areas are *Carex secta*, especially in wetter areas, and *Juncus gregiflorus*, especially where the wetland vegetation merges to pasture. This vegetation type occupies a thin band along the edges of most of the lakes and to a certain extent along the stream which connects the north-eastern lakes. On the west side of the northern lake, similar vegetation surrounds the flat area referred to in the "landform" section (above), and is the "floating" vegetation referred to there. Here, manuka becomes dominant.

In the northern arm of the northern lake the vegetation changes sharply to an association of wheki growing over *Carex secta*. Because of access difficulties, this part of the RAP was not surveyed closely. Consequently it was not possible to determine what other plants occur in this wetland. There is a gradual change away from the main lake with more *Carex secta* nearer the lake being overtopped by more and more wheki. Wheki in turn merges to either ponga or tall forest. Adjoining this area is a small patch heavily dominated by *Carex lesssoniana*. There is another similar area in the south west of the southern part of the RAP.

Most of the RAP is forested. There are basically two types of forest, which tend to alternate following landform patterns. The most common, on the slopes above the lakes, is tawa dominated. The other forest type is dominated by black beech, which mostly occurs higher up on drier ridges and gentle spurs but also down the slopes to the lake edges in a few places.

North of the northern lake the two forest types alternate evenly, following the contours of the land. This pattern is less well-defined elsewhere. Beech forest also covers the flat

area on the west of the northern lake, where it is fringed by wetland vegetation. This is unusual because elsewhere in the district where there are similar landforms the forest is either a tawa-dominated type or a swamp forest type.

The tawa dominated forest which covers much of the RAP is typical of that which covers so much of the ecological district. Several rimu emerge above the canopy. Other podocarp species are also present, including totara, miro and matai, though none of these are very common. While the canopy is dominated by tawa, hinau is also plentiful and rewarewa and pukatea are locally common. Puka is well-established as an epiphyte in the canopy but rare as a free-standing tree. The forest differs from otherwise similar forests nearby in Manawatu Plains Ecological District in that there is not the same well defined sub-canopy. There are, however, several smaller trees scattered under the main canopy, including mahoe, pigeonwood, ramarama, mapou and small-leaved milk tree, with marbleleaf nearer the lake edges. The understorey is relatively dense and contains many small tree and shrub species, particularly near the edges of the forest or where it merges with black beech forest. Amongst those species noted are kanono, shining karamu and other species of *Coprosma*, kawakawa, hangehange, rangiora, pate and the shrub daisy, *Olearia townsonii*.

Prominent amongst the climbers is red rata vine, which appears to be particularly common, though two other species of climbing rata (*Metrosideros diffusa* and *M. perforata*) were also recorded. There is also some supplejack, New Zealand jasmine and *Clematis paniculata*. Nearer the lakes, kiekie, native passionfruit, and two species of bush lawyer (*Rubus cissoides* and *R. schmidelioides*) were also recorded. The ground cover where surveyed is diverse but sparse away from the edges, with several ferns, herbs and grasses present. Parataniwha is locally common as is bush rice grass. Where tracks have been cut through this forest, species such as snowberry and several willowherbs appear.

The black beech forest is more open than the tawa forest. Black beech dominates strongly, though a very few hinau and Hall's totara also reach the canopy. There is no subcanopy as such and the understorey differs greatly in composition from that under the tawa forest. Common plants here are heketara, mingimingi, *Coprosma rhamnoides* and *Helicbrysum aggregatum*. There is little ground cover, except where the beech merges into tawa forest.

Little representative indigenous vegetation remains on the slump landforms, though there are a few pukatea and mahoe trees on the base of a slump at the edge of the southern part of the RAP. However, most of this slump area has been cleared for pasture as it is of generally gentler contour and more easily managed and, consequently, very little is included in the RAP.

There is some gorse in the vicinity of the RAP which has potential to invade wetland areas. However it is not well established within the RAP itself and could be readily controlled. It is unlikely to be a problem in the forested areas. Ogle and Baxter (1990) recorded water lilies on the fringes of the northern lake. No other weeds were recorded which are likely to cause problems. Goats are present and have the potential to cause serious long-term damage to the vegetation. However, they are not as numerous here as they are further inland and control is a realistic proposition. The natural areas are only partly fenced and domestic stock, including cattle and sheep, browse the edges of both forest and wetland vegetation.

Special Features

Dracophyllum strictum and *Gaultheria oppositifolia* have been recorded from within a few hundred metres of the RAP (C. Ogle, pers. comm.) and are likely to be present within the RAP. These two species, as well as *Olearia townsonii*, are at or near their southern distribution limits here.

The black beech forest on a slump terrace landform is almost certainly unique within the ecological district and needs further investigation. The RAP contains some of the best open water to dry ridge vegetation sequences within the ecological district.

There are populations of fernbirds and spotless crakes around the lakes. The forest provides habitat for a number of bird species, including North Island robin, New Zealand falcon and brown kiwi.

The lakes and associated forest have high scenic value and are more accessible to the public than most other lakes in the ecological district.

Comments

The northeastern series of the Moumahaki Lakes (including those adjoining the RAP) are surrounded by legal road. This land needs to be reclassified, ideally as scenic reserve. A more intensive vegetation survey should be undertaken in appropriate habitats to determine whether *Dracophyllum strictum* and *Gaultheria oppositifolia* grow within the RAP. If not, it would be desirable to also seek protection for another area of scrub/forest 500 m south-west of the RAP where these plants have been recorded.

Part of the northern fringe of Lake Moumahaki itself (which is administered by the Department of Conservation) is only periodically submerged and supports several small indigenous herbs characteristic of shallow lake edges, including *Limosella lineata* and *Glossostigma elatinoides*. The sedge *Carex dipsacea* grows on the lake edge. These three plant species have not been recorded elsewhere in the ecological district.

Selection Criteria

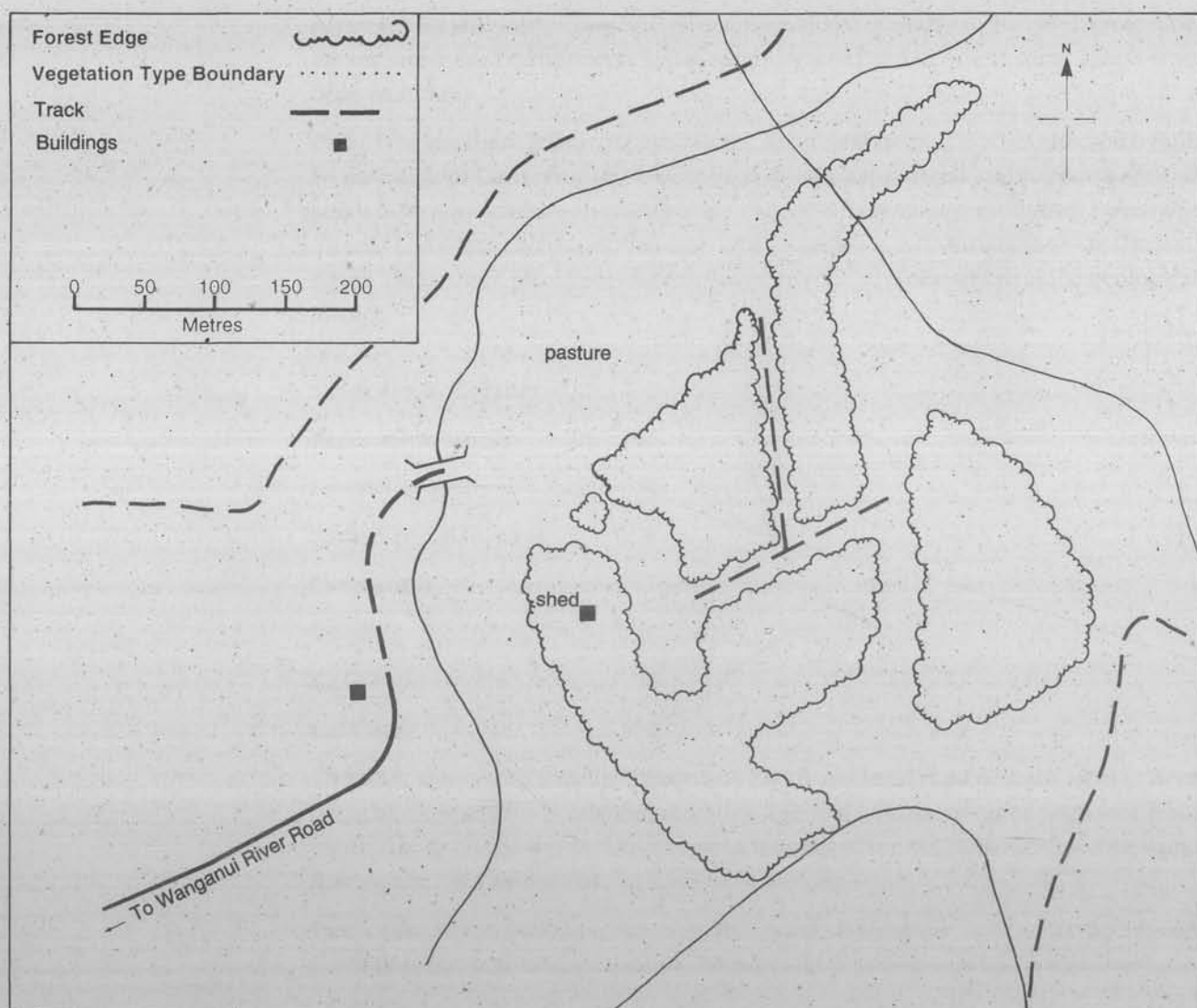
Representativeness:	H
Diversity/Pattern:	H
Rarity/Special features:	H
Naturalness:	H
Viability:	H
Size/Shape:	H
Buffering:	M

The RAP, along with nearby conservation land and legal road contain an excellent range of representative plant communities, much in an uninterrupted sequence from wetland to dry ridge forest. The area has a number of special features and, with some fencing and wild animal control is viable in the long term.

Parts of the Moumahaki Lakes catchment have been recommended for protection on the basis of the vegetation of the lake catchments. This is because the bulk of the lakes

themselves and most of the fringe vegetation are conservation land or unformed legal road. The RAP adds to these the best areas of surrounding forest and, in combination with crown land, include the whole range of plant communities in the catchments, from submerged vegetation to dry ridge forest.

FIGURE 5: PARIKINO SWAMP FOREST RAP 3



RAP 3 Parikino Swamp Forest

Study Area: 12a
Grid Reference: S22 948 550
Size: 8 ha
Altitude: 25 m
Survey Date: 25th June 1995

Ecological Units

1) kahikatea forest on floodplain

Landform

Geology

Floodplain alluvium.

Soils

Gley recent soils; gley soils.

For most of its length, the Whanganui River has steep banks with few terraces or floodplains. At Parikino, there is a floodplain which is some 100 ha in extent. This area is probably an old cut-off meander of the Whanganui River which has partly silted over in floods. Parikino Swamp Forest is on the eastern end of this floodplain. North-east of the RAP, the landform rises gently to a small plateau, which falls away again to the base of steeper hills.

The fall of the land is actually away from the river, at least as far as the RAP, which would have created swampy conditions originally. However some drainage and opening up of natural watercourses has made much of this floodplain considerably less swampy and, when surveyed (in late June), the RAP itself was quite dry underfoot.

Vegetation

Parikino Swamp Forest is dominated by kahikatea. A single 30 m tall, mature kahikatea emerges above a canopy of regenerating kahikatea some 10 m to 15 m tall. Though most of these trees are the best part of a century old, the presence of several stumps suggests that mature trees have been selectively removed within recent decades. Pukatea, matai, titoki and tawa also reach the canopy. While there is no well defined sub-canopy, a number of smaller trees grow throughout the forest, including kaikomako, small-leaved milk-tree, mahoe, *Melicytus micranthus* and lancewood. Heavy stock browsing has all but removed the understorey, though a few divaricating shrubs persist, particularly smaller *Melicytus micranthus* and various coprosmas (*Coprosma areolata*, *C. rigida*, *C. rhamnoides* and *C. crassifolia*). Ground cover varies from bare ground to pasture species, though, again, there are areas where the ground cover is dominated by indigenous vegetation. These are mainly the ferns *Hypolepis ambigua* and thread fern but the grass, *Optismenus imbecillus* and

(in one clearing) the sedge, *Eleocharis gracilis* are locally abundant. Climbers abound through the bush, including native passionfruit, New Zealand jasmine, supplejack, bush lawyer (*Rubus schmidelioides*) and a rata vine (*Metrosideros diffusa*).

The forest is unfenced and browsed by bulls, which have caused serious depletion of the understorey and ground cover. More damage has been caused by cutting of tracks through the forest. Despite these major deleterious influences, the forest maintains a closed canopy over 90% of its area. Hawthorn, blackberry and gorse are present but in small amounts which could be easily controlled. There are numerous seedlings of the forest species and the forest could recover well with fencing and control of these weeds.

Special Features

Within Parikino Swamp Forest is a source of "pupu" mud, used by local Maori for dying purposes (B. Shaw, pers.comm.). Kahikatea forest on floodplain is very uncommon in the ecological district and the Parikino Swamp Forest is one of the largest examples remaining.

Comments

The area is used by the local community as a venue for a local sports day.

Selection Criteria

Representativeness:	H
Diversity/Pattern:	L
Rarity/Special features:	H
Naturalness:	M
Viability:	M
Size/Shape:	H
Buffering:	L

Though it has suffered considerable disturbance, Parikino Swamp Forest remains essentially intact and could recover well, with little management, if fenced.

RAP 4 Tokomaru West Bush

Study Area: 102
Grid Reference: R22 814 520
Size: 40 ha
Altitude: 120 m
Survey Date: 9th June 1995

Ecological Units

- 1) matai-tawa/mixed broadleaf forest on slope
- 2) tawa/mixed broadleaf forest on slope
- 3) mixed broadleaf scrub on slope

Landform

Geology

Moderately consolidated sandstone; unconsolidated sandstone.

Soils

Yellow-brown earths.

