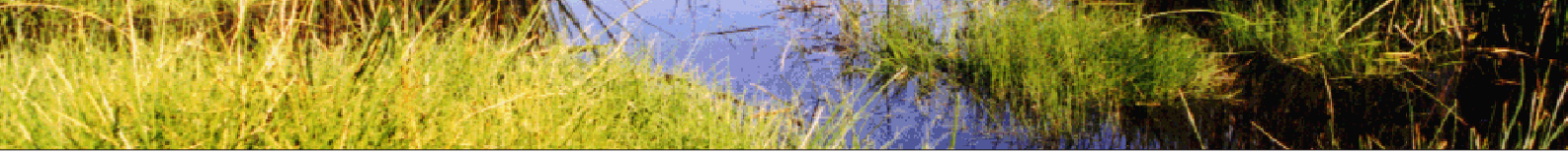

Natural areas of Aupouri Ecological District

Reconnaissance Survey Report for the Protected Natural Areas Programme

2003

Department of Conservation
Te Papa Atawhai

Natural areas of Aupouri Ecological District

Reconnaissance Survey Report for the Protected Natural Areas Programme

NEW ZEALAND PROTECTED NATURAL AREAS PROGRAMME

Linda Conning and Wendy Holland

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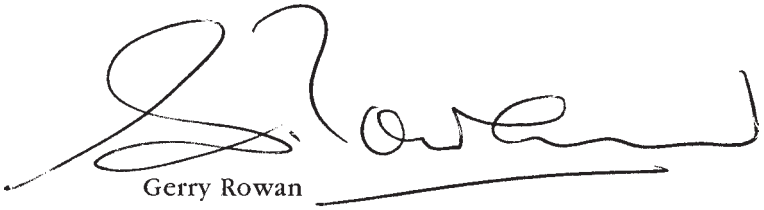
Foreword

This study has collected a large amount of information on the natural areas of the Aupouri Ecological District, and is a valuable guide to the Department of Conservation and other interested agencies and individuals as to the natural values of the Ecological District. This is useful, both for reference as well as setting conservation priorities.

Aupouri is a unique habitat, consisting of one long and a second smaller sand peninsula dotted with dune lakes and wetlands; kanuka/manuka shrublands; semi-wild coastal dune fringes; and three shallow harbours internationally important for their wildlife values. These habitats are home to a rich diversity of species including large numbers of threatened species, many of which, especially wetland dwellers, are seldom seen by people. Another distinctive feature is that there is very little indigenous forest left in this Ecological District—just a few minute remnants of pohutukawa and broadleaf forest.

In view of the overwhelming loss of wetland habitat throughout New Zealand (estimated at 85% since European settlement, Taylor and Smith 1997), and the rarity of dunefields and their associated vegetation, the preservation of these remaining areas is of vital importance for protecting indigenous biodiversity. Since the field surveying began, several areas have either been reduced in size or even disappeared, and ongoing threats, particularly from exotic forestry and other development are likely to further impact on many of the areas.

The challenge for users of this report is to implement effective protection for the natural areas identified before they are lost.



Gerry Rowan

Northland Conservator

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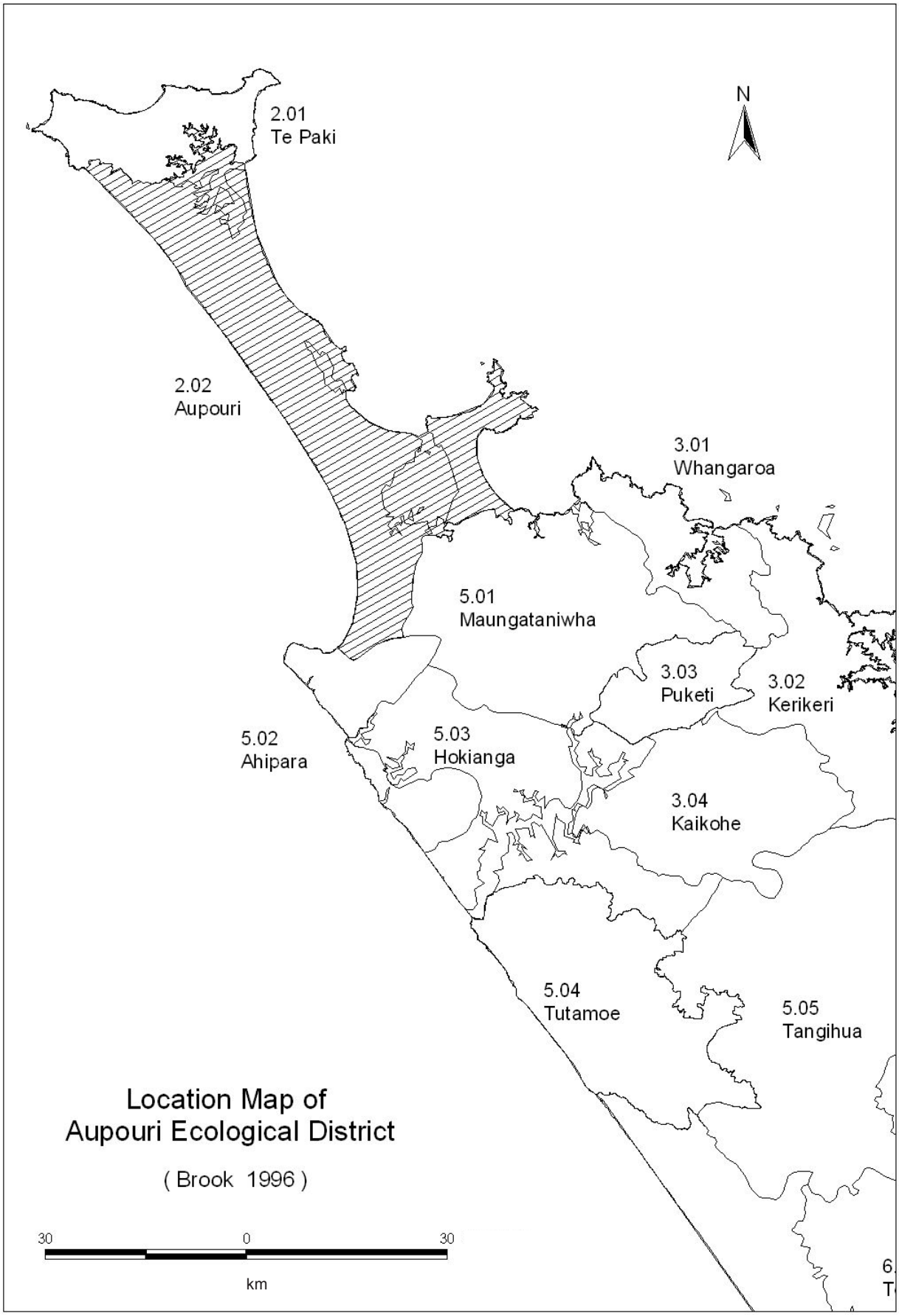
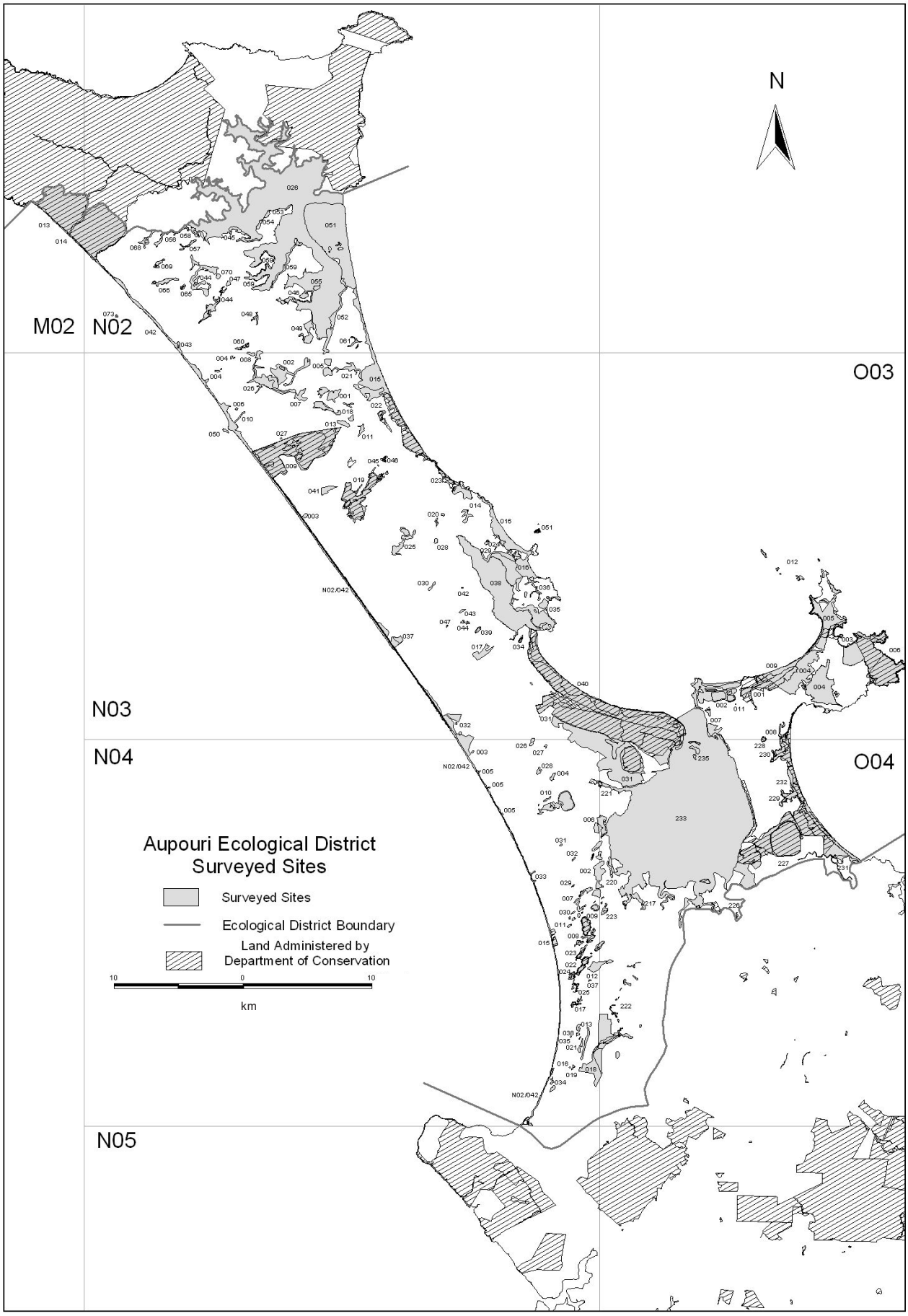


Map 1. Location map of Aupouri Ecological District.



