Natural areas of Whangaroa Ecological District

Reconnaissance survey report for the

Protected Natural Areas Programme

NEW ZEALAND PROTECTED NATURAL AREAS PROGRAMME NO. 41

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Foreword

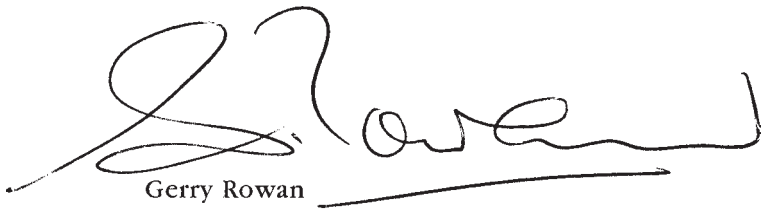
Dramatic outcrops of volcanic rock amongst native bush characterise the steep and rugged Whangaroa landscape. The scenery in the outer Whangaroa Harbour is spectacular with dense forest reaching to the water's edge, hanging valleys and a massive volcanic rock standing sentinel.

Despite extensive habitat modification, a wide range of plant species occur in this relatively small Ecological District, including an endemic species.

Although habitats are less fragmented than in the neighbouring Maungataniwha and Kerikeri Ecological Districts, most of the coastal fringe has been significantly modified from its original indigenous cover. Wetlands in the district are scarce.

Because much of the native vegetation in the district is regenerating following extensive former clearance, there is a tendency to ascribe a lesser importance to it. However, several species which are threatened or of local or restricted distribution are found in these habitats, including the North Island brown kiwi. From such areas, new forests are emerging to replace those removed by the first wave of European settlement, and although the mighty kauri forests are unlikely to be totally replaced, future generations may one day see parts of Whangaroa much the way it was when the early botanists made their historic collections here.

To realise this vision is a great challenge to all those involved with managing the natural resources of this district.



Gerry Rowan

Conservator - Northland

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FIGURE 1. LOCATION MAP OF WHANGAROA ECOLOGICAL DISTRICT (BROOK 1996).

FIGURE 2. MAP OF SURVEYED SITES, WHANGAROA ECOLOGICAL DISTRICT.
LAND ADMINISTERED BY DEPARTMENT OF CONSERVATION SHOWN IN GREEN.

Abstract

The Whangaroa Ecological District is located on the eastern coast of the North Island, south of Mangonui, and covers approximately 33,200 ha.

Natural areas of ecological significance were identified from a reconnaissance survey undertaken in 1994–96, together with information from existing databases.

The Whangaroa Ecological District is characterised by low hill country with spectacular volcanic outcrops. The district has a substantial length of coastline, including an open coast and the Whangaroa harbour itself, exhibiting dramatic scenery.

Whilst the original ecosystems have been considerably modified, much of the district retains a strong degree of naturalness and diversity. Although there is a relatively small proportion of mature forest remaining, there are extensive areas of regenerating forest dominated by tall kanuka, and the diversity of indigenous vascular plant species is high. There are few wetlands.

Priority areas for protection include wetlands, coastal, and kauri forests.

1. Introduction

1.1 THE PROTECTED NATURAL AREAS PROGRAMME

The Protected Natural Areas Programme (PNAP) was established in 1982 to implement s3 (b) of the Reserves Act 1977:

"Ensuring, as far as possible, the survival of all indigenous species of flora and fauna, both rare and commonplace, in their natural communities and habitats, and the preservation of representative examples of all classes of natural ecosystems and landscape which in the aggregate originally gave New Zealand its own recognisable character".

The goal of the programme is:

"To identify and protect representative examples of the full range of indigenous biological and landscape features in New Zealand, and thus maintain the distinctive New Zealand character of the country" (Technical Advisory Group 1986).

The specific aim of the PNAP is to identify, by a process of field survey and evaluation, natural areas of ecological significance throughout New Zealand which are not well represented in existing protected natural areas, and to retain the greatest possible diversity of landform and vegetation patterns consistent with what was originally present. To achieve this, representative biological and

landscape features that are common or extensive within an Ecological District are considered for protection, as well as those features which are special or unique.

As knowledge and information about the presence and distribution of fauna and flora such as invertebrates and bryophytes is limited, the protection of the full range of habitat types is important for maintaining the diversity of lesser known species.

This report differs from many previous PNAP reports in that it is based mainly on a reconnaissance survey and existing published and unpublished data, and includes descriptions of most natural areas within the Ecological District boundaries.

The natural areas described have been evaluated according to two levels of significance based on specified criteria (see Section 2), and are not confined to recommended areas for protection (RAPs), as defined in previous PNAP reports.

This approach was adopted so that the survey report better meets the broader information requirements of the Department of Conservation arising from the Resource Management Act 1991 (RMA) and the Convention on Biological Diversity (1992).

The Purpose and Principles of the RMA are set out in Part II of that Act and include:

- safeguarding the life-supporting capacity of air, water, soil and ecosystems,
- the preservation of natural character of the coastal environment, wetlands and lakes and rivers and their margins,
- the protection of outstanding natural features and landscapes,
- the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna,
- intrinsic values of ecosystems,
- maintenance and enhancement of the quality of the environment.

The Convention on Biological Diversity (1992), under the auspices of the United Nations Environment Programme, has promoted the concepts of biodiversity and ecosystems.

These concepts are reflected in this report in the number of sites, their size, and the emphasis on buffers and linkages in the identification and assessment of sites.

1.2 ECOLOGICAL REGIONS AND DISTRICTS

New Zealand's physical environment is very diverse, and this is reflected in the diversity of indigenous plant and animal communities. In recognition of the biogeographic differences between various parts of New Zealand, a classification of ecological regions and districts has been established (McEwen 1987).

An Ecological District is a local part of New Zealand where the topographical, geological, climatic, soil and biological features, as well as the broad cultural

pattern, produce a characteristic landscape and range of biological communities. Ecological Districts are grouped together into a series of Ecological Regions on the basis of shared general ecological and geological characteristics. In some cases, a single very distinctive Ecological District is given the status of Ecological Region to emphasise its uniqueness (Technical Advisory Group 1986).

The New Zealand Biological Resources Centre co-ordinated the mapping of the country into more than 260 districts in 1982. Ecological Regions and Districts in northern New Zealand have recently been redefined to more accurately classify ecological variation within the Northland and Auckland areas (Brook 1996).

The PNAP uses the division of Ecological Districts as a framework throughout the country for determining ecological significance, including representativeness.

1.3 CONTENTS OF THIS REPORT

This report presents the findings of a reconnaissance PNAP survey of Whangaroa Ecological District. It includes maps and brief descriptions of most of the indigenous natural areas within the Ecological District, together with an analysis of the main vegetation types and information on threatened species and other taxa of scientific interest.

The natural areas described have been assessed according to ecological criteria outlined in Section 2.4.

Soil descriptions are given only for sites listed in Arand et al. (1993) as being of regional, national or international importance.

1.4 WHANGAROA ECOLOGICAL DISTRICT

The Whangaroa Ecological District covers approximately 33,200 ha extending from Hihi to Tauranga Bay and encompassing the Whangaroa Harbour and surrounding hill country. It comprises the northernmost portion of the former Eastern Northland Ecological District, and adjoins the Maungataniwha Ecological District to the west, the Kerikeri Ecological District to the south, and has a short boundary with the Puketi Ecological District to the southwest.

The district is characterised by massive volcanic rock outcrops, the most prominent of which are Taratara, Akatere, Orotere, St Paul's Rock and the awe-inspiring Duke's Nose, all of which dominate the landscape.

Indigenous natural areas constitute approximately one third of the district (36%). Of the natural areas described in this report, 36% are forest, 55% are shrubland, 8% are estuarine, and less than 1% are freshwater wetlands.

Apart from forming the early stages of future forests, the extensive areas of regenerating indigenous vegetation in the district often provide habitat for the threatened North Island brown kiwi, Northland green gecko, and tusked weta. North Island brown kiwi, which was formerly abundant, is still found

throughout most of the district, but generally in small numbers, even in the reserves.

There is considerable plant diversity, as demonstrated by the forest on the northern side of the Whangaroa Harbour which contains over 300 indigenous plant species, including the endemic species, *Coprosma neglecta* subsp. "whangaroa", and *Pseudopanax gillesii,* both of which exhibit a very restricted distribution.

Although a coastal district, it is hard to find any original coastal vegetation. The coastal vegetation that does occur has generally been severely modified, either by repeated clearance or by the ravages of goats and possums. Protection and restoration of coastal vegetation is a high priority in this district.

The coastline is predominantly rocky, but the threatened NZ dotterel can still be found on most of the sandy beaches, although in rather low numbers. Whilst mangroves have generally thrived in the upper Whangaroa Harbour where stock have not intruded, the area of saltmarsh is small, possibly because of the extensive reclamations carried out in earlier years. Freshwater wetlands are also rare in this district, and are a high priority for protection.

Many sites for which there is little information require further detailed survey. It is highly likely that further sites of threatened species, species of limited distribution, or other taxa of scientific interest will be found.

2. Methodology

2.1 GENERAL APPROACH

Information on the composition, extent and ecological values of indigenous natural areas within the northern sector of the Northland Conservancy was obtained during reconnaissance surveys using rapid semi-quantitative methods carried out in 12 Ecological Districts between 1994 and 1996. Field work was carried out mainly by three Department of Conservation staff and co-ordinated in the Whangarei Office of the Northland Conservancy. The survey of Whangaroa Ecological District was part of that larger study.

Natural areas were identified from topographic maps, existing databases, published and unpublished reports, aerial photographs, and field and aerial observations. Areas were identified without regard for tenure. Consequently, many natural areas which are administered by the Department of Conservation as well as other protected areas were also surveyed using the same methodology. This provided a consistent approach to determine representativeness of unprotected natural areas.

Each site was mapped and described. Having been evaluated (see Criteria 2.4 below), the sites were grouped according to one of two levels of ecological significance (See Section 4). Scientific names of species for which common names have been used are given in Appendix 8.4 (Fauna) and Appendix 8.5 (Flora).

In the writing of this report, extensive use was made of information from existing biological databases such as the Sites of Special Biological Interest (SSBI) Database, Rare Plants Database, Freshwater Fisheries Database, Amphibians and Reptiles Database, Bio-sites, the New Zealand Geopreservation Inventories, published information and Department of Conservation internal reports. The SSBI database in the Northland Conservancy was the source of a considerable amount of information, particularly concerning fauna. Herbarium records from Auckland Institute and Museum and Landcare Research Lincoln were also consulted. Geographical and geological information was gained from existing published and unpublished maps.

Although many sites were not surveyed in detail, large amounts of data were collected, considerably expanding the information base for the Ecological District. It is important to note that, because of a tight timetable and budget constraints, some important natural areas may have been overlooked.

2.2 CONSULTATION WITH LANDOWNERS

Because of the magnitude and geographic range of the surveys being undertaken (9 full and 3 part Ecological Districts to be completed in a 2 year period), personal contact with all landowners was not possible. Therefore, all ratepayers were advised by mail by way of a leaflet (Appendix 8.2) informing them of the programme and the reason for it. The leaflet was signed by the Regional Conservator of the Department of Conservation, Northland Conservancy, and provided contacts for further information. A press release on the survey methodology and photograph of the survey team was issued and featured in the local newspapers (see Appendix 8.2).

In many instances permission for access was sought from landowners either by telephone or direct visit, and was generally given. In very few cases was access refused.

Some iwi consultation was undertaken with Whangaroa and Ngapuhi runanga by the Conservancy Manager (Protection) at meetings at Kaikohe and Kaeo.

2.3 DATA ACQUISITION AND ANALYSIS

A rapid, reconnaissance field survey was carried out to record and map the ecological and geomorphological characteristics, habitat type and canopy vegetation of each identified natural area. Most of this work was carried out from roads, foreshores or high points using telescopes and binoculars. The district was covered in a methodical fashion based on geography, i.e. moving north to south and west to east. Where large mosaics occurred, several days were spent accessing the areas from several points.

Some sites were visited once the landowner's consent had been obtained and transects within the habitat undertaken, while some isolated sites were only viewed from an aeroplane or boat. Information on some sites in the latter

category remains limited, and it is likely that some species associations have not been recorded.

Natural areas were mapped using five broad categories of habitat types: forest, shrubland, wetland, duneland, and estuary (See Appendix 8.6).

At each site, the composition and relative abundance of canopy plant species was recorded on the field survey sheet (see Appendix 8.1) in the following four categories: greater than 50% cover was defined as "abundant"; 20–50% cover as "common"; 5–20% cover as "frequent"; and less than 5% cover as "occasional".

Canopy composition based on percentage cover abundance is widely considered to be a valuable approach for description of forest stands. This technique and variations of it, for description of canopy composition, is well established and used throughout the world (see for example Kershaw & Looney 1985; Mueller-Dombois & Ellenberg 1974) as well as within New Zealand (see for example Atkinson 1962, 1985; Leathwick & Rogers 1996; Park & Walls 1978). The specific technique for vegetation description at each site is based on the approach set out in Myers et al. (1987).

This semi-quantitative method was favoured because of the time constraints for the field survey, the extensive areas to be covered and because it could be applied to all vegetation types, with ground cover plant species or substrate being recorded in non-forest habitats. More detailed, and therefore more time-consuming and expensive methods would not necessarily provide more useful information for assessing representativeness. The disadvantage of this survey approach is that it did not provide a great deal of information on the distribution of uncommon and threatened species.

Classification of canopy vegetation types was done by a combination of manual sorting and computer analysis using TWINSPAN (Hill 1979). TWINSPAN is a multivariate analysis programme for two-way classification of site and species data. It provides an indicator species analysis at each partitioning of data during classification, and displays the final result in an ordered two-way species-by-site table.

In the present study, TWINSPAN was used to classify sites according to canopy vegetation composition, as determined from field surveys. Abundance categories of canopy species were coded numerically in the data set as follows: 4 - Abundant (> 50% of the canopy); 3 - Common (20–50%); 2 - Frequent (5–20%); 1 - Occasional (<5%). Vegetation types were determined according to the "abundant" and "common" categories. In many instances, no one species was classified as "abundant" but more than one species was "common".

Site groupings determined in the analysis enabled the identification of common and less common vegetation types within the district and to define the vegetation component of the ecological units.

Landform and geology were classified using information from published and unpublished maps, reports and topographical maps. This information was combined with vegetation types to determine ecological units defined by particular vegetation–geomorphological characteristics, e.g kanuka forest on hillslope, raupo reedland in swamp. Most sites contain a range of ecological units.

Representativeness was assessed by determining the frequency of the different ecological units remaining in the ecological district, region, or nationally.

Because of resource constraints, the framework of land systems was not used in this survey or report.

Other relevant information, such as fauna observations, threats and landowner information collected incidentally, was also recorded on the survey sheet for each site. Once the field reconnaissance or survey had been completed, sites were numbered, and information from other databases, e.g. SSBI and threatened species information, was incorporated into the site descriptions.

Survey forms are held by the Department of Conservation, Northland Conservancy Office, Whangarei.

2.4 CRITERIA FOR ASSESSING HABITAT SIGNIFICANCE

The natural areas described in this report meet at least one of the following criteria:

- They are of predominantly indigenous character, by virtue of physical dominance or species composition
- They provide habitat for a threatened indigenous plant or animal species
- They include an indigenous vegetation community or ecological unit, in any condition, that is nationally uncommon or much reduced from its former extent.

The conservation values of these areas were then assessed using a two-level classification of habitat significance based on the PNAP ecological criteria of representativeness, rarity and special features, diversity and pattern, naturalness, habitat structure, and characteristics important for the maintenance of ecosystems (buffer, linkage or corridor, size and shape).

The highest value areas (Level 1) are those which contain significant vegetation and/or significant habitats of indigenous fauna and are defined by the presence of one or more of the following ecological characteristics:

1. Contain or are regularly used by critical, endangered, vulnerable or rare taxa (i.e. species and subspecies), or taxa of indeterminate threatened status nationally.
2. Contain or are regularly used by indigenous or endemic taxa that are threatened, rare, or of local occurrence in Northland or in the Ecological District.
3. Contain the best representative examples in the Ecological District of a particular ecological unit or combination of ecological units.
4. Have high diversity of taxa or habitat types for the Ecological District.
5. Form ecological buffers, linkages or corridors to other areas of significant vegetation or significant habitats of indigenous fauna.

6. Contain habitat types that are rare or threatened in the Ecological District or regionally or nationally.
7. Support good populations of taxa which are endemic to Northland or Northland–Auckland.
8. Are important for indigenous or endemic migratory taxa.
9. Cover a large geographic area relative to other similar habitat types within the Ecological District.

Level 2 sites are natural areas that support populations of indigenous flora and fauna not identified as meeting the criteria for Level 1. They are sites which:

- contain common indigenous species,
- may be small and isolated from other habitats,
- may contain a high proportion of pest species,
- may be structurally modified, e.g. forest understorey heavily grazed,
- have not been surveyed sufficiently to determine whether they meet the criteria for Level 1 sites.

Categories of species rarity and threat are based on Molloy & Davis (1994), and Cameron et al. 1995 (see Appendix 8.3).

2.5 UPDATING OF DATA

Natural ecosystems and habitats are dynamic and are forever changing, both physically and biologically. Some areas are more dynamic than others, e.g. wetlands, which are particularly susceptible to changes in ground water hydrology, whilst others change more gradually, e.g. forest. The status and composition of species also changes over time, and this could result in changes to the value of some habitats.

Human-induced activities and changes, both within or adjoining significant natural areas, can rapidly speed up the processes of change. Fire, followed by the invasion of adventive weeds, can dramatically modify shrublands. Drainage of adjoining land can alter the water tables of wetlands thus lowering the quality of the habitat and facilitating the establishment of weeds. Ongoing piecemeal destruction or modification of habitats and sustained grazing of bush remnants will, in the long term, completely eliminate some habitats.

The natural areas identified in this survey will require regular monitoring to note changes in both species and habitat composition and condition.

3. Ecological character

3.1 TOPOGRAPHY/GEOLOGY

The Ecological District is composed of coastal hill country with moderately to deeply incised valleys. The highest point is 385 m asl (Huia). The majority of the identified natural areas occur within the 80–200 m asl range.

The coastline is steep and rocky, with pocket gravel beaches and some sand beaches, and common nearshore islets and rock stacks. Whangaroa Harbour (2600 ha) occupies a drowned valley system and has a highly indented coastline.

Lower Miocene Whangaroa Subgroup bluff-forming andesitic tuff breccia, lava flows and intrusions outcrop extensively around Whangaroa Harbour, east and southeast of Kaeo, and at Taratara.

In the northwest of the Ecological District, lower Miocene andesitic dykes intrude allochthonous Cretaceous Tangihua Complex ophiolitic rock units (predominantly altered basalt and subvolcanic intrusions).

To the southeast of Whangaroa Harbour, the Whangaroa Subgroup volcanics are underlain by Paleozoic–Mesozoic Waipapa Terrane greywacke and Cretaceous–Paleogene autochthonous and allochthonous sedimentary cover rocks.

There are extensive Holocene estuarine and alluvial flats at the head of Whangaroa Harbour, and perched basins of Pleistocene–Holocene alluvial deposits in hill country to the northwest and southeast of the harbour (Brook 1996).

3.2 CLIMATE

The Whangaroa Ecological District has a mild, humid and rather windy climate, winds being predominantly from the southwest.

There are no weather stations in the Ecological District, but information is available from Mangonui, just outside the district in the north, Kerikeri Airport, and Waitangi Forest, approx. 20 km to the south.

The mean annual rainfall for Mangonui is 1447 mm and 1495 mm at Waitangi Forest.

Most rainfall occurs during winter (both Mangonui and Waitangi Forest record 45% of the annual rainfall occurring between May and August). The driest months at Mangonui are November, December, January and March, each month having 5–6% of the annual rainfall, and at Waitangi Forest from November to January, having a similar proportion of the mean annual rainfall. Dry spells (period of 15 days or more having less than 1 mm of rain per day) occur at this time of the year.

The district is also subject to periodic cyclonic storms in late summer and early autumn which bring heavy rain and may have widespread effects such as slips and windfalls.

Heavy rain also occurs when northeasterly flows arise between ridges of high pressure to the east and troughs over the Tasman Sea.

The mean annual temperature at Kerikeri Airport is 14.9°C. February is the warmest month, with the mean temperature being 19°C, and July is the coldest month (11°C).

Daily temperature variations are minor, with few extremes of temperature or frosts.

The district has about 2000 hours of bright sunshine per year (Moir et al. 1986).

3.3 VEGETATION

3.3.1 Historical

In the past, much of the district was dominated by broadleaf–podocarp–kauri (*Agathis australis*) forest which has been extensively logged, particularly for kauri.

Whangaroa, one of the former "great kauri ports", probably has the longest history of kauri extraction of any area in New Zealand. The first shipment of kauri from New Zealand was taken from Kaeo on the sailing ship *Dromedary* in 1820. Although the area from the north of the harbour to Mangonui was rich in kauri, and the ridges were heavily clad, it was not common on the coast. Captain Skinner of the *Dromedary* noted "the timber here appears remarkably fine…a considerable distance from the banks of the river;…none seem to grow near the sea." (Sale 1978).

No mature kauri forest remains today and the largest tree remaining in the district is of only average size in comparison with trees at Puketi or Waipoua Forests (see Appendix 8.5B).

Early botanists (e.g. Richard and Alan Cunningham, Colenso, and Thomas Kirk) found the area floristically diverse, with the type locality of many species being from this district.

Along the coast, broadleaf forest including pohutukawa occurred on cliffs and in valleys behind small sandy beaches. Pohutukawa would have been much more plentiful, especially within the harbour. In his diary of 1868, Thomas Major Lane recorded going to the Wairakau for pohutukawa knees for boat framing, boat building being a major early industry at Whangaroa (Winch 1993).

Estuarine wetlands including mangrove (*Avicennia marina* var. *australasica*) forests were also more extensive than at the present time. So little remains of freshwater wetlands that one can only speculate on their original extent. It is likely that they occurred mainly in the coastal valleys grading into the saltwater influence.

The Whangaroa area has been influenced by human settlement for hundreds of years, with more intensive development since European settlement nearly 200 years ago.

Much of the remaining habitat consists of secondary shrubland and forests on steep, dissected hillsides, uneconomical for production, but extensively cleared in colonial times and in the heyday of agricultural subsidies between the Second World War and the early 1980s.

3.3.2 Broad pattern

In most instances botanical nomenclature in this report follows the *Flora of New Zealand,* Vols 1–4 (see Bibliography). A full list of common names used in the text with their botanical reference is to be found in Appendix 8.5.

A high degree of contiguity is a feature of many of the habitats in the Whangaroa Ecological District, with extensive linkages between areas of indigenous vegetation in the Hihi area in the north and especially in the Kaeo area, with unbroken vegetation from Kaeo to Tauranga Bay, and vegetation broken only by roads south of Kaeo.

Many of the large contiguous areas contain only pockets of mature forest, with secondary forest and regenerating forest being a main feature of the vegetation in the district. Manuka (*Leptospermum scoparium*) and kanuka (*Kunzea ericoides*) are the predominant species in regenerating areas, with towai (*Weinmannia silvicola*) featuring less predominantly. The diversity of other canopy species present either in the canopy or as saplings and seedlings varies according to the frequency of previous clearance and proximity to suitable seed sources.

A characteristic of the district is the very conspicuous regeneration of kanuka forest in which ricker kauri stands often dominate on ridges. Tanekaha (*Phyllocladus trichomanoides*) and white maire (*Nestegis lanceolata*) usually grow in association with regenerating kauri, and occasionally rimu (*Dacrydium cupressinum*). Podocarps are generally in low abundance in this district, but in several areas, along with tanekaha, towai and kauri, are close to the 'break out' stage within tall kanuka forest. This is particularly noticeable in the Kaeo area, where some of the secondary forest is approaching 100 years old.

All of the district falls within either the coastal or lowland bioclimatic zones. There is no strong pattern of ecological gradients apparent in this Ecological District, apart from the coastal influence, which is limited in extent, partially reflecting the amount of disturbance of coastal habitats. Elsewhere some species are uncommon below about 100 m asl, e.g. kawaka (*Libocedrus plumosa*) and *Pseudopanax gillesii,* but this may be a reflection of habitat disturbance, or drainage.

Similarly, broadleaf forest is found primarily in valleys and gullies, but this is considered to reflect previous disturbance. Broadleaf–podocarp remnants occur mainly in the west of the district in the Kahoe–Pupuke area.

Analysis of ecological units reflects a wide variety of habitat and vegetation types, generally dictated by geomorphological, topographical and historical disturbance factors. Many of these vegetation types are present at only one site,

or at most in a few sites, and cover only a small geographical area, e.g. *Astelia* associations on cliffs, broadleaf associations on coastal margins, broadleaf and *Metrosideros* associations on rock outcrops, most of the wetland areas, as well as many forest types, e.g. taraire (*Beilschmiedia tarairi*)–tanekaha and taraire–tawa (*Beilschmiedia tawa*).

Regenerating forest, much of it kanuka at a fairly advanced stage, is the vegetation type covering the largest area. A feature of this district is that mamangi (*Coprosma arborea*) occurs frequently, and is sometimes common, in the canopy of manuka–kanuka shrubland, and is a common, and sometimes abundant, subcanopy species in more mature forest. This is indicative of previous major disturbance (P. de Lange pers. comm. 1996).

As this study was in the nature of an overview rather than in depth, the main vegetation types are described below in general terms.

3.3.3 Vegetation types

Wetlands

There are 7 main wetland types:

(i) Fertile swamps (raupo (*Typha orientalis*) dominant)

These are mostly small (< 1 ha) and form part of other sites. The only examples of any size are the Komutu Swamp and an area within the larger North Whangaroa complex.

(ii) Cabbage tree (*Cordyline australis*)–manuka swamp shrubland

Part of the Komutu Swamp is the only example of this type in the Ecological District.

(iii) *Blechnum*–manuka swamp shrubland

A very small area occurs within the Te Whau site.

(iv) Flax (*Phormium tenax*)

Flax occurs with raupo and cabbage tree in the Komutu swamp and in a small site above the Wainiwha Falls at Ranfurly Bay. Apart from these areas there is a small flax swamp along Taratara Rd.

(v) *Juncus–Cyperus* association

This type occurs in a small forest depression, surrounded by kahikatea (*Dacrycarpus dacrydioides*), in the Ohapehape site.

(vi) Kuta (*Schoenoplectus tabernaemontani*)

(vii) Coastal wetlands, either saltmarsh dominated by *Juncus maritimus* and/or jointed rush *(Leptocarpus similis),* or mangrove swamps.

Associated with the coastal wetlands and small estuaries are dune associations (spinifex, marram (*Ammophila arenaria*)) and sandy beaches providing habitat for shorebirds at Tauranga Bay, Taupo Bay, Camp Bay, Tupou Bay, and Motukahakaha Bays.

*Pohutukawa (*Metrosideros excelsa*)*

In this district pohutukawa occurs in the following situations:

(i) Scattered along the coast. Sometimes occurring in association with pohutukawa on coastal cliffs are *Astelia banksii* and rengarenga lily (*Arthropodium cirrhatum*).

(ii) As open treeland with no understorey on coastal sites at Berghan Point, Butterfly Bay, Okura Bay, and Umukukupa.

(iii) As remnant forest at Motukukupa Point (O04/211) with an understorey of flax and *Coprosma macrocarpa* and at Opakau Point with puriri (*Vitex lucens*), taraire, rewarewa (*Knightia excelsa)*, nikau (*Rhopalostylus sapida*) and tawapou *(Pouteria costata)*.

(iv) As isolated trees within coastal vegetation and forest in the Hihi and Whangaroa areas

(v) On rock outcrops with northern rata (*Metrosideros robusta*) at North Whangaroa, including Yerkovich Bush. Associated understorey species include broom (*Carmichaelia australis*), *Pittosporum umbellatum, Pseudopanax gillesii, Olearia furfuracea, Astelia banksii* and, (rarely), *Coprosma neglecta* subsp. "whangaroa".

(vi) In inland forest at Taratara associated with northern rata and kauri, and on rock on and below Taratara itself.

Manuka and kanuka

(i) Shrubland

These species may occur together or as sole dominants, frequently in extensive mosaics of regeneration, on the margins or as part of more than half the sites, including the majority of the larger bush areas.

There is a diversity of pattern occurring in these shrubland areas which largely reflects the pattern and age of previous disturbance, usually being fire or clearance, and proximity to the coast. Bracken (*Pteridium esculentum*) is locally frequent, and the more frequently and/or recently disturbed areas are likely to contain gorse.

In the majority of these shrubland areas, manuka and/or kanuka is abundant forming a dense canopy and containing a dense understorey of ferns, sedges, small shrubs and seedling canopy trees. The black tree fern or mamaku (*Cyathea medullaris*) is present in the canopy of about half of the manuka-kanuka shrubland areas, generally constituting <5% of the canopy. Towai, rewarewa, cabbage tree, totara (*Podocarpus totara*) and wilding pine (*Pinus radiata*) are also scattered in the canopy. Other commonly associated species are *cutty grass (Gahnia setifolia)*, hangehange (*Geniostoma rupestre)*, mahoe (*Melicytus ramiflorus)*, mapou (*Myrsine australis)*, mingimingi (*Leucopogon fasciculatus*), five-finger (*Pseudopanax arboreus)*, and sapling towai, tanekaha and totara.

From Hihi to the Whangaroa Harbour, mamangi occurs frequently or commonly in manuka–kanuka shrublands.

On isolated sites of infertile soil, manuka is abundant, and other soil-infertile tolerant species such as *Hakea*, *Dracophyllum lessonianum*, mingimingi, *Gleichenia, Schoenus* and *Lycopodium* occur.

(ii) Coastal shrublands

Manuka < 3 m tall is usually dominant with frequent to occasional pohutukawa, otherwise there is no common compositional pattern, probably reflecting previous levels of disturbance.

(iii) Secondary kanuka forest

(see also under Kauri below)

Kanuka forest features predominantly in all the large forested areas of the Ecological District especially on the steep hill country.

Kauri and tanekaha occur frequently at about half of the sites. At some sites totara, tawa, taraire, rimu, northern rata and kahikatea are locally frequent. A wide range of other canopy species occur within this forest type including puriri, rewarewa, matai (*Prumnopitys taxifolia)*, lancewood (*Pseudopanax crassifolius)*, karaka (*Corynocarpus laevigatus)*, pohutukawa, tawa, mamaku, nikau, toru (*Toronia toru*) and pukatea (*Laurelia novae-zealandiae)*.