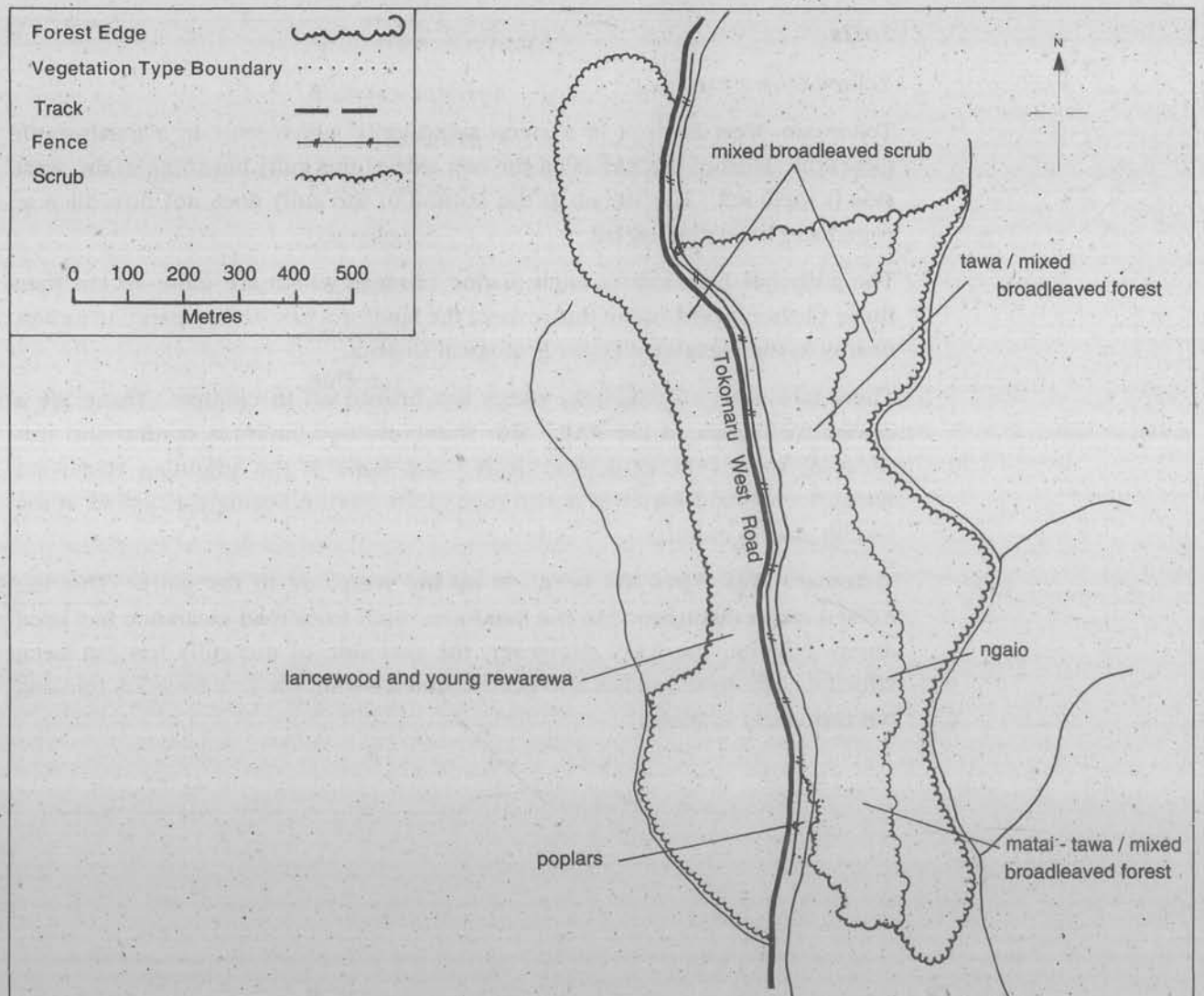
Tokomaru West Bush is in a steep sided gully which runs in a north-south direction. Most of the RAP is on the east side of this gully but some of the west side is included. The stream at the bottom of the gully does not flow all year round and has a gradual fall.

The gully has been cut through marine terraces which are more recent than those further inland and in this respect the landform can be compared to gullies nearby in the Manawatu Plains Ecological District.

There is a layer of shellrock, which has broken off in clumps. These are a distinctive feature of the RAP. This shellrock topography is confined to this southern end of the ecological district and some of the adjoining Manawatu Plains Ecological District (it is also seen in the Foxton Ecological District at the Okehu Stream mouth).

Tokomaru West Road has been cut up the west side of the gully. This has caused major disturbance to the landform. Spill from road clearance has been dumped within the RAP. However, the east side of the gully has not been affected. The landform has also been affected within the RAP by stock tracking but this effect is minor.

FIGURE 6: TOKOMARU WEST BUSH RAP 4



Vegetation

The vegetation in the Tokomaru West Bush includes both forest and seral shrub communities.

The forest is lower down in the gully and is confined to the east side and a small strip above the stream on the west side.

There are two forest types. In the south of the RAP the forest canopy is dominated by matai and tawa, with matai being generally taller (up to 20 m). Matai appears to have spread well following earlier disturbance. In addition to the mature trees, matai is common as seedlings, saplings and younger trees. The canopy in this part of the forest also contains several kahikatea and a very few totara, miro and titoki.

Further north, matai and kahikatea become less common and tawa is the dominant tree. There are also several rewarewa and titoki in the canopy. No other species is numerous in the canopy. In both forest types, the subcanopy is poorly defined, though either mahoe, ponga or regenerating matai are locally common, with occasional karaka, pigeonwood, kohuhu and nikau. The understorey is very depleted, having been browsed by goats and domestic stock. Regenerating matai is common under the matai-tawa canopy and continues under much of the tawa canopy. Shrubs such as New Zealand gloxinia and rangiora, which are less palatable to stock, are locally common. Other species occur where they are protected on cliffs or by fallen blocks of limestone. Ogle et al. (1994) noted that ferns are dominated by drought-tolerant species such as button-fern, lance fern, *Phymatosorus scandens* and *Asplenium gracillimum*. They also noted the presence of drought-tolerant forest sedges, namely *Carex spirostris*, *Uncinia affinis* and *U. scabra*, which are regionally uncommon.

The shrub communities show an advanced stage of regeneration following earlier clearance. Much of the scrub is surrounded by gorse, which has probably aided regeneration by restricting stock and goats. The scrub is very diverse, with no single dominant species. The most common plants throughout this scrub are mahoe, rangiora, lancewood, manuka, ponga, heketara, and koromiko. Lower down on the east slope, ngaio is particularly common, and above the road on the west slope, young rewarewa and lancewood are numerous.

Below the road at the southern end of the RAP, there is a stand of silver poplars, presumably planted for erosion control and now mature. These have not spread and are unlikely to be a problem. Gorse is widespread around the edges of the RAP. While it does not hinder regeneration, attempts to control it with herbicide could harm some indigenous species. Other weeds noted which could be a long-term problem are blackberry, barberry and Himalayan honeysuckle. None of these are particularly widespread and they could be controlled relatively easily at this stage.

Mention has been made above of damage caused by domestic stock and goats. These animals pose the single greatest threat to the RAP (along with possums). They may, however, be partly responsible for the local dominance of matai and browse-resistant shrubs, which are such a distinctive feature of the forest.

Special Features

The limestone-shellrock substrate which is seen through the southern end of the ecological district has mostly been cleared for farming or exotic forestry. The RAP is

the only such place which has a reasonable cover of indigenous vegetation on shellrock.

Matai-dominated forest is unusual in the Matemateaonga Ecological District.

Comments

While the best part of the RAP is on private land east of the road, it is also desirable to protect the natural vegetation along and above the road.

Selection Criteria

Representativeness:	H
Diversity/Pattern:	M
Rarity/Special features:	H
Naturalness:	M
Viability:	H
Size/Shape:	H
Buffering:	M

Though the vegetation in Tokomaru West Bush is disturbed and partly secondary, it is the only remaining area with a vegetation type which represents what may originally have covered several hundred hectares in the southern part of the ecological district. With fencing and weed control, the area is viable in the long term.

RAP 5 Rotokohu Wetlands

Study Area: 16(P)
Grid Reference: R21 635 860
Size: 40 ha
Altitude: 110 m
Survey Date: 12th July 1995

Ecological Units

- 1) raupo reedland on lake edge
- 2) kahikatea-pukatea/mixed sedge-rush treeland on floodplain
- 3) mixed broadleaf/mixed sedge-rush sedgeland on floodplain
- 4) mixed sedge-rush sedgeland on floodplain
- 5) *Bolboschoenus fluviatilis* sedgeland on floodplain
- 6) tawa-mixed broadleaf forest on slope
- 7) black beech forest on slope

Landform

Geology

Floodplain alluvium.

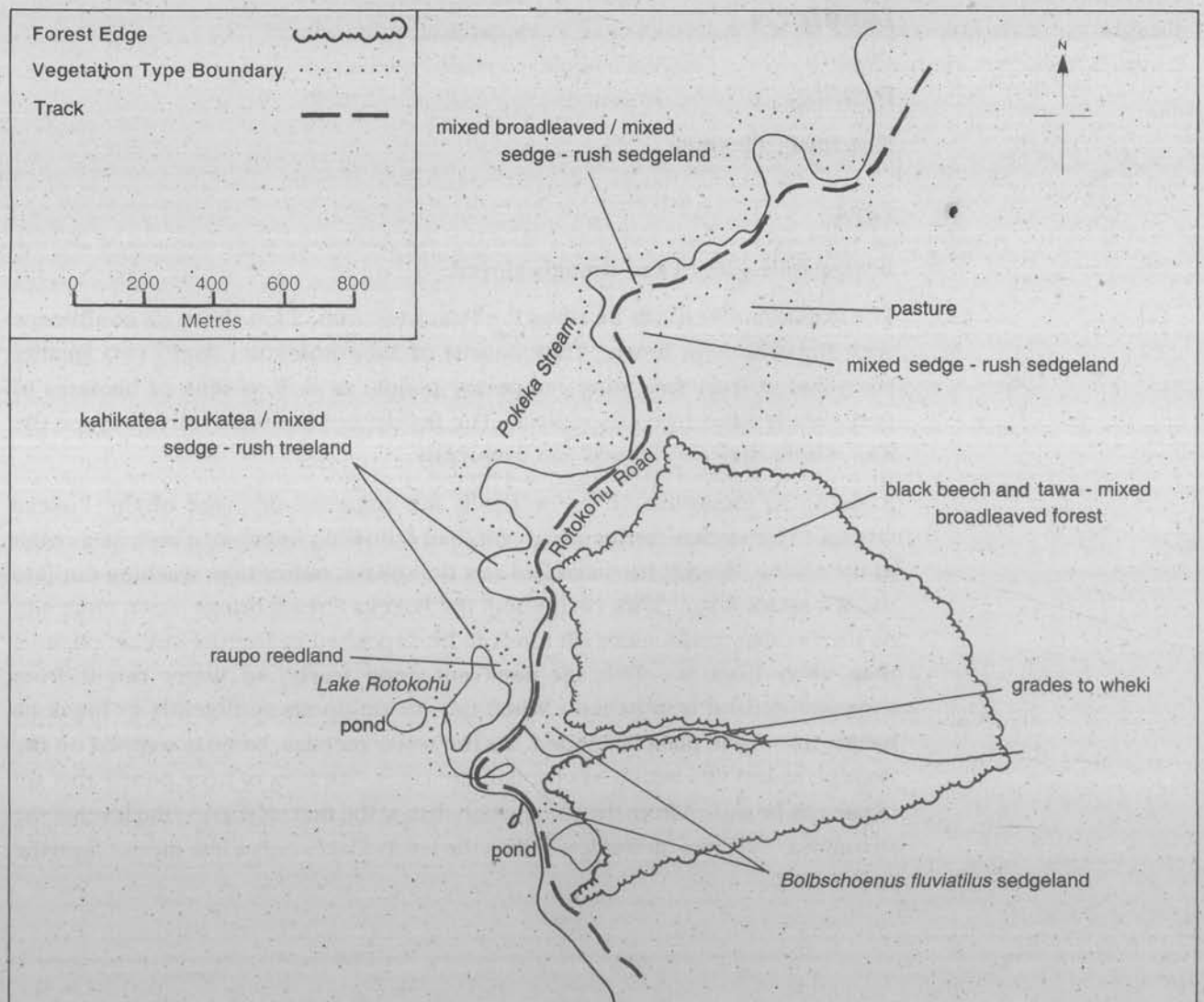
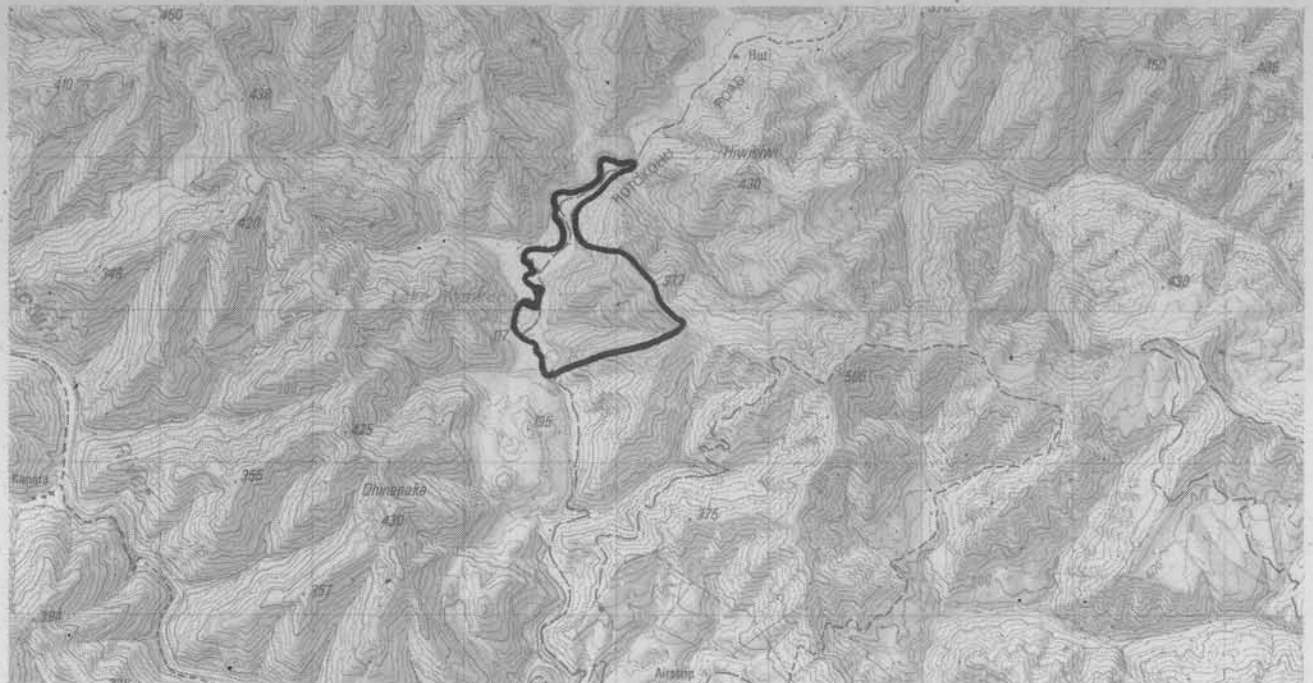
Soils

Recent soils, gleyed and strongly gleyed.