Map 2. Map of surveyed sites, Aupouri Ecological District, including land administered by the Department of Conservation. Note that the representation of protected areas is indicative only and should not be taken to accurately delineate these areas.

Abstract

The Aupouri Ecological District consists of the narrow sand tombolo isthmuses of the Aupouri and Karikari Peninsulas and is connected in the north to a wide club-like head of the Te Paki Ecological District and in the south to the Ahipara and Maungataniwha Ecological Districts.

The District is characterised by shifting and consolidated dunes interspersed with small lakes, marshy hollows and peat swamps, and three large shallow harbours.

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

The Ecological District contains distinctive, nationally rare habitat types such as gumland, dunelands and wetlands, including habitats for a large number of threatened species. The three harbours and Kaimaumau-Motutangi Wetlands are exceptional ecosystems of international importance. These large wetlands contain diverse habitat types that support many threatened flora and fauna species. Kanuka-manuka shrubland is common, but indigenous forest in this Ecological District is represented by only a few small remnants.

Out of 134 natural areas described in this report, 111 are known to contain natural values of regional and national significance. This high proportion reflects the high number of threatened species and habitats present in this Ecological District.

1. Introduction

1.1 THE PROTECTED NATURAL AREAS PROGRAMME

The Protected Natural Areas Programme (PNAP) was established in 1982 to implement s. 3(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 to maintaining the diversity of lesser known species.

This report differs from PNAP reports for regions and districts outside of Northland in that it is based mainly on reconnaissance survey reports 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 PNAP reports for areas outside of Northland.

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), the Convention on Biological Diversity (1992), and the New Zealand Biodiversity Strategy (2000).

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 size of many of the sites identified and surveyed in the fieldwork, 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, including 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 the reconnaissance PNAP survey of the Aupouri 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 sites of international, national or regional significance are derived from Arand et al 1993. Important geological sites and landforms of international, national and regional significance are derived from Kenny & Hayward (1996) (see Appendix 8.3).

1.4 AUPOURI ECOLOGICAL DISTRICT

The Aupouri Ecological District covers 119,422 ha (including the Parengarenga, Houhora, and Rangaunu Harbours, which total 18,168 ha) and is part of the Northern Northland Region. It is located north and east of Kaitaia, and runs from the Ahipara settlement to Scotts Point and Karatia in the north, taking in the Awanui River floodplain, the Karikari Peninsula, and Parengarenga, Houhora and Rangaunu Harbours. It adjoins the Ahipara Ecological District to the south-west, Maungataniwha Ecological District to the south, and Te Paki Ecological District to the north.

Whilst sharing some similarities with the adjoining Te Paki Ecological District and the Ahipara Ecological District, Aupouri is unique. It consists of a major isthmus (Aupouri) and a smaller one (Karikari). Geologically, it comprises

mainly dune sands, both consolidated and mobile, with swampy depressions and chains of dune lakes.

The peninsula topography contributes strongly to the importance of coastal habitats in this Ecological District, and provides much of its character, although only a fraction of the original dunes remain in natural vegetation.

Despite grazing to the shoreline in some places, and the dominance of exotic forestry on the western coast, the coastal margins are generally free of building development. Ninety Mile Beach on the west coast is the longest sandy beach in New Zealand. This beach, together with a series of long sandy beaches on the east coast and on the Karikari Peninsula, provides several sites of threatened plants and a coastal margin which is habitat for a large number of bird species, including the threatened northern NZ dotterel.

The chains of dune lakes and wetlands along the Aupouri Peninsula, although discontinuous, give the area a distinctive character and provide extremely important habitat for a number of threatened and regionally significant fauna species including NZ dabchick, Australasian bittern, spotless crake, banded rail, NI fernbird, and black mudfish. The dune lakes in particular give value as a "collective habitat", being greater than the individual rankings accorded to each individual wetland. Collectively, the entire chain, in conjunction with the three harbours, may qualify for international status due to the rarity of this habitat type today, and because of the range of threatened flora and fauna they support (P. Anderson pers. comm.). For example, the threatened Australasian bittern may require up to 49 ha of wetland to meet its full habitat and breeding requirements and may range over many kilometres of home range length (Ogle & Cheyne 1981). This may consist of several small wetlands within close proximity to each other to accommodate one pair. Also waterbirds, particularly ducks and the threatened NZ dabchick, depend on several individual lakes for their annual habitat requirements (DOC 1991b). It is therefore important to retain the remaining habitat linkages and "stepping stones" if these populations are to remain.

Nationally the Aupouri Peninsula is thought to provide habitat for 3–4% of the total NZ dabchick and Australasian bittern populations (Collier 1996).

Many wetlands in Aupouri Peninsula support populations of the threatened black mudfish and the Peninsula is the stronghold for this species in Northland (V. Kerr pers. comm.).

Lake Waiparera & Wetlands (N04/010) is the most significant wetland in Northland for the long-term survival of the threatened black mudfish due to the extensive size of the wetland, its stable hydrology, and high density of fish surveyed showing a complete age structure (V. Kerr pers. comm.). Due to recent black mudfish work in Northland, significant native aquatic fauna have also been identified in many wetlands, such as the threatened banded kokopu and regionally significant giant bully.

The wetlands represent some of New Zealand's rarest remaining natural ecosystems.

This has contributed to the very high number of threatened wetland species in the District. Since European settlement it has been estimated that only around 15% of New Zealand's original palustrine wetlands remain (Taylor & Smith 1997).

A graphic example of historic wetland habitat loss in Northland is accounted in Ogle (1984):

> "*Carse (1911) described "Lake Tangaonge" [sic.] as the largest of a chain of lakes situated on the west side of the Awanui River and estimated it to have been 5 km long and 2.5 km wide and surrounded by a much larger area of raupo swamps. "Lake Tangaonge" [sic.] is now completely drained and converted to farmland."*

Wetlands continue to be modified or completely lost today. The entire western Motutangi wetlands were destroyed in the 1970s (P. Anderson pers. comm.) and land development is still continuing in the Kaimaumau area. Since 1978 nearly all of the temporary pan wetlands within the natural sand dunes of Aupouri have disappeared.

It is likely that exotic plantations and drainage of adjoining land is contributing to a slow drying out of many lake and wetland areas, modifying or destroying the edge areas, allowing invasion of pampas and other weed species. The peripheral swampy margins and shrubland buffers of wetlands and dune lakes have often been modified by stock or removed altogether during land development.

This District is (or previously was) habitat for more than 46 threatened plant species (excluding vagrants) listed in de Lange et al. (1999a). This very high number is indicative of the sensitivity of the habitats within the Ecological District to modification, as well as the degree of habitat loss which has occurred.

Fragmented shrubland areas, many currently dominated by aggressive colonising exotic species, offer an opportunity for the regeneration of forests virtually absent in the Ecological District (only a few isolated remnants of pohutukawa and coastal broadleaf forest remain). Some shrubland areas are also habitat for threatened species such as the fern *Todea barbara*, but most have never been adequately examined to determine their full ecological value.

Small areas of marine volcanics and sedimentary rock occur at Mt Camel and at Karikari, contributing to the distinctiveness of the Ecological District. Most of the mature coastal forest has been lost from these sites.

Mangroves, saltmarsh and eelgrass beds occur in the three harbours of the District (Parengarenga, Houhora and Rangaunu Harbours), providing some of the richest wildlife areas in the country.

Parengarenga Harbour has the greatest bird diversity of any habitat in Northland (Ogle 1984) and is one of the least modified warm temperate/subtropical harbours in the world (Sewell 1985), with little evidence of pollution from human-related activities (Hayward et al. 2001).

The Parengarenga Harbour is the most important harbour in New Zealand for wintering banded dotterel.

This harbour is also an important feeding area for Northern Hemisphere migrants such as turnstones, with 50% of New Zealand's population recorded at Parengarenga. Rangaunu Harbour has known to support around 50% of New Zealand's population of eastern little terns (R. Pierce pers. comm.).

Several islands occur in this Ecological District, some of which are predator-free and offer a refuge for many species. Some are remote or distant enough to be outside the dispersal range of many weed species.

Of the natural areas identified in the Aupouri Ecological District, 44% are estuarine and harbours, 28.8% are shrubland, 17.6% are dunelands, 9% are wetlands, 0.46% are forest and 0.002% are islands. This represents approximately 34% of the area of the Ecological District.

2. Methodology

2.1 GENERAL APPROACH

To obtain information on the composition, extent and ecological values of indigenous natural areas within the northern sector of the Northland Conservancy, reconnaissance surveys using rapid semi-quantitative methods were 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. This survey 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 evaluated the sites (see Criteria 2.4 below), they 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 8.5A (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, Threatened Plants Database, NIWA Freshwater Fish Database, Amphibians and Reptiles Database, Bio-sites, Geopreservation and Soils Inventories, published information and DOC 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, and the Northland branch of the Ornothological Society of New Zealand provided year 2000 bird records for many of the lakes recorded in this report as well as classified summarised notes from previous years. 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 contraints, 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 (nine full and three 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 then 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.

Iwi consultation was undertaken between the Te Aupouri Maori Trust Board, the then Conservation Manager (Protection) and the Kaupapa Atawhai Manager at a meeting in Kaitaia.

2.3 DATA ACQUISTION 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.

Some sites were not surveyed in this manner, due to either the site being very isolated, or failure to obtain landowner permission for access. In these instances, sites were identified and described from aerial photographs. Information on some of these sites, therefore, 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, as well as variations of the technique, have been used to describe canopy composition both within New Zealand (see Atkinson 1962, 1985; Leathwick & Rogers 1996; Park & Walls 1978) and in other parts of the world

(see Kershaw & Looney 1985; Mueller-Dombois & Ellenberg 1974). 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, however, is that it did not provide a great deal of information on the distribution of uncommon and threatened species.

Plant species present in the "abundant" and/or "common" columns of the survey sheets were used to define each ecological unit. Each site was entered into an ACCESS database, and each ecological unit recorded at that site was listed. A search on each ecological unit gave information on the frequency of the different ecological units remaining in the Ecological District. This information was used to determine the representativeness of each ecological unit (see Section 5. Summary and conclusions, Table 2 (p. 300). Ecological units recorded in the Aupouri Ecological District and protected status). The best representative examples included ecological units of the greatest species diversity, naturalness, long-term viability and rarity in the Ecological District.

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, *Spinifex* grassland on dunes. Most sites contain a range of ecological units.

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 added to the report forms.

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 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) (see Table 3, p. 328).