In most of the areas where this forest type occurs, kanuka is the sole dominant, but other species occur as co-dominants in numerous isolated sites:

Kanuka–tanekaha	Ridge sites at Whakaangi, North Whangaroa, Taratara, Kaeo Bush, and Upper Touwai Stream.
Kanuka–tanekaha–totara	Barrons Bush.
Kanuka–tanekaha–towai	Kaeo Bush.
Kanuka–towai	Teheoriri and Te Whau.
Kanuka–totara	Stony Stream (including riparian areas), North Whangaroa, Barrons Bush, Ngarahu, and Martins Rd. In the riparian areas, mamaku may be frequent and cabbage tree occasional. At North Whangaroa, kohekohe (*Dysoxylum spectabile)* and mamangi are frequent. Elsewhere tanekaha is frequent and a range of other canopy species occur occasionally.
Kanuka–totara–puriri	Stony Stream.

Kauri

Of the 48 Level 1 sites, only 8 contain localised sites of kauri dominance, primarily on ridges and spurs, and occuring either within secondary kanuka forest or within broadleaf–podocarp forest.

Kauri occurs frequently within kanuka forest and is scattered throughout most of the forested sites. Where kauri is dominant, kanuka and tanekaha occur frequently and rimu is occasional.

Elsewhere there are a small number of sites on ridges or upper hillslopes where regenerating kauri is co-dominant with kanuka, tanekaha, or both. Associated species are rimu, totara, taraire, kohekohe, miro, toro (*Myrsine salicina*), and rewarewa.

Tanekaha

Whilst widespread throughout the district, tanekaha is only locally common. It is found to be dominant at only three Level 1 sites (North Whangaroa, Barrons Bush, and Ohapehape). At North Whangaroa it is associated with kanuka and totara; at Barrons Bush it is associated with frequent kanuka and totara (see Kanuka Forest above); and at Ohapehape it occurs on a spur with occasional kauri, rewarewa, totara, towai, and manuka.

Broadleaf–podocarp forest

Taraire is important in this forest type, being the dominant canopy species at more than 50% of the sites. Within this type, towai, kanuka, tanekaha, and totara may be frequent.

This type also has the greatest diversity of canopy species, with most sites having a dozen or more species, including (apart from those already mentioned) rewarewa, puriri, karaka, kohekohe, hinau (*Elaeocarpus dentata)*, tawa, pukatea, titoki (*Alectryon excelsum)*, northern rata, kahikatea, rimu, miro, matai, kawaka, kauri, mamaku, nikau and, rarely, pohutukawa and kowhai (*Sophora microphylla)*.

The broadleaf–podocarp forests in Whangaroa contain few emergents, possibly because these have been removed by logging. In a few sites, kauri, rimu, and to a lesser extent northern rata, may be occasional emergents.

The subcanopy is usually dominated by kohekohe, mamangi, nikau, ponga (*Cyathea dealbata)* and mamaku.

Towai is co-dominant with taraire at 12 sites. Although there is no apparent topographical pattern in its distribution, this constitutes the main forest type in the north of the Ecological District and at Te Whau in the south. Kanuka, totara, puriri, nikau, and tanekaha may be locally frequent within this type. Associated species are similar to the taraire-dominant areas, but with fewer species represented in the canopy.

Puriri is co-dominant with taraire at 12 sites, most of which are small remnant areas in gullies. Totara, kanuka, towai and kohekohe may be locally frequent.

Taraire occurs as a co-dominant with other species in a few small, isolated sites:

Taraire–tanekaha	Whakaangi - in the Tauranganui catchment, associated with kauri, kanuka, puriri, pohutukawa, mamangi, and rewarewa.
Taraire–totara	Ngarahu.
Taraire–tawa	Miru Stream catchment of Upper Touwai Stream.
Taraire–kahikatea	Ngarahu.

Towai occurs as a sole dominant at a few sites. Taraire and puriri may occur frequently. Associated species are rewarewa, manuka, mamaku, and totara. These sites tend to suggest a history of greater disturbance than most other broadleaf sites, being of lesser diversity. (Towai shrubland is limited geographically to the southwestern part of the Ecological District and is frequently associated with gorse, bracken, manuka, and mamaku. In addition these areas generally have an open canopy and occur in areas with a history of disturbance.)

Other broadleaf–podocarp types represented by isolated occurrences are:

Puriri dominance	Confined to small coastal guts at Whangaroa with frequent pohutukawa and a remnant within Tahawai Shrubland.
Puriri–kahikatea	At Stony Stream with frequent taraire.
Puriri–totara–tanekaha	Paikauri - a gully remnant in Quarry Rd.

Secondary podocarp forest

This type is rare in the Ecological District.

Totara is much less dominant in this district than in the adjoining Maungataniwha Ecological District. It occurs abundantly in dominant regenerating stands at only three Level 1 sites (Bridge, Orotere, and Taraire Rd) and is co-dominant with towai at Martins Rd '339' along with kahikatea and taraire which also occur frequently. Two tiny stands of secondary kahikatea occur within Level 1 sites, at Taratara and Te Whau.

A few of the small remnant Level 2 sites contain limited areas of secondary podocarp.

3.3.4 Species of botanical interest

This Ecological District contains several threatened species (see below), two endemics, and a number of other species of botanical interest.

The steep cliffs and bluffs offer habitat for unusual and specialised assemblages of plants including low turfs and herbfields on the tops and for the two Whangaroa associated species, both of which occur in open habitats:

Coprosma neglecta subsp. "whangaroa", an undescribed endemic, currently considered to be distinctive from *C. neglecta* (M. Heads pers. comm 1997). This species, which is common around Lane Cove and is also found on some of the rock outcrops throughout the forest, including Akatere, has a very local distribution.

Pseudopanax gillesii, a glossy "three-fingered" *Pseudopanax*, locally common above 100 m in the North Whangaroa forest, but found only as isolated plants in three or four locations to the south and west of the harbour. Although considered to be endemic to Whangaroa, it was recorded by Cheeseman on Little Barrier Island (Allan 1961), and was recently collected there.

Species at their northern limits in the district are hard beech (*Nothofagus truncata*), and *Pittosporum pimeleoides* subsp. *pimeleoides* and *Cyathea smithii*, all found at Whakaangi.

A botanical feature of particular interest is the recent discovery of *Pittosporum pimeleoides* subsp. *major* (also known as *P. michei*) on the western shores of Whangaroa Harbour (Foster 1998). This species was previously known only from the serpentine soils of the Surville Cliffs at North Cape, and this find raises the question as to whether these specimens were planted or are of natural origin.

Blechnum vulcanicum, a species common in montane areas from Bay of Plenty to Wellington, and in the South Island, is of only local distribution north of the

Bay of Plenty (Brownsey & Smith-Dodsworth 1989). It was collected at Taraire Rd in 1971 (CHR 191562) and considered by Rawlings to be a northern extension of its range (Rawlings 1971).

Uncommon species present are:

The endemic monotypic fern *Loxsoma cunninghamii* known from Thames to Kaitaia and at East Cape, is found at sites at Hihi, along streamsides in the North Whangaroa Forest and in Kaeo Bush.

Kawaka *(Libocedrus plumosa),* whilst having a wide distribution, is usually seen as scattered specimens. At North Whangaroa it is locally common, its occurrence confined to only a handful of sites in Northland (other similar areas being Utukura (South Hokianga), Radar Bush (Te Paki), Ahipara, Tangihua and Russell).

Monoao (*Halocarpus kirkii*), another species of wide distribution but seldom locally common, occurs sparsely at North Whangaroa.

Bulbophyllum tuberculatum, a seldom-observed epiphytic pygmy orchid, is known from several sites at North Whangaroa.

A species present which is common elsewhere but uncommon in this Ecological District is the endemic monotypic *Manoao colensoi* (silver pine), which is common in some cooler areas of the central North Island and western South Island. This species is scarce from Auckland/Coromandel northwards. Only a few immature individuals are known from this Ecological District.

Whangaroa Ecological District is the type locality for many species, particularly those collected by Alan and Richard Cunningham (See Appendix 8.5B). They include common species such as putaputaweta, *Coprosma spathulata, C. propinqua*, northern rata, and bush lawyer. It is interesting to note that Whangaroa is also the type locality of *Ixerba brexioides*, which is not currently known from this district, although even in 1828 it was considered uncommon (Cunningham 1838). It is also the type locality for *Coprosma rotundifolia*, also not currently known to occur in the district.

Other interesting collections made by the Cunninghams include the threatened *Hibiscus trionum, Peraxilla tetrapetala,* and *Sicyos australis*, none of which are known to persist in this Ecological District.

The Endangered *Dactylanthus taylorii,* which is parasitic on the roots of a variety of indigenous trees and shrubs, was collected from this Ecological District within living memory (T. McDermott pers. comm. to L. Forester 1995*).* However, despite searches of areas anecdotally reported to be its habitat, no plants have been located in recent years, and this cryptic species could be extinct in the Ecological District and is possibly extinct in Northland (L. Forester pers. comm. 1996). The main extant populations are in the central North Island (C. Jones 1995).

3.3.5 Threatened plant species

(See Appendix 8.3 for Categories of Threat)

Calystegia marginata - Vulnerable

A slender herbaceous climber with arrow-shaped leaves found on margins in open, low shrubland (Wilson & Given 1987). Also found in eastern Australia, sparse populations are still found at Te Paki, Warawara, Ahipara, Whangaroa, the Bay of Islands, Whangaruru, Whangarei, near Leigh, and Cuvier Island.

In this Ecological District a small number of plants have been found on the northern side of the Whangaroa Harbour.

Colensoa physaloides - Local

A distinctive blue-flowered, shrubby plant with hydrangea-like foliage. It is a monotypic genus which is endemic to Northland, including some of its offshore islands as well as Rakitu Island, to the east of Great Barrier Island (P. de Lange pers. comm. 1996). It is found scattered through forest areas, generally beside streams and tracksides, and on talus slopes. Being vulnerable to browsing, it is usually removed where wild goats or stock are present.

Fuschia procumbens - Local

This prostrate, sprawling fuschia with tiny, brightly coloured flowers is locally common in open coastal habitats on the mainland from North Cape to Maunganui Bluff on the west coast, Coromandel on the east coast, and at Great Barrier Island (Godley & Berry 1995). Found at Taupo Bay and Butterfly Bay.

Hibiscus diversifolius - Vulnerable

Also in Australia and the Pacific, this prickly-stemmed shrub is now found in New Zealand only in the Far North on coastal seeps and boggy areas, often on the inland edge of sandy beaches (Wilson & Given 1989). The most recent record from this Ecological District was from Taupo Bay in 1964.

Ileostylus micranthus - Local

A mistletoe with yellow-green flowers found throughout New Zealand and on Norfolk Island (Poole & Adams 1990). In Northland this species is now of only local distribution despite it having once been widespread in the area (P. de Lange pers. comm. 1996). In this Ecological District, it is found at Waiare Rd on totara.

Juncus holoschoenus - Insufficiently Known

A loosely tufted, rhizomatous rush with leaves arising both from the base and on the stem. Scattered in damp places as far south as Canterbury. Also present in Australia (Moore & Edgar 1970).

This species was recorded from Te Whau by Kirk but is possibly no longer present at the original collection site due to the establishment of a pine plantation, although it may still be present in the vicinity, as large gullies of native vegetation remain in the area.

Peperomia **"Purple Vein"** Insufficiently Known

Not yet described, this form has been found mainly on Great Barrier Island, at Ahipara, and near Taupo Bay (E.K. Cameron pers. comm. 1996), where it hybridises with *P. urvilleana* (P. de Lange pers. comm. 1997).

Peperomia tetraphylla - Local

A small succulent herb with branches pubescent at the nodes, often a low epiphyte. It is very uncommon in Northland (L. Forester pers. comm. 1997) and is generally found in the East Cape–Bay of Plenty area and also occurs in Australia and Polynesia (Allan 1961). Known from only one site in this Ecological District (on volcanic rocks near Kaeo), with single records also from Ahipara and Kaikohe Ecological Districts.

Pimelea tomentosa s.s - Rare

A slender shrub found in open shrubland from Three Kings (P. de Lange pers. comm. 1997) to Nelson/Marlborough (Poole & Adams 1990). There have been few records from Northland, but this species has been found at two sites in the North Whangaroa forest.

Pittosporum pimeleoides **subsp.** ***major*** - Local

Similar to *Pittosporum pimeleoides* subsp. *pimeleoides* (see below) but more prostrate in habit, and the leaves broader and less linear. Considered to be endemic to North Cape (E. Cameron pers. comm. 1999).

Pittosporum pimeleoides **subsp.** ***pimeleoides*** - Rare

A small shrub growing to 2 m with slender branches and narrow–oblong leaves crowded at tips or whorled (Poole & Adams 1990) is found on dry and fairly open ridge sites, usually with mingimingi under tanekaha and kauri. Known only from North Auckland and now known mostly from north of Whangarei (Wilson & Given 1989). Found at Whakaangi, Burlace's Reserve and several sites around the Whangaroa Harbour.

Pittosporum virgatum - Local

Confined to open ridge sites in scattered locations in Coromandel and North Auckland, this species has a distinct juvenile form in which the leaves and branchlets are densely hairy and leaves diverse in form, often lobed. Plants may flower while still in the semi-juvenile stage (Allan 1961). Found at North Whangaroa.

Todea barbara Local

A fern with leathery fronds found on dry sites within gumland vegetation, and also known from Australia (Wilson & Given 1989). In this Ecological District known from near Whakaangi (P. Anderson pers. comm. 1997) and from a single plant found on a roadside near Taratara. However, it was recorded by Druce near Gangway Rd at Saies in 1979. Land clearance may have destroyed these plants, but further plants could be found in the vicinity.

3.4 FAUNA

Information on fauna in this report has been compiled from SSWI and SSBI data bases, as well as from field observations during this survey. The status of individual species is derived from Bell (1986), and Molloy & Davis (1994). (See Appendix 8.3. Bell's "Threatened" equates to "Vulnerable".) Nomenclature

follows the Checklist of the Birds of New Zealand (Ornithological Society 1990) and Pickard & Towns (1988) for reptiles.

The individual site descriptions detail known significant fauna only. Most of the common bird species of Northland, both indigenous and introduced, are to be found in the Ecological District. A checklist of common fauna recorded is included in Appendix 8.4.

3.4.1 Threatened bird species

North Island brown kiwi ***Apteryx australis mantelli***

Threatened endemic Category A

Kiwi, although much reduced from former numbers due to habitat loss, predation by dogs, small predators and possibly pigs, are found throughout the district. Shrubland and regenerating forest areas are as important habitats as the mature forests. The northernmost population of North Island brown kiwi is found in this district, on the Hihi peninsula.

New Zealand pigeon ***Hemiphaga novaeseelandiae novaeseelandiae***

Threatened endemic Category B

Over recent years the population of New Zealand pigeon has been severely depleted in this Ecological District by the combined effects of predation, competition, and heavy poaching.

Small broadleaf forest remnants which lack easy access or are easily monitored by landowners are important for maintaining populations.

New Zealand dotterel ***Charadrius obscurus aquilonius***

Threatened endemic Category B

Found in small numbers on some eastern coast beaches.

Variable oystercatcher ***Haematopus unicolor***

Threatened endemic Category C

Found in small numbers along the eastern coastline.

Caspian tern ***Sterna caspia***

Threatened indigenous Category O

Found in the Whangaroa Harbour.

Reef heron ***Egretta sacra sacra***

Threatened indigenous Category O

Found in the outer Whangaroa Harbour.

Australasian bittern ***Botaura poiciloptilus***

Threatened indigenous Category O

Recorded in wetlands at Barrons Dam, Komutu Swamp, and Whangaroa Harbour.

Bird species not considered nationally threatened but which are uncommon in the Ecological District

North Island fernbird ***Bowdleria punctata vealeae***

Regionally threatened endemic genus

Found in wetlands adjoining the Whangaroa harbour.

Spotless crake ***Porzana tabuensis plumbea***

A species with restricted distribution, being confined on the mainland largely to raupo swamps. Found in the Komutu Swamp.

Banded rail ***Rallus philippensis assimilis***

An endemic subspecies which was once widespread and for which Northland is its national stronghold.

Found in wetlands adjoining the Whangaroa Harbour.

Pied tit ***Petroica macrocephala toitoi***

Populations have been restricted by habitat fragmentation generally to large mature forested areas (Whakaangi and forests on northern and southern sides of the Whangaroa Harbour.)

Whakaangi is the present northern limit for this species.

3.4.2 Invertebrates

A comprehensive discussion and checklist of invertebrates is beyond the scope of the present study. However, it is recognised that the invertebrate fauna, both common, e.g. tree weta, and less common, e.g. *Peripatus* and the forest ringlet butterfly (*Dodonidia helmsii*), are a significant facet of indigenous ecosystems. With the present state of knowledge of these species, the protection of the whole range of habitat types is considered important to ensure populations of invertebrates are maintained.

Threatened snails

Kauri snail *Paryphanta busbyi busbyi*

Threatened endemic Category C

Found throughout the district, with Hihi being the northern limit of the species (P. Anderson/F. Brook pers. comm.).

Other snails

Information on small land snails is sparse, but the presence of rare species is likely.

Several species endemic to north of the Auckland isthmus have been recorded from the Ecological District, including *Liarea turriculata, Liarea waipoua, Amborhytida dunniae, A. forsythi,* and *Phrixgnathus trailli* (F. Brook pers. comm.).

*"*Golden Phenocolelix*",* a species of limited distribution, is recorded from Orotere, as well as the rare Northland endemic *Phrixgnathus* aff. *murdochi/ "Ultrlaoma" "cymbalum".*

The Category C threatened land snail *Placostylus hongii* was formerly found in dunes at Tauranga Bay but is now considered extinct in this Ecological District (F. Brook pers. comm. 1997).

Other invertebrates

Northland tusked weta ***Hemiandrus monstrosus***

Category C

Found at North Whangaroa.

3.4.3 Lizards/geckos

Northland green gecko ***Naultinus grayii***

A Northland endemic, not presently considered threatened, found in shrubland areas.

3.4.4 Threatened fish

Banded kokopu ***Galaxias fasciatus***

Category C

North Whangaroa, Tauranga Valley, Kaeo Bush.

Species of restricted distribution in the Ecological District

Giant bully ***Gobiomorphus gobioides***

Intermittent distribution around the New Zealand coast, with few records from Northland found at Butterfly Bay.

Blue-gilled bully ***Gobiomorphus hubbsi***

Conservancy ranked medium priority as, although its range covers all of New Zealand, there are few records from Northland. Recorded from the Ngaraumaunu Stream

3.5 THREATS

The clearance of land for agriculture has resulted in considerable fragmentation of habitats, opening them up to stock and weed invasion. Mistweed and Mexican devilweed are to be found in almost all forest and shrubland areas, and African clubmoss is present in some areas. The spread of 'new' weeds, such as Mexican daisy, which is naturalised on both sides of the Whangaroa Harbour, is cause for considerable concern.

In the forest and shrubland areas, possums, goats, and pigs constitute the main threat. However, uncontrolled dogs are posing a serious threat to ground-dwelling species, particularly kiwi, as lifestyle blocks created from larger

parcels of land bring more households and domestic animals into back-country areas.

Mustelids, particularly stoats, and rodents, are also significant predators of ground-dwelling bird species. Ferrets are not known to have established in the district to date. (A list of introduced mammals is in Appendix 8.4.)

Over recent years the population of New Zealand pigeon in parts of the Far North has been severely depleted, with heavy poaching pressure considered a significant factor, together with predation and competition (Pierce 1993).

Habitats on forest margins or in successional stages, which are likely to contain kiwi, are under threat from afforestation. Disturbed areas are also threatened by the invasion of exotic species such as prickly hakea, gorse, blue pine, and pampas.

This study confirmed the suspicion that wetlands are now a very rare habitat type. There are so few remaining that all are considered to be significant. Those that do remain are generally small and most are regularly accessed by stock.

Wetland species are particularly susceptible to changes in ground water hydrology and thus are easily affected by surrounding land uses. They are also threatened by invasion of exotic weeds, particularly willow, honeysuckle, and blackberry. There is enormous potential for the restoration of wetland habitats in this Ecological District.

Most coastal habitats in the Ecological District have been greatly modified, largely by agricultural development. There is so little original coastal vegetation remaining that all is significant, despite being fragmented and degraded by weeds. The adventives *Juncus acutus* and *Spartina alterniflora* are becoming intrusive in some saltmarsh, particularly in degraded areas of the Whangaroa Harbour, with *J. acutus* is also present in the Wairakau estuary. Coastal habitats are another potential area for habitat restoration.

Some sub-optimal, fragmented and degraded habitats are also important for the survival of species, such as isolated pockets of broadleaved trees, which are used intermittently by New Zealand pigeon, or a suite of small wetlands and drains used by bittern and rails.

Apart from eliminating or reducing human-related threats, natural areas need to be managed to control animal and plant pests to ensure long-term ecological sustainability of natural habitats.

4. Site descriptions

Records of threatened flora and fauna have been sourced from herbaria and other databases mentioned in Section 2.1, the Kiwi Recovery Programme (for NI brown kiwi), or were direct observations by Department of Conservation staff during the course of this survey.

The status of all records was checked prior to inclusion in this report. All records included were deemed to be valid as from 1992 or more recent, unless otherwise stated.

Only significant fauna data have been included in these site reports. See Appendix 8.4 for common fauna in the Whangaroa Ecological District.

The percentage cover of ecological units has not been included in some of the site descriptions, where much of the information has been drawn from previous surveys and reports which did not record these data.

4.1 SCHEDULE OF SITES

4.1.1 Level 1 sites

Site	Survey no.	Grid ref.
Stony Stream	O04/168A	O04 690 880
Whakaangi	O04/210	O04 615 945
Berghan Point	O04/211	O04 600 950
Taemaro	O04/212	O04 635 945
Opakau Point	O04/213	O04 660 955
Waimahana	O04/214	O04 670 945
Paikauri	O04/215	O04 670 920
Motukahakaha Bays	O04/216	O04 700 926
Tupou Bay	P04/001	P04 725 932
Camp Bay	P04/002	P04 753 917
Te Umukukupa	P04/003	P04 745 934
Tupou Bush	P04/004	P04 726 915
Karangi	P04/005	P04 745 905
Taupo Bay Estuary	P04/006	P04 760 890
Taupo Bay Cliffs	P04/006A	P04 757 900
North Whangaroa	P04/007	P04 750-870
Okura Bay	P04/007A	P04 774 844
Yerkovich Bush	P04/008	P04 748 847
Upper Whangaroa Harbour	P04/011	P04 732 818
Taratara Flax Swamp	P04/014	P04 710 800
Taratara	P04/015	P04 720 800
Waihapa Bay	P04/018	P04 738 812
Tahawai Shrubland	P04/029	P04 760 776
Barrons Bush	P04/033	P04 795 775
Komutu Swamp	P04/034	P04 780 790
Mangaiti	P04/035	P04 800 755
Ngarahu	P04/036	P04 820 755
Burlaces Reserve	P04/039	P04 845 730
Ohapehape	P04/043	P04 855 713
Bridge *et al*	P04/044	P04 855 744
Okaihau Stream	P04/045	P04 860 734
Upukorau Bush	P04/046	P04 870 710
Orotere	P04/048	P04 863 747
Taraire Rd	P04/050	P04 865 765
Martins Rd '339'	P04/051	P04 847 778
Kaeo Bush	P04/052	P04 820 800
Goldie/Clarkson	P04/053	P04 810 820
Mangapiko–Whangaroa	P04/054	P04 798 816
Kaeo River Mouth	P04/055	P04 785 805
Ohauroro (Peach I.)	P04/059	P04 797 865
Te Kahikatoa	P04/060	P04 810 870
Butterfly Bay	P04/062	P04 810 878
Waitapu	P04/064	P04 835 815
Upper Touwai Stream	P04/065	P04 850 830
Teheoriri	P04/066	P04 865 850
Tauranga Valley	P04/067	P04 845 870
Tauranga Bay Estuary	P04/067A	P04 828 878
Te Whau	P04/085	P04 890 735

STONY STREAM

Survey no.	O04/168A
Survey date	6 December 1995
Grid reference	O04 690 880
Area	52.1 ha
Altitude	40-160 m asl

Ecological unit

(a) Secondary totara–kanuka forest on alluvial flats.

(b) Secondary totara–kanuka forest on hillslope.

(c) Totara–puriri–kanuka forest on hillslope.

(d) Puriri–kanuka forest on hillslope.

(e) Puriri–kahikatea forest in gully.

(f) Secondary kauri–kanuka–kahikatea on hillslope.

(g) Kanuka shrubland on hillslope.

Landform/geology

Rolling hill country of Tangihua Complex igneous rock units.

Vegetation

(a) Secondary totara–kanuka forest on alluvial flats lines the stream between the Taupo Bay Rd and SH10 bridge, with frequent cabbage trees.

(b) Secondary totara–kanuka forest on hillslope. Upstream of (c) along the eastern tributary, kanuka and totara occur in equal proportion with frequent mamaku and occasional wattle and cabbage tree.

(c) Totara–puriri–kanuka forest on hillslope. Along the tributary which joins the main stream just above the bridge, and on the adjoining hillsides, totara is abundant, with puriri and kanuka common. Kahikatea and cabbage tree also occur.

Riparian and gully remnants occur at the head of a small tributary near the head of the catchment:

(d) Puriri–kanuka forest with kauri;

(e) Puriri–kahikatea with taraire—this also contains kauri, as well as mamaku, cabbage tree, and totara;

(f) Kauri–kanuka–kahikatea. Below (e) is an area of secondary forest with occasional cabbage tree and puriri.

(d), (e), and (f) are linked along the tributary to the lower catchment by (g) kanuka and scattered cabbage tree.

Fauna

Red finned bully, torrent fish, blue-gilled bully, smelt, koura, shrimp.

Significance

The vegetation contributes to riparian protection and a diversity of instream life in the Stony Stream, including blue-gilled bully, a species for which there are few records from Northland.

FIGURE 3. STONY STREAM, O04/168A.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

WHAKAANGI

Survey no.	O04/210
Survey date	27 March 1995
Grid reference	O04 615 945
Area	707.9 ha
Altitude	Sea level to 336 m asl

Ecological unit

(a) Towai-taraire forest on moderate to steep hillslope.

(b) Secondary kauri forest on hillslope.

(c) Kanuka forest on hillslope.

(d) Manuka–kanuka shrubland on hillslope.

(e) Manuka shrubland on hillslope.

(f) Kanuka–tanekaha forest on ridge.

(g) Taraire–tanekaha forest on hillslope.

Landform/geology

Steep coastal hill country of Tangihua Complex igneous rock units cut by Whangaroa Group andesite dikes and intrusions.

Vegetation

A large contiguous area from sea level to over 300 metres asl, centred on a core of tall diverse forest, and forming a mosaic of broadleaf–podocarp pockets interspersed with kanuka forest, and with lower manuka–kanuka shrubland, especially on the coastal periphery.

(a) Towai–taraire constitutes the main forest type. Kanuka is frequent. It is very diverse, containing rimu, totara, tanekaha, rewarewa, puriri, northern rata, tawa, pohutukawa, and hard beech.

Remnants with frequent rewarewa as well as scattered tanekaha, nikau and pohutukawa occur in the gullies between the TV transmitter and Whakaangi trig.

In the gullies below Taemaro Rd, towai–taraire remnants contain scattered northern rata, rimu, kauri, puriri and rewarewa. In one gully, isolated pohutukawa occurs.

(b) Secondary kauri forest - a small area with occasional rimu and tanekaha.

(c) Kanuka forest is extensive; rimu, tanekaha, kauri and, on the higher slopes, northern rata may be emergent, but sometimes emergents are lacking or with rewarewa as the only emergent.

Kanuka forest also occurs in the gullies between the TV transmitter and Whakaangi trig.

(d) On the Hihi side tall manuka–kanuka shrubland is dominant with lower manuka shrubland closer to the settlement. Towards Taemaro Rd, the shrubland is only about 2 metres tall and contains occasional towai and *Gahnia.*

FIGURE 5. WHAKAANGI, O04/210.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Along the coastal edge near Hihi is manuka–kanuka shrubland about 3–4 metres tall containing occasional pine trees.

(e) Manuka shrubland about 3 metres tall is extensive on the ridges west of the TV transmitter. Scattered within it are rewarewa, mamangi, kohuhu, cabbage tree and mamaku.

The Tauranganui Stream valley contains two less common vegetation types:

(f) Kanuka–tanekaha with occasional rewarewa and pohutukawa,

(g) Taraire–tanekaha with occasional kauri, puriri, pohutukawa, kanuka, mamangi and rewarewa.

According to anecdotal evidence (Tas McDermott pers. comm. to Lisa Forester 1995), the root parasite *Dactylanthus taylorii* (wood rose) was collected from this general area. Attempts to locate extant plants in April 1996 were unsuccessful, and a heavy presence of wild pig was evident. If it was present, it is likely that this species is now extinct in this ecological district.

Significant flora

Todea barbara (Vulnerable), *Pittosporum pimeleoides* subsp. *pimeleoides* (Rare) and *Loxsoma cunninghamii,* a fern of limited distribution in Northland. Two Northland endemics, *Ackama rosifolia* and *Coprosma parviflora,* are present in good numbers.

Fauna

North Island brown kiwi (Category A threatened species), NZ pigeon (Category B threatened species), kauri snail (Category C threatened species); pied tit; *Galaxias* sp.; Northland green gecko (Northland endemic) reported.

Significance

The area contains some unusual vegetation types, and pohutukawa is scattered throughout, indicative of its coastal character.

Representative site for manuka/kanuka shrubland and forest, kanuka–tanekaha forest, tanekaha–taraire forest, towai–taraire forest and kauri forest.

It is a large area, linked contiguously from Hihi to Berghan Point, with very little forest occurring between here and Te Paki, and habitat for several threatened or regionally significant plant and animal species.

Several species are at or approaching their northern limit including pied tit, kiwi, hard beech (*Nothofagus truncata*), *Pittosporum pimeleoides* subsp. *pimeleoides,* and *Cyathea smithii*.

A nationally important geopreservation site occurs at the Tauranganui Stream mouth, being an excellent example of a melange zone between the overlying Tangihua Volcanics and Mangakahia Complex (Kenny & Hayward 1993).

Approximately 20 hectares of this site near Taemaro is stewardship land administered by the Department of Conservation. Three Queen Elizabeth II National Trust covenants are located within this site - one near Whakaangi Trig (19.2 ha); one south of Tauranganui (20.4 ha) and another still being processed at the time of writing of 250 ha behind the settlement of Hihi. In addition, the Department of Conservation has recently purchased a further 20 hectares near the centre of the site.

BERGHAN POINT (Te Reinga Bay to Taemaro)

Survey no.	O04/211
Survey date	27 March 1995
Grid reference	O04 600 950
Area	589.9 ha
Altitude	Sea level to 180 m asl

Ecological unit

(a) Manuka shrubland on coastal hillslope.

(b) Open pohutukawa treeland on coastal cliffs.

(c) Pohutukawa forest on coastal cliffs.