The Rotokohu Wetlands lie along the Pokeka Stream, 2 km above its confluence with the Waitotara River. They consist of Lake Rotokohu itself, two smaller lakes and at least two more temporary ponds, as well as tens of hectares of periodically submerged floodplain. The floodplains continue north beyond the RAP where they are flooded less frequently.

A slump to the south of the wetlands has impeded drainage of the Pokeka Stream. The stream carries a high silt load following heavy rain and, as a result of the slump, this silt has been laid as a floodplain, rather than washing out into the Waitotara River. With each flood, the Pokeka Stream brings down more silt. As the floods recede, more silt tends to be deposited nearer the stream channel than away from it. This silt does not drain freely, so water runoff from surrounding land is impeded. When the stream floods sufficiently to break its banks, the whole plain is flooded. As the water recedes, some is trapped on the floodplain and this action has formed the lakes. An idea of how poorly this silt drains can be gained from the observation that, at the time of survey, the level of the stream was over two metres lower than the level of lakes only a few metres from the stream bank.

FIGURE 7: ROTOKOHU WETLANDS RAP 5



The Pokeka Stream lies at the bottom of a broad valley. The silt deposits have covered the floor of the valley which now ends abruptly at the base of surrounding hills. This has led to the unusual situation of very free-draining, nutrient-leached slopes meeting swampy plains with no intermediate toe slope. The surrounding hills rise some 300m above the floodplain in a series of gentle spurs and sharp ridges, except to the south of the wetlands where slump landforms predominate.

Though there are other examples of poor-draining silt floodplains in the ecological district (such as along the Waitotara and Whenuakura Rivers), those in the vicinity of Lake Rotokohu are the most intact, being undrained and having native vegetation.

Vegetation

As with the landform, some of the vegetation associations found in the Rotokohu Wetlands are better represented within the RAP than elsewhere in the ecological district. Some may even be unique to this area.

The most distinctive feature of the wetland vegetation on the floodplain is the dominance of several sedge species. In the most abundant vegetation type, found over much of the floodplain on both sides of the stream, *Carex geminata* and giant umbrella sedge are the most common of these sedges. The rushes, *Juncus gregiflorus* and *J. effusus* are also widespread. Other sedges found here include *Carex virgata*, *C. dissita*, *C. lessoniana*, *Eleocharis acuta* and *Isolepis distigmatosa*. Other sedges, such as *Carex secta* and *Bolboschoenus fluviatilis* are locally common, while there are stands of *Schoenoplectus validus* in the lakes. Scattered under these sedges are several herbs, such as species of buttercup, watercress, water forget-me-not, willow-herbs and bachelor's button. Several small weeds are present as ground cover, including jointed rush. The main lake has a fringe of raupo.

This sedge and rush association persists in some other parts of the wetlands where taller species dominate, with toetoe marking the boundary between the different vegetation types. These parts of the RAP with taller species are of two types. One has a range of small trees, which, though numerous, are rarely dense and do not form a closed canopy over more than a few square metres. These open tree areas tend to be along the edge of the stream. Unusually, the most common of these trees are *Coprosma rotundifolia* and ramarama. Mahoe and wineberry were also recorded. These smaller trees give way in a few places to kahikatea and pukatea, though, again, these trees are scattered and only form a closed canopy in two places.

The wetlands are more variable on a small scale than this description implies, as some parts of the area are more susceptible to flooding and there are small-scale differences in water-table and probably also fertility. Only the west side of the stream was accessible to survey due to the high (and increasing) water level in the stream on the day. At least two arms of the wetland, which go into drowned side gullies off the main Pokeka Stream have small pukatea, kahikatea and wheki over sedges and rushes and may differ considerably from the parts of the wetlands which were surveyed.

Some forest on adjacent slopes has been recommended for protection along with the wetlands. This forest is of two types, both of which are typical of much of the south of the ecological district but are included because the abrupt change from forest to low-

stature wetland is more unusual. The main forest type has a canopy dominated by tawa, with several emergent rimu and rewarewa and fewer northern rata. Hinau, kamahi and miro are also common. The other forest type follows dry spurs right down to the valley floor and is dominated by black beech.

These forests were not surveyed but the edges seen from the wetlands appeared to be largely unmodified.

There has been some modification of the vegetation. Land to the north and south has been cleared for pasture and it is probable that some clearance has been done within the wetlands, though the extent of such disturbance is unclear. Several weeds are present. Of the larger weeds, willows and pampas grass have the most potential to spread but are not yet widespread. Jointed rush is well-established but does not seem to grow as aggressively here as it does along the coast (see Ravine 1992).

A bigger problem is browsing by stock, particularly cattle, which were present on both sides of the stream when surveyed. They not only damage the vegetation directly but also facilitate the spread of weeds. Goats are present in adjacent forest but are less numerous here than they are further north in the ecological district.

Special Features

Spotless crane and fernbird are present in the wetlands.

Comments

Part of these wetlands is in the Rotokohu Scenic Reserve or on the unformed Rotokohu Road. The best areas, however are on private land. It would greatly add to the value of the RAP to also protect forest to the east of the wetland.

Selection Criteria

Representativeness:	H
Diversity/Pattern:	H
Rarity/Special features:	H
Naturalness:	M
Viability:	H
Size/Shape:	H
Buffering:	H

Indigenous sedge and reed beds of this type, on a river floodplain, are unknown elsewhere in the Matemateaonga Ecological District. The "drowned floodplain" wetland type is better represented here than elsewhere in the district. The area has scenic value, being a mosaic of pools, stream and reed beds, and is traversed by a popular tramping track to the Waitotara Conservation Area. Some weed control is desirable and stock need to be excluded or at least severely restricted. If this was done, the wetland would be viable in the foreseeable future.

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Chapter 4

4.0 DISCUSSION

A paradox of the PNAP is that, often, relatively large, intact, viable natural areas are not recommended for protection while small, disturbed natural areas are recommended. This point is particularly apparent in this report and deserves some explanation.

As stated in the introduction, the PNAP seeks to protect representative biological and landscape features within an ecological district. In a district such as the Matemateaonga Ecological District, which is, overall, very uniform in landform and vegetation patterns and in which very large natural areas already have a protected status, it can be expected that the majority of these features are already adequately protected (Figure 8). Hence, several very large, privately owned natural areas throughout the district have not been recommended for protection, as they are essentially similar to what is already protected.

There are, however, natural features of the district which are not adequately protected. This is because some types of landscapes, particularly those which are more accessible and of easier contour, were cleared for farming earlier, and generally with more success, than those further inland. Consequently, natural areas on river flats and lake edges or at the edges of the ecological district have disproportionately fewer natural areas than steeper and more remote areas. In fact some types of natural area may even have disappeared completely. Stands of forest at Kanuka Reserve (see Appendix 1) and Tokomaru West Bush (RAP 4), for example, give hints that there may have been more matai-dominated forest in parts of the district. Consequently, these more isolated natural areas which differ greatly in landform and vegetation (and usually also fauna) have a high representative value as "museums" of what was once more common in the ecological district as a whole. These areas are often modified, but they still are the best of what remains and so of great importance.

This is not to say that other areas are not worth protecting. In fact, the district has many thousands of hectares of privately owned land with high natural values, which ideally should be protected. These areas add to the value of protected natural areas by increasing the extent of unbroken forest, facilitating movement of indigenous species between nearby areas and/or acting as a store of biodiversity. However, protection efforts should be primarily aimed at those areas recommended for protection in this report, for the reasons outlined above.

The remote nature of the Matemateaonga Ecological District and its difficult terrain means that the district still contains enormous tracts of indigenous forest, which, together with those in North Taranaki, are second in extent only to those of the Ureweras, within the North Island. These forests, then, are of national importance. However, they are seriously threatened by introduced mammalian herbivores. The selection of a small number of RAPs presumes that the rest of the district's natural diversity has been protected in the large PNAs.

Because of the vast area within the ecological district which is already protected, it should not be surprising that as few as five further areas have been specifically recommended for protection following this survey. These few areas will, if protected,

add more to the integrity of the protected natural area network than to its majesty. They are important because they demonstrate that the Matemateaonga Ecological District was not and is not an endless and uniform sequence of a few forest types. They represent the best remaining examples of features of the district which have otherwise been lost and it is important that they are protected, before they, too, disappear for ever.

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Appendix I

EXISTING PROTECTED NATURAL AREAS OF THE MATEMATEAONGA ECOLOGICAL DISTRICT

NATIONAL PARK

Whanganui National Park

Size (ha): 74,174.1485 (72,000 in Matemateaonga ED)
Grid Reference: S21 520 519
Administered by: Department of Conservation
Description: Uplifted Tertiary marine plain, deeply incised by erosion. Includes much of Whanganui River and tributaries. Steep hill country, some terraces. Mostly forested, mainly tawa, kamahi, also podocarps and other broadleaved species. Some beech forest on ridges. Some scrub, manuka, kanuka, pongas. Large population of kiwi, also kaka, robin, falcon, blue duck. Kokako reported. High historical and Maori cultural value. River has high recreational value. Major goat and possum problems, also pigs and some weeds.

SCENIC RESERVES

Tauakira Scenic Reserve

Size (ha): 56.9342 **Grid Reference:** S21 950 605
Administered by: Department of Conservation
Description: Steep country with regenerating forest, some mature tawa and podocarps. On Wanganui River Road.

Pitanga Scenic Reserve

Size (ha): 773.7588 **Grid Reference:** S21 985 655
Administered by: Department of Conservation
Description: Steep country with podocarp, tawa and kamahi forest, also some black beech. Has kiwi.

Moukuku Scenic Reserve

Size (ha): 39.4973 **Grid Reference:** S22 962 575
Administered by: Department of Conservation
Description: Moderate to steep papa hill country. Podocarp, tawa and kowhai forest, some regeneration, some gorse. On Whanganui River.

Kanibinihi Scenic Reserve

Size (ha): 9.1813 **Grid Reference:** S22 920 523
Administered by: Department of Conservation
Description: Moderate to steep, south east aspect. Mainly secondary regeneration. Some gorse. On Whanganui River.

Whanganui River Scenic Reserve

Size (ha): 20.4012 **Grid Reference:** S22 925 529
Administered by: Department of Conservation
Description: Two blocks, moderately steep, south-facing. Tawa and secondary vegetation. On Whanganui River.

Puketarata Scenic Reserve

Size (ha): 114.4349 **Grid Reference:** S22 910 545
Administered by: Department of Conservation
Description: Moderate to steep with south-east aspect. Podocarp, tawa, kamahi and mahoe forest, some regeneration. On Whanganui River.

Paetawa Scenic Reserve

Size (ha): 27.3567 **Grid Reference:** S22 578 945
Administered by: Department of Conservation
Description: Moderate to steep, south-east facing. Podocarp, tawa, kamahi forest, some grass. On Whanganui River.

Otawaki Scenic Reserve

Size (ha): 209.4248 **Grid Reference:** S22 945 595
Administered by: Department of Conservation
Description: Moderate to steep, easterly aspect. Podocarp, tawa forest, some black beech forest, some nikau, kowhai, grass areas near river. On Whanganui River.

Pipipi Scenic Reserve

Size (ha): 8.7007 **Grid Reference:** S20 048 065
Administered by: Department of Conservation
Description: Part tawa, kamahi forest with some podocarps, rest pasture. Being grazed.

Oruru Scenic Reserve

Size (ha): 15.4185 **Grid Reference:** S19 933 290
Administered by: Department of Conservation
Description: Steep slope to flat peninsula. Podocarp-broadleaved forest, manuka and tree-fern scrub, some grassed areas. On Retaruke River. Early Maori trench archaeological interest.

Rotokare Scenic Reserve

Size (ha): 230.2142 **Grid Reference:** Q20 315 940
Administered by: South Taranaki District Council
Description: Contains virtually the whole catchment of Lake Rotokare. Dry slope and swamp forest types. Lake fringes have raupo and *Carex secta*. Has regionally uncommon plants (*Isachne globosa*, *Baumea articulata*), also bittern, fernbird, kiwi.

Ruatiti Scenic Reserve

Size (ha): 151.3523 **Grid Reference:** S20 985 127
Administered by: Department of Conservation
Description: Sides and floor of Ruatiti Valley. Black beech on spurs, tawa, kamahi and podocarps on valley sides, valley floor swampy with kahikatea and wetland vegetation. Ruatiti Stream and a road divide reserve. Borders Manganui-o-te-Ao River.

Rangitatau Scenic Reserve

Size (ha): 90.1614 **Grid Reference:** R22 650 600
Administered by: Department of Conservation
Description: Composed of six smaller areas of land. Mixed broadleaved forest. Section 17 originally set aside as roadman's reserve.

Raorikia Scenic Reserve

Size (ha): 41.6067 **Grid Reference:** R21 890 600
Administered by: Department of Conservation
Description: Moderately steep with easterly aspect. Tawa, podocarp forest. Has kiwi and falcon.