The PNAP criterion of long-term viability has not been included in Table 3. Long-term viability was considered under the umbrella of representativeness, diversity and pattern, naturalness, size and shape.

Level 1 sites

These sites 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 declining or naturally uncommon 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 endemic and indigenous migratory taxa.
9. Cover a large geographic area relative to other similar habitat types within the Ecological District.

Level 2 sites

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 and are not the best representative examples of their type;
- may be small and isolated from other habitats;
- may contain a high proportion of pest species;
- may be structurally modified, e.g. forest understorey grazed;
- **have not been surveyed sufficiently to determine whether they meet the criteria for Level 1 sites.**

LINKS BETWEEN THE PNAP CRITERIA AND LEVELS 1 AND 2.

PNAP CRITERIA	LEVEL 1	LEVEL 2
Representativeness[1]	Contain the best representative examples in the Ecological District of a particular ecological unit or combination of ecological units. (3) Support good populations of taxa which are endemic to Northland or Northland-Auckland. (7)	Not one of the best examples of its type in the Ecological District.
Rarity and Special Features	Contain or is regularly used by critical, endangered, vulnerable or declining or naturally uncommon taxa (i.e. species and subspecies), or taxa of indeterminate threatened status nationally (1). Contain or is regularly used by indigenous or endemic taxa that are threatened, rare, or of local occurrence in Northland or in the Ecological District (2). Contain habitat types that are rare or threatened in the Ecological District or regionally or nationally (6). Are important for endemic and indigenous migratory taxa (8).	Do not regularly contain, or there is no currently known threatened, rare, or species of local occurrence. Contain common habitat types. No currently known special features.
Diversity and Pattern	Have high diversity of taxa or habitat types for the Ecological District. (4).	May contain only one habitat type and/or have a low diversity of taxa relative to other areas of a similar type.
Naturalness	Exhibit a higher level of naturalness than other examples of its type.	Exhibit a lower level of naturalness than other examples of its type.
Buffering/corridors and Linkages	Form ecological buffers, linkages or corridors to other areas of significant vegetation or significant habitats of indigenous fauna.(5)	May be heavily impacted by external influences or may be fragmented and isolated from other natural areas
Size and Shape	Cover a large geographic area relative to other similar habitat types within the Ecological District. (9)	Are likely to be small relative to other similar examples of its type, or if large, is not the best example of its type and meets no other criteria for a Level 1 site.
Long-term Ecological Viability	If the long-term viability of the site is high or medium, it is likely to meet one or more of the other criteria above, or if low, may nevertheless be the best or only example of its type in the Ecological District.	May require a high degree of management to achieve viability or may never be viable under present circumstances or if viable, may not meet any other criteria for a Level 1 site

[1] Best representative examples include sites with the highest level of naturalness, diversity, in the best condition, and with values other than ecological values such as cultural and amenity values (where known).

The site evaluations were made on the basis of data available. Some Level 2 sites are likely to meet Level 1 criteria, following a detailed site-inspection.

2.5 UPDATING OF DATA

Natural ecosystems and habitats are dynamic and are forever changing, both physically and biologically and this is of particular relevance in this District with its large number of wetlands and dunelands. The status and composition of

species also changes over time and this could result in changes to the value of some sites.

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

The Aupouri Ecological District is one of the most distinctive Ecological Districts in New Zealand. This is because of its topography, particularly the length of coastline relative to land area with the large number of dune lakes and wetlands, three of New Zealand's least modified harbours and because of the dominance of sand peninsulas.

Although wetlands and dune lakes occur frequently in this Ecological District, nationally they are uncommon and diminishing habitat types, and, together with dunefields, are poorly represented in the existing protected areas network. These areas continue to be modified or lost due to land development practices or contain species which cannot tolerate environmental change or adapt to other habitat types, e.g. acid-loving orchids of peat bogs. Wetland species are particularly susceptible to changes in groundwater hydrology, and several sites reveal a trend of becoming drier since the Department of Conservation's survey of freshwater wetlands in 1991.

Strikingly obvious, even to the untrained eye, is the northern native hemi-parasitic vine, *Cassytha paniculata,* seen sprawling across large areas of manuka shrubland in both this and the adjoining Te Paki Ecological District.

3.1 TOPOGRAPHY/GEOLOGY

Topography

Aupouri Peninsula is a major dune-sand tombolo of low relief (up to 236 m asl at Mt Camel), linking hill country in the Te Paki, Te Kao, and Houhora areas with the rest of Northland. The west coast of the tombolo is a long sand beach broken only by a low rocky headland at Te Wakatehaua (The Bluff) Island. The east coast has two long sand beaches (Great Exhibition Bay and East Beach) separated by a stretch of cliffed rocky coast and short sand beaches. There are three large estuaries on the east side of the tombolo, namely Parengarenga Harbour (6,449 ha), Houhora Harbour (1,315 ha) and Rangaunu Harbour

(10,185 ha). Rangaunu Harbour is bounded in the east by a dune sand tombolo that links rocky headlands and dissected hill country of Karikari Peninsula with mainland Northland. The north-eastern part of Karikari Peninsula has a steep rocky coastline with small sand and gravel pocket beaches.

The Awanui River, one of the few rivers of any size in the Aupouri Ecological District, discharges into Rangaunu Harbour. This river, which arises in the Maungataniwha Range to the south, has been channellised in much of its lower catchment. During the course of its earlier history it formed a wide flood-plain of alluvial sediments northward and westward of Kaitaia, an area now almost entirely devoid of natural areas.

The District includes several islands including Matapia Island on the west coast, Motu Puruhi and Terakautuhaka Island (Simmonds Island) and the Moturoa Group on the east coast, Kaipohue Island in Parengarenga Harbour and the shellbanks of Walker Island in Rangaunu Harbour.

Geology

The Aupouri and Karikari tombolos are formed mainly of Pleistocene and Holocene dune sand. The oldest dune units outcrop in the north and east of the Aupouri tombolo and on north-eastern Karikari Peninsula. They have limonite pans and lack dune topography. Younger Pleistocene sand units include fields of consolidated parabolic to longitudinal dunes along the central part of the Aupouri tombolo and the western part of the Karikari tombolo, and belts of consolidated coastal foredunes inland from Ahipara Bay, in the east between Houhora and Rangaunu harbours, and inland from the northern and eastern coasts of the Karikari tombolo.

Holocene dune units include foredunes and deflation zones along the open coasts of both tombolos, rare remnants of fixed parabolic dunefields in the central parts of the Aupouri tombolo, and an extensive belt of large transverse dunes along the western side of that tombolo.

Low hill country extending from the western shores of Parengarenga Harbour south-east to Te Kao is formed of allochthonous Cretaceous–Paleocene Tangihua Complex ophiolitic rocks, Mangakahia Complex sandstone and mudstone, and overlying lower Miocene Parengarenga Group sandstone, conglomerate and volcanics. On Karikari Peninsula similar Houhora Terrane rocks are intruded by lower Miocene plutons and dikes. (Brook 1996)

3.2 CLIMATE

The climate of Aupouri Ecological District is dominated by a succession of anticyclones and intervening troughs of low pressure which approach from the west across the Tasman Sea. These weather systems give rise to climatic conditions characterised by very humid and warm summers and mild winters. In addition, the Ecological Region's northern maritime situation enables its lengthy coastlines to be swept by warm oceanic currents, from which sea breezes/wind ensure that temperatures on the land remain relatively constant.

The annual rainfall for the region varies from around 1180 mm to 1420 mm (Cape Reinga and Kaitaia Airport weather stations). Rainfall is influenced to a

large extent by subtropical depressions occurring during winter, with the result that the wettest months are May, June, July and August. The driest period usually extends from December to March except in years of summer cyclonic activity.

The Far North is regarded as a part of New Zealand which is exposed to much wind. The western coast experiences strong prevailing winds alternating from south-westerly to north-westerly directions. Frequent strong winds are also experienced along the short section of northern coast and compare to those of some of the most exposed areas elsewhere in New Zealand. Beaches extending along the eastern coast are subjected to the effects of occasional north-easterly gales.

The District experiences monthly temperatures ranging from 11°C in July to 20°C in February. Sunshine ranges on average from 2000 hours to 2200 hours per year. (Moir et al. 1986)

3.3 VEGETATION

3.3.1 Historical

This section draws on the work of Coster (1983) and Sale (1985). The large tombolo which comprises the Aupouri Peninsula is a dynamic system which has gone through many cycles of sand dunes and forest over thousands of years, along with climate change and sea level rise and fall.

More than 100,000 years ago, during the Ice Age, a marine strait existed between Awanui and Mt Camel as sea levels were up to 170 metres below their present level, and 80,000 years ago, the spit extended up to 30 kilometres to the west of the present shore. The tombolo was formed about 100,000 years ago. After 50,000 years or so, the sea level may have risen further, and then subsequently dropped to very low levels again. At the end of the Ice Age, between 20,000 and 4,000 years ago, the sea level rose to a peak of about two metres above its present level, until about 1,000 years ago. When the tombolo was at its greatest extent, inland kauri forest developed (Sale 1985).

Ancient kauri logs 30,000–40,000 years old remaining in Lake Ohia, extensive gumdigging, and pollen samples of rimu, beech, bog pine, kahikatea and kauri are testimony to earlier kauri-podocarp forests. Drilling at Coal Creek has revealed evidence of kauri at three different levels – 60 m, 30 m and 15 m – with signs that the lowest-level trees were subject to inundation by the sea, the middle level apparently toppled by wind, and the top level burned (Sale 1985). Estimated age of the three forests are up to 40,000 years, 5,000–10,000 years, and 1,000–5,000 years, respectively.

Studies of the landsnail fauna in existing areas of indigenous vegetation were used to reconstruct vegetation from the landsnail remains found in shell middens.

Indications are that "*within the last thousand years... sand dunes were covered in broadleaf forest (including species such as pohutukawa, puriri, karaka, taraire and kohekohe [and possibly tawa, totara and other podocarps])....[O]nly three small remnants of this forest cover, each less than*

a hectare in extent, now exist... within the Aupouri Ecological Region as a whole" (Coster 1983).

Because most of the bird remains have been found in pre-human deposits, not middens, it is thought that the forest may have retreated somewhat by the time humans arrived, although there is archaeological evidence that the early Maori found food and shelter in forest at least until the last few hundred years (Coster 1983).

However, human settlement interrupted the natural sequence of sand accretion and the spread and retreat of vegetation. Sale expounds that "*the most significant change in the environment say 1000 years ago was not in climate…but the effect of the arrival in New Zealand of the major tide of human settlement…fire – deliberate, accidental or spontaneous – now became the major factor not only in completing the destruction of the natural forest but in rendering its recovery ever less likely."* In 1770, Joseph Banks on the *Endeavour* described the land as "*almost entirely occupied by vast sands*" (Sale 1985).