Landform/geology

Steep, cliffed coastal hill country of predominantly Tangihua Complex igneous rock units, with an area of Mangakahia Complex interbedded sandstone and mudstone in the vicinity of the Oneti Stream. Both rock units are cut by numerous andesitic dikes (Whangaroa Group).

Vegetation

(a) Largely a mosaic of a manuka-dominant coastal shrubland to about 3 metres tall, lower on the eastern side of Berghan Point.

Pohutukawa is scattered along the coast and also occurs occasionally further inland. Puriri occasionally occurs in gullies.

From Hihi to Reinga Bay there is some pampas and kikuyu on the ridges.

In the north, rewarewa, mamaku, rimu and mamangi are emergent.

Behind Okaituna Bay, *Hakea* is frequent, and gorse and pampas occur occasionally with pohutukawa and cabbage tree.

The understorey is thickly regenerating and contains hangehange, tree ferns, mingimingi, towai and tanekaha.

(b) The cliffs around Te Reinga Bay are mostly rock or kikuyu with scattered pohutukawa and *Astelia.*

At Berghan Point the cliffs are highly modified with bare ground being predominant with patches of kikuyu and scattered gorse. Many of the pohutukawa are dead from possum browsing.

(c) At Motukukupa Point, is a small but unmodified example of coastal forest, with abundant pohutukawa and occasional puriri, karaka, and tawapou. The understorey is mainly flax and *Coprosma macrocarpa.*

Fauna

NI brown kiwi (Category A threatened species), in low numbers.

FIGURE 3. BERGHAN POINT, O04/211.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Significance

The coastal forest remnant at Motukukupa Point, although minute, is the best example of coastal forest of its type remaining in the ecological district.

Habitat for North Island brown kiwi, possibly the northernmost population.

A large area, linked contiguously from the coast to the Whakaangi trig.

The site includes the Te Reinga Bay thrust contact, a geopreservation site of national importance (Kenny & Hayward 1993).

A Queen Elizabeth II National Trust convenant of 67.8 ha is located on the eastern side of the site.

TAEMARO

Survey no.	O04/212
Survey date	27 March 1995
Grid reference	O04 635 945
Area	228 ha
Altitude	Sea level to 120 m asl

Ecological unit

(a) Manuka–kanuka shrubland on hillslope.

(b) Manuka–gorse shrubland on hillslope.

Landform/geology

Steep coastal hill country of Tangihua Complex igneous rock units.

Vegetation

A mosaic of manuka–kanuka shrubland and scrub between 2 and 6 metres tall.

Below the road the vegetation is discontinuous on its periphery, with a large component of gorse, and contains scattered towai, mamaku, and pine amongst the manuka. A broadleaf remnant occurs in the gully. Along the coast towards the east, gorse and manuka occur in equal proportions and manuka shrubland occurs in gullies near the coast.

North of the Taemaro Bay, towai, mamaku, and pohutukawa occur occasionally near the coast, with pohutukawa scattered on ridges, pa sites, cliffs, and along the coastal edge. An outstanding example of regenerating pohutukawa occurs on the side of one valley adjacent to Taemaro Bay. Other coastal species present are *Coprosma macrocarpa, Ipomoea cairica, Cortaderia splendens,* and *Pseudopanax lessonii*. Pingao is present in small numbers on the edge of the foredune, and small wetland areas occur along streams as they approach the coast.

Further inland the shrubland is taller. Towai, rewarewa, mamangi, and mamaku occasionally occur in the canopy.

Loxsoma cunninghamii is plentiful at several sites.

FIGURE 6. TAEMARO, O04/212.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND.

Fauna
North Island brown kiwi (Category A threatened species), NZ dotterel (Category B threatened species) and variable oystercatcher (Category C threatened species).

Significance
Habitat for several threatened species.

Regenerating coastal vegetation providing a linkage from sandy beach to the Whakaangi trig.

Approximately 20 ha of this site is classified as stewardship land, administered by the Department of Conservation.

OPAKAU POINT

Survey no.	O04/213
Survey date	11 May 1995
Grid reference	O04 660 955
Area	22.8 ha
Altitude	40–220 m asl

Ecological unit
(a) Pohutukawa forest on coastal cliff and hillslope.

Landform/geology
Coastal cliffs of Tangihua Complex igneous rock units and colluvium.

Vegetation
Coastal forest of pohutukawa with puriri, taraire, rewarewa, nikau, and tawapou. There is no understorey on the coastal edge.

Fauna
Not surveyed.

Significance
Although in a degraded state, this is the largest area of coastal forest remaining in the ecological district north of Whangaroa, and is of a different composition to the coastal vegetation around the Whangaroa Harbour, comprising broadleaf species including tawapou, now an uncomon species on the mainland. The forests to the south contain a conspicuous element of kanuka.

FIGURE 7. OPAKAU POINT, O04/213.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

WAIMAHANA

Survey no.	O04/214
Survey date	11 May 1995
Grid reference	O04 670 945
Area	307.2 ha
Altitude	Sea level to 200 m asl

Ecological unit

(a) Manuka shrubland on coastal hillslope.

(b) Taraire–puriri forest on moderate to steep hillslope.

Landform/geology

Steep coastal hill country of Tangihua Complex igneous rock units.

Vegetation

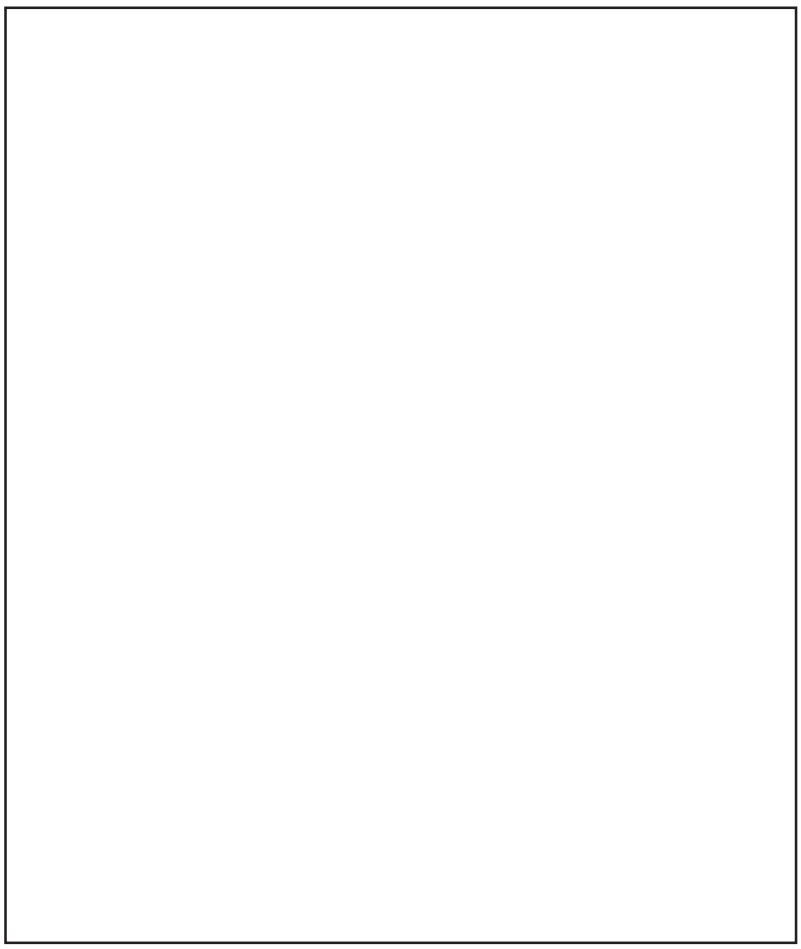
This area contains 3 main vegetation types:

(i) Low manuka shrubland with occasional cabbage tree, pohutukawa, and pine,

FIGURE 8 (ABOVE AND OVERLEAF). WAIMAHANA, O04/214.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.



(ii) Manuka shrubland between 4 and 6 metres with scattered towai and totara,

(iii) Coastal broadleaf forest of puriri–taraire with occasional rewarewa, karaka, kohekohe, pohutukawa, and mamaku.

Fauna

NI brown kiwi (Category A threatened species).

Significance

Represents a nationally uncommon vegetation type of coastal forest and shrubland.

Habitat for a threatened species.

PAIKAURI

Survey no.	O04/215
Survey date	27 March 1993
Grid reference	O04 670 920
Area	362.2 ha
Altitude	60–345 m asl

Ecological unit

(a) Taraire–towai forest on hillslope.

(b) Kanuka forest on hillslope.

(c) Kauri forest on ridge.

(d) Towai forest on hillslope.

(e) Manuka shrubland on hillslope.

(f) Taraire–puriri forest on hillslope.

(g) Puriri–totara–tanekaha forest on hillslope.

FIGURE 9. PAIKAURI, O04/215.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Landform/geology

Steep coastal hill country of Tangihua Complex igneous rock units.

Vegetation

A large mosaic of forest and shrubland.

(a) Taraire–towai forest. The largest area of forest around the trig north of Stony Creek Rd consists of towai-taraire with scattered rata, rewarewa, tanekaha, puriri, pukatea, mamaku, kohekohe, and karaka.

(b) Kanuka forest is dominant on the ridges with frequent kauri and occasional rimu.

(c) Kauri forest dominates on a few ridges.

(d) Towai forest. On the southern side of the trig, towai is common with frequent taraire, rewarewa, and mamaku. Towai is also dominant with puriri and taraire on the southern side of Stony Creek Rd. Northern rata, kauri, tawa, miro, totara, rewarewa, karaka, and tanekaha also occur.

(e) Manuka shrubland with cabbage tree, tree fern, rewarewa, mahoe and hangehange occurs on the margins. Near Stony Creek Rd there is manuka shrubland with scattered hangehange, fivefinger, towai, akeake, cabbage tree, mamaku, and gorse.

(f) Taraire–puriri forest. On the Taupo Bay Rd side are two puriri–taraire remnants with scattered kauri, rimu, tawa, tanekaha, and karaka.

(g) Puriri–totara–tanekaha forest. In the vicinity of the quarry are several remnants with taraire, puriri, totara, tanekaha, and kanuka, all of which contain scattered kauri.

Fauna

NI brown kiwi (Category A threatened species).

Significance

Representative example of manuka shrubland, manuka/kanuka forest, towai forest, and secondary kauri forest.

Habitat for a threatened bird species.

This site includes 247 ha of stewardship land administered by the Department of Conservation.

MOTUKAHAKAHA BAYS

Survey no.	O04/216
Survey date	11 May 1995
Grid reference	O04 700 926
Area	10.6ha
Altitude	Sea level

Ecological unit

(a) Sandy beach.

Landform/geology

Sandy beaches backed by Holocene foredunes.

Vegetation

A series of sandy beaches with farmland behind. Pohutukawa are scattered along the beach. One small pingao bush.

Fauna

Variable oystercatcher (Category C threatened species). Further surveying recommended.

Significance

An isolated sandy beach providing habitat and refuge for a threatened shore bird and potentially for other shorebirds.

FIGURE 10. MOTUKAHAKAHA BAYS, O04/216.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. d = DUNES

TUPOU BAY

Survey no.	P04/001
Survey date	December 1987 (Request for access denied)
Grid reference	P04 725 932
Area	12.4 ha
Altitude	Sea level

Ecological unit

(a) Sandy beach.

(b) *Juncus* association in brackish estuarine zone.

(c) Marram–*Spinifex* association on dunes.

Landform/geology

Sandy beach backed by Holocene foredunes.

Vegetation

Sandy beach with small estuary with *Juncus*, shore ribbon wood, *Eleocharis sphacelata*, marram, and *Spinifex*.

Occasional pohutukawa occur on the farmland behind beach.

FIGURE 11. TUPOU BAY, P04/001.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. d = DUNES

Fauna
NZ dotterel (Category B threatened species), variable oystercatcher (Category C threatened species).

Significance
Habitat for two threatened shore birds. Apart from owners, no land access to beach, providing protection for these vulnerable species from human disturbances which are a greater threat in habitats with regular public access. The best example of shorebird habitat in the ecological district.

CAMP BAY

Survey no.	P04/002
Survey date	11 May 1995
Grid reference	P04 753 917
Area	3 ha
Altitude	Sea level

Ecological unit
(a) Sandy beach.

Landform/geology
Sandy beach backed by Holocene foredune.

Vegetation
Sandy beach with farmland to sand edge. Some pohutukawa.

Fauna
NZ dotterel (Category B threatened species).

Significance
Habitat for a threatened shorebird, one of only 3 isolated sites in the ecological district providing habitat and refuge for threatened shore birds.

Well preserved tertiary fossils from Tangihua sediments occur in the middle of the Bay (Hollis & Hanson 1991), comprising an internationally important geopreservation site (Kenny & Hayward 1993).

FIGURE 12. CAMP BAY, P04/002.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. d = DUNES

TE UMUKUKUPA

Survey no.	P04/003
Survey date	20 April 1995
Grid reference	P04 745 934
Area	26.9 ha
Altitude	2–200 m asl

Ecological unit

(a) Taraire forest in gully.

(b) Taraire-puriri forest on hillslope.

(c) Manuka shrubland on hillslope.

(d) Pohutukawa treeland on coastal cliff.

Landform/geology

Coastal hill country of Whangaroa Group andesitic intrusives.

FIGURE 13. TE UMUKUKUPA, P04/003.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Vegetation

There is a small area of pohutukawa in a narrow strip down the cliff, with a closed canopy in places but no understorey.

In inland gullies, within 1 km of the coast, are small broadleaf–podocarp remnants (taraire, puriri, totara, and occasional kauri), with manuka shrubland about 2–3 m tall on the margins.

Fauna

Not surveyed, but NI brown kiwi (Category A threatened species) likely to be present.

Significance

One of the larger stands of mature pohutukawa remaining on this coastline.

NI brown kiwi known from an adjoining area and are thought to be present.

TUPOU BUSH

Survey no.	P04/004
Survey date	20 April 1994
Grid reference	P04 726 915
Area	37 ha
Altitude	100–200 m asl

Ecological unit

(a) Kanuka forest on hillslope.

Landform/geology

Coastal hill country of Tupou Complex greywacke.

Vegetation

Kanuka-dominant secondary forest with a wide range of other species including rimu, puriri, kauri, totara, mamaku, rewarewa, taraire, kahikatea, tanekaha, matai, lancewood, nikau, cabbage tree, and karaka.

The understorey includes mingimingi, hangehange, small-leaved coprosma species, *Coprosma macrocarpa,* mahoe, kawakawa, and pate. Houpara and pohutukawa are also present.

There is a small outlying remnant with similar vegetation in two gullies linked with low manuka.

FIGURE 14. TUPOU BUSH, P04/004.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. f = FOREST.

Fauna
North Island brown kiwi (Category A threatened species), NZ pigeon (Category B threatened species), kauri snail (Category C threatened species).

Significance
Habitat for three threatened fauna species.

The main bush area is a representative example of diverse secondary coastal kanuka forest.

KARANGI

Survey no.	P04/005
Survey date	20 April 1995
Grid reference	P04 745 905
Area	51 ha
Altitude	60-240 m asl

Ecological unit
(a) Manuka–gorse shrubland on hillslope.

(b) Taraire–puriri forest in gully.

Landform/geology
Steep coastal hill country on Tangihua Complex igneous rocks.

Vegetation
Remnants of puriri–taraire bush in the gullies surrounded by scrub of manuka and gorse.

Fauna
NI brown kiwi (Category A threatened species) present on sites adjoining this area.

Significance
Linkage and refuge for kiwi (threatened species) from adjoining pine plantation.

FIGURE 15. KARANGI, P04/005.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

TAUPO BAY ESTUARY

Survey no.	P04/006
Survey date	31 May 1995
Grid reference	P04 760 890
Area	5.7 ha
Altitude	Sea level

Ecological unit

(a) Raupo swamp on consolidated sands.

(b) *Juncus–Leptocarpus* association on estuary margin.

(c) Marram–*Spinifex* association on dunes.

FIGURE 16.TAUPO BAY ESTUARY, P04/006.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

e = ESTUARY; d = DUNES.

Landform/geology

Stream-mouth estuary behind Holocene foredune belt.

Vegetation

A thin strip of saltmarsh vegetation on the edge of the narrow, elongated estuary containing both *Juncus* and *Leptocarpus* with occasional flax and a few isolated pampas bushes.

At the upper end is a small raupo wetland.

On the dune, both marram and spinifex occur with a small amount of pingao and frequent sea rocket.

Fauna

NZ dotterel (Category B threatened species).

Significance

Representation of a restricted habitat type (an estuarine remnant).

Habitat for threatened bird species.

TAUPO BAY CLIFFS

Survey no.	P04/006A
Survey date	31 May 1995
Grid reference	P04 757 900
Area	3.6 ha
Altitude	Sea level to 60 m

Ecological unit

(a) Coastal manuka shrubland on coastal cliffs.

Landform/geology

Coastal cliffs of Tupou Complex greywacke.

Vegetation

Manuka 2–4 metres tall with frequent pohutukawa and occasional kohekohe, *Astelia banksii,* kawakawa, and tutu.

Significant flora

Fuschia procumbens (Local)

Fauna

Not surveyed.

Significance

Remnant of uncommon coastal vegetation, including a species of Local distribution.

FIGURE 17. TAUPO BAY CLIFFS, P04/006A.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. s = SHRUBLAND.

NORTH WHANGAROA

Survey no.	P04/007
Survey date	1995
Grid reference	P04 750 870
Area	2583.4 ha
Altitude	Sea level to 370 m asl

Ecological unit

(a) Manuka–kanuka shrubland on coastal cliffs.

(b) Manuka–kanuka shrubland on hillslopes and ridges.

(c) Kanuka–manuka–mamangi shrubland on hillslopes.

(d) Manuka scrub on hillslope.

(e) Bracken fernland on hillslope.

(f) Broadleaf shrubland association on coastal margin.

(g) Broadleaf shrubland association on rocky ridges.

(h) Kanuka forest on hillslope and ridge.

(i) Kanuka–totara forest on ridge.

(j) Kanuka–kauri forest on ridge.

(k) Tanekaha–kauri forest on ridge.

(l) Kauri forest on ridge.

(m) Tanekaha forest on ridge.

(n) Taraire forest on hillslope.

(o) Taraire–towai forest in gully.

(p) Taraire–kanuka forest on hillslope.

(q) Taraire–puriri forest on moderate to steep hillslope.

(r) Puriri forest in coastal gully.

(s) *Metrosideros* association on rock outcrop.

(t) Flax swamp shrubland in stream valley.

(u) Raupo swamp in valley.

(v) Tussock shrubland association on coastal cliff.

Landform/geology

Steep hill country with spectacular rock bluffs, escarpments and coastal cliffs. Most of the area is formed of Whangaroa Group andesitic lava flows and breccia, but underlying Tupou Complex greywacke outcrops in the vicinity of Totara North, Waitepipi Bay, and in the valleys of the Wairakau and Tahuna Streams. Freshwater wetlands are present in the valley opening to Rere Bay and along the Wainiwha Stream upstream of the waterfall.

FIGURE 18 (ABOVE AND OPPOSITE). NORTH WHANGAROA, P04/007.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

w = WETLAND; s = SHRUBLAND; f = FOREST.

Vegetation

A mosaic of diverse secondary broadleaf–podocarp and kauri forest interspersed with and buffered by shrublands that have been regenerating for many years. Although all of the area has been logged at some time, at least 40% of the area has never being totally cleared or burnt, and has a very high diversity of indigenous species (over 300).

The most intact areas are in the southwestern sector (known as Campbells Bush), and in the western headwaters of the Tahuna Stream.

Type (a) low manuka–kanuka shrubland, occurs on coastal cliffs with locally frequent mamangi, flax, rengarenga lily and *Astelia*. Karaka, pohutukawa, puriri and kowhai occur occasionally.

On the north side of the Wairakau Stream is a mosaic of regenerating manuka-kanuka shrubland between 2 and 6 metres, with mamaku, mahoe, hangehange, towai and the occasional puriri. Towards the coast *Hakea* is frequent.

Type (b) manuka and kanuka between 2 and 6 metres tall, with emerging cabbage tree, tree ferns, and mamangi, occurs on the coastal peninsula. Mature puriri and pohutukawa are found below the high rocky outcrops.

Tree ferns are dominant in some gullies. There are also occasional emerging rewarewa and some coastal fivefinger (*Pseudopanax lessonii*) in the canopy. Mistweed is the most abundant shrub/ground cover on the harbour side except where there are patches of rasp fern which forms a dense monculture.

Other common understorey species are bracken, maidenhair (*Adiantum hispidulum*), hangehange, both large and small leaved coprosma species, rangiora, lacebark, lancewood, *Gahnia lacera*, mapou, *Hebe stricta,* and mingimingi.

Type (c) Kanuka–manuka–mamangi shrubland. Shrubland 2–3 metres tall with emergent rewarewa and towai occurs around the high point 'Papakura' on a large plateau. In some places the rewarewa exceeds 6 metres. The understorey contains a variety of shrubs and seedlings of totara, towai, tanekaha, rewarewa and a few kauri and rimu. Near the plateau edge on the southern side the canopy trees are taller, from 4-6 metres. A shallow basin near the centre of the area contains a stand of larger trees including kauri, rimu, tanekaha and kahikatea. Scattered throughout are wilding pines and mistweed, and the summit has a stand of gorse. Some *Hakea* is present but it is not dominant.

More recently disturbed areas in the southwest (Campbells Bush) are also regenerating in this type and contain totara, kohekohe, and towai seedlings.

Type (d) Manuka scrub. Occurs on the northern margin of the forest and Tapu Mountain with bracken, mistweed, and blue pine.

Type (e) Bracken fernland. Occurs within the mosaic on the northern side of the Wairakau Stream and on the northern margin of the forest. *Ageratina* sp. tend to be frequent to abundant, with cabbage tree, mamaku, towai, and akeake also occurring.

Type (f) Broadleaf shrubland association on coastal margin. Behind the beach at Ranfurly Bay is a margin of flax, *Leptocarpus*, kawakawa, mahoe, and cabbage tree with large-leaved coprosma species, houpara, whau, and mamaku also present.

Type (g) Broadleaf shrubland association on rocky ridges. Occurs on the ridge east of Akatere. The Whangaroa-associated shrub *Pseudopanax gillesii* is common, akepiro is frequent, and the endemic *Coprosma neglecta* subsp. "whangaroa", *Astelia banksii,* and *Pittosporum umbellatum* scattered.

Type (h) Kanuka forest. South of the Wairakau Stream on the ridges running north is tall kanuka with puriri, rewarewa and occasional karaka and pohutukawa.

Towards the west, the vegetation is more mature, with diverse kanuka forest containing frequent tanekaha, towai, totara and taraire and scattered tawa, rewarewa, kauri (on the ridges), northern rata, puriri, kahikatea, toru, nikau, karaka, rimu, and pukatea.

Tall kanuka forest is also common in Campbells Bush, with frequent tanekaha and scattered kauri, rimu, rewarewa, white maire, toru and kawaka. Monoao and matai occur rarely, as does pohutukawa, particularly on outcrops. The understorey is mainly kohekohe, mamangi, tree ferns, mingimingi, Kirk's tree daisy, dwarf cabbage tree, *Alseuosmia banksii,* and *Pittosporum umbellatum.*

Type (i) Kanuka–totara forest. Occurs on some of the ridges with kohekohe and mamangi. Tanekaha, kauri, rimu, and rewarewa also occur.

Type (j) Kanuka–kauri forest. Occurs on some ridges in the area known as Campbells Bush.

Type (k) Tanekaha–kauri forest. Kanuka is locally frequent and rimu, totara, northern rata, rewarewa, and kawaka occurring occasionally.

Type (l) Kauri forest. Secondary kauri is a dominant emergent over kanuka and frequent tanekaha on some ridges. Rimu, northern rata, and rewarewa also occur. Elsewhere kauri is dominant, with frequent tanekaha and occasional kanuka, totara, rimu, and isolated kawaka.

Kauri also features in some areas of kanuka forest on ridges where it may be locally frequent as an emergent, along with totara. Tanekaha, rewarewa, and emergent rimu are found scattered in this type.

Other species associated with kauri are fan fern, *Astelia trinervia, Gahnia* species, *Dracophyllum latifolium,* and the orchids *Pterostylis graminea* var. *rubicaulis* and *Acianthus sinclairii.*

Type (m) Tanekaha forest. Occurs as part of a mosaic with Types (h), (i), (j) (k) and (l). Totara, rimu, kauri, and kanuka occur occasionally.

Type (n) Taraire forest. Taraire forest is widespread, with frequent towai, kohekohe and kanuka with scattered puriri, tawa, and rewarewa (particularly in the gullies and wetter sites). The understorey is generally dense, with tree ferns, hangehange, kiekie, and supplejack common. In wetter areas, nikau and parataniwha are abundant and filmy ferns common.

The upper Tahuna catchment is mainly this type with occasional totara, puriri, hinau, karaka, towai, kohekohe, and matai.

Type (o) Taraire–towai forest. Occurs in some gullies. Other species occurring are puriri, mamaku, rewarewa, nikau, and kohekohe. Emergent rimu, northern rata, and kauri may occur occasionally in both of these types.

Type (p) Taraire–kanuka forest. Occurs below Akatere and on the southwestern slopes of Campbells Bush with occasional rimu, puriri, karaka, totara, kohekohe, towai, tawa, northern rata, mamaku, and emergent kauri and rewarewa.

Type (q) Taraire–puriri forest. Occurs on the peak '304' m asl (G. R. 726 888). Totara is frequent with occasional cabbage tree.

Type (r) Puriri forest. Occurs in the gullies along the coast with frequent pohutukawa and occasional kowhai, karaka, rewarewa and houpara.

Type (s) *Metrosideros* association. Rocky outcrops occur throughout the forest, with pohutukawa and northern rata commonly growing on them. In such areas broom, *Astelia trinervia, Olearia furfuracea, Pseudopanax gillesii, Brachyglottis kirkii, Coprosma neglecta* subsp. "whangaroa", and *Pittosporum umbellatum* are often found also.

Type (t) Flax swamp. Close to the top of the Wainiwha Falls is a small perched wetland with flax and cabbage trees.

Type (u) Raupo swamp. Occurs in a valley above Rere Bay.

Type (v) Tussock shrubland association. In many places, rocky cliffs fall directly to the water. Along the entrance to the Wairakau estuary, the dominant species in this type are flax, rengarenga lily, *Astelia, Hebe,* and *Coprosma neglecta* subsp. "whangaroa", with kowhai, pohutukawa, karaka and puriri growing where there are pockets of soil. On the harsher sites, such as the northern side of the Haystack, karaka, puriri, and kowhai are absent although these species are found in other places around the shoreline. There is a small amount of pampas on the outer coastal cliffs.

Significant flora

Calystegia marginata (Vulnerable), *Pimelea tomentosa s.s.*(Rare), *Coprosma neglecta* subsp. "whangaroa" (endemic), *Pseudopanax gillesii* (distribution restricted to Whangaroa and Little Barrier Island), *Loxsoma cunninghamii* (restricted distribution in Northland), *Pittosporum pimeleoides* subsp. *pimeleoides* (Rare), *Pittosporum virgatum* (Local), *Colensoa physaloides* (Local), *Halocarpus kirkii* (restricted distribution), *Manoao colensoi* (restricted distribution), *Libocedrus plumosa* (restricted distribution), in relatively high numbers, *Metrosideros carminea* (uncommon in the ecological district).

Fauna

North Island brown kiwi (Category A threatened species), NZ pigeon (Category B threatened species), kauri snail (Category C threatened species), tusked weta (Category C threatened species), banded kokopu (Category C threatened species), Northland green gecko (Northland endemic), fernbird and pied tit (regionally significant species), giant worm *Spenceriella gigantea*,

Significance

Representative site for (a), (b), (c), (e), (f), (g), (h), (i), (j), (k), (l), (m), (n), (o), (p), (r), (s), (t), (u) and (v).

Many threatened, local, endemic or regionally uncommon plant species and in total a large number of indigenous species (over 300).

Habitat for several fauna species which are threatened or regionally significant.

The site includes several features classified as geopreservation sites including:

- Whangaroa North Head ring plain deposits in cliffs 1.5 km north of the harbour entrance (nationally important);

- Jellicoe Cave, a narrow, navigable sea cave through Wairakau Volcanics breccia, located on the open coast near the ring plain deposits above (regionally important);

- Taupo Bay andesite flow located in the lower parts of high cliffs on the open coast east of Taupo Bay (regionally important);

- Taupo Bay ring plain deposits located in cliffs and tidal rocks at the southern end of Taupo Bay (regionally important);

- Wairakau Bay estuary (regionally important);

- Whangaroa Harbour lacustrine sequence located on the shoreline below 'Papakura' (regionally important);

- Whangaroa exfoliation domes of a spectacular nature surrounding Pekapeka Bay (regionally important).

The area includes 1755 ha of Scenic Reserve, 43 ha of Historic Reserve, and a 75 ha Queen Elizabeth II National Trust covenant.

OKURA BAY

Survey no.	P04/007A
Survey date	20 May 1995
Grid reference	P04 774 844
Area	1.6 ha
Altitude	20–60 m asl

Ecological unit

(a) Pohutukawa treeland on hillslope.

FIGURE 19. OKURA BAY, P04/007A.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. f = FOREST.

Landform/geology
Coastal hillslope of Tupou Complex greywacke.

Vegetation
A small stand of pohutukawa with scattered pine and eucalypt.

Fauna
Not applicable.

Significance
A small remnant stand of mature pohutukawa—uncommon in the ecological district.

YERKOVICH BUSH

Survey no.	P04/008
Survey date	13 July 1994
Grid reference	P04 748 847
Area	19.5 ha
Altitude	100–260 m asl

Ecological unit

(a) *Metrosideros* association on rock outcrop.

(b) Taraire forest on steep hillslope.

(c) Manuka–kanuka shrubland on moderate to steep hillslope.

Landform/geology

Steep hill country with spectacular rock bluffs, and escarpments. Most of the area is formed of Whangaroa Group andesitic lava flows and breccia.

Vegetation

An outlying area of the larger Ranfurly Bay S.R. mosaic, separated from the larger area only by a farm track.

Type (a) *Metrosideros* association. About 20% of the area is pohutukawa and northern rata, with puriri, taraire, karaka, totara and towai.

Type (b) Taraire forest. Half of the area is taraire dominant broadleaf-podocarp, with occasional kauri. The subcanopy has abundant kohekohe with occasional nikau, mamaku, and ponga. Kawakawa and *Rhabdothamnus* are frequent in the shrub layer with occasional gully fern, wheki, *Coprosma rhamnoides* and scattered totara, taraire, and kohekohe seedlings. Thread fern occurs frequently throughout the ground layer with occasional hairy shield fern. Mistweed, *Peperomia,* and bracken are locally abundant. *Colensoa physaloides* occurs rarely. The coastal fivefinger *Pseudopanax lessonii* is present and *Ascarina lucida* (hutu), uncommon in this district, is also reported.