Hautonu Scenic Reserve

Size (ha): 3.7433 **Grid Reference:** S19 910 300
Administered by: Department of Conservation
Description: Steep with rocky bluffs. Tawa, titoki forest, some regeneration with manuka and tree fern. Has been burnt in the past.

Papaotu Scenic Reserve

Size (ha): 11.3312 **Grid Reference:** S19 950 295
Administered by: Department of Conservation
Description: Very steep, deeply incised. Natural values unknown.

Moeawatea Scenic Reserve

Size (ha): 261.1234 **Grid Reference:** R21 528 898
Administered by: Department of Conservation
Description: Moderate to steep. Mostly tawa, podocarp forest, some manuka, grass. Two ha grazed.

Opaku Scenic Reserve

Size (ha): 5.4633 **Grid Reference:** R21 528 864
Administered by: Department of Conservation
Description: Long, narrow remnant on a steep riverbank. Secondary forest with tawa, some rimu and kahikatea. Parallels Moeawatea Stream.

Ahoroa Scenic Reserve

Size (ha): 436.2200 **Grid Reference:** R21 535 798
Administered by: Department of Conservation
Description: Steep with a westerly aspect. Podocarp, tawa forest. Has kiwi.

Rotokobu Scenic Reserve

Size (ha): 573.6874 **Grid Reference:** R21 625 848
Administered by: Department of Conservation
Description: Most moderate to steep hills, some wetland on valley floor. Black beech forest on spurs, podocarp, tawa forest on slopes. Wetland vegetation includes species of *Carex* and raupo. Adjoins RAP 5.

Patukino Scenic Reserve

Size (ha): 628.4767 **Grid Reference:** R21 640 742
Administered by: Department of Conservation
Description: Steep with a south-east aspect. Podocarp, tawa forest. Has kiwi.

Mangapapa Scenic Reserve

Size (ha): 145.0798 **Grid Reference:** R21 715 775
Administered by: Department of Conservation
Description: Moderate to steep with a northerly aspect. Podocarp, tawa forest. 7.2 ha grazed.

Manganui o tabu Scenic Reserve

Size (ha): 158.7805 **Grid Reference:** R21 720 695
Administered by: Department of Conservation
Description: Steep hills. Beech forest on ridges, podocarp, tawa, kamahi, rewarewa forest elsewhere. Part is grazed.

Powataunga Scenic Reserve

Size (ha): 970.0314 **Grid Reference:** R21 830 770
Administered by: Department of Conservation
Description: Steep, with steep-sided streams. Podocarp, tawa forest.

Kauarapaoa Scenic Reserve

Size (ha): 58.8413 **Grid Reference:** R21 808 695
Administered by: Department of Conservation
Description: Steep with northern and south-easterly aspects. Podocarp, tawa forest.

Oboutabi Scenic Reserve

Size (ha): 18.0292 **Grid Reference:** R21 871 828
Administered by: Department of Conservation
Description: Little information.

Haebaekupenga Scenic Reserve

Size (ha): 39.7856 **Grid Reference:** R21 888681
Administered by: Department of Conservation
Description: Steep, with north-east aspect. Forest with podocarp, tawa and beech. Reserve has been burnt in the past.

Rotokahu Scenic Reserve

Size (ha): 509.9038 **Grid Reference:** S19 992 255
Administered by: Department of Conservation
Description: Steep bluffs and gorges, includes landslide-formed Lake Hawkes. Has red beech, black beech, hard beech and silver beech, also forest and scrub with podocarps and broadleaved species. Commonly known as Lake Hawkes Reserve. High scenic value, including impressive waterfall. Southernmost known North Island occurrence of *Dracophyllum traversii*. 17 ha grazed.

Sec 18 Scenic Reserve

Size (ha): 285.2140 **Grid Reference:** S19 930 250
Administered by: Department of Conservation
Description: Sheer bluffs and terraces. Tawa, kamahi forest with podocarps.

Mangawhio Lake Scenic Reserve

Size (ha): 22.0000 **Grid Reference:** R21 640 711
Administered by: Department of Conservation
Description: Lake and moderate to steep surrounding hills. Tawa, podocarp forest with some exotics. Has spotless crane.

Pohautubia Scenic Reserve

Size (ha): 114.9965 **Grid Reference:** R20 658 092
Administered by: Department of Conservation
Description: Generally steep. Rimu, tawa, kamahi forest. Has kiwi and kaka.

Ranana/Morikau Scenic Reserve

Size (ha): 101.2220 **Grid Reference:** R21 890 793
Administered by: Department of Conservation
Description: Little information.

Arawata Caves Scenic Reserve

Size (ha): 18.5144 **Grid Reference:** R20 869 008
Administered by: Department of Conservation
Description: Little information.

Ngaporo Scenic Reserve

Size (ha): 28.7326 **Grid Reference:** R20 865 973
Administered by: Department of Conservation
Description: Little information.

Waipapa Valley Scenic Reserve

Size (ha): 1.4163 **Grid Reference:** R20 877 162
Administered by: Department of Conservation
Description: Two small blocks either side of the Waipapa Stream. Kamahi, tawa forest with some podocarps.

Makino Scenic Reserve

Size (ha): 7.6280 **Grid Reference:** Q21 327 884
Administered by: Department of Conservation
Description: Steep, dissected south-facing slopes. Eastern half tawa forest, rest pasture. Heavily browsed by stock.

Tabunamaere Scenic Reserve

Size (ha): 128.3630 **Grid Reference:** Q20 471 993
Administered by: Department of Conservation
Description: Small hill and a steep face. Tawa forest and scrub with manuka and wineberry. On Whenuakura River. Kiwi reported in vicinity. Six ha grazed.

Kirai Scenic Reserve

Size (ha): 19.5993 **Grid Reference:** Q20 486 137
Administered by: Department of Conservation
Description: Steep slopes and a saddle area. Kamahi, tawa forest, some scrub and pasture. Has a road tunnel through it. Robin, kiwi reported.

Paorae Scenic Reserve

Size (ha): 6.4860 **Grid Reference:** R18 793538
Administered by: Department of Conservation
Description: Central ridge and slopes down to north, east and west. Kamahi forest fringed by rimu, kahikatea forest.

Te Rauāteti Scenic Reserve

Size (ha): 5.2609 **Grid Reference:** R18 815 522
Administered by: Department of Conservation
Description: Rolling to steep. Tawa forest, some podocarps and kamahi. Cutover forest, regenerating since 1928.

Tatu Scenic Reserve

Size (ha): 4.6858 **Grid Reference:** R18 784 512
Administered by: Department of Conservation
Description: Small remnant on alluvial plain. Totara, rimu, kahikatea forest, some pasture. Has footbridge, tracks and picnic area.

Waitewheta Scenic Reserve

Size (ha): 11.6051 **Grid Reference:** R18 816 611
Administered by: Department of Conservation
Description: Oxbow lake and floodplain. Plain forested, mainly kahikatea, tawa. Has a metalled foot track.

Piki Scenic Reserve

Size (ha): 80.1277 **Grid Reference:** R18 835 663
Administered by: Department of Conservation
Description: A central ridge with associated slopes and spurs, also a flat stream terrace. Tawa dominated forest, also kamahi, kahikatea, matai. Contains hybrid *Lophomyrtus* and a range of bird species.

Awabou Scenic Reserve

Size (ha): 434.9173 **Grid Reference:** R19 568 263
Administered by: Department of Conservation
Description: Rugged hill country dissected by streams. Wetlands in valleys. Black beech on ridges, tawa dominated with emergent podocarps on slopes. Toetoe, raupo on wetlands. Has kiwi.

Kobura Scenic Reserve

Size (ha): 14.3840 **Grid Reference:** R19 694 316
Administered by: Department of Conservation
Description: Steep ridge and flat terrace, either side of Kohuratahi Stream. Tawa kamahi forest, black maire forest, some mahoe and pasture. Some sheep grazing.

Putikituna Scenic Reserve

Size (ha): 37.6357 **Grid Reference:** R19 691 247
Administered by: Department of Conservation
Description: Hillsides. Tawa, kamahi forest, some podocarps. Has been some encroachment of Okara Road.

Whangamomona Scenic Reserve

Size (ha): 31.0210 **Grid Reference:** R19 603 275
Administered by: Department of Conservation
Description: Two blocks either side of road and rail. Steep, dissected country. Tawa dominated forest, also some black beech forest, manuka scrub, bracken fernland, raupo wetland. Has kiwi.

Marangae Scenic Reserve

Size (ha): 14.9734 **Grid Reference:** R19 746 296
Administered by: Department of Conservation
Description: Five blocks in steep valley of Marangae Stream. Mixed podocarp forest. Bounds Whanganui National Park. May have kiwi, robin, kaka, bats.

Pipiriki Scenic Reserve

Size (ha): 0.4350 **Grid Reference:** R20 901 865
Administered by: Department of Conservation
Description: Steep-sided gully with indigenous vegetation.

RECREATION RESERVES

Manganui Valley Recreation Reserve

Size (ha): 0.8750 **Grid Reference:** S20 053 060
Administered by: Department of Conservation
Description: Swampy grassland. Little information.

Manganui a te Ao Recreation Reserve

Size (ha): 6.0701 **Grid Reference:** S20 070 085
Administered by: Department of Conservation
Description: Rolling to flat river terrace with mostly wattles, some manuka, grass.

Kiosk Recreation Reserve

Size (ha): 0.1565 **Grid Reference:** S22 921 488
Administered by: Department of Conservation
Description: Flat to gentle. Grass, native and exotic shrubs, some planted.

Aotubia Recreation Reserve

Size (ha): 2.7316 **Grid Reference:** R20 662 168
Administered by: Department of Conservation
Description: Mainly flat land next to "Bridge to Somewhere". Mixed podocarp forest and some pasture. Grazed.

GROWTH AND PRESERVATION OF TIMBER RESERVES

Putikitunga Growth and Preservation of Timber Reserve

Size (ha): 20.2343 **Grid Reference:** R19 700 271
Administered by: Department of Conservation
Description: Tangarakau River terraces. Mixed podocarp forest. Adjoins Tangarakau Conservation Area.

Mangaehu Growth and Preservation of Timber Reserve

Size (ha): 16.7756 **Grid Reference:** R20 614 118
Administered by: Department of Conservation
Description: Moderate to steep faces below the Kohi Saddle. Some podocarp forest, some manuka scrub. Used as timber supply for papa burning.

Mahoe Growth and Preservation of Timber Reserve

Size (ha): 305.1329 **Grid Reference:** R19 570 200
Administered by: Department of Conservation
Description: Steep, south facing, dropping down to Mangarewa Stream headwaters. Beech forest on ridges, podocarp, tawa forest elsewhere.

LOCAL PURPOSE RESERVE

Obura River Local Purpose Reserve

Size (ha): 1.7503 **Grid Reference:** R19 854 413
Administered by: Department of Conservation
Description: River terrace with rimu, kamahi, scrub, grass. Grazed.

Pipiriki Municipal No. 1 Local Purpose Reserve

Size (ha): 0.3743 **Grid Reference:** R20 900 855
Administered by: Department of Conservation
Description: Steep face with ponga and secondary vegetation. Some gorse and wattles.

ROAD RESERVE (administered by Department of Conservation)

Mangaturuturu West Bridge Reserve

Size (ha): 9.3077 **Grid Reference:** S20 065 060
Administered by: Department of Conservation
Description: Flat area with small, steep-sided stream. Kahikatea, manuka, tree ferns. Some wattle.

CONSERVATION AREAS (only those known to have indigenous vegetation are listed)

Tangahoe Conservation Area

Size (ha): 41.4449 **Grid Reference:** R20 801 062
Administered by: Department of Conservation
Description: Steep, broken, south-facing hills. Mixed podocarp forest. Likely to have kiwi, kaka, falcon.

Toi Conservation Area

Size (ha): 143.6609 **Grid Reference:** R19 625 345
Administered by: Department of Conservation
Description: Bowl-shaped area with steep faces draining into the Whangamomona River. Tawa, kamahi forest with scattered rewarewa.

Ramanui Conservation Area

Size (ha): 78.7560 **Grid Reference:** R20 810 047
Administered by: Department of Conservation
Description: Steep hill country. Podocarp, tawa forest, some black beech on ridges, small grass clearings with manuka. Bisected by Matemateaonga Track.

Rimunui Conservation Area

Size (ha): 1846.1757 **Grid Reference:** Q21 478 800
Administered by: Department of Conservation
Description: Moderate to steep. Tawa, rimu forest with black beech on outcrops. Has kiwi, robin, falcon. 18.3 ha grazed.

Mangatiti Conservation Area

Size (ha): 172.2696 **Grid Reference:** R20 833 114
Administered by: Department of Conservation
Description: Moderate to steep with a southern aspect. Cutover, manuka with rimu, tawa remnants.

Otumokura Conservation Area

Size (ha): 141.6399 **Grid Reference:** Q21 643 172
Administered by: Department of Conservation
Description: Steep, broken, south facing, adjacent to Patea River. Mixed podocarp forest. May have kiwi.

Obotu Conservation Area

Size (ha): 60.0502 **Grid Reference:** S21 930 740
Administered by: Department of Conservation
Description: Steep head catchment of Manukaroa Stream. Podocarp, tawa forest, with black beech on ridges. Has robin and kiwi.

Abu Abu Conservation Area

Size (ha): 1509.7859 **Grid Reference:** R21 890 660
Administered by: Department of Conservation
Description: Moderate to steep. Mostly manuka, kanuka, fern tree scrub. Some podocarp, tawa remnants. May have kiwi. Grazing lease on 260 ha.

Arawata Conservation Area

Size (ha): 18.1096 **Grid Reference:** R20 851 996
Administered by: Department of Conservation
Description: Steep area including the main Ranganui ridgeline. Dense podocarps, tawa, with black beech on ridgeline. Has kiwi.

Kotiti Stream Conservation Area

Size (ha): 2.9339 **Grid Reference:** R22 812 501
Administered by: Department of Conservation
Description: Moderate to steep with easterly aspect. Regenerating bush, gorse and pasture.