Millener (1981) identified many subfossil bird species from the Aupouri Peninsula, including NZ falcon, little spotted kiwi, takahe, kaka, weka, kakapo, parakeet, tui, saddleback and the now extinct huia (*Heterolocha acutirostris*), NZ crow (*Palaecorax moriorum*), NZ quail (*Coturnix novaeseelandiae*), little woodhen (*Gallirallus minor*) and several moa species, illustrating a rich avifauna long since gone, along with the habitat supporting it. However, William Colenso reported of Ninety Mile Beach in 1839, "*the shore was occupied by thousands of seabirds – gulls, and oystercatchers, sanderlings and many others*" (Sale 1985).

Farming and gum-digging by European settlers saw increased burning of the vegetation, resulting in the present mobile dune system. Four major fires have been recorded at Kaimaumau since the 1940s (Hicks et al. 2001). In 1963 there was a report of a fire lit by drovers which resulted in destruction of dune vegetation and scorching of several large pohutukawa at Te Arai (Barnett 1985, p. 17). From the 1930s until that time, there were reports of sand drifts engulfing some pohutukawa, karaka and dune lakes. Dunes were used as a winter run-off for horses and cattle (Sale 1985).

Meanwhile, marram planting began in 1922, although large-scale development for exotic foresty, beginning with the planting of marram and lupin, did not get under way until 1960s. The conversion of the sandfields to pine forest or farmland is almost total. Today approximately 25% of the land area on the Aupouri Peninsula comprises exotic forest (NRC 1991). The wetlands have undergone a similar fate, of either total destruction, or considerable reduction in extent. At the same time, exotic species, particularly pampas and Sydney golden wattle have aggressively invaded open habitats. The changes which have occurred in the last 50 years have attempted to halt the dynamics of this constantly changing pre-human habitat; only the future will judge their effects.

3.3.2 Broad pattern

Although there is no distinct coastal gradient as such, many of the sites are coastal, adjacent to the coast, or linked to the coast either by contiguity of habitat or by watercourse, and the predominant substrate is sand.

A distinctive aspect of this Ecological District is that there is now virtually no indigenous forest, but wetlands are frequent. Wire rush (*Empodisma minus*), a sedge common in both alpine and lowland bogs throughout much of New Zealand and in parts of Australia, is uncommon throughout most of Northland. The Aupouri Ecological District is the stronghold for this species in Northland (P. Anderson pers. comm. 1996).

Another distinctive feature is the predominance of exotic weed species – 46 out of 134 sites contain vegetation types which are defined by an exotic weed component.

3.3.3 Vegetation types

Sandfields

This Aupouri Ecological District is one of few Ecological Districts in New Zealand containing large areas of relatively natural dunelands with large expanses of open sand as well as vegetated dunes. Hard pans occur occasionally within these sandfields.

Dunes, which are mainly unvegetated, may have scattered toetoe, tauhinu, pingao and the sedges oioi and knobby clubrush.

On vegetated dunes, the foredunes are generally dominated by *Spinifex,* with pingao*, Carex pumila*, and in some areas, marram. Knobby clubrush, oioi, pohuehue, toetoe, harakeke, and on the Karikari Peninsula*, Coprosma acerosa* may be frequent. Other species likely to be present are tauhinu, *Pimelea arenaria* and NZ spinach.

Knobby clubrush and oioi are common in dune depressions, and knobby clubrush is locally dominant in many dune areas. Toetoe is dominant on parts of Ninety Mile Beach and at Lake Waikanae.

Exotic species such as marram, lupin, pampas, kikuyu, harestail, wattle and others occur in some areas.

Coastal shrublands

Older dunes may have manuka, kanuka, native broom, ti kouka, pohutukawa, mahoe, bracken and ngaio present. At Rarawa, Henderson Bay and Waipapakauri, harakeke dominant shrublands are found, generally in association with manuka, kanuka and sedges. Pohutukawa and toetoe are present and locally frequent.

Estuaries

(i) Mangrove forests

These occur in the Parengarenga, Houhora and Rangaunu Harbours, with Rangaunu being the largest mangrove forest in New Zealand (Ogle 1984). Manuka is frequent on the landward margins, with occasional saltmarsh ribbonwood, knobby clubrush, sea rush, harakeke and pampas.

Mangroves are also present in the Rarawa and Awapoko estuaries.

(ii) Saltmarsh

Saltmarsh comprising oioi and sea rush occurs in the three large harbours, grading into *Baumea juncea* in more brackish areas. Mangroves are often scattered with harakeke, saltmarsh ribbonwood, manuka and ti kouka occurring on higher ground.

Oioi is dominant at Rarawa, and sea rush at Awapoko.

On some islands in Rangaunu Harbour, oioi is abundant with emergent manuka, ti kouka, saltmarsh ribbonwood and *Hebe*.

(iii) Saltmeadows

Saltmeadows of glasswort, sea primrose and *Selliera radicans* are also present in the estuaries. NZ spinach and *Baumea juncea* may also be present.

(iv) Eelgrass beds

These occur extensively in the three large harbours. *Zostera capricorni* occurs in the Parengarenga Harbour and *Z. muelleri* occurs in Rangaunu Harbour (Shaw et al. 1990).

Islands

Distinct vegetation types are found only on the islands:

(i) Grasslands

- Buffalo grass, especially on disturbed sites.
- *Zoysia pauciflora*, with scattered shrubs.
- *Poa pusilla* with adventive herbs.

(ii) Herbfields

- Native iceplant either as a sole dominant or with knobby clubrush or Mercury Bay weed.
- Glasswort as a sole dominant or in isolated patches, sometimes in association with Mercury Bay weed or sea primrose.
- Cook's scurvy grass which occurs only on Matapia Island.

(iii) Sedgelands

- Giant umbrella sedge is dominant on Matapia Island.

(iv) Associations

- *Pimelea arenaria–Spinifex* occurs as a dominant vegetation type on Walker Island.

(v) Shrubland

- Taupata dominant, either solely or in co-dominance with *Melicytus novae-zelandiae*.
- Associations of coastal species including taupata, *Melicytus novae-zelandiae, Coprosma macrocarpa*, ti kouka, hangehange, pohuehue, harakeke, toetoe, bracken, sedges, and sometimes kanuka.

- Harakeke dominant solely or with giant umbrella sedge
- Manuka dominant with harakeke, ti kouka and mingimingi
- Karo
- Pohuehue

(vi) Forest

- Tawapou dominant coastal forest occurs on the Motu Puruhi Island & Terakautuhaka Island. It is low in height (< 6 m) with mahoe, houpara and karo.

Freshwater wetlands

Wetland types include:

(i) Dune lakes

There are more than 20 major dune lakes, and many smaller ones.

In addition, numerous other wetland areas contain open water, although the area concerned may be small and the open water seasonal.

(ii) Fertile wetlands

These wetlands are the most common, and are dominated by *Eleocharis sphacelata, Baumea articulata* and raupo.

Eleocharis sphacelata-dominant wetlands are the most numerous of this type, varying from a fringe on lake edges to extensive, dense reed beds. *Baumea articulata* occurs frequently in about a third of these areas, and raupo is frequent in about 20%. Other species which may be present within this type are kuta, giant umbrella sedge, harakeke, toetoe, water fern, kiokio, *Isolepis prolifer*, *Carex* and *Juncus* species.

Several of these areas contain the threatened plants *Hydatella inconspicua, Cyclosorus interruptus, Myriophyllum robustum* and *Thelypteris confluens.*

Eleocharis sp. and raupo may both be present at fertile wetland sites, but growing separately.

Raupo-dominant wetlands are also numerous in the Ecological District. Raupo may also occur on lake fringes or in dense swards. In about 25% of the sites, *Eleocharis sphacelata* occurs frequently. *Baumea articulata*, harakeke, manuka, ti kouka and kiokio may also be frequent. Other species sometimes present include kanuka, toetoe, karamu, houpara, hangehange, kuta, giant umbrella sedge, *Baumea rubiginosa, Carex secta,* brake fern, oioi, knobby clubrush, water fern, willow weed, mamaku, *Myriophyllum propinquum* and pampas.

The threatened *Thelypteris confluens* is found at several of these sites.

Raupo is found in association with *Baumea articulata* at two sites, and in association with harakeke at four sites. Other species usually present in the latter association are willow weed, toetoe, giant umbrella sedge and oioi.

There are only two sites in the Ecological District where harakeke is dominant (S Urlich Road Wetland, and Rotokawau Lakes & Puwheke Beach). At S Urlich Road Wetland, ti kouka and kanuka are frequent, with occasional taupata and mamaku. Harakeke is dominant, with frequent manuka and occasional species

including bracken, *Gleichenia dicarpa* and *Baumea teretifolia* in a small area at Rotokawau Lakes & Puwheke Beach.

The other main species of fertile wetlands, *Baumea articulata*, is dominant at eight sites. In about half of these, *Eleocharis sphacelata*, raupo, *Juncus pallidus*, and manuka may be frequent. At six other sites, *B. articulata* is co-dominant with *Eleocharis sphacelata*. Raupo, harakeke, *Juncus* sp., *Carex secta,* willow weed, brake fern and water fern may be present. The threatened *Myriophyllum robustum* occurs at two of these sites. None of these sites occur on the Karikari Peninsula.

Fertile swamp shrublands. At some sites, manuka occurs scattered or in clumps in a mosaic with *Eleocharis sphacelata, Baumea articulata*, harakeke, raupo, ti kouka, giant umbrella sedge, kiokio, willow weed and (rarely) *Coprosma tenuicaulis.* Some of these sites may have been induced by nutrient run-off from adjacent land use.

At Waiparera Creek on Rangaunu Harbour, giant umbrella sedge occurs with *Coprosma propinqua* and *C. tenuicaulis.*

(iii) Peat bogs

These areas may be drier than other wetland types and include swamp shrublands, which is the most common form, occurring at 19 sites.

Manuka, and sometimes kanuka (indicating dry and more fertile sites), often in clumps, is emergent over *Baumea* sp., *Schoenus* sp. and umbrella fern. Other species typical of these habitats are wire rush, *Epacris pauciflora, Cassytha*, mingimingi, bracken, turutu, *Lycopodium* sp., sundews and acid-loving orchids, especially *Thelymitra* species.

In peat hollows at Kaimaumau manuka is absent with sedges and umbrella fern dominating.