Type (c) Manuka–kanuka shrubland. The remainder is regenerating shrubland, with several species emerging from the canopy. On the northwestern perimeter are a few pine trees.

Fauna

NZ pigeon (Category B threatened species), kauri snail (Category C threatened species).

Significance

An uncommon combination of pohutukawa and northern rata, but showing evidence of heavy possum browse. The surrounding regenerating shrubland vegetation provides a buffer.

Habitat for two threatened species.

On a steep south-facing slope, it is also the source of water for a number of local residences.

FIGURE 20. YERKOVICH BUSH, P04/008.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

UPPER WHANGAROA HARBOUR

Survey no.	P04/011
Survey date	20 October 1994
Grid reference	P04 732 818
Area	948.8 ha
Altitude	Sea level

Ecological unit

(a) Mangrove forest on estuary.

(b) *Leptocarpus* association at land/estuary interface.

Landform/geology

Drowned river valley.

FIGURE 21. UPPER WHANGAROA HARBOUR, P04/011.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. e = ESTUARY.

Vegetation

Extensive mangrove areas with salt marsh in the upper reaches. The salt marsh consists mostly of *Leptocarpus,* with *Juncus* and occasional flax, pampas, *Baumea juncea* and *Plagianthus*.

The adventive *Juncus acutus* is locally dominant in some parts of the upper harbour (and also in the Wairakau estuary), and *Spartina* is present near the Kaeo River mouth.

Fauna

Australasian bittern, Caspian tern, and reef heron (all Category O threatened species), fernbird (Otangaroa Rd, Waikoura Creek, Weber and Pupuke Rds), and banded rail (both regionally significant species).

Significance

High-quality estuarine habitat for birds including threatened and regionally significant species and the best example of estuarine habitat in the ecological district.

Two hectares on the margin of reclaimed land at Waihapa is classsified as stewardship land, administered by the Department of Conservation.

TARATARA FLAX SWAMP

Survey no.	P04/014
Survey date	13 July 1994
Grid reference	P04 710 800
Area	3.4 ha
Altitude	c. 50 m asl

Ecological unit

(a) Flax swamp shrubland in stream valley.

(b) Raupo swamp in stream valley.

Landform/geology

Freshwater wetlands along a tributary of the Mangawhero Stream

Vegetation

In the upper part, raupo is common with frequent flax and *Eleocharis sphacelata.* Downstream, flax is dominant with frequent manuka and bracken, *Hebe stricta* and cabbage tree also occur occasionally.

Fauna

Not surveyed.

Significance

A small example of flax swamp, a rare habitat type in the ecological district and region.

FIGURE 22. TARATARA FLAX SWAMP, P04/014.
EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. w = WETLAND.

TARATARA

Survey no.	P04/015
Survey date	13 July, 20 October 1994
Grid reference	P04 720 800
Area	401.1 ha
Altitude	60–300 m asl

Ecological unit

(a) Manuka shrubland on moderate to steep hillslope.

(b) Bracken scrub on hillslope.

(c) Pohutukawa treeland on rock face.

(d) Taraire forest on hillslope.

(e) Kanuka–tanekaha forest on hillslope.

(f) Kanuka forest on hillslope.

(g) Secondary kahikatea forest on hillslope.

(h) Raupo swamp in valley bottom.

FIGURE 23. TARATARA, P04/015.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

w = WETLAND; s = SHRUBLAND; f = FOREST.

Landform/geology

Includes Taratara Rock, a spectacular flat-topped, steep sided butte, one of the most dominant landscape features in the region.

Bush: Hillslope of Mangakahia Complex siliceous mudstone and overlying bluff-forming Whangaroa Group andesitic breccia, and derived colluvial boulders of breccia.

Shrubland: Hill country of Mangakahia Complex siliceous mudstone, with overlying bluff-forming Whangaroa Group andesitic breccia, and derived colluvial breccia boulders at Taratara.

Vegetation

A large mosaic of manuka shrubland, scrub, wetland and forest.

Generally speaking, more weeds occur on the margins, and the vegetation of most interest occurs closer to the peak itself. However, there are exceptions to this, with a plant of the vulnerable fern *Todea barbara* being found on the roadside, and with apparently ordinary vegetation containing fernbird, and possibly kiwi.

Type (a) Manuka shrubland. Near the corner of Otangaroa and Weber-Waihapa Rd, on the north side of Taratara, the vegetation is mostly manuka between 3 and 4 metres, with scattered mamaku, cabbage tree, towai, rewarewa, nikau, puriri, and the occasional rimu. About 10% of this area contains pampas and mistweed as well as manuka, bracken, hangehange, and mamaku.

The narrow strip of vegetation running down from Taratara to join this is also mostly manuka, between 2 and 4 metres tall. As well as puriri, mamaku and mahoe, blue pine, pampas, wattle, and pine also occur. Near Waihapa Rd the vegetation is similar, but without exotics.

The rounded peaks of the Taratara complex are covered in low shrubland of manuka, sometimes with frequent mamaku. Totara, rewarewa, cabbage tree, *Gahnia*, pine and blue pine also occur.

Between here and Takakuri Station is an extensive area of low manuka with occasional cabbage tree and mamaku. Closer to Takakuri the shrubland is slightly taller and occasional towai and *Gahnia* are apparent. Along the Mangawhero Stream is a band of taller shrubland with scattered totara and kahikatea. Nearer Otangaroa Rd, radiata and blue pine occasionally occur.

Type (b) Bracken scrub. Occurs near Otangaroa Rd with *Ageratina* species, manuka, pampas and hangehange.

Type (c) Pohutukawa treeland. Mature pohutukawa grow amongst the tumble of rock fallen from the peak. The rock fern *Cheilanthes humilis* is found on some of the exposed rock surfaces.

Type (d) Taraire forest. Just below Taratara rock on the north side is a small remnant of taraire with frequent karaka and occasional puriri, nikau and pohutukawa. Near Waihapa Rd it occurs with puriri. This area also contains isolated pohutukawa as well as kowhai, northern rata, totara and rewarewa.

Taraire with towai and kanuka and occasional rewarewa, kahikatea, kauri rickers and emergent northern rata occurs above the airstrip on the south eastern side.

Below Taratara peak on the Otangaroa side is another small remnant of taraire with occasional karaka, puriri, nikau and mamaku.

Type (e) Kanuka–tanekaha forest. Occurs with northern rata and pohutukawa above the airstrip on the southeastern side.

Type (f) Kanuka forest. Occurs near Waihapa Rd, with frequent rewarewa and northern rata as well as occasional pohutukawa, kahikatea, taraire, rimu, tanekaha, karaka, towai and nikau.

Above the airstrip on the southeastern side, it occurs with occasional kauri, tanekaha and rewarewa.

Type (g) Secondary kahikatea forest. Below Taratara peak on the Otangaroa Rd side is a patch of kahikatea with towai, rewarewa, nikau and kanuka. Puriri and totara are also present.

Type (h) Raupo swamp. In the valley bottom on the southwestern side, there is a small raupo wetland with frequent manuka and wheki.

Significant flora

The restricted distribution *Pseudopanax gillesii* has been recorded from this site (Katie Reynolds - voucher in CHR).

Fauna

Fernbird (regionally significant species).

Significance

A large contiguous habitat.

The shrubland contains a regionally significant bird species and may contain the Vulnerable *Todea barbara*.

Representative site for manuka shrubland, kanuka forest, kanuka-tanekaha forest and taraire forest, and contains probably the most inland site of pohutukawa in the district, and the association of pohutukawa with kauri and northern rata is unusual and of considerable interest. In addition this vegetation occurs on and around a very distinctive geological landmark.

A geopreservation site of regional importance (Kenney and Hayward 1993).

WAIHAPA BAY

Survey no.	P04/018
Survey date	20 October 1994
Grid reference	P04 738 812
Area	133.5 ha
Altitude	Sea level to 60 m asl

Ecological unit

(a) Manuka shrubland on gentle hillslope.

(b) Manuka swamp–shrubland on alluvium.

(c) Raupo–*Juncus–Baumea* association on estuary margin.

Landform/geology

Coastal hillslopes of Mangakahia sandstone and mudstone

Vegetation

Type (a) Manuka shrubland. On the western side of the bay, more than half of the area is low manuka with occasional blue pine and *Hakea*, some of which has been intermittently cleared. Most of the remainder is about 2–3 metre tall manuka, with occasional towai and mamaku as well as blue pine. On the edge of the mangroves is a small area where mamaku is abundant.

Elsewhere, manuka 3–4 metres tall is abundant with mamaku and cabbage tree, as well as occasional *Coprosma propinqua* and kahikatea. The occasional peach tree near the sea edge is evidence of previous occupation.

On the eastern side of the bay, the vegetation is mostly manuka 2–3 metres tall with occasional wattle and wild pine. A small area also contains isolated macrocarpa, totara, and puriri.

Type (b) Manuka swamp–shrubland. At the head of the bay is a swampy area of manuka with frequent *Juncus* and isolated flax and cabbage tree. This runs into Type (c).

Type (c) Raupo–*Juncus–Baumea. Coprosma tenuicaulis* and *Gleichenia* are locally frequent, and cabbage tree, *Coprosma propinqua,* and *Blechnum* fern also occur.

Fauna

Fernbird (regionally significant species).

Significance

Coastal riparian vegetation and wetland, uncommon vegetation types in the Ecological District, and habitat for a regionally significant bird species. The shrubland provides a buffer for the estuary.

FIGURE 24. WAIHAPA BAY, P04/018.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; w = WETLAND.

TAHAWAI SHRUBLAND

Survey no.	P04/029
Survey date	20 October 1994
Grid reference	P04 760 776
Area	91.8 ha
Altitude	20–120 m asl

Ecological unit

(a) Manuka shrubland on hillslope.

(b) Manuka–gorse shrubland on hillslope.

(c) Manuka–bracken shrubland on hillslope.

(d) Secondary totara forest on hillslope.

(e) Puriri forest on hillslope.

Landform/geology

Hill country comprising a tectonic melange of Mangakahia Complex rock units, with colluvial Kerikeri Volcanics basalt boulders

Vegetation

The majority of this area is manuka shrubland with scattered totara, towai, mamaku, cabbage tree, and pine.

On the south western margins is a small area of bracken, gorse, and manuka scrub.

About 10% of the area is secondary totara with frequent towai and occasional kahikatea, puriri, taraire, rewarewa, mamaku, and cabbage tree.

A similar-sized area consists of puriri with towai and the other species mentioned as well as rimu and karaka.

There is a very small stand of manuka with tanekaha.

Fauna

Not surveyed—habitat suitable for kiwi, which may be present.

Significance

A large regenerating area which may contain kiwi.

It is a representative site for manuka shrubland, totara forest, and puriri forest, being only one of two sites of puriri dominance recorded in the ecological district, as well as occurring on a geological base of limited extent in this ecological district.

FIGURE 25. TAHAWAI SHRUBLAND, P04/029.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

BARRONS BUSH

Survey no.	P04/033
Survey date	13 January 1995
Grid reference	P04 795 775
Area	379.7 ha
Altitude	20–240 m asl

Ecological unit

(a) Manuka–kanuka shrubland on hillslope.

(b) Secondary kanuka forest on hillslope.

(c) Secondary tanekaha forest on hillslope.

(d) Taraire–puriri forest in gully.

(e) Manuka–gorse–bracken scrub.

(f) Constructed pond in stream valley.

(g) Raupo swamp in stream valley.

(h) *Schoenoplectus* reedland in stream valley.

Landform/geology

Hill country of Waipapa Group greywacke and overlying Te Kuiti Group glauconitic sandstone in the northeast and east (i.e. vicinity of Taita trig), and of Mangakahia Complex sandstone and mudstone lithofacies in the west and southwest.

Vegetation

A mosaic of manuka–kanuka shrubland, regenerating kanuka forest, broadleaf pockets and scrub.

Type (a) Manuka–kanuka shrubland. Occurs on the fringes with occasional mamaku, rewarewa, towai, totara, puriri and pine.

Type (b) A considerable portion of the site, especially in the north and east, is vigorously regenerating kanuka forest. In some places only puriri and mamaku are emergent but elsewhere rewarewa, kahikatea, totara, towai, rimu and tanekaha are emergent. Through much of the area these species are on the point of emergence. The best example of secondary forest can be seen from SH 10 near the Kaeo bridge. Here tanekaha occurs frequently within the kanuka with occasional rewarewa, rimu and kauri, or is actually dominant (Type (c)) with lesser amounts of kanuka and totara. Totara also occurs frequently within this kanuka dominance. On the western side in the catchment of the Komutu Creek, totara is common and rimu and puriri occasional.

The understorey consists of *Alseuosmia*, Kirks tree daisy, mingimingi, small-leaved *Coprosma* species, tree ferns and seedling tanekaha, rimu and totara. The ground layer contains abundant moss and frequent Hounds tongue fern.

Type (c) Secondary tanekaha forest. Occurs within and also on the margin of Type (b).

FIGURE 26. BARRONS BUSH, P04/033.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Type (d) Taraire–puriri forest. Tends to occur in the gullies. Rimu, kahikatea, totara, rewarewa, karaka, kauri and tanekaha are also present. The understorey consists of ponga, nikau, hangehange, supplejack and *Blechnum fraseri.*

Type (e) Manuka–gorse–bracken scrub. In some places, especially below Puketawa, gorse and scrub link the areas to each other and to Maungamiemie (Maungataniwha Ecological District).

Type (f) Constructed pond. On the western side is Barrons Dam, an artificial pond, with bush on one side, manuka 3–4 metres tall on 2 sides, and open grass with scattered manuka on the fourth side. The pond has *Azolla, Potamogeton* and filamentous algae growing in the shallows with several patches of water lilies. There are some patches of the adventive African club moss near the pond.

Type (g) Raupo swamp, On one corner next to the bush, there is a small area of raupo with *Calystegia sepium, Baumea rubiginosa, Cyperus ustulatus,* and hopeless menace grass grading into Type (h) *Schoenoplectus tabernaemontani.*

Type (h) *Schoenoplectus tabernaemontani* reedland. Occurs at the head of the pond on the bush edge.

Fauna

Australasian bittern (Category O threatened species).

Northland–Auckland endemic Northland snail *Liarea turriculata* and the Northland endemic *Phrixgnathus trailli.*

Significance

A large contiguous area which contains a very good example of secondary tanekaha forest and secondary kanuka forest at the point of emergence and contains several endemic snail species.

The constructed pond margins provide habitat for Australasian bittern, and is the best example of a pond habitat in the Ecological District. Type (h), although small in extent is the only example of its type recorded in the ecological district.

KOMUTU SWAMP

Survey no.	P04/034
Survey date	13 January 1995
Grid reference	P04 780 790
Area	29 ha
Altitude	>sea level

Ecological unit

(a) Raupo swamp on alluvium.

(b) Manuka–cabbage tree shrubland on alluvial flats.

(c) Cabbage tree shrubland on alluvium.

(d) Raupo–flax swamp on alluvium.

Landform/geology

Freshwater wetland on Holocene estuarine and swamp deposits

Vegetation

Type (a) Raupo swamp. About a third of this area is raupo with occasional flax.

Type (b) Manuka shrubland. Another third is 2–3 metre tall manuka.

FIGURE 27. KOMUTU SWAMP, P04/034.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. w = WETLAND.

Type (c) Cabbage tree shrubland. About 25% is cabbage tree with areas of rank grass and *Cyperus ustulatus*, and scattered manuka, flax, *Coprosma tenuicaulis* and *Coprosma propinqua*. Several native sedges and rushes occur as understorey species.

Type (d) Raupo–flax swamp. On the eastern side, away from the highway, is a raupo–flax swamp with scattered cabbage tree. This wetland has changed since previous roadworks altered the drainage, resulting in the original estuarine–brackish ecosystem becoming predominantly freshwater, and it has become drier.

Fauna

Australasian bittern (Category O threatened species), fernbird, banded rail and spotless crake (all regionally significant species).

Significance

The best example of a freshwater wetland known in this district. Good examples of cabbage tree thickets are becoming increasingly rare in the ecological district and region.

Habitat for several significant bird species.

MANGAITI

Survey no.	P04/035
Survey date	31 January 1995
Grid reference	P04 800 755
Area	117.2 ha
Altitude	40-140 m asl

Ecological unit

(a) Manuka–kanuka shrubland on hillslope.

(b) Taraire forest on hillslope.

(c) Totara–kahikatea–taraire.

Landform/geology

Hill country of Waipapa Group greywacke and Te Kuiti glauconitic sandstone in the southeast, and of overlying Mangakahia Complex mudstone in the northwest.

FIGURE 28. MANGAITI, P04/035.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. s = SHRUBLAND.

Vegetation

The majority of this area is manuka–kanuka shrubland between 2 and 4 metres tall. Scattered throughout are mamaku, totara and kahikatea.

About 10% of the area is secondary totara–kahikatea–kanuka with occasional rimu and mamaku.

An even smaller area is taraire with kahikatea and occasional rimu, puriri, towai and rewarewa.

Fauna

NI brown kiwi (Category A threatened species).

Significance

A large area (over 100 ha), habitat for a threatened species.

NGARAHU

Survey no.	P04/036
Survey date	13 January 1995
Grid reference	P04 820 755
Area	439 ha
Altitude	40–300 m asl

Ecological unit

(a) Manuka–kanuka shrubland on hillslope.

(b) Taraire–kahikatea forest in gully.

(c) Taraire–totara forest on hillslope.

(d) Secondary towai–kanuka forest and shrubland in gully.

(e) Secondary totara–kanuka on hillslope.

(f) Secondary manuka–tanekaha–totara forest on hillslope.

(g) Taraire–puriri forest on hillslope and gully.

(h) Towai forest in gully.

(i) Towai–manuka shrubland on hillslope.

Landform/geology

Steeply dissected hill country of Waipapa Complex greywacke

Vegetation

Type (a) Manuka/kanuka shrubland. The area is predominantly regenerating manuka of variable height up to 6 metres tall. Within this mamaku and bracken may be frequent, and scattered throughout are totara, towai, puriri and pine. Ricker kauri occurs rarely. On the ridge top are open tracks but otherwise manuka and gorse are common with scattered bracken, ring fern and *Hakea.* Sun orchids grow on the track edges.

Near Matawherohia Rd is an area of manuka scrub with bracken and gorse. The canopy is open. Rewarewa, towai, rimu, kahikatea, totara and pine occur sparsely. In the gullies are several remnants of mixed forest:

Type (b) Taraire–kahikatea forest.

Type (c) Taraire–totara (also occurs near the Kaeo River).

Type (d)Towai–manuka/kanuka forest. Occurs in the south eastern sector with frequent mamaku, mistweed, gorse and bracken. Secondary forest occurs in the gullies with occasional kahikatea and rewarewa.

Type (e) Totara–kanuka forest. Contains occasional kauri, kahikatea and puriri.

Type (f) Secondary manuka–tanekaha–totara forest. On the north eastern corner near the Kaeo River, totara or tanekaha frequently appear above the manuka, or all three come together with isolated wattle, pine, rimu and kauri.

FIGURE 29. NGARAHU, P04/036.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Type (g) Taraire–puriri forest. Occurs in the gullies. Puriri is abundant with taraire, towai and kanuka. or towai with puriri and taraire.

Type (h) Towai forest. Occurs in gullies with puriri and taraire.

Fauna

NI brown kiwi (Category A threatened species), probably in low numbers.

Significance

A large, rugged area, geographically dominant in the Kaeo area which still retains kiwi. It is contiguous with Waiare Bush.

BURLACES RESERVE

Survey no.	P04/039
Survey date	13 February 1995
Grid reference	P04 845 730
Area	260.3 ha
Altitude	20–260 m asl

Ecological unit

(a) Taraire forest on hillslope.

(b) Towai–taraire forest on hillslope.

(c) Secondary manuka forest on hillslope.

(d) Secondary kauri–tanekaha forest on hillslope.

(e) Secondary towai forest on hillslope.

(f) Towai–bracken association on hillslope.

(g) Towai–manuka shrubland on hillslope.

(h) Towai–mamaku shrubland on hillslope.

(i) Manuka–gorse shrubland on hillslope.

Landform/geology

Hill country of Waipapa Group greywacke with a prominent fault scarp forming the southwestern margin

Vegetation

Type (a) Taraire forest. Occurs in the main area (which continues over the ridge to the south) on the northern side, within the pine plantation, with a diverse range of other canopy species including kauri, rata, tawa, karaka, miro and kawaka.

FIGURE 30. BURLACES RESERVE, P04/039.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Type (b) Towai–taraire forest. A smaller area than (a) with occasional kauri, puriri, rewarewa and kanuka also occurs within the pine plantation on the northern face. The subcanopy contains abundant nikau and kohekohe with occasional tawa, rewarewa, pigeonwood and mamaku. Hangehange is abundant in the shrublayer, with occasional kawakawa. *Asplenium* and *Blechnum* ferns occur.

On the face above/opposite the Kaeo River, a wide range of other species occur, including kauri, totara, rewarewa, mamaku, rimu, tawa, kohuhu, lacebark, puriri, karaka, hinau, makamaka, titoki, and northern rata.

Type (c) Secondary manuka forest. Occupies half of the northern face below the point '259' with frequent tanekaha and occasional rewarewa, towai, and totara.

Type (d) Secondary tanekaha–kauri forest. Near the Upukorau Rd intersection is a small area of kauri rickers and tanekaha with kanuka.

Type (e) Secondary towai forest. Rewarewa is frequent and kanuka occasional.

Type (f) Towai–bracken shrubland. On the northern face below the point '259', half of the vegetation is towai and bracken, with occasional mamaku and totara.

Type (g) Towai–manuka shrubland. Near the Upukorau Rd intersection is a small area of towai–manuka shrubland with frequent tanekaha and occasional rewarewa and mamaku.

Type (h) Towai–mamaku shrubland. This site is joined to Ngarahu (036) by towai–mamaku shrubland that contains areas of bracken and occasional puriri, rewarewa and totara.

Type (i) Manuka-gorse shrubland. Mistweed is rampant in areas opened up by goat browse.

Significant flora

Pittosporum pimeleoides subsp. *pimeleioides* (Rare). The mistletoe *Ileostylis micranthus* (Local) has recently been found on totara near the forest edge.

Fauna

NI brown kiwi, (Category A threatened species), NZ pigeon, (Category B threatened species), kauri snail (Category C threatened species).

Significance

Habitat for several threatened species.

This forest has a diversity of species including kawaka, tawa, mairehau *(Phebalium nudum), Pittosporum cornifolium* and *Cordyline pumilio*. It is an important seed source for the regenerating areas in the vicinity.

The site is a representative example of taraire forest and forms a linkage from Upukorau (046) to Ngarahu (036).

Within this site, 164 ha is stewardship land administered by the Department of Conservation and 45 ha is protected by a Queen Elizabeth II National Trust convenant.

OHAPEHAPE

Survey no.	P04/043
Survey date	25 September 1995
Grid reference	P04 855 713
Area	146.6 ha
Altitude	60–290 m asl

Ecological unit

(a) Manuka/kanuka–towai shrubland on gentle and steep hillslopes.

(b) Towai–taraire forest on steep hillslope.

(c) Taraire forest on hillslope.

(d) *Juncus–Cyperus* association in shallow depression within forest.

(e) Gorse–mistweed–kanuka scrub on cliffs and bluff tops.

(f) Secondary tanekaha forest on ridge.

Landform/geology

Steeply dissected hill country of Waipapa Group greywacke in the north and east and overlying Whangaroa Group lacustrine sediments and andesitic breccia in the south and west. The latter rock unit forms bluffs around Ohapehape trig.

Vegetation

Rimu Stream:

Type (a) Manuka/kanuka–towai shrubland. The lower streamside has an open canopy with wheki and mamaku and a depauperate understorey, mainly of mistweed, *Coprosma rhamnoides*, and totara saplings.

Type (b) Towai–taraire forest. Further upstream is more mature forest of towai-taraire with totara and an understorey of nikau and *Coprosma rhamnoides,* with other shrubs and ferns occurring rarely. It has been heavily grazed.

Ohapehape Rock:

Type (c) Taraire forest. Below the summit is taraire forest with puriri and occasional towai, rimu, totara, kahikatea, rewarewa, pukatea, tawa, karaka and nikau. The sub canopy consists of kohekohe, nikau, pate, kawakawa, karaka and wheki. *Rhabdothamnus, Pteris macilenta, Diplazium australe* and nikau comprise the shrub layer. This area contains a higher number of plant species but has been heavily browsed by goats over a long period of time, and may have lost some of its original diversity.

Type (d) *Juncus-Cyperus* association. A small clearing is dominated by *Juncus gregiflorus, Cyperus ustulatus* and a variety of exotic grasses, surrounded by secondary kahikatea. Although this type was not recorded elsewhere in the ecological district, its value is limited by its small size and presence of exotic species.

Type (e) Gorse-mistweed-kanuka scrub. On the cliffs, which show considerable erosion, gorse and mistweed are common, but kanuka, *Gahnia*,

FIGURE 31. OHAPEHAPE, P04/043.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

mapou, bracken and mingimingi are also frequent, with *Griselinia,* tanekaha, rewarewa and cabbage tree occurring rarely. The summit is dominated by mistweed, with gorse and bracken occurring frequently.

Waiare Rd and Tributary:

Type (b) Towai-taraire forest occurs in the gullies on the eastern side of the rock, with occasional puriri, rewarewa, karaka, rimu, kohekohe, kohuhu, kauri, titoki, kawaka and northern rata.

Type (a) open canopy towai-manuka shrubland with an understorey of bracken, *Gahnia* and mingimingi occurs on the ridges.

Along Waiare Rd, between the Kaeo River and the pine trees, Type (c) taraire is abundant with frequent totara and a wide diversity of other canopy species including tawa, pukatea, titoki, kauri and northern rata.

Type (f) Secondary tanekaha forest. On a spur above a tributary of the river is a small area where tanekaha is abundant. Kauri, rewarewa, totara, towai and manuka also occur.

Type (a) occurs along the main river, upstream with bracken and gorse. Five-finger and kohuhu also occur in this open-canopy area.

Shrublands:

Type (a) occurs in the west towards the airstrip with scattered totara and mamaku.

Fauna

NI brown kiwi, (Category A threatened species), NZ pigeon, (Category B threatened species).

Significance

A large area containing pockets of diverse forest which is habitat for two threatened bird species.

A representative site for taraire forest and towai–taraire forest.

BRIDGE ET AL.

Survey no.	P04/044
Survey date	13 February 1995
Grid reference	P04 855 744
Area	26.4 ha
Altitude	20–130 m asl

Ecological unit

(a) Secondary totara forest on hillslope.

(b) Taraire forest on hillslope.

FIGURE 32. BRIDGE AT AL., P04/044.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. f = FOREST.

Landform/geology

Hillslope of Te Kuiti Group calcareous mudstone, with colluvial boulders of Whangaroa Group andesitic breccia.

Vegetation

This area includes the Kaeo Bible Park Nature reserve and adjoining bush.

The main vegetation type is abundant taraire with frequent totara and scattered puriri, rimu, kahikatea, tawa, pukatea, rewarewa, northern rata, karaka, matai, titoki and kohekohe with a wide variety of other species (168) including the infrequently seen epiphytic orchid *Bulbophyllum tuberculatum* and a few plants of *Pseudopanax gillesii*. The invasive weed African Club moss is present, mostly on the paths.

Secondary totara occurs on the margins.

Fauna

NZ pigeon (Category B threatened species).

Significance

An area of relatively high diversity and a representative site for taraire and totara forest. It contains a plant species of very restricted distribution and is breeding territory for NZ pigeon.

OKAIHAU STREAM

Survey no.	P04/045
Survey date	13 February 1995
Grid reference	P04 860 734
Area	37.1 ha
Altitude	20-120 m asl

Ecological unit

(a) Manuka–kanuka shrubland on hillslope.

(b) Towai shrubland on steep hillslope.

(c) Secondary totara–kanuka forest on alluvium.

(d) Taraire forest on steep hillslope.

FIGURE 33. OKAIHAU STREAM, P04/045.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Landform/geology
Steeply dissected hill country of Waipapa Group greywacke.

Vegetation
Most of the area is Type (a) secondary manuka–kanuka with occasional emergent totara, towai, rewarewa and mamaku, or Type (b) abundant towai with bracken and gorse, and scattered pate, mahoe, and mamaku.

Type (c) occurs on the riverbank.

Type (d) is taller forest which contains abundant taraire with scattered kauri, totara, rimu, rewarewa, karaka, puriri, and tanekaha.

Fauna
Not surveyed.

Significance
A riparian buffer on steep land above the Kaeo River.

UPUKORAU BUSH

Survey no.	P04/046
Survey date	10 February 1995
Grid reference	P04 870 710
Area	344.1 ha
Altitude	40–220 m asl

Ecological unit
(a) Bracken–*Ageratina* fernland on steep hillslope.

(b) Manuka–kanuka shrubland on steep hillslope.

(c) Towai–manuka–kanuka shrubland on hillslope.

(d) Taraire forest in gully.

Landform/geology
Catchment at the head of the Kaeo River, comprising a mixture of rock types. Waipapa Group greywacke forms steep hill country south of Upukorau trig, whereas the area to the east includes Mangakahia Complex sandstone and siliceous mudstone, Whangaroa Group dacitic intrusives, and with Kerikeri volcanics basalt flows around the head of the catchment.

FIGURE 34. UPUKORAU BUSH, P04/046.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Vegetation

A mosaic of shrubland and secondary mixed forest.

Shrubland may be towai dominant with frequent manuka–kanuka and occasional puriri, totara, rewarewa, kahikatea and mamaku, or manuka–kanuka dominant with scattered towai and mamaku. Within these shrubland areas, patches of bracken with common to abundant *Ageratina* sp. occur.

In the gullies are remnants of taraire forest with frequent totara and occasional rewarewa, kahikatea, towai, tawa, rata and kauri. On steep banks out of the reach of goats, *Colensoa physaloides* can be found. The understorey consists of nikau, wheki, supplejack, mahoe, pigeonwood, hangehange, small-leaved Coprosma species and seedling rimu and totara. Near Upukorau Rd is an area of secondary totara and kanuka with scattered puriri.

Significant flora

Colensoa physaloides, classified as of Local distribution.

Fauna

NI brown kiwi, (Category A threatened species), NZ pigeon, (Category B threatened species).

Significance

A large area, contiguous with other habitats (Ohapehape - 043 and Burlace's Reserve - 039).

Representative site for type (c).

Habitat for threatened species.

Much of the terrain is rugged and contains deeply incised stream valleys, and provides upper catchment protection.

OROTERE

Survey no.	P04/048
Survey date	6 April 1995
Grid reference	P04 863 747
Area	48.7 ha
Altitude	60–310 m asl

Ecological unit

(a) Taraire forest on steep hillslope.

(b) Towai–taraire forest on hillslope.

(c) Secondary totara forest on hillslope.

(d) Secondary towai forest on hillslope.