Jean D'Arcy Conservation Area

Size (ha): 1072.3265 **Grid Reference:** R21 805 785
Administered by: Department of Conservation
Description: Moderate to steep papa hill country. Podocarp, tawa, kamahi forest. Some regeneration with manuka. Several large rata, mountain cabbage tree present. Has kiwi. Some logging has occurred, road through middle.

Neilson's Conservation Area

Size (ha): 674.1051 **Grid Reference:** S19 950 328
Administered by: Department of Conservation
Description: Uplifted plain deeply incised by erosion. Black beech forest on ridge top, tawa, kamahi, some podocarps on slopes. Lower areas have manuka and tree fern. Has a wide range of native birds. Three ha grazed.

Kaiwhakauku Conservation Area

Size (ha): 4.2262 **Grid Reference:** S19 906 213
Administered by: Department of Conservation
Description: Uplifted Tertiary marine plain and river flat. Forest with tawa, kamahi, rimu, totara, rewarewa, mahoe. Some tree fern, manuka, kanuka.

Tokomaru East Block Conservation Area

Size (ha): 518.3820 **Grid Reference:** R22 845 600
Administered by: Department of Conservation
Description: Moderate to steep, some gorges, southerly aspect. Podocarp, tawa forest, some gorse, substantial regeneration. Has kiwi.

Waireka Road Conservation Area

Size (ha): 1.8210 **Grid Reference:** R22 875 470
Administered by: Department of Conservation
Description: Moderate to steep with southerly aspect. Podocarp, tawa forest, some grass and gorse.

Okabutiria Conservation Area

Size (ha): 208.9071 **Grid Reference:** R21 518 728
Administered by: Department of Conservation
Description: Steep with south-easterly aspect. Manuka scrub and broadleaved forest with tawa and some podocarps. 2.3 ha grazed.

Omaibine Conservation Area

Size (ha): 859.5522 **Grid Reference:** R21 560 765
Administered by: Department of Conservation
Description: Moderate to steep with westerly aspect. Has small lake and stream with steep banks. Podocarp, tawa forest, some grass.

Weraweraonga Stream Conservation Area

Size (ha): 970.4360 **Grid Reference:** R21 605 765
Administered by: Department of Conservation
Description: Steep with southerly aspect. Tawa, podocarp forest, some manuka scrub. Has kiwi.

Lakes Road Conservation Area

Size (ha): 71.6293 **Grid Reference:** R21 639 732
Administered by: Department of Conservation
Description: Moderate slopes with westerly aspect. Tawa, podocarp forest.

Lake Beds Conservation Area

Size (ha): 21.3472 **Grid Reference:** R21 690 549
Administered by: Department of Conservation
Description: Five small lakes and small, grazed valley floor area with stream. Mostly surrounded by unformed legal road with wetland vegetation. Adjoins RAP 2. Has fernbirds.

Tabeke Conservation Area

Size (ha): 5939.8098 **Grid Reference:** R20 920 170
Administered by: Department of Conservation
Description: Steep to rolling. Forest with tawa, kamahi canopy, also totara, miro, hinau, matai, rewarewa, northern rata, mahoe. Approximately 480 ha grazed.

Murumuru Conservation Area

Size (ha): 6048.7722 **Grid Reference:** S20 910 070
Administered by: Department of Conservation
Description: Steep country above Whanganui River. Tawa, kamahi forest with podocarps, also some manuka scrub and grass. Has kiwi and fernbird.

Mystery Block Conservation Area

Size (ha): 615.7898 **Grid Reference:** R21 800 675
Administered by: Department of Conservation
Description: Moderate to steep with south-east aspect. Reverted farmland, surrendered in 1965. Mostly podocarp tawa or beech forest, some remains in grass. Two ha grazed.

Abu Abu Stream Conservation Area

Size (ha): 38.0226 **Grid Reference:** R21 873 700
Administered by: Department of Conservation
Description: Steep bluff along stream bank. Tawa forest. Has old man's beard.

Taunoka Conservation Area

Size (ha): 476.7800 **Grid Reference:** R21 795 885
Administered by: Department of Conservation
Description: Moderate to steep with south-east aspect. Tawa podocarp forest, some manuka, fern regeneration, some grassland.

Kapara Conservation Area

Size (ha): 12,089.8674 **Grid Reference:** R21 570 900
Administered by: Department of Conservation
Description: Most moderate to steep, some flats. Tawa, podocarp forest, beech on ridges, grassed flats. Has kiwi, robin, falcon. Sixty-six ha grazed.

Nukuhau Conservation Area

Size (ha): 226.2939 **Grid Reference:** R21 515 770
Administered by: Department of Conservation
Description: Steep faces with a westerly aspect. Most tawa forest, some grassland. Near RAP 1.

Tarere Conservation Area

Size (ha): 6941.3999 **Grid Reference:** Q20 430 900
Administered by: Department of Conservation
Description: Steep, broken unstable country. Mixed podocarp, tawa forest, black beech on ridges. Some areas have been logged, some regeneration, mainly manuka and tree ferns. Continues into Manawatu Plains Ecological District - adjoins Manawatu Plains RAP 32. Has kiwi, robin, parakeets. Some grazing in south.

Mangaehu Conservation Area

Size (ha): 403.8761 **Grid Reference:** R20 560 098
Administered by: Department of Conservation
Description: Steep, broken land with mixed podocarp forest. May have kiwi. 5.4 ha grazed.

Riariaki Conservation Area

Size (ha): 1579.6289 **Grid Reference:** S19 030 190
Administered by: Department of Conservation
Description: Dissected country with bluffs and gorges. 90% mixed podocarp forest with tawa, kamahi, rewarewa, hinau. Remainder in grass. 110 ha grazed.

Pit Conservation Area

Size (ha): 1.0698 **Grid Reference:** S20 988 927
Administered by: Department of Conservation
Description: Small area at head of a gully. Forest with tawa, kamahi, totara, miro, matai, rewarewa, ponga.

Tangarakau Conservation Area

Size (ha): 6245.9761 **Grid Reference:** R19 740 340
Administered by: Department of Conservation
Description: Mostly steep to rolling with some areas of swamp. Mature forest with tawa, kamahi, podocarps. Has bat species, blue duck, robin, kiwi, kaka. 350 ha grazed.

Whangamomona Conservation Area

Size (ha): 13,694.0285 **Grid Reference:** R20 695 120
Administered by: Department of Conservation
Description: Steep, broken country with steep, incised valleys and small, isolated wetlands. Mixed podocarp-broadleaved forest, some beech (including

Waitotara Conservation Area

Size (ha): 27,235.5823 **Grid Reference:** R20 600 010
Administered by: Department of Conservation
Description: Moderate to steep country. Tawa, podocarp forest, some areas of black beech on ridges, some manuka scrub. Has kaka, falcon, blue duck, kakariki, robin, kiwi, short and long-tailed bats. Has tracks and three huts, 30 ha grazed.

Mangaone Conservation Area

Size (ha): 1.0138 **Grid Reference:** Q21 362 848
Administered by: Department of Conservation
Description: Trig point with some manuka scrub.

Maben Conservation Area

Size (ha): 4.7551 **Grid Reference:** Q21 415 865
Administered by: Department of Conservation
Description: Small end of a peninsula on Lake Rotorangi. Manuka scrub and regenerating forest.

Rawhitiroa Road Conservation Area

Size (ha): 409.9465 **Grid Reference:** Q20 485 988
Administered by: Department of Conservation
Description: Steep with southerly aspect. Manuka scrub and regenerating mixed podocarp forest. Partly cleared for farming in 1880's. Kiwi reported. 13.2 ha grazed.

Waitiri Conservation Area

Size (ha): 218.7966 ha **Grid Reference:** Q20 448 040
Administered by: Department of Conservation
Description: In two blocks, steep. Podocarp tawa forest, mahoe, tree fern forest, manuka scrub.

Tututawa Conservation Area

Size (ha): 68.7966 **Grid Reference:** Q20 450080
Administered by: Department of Conservation
Description: Steep broken country either side of a ridge. Tawa, podocarp forest.

Popuanui Conservation Area

Size (ha): 72.4387 **Grid Reference:** Q20 463 105
Administered by: Department of Conservation
Description: Two blocks split by unformed road. Podocarp forest. Has robin, whitehead, kiwi reported.

Marcos Hill Conservation Area

Size (ha): 49.9081 **Grid Reference:** R19 595 317
Administered by: Department of Conservation
Description: Head of gully, forested, little information.

Obawe Road Conservation Area

Size (ha): 44.5154 **Grid Reference:** R19 527 236
Administered by: Department of Conservation
Description: Steep hills with podocarp forest. May have kiwi.

Whangamomona Saddle Conservation Area

Size (ha): 38.7881 **Grid Reference:** R19 568 275
Administered by: Department of Conservation
Description: Steep-sided. Podocarp forest with beech on ridges.

Mangatawai Conservation Area

Size (ha): 217.7208 **Grid Reference:** R19 879 210
Administered by: Department of Conservation
Description: Long and narrow, surrounded by Whanganui National Park. Steep hill country. Mainly tawa, kamahi forest with some podocarps. Has kiwi. Farm area abandoned in 1940's.

Depot Road Conservation Area

Size (ha): 0.1125 **Grid Reference:** R19 886 305
Administered by: Department of Conservation
Description: River terrace and steep hill beside Whanganui River. Terrace grassed, hillside has podocarp forest. Historic area known as Wade's Landing.

Falls Conservation Area

Size (ha): 0.7500 **Grid Reference:** R19 889 388
Administered by: Department of Conservation
Description: Described in Whanganui Conservancy CMS as "steep river terrace". Some grassed, some indigenous forest/scrub. Has a river boat landing.

Putikitunga Conservation Area

Size (ha): 23.6640 **Grid Reference:** R19 680 278
Administered by: Department of Conservation
Description: Ridge to ridge catchment area of Putikitunga Stream. Beech forest on ridges, podocarp forest elsewhere. Has robin, short-jawed kokopu, may have kiwi.

Taumatamaboe Conservation Area

Size (ha): 12.6000 **Grid Reference:** R20 788 093
Administered by: Department of Conservation
Description: Steep face on northern side of Arapoto Stream. Podocarp, tawa forest, black beech on ridgeline. Has kiwi.

Jury Conservation Area

Size (ha): 7.1600 **Grid Reference:** R20 505 160
Administered by: Department of Conservation
Description: Known locally as Kanuka Reserve. Floodplain of Makahu Stream. Unusual, open, secondary forest of tall kanuka and matai. Divaricating shrubs abundant. Some planting done including non-local NZ species, e.g. kauri. Camping area, has toilet, fireplace.

Koriniti Conservation Area

Size (ha): 135.6708 **Grid Reference:** S21 935 700
Administered by: Department of Conservation
Description: North-facing, steep area with entrenched streams. Podocarp, tawa forest, some beech on ridges. Western side has manuka scrub.

Adams Conservation Area

Size (ha): 256.2671 **Grid Reference:** R20 835 145
Administered by: Department of Conservation
Description: Steep block at headwaters of Maringanga Stream. Podocarp, tawa forest. Has kiwi.

MARGINAL STRIPS

Makokoti Stream Marginal Strip

Size (ha): 1.5040 **Grid Reference:** S19 905 315
Administered by: Department of Conservation
Description: River terrace with grass, ferns and manuka scrub.

Whanganui River No. 2 Marginal Strip

Size (ha): 0.4000 **Grid Reference:** S21 946 662
Administered by: Department of Conservation
Description: Within flood margins of Whanganui River. Rank grass and manuka, ponga scrub.

CONSERVATION COVENANTS

Landcorp Round Hill

Size (ha): 20.1221 **Grid Reference:** R20 670 131
and R20 682 130

Administered by: Department of Conservation

Description: Part of Aotuhia Farm Block. Two areas of bush and scrub. Canopy of tawa and rewarewa, some rimu. Manuka, tree fern scrub. Has kiwi.

Landcorp Quarry

Size (ha): 0.4950 **Grid Reference:** R20 657 168

Administered by: Department of Conservation

Description: Small stand of regenerating kahikatea on floodplain of Whangamomona River. Grazed out by cattle. Kiwi in area.

Landcorp Whangamomona Road

Size (ha): 7.8850 **Grid Reference:** R19 609 217

Administered by: Department of Conservation

Description: Rewarewa, tawa, rimu forest on Poarangi Farm. Kiwi in area.

Landcorp Bridge to Somewhere

Size (ha): 10.5480 **Grid Reference:** R20 656 163

Administered by: Department of Conservation

Description: Steep face above road and Whangamomona River. Tawa, rewarewa, hinau forest, a few beech trees, some manuka. Has kiwi, may have

Landcorp Poarangi Road

Size (ha): 10.5710 **Grid Reference:** R19 612 243

Administered by: Department of Conservation

Description: Manuka scrub and broadleaved-podocarp forest along Whangamomona Road. Has kiwi and long-tailed bats.

Landcorp Arnold Stream

Size (ha): 31.3060 **Grid Reference:** R19 605 225

Administered by: Department of Conservation

Description: Manuka scrub and podocarp forest above tunnel on Whangamomona Road. Has kiwi and long-tailed bat.

Landcorp Kiwi Reserve

Size (ha): 72.8900 **Grid Reference:** Q19 469 206

Administered by: Department of Conservation

Description: Mature kamahi, rimu, tawa forest.

Landcorp Makahu Forest "Camp Wetland" and "Saddle Road"

Size (ha): 4.2300 **Grid Reference:** Q20 482 182
(Camp Wetland) Q20 486 192
(Saddle Road)
Administered by: Department of Conservation
Description: Small remnant of larger, drained wetland. Raupo and *Carex* spp. swamp. Has spotless crane.

Landcorp Douglas and Ernie's Wetlands

Size (ha): 3.2100 **Grid Reference:** Q20 480 195
(Douglas) Q19 484 205
(Ernie's)
Administered by: Department of Conservation
Description: Small remnants of larger, drained wetlands. Raupo and *Carex* spp. swamp. Has spotless crane.

Landcorp Kobi Wetland

Size (ha): 2.0100 **Grid Reference:** Q19 494 201
Administered by: Department of Conservation
Description: Small remnant wetland systems. Raupo and sedge swamps. Have spotless crane.