Sedges are dominant in a few areas:

At Lake Ohia, *Baumea* sp. and *Schoenus* sp. are co-dominant with umbrella fern, turutu, kumarahou, harakeke and *Dracophyllum lessonianum*.

Lepidosperma filiforme is locally dominant. *Baumea* sp. and *Schoenus* sp. also occur with *Epacris pauciflora*, manuka and *Dracophyllum lessonianum.*

At Lake Rotokawau, *Baumea juncea* is dominant, with oioi, *Schoenus brevifolius* and *Isolepis prolifer*. Elsewhere wire rush and *Schoenus tendo* form dense swards.

Further north, at Lake Te Kahika, wire rush is co-dominant with umbrella fern. Other sedges in association are *Baumea teretifolia,* oioi, *Schoenus* sp., *Morelotia affinis* and *Lepidosperma laterale*.

(iv) Intermediate wetlands

A few sites are neither truly fertile or acid:

- Raupo and oioi occur at the Coal Creek stream mouth on Ninety Mile Beach. Toetoe is frequent and harakeke present.
- Oioi is dominant in some wetlands on unconsolidated sands, mainly on the west coast. Raupo may also be present in these areas.

- Wire rush is common in an *Eleocharis sphacelata* dominant wetland at Karatia. Other species present (harakeke, raupo, *Baumea rubiginosa* and kiokio) are typical species of fertile wetlands.
- Knobby clubrush is dominant at the Te Ramanuka Lakes.
- *Isolepis prolifer* is dominant on lake shores at Lake Waikanae and Sandhills Rd Wetland No1, and occurs in association with *Eleocharis acuta* and *Juncus* sp. at Kowhai Swamp.

(v) Mixed coastal turfs

These occur on some sand flats where freshwater streams reach the coast, such as Te Arai and Te Paki Stream. This type is of limited extent and not commonly recorded but is likely to be present on Motu Puruhi and Terakautuhaka Islands (L. Forester pers. comm. 2002). Species likely to be present in these areas are *Lilaeopsis orbicularis*, *Limosella lineata* agg., *Cotula* sp., *Myriophyllum votschii and Epilobium pallidiflorum*. *Ophioglossum*, the Adders tongue fern can occur here too.

Shrublands

Manuka and kanuka comprise the main shrubland types in this Ecological District.

Kanuka-dominant shrubland is recorded at 31 sites. Manuka and toetoe are frequent within a third of these. Exotic species such as gorse, Sydney golden wattle and *Callistachys lanceolata* are common or frequent in about the same number. Other species likely to be present in these shrublands are the scrambling hemi-parasite *Cassytha,* ti kouka, bracken, mamaku, kumarahou, hangehange, mingimingi, *Coprosma rhamnoides*, houpara, kawakawa, *Lepidosperma laterale*, pohutukawa, and prickly hakea. At a few coastal locations, ngaio, mahoe, puriri, kohekohe and karaka are present.

Apart from the areas mentioned above where exotic species are common or frequent, at a few sites Sydney golden wattle is co-dominant with kanuka, but with an indigenous understorey of manuka, mingimingi, mapou, water fern, turutu, and *Lepidosperma laterale*.

Manuka-dominant shrublands are mainly associated with peat bogs (see swamp-shrublands above), and are otherwise few in number, in association with *Dracophyllum lessonianum, Baumea rubiginosa, B. juncea, Schoenus brevifolius, Lepidosperma laterale,* umbrella fern, mingimingi, kumarahou, bracken, and prickly hakea.

Manuka and kanuka occur together at numerous sites. Gorse is frequent or common in two thirds of these sites, and prickly hakea and Sydney golden wattle, also occur frequently. Other species occurring are similar to the other shrubland areas.

Forest

Very little forest occurs in this Ecological District. What is present consists of very small areas. These include:

(i) Coastal broadleaf forest

Pohutukawa

Pohutukawa occurs in two situations:

- On coastal cliffs as either pure stands or with puriri, kanuka, kohekohe, harakeke or ti kouka.
- On west coast sand dunes in pure stands or with kanuka, and sometimes as scattered trees. Understorey species include houpara, five-finger, *Pseudopanax ferox*, native broom, mapou, hangehange, kawakawa, ngaio, harakeke, toetoe, *Coprosma rhamnoides*, Hound's tongue, shining spleenwort and *Hebe diosmifolia*.

Pohutukawa-toetoe

On Ninety Mile Beach at Ninety Mile Beach Swamp, a small area of abundant pohutukawa to 3 m occurs and toetoe is common. Houpara, harakeke, and kanuka are also present.

Kanuka-pohutukawa

On the Karikari Peninsula, kanuka and pohutukawa occur on cliffs with ti kouka and harakeke and on the coastal margin at Brodies Creek (Karikari Peninsula), with kohekohe, ti kouka, tawapou, mahoe, tree ferns, macrocarpa and gum trees.

Kohekohe

Kohekohe-dominant forest has only been recorded at one site in this Ecological District, Brodies Creek on the Karikari Peninsula. Here it occurs with occasional pohutukawa, ti kouka, mahoe, kanuka, wheki and gum tree.

Kanuka

At a few sites on the Karikari Peninsula and in the north of the District, kanuka forest with puriri, taraire, kohekohe, karaka and ti kouka occurs.

Kanuka-puriri

One site of kanuka-puriri occurs on the Karikari Peninsula. Other species present include ti kouka, mahoe, kahikatea and mamaku.

(ii) Inland broadleaf forest

There are five sites of broadleaf forest, all consisting of small remnants:

- Kanuka forest beside Lake Kihona.
- Kohekohe-puriri-taraire forest beside Lake Kihona.
- Puriri forest on the Awanui plain.
- Puriri-taraire forest occurs on sand at Lake Waikanae, and on alluvial flats on the Awanui plain.
- Puriri-karaka forest occurs in a small remnant north of Te Arai.

(iii) Podocarp forest

A few small secondary kahikatea remnants occur on the Awanui plain.

Totara treeland emergent over divaricating shrubs occurs on the edge of the Rangaunu Harbour.

(iv) Podocarp-broadleaf forest

Along the Mangatete River, a thin fringe of kahikatea with kanuka occurs, with frequent totara and willow and occasional ti kouka and puriri.

3.3.4 Species of botanical interest

A high diversity of threatened and uncommon plants have been recorded in the Aupouri Ecological District (see below), including 12 regionally significant (determined by Northland Conservancy) and 39 threatened (de Lange et al. 1999a). A further 10 threatened plants have not been recorded for some time and are likely to be extinct in the Ecological District.

This District is the southern limit for *Christella* aff. *dentata,* and northern limit for *Pittosporum obcordatum*, *Cryptostylis subulata*, and *Thelymitra malvina.* Several plant specimens collected in the District in the late 19th century and early last century were used to describe and name those particular plant species. These collection points known as the type locality include *Petalochilus alatus* (known then as *Caladenia minor* var. *exigna), Pittosporum obcordatum* (known then as *P. obcordatum* var. *kaitaiaensis*) and *Utricularia delicatula*.

Over 30 species of native orchid occur in the Ecological District (see Appendix 8.5C), some of which are endemic to Northland or the Far North. Sixteen are classified as threatened (see below), of which six are historical records and a further three are regionally significant. Four are confined to northern Northland, *Thelymitra* (a), *T.* "darkie", *T.* "rough leaf" and *Spiranthes* aff. *novae-zelandiae* (although taxonomically unresolved, this orchid seems to be confined to Kaimaumau).

Corybas rotundifolius, formerly ranked Local by Cameron et al 1995, is a distinctive species in Northland as a component of gumland communities or sites of previous kauri forest.

3.3.5 Regionally significant species

Note: Regionally significant species status is determined by the Department of Conservation, Northland Conservancy.

Astelia grandis
A very large endemic *Astelia* with leaves extending up to two metres in length. It is found in swampy and peaty ground (Moore & Edgar 1970) being recorded from two sites in this Ecological District.

Adelopetalum tuberculatum
This species is found in trees and tree branches where it forms a tight clump and can be seen growing on conifers in association with lichen (St George 1999). Recorded from Foleys Bush.

Elaeocarpus hookerianus pokaka
This species is recorded at only a few sites in the Ecological Region and at only one in the Aupouri Ecological District.

Empodisma minus wire rush
This species is a major peat-former occurring in several habitats in this Ecological District. The Aupouri Ecological District is the stronghold for this species in Northland.

Hebe diosmifolia
Hebe diosmifolia occurs as scattered populations in Northland. Recorded from two sites in this District.

Hebe* aff. *pubescens
A distinctive *Hebe* with hairs on the underside of its leaves (Poole & Adams 1994), this form has been recorded from only one site in Northland, at Maitai Bay in this Ecological District.

Myriophyllum votschii
This semi aquatic to aquatic herb has been recorded from two dune wetlands in this District.

Nestegis cunninghamii black maire
Of uncommon distribution in Northland, black maire has been recorded from only one site in this Ecological District.

Pouteria costata tawapou
A coastal tree now uncommon on the mainland, with records from only two sites in the Ecological District, onlyone of which is on the mainland.

***Thelymitra* "darkie"** AK 231761
This is an unnamed orchid of uncommon distribution in Northland recorded from twosites in the Ecological District.

***Thelymitra* "rough leaf"** AK 229531
A robust plant, endemic to Northland, flowering in October. This orchid has been recorded from two sites in this Ecological District.

Utricularia delicatula
The bladderwort *Utricularia delicatula*, formerly ranked as Local by Cameron et al. (1995), has its stronghold at Kaimaumau and is also found at Lake Ohia.

3.3.6 Threatened plant species

(See Appendix 8.3 for Categories of Threat)

(i) Critically Endangered

Amphibromus fluitans
This native semi-aquatic grass has been recorded in Northland on Ninety Mile Beach (Gardner 2000) and was recorded by P.J. de Lange on Karikari Moana Peninsula in 1998 (P.J. de Lange pers. comm. 2000).

Atriplex hollowayi Holloway's crystalwort
Formerly known as *Atriplex* aff. *billardierei*, this prostrate annual herb is found on open beaches near the high tide mark, forming mounds with only the tips of the branchlets showing (Wilson & Given 1989).

Atriplex hollowayi is endemic to the North Island historically being found as far south as near Wellington. Within Northland it was historically recorded from Rangaunu Harbour, Houhora Bay and Karikari Moana. Populations of this plant in New Zealand however, are now totally restricted to the Te Paki Ecological

District. The most recent records in the Aupouri Ecological District are from 1971 by Esler (Threatened Plants Database, Houhora Harbour) and anecdotal records from East Beach around the same time (V. Hensley pers. comm.).