(e) Towai–taraire forest on hillslope.

Landform/geology

Hill country with bluffs and escarpments of Whangaroa Group andesitic breccia and lava flows

Vegetation

Type (a) Taraire forest. The main bush is located on a prominent volcanic plug and contains abundant taraire with scattered rewarewa, titoki, karaka, mamaku, kahikatea, towai, puriri, totara, tawa, hinau, kauri, northern rata and emergent rimu. On the road edge, mamangi, tutu and gorse are common.

Type (b) Towai forest. On the north eastern side towai is abundant with frequent manuka and occasional totara and rewarewa.

The subcanopy contains abundant kohekohe and nikau with frequent ponga, mapou and mamangi. Hangehange, kawakawa and nikau occur frequently in the shrub layer with occasional pate, rangiora, mahoe, *Rhabdothamnus*, and pigeonwood. Mistweed, gully fern, and thread fern are abundant in the ground layer with frequent nikau and *Asplenium.*

Type (c) Secondary totara forest. Towai, puriri, rewarewa are occasional. There are some open areas of ring fern and grass.

Type (d) Secondary towai. Linked to types (c) and (b) by manuka and gorse with scattered towai, totara, mahoe and mamaku.

Type (e) Towai-taraire forest. Occurs in the north west with occasional rewarewa, totara, nikau, and rimu. The site seems heavily grazed, and *Ageratina* is widespread.

Fauna

North Island brown kiwi (Category A threatened species), NZ pigeon (Category B threatened species), kauri snail (Category C threatened species), and Northland endemic snails "Golden Phenocolelix" (of Local distribution) and the rare endemic "*Utralaoma" "cymbalum"/Phrixgnathus aff. murdochi.*

Significance

Remnant vegetation on a dominant geological feature.

Habitat for several species of threatened or endemic fauna.

FIGURE 35. OROTERE, P04/048.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

TARAIRE RD

Survey no.	P04/050
Survey date	6 April 1995
Grid reference	P04 865 765
Area	164.6 ha
Altitude	80–320 m asl

Ecological unit

(a) Taraire forest on flat ridge and steep hillslope.

(b) Towai-totara forest on flat ridge and steep hillslope.

(c) Secondary totara forest on flat ridge.

(d) Towai forest on hillslope.

(e) Kanuka shrubland on gentle to moderate hillslope.

Landform/geology

Steep hill country with bluffs and escarpments of Whangaroa group breccia and lava flows, overlain by Kerikeri Volcanics basalt flows forming more gently sloping country along Taraire Rd.

Vegetation

Type (a) Taraire forest. The Kukupaere Reserve contains abundant taraire and frequent puriri. Totara, towai, rimu, kahikatea, tawa, miro, northern rata, nikau, kohekohe, karaka, rewarewa, kauri and mamaku also occur.

The sub-canopy contains abundant kohekohe, nikau and ponga, frequent towai, totara, rimu and kahikatea, occasional lacebark, kauri and tanekaha. Supplejack, kiekie, parataniwha and mistweed are locally abundant. Hangehange, *Coprosma rhamnoides*, nikau and ponga are all frequent. Mapou, *Gahnia,* and *Rhabdothamnus* and *Asplenium lamprophyllum* also occur.

Below the gun club, taraire is also abundant with towai frequent. Totara, puriri, northern rata and kauri also occur.

Type (b) Towai-totara forest. Near the Taraire Rd edge, towai and totara are common with scattered rimu, kahikatea and rewarewa.

Type (c) Secondary totara forest. There is also an area where totara is abundant, with frequent taraire and towai and occasional rimu, kahikatea and karaka.

Type (d) Towai forest. Between the Reserve and the Kaeo Gun Club, towai is common with frequent tawa, taraire and rewarewa, northern rata and totara also occur.

Type (e) Kanuka shrubland. At the northern end there is kanuka shrubland to 6 metres tall with scattered mamaku and towai. Near the summit is an open area of bracken and mistweed with gorse, mahoe, and scattered *Hebe* sp. and broadleaved shrubs.

FIGURE 36. TARAIRE ROAD, P04/050.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Significant flora

The Whangaroa associated *Pseudopanax gillesii, Peperomia tetraphylla* (Local), *Blechnum vulcanicum* (of local distribution in Northland and at its northern limit), as well as uncommon species in the ecological district *Hebe sp (m), Metrosideros carminea, Asplenium lamprophyllum*, *Dicksonia lanata, Doodia mollis* and *Helichrysum lanceolatum. Peperomia tetraphylla* and *Blechnum vulcanicum* were collected by Rawlings in 1971.

Fauna

North Island brown kiwi (Category A threatened species), NZ pigeon (Category B threatened species), kauri snail (Category C threatened species), and pied tit (regionally significant species).

Significance

Representative example of taraire, towai, totara, and towai–totara forest, and has high landscape values being located on a dominant escarpment.

Habitat for numerous species of flora and fauna which are threatened or of limited distribution.

The site includes 90 ha of Scenic Reserve.

MARTINS RD '339'

Survey no.	P04/051
Survey date	6 April 1995
Grid reference	P04 847 778
Area	180.5 ha
Altitude	40-340 m asl

Ecological unit

(a) Manuka–kanuka shrubland on hillslope.

(b) Towai shrubland on hillslope.

(c) Secondary kanuka–towai forest on hillslope.

(d) Bracken–gorse scrub on hillslope.

(e) Towai–taraire forest on hillslope.

(f) Secondary totara–kanuka forest on hillslope.

(g) Totara–towai forest on hillslope.

Landform/geology

Hill country of Te Kuiti Group glauconitic sandstone overlain by Whangaroa Group andesitic breccia, and with an area of Mangakahia Complex mudstone on the knoll east of SH10.

FIGURE 37. MARTINS ROAD "339", P04/051.
EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.
s = SHRUBLAND; f = FOREST.

Vegetation

A mosaic of scrub, regenerating shrubland and forest.

Type (a) Manuka–kanuka shrubland. Tall shrubland containing rewarewa, totara, puriri, kahikatea and mamaku occurs in the Te Poka Stream catchment. Near the bottom of Martins Rd, towai, mamaku, and pine are scattered.

Type (b) Towai shrubland. Tall shrubland containing rewarewa, totara, puriri, kahikatea and mamaku occurs in the Te Poka Stream catchment.

Type (c) Secondary kanuka–towai forest on hillslope. Also occurs in the Te Poka Stream catchment containing tanekaha and rimu, as well as the species occurring in Types (a) and (b) as well as near Martins Rd, with frequent mamaku and occasional five finger and pate.

Type (d) Bracken–gorse scrub on hillslope. Occurs on the margins with scattered towai.

Type (e) Towai–taraire forest. Near the summit towai and taraire are common with frequent totara.

Type (f) Secondary totara–kanuka forest. Occurs on the Martins Rd side with frequent towai and occasional mamaku and kahikatea.

Type (g) Totara–towai forest. North of the summit is an outlying remnant in which totara and towai are common with frequent kahikatea and taraire with occasional kauri, rimu, and puriri.

Fauna

North Island brown kiwi (Category A threatened species) and kauri snail (Kingett-Mitchell) (Category C threatened species).

Significance

Habitat for two threatened fauna species.

A large area functioning as a linkage between Taraire Rd (050) and Kaeo Bush (052).

KAEO BUSH

Survey no.	P04/052
Survey date	March–April 1995
Grid reference	P04 820 800
Area	833.9 ha
Altitude	<20–380 m asl

Ecological unit

(a) Secondary kanuka forest on ridge and hillslope.

(b) Taraire forest in gully.

(c) Manuka/kanuka shrubland on hillslope.

(d) Secondary kanuka–kauri forest on ridge.

(e) Manuka shrubland on hillslope.

(f) Secondary manuka–kanuka–towai forest on hillslope.

(g) Taraire–towai forest on hillslope.

(h) Towai forest in gully.

(i) Secondary towai–tanekaha–kanuka forest on hillslope.

(j) Secondary kauri–tanekaha forest on hillslope.

(k) Secondary manuka–kanuka–tanekaha forest on hillslope.

(l) Taraire–puriri forest on hillslope.

Landform/geology

Steeply dissected hill country of Waipapa Group greywacke and overlying Te Kuiti group glauconitic sandstone, with Whangaroa Group andesitic breccia in the vicinity of Huia trig, and Mangakahia Complex mudstone outcropping along the northwestern margin of the area.

Vegetation

A very large area, mostly of kanuka and manuka at various stages of regeneration, but including pockets of broadleaf and kauri.

Type (a) Secondary kanuka forest. Just north of Kaeo, in the Taiwatatawa and Pahuhu Stream catchments, (in the vicinity of the quarry), is an extensive area of tall kanuka (6-10 metres) with scattered totara, towai, mamaku, wattle and pine. On the ridges, kanuka is common with frequent kauri and occasional tanekaha.

Towards Waikoura, (in the reserve), rewarewa, tanekaha, and rimu are beginning to emerge above the kanuka. Toru is frequent and towai occasional. The subcanopy consists of frequent tanekaha and mingimingi, occasional toru, mapou, rimu and towai. The shrub layer is dense with mingimingi, mapou, toru, towai and tanekaha. The ground layer is also dense with *Gleichenia, Schoenus tendo*, mingimingi, *Hakea* and *Lycopodium.*

Kanuka forest with occasional emerging tanekaha and rewarewa links Types (b), (c) and (d) in the Kaeo reserve.

FIGURE 38. KAEO BUSH, P04/052.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

In the lower part of Martins Rd, tall kanuka occurs with a sparse canopy. Some clearing has taken place here. (A small area adjacent to this is protected under a QE II covenant).

Type (b) Taraire forest. In the gullies in the Taiwatatawa and Pahuhu Stream catchments, (in the vicinity of the quarry), taraire is common, tanekaha frequent, and kauri, puriri, rewarewa, totara, rimu, karaka, towai and tawa occasional.

Taraire is dominant in a large gully within the Kaeo Reserve, with towai and tanekaha. Rimu, kauri, northern rata, karaka, puriri, rewarewa, totara and mamaku are also present. There are other similar areas of taraire dominance in the northern part of the reserve, with tawa occurring frequently, rather than towai. Kohekohe is frequent in the understorey.

Below Huia, there is a larger area of taraire with kauri, puriri, totara and emergent rimu.

Type (c) Manuka/kanuka shrubland. On the margins of the Kaeo Reserve the shrubland is about 3 metres tall with occasional tanekaha. Low shrubland with scattered pines links some areas.

Low manuka–kanuka shrubland occurs on several ridges south of Huia and to 5 metres tall on the margins behind Kaeo, with scattered pine and tree ferns.

Type (d) Secondary kanuka–kauri forest. Occurs in the north with frequent rimu, totara, taraire, kohekohe, and occasional tanekaha and miro. The shrub layer consists of frequent ponga. Wheki, tawa, kohekohe, kiekie, hinau and *Alseuosmia macrophylla* occur occasionally. The ground layer here is generally sparse with ponga, *Blechnum fraseri*, *Loxsoma cunninghamii* and *Metrosideros perforata. Pittosporum pimeleoides* subsp. *pimeleoides* and the Whangaroa endemic *Pseudopanax gilliesii* are also present.

Type (e) Manuka shrubland. In the small infertile basins where there is low dense manuka, *Gleichenia* and *Schoenus* are abundant, with occasional *Dracophyllum lessonianum*.

Type (f) Secondary towai-manuka forest. Also occurs below Huia with puriri, rimu, totara, rewarewa and mamaku.

Type (g) Towai–taraire forest. On the Huia Rd side of the trig, towai is co-dominant with taraire.

South of Huia are a variety of types of regeneration:

Type (a) tall manuka/kanuka with occasional tanekaha, rewarewa and mamaku

Type (f) towai–kanuka with occasional kahikatea, rewarewa, rimu, totara and puriri.

Type (h) towai (in a gully) with occasional kauri and kahikateaType (i) towai-tanekaha-kanuka with occasional kauri, rimu and kahikatea.

Type (j) kauri and tanekaha with frequent kanuka and occasional rimu.

Type (k) tanekaha and kanuka with occasional rimu, kauri and rewarewa. This type also occurs behind the Kaeo Hall, with occasional rimu, totara, towai, mamaku and pine.

Type (l) Puriri–taraire forest. Also occurs south of Huia with scattered rewarewa, tawa, nikau and kahikatea. The understorey in the regenerating areas tends to be tree ferns, mingimingi, small-leaved *Coprosma* species, mapou, mahoe, hangehange, *Gleichenia* and *Lycopodium* and seedlings, mainly of tanekaha and towai.

Significant flora

The Rare *Pittosporum pimeleoides* subsp. *pimeleoides,* the Whangaroa associated *Pseudopanax gilliesii* and *Loxsoma cunninghamii,* a fern of limited distribution in Northland.

Fauna

North Island brown kiwi (Category A threatened species), kauri snail (Category C threatened species) and banded kokopu (Category C threatened species) in Waikoura Creek.

Significance

Large, diverse, contiguous habitat.

Some good examples of secondary vegetation, both with and without kauri, and a representative site for manuka/kanuka shrublands, kanuka–kauri forest, kanuka–tanekaha forest, kauri–tanekaha forest, manuka/kanuka–towai forest, towai–manuka–tanekaha forest, towai forest and towai–taraire forest.

Habitat for several species which are threatened, or of restricted distribution.

The site includes 353 ha of the Kaeo Scenic Reserve and 13.4 ha under Queen Elizabeth II National Trust covenant.

GOLDIE/CLARKSON

Survey no.	P04/053
Survey date	23 August 1994
Grid reference	P04 810 820
Area	114.3 ha
Altitude	20–170 m asl

Ecological unit

(a) Manuka–kanuka shrubland on moderate to steep hillslope.

(b) Kanuka forest on steep hillslope.

Landform/geology

Coastal hill country of Te Kuiti Group glauconitic sandstone.

Vegetation

Over 90% of this area is manuka-kanuka about 6 metres tall, with scattered pine, rewarewa and mamaku. There is a forest remnant within this where kanuka is common and rimu, kauri, tanekaha, and taraire frequent. Also present are rewarewa, towai, puriri, totara, tawa, and northern rata.

FIGURE 39. GOLDIE/CLARKSON, P04/053.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Significant flora

The regionally uncommon *Loxsoma cunninghamii*, the Whangaroa associated *Pseudopanax gillesii*, and the forest remnant is habitat for the Rare *Pittosporum pimeleoides* subsp. *pimeleoides*.

Fauna

North Island brown kiwi (Category A threatened species) and pied tit (regionally significant species).

Significance

Habitat for several species which are either threatened, regionally uncommon, or of restricted distribution, as well as being a seed source for regeneration of surrounding areas.

Part of a much larger habitat, linking Kaeo Bush to Whangaroa and Matingirau.

MANGAPIKO–WHANGAROA

Survey no.	P04/054
Survey date	30 March 1995
Grid reference	P04 798 816
Area	184.3 ha
Altitude	<20–176

Ecological unit

(a) Manuka–kanuka shrubland on hillslope.

(b) Taraire forest on hillslope.

(c) Secondary kanuka forest on moderate to steep hillslope.

(d) Kanuka–taraire forest on hillslope.

Landform/geology

Coastal hill country of Te Kuiti Group glauconitic sandstone

Vegetation

A mosaic of manuka–kanuka shrubland and secondary forest with pockets of broadleaf in the gullies which adjoins Kaeo Bush and is contiguous with the extensive area of indigenous vegetation on the southern side of the Whangaroa Harbour.

Type (a) Manuka-kanuka shrubland. Occurs on the southern side of Mangapiko, near the recently cleared area, between 2 and 4 metres tall with occasional mamaku, towai and pine. Spreading north in the central area is an area of kanuka between 4 and 6 metres tall which contains scattered pine, rewarewa, kauri, tanekaha, and near the road, pohutukawa. Along Whangaroa Rd, kanuka to 6 metres is dominant. Scattered throughout are pohutukawa, totara, tanekaha, towai, puriri, mamaku, wattle and pine. South of Wainui Rd, kanuka is abundant with scattered pine.

Type (b) Taraire forest. Occurs on the southern side of Mangapiko and has frequent puriri and manuka-kanuka. Kauri, tanekaha, rewarewa, towai and mamaku also occur here. Behind the motor camp is another pocket of taraire dominance, with frequent tanekaha. Karaka, towai, tawa, kauri and rewarewa are also present.

Type (c) Kanuka–taraire forest. Occurs in gullies in the centre of the site. Kauri, tanekaha, rewarewa, puriri, karaka, totara and northern rata are present here.

Type (d) Secondary kanuka forest. Occurs further inland from (c) kauri and tanekaha are frequent with occasional towai and rewarewa.

Fauna

North Island brown kiwi (Category A threatened species), present in low numbers.

Significance

Contains some high quality secondary kanuka and is contiguous with both Kaeo Bush (052) and Goldie/Clarkson (053), both of which contain threatened plants which may also be present at this site, as well as being habitat for kiwi.

FIGURE 40. MANGAPIKO–WHANGAROA, P04/054.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

KAEO RIVER MOUTH

Survey no.	P04/055
Survey date	30 March 1995
Grid reference	P04 785 805
Area	14.8 ha
Altitude	Sea level to 60 m asl

Ecological unit

(a) Manuka forest and shrubland on coastal promontory.

Landform/geology

Coastal promontory of Te Kuiti Group glauconitic sandstone.

Vegetation

Manuka shrubland with occasional tanekaha, totara, mamaku, pohutukawa, and puriri, which grades into mangroves.

Fauna

North Island brown kiwi (Category A threatened species).

FIGURE 41. KAEO RIVER MOUTH, P04/055.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND.

Significance
Habitat for a threatened bird species.

Coastal riparian vegetation grading into mangroves is uncommon in the ecological district and region.

OHAURORO (PEACH ISLAND)

Survey no.	P04/059
Survey date	20 April 1995
Grid reference	P04 797 865
Area	4.2 ha
Altitude	Sea level to 100 m

Ecological unit
(a) Manuka forest on coastal hillslope.

(b) *Astelia* association on coastal cliff.

Landform/geology
Steep hillside on island formed of Tupou Complex greywacke overlain by Whangaroa Complex andesitic breccia.

Vegetation
On the southern side of the island, manuka is dominant, with pohutukawa and mamaku occurring frequently and karaka and puriri occasionally. The understorey comprises mainly hangehange, large-leaved *Coprosma* species, mapou, mahoe, kohuhu, *Gahnia lacera*, maidenhair, rasp and brake ferns.

Near the summit, *Astelia banksii* is common on the cliffs. Manuka is frequent, and pohutukawa occasional.

Fauna
Not surveyed.

Significance
Representative example of type (b) and regenerating coastal forest on an island habitat.

FIGURE 42. OHAURORO (PEACH ISLAND), P04/059.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. f = FOREST.

TE KAHIKATOA

Survey no.	P04/060
Survey date	20 April 1995
Grid reference	P04 810 870
Area	130.6 ha
Altitude	Sea level to 220 m

Ecological unit

(a) Manuka forest on coastal bank and hillslope.

(b) Manuka shrubland on coastal bank and hillslope.

(c) Taraire forest on coastal hillslope.

(d) Tanekaha–manuka forest on hillslope.

Landform/geology

Promontory forming the eastern side of Whangaroa Harbour entrance with bluffs and coastal cliffs. Most of the area comprises Whangaroa Group andesitic breccia, but Tupou Complex greywacke forms lower slopes in the vicinity of Pararako Bay.

FIGURE 43. TE KAHIKATOA, P04/060.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Vegetation

Type (a) Manuka forest. South of Kingfish Lodge is a coastal band of abundant manuka over 6 metres tall, with rewarewa occurring frequently. Other species present are akepiro, houpara, fivefinger, pohutukawa, puriri, kowhai, cabbage tree, and towai. The understorey is mainly kawakawa*, Coprosma macrocarpa,* and rangiora.

Type (b) Manuka shrubland. An area of 3–4 metre high shrubland provides a buffer along the bank above the sea. At Pararako Bay, tall manuka with scattered mahoe, tanekaha, and pohutukawa occurs.

Type (c) Taraire forest. Inland of (a), taraire is dominant, with scattered kohekohe, tanekaha, puriri, rewarewa, pohutukawa, titoki, and kowhai. The main forest below the trig is also taraire-dominant and contains northern rata, puriri, kauri, pohutukawa, matai, totara, tanekaha, and rewarewa.

Type (d) Tanekaha–manuka forest. In the east, dense tanekaha occurs, with manuka common. Rewarewa, totara, kahikatea, kauri, miro, rimu, and matai are scattered. Puriri, taraire, and kohekohe occur in the gullies.

Fauna

North Island brown kiwi (Category A threatened species).

Significance

Good examples of coastal vegetation and sequence from sea level to over 200 m and representative site for manuka shrubland and manuka–tanekaha forest.

Habitat for a threatened bird species.

BUTTERFLY BAY

Survey no.	P04/062
Survey date	3 April 1995
Grid reference	P04 810 878
Area	75.9 ha
Altitude	Sea level to 140 m asl

Ecological unit

(a) Manuka shrubland on coastal hillslope.

(b) *Astelia*–renga lily on coastal cliffs.

(c) Pohutukawa treeland in coastal gully.

Landform/geology

Seaward coastal cliffs and bluffed hillslopes on the of the Whangaroa Harbour entrance, formed of Whangaroa Group andesitic breccia.

Vegetation

Mostly low regenerating coastal shrubland. The canopy is sometimes open and discontinuous. Gorse is sometimes frequent, as are grassy clearings. Other

FIGURE 44. BUTTERFLY BAY, P04/062.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. s = SHRUBLAND.

species occurring are cabbage tree, pohutukawa, mamangi, mamaku, karaka, pine and puriri.

On the cliffs are *Astelia* and rengarenga lily. In a gully below the cliffs is pohutukawa with karaka where the understorey comprises kawakawa, shining spleenwort and taupata.

Significant flora

The Local *Fuschia procumbens* was recorded by Rawlings in 1971 with *Ipomoea cairica*.

Fauna

Giant bully record from stream running into Butterfly Bay

Significance

Coastal shrubland, especially from Butterfly Bay to Kingfish Lodge, is now uncommon in the ecological district.

Representative example of type (b) and habitat for a plant species of Local distribution.

The Tauranga Bay channelised flow, a geopreservation site of regional importance, is exposed in the cliffs behind the Tauranga Bay campground (Kenny & Hayward 1993).

WAITAPU

Survey no.	P04/064
Survey date	3 April 1995
Grid reference	P04 835 815
Area	147.2 ha
Altitude	60–250 m asl

Ecological unit

(a) Manuka–kanuka shrubland on hillslope.

(b) Secondary kanuka forest on hillslope.

(c) Taraire forest on hillslope.

(d) Manuka shrubland.

Landform/geology

Steeply dissected hill country of Waipapa Group greywacke in the southeast, and overlying Te Kuiti Group glauconitic sandstone in the northwest.

Vegetation

Type (a) Manuka–kanuka shrubland. Constitutes most of the area, varying from 1 metre in height to tall, secondary forest. The lower areas tend to have mamaku, towai, pine, or wattle scattered through them.

Type (b) Secondary kanuka forest. The older vegetation may have kahikatea, rimu, totara, tanekaha, and kauri as occasional emergents.

Type (c) Taraire forest. In the main valley, taraire is either abundant or common, with frequent tanekaha and/or kanuka. Other species present are kauri, northern rata, kahikatea, towai, puriri, rewarewa, and karaka.

Type (d) Manuka shrubland. Below the high point '254' (G.R.832 814), where there are some rocky bluffs, there is a linking corridor of manuka with some gorse.

Significant flora

The Rare *Pittosporum pimeleoides* subsp. *pimeleoides* (L.Winch 1991).

Fauna

Not surveyed, but kiwi (Category A threatened species) present in adjacent area and likely to be present here.

Significance

Acts as a linkage from Kaeo Bush to the western Whangaroa forests and is likely to be kiwi habitat.

FIGURE 45. WAITAPU, P04/064.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

UPPER TOUWAI STREAM

Survey no.	P04/065
Survey date	3 April 1994
Grid reference	P04 850 830
Arera	472.6 ha
Altitude	40–330 m asl

Ecological unit

(a) Manuka shrubland on hillslope.

(b) Taraire forest on moderate to steep hillslope.

(c) Taraire–tawa forest on moderate to steep hillslope.

(d) Secondary kanuka forest on ridge.

(e) Secondary manuka-tanekaha forest on hillslope.

Landform/geology

Steeply dissected hill country of Waipapa Complex greywacke in the central southern part, Te Kuiti Group glauconitic sandstone in the northwest, and Whangaroa Group andesitic breccia in the east and around the southern rim of the Touwai Stream catchments.

Vegetation

Type (a) Manuka shrubland. In the lower valley, near Matingirau, there are extensive areas of low manuka shrubland, some of which has an open canopy, with bracken. Pine and tree ferns are scattered. On the edge of the escarpment is manuka shrubland with mahoe, fivefinger and gorse.

Type (b) Taraire forest. Further up the valley, the terrain is extremely steep. In the valleys taraire is dominant with occasional rewarewa, puriri, northern rata, karaka, and rimu. Tall taraire forest with puriri, tawa and towai occurs in the Miru Stream area. Rimu is emergent, as is kauri on the ridges. Northern rata, kahikatea and nikau are also present.

Type (c) Taraire–tawa forest. Occurs with Type (b).

Type (d) Kanuka forest. On the ridges, kanuka is common with frequent tanekaha and kauri and occasional totara, rata, rimu and rewarewa.

Type (e) Secondary manuka–tanekaha forest. Occurs on ridge sites in the central southern area with frequent kauri and occasional rimu and rewarewa.

Fauna

Common bully, red finned bully, common smelt and inanga recorded in the Touwai Stream.

Kiwi (Category A threatened species) are present in adjacent habitat and are likely to be present here.

Significance

The area contains tall mature forest and is a representative site for taraire-tawa forest.

The area provides an important linkage between habitats (Waiotapu - 064 and Teheoriri - 066).

Likely to contain kiwi.

FIGURE 46. UPPER TOUWAI STREAM, P04/065.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

TEHEORIRI

Survey no.	P04/066
Survey date	3 April 1995
Grid reference	P04 865 850
Area	341.4 ha
Altitude	100–340 m asl

Ecological unit

(a) Towai–kanuka forest on hillslope.

(b) Secondary manuka-kanuka forest on hillslope.

(c) Manuka shrubland on hillslope.

(d) Taraire forest on hillslope.

(e) Secondary towai forest on hillslope.

(f) Towai–taraire forest on hillslope.

(g) Secondary kauri on ridge.

(h) Kanuka–tanekaha forest on ridge.

Landform/geology

Steeply dissected hill country of predominantly Whangaroa Group andesitic breccia but with Waipapa Group greywacke in the southeast and in the catchment NE of Teheoriri, and Kerikeri Volcanics basalt flow remnants along the ridge crest extending NNE from Teheoriri.

Vegetation

Type (a) Towai–kanuka forest. On the slopes north of the high point '336' (G.R. 856 842), towai and kanuka are common with puriri and taraire frequent. Karaka, kauri, rimu, rewarewa, and nikau are also present.

Type (b) Secondary manuka–kanuka forest. Also on the slopes north of the high point '336' with occasional rimu, kauri and rewarewa.

Type (c) Manuka shrubland. On the margins is low manuka shrubland, some with bracken and occasional mahoe, hangehange and mamaku. Isolated puriri and kahikatea occur in the taller shrubland. On the margins near Thompson's Access Rd is low manuka shrubland with occasional mamaku.

Type (d) Taraire forest. At the head of the Tauranga Stream valley, taraire is dominant with frequent tanekaha and occasional kauri and kahikatea. Nearer to Thompson's Access Rd, there is less tanekaha. Towai, northern rata, kahikatea, rimu, karaka and pukatea occur.

Type (e) Secondary towai forest. On the margins near Thompson's Access Rd and secondary towai with frequent kanuka and scattered rewarewa and nikau.

Type (f) Towai-taraire forest. Near the summit of Radar Hill, towai and taraire are common with frequent puriri. Rimu, karaka, rewarewa, kauri and kanuka are present.

FIGURE 47. TEHEORIRI, P04/066.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Type (g) Secondary kauri forest. Kauri is dominant on two ridges.

Type (h) Kanuka–tanekaha forest. Near the summit of Radar Hill there is also an area where kanuka and tanekaha are common, with scattered rimu and rewarewa.

Significant flora

Pseudopanax ferox (SSBI 1992) - possibly the only record in the Ecological District.

Fauna

Torrentfish, redfinned bully and banded kokopu (Category C threatened species) recorded from the Tauranga stream. NI brown kiwi (Category A threatened species) have not been surveyed recently but are present in adjacent habitat and are likely to be present here.

Significance

A large area of mature forest containing some stands of kauri, and contiguous with other large habitats (Upper Touwai Stream 065 and Tauranga Valley 067). It is a representative site for towai–taraire forest, kanuka–tanekaha forest and kauri forest.

Habitat for aquatic species, including one which is threatened, as well as habitat for kiwi.

Includes approximately 116 ha of the Tauranga Valley Scenic Reserve.

TAURANGA VALLEY

Survey no.	P04/067
Survey date	3 April 1995
Grid reference	P04 845 870
Area	150.7 ha
Altitude	<20–250 m asl

Ecological unit

(a) Taraire forest on moderate hillslope.

(b) Kauri forest on ridge.

(c) Kanuka forest on hillslope.

(d) Kanuka shrubland on hillslope.

(e) Towai–taraire forest on hillslope.

(f) Manuka shrubland on hillslope.

FIGURE 48. TAURANGA VALLEY, P04/067.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Landform/geology

Steeply sloping hillside of predominantly Whangaroa Group andesitic breccia, but with underlying Waipapa group greywacke and a small area of Mangakahia Complex mudstone at the southeastern end of the ridge.

Vegetation

In the east there is tall taraire forest with frequent kahikatea and towai. Rewarewa, puriri, rimu, totara, rata, tawa, tanekaha and karaka are also present.

On the ridges there is tall emergent kauri which is either dominant or contains frequent kanuka and occasional rimu.

Secondary kanuka forest is common on the lower slopes. Kauri and tanekaha occur within this, sometimes frequently, as well as rimu, puriri and pohutukawa.

On the edges and lower slopes near the road bridge is lower manuka-kanuka shrubland, some with bracken.

Near the beach the forest canopy is discontinuous. Towai and taraire are common with frequent nikau and occasional puriri and rewarewa.

Behind the lagoon is an extensive area of low manuka with cabbage tree, karaka, puriri, pohutukawa, rewarewa and mamaku.

Near the ridge the vegetation is mostly manuka and gorse.

Fauna

Habitat for NI brown kiwi (Category A threatened species), kauri snail (Category C threatened species), banded kokopu (Category C threatened species), red-finned bully, torrentfish.

Significance

Representative example of mixed forest with kauri. The vegetation nearer the coast is modified but provides a link to the coastal shrubland.