Landcorp Tunnel Wetland

Size (ha): 1.0430 **Grid Reference:** R19 505 238
Administered by: Department of Conservation
Description: One large and two smaller wetlands with raupo and sedges. Have spotless crane.

Rayonier N.Z. Ltd. Te Wera

Size (ha): 39.1000 **Grid Reference:** Q19 500 200
Administered by: Department of Conservation
Description: Eight areas of raupo swamp in the Te Wera and Diamond Valleys. Have spotless crane and fernbird.

Rayonier N.Z. Ltd. Te Wera No. 2

Size (ha): 29.8000 **Grid Reference:** Q19 500 200
(see above)
Administered by: Department of Conservation
Description: Nine area of raupo swamp in small valley floors throughout Te Wera Forest. Manuka scrub on the edges. Have spotless crane and fernbird.

OPEN SPACE COVENANTS

H.A. and A.W. Volkering Open Space Covenants

Size (ha): 3.3 **Grid Reference:** S20 038 064
Administered by: QEII National Trust
Description: Rolling country on the banks of the Manganui-o-te-Ao River. Podocarp dominated forest.

Ford Conservation Covenant

Size (ha): 4.9 **Grid Reference:** R20 513 108
Administered by: QEII National Trust
Description: Small knoll above Mangachu Stream, gently rolling with some terrace near stream. Tawa, kamahi forest with many rimu, other podocarps.

Wickham Open Space Covenant

Size (ha): 2 **Grid Reference:** S22 950 558
Administered by: QEII National Trust
Description: On edge of floodplain of Whanganui River and associated terrace. Wetland on floodplain dammed to restore water table, has open water, raupo, broadleaved shrubs, kahikatea-pukatea-marbleleaf in successional sequence. Tawa-pukatea forest on edge of wetland, tawa forest on terrace. Mature akeake recorded in terrace forest. Floodplain was a meander of Whanganui River.

Whanganui Trust Open Space Covenant

Size (ha): 46 **Grid Reference:** R21 814 834
Administered by: QEII National Trust
Description: Steep dissected hill country, prominent ridges and spurs, gullies and streams in headwaters of Otaupari Stream. Most tawa forest with some podocarps, also some black beech forest.

Wood and Luggage Open Space Covenant

Size (ha): 11.5 **Grid Reference:** R19 550 253
Administered by: QEII National Trust
Description: Lowland swamp area with rolling country on margins. Mainly raupo and sedges, edges have a belt of manuka and shrubs. Has fernbirds and spotless crane.

Matthews Open Space Covenant

Size (ha): 77.7 **Grid Reference:** Q21 930 851
Administered by: QEII National Trust
Description: Rolling to steeply dissected hill country, some broad ridge crests and narrow spurs. Numerous gullies and basins present. Forest remnant, may have been logged.

Dickson Open Space Covenant

Size (ha): 132 **Grid Reference:** Q20 377 905
Administered by: QEII National Trust
Description: Little information. General area has steep hills topped by ridges. May include some river terrace. Forested, probably tawa, podocarps, maybe also beech on ridges. some pukatea (this is forest type found on much of the lake edge).

Collier Open Space Covenant

Size (ha): 223 **Grid Reference:** Q20 375 915

Administered by: QEII National Trust

Description: Little information. General area has steep hills, topped by ridges. May include some river terrace. Forested, probably tawa, has been logged for podocarps. May have some beech forest on ridges.

W.G. Oliver Open Space Covenants

Size (ha): 2.6 **Grid Reference:** S20 023 073

Administered by: QEII National Trust

Description: River terrace beside the Manganui-o-te-Ao River. Podocarp forest with red beech and dense understorey of divaricating shrubs.

Appendix II

COMMON AND FORMAL PLANT NAMES AS USED IN TEXT

* denotes adventive species

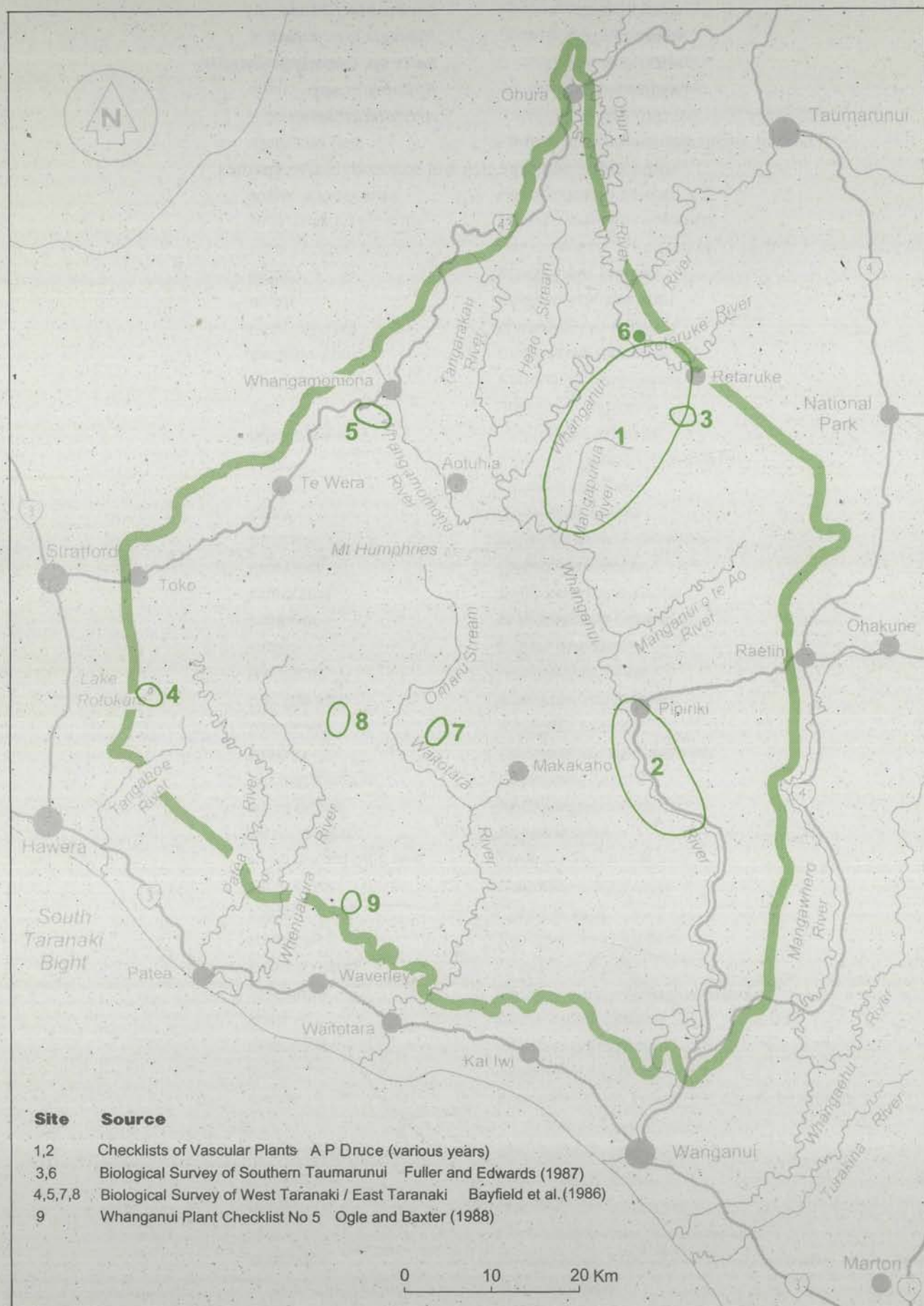
bachelor's button	<i>Cotula coronopifolia</i>
*barberry	<i>Berberis glaucocarpa</i>
black beech	<i>Nothofagus solandri</i> var. <i>solandri</i>
*blackberry	<i>Rubus fruticosus</i> agg.
black maire	<i>Nestegis cunninghamii</i>
bracken fern	<i>Pteridium esculentum</i>
bush lawyer	<i>Rubus</i> sp. (usually <i>R. cissoides</i> or <i>R. schmidtioides</i>)
bush rice grass	<i>Microlaena avenacea</i>
*buttercup ¹	<i>Ranunculus</i> spp.
button fern	<i>Pellaea rotundifolia</i>
climbing rata	<i>Metrosideros</i> spp.
coprosma	<i>Coprosma</i> spp.
five-finger	<i>Pseudopanax arboreus</i>
giant umbrella sedge	<i>Cyperus ustulatus</i>
*gorse	<i>Ulex europaeus</i>
Hall's totara	<i>Podocarpus hallii</i>
hangehange	<i>Geniostoma rupestre</i> subsp. <i>ligustrifolium</i>
hard beech	<i>Nothofagus truncata</i>
heketara	<i>Olearia rani</i>
*Himalayan honeysuckle	<i>Leycesteria formosa</i>
hinau	<i>Elaeocarpus dentatus</i>
hook sedges	<i>Uncinia</i> spp.
*jointed rush	<i>Juncus articulatus</i>
kahikatea	<i>Dacrycarpus dacrydioides</i>
kaikomako	<i>Pennantia corymbosa</i>
kamahi	<i>Weinmannia racemosa</i> var. <i>racemosa</i>
kanono	<i>Coprosma grandifolia</i>
karamu	<i>Coprosma robusta</i>
kawakawa	<i>Macropiper excelsum</i> var. <i>excelsum</i>
kickie	<i>Freycinetia baueriana</i> subsp. <i>banksii</i>
kiokio	<i>Blechnum</i> sp. (unnamed; <i>B.</i> "black spot")
kohuhu	<i>Pittosporum tenuifolium</i>
koromiko	<i>Hebe stricta</i> var. <i>stricta</i>
lance fern	<i>Anarthropteris lanceolata</i>
lancewood	<i>Pseudopanax crassifolius</i>
lowland ribbonwood	<i>Plagianthus regius</i>
mahoe	<i>Melicytus ramiflorus</i>
mamaku	<i>Cyathea medullaris</i>
manuka	<i>Leptospermum scoparium</i>

mapou	<i>Myrsine australis</i>
marbleleaf	<i>Carpodetus serratus</i>
matai	<i>Prumnopitys taxifolia</i>
mingimingi	<i>Leucopogon fasciculatus</i>
miro	<i>Prumnopitys ferruginea</i>
mountain beech	<i>Nothofagus solandri</i> var. <i>cliffortioides</i>
mountain flax	<i>Pbormium cookianum</i> subsp. <i>bookeri</i>
narrow-leaved maire	<i>Nestegis montana</i>
native passionfruit	<i>Passiflora tetrandra</i>
New Zealand gloxinia	<i>Rhabdothamnus solandri</i>
New Zealand jasmine	<i>Parsonsia</i> sp. (<i>P. capsularis</i> and/or <i>P. heterophylla</i>)
ngaio	<i>Myoporum laetum</i>
nikau	<i>Rhopalostylis sapida</i>
northern rata	<i>Metrosideros robusta</i>
*pampas grass	<i>Cortaderia selleana</i>
parataniwha	<i>Elatostema rugosum</i>
pate	<i>Schefflera digitata</i>
pigeonwood	<i>Hedycarya arborea</i>
*pine	<i>Pinus</i> sp. (usually <i>P. radiata</i>)
ponga	<i>Cyathea dealbata</i>
puka	<i>Griselinia lucida</i>
pukatea	<i>Laurelia novae-zelandiae</i>
quintinia	<i>Quintinia serrata</i>
ramarama	<i>Lophomyrtus bullata</i>
rangiora	<i>Brachyglottis repanda</i>
raupo	<i>Typha orientalis</i>
red beech	<i>Nothofagus fusca</i>
red rata vine	<i>Metrosideros fulgens</i>
rewarewa	<i>Knightia excelsa</i>
rimu	<i>Dacrydium cupressinum</i>
shining karamu	<i>Coprosma lucida</i>
silver beech	<i>Nothofagus menziesii</i>
*silver poplar	<i>Populus alba</i>
small-leaved milk tree	<i>Streblus heterophyllus</i>
snowberry	<i>Gaultheria antipoda</i>
spider orchid	<i>Corybas</i> spp.
supplejack	<i>Ripogonum scandens</i>
swamp maire	<i>Syzygium maire</i>
tanekaha	<i>Phyllocladus trichomanoides</i>
tawa	<i>Beilschmiedia tawa</i>
thread fern	<i>Blechnum filiforme</i>
titoki	<i>Alectryon excelsus</i>
toetoe	<i>Cortaderia</i> spp. (usually <i>C. toetoe</i> in wetlands, <i>C. fulvida</i> on slopes)
tree dracophyllum	<i>Dracophyllum traversii</i>
tree fuchsia	<i>Fuchsia excorticata</i>
tuhara	<i>Machaerina sinclairii</i>
tutu	<i>Coriaria arborea</i> var. <i>arborea</i>
*watercress	<i>Rorippa microphylla</i> or <i>R. nasturtium</i> - <i>aquaticum</i>
*water forget-me-not	<i>Myosotis laxa</i>

wheki	<i>Dicksonia squarrosa</i>
wheki-ponga	<i>Dicksonia fibrosa</i>
white maire	<i>Nestegis lanceolata</i>
*willow	<i>Salix</i> sp. (mostly <i>S. fragilis</i>)
*willowherb ¹	<i>Epilobium</i> spp.
wineberry	<i>Aristotelia serrata</i>

¹ some indigenous species and some adventive species

FIGURE 9: LOCATION OF SITES FOR PLANT LISTS IN APPENDIX 3



Appendix III

INDIGENOUS VASCULAR PLANTS OF THE MATEMATEAONGA ECOLOGICAL DISTRICT AND DISTRIBUTION IN SELECTED PARTS (FIGURE 9).

Species listed but which have no location in columns 1-9 are known from one or more other reserves and/or areas of un-reserved lands in the Ecological District.