Mazus novaezeelandiae* subsp. *impolitus* f. *hirtus
This species was formerly considered to be *M. pumilio*, and was thought to have been widespread distribution from Cape Maria van Dieman to Canterbury (Barker 1991) , and Australia. This form, however, has a restricted distribution, occurring in only a few locations in the north and north-eastern areas of the North Island where it is found in lowland kahikatea forest (Heenan 1998). This form has distinct hairy margins and shiny leaves (Heenan 1998). The only record in this Ecological Region is from the Kaitaia area in the Aupouri Ecological District.

(ii) Endangered

Lepidium oleraceum Cook's scurvy grass
A small herb with fleshy leaves, with teeth around the leaf tip, it is restricted mainly to islands. It is present in low numbers on Matapia Island and possibly on the Karikari Islands (L.J. Forester pers. comm.).

Phylloglossum drummondii
This is a very small plant up to 7 cm high with small tubers and a rosette of up to 10 bright green, fleshy leaves. It has a very short growing season, only appearing above ground from May to October. The only species in its genus, this fern ally is also found in Australia and Tasmania. In New Zealand it is restricted to low, open manuka north of Auckland, growing with sedges on seasonally damp gumland sites (Wilson & Given 1989). It is recorded from two sites in this Ecological District, Lake Ohia and Kaimaumau.

(iii) Vulnerable

Hibiscus diversifolius
Also occurring in Australia and the Pacific, this prickly stemmed shrub is found in New Zealand in coastal seeps and boggy areas, often on the inland edge of sandy beaches (Wilson & Given 1989) between North Cape and Whangaroa Bay and at Bream Head. It is recorded from two sites in this Ecological District.

Lycopodiella serpentina
One of the smallest club mosses, it is also present in Australia and New Caledonia. In New Zealand it is known from a few populations in Northland, and several sites in the South Auckland and Hamilton regions (Wilson & Given 1989). It is found on open sites on gumland soils amongst umbrella fern and sundews in the Kaimaumau and Karikari Peninsula peat bogs. It has been recorded at eight sites in this Ecological District.

Ophioglossum petiolatum
An unusual herb-like fern up to 30 cm high with one or sometimes two leaves. Has been recorded from moist talus and grassy areas, sandy margins of coastal lagoons, herbfields near lake margins, swamps and streams, and rarely, podocarp forest. Recorded from three sites in this Ecological District.

Pomaderris polifolia

A low bushy shrub. The adult leaves have short petioles, and flowers are grouped in small clusters at branchlet tips and in leaf axils. It grows amongst stunted manuka on infertile gumland soils, and is found at a few sites from the Far North, and David Island in the Hauraki Gulf. It has been recorded recently from Lake Wahakari and from Te Kao in 1990.

Senecio scaberulus

This fireweed is found in open coastal and offshore island habitats from Auckland to Te Paki. Formerly widespread, it is now rare in the wild, with few recent records, one such being from Mt Camel in 1992 (CHR 482957 and 483113).

Thelypteris confluens

Commonly known as the marsh fern, this species grows amongst dense stands or swards of other wetland plants, e.g. sedges. It grows up to 60 cm in height, and is frost tender. Northland is the stronghold for this species. There are numerous records of marsh fern in this District. A 1991 survey found marsh ferns growing in six different sites including the Lake Ohia/Kaimaumau wetlands. Its favoured sites were in the intermediate and fertile wetlands, and on some margins of the dune lakes. Once widespread, this fern is now confined to north of Auckland and Bay of Plenty/Rotorua (Wilson & Given 1989). It is also found in South Africa, India, Asia and Australia.

Todea barbara

This is a large, erect fern with leathery fronds growing up to two metres tall and found on dry sites within gumland vegetation. It is recorded at numerous sites within the District on the margins of the oligotrophic lakes and wetlands sometimes as scattered individuals. This fern grows south to the Bay of Islands and is found on the Poor Knights Islands and also occurs in South Africa and Australia.

Utricularia protrusa

An endemic bladderwort found in peaty water with records from seven sites in this Ecological District.

(iv) Declining

Austrofestuca littoralis

Found on sandy and rocky places near the shore, this species is recorded from Kaimaumau, the west coast north of Kaitaia and on Karikari Peninsula. The most recent record in this District is from Karikari Moana in 1992.

Colensoa physaloides

This is a distinctive blue-flowered, shrubby plant with hydrangea-like foliage. It is a monotypic genus, endemic to Northland, some of its islands; and Rakitu Island, east of Great Barrier Island (P.J. de Lange pers. comm.). It is found scattered through forest areas, generally beside stream and tracksides, and on talus slopes. A highly palatable plant, *Colensoa physaloides* is very sensitive to browse from goats and possums. Recorded in this Ecological District from Whangatupere Bay on the Karikari Peninsula in 1999.

Cyclosorus interruptus

This fern grows in intermediate wetlands amongst other aquatic sedges and rushes, in very damp or shallow water. It has been found in the Kaimaumau, Karikari Peninsula and some Aupouri Forest wetlands. It requires a warm and frost-free environment with colonies occurring as far south as Taupo, although in the colder southern sites it is restricted to the warm waters of the geothermal areas (Wilson & Given 1989).

Eleocharis neozelandica

This small endemic sedge occurs on the sandy margin of dune lakes, damp sandy flats and dune hollows or coastal stream flats (Wilson & Given 1989).

Scattered records occur from Christchurch, Farewell Spit, Wellington, Manawatu, Auckland and in Northland from near Mitimiti, with its stronghold being at Pouto and to a lesser degree Te Paki (L. Forester pers. comm.). There are records from six sites in this District.

Euphorbia glauca

Sometimes known as New Zealand sea spurge, *Euphorbia glauca*, is a soft herb of sporadic distribution around the coast on sand dunes and coastal seeps. In this District it has been recorded from three sites.

Hydatella inconspicua

This is a small grass-like aquatic herb, which is found in Northland, Fiordland and Central Otago. In Northland *Hydatella inconspicua* is known from about 13 locations from the Aupouri, Kai iwi and Pouto dunelakes. It grows in water of one to two metres in depth (Wilson & Given 1989).

Isolepis fluitans

Recently rediscovered in Northland from Lake Wahakari. Last collections from this area were from Lake Tangonge and Houhora by Matthews (1913) and Cheeseman (1896) (permission granted by Northland Regional Council for use of this information from Champion et al. 2002).

Myriophyllum robustum

This aquatic water herb is an endemic species, which was once widespread throughout New Zealand. However, due to modification or loss of habitat it is known from only about eight individual sites in the North Island and from 15 sites along the west coast of the South Island (Wilson & Given 1989). This plant has been recorded from six of the dune lakes, all being located within the collective chain of lakes in the Awanui-southern Aupouri area. It is to be found around the shallow lake margins.

Pimelea arenaria

Known also as sand daphne, this sprawling cushion plant is found growing on coastal dunes and hollows. Relatively widespread in parts north of Auckland (Given 1981), it is however, decreasing in other parts of New Zealand and perhaps now extinct in the Canterbury/Westland region (Wilson & Galloway 1993). The northern populations differ from southern plants. There are numerous records of *Pimelea arenaria* in this Ecological District, with the largest population occurring on Walker Island, Rangaunu Harbour.

Pterostylis tasmanica
This is a distinctive orchid with rosette leaves and yellow hairs on the labellum. *Pterostylis tasmanica* has a patchy distribution in the Far North, Auckland, Wellington and Nelson (Hollard & Clements 1993), and widespread in Tasmania and Victoria, Australia. In this Ecological District it is found at the Kaimaumau-Motutangi Wetlands.

(v) Recovering—Conservation Dependent

Desmoschoenus spiralis pingao
An important sandbinder, pingao is now far less common along New Zealand's coastline than in former times. It is, however, recorded from several sites in the Ecological District.

Pittosporum obcordatum
This is a tall shrub or small erect tree up to five metres, with slender, divaricating and interlacing branchlets. Leaves of juvenile plants are different from those of adults, being up to 2.5 cm or more long, having broad petioles, and varying from linear to spathulate with entire to lobed margins. Habitat records are from shrubland and lowland podocarp forest on alluvial or swampy soils. The species seems to prefer river terraces and flats, especially areas which are swampy or subject to flooding. It is known in this Ecological Region from only one remnant near Kaitaia but would have been previously more widespread before the habitats were cleared.

(vi) Naturally Uncommon—Sparse

Calochilus paludosus
This is a bearded orchid of mainly swampy and poorly drained habitats. Its distribution is limited to the northern and central parts of the North Island, and the north-west of the South Island (B. Molloy pers. comm. 1996). It is found in Australia and considered by de Lange & Molloy (1995) as a vagrant in New Zealand. Recorded in this Ecological District from Lake Ohia.

Drosera pygmaea
This is a tiny herb found in peaty and boggy ground with scattered populations from Waikato north, Southland and also in Australia (Allan 1961). Found at a few sites around the Rangaunu Harbour (E. Cameron pers. comm. 2000).

Fuchsia procumbens
This prostrate, sprawling plant is found 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). It is recorded from two sites in this District.

Korthalsella salicornioides
This is a dwarf mistletoe, usually hemi-parasitic on manuka and kanuka (Poole & Adams 1990) and endemic to the North and South Islands. Found in this District on manuka at Kaimaumau–Motutangi Wetlands.

Pellaea falcata
This fern is restricted to coastal areas north of Auckland (Brownsey & Smith-Dodsworth 2000). It was found at Puwheke on the Karikari Peninsula in 1984.

Pseudopanax ferox
The so-called "fierce lancewood", named from the hooked teeth of the juvenile form, is of local distribution from Aupouri to the southern South Island (Poole & Adams 1994). In this Ecological District it is found in remnants of coastal forest and shrubland adjoining sand dunes at Te Arai Sandfields.

Senecio repangae* subsp. *repangae
This is a small herb found in coastal locations on Cuvier Island, Bay of Islands and Great Barrier Island. In this Ecological District it is known only from Te Wakatehaua Island (The Bluff) (de Lange 1996).

Thelymitra sanscilia
Considered to be distinct from *T. pauciflora* (B. Molloy pers. comm. 1996) and known only in Northland (St George 1999) from Ahipara, Kaimaumau and two sites at Peria.

(vii) Naturally Uncommon—Range Restricted

Cryptostylis subulata
Known as the duck-billed orchid, this tall, attractive orchid grows to 130 cm in height. It is known from the Karikari Peninsula and Kaimaumau-Motutangi wetland complex where it grows in seasonally wet and low-lying areas of peat bog. It is also found in Eastern Australia.

Thelymitra malvina
This is an attractive orchid (with "pink whiskers") recently discovered in New Zealand in Northland. It occurs on gumland soils, generally in proximity of old kauri stumps from three sites in this Ecological District. It also occurs in Australia in coastal New South Wales and Victoria, and near Kaikohe.