Habitat for aquatic species, including one which is threatened, as well as habitat for two other threatened fauna species.

Includes approximately 116 ha of the Tauranga Valley Scenic Reserve.

TAURANGA BAY ESTUARY

Survey no.	P04/067A
Survey date	3 April 1995
Grid reference	P04 828 878
Area	10 ha
Altitude	Sea level

Ecological unit

(a) Marram grassland on dunes.

(b) *Leptocarpus* saltmarsh on estuary margin.

(c) Mangroves on estuary.

FIGURE 49. TAURANGA BAY ESTUARY, P04/067A.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

e = ESTUARY; d = DUNES.

Landform/geology
Riverine estuary behind Holocene coastal foredunes.

Vegetation
Marram grass occurs at the estuary entrance. Some mudflats in the estuary contain scattered *Leptocarpus* grading into a narrow, mangrove lined channel.

Fauna
NZ dotterel (Category B threatened species) and banded rail (regionally significant).

Significance
Small but good quality estuarine habitat.

TE WHAU

Survey no.	P04/085
Survey date	14 June 1995
Grid reference	P04 890 735
Area	768.6 ha
Altitude	40–200 m asl

Ecological unit
(a) Towai–taraire forest on hillslope.

(b) Taraire forest on hillslope.

(c) Secondary kanuka–kauri–tanekaha on ridge.

(d) Kanuka forest on hillslope.

(e) Secondary manuka–kanuka–towai on hillslope.

(f) Manuka shrubland on hillslope.

(g) Towai shrubland on hillslope.

(h) *Blechnum* association on stream margins.

(i) Secondary kahikatea on toeslope.

Landform/geology
Northern catchment: Deeply incised valley system, predominantly cut in Whangaroa Group andesitic lava, but with areas of Mangakahia Complex siliceous mudstone present locally.

Southern catchment: Valley system cut in Mangakahia Complex siliceous mudstone in the western part and Waipapa Group greywacke in the east, and with Kerikeri Volcanics basalt flows around the southern rim of the catchment.

FIGURE 50. TE WHAU, P04/085.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST; w = WETLAND.

Vegetation

A mosaic of regenerating shrubland and forest amongst pine plantations.

Type (a) Towai-taraire forest and Type (b) Taraire forest.

Towai-taraire is the main forest type and tends to be on the steep-side-gullies with totara and/or tanekaha occurring frequently with occasional rewarewa, tawa, rimu, hinau, karaka, puriri, kahikatea, nikau, kauri, northern rata, pukatea and kohekohe. Taraire is a sole dominant in the gullies.

On some ridges and drier sites, secondary forest of various types are found:

Type (c) Kanuka-kauri-tanekaha with occasional rimu, toro and rewarewa;

Type (d) Kanuka abundant with kauri and tanekaha frequent and occasional rimu and kahikatea and Kanuka abundant with rimu, kauri, rewarewa and tanekaha only occasional;

Type (e) Kanuka-towai with only occasional kauri, tanekaha, and rewarewa.

In the gully heads and on the margins a variety of shrubland types occur:

Type (f) Manuka shrubland between 3 and 6 metres which may have no emergents, or rewarewa, mamaku and towai emerging;

Type (g) Towai shrubland of similar height range which may contain occasional mamaku, manuka, rewarewa, puriri, totara, and nikau.

Type (h) *Blechnum* association on stream margins

In a gully near SH10 there is a small wetland adjacent to a watercourse containing *Blechnum* with hangehange and Mexican devilweed and occasional manuka, pate, mahoe, gorse and *Juncus pallidus*.

The riparian vegetation is manuka up to 4 metres with scattered mamaku and pate and an understorey of large-leaved mahoe and hangehange.

Type (i) Secondary kahikatea on toeslope

Near the head of this gully is a small stand of secondary kahikatea.

Fauna

NZ pigeon (Category B threatened species).

Significance

A very diverse range of vegetation types and rock types including good examples of kanuka forest on very spectacular terrain with deep gullies and steep bluffs.

Representative site for manuka and towai shrublands, manuka/kanuka–towai forest, kanuka–kauri–tanekaha forest, towai forest and towai–taraire forest.

Habitat for a threatened bird species.

4.1.2 Level 2 sites

Site	Survey no.	Grid ref.
Taratara/Hobbs Rd	O04/012A	O04 700 827
Oruaiti SH10 (Burgess)	O04/170	O04 664 889
Taupo Bay Hill	P04/005A	P04 745 900
Unuhi Stream	P04/009	P04704 841
Johansson–Kahoe	P04/010	P04 728 833
Iwitaua Stream headwaters	P04/012	P04 715-825
Taratara/Otangaroa Rd Nth	P04/013	P04 712 810
Wharuarua	P04/030	P04 774 786
Weber Rd	P04/031	P04 755 785
Lower Waiare Rd	P04/040	P04 840 758
Upukorau Airstrip	P04/047	P04 878 728
Link Rd	P04/049	P04 875 757
Whangaroa–St Pauls	P04/056	P04 795 830
Matingirau	P04/057	P04 805 845
Milford Island	P04/058	P04 806 855
Tutu	P04/063	P04 825 840

TARATARA/HOBBS RD INTERSECTION

Survey no. O04/012A

Survey date 29 August 1994

Grid reference O04 700 827

Area 8.6 ha

Altitude 80–120 m asl

Ecological unit

(a) Taraire–totara–kahikatea forest on hillslope.

(b) Towai–manuka–kanuka shrubland on ridge.

(c) Secondary kahikatea forest on hillslope.

Landform/geology

Hill country of Mangakahia Complex sandstone and mudstone cut by Whangaroa Group andesite intrusions

FIGURE 51. TARATARA–HOBBS ROAD, O04/012A.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. f = FOREST.

Vegetation

A taraire dominant remnant with totara and kahikatea. Puriri, nikau, rewarewa, rimu, northern rata, kauri and kohekohe also occur.

Across the road is tall towai–kanuka–manuka shrubland with frequent kauri rickers, tanekaha, and totara, as well as scattered rewarewa and rimu.

There is also some secondary kahikatea with totara and taraire.

Fauna

NZ pigeon (Category B threatened species).

Significance

Source of food for NZ pigeon.

ORUAITI SH10 (BURGESS)

Survey no.	O04/170
Survey date	7 July 1994
Grid reference	O04 664 889
Area	10.6 ha
Altitude	20–150 m asl

Ecological unit

(a) Manuka–kanuka shrubland.

(b) Mixed kanuka–broadleaf–podocarp forest on hillslope.

Landform/geology

Hill country of Tangihua Complex igneous rock units.

Vegetation

Most of this area is regenerating kanuka-manuka with mamaku and gorse and scattered mahoe, cabbage tree and mapou.

FIGURE 52. ORUAITI SH10 (BURGESS), O04/170.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Within this is a remnant of kanuka with puriri, karaka, taraire, totara and tree fern. Kauri, rimu, kahikatea, kohekohe, and cabbage tree also occur.

Fauna
Not surveyed.

Significance
Vigorous regeneration in an area without a lot of indigenous vegetation.

TAUPO BAY HILL

Survey no.	P04/005A
Survey date	31 May 1995
Grid reference	P04 745 900
Area	32.7 ha
Altitude	<20–120 m asl

Ecological unit
(a) Raupo swamp on alluvium.

(b) Manuka shrubland on hillslope.

(c) Manuka–kanuka shrubland on hillslope.

(d) Towai–puriri forest in gully and hillslope.

Landform/geology
Gullies in Tupou Complex greywacke with freshwater wetlands in lower reaches.

Vegetation
(a) Raupo swamp. In the valley bottoms are raupo wetlands.

The majority of the vegetation is shrubland; either (b) manuka between 2 and 4 metres with frequent gorse and open areas of grass; or (c) taller manuka–kanuka (4–8m). The understorey is mainly ponga, small-leaved coprosma species, rasp and thread fern, and seedling mapou, lacebark and pigeonwood.

(d) Towai–puriri forest. In the gullies are remnants of coastal forest with an understorey of kohekohe, nikau and ponga. Karaka is frequent. Other species occurring are taraire, totara, tanekaha, rewarewa, kahikatea, and pohutukawa.

Fauna
Not surveyed.

Significance
Mainly regenerating manuka–kanuka with low diversity. Remnants of coastal forest and wetland habitat are of a type not well represented in the ecological district, but are limited in value by their small size.

FIGURE 53. TAUPO BAY HILL, P04/005A.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST; w = WETLAND.

UNUHI STREAM

Survey no.	P04/009
Survey date	6 July 1994
Grid reference	P04 704 841
Area	1–2 ha approx
Altitude	90 m asl

Ecological unit

(a) Constructed pond in stream valley.

(b) Raupo swamp on pond margins.

Landform/geology

Freshwater wetland on Holocene alluvium in Unihia Stream.

Vegetation

This site is an area of open water surrounded by raupo and sedges. Pines less than 10 years old have been planted on the perimeter.

Fauna

Survey needed.

Significance

Potential waterfowl habitat.

FIGURE 54. UNUHI STREAM, P04/009.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. w = WETLAND.

JOHANSSON–KAHOE

Survey no.	P04/010
Survey date	6 July 1994
Grid reference	P04 728 833
Area	4.8 ha
Altitude	20–60 m asl

Ecological unit
(a) Kanuka–totara forest on hillslope.

Landform/geology
Hill slope on Mangakahia Complex siliceous mudstone cut by a Whangaroa Group dacite intrusion.

Vegetation
A small stand of secondary totara–kanuka with frequent kahikatea and occasional puriri, tanekaha, kauri, and emergent rimu.

Fauna
Not surveyed.

Significance
Potential food source for NZ pigeon.

FIGURE 55. JOHANSSON–KAHOE, P04/010.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. f = FOREST.

IWITAUA STREAM HEADWATERS

Survey no.	P04/012
Survey date	6 July 1994
Grid reference	P04 700-710 810-830
Area	15.4 ha
Altitude	40–100 m asl

Ecological unit

(a) Taraire–puriri–kahikatea forest on hillslope.

(b) Manuka–kanuka shrubland on hillslope.

FIGURE 56. IWITAUA STREAM HEADWATERS, P04/012.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

f = FOREST.

Landform/geology
Hill country of Mangakahia Complex sandstone and mudstone cut by Whangaroa Group andesite intrusions.

Vegetation
Several small remnants, mostly taraire dominant or taraire–puriri. Kahikatea and totara may be common or frequent. Other species occurring are nikau, cabbage tree, tree fern, rewarewa, pukatea, towai, tawa, rimu, kauri, and northern rata.

Two of the remnants have low manuka–kanuka shrubland on their margins.

Fauna
Not surveyed.

Significance
Provision of seasonal food for NZ pigeon.

TARATARA/OTANGAROA RD NTH

Survey no.	P04/013
Survey date	13 July 1994
Grid reference	P04 712 810
Area	48.7 ha
Altitude	20–100 m asl

Ecological unit
(a) Secondary kahikatea forest on hillslope.

(b) Taraire–kahikatea forest on hillslope.

(c) Manuk–kanuka shrubland on hillslope.

Landform/geology
Hill country in Mangakahia Complex sandstone and mudstone.

Vegetation
More than half of this area is manuka-kanuka shrubland much of which has been frequently burnt.

About a quarter of the area is taraire with kahikatea, nikau and puriri; rimu, totara, tawa, kauri and northern rata are also present in small numbers.

The remainder is kahikatea with totara and occasional puriri, rimu, nikau, rewarewa, and tree fern.

Fauna
Not surveyed.

Significance
Broadleaf–podocarp areas are a source of food for NZ pigeon.

FIGURE 57. TARATARA/OTANGAROA RD NTH, P04/013.
EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.
s = SHRUBLAND; f = FOREST.

WHARUARUA

Survey no.	P04/030
Survey date	20 October 1994
Grid reference	P04 744 786
Area	17.9 ha
Altitude	40–140 m asl

Ecological unit

(a) Taraire–puriri forest on hillslope.

Landform/geology

Hill country of Tupou Complex greywacke within a tectonic melange of Mangakahia Complex rock units.

FIGURE 58. WHARUARUA, P04/030.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. f = FOREST.

Vegetation
A group of broadleaf remnants, three of which are taraire dominant with frequent puriri and the fourth has equal proportions of puriri and taraire.

Other species scattered thoughout are kanuka, totara, kahikatea, rimu, rewarewa, kohekohe, tawa, nikau, pukatea, titoki, karaka, tanekaha, matai, kauri, toro, towai, and northern rata.

Fauna
Kiwi reported.

Significance
All blocks are in steep-sided gullies and provide seasonal food for NZ pigeon.

WEBER RD

Survey no.	P04/031
Survey date	14, 20 October 1994
Grid reference	P04 755 785
Area	28.6 ha
Altitude	20–140 m asl

Ecological unit
(a) Taraire–puriri forest in hillslope.

(b) Tanekaha–totara forest on hillslope.

(c) Taraire–kanuka forest on hillslope.

(d) Totara–kanuka forest on hillslope.

(e) Tanekaha forest on hillslope.

(f) Towai–manuka forest on hillslope.

Landform/geology
Hill country of Tupou Complex greywacke within a tectonic melange of Mangakahia Complex rock units.

Vegetation
A series of remnants in the next catchment to Wharuarua but more variable in species dominance.

Other species present are kahikatea, rimu, rewarewa, kohekohe, tawa, nikau, pukatea, titoki, karaka, matai, kauri, miro, and northern rata.

Fauna
NZ pigeon (Category B threatened species).

Significance
These blocks provide seasonal food for NZ pigeon.

FIGURE 59. WEBER ROAD, P04/031.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. f = FOREST.

LOWER WAIARE RD

Survey no.	P04/040
Survey date	13 February 1995
Grid reference	P04 840 758
Area	21.8 ha
Altitude	20–100 m asl

Ecological unit

(a) Secondary totara on hillslope.

(b) Secondary kauri on ridge.

(c) Secondary totara–towai forest on hillslope.

(d) Manuka shrubland on hillslope.

FIGURE 60. LOWER WAIARE RD, P04/040.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Landform/geology
Hill country of Waipapa Group greywacke and overlying Te Kuiti Group calcareous mudstone.

Vegetation
On the western side of the road is an area of secondary totara with frequent tanekaha, and manuka. Kauri, puriri, karaka, taraire, towai, rewarewa, kawaka, rimu, and kahikatea also occur in small numbers. Other species present are manuka, cabbage tree, mapou, putaputaweta, rangiora, hangehange, supplejack, wheki, and nikau. This area is protected by a QE II covenant.

Across the road, rising steeply above the river is similar vegetation, as well as a small area of totara–towai with taraire and occasional pukatea, rewarewa, and rata.

On a ridge is a small area of kauri with frequent totara.

About half the area is manuka shrubland with totara, towai, mamaku, tanekaha, and rimu.

Fauna
Not surveyed. Kiwi possibly present on western side of the road.

Significance
Small but vigorously regenerating areas, one on a steep slope above the Kaeo River.

UPUKORAU AIRSTRIP

Survey no.	P04/047
Survey date	13 February 1995
Grid reference	P04 878 728
Area	16.9 ha
Altitude	40–150 m asl

Ecological unit
(a) Towai–manuka–kanuka shrubland on hillslope.

(b) Secondary totara–kanuka forest on hillslope.

Landform/geology
Hillside with Mangakahia Complex sandstone and siliceous mudstone on the lower slopes, and Whangaroa Group andesitic intrusives above.

Vegetation
Half of the area is secondary totara–manuka–kanuka with scattered tanekaha, puriri, kauri, and mamaku.

The remainder is towai–manuka–kanuka shrubland with occasional rewarewa and mamaku.

Fauna

Not surveyed but adjacent to an area containing kiwi.

Significance

Acts as a linkage between Upukorau and Te Whau, and is possibly used by kiwi (Category A threatened species).

FIGURE 61. UPUKORAU AIRSTRIP, P04/047.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. s = SHRUBLAND.

LINK RD

Survey no.	P04/049
Survey date	3 November 1995
Grid reference	P04 875 757
Area	11.8 ha
Altitude	180–200 m asl

Ecological unit

(a) Towai–taraire forest in gully.

(b) Taraire forest on gentle hillslope.

(c) Secondary totara forest on gentle hillslope.

(d) Secondary totara–towai on gentle hillslope.

(e) Bog association in gully bottom.

FIGURE 62. LINK RD, P04/049.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. f = FOREST.

Landform/geology

Gently rolling country with Whangaroa Group andesite flows in valleys, overlain by Kerikeri Volcanics basalt flows.

Vegetation

Two remnants, both unfenced. The larger, on the eastern side of the road, lines a gully system. Both towai and taraire are common with frequent kahikatea and totara, pukatea, kauri, rimu, northern rata, rewarewa and swamp maire also occur.

The smaller block, to the west is mostly taraire dominant with frequent towai and totara.

Secondary totara is dominant on the margins. Rimu, rewarewa and puriri occur occasionally in the canopy. The sub-canopy consists of nikau, ponga and kohekohe. The understorey is mostly grazed out except for gullies with large rocks and boulders where ponga, hangehange and nikau are present. Most of the understorey species present occur here. There is a healthy layer of leaf litter.

On the south western side vegetation is less mature, with secondary totara, towai, and kahikatea. Lancewood also occurs. *Coprosma rhamnoides*, mapou and mingimingi are common in the understorey here and the ground layer is mossy where the canopy is open.

In the gully bottom is a small boggy area where there are a few swamp maire and kahikatea emergent over wheki and supplejack. Kiekie occurs on the margin of a

more open area, with *Potamogeton* growing in small pools. Kiokio, soft rush, and *Sphagnum* moss occur on the edges of these pools.

Fauna
NZ pigeon (Category B threatened species).

Significance
Presence of swamp maire is uncommon in this ecological district. Potential food source for NZ pigeon.

WHANGAROA–ST PAULS

Survey no.	P04/056
Survey date	30 March 1995
Grid reference	P04 795 830
Area	78.4 ha
Altitude	<20–c. 200 m asl

Ecological unit
(a) Taraire forest on hillslope.

(b) Kanuka shrubland on hillslope.

Landform/geology
Coastal hills of Tupou Complex greywacke, with Whangaroa Group andesitic breccia forming the prominent bluffed knoll of Ohakiri.

Vegetation
The flanks of St Pauls Rock (Ohakiri) are mostly covered in kanuka with occasional totara, puriri, pohutukawa, towai, rewarewa, and pine. On the southwestern side is an area of taraire dominance with scattered puriri, rewarewa, pohutukawa, tawa, karaka, titoki, and towai.

Towards Kaheka Point tall kanuka is dominant with pine trees in large numbers. There are several open areas, and wattle occurs.

Fauna
Not surveyed.

Significance
Advanced regeneration with a coastal influence around Ohakiri.

St Pauls Rock dome and the Waiotapu cretaceous unconformity (on the shore platform on the south eastern side of the site) are geopreservation sites of regional importance (Kenny & Hayward 1993).

The site includes 53 ha of scenic reserve administered by the Department of Conservation.

FIGURE 63. WHANGAROA–ST PAULS, P04/056.
EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.
s = SHRUBLAND; f = FOREST.

MATINGIRAU

Survey no.	P04/057
Survey date	30 March 1995
Grid reference	P04 805 845
Area	37 ha
Altitude	Sea level to 125 m

Ecological unit

(a) Manuka–gorse scrub on hillslope.

(b) Manuka shrubland on hillslope.

(c) Puriri–taraire forest on hillslope.

FIGURE 64. MATINGIRAU, P04/057.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

Landform/geology
Coastal hill of Tupou Complex greywacke.

Vegetation
Mostly manuka shrubland up to 4 metres tall with scattered puriri, mamaku and pine; or scrub of manuka and gorse with scattered mamaku and puriri.

There is a small pocket of puriri and taraire with occasional rewarewa.

Fauna
Not surveyed

Significance
Although heavily modified by burning and grazing, the margins have riparian protection values and the area has potential for restoration.

MILFORD ISLAND

Survey no.	P04/058
Survey date	30 March 1995
Grid reference	P04 806 855
Area	25.8 ha
Altitude	Sea level to 60 m

Ecological unit
(a) Kanuka forest on coastal banks and hillslope.

Landform/geology
Island of Tupou Complex greywacke.

Vegetation
Most of the island is covered in tall kanuka with scattered pine, puriri, mamaku and pohutukawa. The understorey is mainly small-leaved *Coprosma* and tree ferns.

Fauna
Kiwi (Category A threatened species) reported.

Significance
Used by kiwi and of sufficient size to be potentially a significant island habitat.

FIGURE 65. MILFORD ISLAND, P04/058.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA. s = SHRUBLAND.

TUTU

Survey no.	P04/063
Survey date	3 April 1995
Grid reference	P04 825 840
Area	151.3 ha
Altitude	Sea level to 170 m asl

Ecological unit

(a) Manuka shrubland on hillslope.

(b) Manuka forest on coastal bank and hillslope.

Landform/geology

Hill country of Tupou Complex greywacke, with a small area of Motatau Complex calcareous mudstone in the eastern part of Waipahihi Stream Valley.

Vegetation

A mosaic of manuka shrubland between 1 and 6 metres. Bracken, mamaku, devilweed, and gorse are often frequent. Mahoe, hangehange, cabbage tree, and pine are scattered.

In Touwai Bay there is a very small coastal forest remnant where manuka is dominant with a diverse range of other species: kowhai, rata, tawa, kahikatea, taraire, puriri, rewarewa, kauri, tanekaha, and *Pittosporum umbellatum.* The

FIGURE 66. TUTU, P04/063.

EACH GRID IS 1000 M × 1000 M AND EQUALS 100 HA.

s = SHRUBLAND; f = FOREST.

understorey consists of mahoe, lacebark, mapou, ponga, kohuhu, *Hebe stricta,* and *Doodia media*. Mangroves grow on the edge.

Fauna

Not surveyed

Significance

A large area of vegetation. The coastal remnant is a rare vegetation type—tawa and northern rata growing on the water's edge.

5. Summary and conclusions

The Protected Natural Area network in the Whangaroa Ecological District is summarised in Table 1. Note that these sites are all larger than the area currently protected.

A list of ecological units recorded in the Whangaroa Ecological District and their current protection status is set out in Table 2 (page 155) and a summary of the site evaluations is given in Table 3 (page 166).

TABLE 1. PROTECTED NATURAL AREAS NETWORK IN THE WHANGAROA ECOLOGICAL DISTRICT (AREA GIVEN IN HA).

Site	Site no.	Status				Total
		QEII	SR	SL	HR	
Whakaangi	O04/210	289.6	21	20		330.6 (approx)
Taemaro	O04/212	67.8		50		117.8 (approx)
Paikauri	O04/215			247.6		247.6
North Whangaroa	P04/007	75	1755.1		42.7	1872.8
St Pauls Rock	P04/056		53.1			53.1
Upper Whangaroa Harbour	P04/011			2		2
Kaeo Bush	P04/052	13.4	353.8			367.2
Taraire Rd	P04/050		90.3			90.3
Burlace's Reserve	P04/039	44.7		163.9		208.6
Upper Touwai Stream	P04/065			80.5		80.5
Teheoriri	P04/066		116			116 (approx)
Tauranga Valley	P04/067		116			116 (approx)
	TOTAL	490.5	2505.3	564	42.7	3602.5

Key: SR = Scenic Reserve; SL = Stewardship Land; QEII = Queen Elizabeth II National Trust covenant; HR = Historic Reserve

5.1 PRIORITY NATURAL AREAS FOR PROTECTION IN THIS ECOLOGICAL DISTRICT

1. Habitat types and landforms which are nationally uncommon, including
   - all freshwater wetlands, especially Komutu Swamp,
   - coastal forests, shrublands and associations scattered from Hihi to Tauranga Bay,
   - podocarp forests, especially the emerging site at Barrons Bush
   - kauri forests,
   - saltmarsh.
2. Habitats where species are at or approaching their northern limits, in this district occurring at Whakaangi and Berghan Point.
3. Retention of the contiguity of large habitats, for species dispersal and particularly to retain habitat for kiwi. Such areas include:
   - Whakaangi-Berghan Point,
   - North Whangaroa,
   - Taratara,
   - Barrons Bush–Ngarahu–Burlaces Reserve–Ohapehape–Upukorau Bush–Te Whau,
   - Bridge–Orotere–Taraire Rd–Martins Rd–Kaeo Bush and all contiguous habitats to Tauranga Bay.
4. Distinctive plant species associations which occur at Whakaangi, North Whangaroa, Kaeo Bush, Taraire Rd and Taratara.

The overall management of the coastal margin, especially seasonally, is also important for the small waders and sea bird species such as NZ dotterel, variable oystercatcher, and white-fronted tern, which breed there. Stock, including dogs, and off-road vehicles, also pose threats to these species.

TABLE 2. ECOLOGICAL UNITS RECORDED IN THE WHANGAROA ECOLOGICAL DISTRICT AND PROTECTED NATURAL AREA STATUS

STATUS: SR = Scenic Reserve; SL = Stewardship Land; QEII = Queen Elizabeth II National Trust covenant; HR = Historic Reserve; CN = Consent Notice under RMA; Pt = Partly protected; UP = Unprotected; 2 = Level 2 site; REPR. SITE = Representative site.

VEGETATION TYPE	SITE NO.	STATUS	SITE NAME	GEOLOGY	REPR. SITE
Wetlands					
Pond	P04/033	UP	Barrons Bush	alluvium	Yes
	P04/009-2	UP	Unuhi Stream	Holocene alluvium	
Raupo	P04/006	UP	Taupo Bay estuary	estuarine sands	
	P04/007	UP	North Whangaroa	Whangaroa group andesitic lava flow	Yes
	P04/014	UP	Taratara Flax Swamp	alluvium	
	P04/015	UP	Taratara	alluvium	
	P04/033	UP	Barrons Bush	alluvium	
	P04/034	UP	Komutu Swamp	Holocene estuarine & swamp deposits	Yes
	P04/005A-2	UP	Taupo Bay Hill	Tupou Complex greywacke/alluvium	
	P04/009-2	UP	Unuhi Stream	Holocene alluvium	
Raupo-Juncus-Baumea	P04/018	UP	Waihapa Bay	alluvium	Yes
Juncus-Cyperus	P04/043	UP	Ohapehape	Waipapa Group greywacke	
Kuta	P04/033	UP	Barrons Bush	alluvium	Yes
Raupo-flax	P04/034	UP	Komutu Swamp	Holocene estuarine & swamp deposits	Yes
Flax	P04/007	Pt SR	North Whangaroa	Whangaroa group andesitic lava flow	Yes
	P04/014	UP	Taratara Flax Swamp	alluvium	Yes
Cabbage tree	P04/034	UP	Komutu Swamp	Holocene estuarine & swamp deposits	Yes
Cabbage tree-manuka	P04/034	UP	Komutu Swamp	Holocene estuarine & swamp deposits	Yes
Manuka swamp shrubland	P04/018	UP	Waihapa Bay	alluvium	Yes
Blechnum association	P04/085	UP	Te Whau	Whangaroa Group andesitic lava	
Bog association	P04/049-2	UP	Link Rd	Whangaroa Group andesitic lava	
Estuaries					
Juncus assoc	P04/001	UP	Tupou Bay		
Juncus-Leptocarpus	P04/006	UP	Taupo Bay Estuary		
Leptocarpus	P04/067A	UP	Tauranga Bay Estuary		
	P04/011	UP	Upper Whangaroa Harbour		Yes

VEGETATION TYPE	SITE NO.	STATUS	SITE NAME	GEOLOGY	REPR. SITE
Estuaries *(continued)*					
Mangroves	P04/067A	UP	Tauranga Bay Estuary		
	P04/011	UP	Whangaroa Harbour		Yes
Dunes					
Sandy beach	P04/001	UP	Tupou Bay		Yes
	P04/002	UP	Camp Bay		
	O04/216	UP	Motukahakaha Bays		
Marram–spinifex	P04/006	UP	Taupo Bay estuary		
Marram	P04/067A	UP	Tauranga Bay estuary		
Shrublands					
Astelia association	P04/059	UP	Ohauroro	Whangaroa Complex andesitic breccia overlying Tupou Complex greywacke	Yes
Astelia–rengarenga lily	P04/062	UP	Butterfly Bay	Whangaroa Group andesitic breccia	Yes
Tussock shrubland	P04/007	SR	North Whangaroa	Whangaroa Group andesitic lava flow & breccia	Yes
Broadleaf shrublands (coastal & ridge)	P04/007	SR	North Whangaroa	Whangaroa Group andesitic lava flow & breccia	Yes
Kanuka	O04/168A	UP	Stony Stream	Tangihua Complex	
	P04/050	Pt SR	Taraire Rd	Whangaroa Group andesitic lava flow & breccia	
	P04/067	Pt SR	Tauranga Valley	Whangaroa Group andesitic breccia overlying Waipapa Group greywacke	
	P04/056-2	SR	Whangaroa-St Pauls	Tupou Complex greywacke	
Manuka	O04/210	Pt SL	Whakaangi (low)	Tangihua Complex cut by Whangaroa Group dikes & intrusion	Yes
	O04/211	Pt QEII	Berghan Point (coastal)	Tangihua Complex cut by Whangaroa Group dikes & intrusion	
	O04/214	UP	Waimahana (coastal)	Tangihua Complex	
	O04/215	Pt SL	Paikauri	Tangihua Complex	Yes
	P04/003	UP	Te Umukukupa	Whangaroa Group andesitic intrusives	
	P04/006A	UP	Taupo Bay Cliffs	Tupou Complex greywacke	
	P04/007	HR	North Whangaroa	Whangaroa Group andesitic lava flow & breccia	
	P04/015	UP	Taratara	Mangakahia Complex siliceous mudstone with overlying Whangaroa Gp andesitic brecia & derived colluvium	Yes
	P04/018	UP	Waihapa Bay	Mangakahia Complex sandstone & mudstone	
	P04/029	UP	Tahawai Shrubland	Tectonic melange of Mangakahia Complex/colluvial Kerikeri Volcanics basalt & boulders	Yes
	P04/052	Pt SR	Kaeo Bush	Waipapa Group greywacke overlying Te Kuiti Group glauconitic sandstone	Yes