1. West of Retaruke [A P Druce and N C Simpson: Checklist 95]
 2. Wanganui River Between Pipiriki and Jerusalem [A P Druce: Checklist No.163]
 3. Rotokabu (including Lake Hawkes) [Fuller and Edwards 1987]
 4. Rotokare [Bayfield et al. 1986; Ogle 1993 (Wanganui Checklist No. 50)]
 5. Awabou [Bayfield et al. 1986]
 6. Oruru [Fuller and Edwards 1987]
 7. Rotokobu [Bayfield et al. 1986; Ogle (pers. obs. 1991)]
 8. Moeawatea [Bayfield et al. 1986]
 9. Moumabaki Lakes [Ogle and Baxter 1988 (Wanganui plant list No. 5)]
- (w = wetlands; d = dryland only)

	1	2	3	4	5	6	7	8	9
TREES AND SHRUBS									
<i>Alectryon excelsus</i> var. <i>excelsus</i>	x	x	x	x		x	x	x	
<i>Alseuosmia macrophylla</i>	x	x	x		x				
<i>Aristotelia serrata</i>	x	x	x	x	x	x	x	x	
<i>Ascarina lucida</i>						x			
<i>Beilschmiedia tawa</i>	x	x	x	x	x	x	x	x	d
<i>Brachyglottis kirkii</i> s.s.			x						
<i>B. repanda</i>	x	x	x	x	x	x	x	x	d
<i>Carmichaelia arborea</i> (incl <i>C.</i> <i>cunninghamii</i>)	x	x		x			x	x	d
<i>Carpodetus serratus</i>	x	x	x	x	x	x	x	x	w
<i>Coprosma areolata</i>	x	x	x	x	x		x	x	
<i>C. colensoi</i>			x						

	1	2	3	4	5	6	7	8	9
<i>C. grandifolia</i>	x	x	x			x			
<i>C. lucida</i>	x	x	x	x	x	x	x		d
<i>C. propinqua</i>									
<i>C. propinqua</i> x <i>C. robusta</i>									d
<i>C. rhamnoides</i>	x	x	x	x	x	x	x	x	w
<i>C. robusta</i>					x		x		w
<i>C. rotundifolia</i>					x		x		w
<i>C. tenuicaulis</i>				x					
<i>C. tenuifolia</i>									
<i>C. "sp. t." of Eagle (1986)</i>									
<i>Cordyline australis</i>	x	x		x			x		w
<i>C. banksii</i>	x	x			x	x		x	
<i>C. indivisa</i>	x								
<i>Coriaria arborea</i> var. <i>arborea</i>	x	x			x	x	x		
<i>Corynocarpus laevigatus</i>		x		x			x		
<i>Cyathodes juniperina</i>	x		x		x		x	x	
<i>Dacrycarpus dacrydioides</i>	x	x	x	x	x	x	x	x	w
<i>Dacrydium cupressinum</i>	x	x	x	x	x	x	x	x	d
<i>Dodonaea viscosa</i>									
<i>Dracophyllum strictum</i>	x	x	x		x				d
<i>D. traversii</i>			x						
<i>Dysoxylum spectabile</i> (doubtful)									
<i>Elaeocarpus dentatus</i>	x	x	x	x	x	x	x	x	d
<i>E. hookerianus</i>		x		x					
<i>Fuchsia excorticata</i>	x	x	x	x	x	x	x	x	

	1	2	3	4	5	6	7	8	9
<i>F. perscandens</i>									
<i>Gaultheria antipoda</i>	x	x	x		x			x	d
<i>G. oppositifolia</i>	x	x	x						d
<i>G. paniculata</i>	x	x	x		x				
<i>G. antipoda</i> x <i>G. oppositifolia</i>									
<i>Geniostoma rupestre</i> var.									
<i>ligustrifolium</i>	x	x	x	x	x		x	x	d
<i>Griselinia littoralis</i>	x		x		x				
<i>G. lucida</i>	x	x	x	x	x		x	x	d
<i>Hebe macrocarpa</i> var. (<i>H. corriganii</i>)	x				x				
<i>Hebe stricta</i> var. <i>stricta</i>	x	x	x	x	x	x	x	x	d
<i>Hedycarya arborea</i>	x	x	x	x	x	x	x	x	w
<i>Helichrysum aggregatum</i>	x		x						
<i>Hoheria populnea</i> var.									
(<i>H. sexstylosa</i>)			x	x	x	x	x	x	d
<i>Ileostylus micranthus</i>									
<i>Knightia excelsa</i>	x	x	x	x	x	x	x	x	d
<i>Kunzea ericoides</i> var. <i>ericoides</i>	x	x	x	x		x			
<i>Laurelia novae-zelandiae</i>	x	x	x	x	x		x	x	w
<i>Leptospermum scoparium</i>	x	x	x	x	x	x	x	x	w
<i>Leucopogon fasciculatus</i>	x					x			w
<i>L. fraserii</i>			x		x		x	x	
<i>Lophomyrtus aotearoana</i>		x		x			x	x	d
<i>Macropiper excelsum</i> var. <i>excelsum</i>	x	x		x			x		w
<i>Melicope simplex</i>						x			

	1	2	3	4	5	6	7	8	9
<i>Melicytus lanceolatus</i>	x				x	x			
<i>M. ramiflorus</i>	x	x	x	x	x	x	x	x	d
<i>Metrosideros robusta</i>	x	x	x	x	x		x	x	
<i>Mida salicifolia</i>									
<i>Myoporum laetum</i>		x							
<i>Myrsine australis</i>	x	x	x	x	x		x	x	d
<i>M. salicina</i>	x	x							
<i>Nestegis cunninghamii</i>	x	x	x		x			x	d
<i>N. lanceolata</i>	x	x	x	x	x	x	x	x	d
<i>N. montana</i>					x				
<i>Nothofagus menziesii</i>			x						
<i>N. solandri</i> var. <i>solandri</i>	x	x	x		x	x	x	x	w
<i>N. truncata</i>			x		x				
<i>Olearia furfuracea</i>									
<i>O. rani</i>	x	x	x	x	x	x	x	x	d
<i>O. townsonii</i>	x		x						d
<i>Pennantia corymbosa</i>	x	x	x	x	x	x			
<i>Pimelea prostrata</i>									
<i>Pittosporum cornifolium</i>					x				
<i>P. eugenioides</i>							x		
<i>P. tenuifolium</i> subsp. <i>tenuifolium</i>									
<i>P. tenuifolium</i> subsp. <i>colensoi</i>					x				
<i>Plagianthus regius</i>									
<i>Podocarpus hallii</i>	x		x		x	x	x	x	d
<i>P. totara</i>			x	x				x	d

	1	2	3	4	5	6	7	8	9
<i>Prumnopitys ferruginea</i>	x	x	x	x	x	x	x	x	d
<i>P. taxifolia</i>	x	x	x		x	x	x		d
<i>Pseudopanax anomalous</i>									d
<i>P. arboreus</i>	x	x	x			x	x		d
<i>P. crassifolius</i>	x	x	x	x	x	x	x		d
<i>P. edgerleyi</i>		x							
<i>P. laetus</i>	x		x			x			
<i>Pseudowintera axillaris</i>	x		x	x	x				
<i>P. colorata</i>									
<i>Quintinia serrata</i>	x		x		x				
<i>Rhabdothamnus solandri</i>	x	x	x	x	x	x	x	x	d
<i>Rhopalostylis sapida</i>	x	x		x			x		d
<i>Schefflera digitata</i>	x	x	x	x	x	x	x	x	d
<i>Solanum aviculare</i>	x			x					
<i>Sophora microphylla</i>	x	x					x		d
<i>Streblus heterophyllus</i>	x	x			x	x	x	x	d
<i>Syzygium maire</i>				x					
<i>Urtica ferox</i>					x		x		d
<i>Weinmannia racemosa</i> var.									
<i>racemosa</i>	x	x	x	x	x	x	x	x	w
LIANES									
<i>Calystegia sepium</i> agg.									w
<i>C. tuguriorum</i>	x	x		x		x	x		
<i>Clematis foetida</i>	x	x		x	x	x	x		
<i>C. forsteri</i>	x	x				x			

	1	2	3	4	5	6	7	8	9
<i>C. paniculata</i>	x	x	x	x	x		x	x	d
<i>Freycinetia baueriana</i> subsp. <i>banksii</i>	x	x	x	x	x	x	x	x	w
<i>Metrosideros colensoi</i>	x	x	x	x	x	x	x	x	
<i>M. diffusa</i>	x	x	x	x	x	x	x	x	w
<i>M. fulgens</i>	x	x	x	x	x		x	x	d
<i>M. perforata</i>	x	x	x	x	x	x	x	x	w
<i>Muehlenbeckia australis</i>	x	x	x	x	x	x	x	x	d
<i>Parsonsia capsularis</i>	x	x	x	x	x		x	x	
<i>P. heterophylla</i>	x		x	x	x	x			
<i>Passiflora tetrandra</i>	x	x	x	x	x	x	x	x	w
<i>Ripogonum scandens</i>	x	x	x	x	x	x	x	x	w
<i>Rubus australis</i>	x		x						
<i>R. cissoides</i> var. <i>cissoides</i> and/or									
unnamed var. with narrow leaflets	x	x	x	x	x	x	x	x	d
<i>R. schmidelioides</i> var. <i>schmidelioides</i>	x	x			x	x			d
DICOT AND MONOCOT HERBS									
<i>Acaena anserinifolia</i>	x		x		x	x	x	x	w
<i>Acianthus sinclairii</i>	x	x							d
<i>Anaphalis keriensis</i>	x	x	x		x	x		x	
<i>A. subrigida</i>	x	x					x		
<i>Aporostylis bifolia</i>					x				
<i>Arthropodium candidum</i>	x	x							
<i>Astelia fragrans</i>				x					
<i>A. solandri</i>	x	x	x	x	x	x	x	x	w
<i>A. trinervia</i>	x			x					

	1	2	3	4	5	6	7	8	9
<i>Australina pusilla</i>									
<i>Baumea articulata</i>				x					
<i>Bolboschoenus fluviatilis</i>							x		w
<i>Brachyglottis turneri</i>									
<i>Bulbophyllum pygmaeum</i>	x								
<i>Caladenia</i> sp. or spp.		x				x			
<i>Callitriche petrici</i>									w
<i>C. muelleri</i>				x					
<i>Cardamine</i> sp. or spp. (<i>C. debilis</i> agg.)	x	x		x	x	x	x	x	d
<i>Carex breviculmis</i>									d
<i>C. dipsacea</i>									w
<i>C. dissita</i>		x		x		x	x	x	d
<i>C. flagellifera</i>		x							w
<i>C. geminata</i> agg.	x	x		x	x	x			w
<i>C. forsteri</i>	x	x			x				
<i>C. inversa</i>									d
<i>C. lessoniana</i>	x						x	x	w
<i>C. maorica</i>			x	x		x			w
<i>C. secta</i> var. <i>secta</i>			x	x		x			w
<i>C. solandri</i>	x	x			x				
<i>C. spinirostris</i>									
<i>C. virgata</i>				x	x	x	x	x	w
<i>Centella uniflora</i>									d
<i>Chiloglottis cornuta</i>		x		x	x				
<i>Collospermum hastatum</i>	x	x	x	x		x	x	x	w

	1	2	3	4	5	6	7	8	9
<i>C. microspermum</i>	x	x		x	x	x			
<i>Cortaderia fulvida</i>	x	x	x	x		x	x	x	
<i>C. toetoe</i>	x	x					x		w
<i>Corybas acuminatus</i>									
<i>C. cheesemanii</i>									
<i>C. cryptanthus</i>									
<i>C. iridescens</i>									
<i>C. macranthus</i>		x							
<i>C. oblongus</i>		x			x			x	
<i>C. orbiculatus</i>									
<i>C. rivularis</i> agg.		x				x			d
<i>C. trilobus</i> agg.	x	x	x			x	x	x	
<i>Cotula coronopifolia</i>									w
<i>Cyperus ustulatus</i>							x		w
<i>Dactylanthus taylorii</i>									
<i>Dendrobium cunninghamii</i>	x	x	x	x	x	x	x		d
<i>Deyeuxia avenoides</i>									d
<i>Dianella nigra</i>	x	x	x	x	x	x	x	x	w
<i>Dichelachne crinita</i>		x							d
<i>Dichondra</i> sp. (<i>D. brevifolia</i> agg.)		x			x				d
<i>Drosera binata</i>									w
<i>D. peltata</i> subsp. <i>auriculata</i>		x							
<i>Drymoanthus adversus</i>	x			x	x			x	d
<i>Earina autumnalis</i>	x	x	x		x	x	x	x	d
<i>E. mucronata</i>	x	x	x	x	x	x	x	x	d

	1	2	3	4	5	6	7	8	9
<i>Echinopogon ovatus</i>					x	x			
<i>Elatostema rugosum</i>	x	x	x	x	x	x	x		d
<i>Eleocharis acuta</i>				x			x		w
<i>E. gracilis</i>									w
<i>Epilobium alsinoides</i>	x	x	?						
<i>E. cinereum</i>		x							
<i>E. insulare</i>							x		w
<i>E. komarovianum</i>									d
<i>E. macropus</i> (doubtful)									
<i>E. nerteroides</i>	x	x	x			x			
<i>E. nummulariifolium</i>	x	x	x			x			
<i>E. pallidiflorum</i>									w
<i>E. pedunculare</i>									d
<i>E. pubens</i>	x	x	x						
<i>E. rotundifolium</i>	x	x			x	x	x	x	d
<i>Euphrasia cuneata</i>	x	x			x		x	x	
<i>Gahnia lacera</i>		x							
<i>G. pauciflora</i>	x	x			?			x	
<i>G. setifolia</i>	x				x				d
<i>Galium propinquum</i>		x							d
<i>G. trilobum</i>									w
<i>Gastrodia cunninghamii</i>		x							
<i>G. sp.</i> [unnamed: <i>G. "Long Column"</i>]									
<i>Genoplesium nudum</i>									
<i>Geranium microphyllum</i>			x						