(viii) Naturally Uncommon—Vagrant

Gratiola pedunculata
A third species of *Gratiola* now found in New Zealand, originally from Australia. A sweet-smelling herb, sometimes submerged, at present recorded from only one site in New Zealand – Lake Waiporohita (de Lange 1997).

(ix)Taxonomically Indeterminate—Critically Endangered

Calochilus* aff. *herbaceous
This is a bearded orchid known only from Northland with recent records only in the Far North (P.J. de Lange, B. Molloy pers comm). It is recorded from two sites in this Ecological District. It is widespread in Australia and considered by de Lange & Molloy (1995) as a vagrant in New Zealand.

Christella* aff. *dentata
This soft fern has tufts of pale green, velvety-textured fronds arising from a very shortly creeping rhizome. It was found at several localities near Kaitaia in the

early 1900s, but in recent years it has been recorded from only four sites in this region. The only wild populations known in New Zealand grow in disturbed remnant kahikatea stands, sheltered in holes left by the rotting stumps of felled trees (Wilson & Given 1989). In 1978 Bartlett (Threatened Plants Database) recorded it from the lower reaches of the Mangatete River.

(x) Taxonomically Indeterminate—Endangered

***Thelymitra* (a)**
Previously tagged as *Thelymitra* "Ahipara" this sun orchid has yet to be described, but is distinctive in its tolerance to seasonal flooding and is considered endemic to this Ecological Region and is not found south of Kaikohe. It was transferred to the Ahipara gumfields and Lake Ohia from a site near Kaitaia in 1990 as a protective measure (de Lange et al. 1991).

(xi) Taxonomically Indeterminate—Insufficiently Known

Spiranthes* aff. *novae-zelandiae
This is a long-stemmed orchid not yet described, known from the damp, boggy areas of Kaimaumau-Motutangi Wetlands.

3.3.7 Threatened species not recorded for some time in the Ecological District

These species were previously recorded in the Ecological District but have not been recorded for some time and are likely to be extinct in the Ecological District

(i) Critically Endangered

Corybas carsei
This orchid was recorded at Lake Tangonge in 1919 but this lake was drained and no longer exists.

(ii) Endangered

Hebe speciosa
This bushy shrub grows to 2 m and has broad, glossy, dark green, leathery to almost fleshy leaves and reddish magenta flowers. It was recorded from Houhora and the Mt Camel area in 1915 and is probably extinct in this Ecological Region (de Lange & Cameron 1992).

Pterostylis micromega
A small orchid with a large, pale flower, forward curving, and often has crinkled leaves. It occurs in wet areas in the North Island, Cobb Valley and has been recorded in the Chathams. Recorded from Tangonge in 1902 and probably now extinct in the Ecological Region.

(iii)Declining

Pimelea tomentosa
This is a small erect shrub with slender, hairy branchlets, dark brown bark and narrow, rather thin leaves, which are scarcely hairy on the upper surface but

densely hairy beneath when young. The flowers are densely hairy white and pink and the berry-like fruit can be white, dark red or black.

It is found in open shrubland from North Cape to Nelson/Marlborough (Poole & Adams 1994). This plant may be extinct in this Ecological Region (most recent record is 1911).

Sonchus kirkii

This is an endemic coastal sow thistle usually occurring in open wet sites. It was recorded at Te Wakatehaua Island (The Bluff) in 1990 but despite survey efforts it has not been found since 1996 (de Lange 1996) and is thought to be extinct there.

Sporodanthus ferrigineus

Originally known as S. traversii (which is now only known from the Chatham Islands), *S. ferrigineus* is a robust, tall plant (culms up to five metres) occurring on peat bogs. It was historically recorded from Lake Tangonge in 1912/13 (de Lange et al. 1999b).

(iv) Naturally Uncommon—Sparse

Thelymitra matthewsii

This is a tall orchid with a leaf which spirals around the stem. It is found rarely in Australia, with early New Zealand records from the coast north of Auckland, Lake Tangonge (1911) and near Waimimiha (1924). It was formerly found in swamps and bogs (Wilson & Given 1989) but isolated plants have been found in recent years on exposed sites at North Cape.

(v) Naturally Uncommon—Vagrant

Chiloglottis formicifera

This is an orchid which was found in damp gumland scrub (Hollard & Clements 1993). It was recorded from Tangonge in 1900, but is no longer known from New Zealand. It is now found only in New South Wales, Australia.

Caleana minor

This is a small duck orchid that grows on poor soils under manuka. It was previously recorded near Kaitaia in the early 1900s (Wilson & Given 1989) and most latterly by Esler at Tangonge in 1978 on a site which was reportedly destroyed. In New Zealand it is now known only from geothermal ground in Rotorua. It is not threatened in Australia.

Pterostylis nutans

This is a slender orchid with a solitary flower curled over. Records confined to Northern Auckland Region. The species was collected around Kaitaia between 1910 and 1920 and was last recorded from Whangaparoa Peninsula a few years later. It was usually found amongst shrubland.

3.4 FAUNA

Information on fauna in this report has been compiled from a variety of sources including SSWI (Special Sites of Wildlife Interest), SSBI databases, and other biological databases, including the Ornithological Society of New Zealand's classfied summarised notes, as well as from field observations during this survey. The conservation ranking of individual species is derived from Molloy & Davis (1994) and categories of threat and rarity for landsnails are based on the classification scheme of de Lange & Norton (1998) used by Brook (1999a) (See Appendix 8.3).

Nomenclature follows Turbott (1990) and Heather & Robertson (2000) for birds, and Gill & Whitaker (1996) for reptiles.

A comprehensive discussion and checklist of fauna, particularly invertebrates, is beyond the scope of the present study. The individual site descriptions generally detail known significant fauna only. However, it is recognised that the invertebrate fauna, both common and less common 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. The recent discovery of the only known species in New Zealand of the parasitic wasp family Dryinidae in wattle scrub at Rarawa (John Early pers. comm. 1996) is indicative of the paucity of information about invertebrate species in New Zealand.

Most of the common bird species of Northland, both indigenous and introduced, are to be found in the Ecological District. A checklist of fauna recorded is included in Appendix 8.4.

There have been several other bird species rarely recorded, probably as vagrants or blown by storms or arrived by other means. These species include channel-billed cuckoo (*Scythrops novaehollandiae*), fan-tailed cuckoo (*Cacomantis flabelliformis*), white-capped noddy (*Anous tenuirostris*), and American golden plover (*Pluvialis dominica*) (Howell 1987; Medway 2000).

A species which has colonised New Zealand in relatively recent times (1970s) and frequents dunelakes in the Ecological District is the Australasian little grebe. The Aupouri Peninsula appears to be its stronghold in Northland, with up to 20 birds being observed at some sites. It has yet to be determined whether it is impacting on other species such as the NZ dabchick (R. Pierce pers. comm. 1996).

The three major harbours in this Ecological District (Parengarenga, Houhora and Rangaunu) are very important for indigenous resident species (the northern race of NZ dotterel, variable oystercatcher, Caspian tern), all of which are threatened, as well as for both New Zealand and northern hemisphere migratory species which use the harbours as feeding areas (see table on p.40). More than 30 such species have been recorded.

Matapia Island is the most significant NZ fur seal haul-out area in Northland, with in excess of 500 seals being recorded there between June and October in comparison to other haul-out sites which hold only 1–22 seals (R. Parrish pers. comm. 2002).

3.4.1 Threatened bird species

Category B threatened species

Kukupa *Hemiphaga novaeseelandiae*
Endemic

Kukupa have been found on the Karikari Peninsula, from Whangatupere Bay and on the Awanui River plain.

Northern NZ dotterel *Charadrius obscurus aquilonius*
Endemic

Found in small to moderate numbers along sandy beaches and in the Parengarenga, Houhora and Rangaunu Harbours where post-breeding concentrations occur. Recorded from many sites within the Ecological District. This Ecological District is an important stronghold for the northern subspecies of NZ dotterel.

Wrybill *Anarhynchus frontalis*
Endemic

After breeding in Canterbury and South Otago, small flocks move north, mainly to the Firth of Thames, Manakau and Kaipara Harbours. In the Ecological District they are mainly found in the Parengarenga, Houhora and Rangaunu Harbours, with the main Aupouri population of up to 150 at Parengarenga.

Category C threatened species

Banded dotterel *Charadrius bicinctus bicinctus*
Endemic

There are few breeding areas north of Auckland (Ogle 1984), but the species is known to breed at Parengarenga, Rangaunu, Kowhai Beach, and particularly on the Karikari Peninsula. The large numbers of birds present in summer-winter are mostly from the South Island, unlike the situation at other North Island harbours which attract birds from North Island breeding grounds (Pierce 1999).

NZ dabchick *Poliocephalus rufopectus*
Endemic

NZ dabchicks are found on more than a dozen dune lakes throughout the Ecological District. The Aupouri and Pouto populations are the only Northland dune lake localities where dabchicks still occur, however there is a non dune lake record of dabchick on an artifical pond in the Tutamoe Ecological District (R. Pierce pers. comm. 2000). NZ dabchicks are thought to be declining on the Aupouri dunelakes (Simpkin & Snell 2000).

Variable oystercatcher *Haematopus unicolor*
Endemic

Variable oystercatchers are found in moderate numbers along the coastline and in the Parengarenga, Houhora and Rangaunu Harbours. Post-breeding concentrations occur in the harbours.