VEGETATION TYPE	SITE NO.	STATUS	SITE NAME	GEOLOGY	REPR. SITE
Shrublands *(cont'd)*					
Manuka	P04/060	UP	Te Kahikatoa	Tupou Complex greywacke	Yes
	P04/062	UP	Butterfly Bay (coastal)	Whangaroa Group andesitic breccia	
	P04/064	UP	Waiotapu	Waipapa Group greywacke overlying Te Kuiti group glauconitic sandstone	
	P04/065	UP	Upper Touwai Stream	Waipapa Group greywacke overlain by Whangaroa Group andesitic breccia	
	P04/066	UP	Teheoriri	Whangaroa Group andesitic breccia	
	P04/067	UP	Tauranga Valley	Whangaroa Group andesitic breccia overlying Waipapa Group greywacke	
	P04/085	UP	Te Whau	Whangaroa Group andesitic lava/ Mangakahia Complex siliceous mudstone/ Waipapa Group greywacke/Kerikeri Volcanic basalt flow	Yes
	P04/005A-2	UP	Taupo Bay Hill	Tupou Complex greywacke	
	P04/040-2	UP	Lower Waiare Rd	Waipapa Group greywacke & Te Kuiti group glauconitic sandstone	
	P04/070-2	UP	Matingirau	Tupou Complex greywacke	
	P04/063-2	UP	Tutu	Tupou Complex greywacke	
Manuka–kanuka	O04/210	UP	Whakaangi (tall -Hihi)	Tangihua Complex cut by Whangaroa Group andesite dikes & intrusions	Yes
		UP	(coastal 3-4m)		
	O04/212	UP	Taemaro	Tangihua Complex	
	P04/007	Pt SR QEII	North Whangaroa (coastal cliffs & inland)	Whangaroa Group andesitic lava flows & breccia	Yes
	P04/008	UP	Yerkovich Bush	Whangaroa Group andesitic lava flows & breccia	
	P04/033	UP	Barrons Bush	Waipapa Group greywacke overlying Te Kuiti group glauconitic sandstone & Mangakahia Complex sandstone & mudstone	
	P04/035	UP	Mangaiti	Waipapa Group greywacke & Te Kuiti group glauconitic sandstone	
	P04/036	UP	Ngarahu	Waipapa Complex greywacke	
	P04/045	UP	Okaihau Stream	Waipapa Complex greywacke	
	P04/46	UP	Upukorau Bush	Whangaroa Group dacitic intrusives/ Mangakahia Complex sandstone & siliceous mudstone/ Waipapa Group greywacke/Kerikeri Volcanic basalt flow	
	P04/051	UP	Martins Rd '339'	Te Kuiti glauconitic sandstone	
	P04/052	Pt SR	Kaeo Bush	Waipapa Group greywacke overlying Te Kuiti Group glauconitic sandstone; some Whangaroa Group andesitic breccia & Mangakahia Complex mudstone	Yes
	P04/053	UP	Goldie/Clarkson	Te Kuiti Group glauconitic sandstone	
	P04/054	UP	Mangapiko-Whangaroa	Te Kuiti Group glauconitic sandstone	
	P04/055	CN	Kaeo River Mouth	Te Kuiti Group glauconitic sandstone	
	O04/170-2	UP	Oruaiti - SH10	Tangihua Complex	
	P04/005A-2	UP	Taupo Bay Hill	Tupou Complex greywacke	
	P04/012-2	UP	Iwitaua Stream Headwaters	Mangakahia Complex sandstone and mudstone cut by Whangaroa Group andesitic intrusions	
	P04/013-2	UP	Taratara/ Otangaroa Rd Nth	Mangakahia Complex sandstone and mudstone	
	P04/063-2	UP	Tutu	Tupou Complex greywacke	

VEGETATION TYPE	SITE NO.	STATUS	SITE NAME	GEOLOGY	REPR. SITE
Shrublands *(cont'd)*					
Manuka–gorse	O04/212	UP	Taemaro	Tangihua Complex	
	P04/005	UP	Karangi	Tangihua Complex	
	P04/029	UP	Tahawai Shrubland	Tectonic melange of Mangakahia Complex/colluvial Kerikeri Volcanics basalt & boulders	
	P04/039	Pt SL	Burlace's Reserve	Waipapa Group greywacke	
	P04/057-2	UP	Matingirau	Tupou Complex greywacke	
Manuka–gorse–bracken	P04/033	UP	Barrons Bush	Waipapa Group greywacke overlying Te Kuiti group glauconitic sandstone & Mangakahia Complex sand- & mudstone	
Bracken–gorse scrub	P04/051	UP	Martins Rd '339'	Te Kuiti Group glauconitic sandstone	
Bracken–manuka	P04/029	UP	Tahawai Shrubland	Tectonic melange of Mangakahia Complex/colluvial Kerikeri Volcanics basalt & boulders	
Kanuka–gorse–*Ageratina* scrub	P04/043	UP	Ohapehape	Whangaroa Group lacustrine sediments & andesitic breccia	
Bracken–*Ageratina* scrub	P04/046	UP	Upukorau Bush	Whangaroa Group dacitic intrusives/ Mangakahia Complex sandstone & siliceous mudstone/ Waipapa Group greywacke/Kerikeri Volcanic basalt flow	
Bracken scrub	P04/015	UP	Taratara	Mangakahia Complex siliceous mudstone with Whangaroa Group andesitic breccia & derived colluvial boulders	
Bracken fernland	P04/007	Pt SR QEII	North Whangaroa	Whangaroa Group andesitic lava flow & breccia	Yes
Kanuka–kanuka–mamangi shrubland	P04/007	Pt SR QEII	North Whangaroa	Whangaroa Group andesitic lava flow & breccia	Yes
Manuka–towai	P04/036	UP	Ngarahu	Waipapa Group greywacke	
	P04/039	Pt SL	Burlace's Reserve	Waipapa Group greywacke	
Manuka–kanuka–towai shrubland	P04/043	UP	Ohapehape	Waipapa Group greywacke	
	P04/046	UP	Upukorau Bush	Whangaroa Group dacitic intrusives/ Mangakahia Complex sandstone & siliceous mudstone/ Waipapa Group greywacke/Kerikeri Volcanic basalt flow	Yes
	O04/12A-2	UP	Taratara/Hobbs Rd Intersection	Mangakahia sandstone & mudstone cut by Whangaroa Group andesitic intrusions	
	P04/047-2	UP	Upukorau Airstrip	Mangakahia sandstone & siliceous mudstone & Whangaroa Group andesitic intrusions	

VEGETATION TYPE	SITE NO.	STATUS	SITE NAME	GEOLOGY	REPR. SITE
Shrublands *(cont'd)*					
Towai–mamaku shrubland	P04/039	UP	Burlaces Reserve	Waipapa Group greywacke	
Towai–bracken shrubland	P04/039	UP	Burlaces Reserve	Waipapa Group greywacke	
Towai shrubland	P04/045	UP	Okaihau Stream	Waipapa Group greywacke	
	P04/051	UP	Martins Rd '339'	Te Kuiti glauconitic sandstone	
	P04/085	UP	Te Whau	Whangaroa Group andesitic lava/ Mangakahia Complex siliceous mudstone/ Waipapa Group greywacke/Kerikeri Volcanic basalt flow	Yes
Broadleaf forest					
Pohutukawa	O04/211	Pt QEII	Berghan Point (forest and treeland)	Tangihua Group /Whangaroa Group	Yes
	O04/213	UP	Opakau Point (forest)	Tangihua Complex	Yes
	P04/003	UP	Te Umukukupa (treeland)	Whangaroa Group	
	P04/007A	UP	Okura Bay (treeland)	Tupou Complex greywacke	
	P04/015	UP	Taratara (treeland)	Mangakahia Complex siliceous mudstoneand overlying Whangaroa Group andesitic breccia	Yes
	P04/062	UP	Butterfly Bay (treeland)	Whangaroa Group andesitic breccia	
Metrosideros association	P04/007	SR	North Whangaroa	Whangaroa Group andesitic breccia	Yes
	P04/008	QEII	Yerkovich Bush	Whangaroa Group andesitic lava/ Mangakahia Complex siliceous mudstone/Waipapa Group greywacke/ Kerikeri Volcanic basalt flow	Yes
Manuka/kanuka forest	O04/210	Pt QEII	Whakaangi	Tangihua Group /Whangaroa Group	Yes
	O04/215	Pt SL	Paikauri	Tangihua Complex	Yes
	P04/004	UP	Tupou Bush	Tupou Complex greywacke	Yes
	P04/007	Pt SR QEII	North Whangaroa	Whangaroa Group andesitic breccia	Yes
	P04/015	UP	Taratara	Mangakahia Complex siliceous mudstone and overlying Whangaroa Group andesitic breccia	Yes
	P04/033	UP	Barrons Bush	Waipapa Group greywacke overlying Te Kuiti Group glauconitic sandstone	Yes
	P04/039	Pt SL	Burlaces Reserve	Waipapa Group greywacke	
	P04/052	Pt SR	Kaeo Bush	Waipapa Group greywacke overlying Te Kuiti Group glauconitic sandstone; some Whangaroa Group andesitic breccia & Mangakahia Complex mudstone	
	P04/053	UP	Goldie/Clarkson	Te Kuiti glauconitic sandstone	
	P04/054	UP	Mangapiko-Whangaroa	Te Kuiti glauconitic sandstone	
	P04/059	UP	Ohauroro	Tupou Complex greywacke overlain by Whangaroa Group andesitic breccia	
	P04/060	UP	Te Kahikatoa	Whangaroa Group andesitic breccia	
	P04/064	UP	Waitapu	Waipapa Group greywacke overlying Te Kuiti group glauconitic sandstone	

VEGETATION TYPE	SITE NO.	STATUS	SITE NAME	GEOLOGY	REPR. SITE
Broadleaf forest *(cont'd)*					
Manuka/kanuka forest	P04/065	UP	Upper Touwai Stream	Waipapa Complex greywacke/ Whangaroa Group andesitic breccia	
	P04/066	Pt SR	Teheoriri	Whangaroa Group andesitic breccia	
	P04/067	Pt SR	Tauranga Valley	Whangaroa Group andesitic breccia with underlying Waipapa Group greywacke	
	P04/085	UP	Te Whau	Whangaroa Group andesitic lava/ Mangakahia Complex siliceous mudstone/Waipapa Group greywacke/ Kerikeri Volcanic basalt flow	Yes
	P04/058-2	UP	Milford Island	Tupou Complex greywacke	
	P04/170-2	UP	Oruaiti - SH10	Tangihua Complex	
Kanuka-taraire	P04/007	Pt SR QEII	North Whangaroa	Whangaroa Group andesitic breccia	Yes
	P04/054	UP	Mangapiko-Whangaroa	Te Kuiti glauconitic sandstone	
	P04/031-2	UP	Weber Rd	Tupou Complex greywacke with tectonic melange of Mangakahia Complex	
Taraire forest	P04/003	UP	Te Umukukupa	Whangaroa Group andesitic breccia	
	P04/007	Pt SR QEII	North Whangaroa	Whangaroa Group andesitic breccia	Yes
	P04/008	UP	Yerkovich Bush	Whangaroa Group andesitic breccia	
	P04/015	UP	Taratara	Mangakahia Complex siliceous mudstone & overlying Whangaroa Group andesitic breccia	Yes
	P04/035	UP	Mangaiti	Waipapa Group greywacke & Te Kuiti group glauconitic sandstone	
	P04/039	Pt SL	Burlaces's Reserve	Waipapa Group greywacke	Yes
	P04/043	UP	Ohapehape	Whangaroa Group lacustrine sediments and andesitic breccia	Yes
	P04/044		Bridge	Te Kuiti Group calcareous mudstone/Whangaroa Group andesitic breccia colluvium	Yes
	P04/045	UP	Okaihau Stream	Waipapa Group greywacke	
	P04/046	UP	Upukorau Bush	Whangaroa Group dacitic intrusives/ Mangakahia Complex sandstone & siliceous mudstone/Waipapa Group greywacke/Kerikeri Volcanic basalt flow	
	P04/048	UP	Orotere	Whangaroa Group andesitic breccia & lava	
	P04/050	Pt SR	Taraire Rd	Whangaroa Group andesitic breccia overlain with Kerikeri Volcanics basalt flows	Yes
	P04/060	UP	Te Kahikatoa	Whangaroa Group andesitic breccia	
	P04/064	UP	Waitapu	Waipapa Group greywacke	
	P04/065	Pt SR	Upper Touwai Stream	Whangaroa Group andesitic breccia	
	P04/066	SR	Teheoriri	Whangaroa Group andesitic breccia	
	P04/067	SR	Tauranga Valley	Whangaroa Group andesitic breccia with underlying Waipapa Group greywacke/Mangakahia Complex mudstone (east)	

VEGETATION TYPE	SITE NO.	STATUS	SITE NAME	GEOLOGY	REPR. SITE
Broadleaf forest *(cont'd)*					
Taraire forest	P04/085	UP	Te Whau	Whangaroa Group andesitic lava/ Mangakahia Complex siliceous mudstone/Waipapa Group greywacke/Kerikeri Volcanic basalt flow	Yes
	P04/049-2	UP	Link Rd	Whangaroa Group andesitic flows overlain by Kerikeri Volcanic basalt flow	
	P04/056-2	SR	Whangaroa-St Pauls	Tupou Complex greywacke/ Whangaroa Group andesitic breccia (St Pauls)	
Taraire–puriri forest	O04/214	UP	Waimahana	Tangihua Complex	Yes
	O04/215	Pt SL	Paikauri	Tangihua Complex	
	P04/003	UP	Te Umukukupa	Whangaroa Group andesitic breccia	
	P04/005	UP	Karangi	Tangihua Complex	
	P04/007	UP	North Whangaroa	Whangaroa Group andesitic breccia	
	P04/033	UP	Barrons Bush	Waipapa Group greywacke overlying Te Kuiti Group glauconitic sandstone	
	P04/036	UP	Ngarahu	Waipapa Group Complex	
	P04/039	Pt SL	Burlaces Reserve	Waipapa Group Complex	
	P04/052	SR	Kaeo Bush	Waipapa Group greywacke overlying Te Kuiti Group glauconitic sandstone; some Whangaroa Group andesitic breccia & Mangakahia Complex mudstone	Yes
	P04/030-2	UP	Wharuarua	Tupou Complex greywacke/tectonic melange of Mangakahia Complex	
	P04/031-2	UP	Weber Rd	Tupou Complex greywacke	
	P04/057-2	UP	Matingirau	Tupou Complex greywacke	
Puriri forest	P04/007	SR	North Whangaroa (coastal)	Whangaroa Group andesitic breccia	Yes
	P04/029	UP	Tahawai Shrubland	Tectonic melange of Mangakahia Complex/colluvial Kerikeri Volcanics basalt & boulders	Yes
Puriri–kanuka	O04/168A	UP	Stony Stream	Tangihua Complex	
Puriri–towai	P04/005A-2	UP	Taupo Bay Hill	Tupou Complex greywacke	
Taraire–tawa	P04/065	SR	Upper Touwai Stream	Te Kuiti Group glauconitic sandstone	Yes
Taraire–towai	O04/210	Pt QEII	Whakaangi	Tangihua Complex cut by Whangaroa Group dikes & intrusion	Yes
	O04/215	Pt SL	Paikauri	Tangihua Complex	
	P04/007	Pt SR QEII	North Whangaroa	Whangaroa group andesitic breccia	Yes
	P04/039	Pt SL	Burlaces Reserve	Waipapa Group greywacke	
	P04/043	UP	Ohapehape	Whangaroa Group lacustrine sediments and andesitic breccia/ Waipapa Group greywacke	Yes
	P04/048	UP	Orotere	Whangaroa group andesitic breccia & lava	
	P04/051	UP	Martins Rd '339'	Te Kuiti Group glauconitic sandstone	

VEGETATION TYPE	SITE NO.	STATUS	SITE NAME	GEOLOGY	REPR. SITE
Broadleaf forest *(cont'd)*					
Taraire–towai	P04/052	Pt SR	Kaeo Bush	Waipapa Group greywacke overlying Te Kuiti Group glauconitic sandstone; some Whangaroa Group andesitic breccia & Mangakahia Complex mudstone	Yes
	P04/066	SR	Teheoriri	Kerikeri Volcanics basalt flow	Yes
	P04/067	SR	Tauranga Valley	Whangaroa group andesitic breccia with underlying Waipapa group greywacke	
	P04/085	UP	Te Whau	Whangaroa Group andesitic lava/ Mangakahia Complex siliceous mudstone/Waipapa Group greywacke/ Kerikeri Volcanic basalt flow	Yes
	P04/049-2	UP	Link Rd	Whangaroa Group andesitic flows overlain by Kerikeri Volcanics basalt flow	
Towai Forest	O04/215	Pt SL	Paikauri	Tangihua Complex	Yes
	P04/004	UP	Tupou Bush	Tupou Complex greywacke	
	P04/036	UP	Ngarahu	Waipapa Group greywacke	
	P04/039	Pt SL	Burlaces Reserve	Waipapa Group greywacke	
	P04/048	UP	Orotere	Whangaroa group andesitic breccia	
	P04/050	Pt SR	Taraire Rd	Whangaroa Group andesitic breccia overlain by Kerikeri Volcanics basalt flows	Yes
	P04/051	UP	Martins Rd '339'	Te Kuiti Group glauconitic sandstone	
	P04/052	UP	Kaeo Bush	Waipapa Group greywacke overlying Te Kuiti Group glauconitic sandstone; some Whangaroa Group andesitic breccia & Mangakahia Complex mudstone	Yes
	P04/066	UP	Teheoriri	Whangaroa Group andesitic breccia	Yes
Towai-kanuka-manuka	P04/036	UP	Ngarahu	Waipapa Complex greywacke	
	P04/051	UP	Martins Rd '339'	Te Kuiti Group glauconitic sandstone	
	P04/052	UP	Kaeo Bush	Waipapa Group greywacke overlying Te Kuiti Group glauconitic sandstone; some Whangaroa Group andesitic breccia & Mangakahia Complex mudstone	Yes
	P04/066		Teheoriri	Whangaroa Group andesitic breccia	
	P04/085	UP	Te Whau	Whangaroa Group andesitic lava/ Mangakahia Complex siliceous mudstone/Waipapa Group greywacke/ Kerikeri Volcanic basalt flow	Yes
	P04/031-2	UP	Weber Rd	Mangakahia Complex siliceous mudstone	
Broadleaf–podocarp forest					
Kanuka–totara	O04/168A	UP	Stony Stream	Tangihua & alluvium	
	P04/007	SR	North Whangaroa	Whangaroa Group andesitic breccia	Yes
	P04/036	UP	Ngarahu	Waipapa Complex greywacke	
	P04/045	UP	Okaihau Stream	Waipapa Complex greywacke	
	P04/051	UP	Martins Rd '339'	Te Kuiti Group glauconitic sandstone	
	P04/010-2	UP	Johansson-Kahoe	Mangakahia Complex siliceous mudstone cut by Whangaroa group dacite intrusion	
	P04/031-2	UP	Weber Rd	Tupou Complex greywacke within tectonic melange of Mangakahia Complex	

VEGETATION TYPE	SITE NO.	STATUS	SITE NAME	GEOLOGY	REPR. SITE
Broadleaf–podocarp forest *(cont'd)*					
Kanuka–totara	P04/047-2	UP	Upukorau Airstrip	Mangakahia Complex sandstone & siliceous mudstone/Whangaroa Group intrusives	
Kanuka–totara–puriri	O04/168A	UP	Stony Stream	Tangihua Complex	
Puriri–kahikatea	O04/168A	UP	Stony Stream	Tangihua Complex	
Taraire–puriri–kahikatea	P04/012-2	UP	Iwitaua Stream Headwaters	Mangakahia Complex sandstone & mudstone cut by Whangaroa Group intrusives	
Taraire–kahikatea	P04/036 P04/013-2	UP UP	Ngarahu Taratara/ Otangaroa Rd Nth	Waipapa Group greywacke Mangakahia Complex sandstone & mudstone	
Totara–kahikatea–taraire	P04/035 P04/012A-2	UP UP	Mangaiti Taratara/Hobbs Rd	Waipapa Group greywacke & Te Kuiti group glauconitic sandstone Mangakahia Complex sandstone & mudstone	
Taraire–totara	P04/036	UP	Ngarahu	Waipapa Group greywacke	
Totara–towai	P04/050 P04/051 P04/040-2 P04/049-2	Pt SR UP QEII UP	Taraire Rd Martins Rd '339' Lower Waiare Rd Link Rd	Whangaroa Group andesitic breccia overlain by Kerikeri Volcanics basalt flows Te Kuiti Group glauconitic sandstone Waipapa Group greywacke overlying Te Kuiti Group calcareous sandstone Whangaroa Group andesitic flows overlain by Kerikeri Volcanic basalt flow	Yes
Kauri–kanuka	P04/007 P04/052	SR QEII Pt SR	North Whangaroa Kaeo Bush	Whangaroa Group andesitic breccia Waipapa Group greywacke breccia overlying Te Kuiti Group glauconitic sandstone; some Whangaroa Group andesitic breccia & Mangakahia Complex mudstone	Yes Yes
Kauri–kanuka–kahikatea	O04/168A	UP	Stony Stream	Tangihua Complex	
Kauri–kanuka–tanekaha	P04/085	UP	Te Whau	Whangaroa Group andesitic lava/ Mangakahia Complex siliceous mudstone/Waipapa Group greywacke/ Kerikeri Volcanic basalt flow	Yes

VEGETATION TYPE	SITE NO.	STATUS	SITE NAME	GEOLOGY	REPR. SITE
Broadleaf–podocarp forest *(cont'd)*					
Tanekaha–kanuka–manuka	O04/210	UP	Whakaangi	Tangihua Complex cut by Whangaroa Group dikes & intrusion	Yes
	P04/015	UP	Taratara	Mangakahia Complex siliceous mudstone/Whangaroa Group andesitic breccia & derived colluvial boulders	Yes
	P04/052	Pt QEII?	Kaeo Bush	Waipapa Group greywacke overlying Te Kuiti Group glauconitic sandstone; some Whangaroa Group andesitic breccia & Mangakahia Complex mudstone	Yes
	P04/060	UP	Te Kahikatoa	Tupou Complex greywacke	Yes
	P04/065	UP	Upper Touwai Stream	Waipapa Complex greywacke/ Te Kuiti Group glauconitic sandstone/ Whangaroa Group andesitic breccia	
	P04/066	SR	Teheoriri	Kerikeri Volcanics basalt flow	Yes
Manuka–tanekaha–totara	P04/036	UP	Ngarahu	Waipapa Group greywacke	
Towai–manuka–tanekaha	P04/052	UP	Kaeo Bush	Waipapa Group greywacke overlying Te Kuiti Group glauconitic sandstone; some Whangaroa Group andesitic breccia & Mangakahia Complex mudstone	Yes
Tanekaha–taraire	O04/210	UP	Whakaangi	Tangihua Complex cut by Whangaroa Group dikes & intrusion	Yes
Puriri–totara–tanekaha	O04/215	Pt SL	Paikauri	Tangihua Complex	
Podocarp forest					
Totara	P04/044	UP	Bridge	Te Kuiti Group glauconitic sandstone	Yes
	P04/048	UP	Orotere	Whangaroa Group andesitic breccia	
	P04/050	Pt SR	Taraire Rd	Whangaroa Group andesitic breccia overlain by Kerikeri Volcanics basalt flows	Yes
	P04/029	UP	Tahawai Rd	Tectonic melange of Mangakahia Complex/colluvial Kerikeri Volcanics basalt & boulders	Yes
	P04/040-2	QEII	Lower Waiare Rd	Waipapa Group greywacke overlying Te Kuiti Group calcareous sandstone	
	P04/049-2	UP	Link Rd	Whangaroa Group andesitic flows overlain by Kerikeri Volcanic basalt flow	
Kahikatea	P04/015	UP	Taratara	Mangakahia Complex siliceous mudstone/Whangaroa Group andesitic breccia & derived colluvial boulders	
	P04/085	UP	Te Whau	Whangaroa Group andesitic lava	
	O04/012-2	UP	Taratara/Hobbs Rd	Mangakahia sandstone & mudstone cut by Whangaroa Group andesitic intrusions	
	P04/013-2	UP	Taratara/ Otangaroa Rd Nth	Mangakahia sandstone & mudstone	

VEGETATION TYPE	SITE NO.	STATUS	SITE NAME	GEOLOGY	REPR. SITE
Podocarp forest *(cont'd)*					
Kauri	O04/210	QEII	Whakaangi	Tangihua Complex cut by Whangaroa Group dikes & intrusion	Yes
	O04/215	SL	Paikauri	Tangihua Complex	Yes
	P04/007	SP QEII	North Whangaroa	Whangaroa Group andesitic breccia	Yes
	P04/066	SR	Teheoriri	Kerikeri Volcanics basalt flow	Yes
	P04/067	SR	Tauranga Valley	Whangaroa Group andesitic breccia/ Waipapa Group greywacke	Yes
	P04/040-2	UP	Lower Waiare Rd	Waipapa Group greywacke overlying Te Kuiti Group calcareous sandstone	
Kauri–tanekaha	P04/007	SR QEII	North Whangaroa	Whangaroa Group andesitic breccia	Yes
	P04/039	SL	Burlaces Reserve	Waipapa Group greywacke	
	P04/052	UP	Kaeo Bush	Waipapa Group greywacke overlying Te Kuiti Group glauconitic sandstone; some Whangaroa Group andesitic breccia & Mangakahia Complex mudstone	Yes
Tanekaha	P04/007	QEII	North Whangaroa	Whangaroa Group andesitic breccia	Yes
	P04/033	UP	Barrons Bush	Waipapa Group greywacke overlying Te Kuiti Group glauconitic sandstone	Yes
	P04/043	UP	Ohapehape	Waipapa Group greywacke	
	P04/031-2	UP	Weber Rd	Tupou Complex greywacke within tectonic melange of Mangakahia Complex	
Tanekaha–totara	P04/031-2	UP	Weber Rd	Tupou Complex greywacke within tectonic melange of Mangakahia Complex	

TABLE 3 SUMMARY OF SITE EVALUATIONS

	Representativeness	Rarity/Special features	
LEVEL 1 SITES Stony Stream		Blue-gilled bully	
Whakaangi	High - rep. site for 5 e.u.s*	Flora: 2 threatened sp.; 1 restricted dist; 3 @ northern limits. Fauna: 3 threatened; 1 @ northern limit	
Berghan Point	Coastal shrubland incl. remnant pohutukawa	Kiwi	
Taemaro	Coastal	Fauna: 3 threatened sp. Flora:1 restricted dist	
Opakau Point	High - coastal forest	Rare forest type	
Waimahana	Coastal	Kiwi	
Paikauri	Representative site for 4 e.u.s incl kauri forest	Kiwi	
Motukahakaha Bays		Variable oystercatcher	
Tupou Bay	Dune association; best example of shorebird habitat in ED	2 threatened species	
Camp Bay		NZ dotterel	
Te Umukukupa	One of the largest stands of coastal pohutukawa in ED	Kiwi	
Tupou Bush	Best example of type	3 threatened fauna sp.	
Karangi		Kiwi	
Taupo Bay Estuary	Estuarine habitat	NZ dotterel	
Taupo Bay Cliffs	Uncommon coastal vegetation	1 Local plant species	
North Whangaroa	High - rep. site for 19 e.u.s	Flora: 5 threatened species; 1 endemic; 6 uncommon. Fauna:5 threatened sp; 1 endemic; 2 regionally significant. 7 geopreservation sites.	
Okura Bay	Stand of mature pohutukawa	Pohutukawa uncommon vegetation type	
Yerkovich Bush	1 of 2 sites with *Metrosideros* association	Uncommon vegetation type; 3 threatened species	

* rep. site = representative site; e.u.s = ecological units

	Diversity & pattern	Naturalness	Buffer/linkage/corridor	Size & shape
	Freshwater fish	High % of riparian shading	Riparian protection	
	7 e.u.s	Largely intact; includes vigorous regeneration	Part of a greater contiguous area	700+ ha
	3 e.u.s	Severe pohutukawa browse; some pampas, gorse & roading impacts	Links coast to ridgetop	600 ha approx.
	2 e.u.s	Regenerating	Part of a greater contiguous area Links coast to ridgetop	200 + ha
	1 e.u.	Grazed and browsed	Adjoins O04/214	20 + ha
	2 e.u.s	Scattered pine	Adjoins O04/213 and O04/215	300 + ha
	7 e.u.s	Part intact; remainder regenerating	Adjoins O04/214	360 ha
		No riparian vegetation		
	3 e.u.s	Some modification but limited human disturbance of habitat		
		Minimal riparian vegetation		
	4 e.u.s	Fragmented and grazed		
	Species diversity incl. coastal species	Fenced		37 ha
		Cutover	Refuge for kiwi; linkage to P04/003	
		Margins modified		Small
		Modifed; regenerating		Small area
	High (21 e.u.s) > 300 plant species	Mature forest and regeneration	Borders approximately 13 km coast	Large (2500+ ha)
		Isolated; exotics present		Small
		Browsed	Adjacent to Whangaroa North	20 ha

	Representativeness	Rarity/Special features	
LEVEL 1 SITES (Cont'd) Upper Whangaroa Harbour	Best example of estuary in ED	3 threatened species; 2 regionally significant	
Taratara Flax Swamp	1 of 2 examples in ED	Rare habitat type in ED	
Taratara	High - rep. site for 4 e.u.s; association of *Metrosideros* and kauri	Geological interest; 1 restricted distribution plant;fernbird	
Waihapa Bay	Rep. site 2 wetland types	Fernbird	
Tahawai Shrubland	Rep site for 3 e.u.s	Possibly kiwi. Rock types of limited extent in ED	
Barrons Bush	Rep site for 3 e.u.s - best example of emerging podocarp forest in ED	Bittern, endemic snails	
Komutu Swamp	High; best wetland in ED	1 threatened, 3 regionally significant birds	
Mangaiti		Kiwi	
Ngarahu		Kiwi	
Burlaces Reserve	Rep. site for taraire forest	Fauna: 3 threatened sp; 1 threatened plant	
Ohapehape	Rep. site for 2 e.u.s	Fauna: 2 threatened sp.	
Bridge	Rep. site for 2 e.u.s	Fauna: 1 threatened sp; 1 restricted distribution plant	
Okaihau Stream			
Upukorau Bush	Rep. site for 1 e.u.	Fauna: 2 threatened sp; 1 Local plant	
Orotere		Fauna: 3 threatened sp; 3 endemic snails	
Taraire Rd	Rep. site for 4 e.u.s	Fauna: 3 threatened & 1 regionally significant sp. Flora: 1 Local & several uncommon sp.	
Martins Rd 339		Fauna: 2 threatened species	
Kaeo Bush	Rep. site for 8 e.u.s	Fauna: 3 threatened species; Flora: 1 threatened, 2 uncommon sp.	