	1	2	3	4	5	6	7	8	9
<i>G. potentilloides</i>		x				x			
<i>Gnaphalium audax</i> s.s.	x	x	x	?					
<i>G. gymnocephalum</i>	x	x		x					d
<i>G. involucratum</i>									w
<i>G. sphaericum</i>									d
<i>Glossostigma elatinoides</i>									w
<i>Gunnera monoica</i> var. <i>monoica</i>	x	x		x	x				d
<i>Haloragis erecta</i>	x	x			x	x	x		w
<i>Hydrocotyle elongata</i>	x	x							
<i>H. heteromeria</i>				x	x	x	x	x	w
<i>H. microphylla</i>			x						w
<i>H. moschata</i>	x	x		x	x	x	x	x	w
<i>H. novae-zeelandiae</i> s.s.		x					x		w
<i>H. pterocarpa</i>									w
<i>Isachne globosa</i>				x					w
<i>Isolepis distigmata</i>							x		
<i>I. nodosa</i>									d
<i>I. pottsii</i>		x					?		
<i>I. prolifer</i>					?				w
<i>I. reticularis</i>	x	x				x			w
<i>Juncus australis</i>									d
<i>J. distegus</i>									w
<i>J. gregiflorus</i>	x		x	x	x	x	x	x	w
<i>J. pallidus</i>									w
<i>J. planifolius</i>				x	x			x	w

	1	2	3	4	5	6	7	8	9
<i>J. sarophorus</i>			x	x	x				w
<i>Lagenifera pumila</i>		x		x	x		x	x	d
<i>Lemna</i> sp. (<i>L. minor</i> of NZ authors)				x			x		w
<i>Leptinella squalida</i> ssp. <i>squalida</i>									d
<i>Libertia grandiflora</i>			x		x		x		
<i>L. ixioides</i>									
<i>L. pulchella</i>	x				x				
<i>Limosella lineata</i>									w
<i>Luzula picta</i> s.s.	x	x	x			x	x	x	d
<i>Machaerina sinclairii</i>	x	x	x		x	x	x	x	d
<i>Mentha cunninghamii</i>									d
<i>Microlaena avenacea</i>	x	x	x	x	x	x	x	x	d
<i>M. stipoides</i>	x	x	x			x			d
<i>Microtis unifolia</i>		x		x	x	x	x	?	w
<i>Myriophyllum propinquum</i>				x					w
<i>M. triphyllum</i>									w
<i>Nertera ciliata</i>									
<i>N. depressa</i>	x	x	x	x	x	x	x	x	w
<i>N. setulosa</i>									w
<i>N. villosa</i>					x				
<i>Orthoceras novae-zeelandiae</i>		x							
<i>Ourisia macrophylla</i> ssp. <i>robusta</i>	x								
<i>Oxalis exilis</i>	x	x							w
<i>O. magellanica</i>									d
<i>Parahebe diffusa</i>		x							

	1	2	3	4	5	6	7	8	9
<i>Phormium cookianum</i> ssp. <i>hookeri</i>	x		x			x	x	x	w
<i>P. tenax</i>				x					w
<i>Plantago raoulii</i> var. (narrow-leaved)		x							
<i>Poa anceps</i> ssp. <i>anceps</i>	x	x				x	x	x	d
<i>Polygonum salicifolium</i>									w
<i>Potamogeton cheesemanii</i>					x				
<i>P. ochreatus</i>									w
<i>Pratia angulata</i>	x	x	x	x	x	x	x	x	w
<i>Pseudognaphalium luteo-album</i> agg.						x	x	x	d
<i>Pterostylis alobula</i>									d
<i>P. banksii</i>	x	x		x		x	x	x	d
<i>P. trullifolia</i> (? error for <i>P. alobula</i>)									
<i>P. graminea</i> and/or <i>P. montana</i>		x	x	x					
<i>Ranunculus reflexus</i>	x	x	x		*x	x	x	x	w
<i>R. sp.</i> (<i>R. amphitricus</i> and/or									
<i>R. glabrifolius</i>)									w
<i>Rytidosperma clavatum</i>		x							
<i>R. gracile</i>		x			?	?		x	d
<i>R. unarede</i>		x						?	
<i>Schoenoplectus validus</i>							x		w
<i>Schoenus maschalinus</i>		x						x	d
<i>S. tendo</i>	x				x				
<i>Senecio glomeratus</i>									
<i>S. hispidulus</i>	x								
<i>S. minimus</i>	x	x	x	x	x	x	x	x	w

	1	2	3	4	5	6	7	8	9
<i>S. rufiglandulosus</i>	x	x			x	x		x	d
<i>Stellaria decipiens</i>		x	x	x	x	x	x	x	d
<i>Thelymitra longifolia</i>		x	x		?		?	?	w
<i>Triglochin striata</i>									w
<i>Typha orientalis</i>			x	x	x		x		w
<i>Uncinia affinis</i>									
<i>U. banksii</i>				x	x				
<i>U. ferruginea</i>	x	x		x	x	x	x	x	
<i>U. gracilentia</i>									
<i>U. scabra</i>								x	d
<i>U. uncinata</i>	x	x	x	x	x	x	x	x	d
<i>U. zotovii</i>	x		x		x	x			?
<i>Urtica incisa</i>	x	x	x	x	x	x	x	x	d
<i>Wahlenbergia colensoi</i>									d
<i>W. gracilis</i> (doubtfully present)		?							
FERNS AND FERN ALLIES									
<i>Adiantum cunninghamii</i>	x	x		x		x	x	x	d
<i>A. fulvum</i>									
<i>Anarthropteris lanceolata</i>	x	x	x	x	x	x		x	d
<i>Arthropteris tenella</i>				x					
<i>Asplenium bulbiferum</i>	x	x	x	x	x	x	x	x	d
<i>A. flaccidum</i>	x	x	x	x	x	x	x	x	w
<i>A. gracillimum</i>				x					
<i>A. hookerianum</i>				x		x			
<i>A. oblongifolium</i>	x	x	x	x	x		x	x	d

	1	2	3	4	5	6	7	8	9
<i>A. polyodon</i>	x	x	x	x		x	x	x	w
<i>Azolla filiculoides</i> ssp. <i>rubra</i>			x	x			x		w
<i>Blechnum chambersii</i>	x	x	x	x	x	x	x	x	w
<i>B. colensoi</i>	x	x	x		x	x		x	
<i>B. discolor</i>	x		x	x	x	x	x	x	w
<i>B. filiforme</i>	x	x	x	x	x	x	x	x	w
<i>B. fluviatile</i>	x	x	x	x	x	x	x	x	w
<i>B. membranaceum</i>		x							
<i>B. minus</i>			x				x		w
<i>B. penna-marina</i>				x					d
<i>B. procerum</i>									
<i>B. vulcanicum</i>	x		x						
<i>B. sp.</i> (unnamed; <i>B. "Black Spot"</i>)	x	x	x	?	x	x	x	x	d
<i>Botrychium australe</i>									d
<i>B. biforme</i>		x	x						
<i>Cardiomanes reniforme</i>	x	x	x	x	x	x	x	x	d
<i>Ctenopteris heterophylla</i>	x	x	x		x		x	x	
<i>Cyathea cunninghamii</i>		x					x	x	
<i>C. dealbata</i>	x	x	x	x	x		x	x	w
<i>C. medullaris</i>	x	x	x	x	x		x	x	w
<i>C. smithii</i>	x	x	x		x		x	x	d
<i>Dicksonia fibrosa</i>	x	x	x		x	x	x	x	d
<i>D. squarrosa</i>	x	x	x	x	x	x	x	x	w
<i>Diplazium australe</i>	x	x			x	x		x	w
<i>Grammitis billardierei</i>	x		x		x			x	

	1	2	3	4	5	6	7	8	9
<i>G. ciliata</i>		x			x				d
<i>G. pseudociliata</i>									
<i>Histiopteris incisa</i>	x	x	x	x	x	x	x	x	w
<i>Hymenophyllum bivalve</i>									
<i>H. demissum</i>	x	x	x		x	x	x	x	d
<i>H. dilatatum</i>	x	x	x	x	x			x	
<i>H. ferrugineum</i>	x	x	x	x	x			x	
<i>H. flabellatum</i>	x	x		x	x	x	x	x	
<i>H. flexuosum</i>	x		x						
<i>H. multifidum</i>	x	x			x		x	x	
<i>H. rarum</i>	x	x			x			x	
<i>H. revolutum</i>	x	x			x	x	x		
<i>H. sanguinolentum</i>	x	x	x		x	x	x	x	d
<i>H. scabrum</i>	x	x	x	x	x				
<i>Hypolepis ambigua</i>	x	x	x	x	x		x		w
<i>H. lactea</i>									
<i>H. rufobarbata</i>					x				
<i>Lastreopsis glabella</i>	x		x	x					d
<i>L. hispida</i>	x	x	x	x					d
<i>Leptolepis novae-zelandiae</i>		x	x						
<i>Leptopteris hymenophylloides</i>	x	x	x	x	x	x	x	x	d
<i>L. hymenophylloides</i> x <i>L. suberba</i>									
<i>L. suberba</i>									
<i>Lindsaea trichomanoides</i>			x		x		x	x	d
<i>L. viridis</i>									

	1	2	3	4	5	6	7	8	9
<i>Lycopodium deuterodensum</i>									
<i>L. scariosum</i>				x	x				
<i>L. varium</i>	x	x	x	x	x	x	x	x	d
<i>L. volubile</i>	x	x	x		x	x	x	x	d
<i>Ophioglossum coriaceum</i>		x							
<i>Paesia scaberula</i>	x	x	x	x	x	x	x	x	w
<i>Pellaea rotundifolia</i>		x							d
<i>Phymatosorus pustulatus</i>	x	x	x	x	x	x	x	x	w
<i>P. scandens</i>	x	x	x	x	x	x	x	x	d
<i>Pneumatopteris pennigera</i>	x	x	x	x					w
<i>Polystichum richardii</i>	x	x	x	x	x	x	x	x	
<i>P. silvaticum</i>		x		x					
<i>P. vestitum</i>	x	x			x	x	x		
<i>Pteridium esculentum</i>	x	x	x	x	x	x	x	x	w
<i>Pteris macilenta</i> (of NZ authors)		x	x	x			x	x	w
<i>P. tremula</i>				x			x	x	d
<i>Pyrrosia eleagnifolia</i>	x	x	x	x	x	x	x	x	w
<i>Rumohra adiantiformis</i>	x	x	x		x			x	d
<i>Sticherus cunninghamii</i>			x						
<i>Tmesipteris elongata</i>		x			x		x	x	d
<i>T. tannensis</i>	x		x	x	x	x	x		d
<i>Trichomanes elongatum</i>		x							d
<i>T. endlicherianum</i>									
<i>T. colensoi</i>									
<i>T. venosum</i>	x	x	x	x	x	x	x	x	

Appendix IV

INDIGENOUS VERTEBRATE FAUNA OF THE MATEMATEAONGA ECOLOGICAL DISTRICT

Mammals

long-tailed bat, pekapeka
short-tailed bat, pekapeka

Chalinolobus tuberculatus
Mystacina tuberculata rhyacobia

Birds

Australasian harrier, kahu
bellbird, korimako
black shag, kawau
blue duck, whio
brown kiwi
California quail
grey duck, parera
grey warbler, riroriro
kingfisher, kotare
little shag, kawaupaka
long-tailed cuckoo, koekoea
nankeen night heron
New Zealand dabchick, weiweia
New Zealand falcon, karearea
New Zealand pigeon, kereru

New Zealand pipit, pihoihoi
New Zealand shoveler
North Island fantail, piwakawaka,
tiwaiwaka
North Island fernbird, matata
North Island kaka
North Island rifleman, titipounamu
morepork, ruru
paradise shelduck, putangitangi
pied stilt, poaka
pied tit, miromiro
pukeko
red-billed gull, tarapunga
shining cuckoo, pipiwharauoa
silveryeye, tauhou
southern black-backed gull, karoro
spotless crane, puweto
spur-winged plover
tui

Circus approximans
Antbornis melanura melanura
Phalacrocorax carbo
Hymenolaimus malacorhynchus
Apteryx mantelli
Callipepla californica
Anas superciliosa superciliosa
Gerygone igata
Halcyon sancta vagans
Phalacrocorax sulcirostris
Eudynamis taitensis
Nycticorax caledonicus
Podiceps rufopectus
Falco novaeseelandiae
Hemiphaga novaeseelandiae
novaeseelandiae
Anthus novaeseelandiae
Anas rhynchotis variegata
Rhipidura fuliginosa placabilis

Bowdleria punctata vealeae
Nestor meridionalis septentrionalis
Acanthisitta chloris granti
Ninox novaeseelandiae novaeseelandiae
Tadorna variegata
Himantopus himantopus leucocephalus
Petroica macrocephala
Porphyrio porphyrio melanotus
Larus novaehollandiae scopulinus
Chrysococcyx lucidus lucidus
Zosterops lateralis lateralis
Larus dominicanus
Porzana tabuensis plumbea
Lobibyx novaehollandiae
Prosthemadera novaeseelandiae
novaeseelandiae

white-faced heron
 whitehead, popokatea
 yellow-crowned parakeet, kakariki

Ardea novaehollandiae novaehollandiae
Moboua albigilla
Cyanoramphus auriceps

Reptiles

brown skink
 common gecko
 common green gecko
 common skink

Oligosoma zelandicum
Hoplodactylus maculatus
Naultinus elegans
Oligosoma nigriplantare subsp.
polychroma

copper skink
 forest gecko
 gold-striped gecko
 ornate skink
 Pacific gecko
 striped skink

Cyclodina aenea
Hoplodactylus granulatus
Hoplodactylus chrysosireticus
Cyclodina ornata
Hoplodactylus pacificus
Oligosoma striatum

Fish

banded kokopu
 black flounder
 brown mudfish
 common bully
 common smelt
 Cran's bully
 giant kokopu
 grey mullet
 inanga
 kahawai
 koaro
 lamprey
 long-finned eel
 red-finned bully
 short-finned eel
 short-jawed kokopu
 torrentfish
 upland bully
 yellow-belly flounder
 yellow-eyed mullet

Galaxias fasciatus
Rhombosolea retiaria
Neobanna diversus
Gobiomorphus cotidianus
Retropinna retropinna
Gobiomorphus basalis
Galaxias argenteus
Mugil cephalus
Galaxias maculatus
Arripis trutta
Galaxias brevipinnis
Geotria australis
Anguilla dieffenbachii
Gobiomorphus buttoni
Anguilla australis
Galaxias postvectis
Cheimarrichthys forsteri
Gobiomorphus breviceps
Rhombosolea leporina
Aldrichetta forsteri