	Diversity & pattern	Naturalness	Buffer/linkage/corridor	Size & shape
	Best wetland bird diversity in ED	Varies from intact to modified; some *Spartina* & sharp rush	Adjoins 5 other sites	950 ha
		Modified		Small; long & narrow
	Mosaic; contains Mangakahia siliceous mud-stone - distinctive in ED	Browsed;mature forest & regeneration		Large (400 ha)
		Regenerating	Adjoins estuary	130 ha
	4 e.u.s	Regenerating; some weeds		c 90 ha
	Mosaic; diversity of rock types	Varies - regenerating; exotic weeds in some parts	Close to Kaeo River	380 ha
	Part of sequence from estuary to forest	Some exotic sp present	Adjoins Whangaroa Harbour	29 ha
	Diversity of rock types	Regenerating		c. 120 ha
	Mosaic of regeneration	Mixed pattern of regeneration; exotic weed species	Adjoins P04/037 and P04/039	Large (440 ha)
	9 e.u.s	Regenerating; weeds & pests	Adjoins P04/036 & P04/046	260 ha
	6 e.u.s	Fragmented, grazed; weeds	Adjoins P04/039 & P04/046	c 150 ha
	2 e.u.s	Even canopy; browser control; some timber extraction & *Selaginella*	Adjacent to P04/048	c 25 ha
	4 e.u.s	Regenerating; some weeds	Riparian buffer	37 ha
	4 e.u.s; diversity of rock types	Regenerating; abundant mistweed, goats	Contiguous with P04/039 & P04/043	c. 350 ha
	5 e.u.s	Grazed; abundant mistweed	Adjacent to P04/044 & P04/050	c. 50 ha
	5 e.u.s	Some secondary vegetation and regeneration but most intact.	Adjoins P04/048 and P04/051	165 ha
	7 e.u.s; diversity of rock types	Cutover; some regenerating; weeds; some grazing	Adjoins P04/050 & near P04/052	180 ha
	12 e.u.s; diversity of rock types	Mosaic; some regenerating but mostly high	Part of large habitat linking Kaeo to Tauranga Bay. Adjoins P04/053, P04/054, P04/064 and near P04/051	> 800 ha

	Representativeness	Rarity/Special features	
LEVEL 1 SITES (Cont'd) Goldie/Clarkson		Flora: 1 threatened, 2 uncommon sp	
Mangapiko-Whangaroa		Kiwi	
Kaeo River Mouth	Coastal riparian	Kiwi	
Ohauroro	Rep. site		
Te Kahikatoa	Rep. site for 2 e.u.s	Kiwi	
Butterfly Bay	Coastal; rep. site for 1 e.u.	1 Local plant species	
Waitapu		1 threatened plant species	
Upper Touwai Stream	Rep site for 1 e.u.	Kiwi	
Teheoriri	Rep. site for 3 e.u.s	2 threatened fauna species	
Tauranga Valley	Rep. site for 3 e.u.s	3 threatened fauna species	
Tauranga Bay Estuary	Estuarine habitat	Fauna: 1 threatened and 1 regionally significant species	
Te Whau	Rep. site for 6 e.u.s	1 threatened bird species. Spectacular gorges.	

	Diversity & pattern	Naturalness	Buffer/linkage/corridor	Size & shape
	2 e.u.s	Most is even canopy; some weeds on margins & a few wilding pines	Part of large habitat linking Kaeo to Tauranga Bay. Adjoins P04/052, P04/054, P04/064	> 100 ha
	4 e.u.s	Cutover; some being developed; weeds	Part of large habitat linking Kaeo to Tauranga Bay. Adjoins P04/053	c. 180 ha
	1 e.u.	Regenerating;poor understorey and some gorse on margins	Estuarine buffer	c. 15 ha
	2 e.u.s	Some weeds and broken canopy		c. 4 ha
	4 e.u.s	Some margins regenerating, discontinuous but main canopy intact	Sequence from sea level to > 200m	130 ha
	3 e.u.s	Discontinuous cover		75 ha
	3 e.u.s	Mosaic of regeneration	Part of large habitat linking Kaeo to Tauranga Bay. Adjoins P04/053, P04/065	c. 150 ha
	5 e.u.s; diversity of rock types	Mixed; includes tall forest	Part of large habitat linking Kaeo to Tauranga Bay. Adjoins P04/064 & P04/066	c. 470 ha
	8 e.u.s	Includes mature forest	Part of large habitat linking Kaeo to Tauranga Bay. Adjoins P04/067, P04/065	c. 340 ha
	6 e.u.s	Includes mature kauri forest; canopy near coast discontinuous	Part of large habitat linking Kaeo to Tauranga Bay. Adjoins P04/066	150 ha
	3 e.u.s	Riparian margins developed	Links Tauranga stream (high freshwater fish diversity) to coast	10 ha
	9 e.u.s; diversity of rock types	Even canopy forest in gullies amongst pine plantations	Adjoins P04/046 & P04/047	>750 ha

	Representativeness	Rarity/Special features	
LEVEL 2 SITES Taratara/Hobbs Rd		NZ pigeon	
Oruaiti SH 10			
Taupo Bay Hill	Coastal remnants and wetland		
Unuhi Stream	Pond and wetland		
Johansson-Kahoe		Rock types of limited extent in ED	
Iwitaua Stream Headwaters			
Taratara/ Otangaroa Rd Nth	Contains secondary podocarp		
Wharuarua		Kiwi reported Rock type association of limited extent in ED	
Weber Rd		NZ pigeon Rock type association of limited extent in ED	
Lower Waiare Rd		Kiwi likely	
Upukorau Airstrip		Kiwi likely	
Link Rd	Bog association	NZ pigeon; swamp maire	
Whangaroa-St Pauls	Coastal		
Matingirau	Coastal		
Milford Island	Island habitat	Kiwi reported	
Tutu	Coastal forest(tiny remnant)		

*e.u.s = ecological units

	Diversity & pattern	Naturalness	Buffer/linkage/corridor	Size & shape
	3 e.u.s*	Remnant		< 10 ha
	2 e.u.s	Remnant		c 10 ha
	4 e.u.s	Mostly regenerating; limited understorey		c 30 ha
	2 e.u.s	Constructed in stream valley		small
	1 e.u.	Grazed		< 5 ha
	2 e.u.s	Scattered remnants;grazed		c 15 ha
	3 e.u.s	50% previously burnt		c 50 ha
	1 e.u.	Remnants		< 20 ha
	Diversity of rock units and canopy species	Remnants		< 30 ha
		Regenerating	Partial buffer to Kaeo River	c 20 ha
		2 e.u.s	Links PO4/046 and P04/085	< 20 ha
	5 e.u.s	Heavily grazed		c 10 ha
	2 e.u.s	Frequent pines; exotic weeds		c 80 ha
	3 e.u.s	Frequently burnt; weeds	Buffers harbour	c 35 ha
	1 e.u.	Understorey depauperate; weeds		25 ha
	2 e.u.s	Degraded; weedy	Buffers harbour	c 150 ha

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8. Appendices

8.1 FIELD SURVEY FORM

8.2 LETTER TO RATEPAYERS/NEWS MEDIA ITEM

8.3 CATEGORIES OF THREAT

New Zealand Threatened Plant List

In this report categories of threatened plants are taken from the New Zealand Threatened Plants Committee (Cameron et al. 1995), which are based on those used by the Conservation Monitoring Centre of the International Union for Conservation of Nature and Natural Resources (IUCN) in their worldwide survey of threatened species. The categories are as follows:

Presumed Extinct
Taxa which are no longer known to exist in the wild or in cultivation after *repeated* searches of the type localities and *other known or likely places*.

Critical
Taxa which face *an extremely high probability of extinction* in the wild within the immediate future.

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

Vulnerable
Taxa believed *likely to move into the Endangered category in the near future if the causal factors continue* operating. Included are taxa of which most or all of the populations are decreasing because of over-exploitation, extensive destruction of habitat, or other environmental disturbance; taxa with populations that have been seriously depleted and whose ultimate security is not yet assured; and taxa with populations that are still abundant, but are under threat from serious adverse factors throughout their range.

Rare
Taxa with small populations which are not Endangered or Vulnerable but *are at risk*. These taxa are usually localised within restricted geographical areas or habitats, or are thinly scattered over a more extensive range. Rare species are often endemics with a narrow distribution whereas Vulnerable and Endangered species have often been formerly more widespread.

Insufficiently Known
Taxa that are *suspected* but *not definitely known* to belong to any of the above categories because of lack of information. An "Insufficiently Known" taxon does not have to be *proved* to be in any of the four categories - Critical, Endangered, Vulnerable or Rare. It is hoped that listing a taxon as "Insufficiently Known" will stimulate studies to find out its true category of threat.

Taxonomically Indeterminate

This includes: (1) Taxa about which there is *doubt regarding a taxonomic status* and which require further investigation; and (2) *genetic variants* which are distinct at a level *which may not warrant formal taxonomic recognition*. Species within this category are then defined by probable category of threat.

Local

This is not an IUCN Threat Category. It has been compiled by the New Zealand Threatened Plants Committee (Cameron et al. 1995) and is regularly updated. It is designed to act as a "watchlist" for taxa which are sufficiently restricted to warrant noting and some monitoring. It may include taxa which occupy habitats potentially threatened in the future, and those found in sensitive habitats which are prone to damage.

Molloy & Davis (1994) Categories of Threat

The Molloy & Davis categories were developed to identify species which should be assessed for conservation action. It includes taxonomic groups not ranked under IUCN categories such as bryophytes and invertebrates.

The Categories are as follows:

Category A	Highest priority threatened species (score >47 out of a possible 83).
Category B	Second priority threatened species (score 39–47 inclusive).
Category C	Third priority threatened species (score 30–38 inclusive).
Category X	Species which have not been sighted for a number of years but which may still exist.
Category I	Species about which little information exists, but based on existing evidence, are considered to be threatened.
Category O	Species which are threatened in New Zealand, but which are known to be secure in other parts of their range outside New Zealand.
Category M	Species that are rare or localised, and of cultural importance to Maori.

8.4 FAUNA

A. Checklist of birds of Northland recorded from the Whangaroa Ecological District

NI brown kiwi	*Apteryx australis mantelli*
Blue penguin	*Eudyptula minor*
Australasian gannet	*Morus serrator*
Black shag	*Phalacrocorax carbo*
Pied shag	*P. varius varius*
Little black shag	*P. sulcirostris*
Little shag	*P. melanoleucos brevirostris*
White faced heron	*Ardea novaehollandiae novaehollandiae*
Reef heron	*Egretta sacra sacra*
Australasian bittern	*Botaurus poiciloptilus*
Paradise shelduck	*Tadorna variegata*
*Mallard	*Anas platyrhynchos platyrhynchos*
Grey duck	*Anas superciliosa superciliosa*
NZ shoveler	*Anas rhynchotis variegata*
Australasian harrier	*Circus approximans*
*Californian quail	*Callipela californica brunnescens*
*Brown quail	*Synoicus ypsilophorus*
*Pheasant	*Phasianus colchicus*
Banded rail	*Rallus philippensis assimilis*
Spotless crake	*Porzana tabuensis plumbea*
Pukeko	*Porphyrio porphyrio melanotus*
Variable oystercatcher	*Haematopus unicolor*
Pied stilt	*Himantopus himantopus leucocephalus*
NZ dotterel	*Charadrius obscurus aquilonius*
Banded dotterel	*Charadrius bicinctus bicinctus*
*Spur-winged plover	*Vanellus miles novaehollandiae*
Eastern bar-tailed godwit	*Limosa lapponica baueri*
Southern black backed-gull	*Larus dominicanus dominicanus*
Red-billed gull	*Larus novaehollandiae scopulinus*
Caspian tern	*Sterna caspia*
White-fronted tern	*Sterna striata*
NZ pigeon	*Hemiphaga novaeseelandiae novaeseelandiae*
*Eastern rosella	*Platycerus eximius*
Shining cuckoo	*Chalcites lucidus lucidus*
Long-tailed cuckoo	*Eudynamis taitensis*
Morepork	*Ninox novaeseelandiae novaeseelandiae*
Kingfisher	*Halcyon sancta vagans*
*Skylark	*Alauda arvensis arvensis*
Welcome swallow	*Hirundo tahitica neoxena*
NZ pipit	*Anthus novaeseelandiae*
*Blackbird	*Turdus merula merula*
*Song thrush	*Turdus philomelos clarkei*
*Hedge sparrow	*Prunella modularis*
NI fernbird	*Bowdleria punctata vealeae*
NI fantail	*Rhipidura fuliginosa placabilis*
Pied tit	*Petroica macroceohala toitoi*
Grey warbler	*Gerygone igata*
Silver-eye	*Zosterops lateralis lateralis*
Tui	*Prosthemadera novaeseelandiae*
*Yellow hammer	*Emberiza cintrinella caliginosa*
*Chaffinch	*Fringilla coelebs gengleri*
*Greenfinch	*Carduelis chloris*
*Goldfinch	*Carduelis carduelis britannica*
*Redpoll	*Carduelis flammea*
*House sparrow	*Passer domesticus domesticus*
*Starling	*Sturnus vulgaris vulgaris*
*Myna	*Acridotheres tristis*
*White-backed magpie	*Gymnorhina hypoleuca*

*Introduced

B. Other fauna recorded in the Ecological District

Lizards/geckos		
Northland green gecko	*Naultinus grayi*	Northland endemic Reported from Whakaangi and North Whangaroa
Forest gecko	*Hoplodactylus granulatus*	possibly widespread
Pacific gecko	*Hoplodactylus pacificus*	Hihi
Shore skink	*Oligosoma smithi*	Te Reinga Bay
Frogs		
Green frog	*Litoria aurea*	
Golden bell frog	*L. raniformis*	
Freshwater invertebrates		
Freshwater crayfish	*Parenephrops planifrons*	
Freshwater shrimp	*Paratya curviroistrus*	
Fish		
Shortfinned eel	*Anguilla australis*	
Longfinned eel	*Anguilla dieffenbachii*	
Torrentfish	*Cheimarrichthys fosteri*	
Koaro	*Galaxias brevipennis*	
Banded kokopu	*G. fasciatus*	
Inanga	*G. maculatus*	
Common smelt	*Retropinna retropinna*	
Red finned bully	*Gobiomorphus huttoni*	
Blue-gilled bully	*G. hubbsii* (Stony Stream)	
Common bully	*G. cotidianus*	
Giant bully	*G. gobioides* (Butterfly Bay)	
Lamprey	*Geotria australis*	
	(1971 record in Whangaroa harbour; Matauri Bay 1993 - P.Anderson pers. comm. 1997)	
Introduced fish		
Mosquitofish	*Gambusia affinis*	
Introduced mammals		
mouse	*Mus musculus*	
ship rat	*Rattus rattus rattus*	
Norway rat	*Rattus norvegicus*	
weasel	*Mustela nivalis*	
stoat	*Mustela erminea*	
ferret	*Mustela furro*	
Feral cat	*Felis catus*	
Feral dog	*Canis familaris*	
Cattle	*Bos taurus*	
Goat	*Capra hircus*	
Possum	*Trichosurus vulpecula*	
Pig	*Sus scrofa*	
Hedgehog	*Erinaceus europeus occidentalis*	

8.5A COMMON AND SCIENTIFIC PLANT NAMES USED IN THE TEXT

This is not a definitive list of common names used for plants from the ecological district. Rather it is a guide to the reader as to exactly which species is referred to when the common name is used in the text.

Indigenous

akeake	*Dodonaea viscosa*
akepiro	*Olearia furfuracea*
bracken	*Pteridium esculentum*
brake fern	*Pteris* sp.
broom	*Carmichaelia australis*
cabbage tree	*Cordyline australis*
cutty grass	*Gahnia setifolia*
dwarf cabbage tree	*C. pumilio*
fan fern	*Schizaea dichotoma*
fivefinger	*Pseudopanax arboreus*
flax	*Phormium tenax*
gully fern	*Pneumatopteris pennigera*
hairy shield fern	*Lastreopsis hispida*
hangehange	*Geniostoma rupestre* var. *ligustrifolium*
hard beech	*Nothofagus truncata*
hinau	*Elaeocarpus dentatus*
hopeless menace	*Oplismenus hirtellus*
hound's tongue fern	*Phymatosorus pustulatus*
houpara	*Pseudopanax lessonii*
kahikatea	*Dacrycarpus dacrydioides*
kanuka	*Kunzea ericoides s.l.*
karaka	*Corynocarpus laevigatus*
kauri	*Agathis australis*
kawaka	*Libocedrus plumosa*
kawakawa	*Macropiper excelsum* subsp. *excelsum*
kiekie	*Freycinetia banksii*
kiokio	*Blechnum* 'blackspot'
Kirk's tree daisy[1]	*Brachyglottis kirkii*
kohekohe	*Dysoxylum spectabile*
kohuhu	*Pittosporum tenuifolium* var. *tenuifolium*
kowhai	*Sophora microphylla*
kuta	*Schoenoplectus tabernaemontani*
lacebark	*Hoheria populnea*
lancewood	*Pseudopanax crassifolius*
mahoe	*Melicytus ramiflorus* subsp. *ramiflorus*
maidenhair fern	*Adiantum cunninghamii, A. hispidulum*
mamaku	*Cyathea medullaris*
mamangi	*Coprosma arborea*
manuka	*Leptospermum scoparium*
mangrove	*Avicennia marina* subsp.*australasica*
mapou	*Myrsine australis*
matai	*Prumnopitys taxifolia*
mingimingi	*Leucopogon fasciculatus*
miro	*Prumnopitys ferruginea*
monoao	*Halocarpus kirkii*
nikau	*Rhopalostylis sapida*
northern rata	*Metrosideros robusta*
parataniwha	*Elatostema rugosum*
pate	*Schefflera digitata*
pigeonwood	*Hedycarya arborea*
pingao	*Desmoschoenus spiralis*
pohutukawa	*Metrosideros excelsa*
ponga	*Cyathea dealbata*
pukatea	*Laurelia novae-zelandiae*
puriri	*Vitex lucens*
putaputaweta	*Carpodetus serratus*
rangiora	*Brachyglottis repanda*
rasp fern	*Doodia media* subsp. *australis*
raupo	*Typha orientalis*
renga lily	*Arthropodium cirratum*
rewarewa	*Knightia excelsa*
rimu	*Dacrydium cupressinum*
ring fern	*Paesia scaberula*
shining spleenwort	*Asplenium oblongifolium*
shore ribbonwood	*Plagianthus divaricatus*
sun orchid	*Thelymitra* sp.
supplejack	*Ripogonum scandens*
tanekaha	*Phyllocladus trichomanoides*
taraire	*Beilschmiedia tarairi*
taupata	*Coprosma repens*
tawa	*Beilschmiedia tawa*
tawapou	*Pouteria costata*
thread fern	*Blechnum filiforme*
titoki	*Alectryon excelsus*
toro	*Myrsine salicina*
toru	*Toronia toru*
totara	*Podocarpus totara*
towai	*Weinmannia silvicola*
tutu	*Coriaria arborea*
whau	*Entelea arborescens*
wheki	*Dicksonia squarrosa*
white maire	*Nestegis lanceolata*

[1] Data considered in this report do not distinguish whether the species referred is *Brachyglottis kirkii* var. *kirkii* or *B. kirkii* var. *angustior*. The vernacular "Kirk's tree daisy" may refer to one or both of these species.

Adventives

African club moss	*Selaginella kraussiana*	Mexican daisy	*Erigeron karvinskianus*
blackberry	*Rubus fruticosus*	Mexican devilweed	*Ageratina adenophora*
blue pine	*Psoralea pinnata*	mistweed	*Ageratine riparia*
gorse	*Ulex europeus*	pampas	*Cortaderia sellonoa*
hakea	*Hakea sericea*	pine	*Pinus radiata*
honeysuckle	*Lonicera japonica*	prickly hakea	*Hakea sericea*
kahili ginger	*Hedychium gardnerianum*	sea rocket	*Cakile edulenta*
kikuyu	*Pennisetum clandestinum*	soft rush	*Juncus effusus*
macrocarpa	*Cupressus macrocarpa*	water lily	*Nymphaea alba*
marram grass	*Ammophila arenaria*	wattle	*Acacia mearnsii*

8.5B WHANGAROA ECOLOGICAL DISTRICT TYPE LOCALITIES

From Cunningham (1838)

Alseuosmia ligustrifolia		RC	1833	"shaded woods at Wangaroa"
A. palaeiformis		RC	1833	"dense forests at Wangaroa"
A. atriplicifolia		RC	1833	"dry woods at Wangaroa"
Carpodetus serratus	putaputaweta	AC	1826	"on alluvial banks of rivers, occasionally in salt-water marshes, Wangaroa"
Clematis cunninghamii (C. parviflora?)		AC	1826	"thickets on the skirts of forests, Wangaroa"
Corokio buddleoides		AC	1826	"margins of woods on the shores of the BoI, Wangaroa etc"
Coprosma propinqua			1833	"shaded woods"
C. rotundifolia		RC	1830	"in dry woods" No known records -very uncommon if it persists here
C. spathulata		AC	1826	"shady rocks"
Epilobium hirtigerum		RC	1834	"skirts of forests round Wangaroa Harbour"
Galium propinquum		RC	1833	"shaded woods at Wangaroa"
G. tenuicaule		RC	1834	"damp woods"
Haloragis incana (Gonocarpus?)		AC	1826	"Wangaroa, dry exposed rocky hills"
Haloragis depressa		AC	1826	"Low boggy ground at Wangaroa"
Ixerba brexioides	tawari	AC	1828	"skirts of woods at Wangaroa"; said to be of rare occurrence
Metrosideros robusta	northern rata	AC	1826	"Forests of Wangaroa"
Mida salicifolia		AC	1826	"Forests of Wangaroa"
P. pimeleoides		AC	1826	"Dry woods on the shores of the BoI, Wangaroa etc"
Rubus cissoides	bushlawyer	AC	1826	"Dense forests at Wangaroa"
R. schmidelioides	bushlawyer	AC	1826	"Forests of Wangaroa"

Whangaroa ED - Other collections

Alectryon excelsus	titoki	AC	1826	shady forests of Wangaroa
Elaeocarpus dentata	hinau	AC	1826	Wangaroa, Hokianga
Epilobium pallidiflorum		AC	1826	in low and wet situations, Wangaroa
Geranium pilosum		AC	1826	low moist places in the valley Wangaroa
G. microphyllum		AC	1826	low moist places in the valley Wangaroa
Hibiscus trionum		RC	1833	"at Ngaire opposite the Cavallos [Cavalli] Isles, off the east coast"
Metrosideros diffusa	rata vine	AC	1826	
M perforata (M. buxifolia)	white rata vine	AC	1826	
Pelargonium inodorum		AC	1826	low moist places in the valley Wangaroa
Peraxilla tetrepetala (Loranthus tetrapetalus)		AC	1826	on pohutukawa and puriri
Pittosporum tenuifolium	kohuhu	AC	1826	"on the skirts of salt-water inlets"
P. umbellatum		RC	1833	shores of Onawero Bay Wangaroa
Ranunculus reflexus (R. hirtus)		AC	1826	banks of Kaeo river
Rubus australis	bush lawyer	AC	1826	
Sicyos australis	native cucumber	RC	1833	"among underwood on the sea coast, Wangaroa"

8.6 GLOSSARY

Allochthonous

Geologic units that have been transported to their present position.

Autochthonous

Rock units that formed in their present posiiton (opposite of allochthonous).

Biodiversity

The variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (IUCN 1993).

Buffer

A zone surrounding a natural area which reduces the effects of external influences on the natural area. For example, shrubland, scrub and exotic trees around native forested areas provide a gradation of habitats from fully modified to a natural state. This effect also applies to waterways - riparian vegetation and wetlands protect both water quality and habitat from influences arising from the surrounding land.

Community

An association of populations of plants and animals which occur naturally together in a common environment.

Diversity and pattern

Diversity is the variety and range of species of biological communities, ecosystems and landforms. Pattern refers to changes in species composition, communities and ecosystems along environmental gradients.

Ecological District

A local part of New Zealand where geological, topographical, climatic, and biological features and processes, including the broad cultural pattern, interrelate to produce a characteristic landscape and range of biological communities.

Ecological Region

A group of adjacent Ecological Districts which have diverse but closely related characteristics, or in some cases a single very distinctive Ecological District.

Ecological unit

Vegetation type occurring on a particular landform or soil or rock type.

Ecosystem

Any inter-related and functioning assemblage of plants, animals, and substrates (including air, water, and soil) on any scale, including the processes of energy flow and productivity (Myers et al. 1987).

Endemic

Occurring naturally in, and restricted to, a particular country, region or locality.

Estuary

A sheltered embayment where streams and rivers enter tidal waters.

Exotic

Introduced from outside New Zealand.

Fernland

Dominated by ferns such as *Gleichenia*, bracken, tree ferns, with occasional woody plants.

Foredune

Mobile and fixed transverse dunes along coastal margins.

Forest

A tall, predominantly closed canopy consisting mainly of tree species (a tree being a woody plant which attains a 10 cm diameter at breast height - Atkinson 1985).

Much of Northland's forest consists of or includes secondary growth which has developed following disturbance or destruction of the original forest. This may include secondary manuka/kanuka forest where those species have reached tree size and may contain other canopy species.

Habitat

The part of the environment where a plant or animal lives. It includes both the living and non-living features of the area.

Herbfield

Vegetation in which the dominant cover is of non-woody or semi-woody plants < 1 m tall.

Indigenous

Native to and occurring naturally within the New Zealand Biogeographic Region.

Landform

A part of the land's surface with distinctive naturally formed physical characteristics, e.g. a hill, valley, etc.

Linkages/corridors

Vegetated or aquatic areas (can be forest, shrubland, wetland, streams, beach, or exotic vegetation such as pine) that link up two or more habitats. With a link between habitats the gene pool for a species is greater, which enhances the viability of that population. The corridor does not have to be continuous for many species to utilise it. Small remnants can act as stepping stones between two larger habitats so that birds such as kiwi can move from remnant to remnant up to 500 m apart.

Natural Area

A tract of land which supports natural landforms and predominantly native vegetation or provides habitat for indigenous species; identified as a unit for

evaluation of ecological quality and representativeness and has potential to be ecologically significant.

Naturalness

The degree to which a habitat is modified and disturbed by human activity or introduced plants and animals, and what natural values are retained despite these factors, i.e. to what extent native species are functioning according to natural processes.

Rarity

This is a measure of commonness and may apply to entire ecosystems through to single species. It may refer to the threatened status of a species (see Appendix 8.3) or habitat type in any one of the following ways: formerly common but now rare; rare elsewhere but common in the district; rare in the district but common elsewhere; confined to a limited geographic area; at the limit of its range; or with a contracting or fragmented range.

For example, old growth alluvial swamp forests are an extremely rare ecosystem type in Northland, and indeed nationally, even though they contain no species which are regarded as rare in themselves.

Reedland

A swampy area dominated by reeds such as raupo.

Refuge

Native bush enclaves in production pine forest become a refuge for some native species during the logging phase, e.g. allowing bird species, such as kiwi, a retreat from logged areas.

Representativeness

The extent to which an area represents or exemplifies the components of the natural diversity of the Ecological District. This implies consideration of the full range of natural ecosystems and landscapes that were originally found in the Ecological District, how well they are represented in today's environment, and the extent to which they are included in the protected areas network.

Riparian functions

Riparian vegetation performs important functions such as providing corridors linking habitats and providing shading to streams. This is important in Northland, as many streams have small catchments and the water temperature can rise depleting the available oxygen, leading to the death of aquatic life. Litter debris enters the nutrient cycle and supports invertebrates such as mayfly, caddisfly, and stonefly feeding on it. Riparian vegetation also acts as a buffer for non-point water discharges.

Riparian zone

An area of land immediately adjacent to a watercourse.

Riverine forest

Forest situated on a floodplain alongside a stream/river and subject to periodic inundation by floodwaters.

It is characterised by species such as cabbage tree, lowland ribbonwood (*Plagianthus regius*), kowhai (*Sophora microphylla*), kahikatea, pukatea, kaikomako (*Pennantia corymbosa*), titoki (*Alectryon excelsus*), and divaricating shrubs. On drier areas totara, taraire, kohekohe, matai, and kanuka may occur. It commonly occurs only as narrow strips due to the deforestation of flat land for pasture.

Rush/sedgeland

Swampy areas dominated by rushes, sedges, rush-like sedges, or restiads, e.g. *Baumea, Juncus* (rush), *Carex*, *Schoenus, Isolepis, Bolboschoenus*, *Empodisma,* and *Leptocarpus.*

Scrub

Refers to seral communities, often dominated by or with a large component of exotic species such as gorse, *Hakea,* tobacco weed, etc.; and/or commonly lacking a closed canopy and in which an understorey is either absent or composed primarily of exotic species.

Secondary vegetation

Native vegetation established after destruction or disturbance of the previous vegetation and which is essentially different from the original vegetation. (See Succession, below.)

Seral

Describes a plant community in the process of succession.

Shrubland

Vegetation in which the canopy is dominated by woody plants less than 10 cm diameter at breast height.

There are 2 main types:

(i) Successional vegetation dominated by seral species such as manuka, kanuka, mahoe, etc. or shrubs such as hangehange, bracken, kumerahou.

As used in this report it implies a closed canopy and in more advanced stages contains an understorey of indigenous species.

(ii) Seral vegetation where the rate of further succession is extremely slow, being limited by abiotic factors such as soil structure and fertility, wind shear, etc., e.g. gumland manuka shrubland, *Muehlenbeckia* shrubland on dunes.

Site

An area of habitat identified during the rapid field inventory phase of the PNAP. Its boundaries may be defined by the edge of the habitat (where discrete), catchment, or other geographical feature, e.g. river, vegetation type, or legal title.

Succession

The process of change in the appearance, composition, and structure of a community, usually over a period of time. Change may be due to natural or human-induced factors, or both. For example, the colonisation of bare rock or

soil by algae and lichens, ending with a stable climax community in equilibrium with the environment. Secondary succession occurs where the original vegetation has been destroyed, e.g. by fire.

Survey no.

The identifier number given to each site. The first three figures refer to the NZMS 260 topographical map sheet that the habitat is on.

Sustainability

The long-term ecological viability of a natural area. This is related to the size and shape of the area as well as to threats from introduced pests.

Swamp

Fertile or eutrophic wetland, usually dominated by raupo, *Carex*, *Baumea articulata*, flax, and cabbage tree.

Swamp forest

A forest type containing water-tolerant trees and swamp species such as kahikatea, swamp maire, and pukatea. It may occur on alluvial valley areas, but also occurs on poorly drained, semi-level sites within forests at higher altitudes.

Swamp shrubland

A transitional type, with woody co-dominants like *Coprosma propinqua*–manuka–*Cordyline* with putaputaweta, *Coprosma tenuicaulis*, and other divaricating shrubs.

Tectonic melange

Body of rock composed of broken rock fragments of all sizes and many origins in a sheared matrix, formed by deterioration within the earth's crust.

Toeslope

The area at the base of a slope where debris and topsoil have accumulated, it may be more fertile than higher up the slope.

Vegetation type

Defined by the dominant canopy species and the structure of the vegetation, e.g taraire forest, manuka shrubland

Viability

The ability of an area's natural communities to maintain themselves in the long term in the absence of particular management efforts to achieve this. Regeneration and vigour of species within these communities and stability of communities and processes contribute to viability.

Wetland

An area of land that is permanently or intermittently waterlogged and supports flora and fauna adapted to wet conditions. Wetland is used as a broad definition for several types of aquatic systems, e.g. swamps, bogs and ephemerals.

9. Index of sites

(continued overleaf)