NEW ZEALAND MIGRANTS (Numbers peak December–August (Sagar et al. 1999))		
Royal spoonbill	*Platalea regia*	Parengarenga and Rangaunu Harbours, breeding in small numbers near Parengarenga. Has increased during 1990s.
SI pied oystercatcher	*Haemotopus ostralegus*	Three large harbours and beaches, maximum counts low hundreds per site.
Wrybill	*Anarchynchus frontalis*	Three large harbours, maximum 271 birds on Parengarenga.
Banded dotterel	*Charadrius b. bicinctus*	Three large harbours, maximum counts 1500 on Parengarenga.
Pied stilt	*Himantopus h. leucocephalus*	Harbours and flood pasture. Low thousands.
TRANS-EQUATORIAL MIGRANTS (Numbers peak September–April (Sagar et al. 1999))		
Pacific golden plover	*Pluvalis fulva*	Three large harbours and Lake Ohia, up to 200 birds on each, maximum 250 on Parengarenga.
Turnstone	*Arenaria interpres*	Three large harbours and beaches, maximum c. 1500 on Parengarenga.
Lesser knot	*Calidris canutus rogersi*	Three large harbours, maximum 13,500 Parengarenga.
Curlew sandpiper	*C. ferruginea*	Mainly Parengarenga (maximum c. 50), Rangaunu and Waimango Swamp.
Sharp-tailed sandpiper	*C. accuminata*	Mainly Parengarenga, Rangaunu and Waimango Swamp.
Red-necked stint	*C. ruficollis*	Three large harbours and Waimango Swamp, maximum c. 50 on Parengarenga.
Asiatic whimbrel	*Numenius phaeopus variegata*	Three large harbours, maximum 53 on Parengarenga.
Bar-tailed godwit	*Limosa l. lapponica*	Three large harbours, thousands on each, maximum 7850 on Parengarenga.
Eastern little tern	*Sterna albifrons*	Mainly Rangaunu Harbour, maximum c. 100.
Note: Small numbers of many other species of plover, sandpiper and tern have been recorded in this Ecological District (see Appendix 8.4)		
OTHER MIGRANTS		
Cattle egret	*Bubulcus ibis coromandus*	Autumn and winter visitor from Australia to pasture particularly in the Unahi area but also north to Parengarenga.
Shining cuckoo	*Chrysococcyx lucidus*	Spring summer visitor from the Solomons and Bismarck Archipelago to forest and shrubland in New Zealand including the Aupouri Ecological District.
Long-tailed cuckoo	*Eudynamys taitensis*	Passage migrant in late summer.

White-fronted tern *Sterna striata*

Endemic

White-fronted terns are found along the coastline and in the Parengarenga, Houhora and Rangaunu Harbours. Numbers of this endemic species have been greatly reduced over the past 20 years. Breeds in colonies on islands, on an island in Rangaunu Harbour (Walker Island) and sometimes nesting is attempted on sandspits and beach dunes.

Category O threatened species

Reef heron Egretta sacra sacra
Reef herons are found in small numbers in the Parengarenga, Houhora and Rangaunu Harbours, the Awapoko Estuary and along the coastline.

White heron *Egretta alba modesta*
White herons occur rarely but regularly at Parengarenga and Houhora harbours and occasionally at other sites, e.g. Awapoko Estuary and Lake Ngatu.

Australasian bittern *Botaurus poiciloptilus*
Bittern are found in a variety of wetland areas, including swamp shrubland and mangroves, from Te Paki Stream to the Awanui River, and on the Karikari Peninsula. The Ecological District is an important stronghold for Australasian bittern in New Zealand.

Royal spoonbill *Platalea regia*
Royal spoonbill are found in Parengarenga and Rangaunu Harbours and on Ngatuwhete Lake and other wetlands.

Caspian tern *Sterna caspia*
Found along the coastline and in the Parengarenga, Houhora and Rangaunu Harbours, as well as some inland sites Lake Te Kahika, Lake Taeore and Lake Waiporohita. Breeds at Rangaunu, Parengarenga and Walker Island.

3.4.2 Bird species of regional and district significance

These are species not considered nationally threatened but which are rare in both the Ecological Region and District.

Australasian little grebe *Tachybaptus novaehollandiae novaehollandiae*
The Australasian little grebe has colonised New Zealand in relatively recent times (1970s) and frequents dunelakes in this Ecological District. The Aupouri Peninsula appears to be its stronghold in Northland, with up to 20 birds being observed at some sites.

Recorded from many wetlands in this Ecological District.

Banded rail *Rallus philippensis assimilis*
Indigenous

This species was once widespread in New Zealand, but now Northland is its national stronghold.

Important populations occur in mangroves and adjacent habitats in the Parengarenga, Houhora and Rangaunu Harbours and at Kaimaumau–Motutangi Wetlands.

Grey teal *Anas gracilis*
Indigenous

This species is of local distribution. In Northland it is recorded mainly from the Manganui River (Tokatoka Ecological District) and Pouto Peninsula area

(Kaipara Ecological District) (P Anderson pers. comm. 1998) and flocks of more than 100 in the Motatau area (R. Pierce pers. comm. 2002). In this Ecological District it is recorded from three sites, Wairahi Swamp & Lake Taeore, Lake Heather, and Jones Lake.

NZ scaup ***Aythya novaeseelandiae***
Endemic

An endemic species confined to freshwater lakes. Most Northland birds are confined to dunelakes of Aupouri and Pouto Ecological Districts but are thought to be declining in Aupouri dunelakes (Simpkin & Snell 2000).

Marsh crake ***Porzana pusilla affinis***
Indigenous

Although widely distributed in New Zealand marsh crake have been recorded only sparingly in Northland. In this Ecological District it is recorded from Lake Ohia and Rotokawau Lakes on the Karikari Peninsula. Other sites in Northland include Spirits Bay, Whangarei, Kaipara Harbour and Pouto.

NI fernbird ***Bowdleria punctata vealeae***
Endemic

Nationally important populations occur at Kaimaumau and Lake Ohia. This species is widely distributed throughout the Ecological District including shrublands and harbour edges.

Spotless crake ***Porzana tabuensis plumbea***
Indigenous

This species has a restricted distribution, confined on the mainland largely to dense reed beds. It is found at a variety of wetland sites throughout the Ecological District.

3.4.3 Invertebrates

Note: Threat rankings for landsnails listed below are based on the classification of Molloy et al. (2001).

Allodiscus fallax (Nationally Endangered)
This landsnail species is endemic to Karikari Peninsula, and is known from a single population restricted to a small remnant of coastal broadleaved forest at Whangatupere Bay. No information is available on current threats, but threats in the recent past have included habitat modification by pigs, cattle, possums and invasive weeds.

***Allodiscus* sp. "Houhora"** (Nationally Endangered)
This undescribed landsnail species is apparently endemic to Mt Camel, where it is restricted to a small remnant of coastal broadleaved forest. Most of the original native vegetation on Mt Camel has been cleared, which may have resulted in a marked decline in the population of *Allodiscus* sp. "Houhora". Existing threats to this species include continued modification and destruction of habitat (i.e., from damage by possums and live stock) and, possibly, predation by rats and mice. The sole population of *Allodiscus* sp. "Houhora" is

presently highly threatened, with its survival contingent on preservation of the remaining native forest habitat.

***Cytora* sp. "whangatupere"** (Nationally Endangered)
This landsnail species is apparently endemic to Karikari Peninsula and, like *Allodiscus fallax*, is known from a single population restricted to a small remnant of coastal broadleaved forest at Whangatupere Bay. No information is available on current threats, but threats in the recent past have included habitat modification by pigs, cattle, possums and invasive weeds.

Archey's dune snail *Succinea archeyi* (Serious Decline)
A threatened coastal landsnail species with a patchy distribution in the northern North Island between Cape Maria van Diemen and Bay of Plenty. In Aupouri Ecological District, populations of *S. archeyi* are present on coastal dunefields at Tokerau Beach and Puwheke Beach (Brook 1999b, 2000). There is also an unconfirmed record of this species from dunefields at Great Exhibition Bay.

Succinea archeyi was formerly widely distributed in northern and eastern Northland, and from the Hauraki Gulf to western Bay of Plenty. It declined markedly in historic time, mainly as a result of the impacts of pastoral farming on coastal habitats occupied by the snail (Brook 2000). The main existing threats to the species are modification and loss of habitat (e.g., through damage to dune vegetation by cattle, sheep and horses; replacement of native dune vegetation by exotic pasture grasses, plantation forests and weed species; residential development; dune erosion). Predation by introduced mammals (e.g., mice, rats, hedgehogs, possums) may also be important. Several of the remaining populations are highly threatened, and will probably become extinct if historical trends continue (Brook 1999b).

Climocella reinga (Range Restricted)
This landsnail is endemic to northern Aupouri Peninsula, with populations present as far south as Mt Camel. It lives in native shrubland and broadleaved forest (Goulstone 1996). *Climocella reinga* presently has a fragmented, relict distribution as a result of extensive habitat destruction caused by land clearance for gum-digging, pastoral farming and exotic forestry. The total population is probably still declining as a consequence of continued modification and loss of habitat, and there is a risk that some subpopulations could become extinct if historical trends continue. Existing threats include land clearance and catchment disturbance associated with forestry operations, and damage to native vegetation and soil structure by pigs, possums, goats, cattle and horses. There is also a potential risk of habitat destruction by fire.

Egestula pandora (Range Restricted)
This landsnail is endemic to northern Aupouri Peninsula, with populations present as far south as Te Kao. It lives in kanuka forest, broadleaved forest and conifer-broadleaved forest. *Egestula pandora* presently has a fragmented, relict distribution as a result of extensive habitat destruction caused by land clearance for gum-digging, pastoral farming and exotic forestry. The total population is probably still declining as a consequence of continued modification and loss of habitat, and there is a risk that some subpopulations could become extinct if historical trends continue. Existing threats include land clearance and

catchment disturbance associated with forestry operations, and damage to native vegetation and soil structure by pigs, possums, goats, cattle and horses. There is also a potential risk of habitat destruction by fire.

Serpho matthewsi (Range Restricted)
This landsnail is endemic to northern Aupouri Peninsula, with populations present as far south as Te Kao. It lives in kanuka forest, broadleaved forest and conifer-broadleaved forest. *Serpho matthewsi* presently has a fragmented, relict distribution as a result of extensive habitat destruction caused by land clearance for gum-digging, pastoral farming and exotic forestry. The total population is probably still declining as a consequence of continued modification and loss of habitat, and there is a risk that some subpopulations could become extinct if historical trends continue. Existing threats include land clearance and catchment disturbance associated with forestry operations, and damage to native vegetation and soil structure by pigs, possums, goats, cattle and horses. There is also a potential risk of habitat destruction by fire.

Unidentified onychophoran
A peripatus-type organism known from only one site in the Ecological District (Whangatupere Bay), and possibly at its northern limit (F.J. Brook pers. comm. 1996; D. Gleeson (pers. comm. 2002) verified probable northern limit status). These organisms are usually found inside or under rotten logs and sometimes in leaf litter and their appearance is purple/bluish and speckled with orange papillae (D. Gleeson pers. comm. 2002).

Black katipo spider *Latrodectus atritus*
Black katipo spiders are recorded in many locations around the coastline of Northland including the coastline of the Aupouri and Karikari Peninsulas in this Ecological District (J. Griffiths pers. comm.). Unlike the katipo spider, the black katipo does not exhibit the characteristic red stripe along its back.

3.4.4 Threatened lizards

Recent scientific study of the *Hoplodactylus pacificus* species group now includes *H. pacificus* and five species. Two of these five species are Te Paki and Aupouri endemics; *H.* "Matapia Island" (see below) and *H.* "North Cape Pacific gecko". *H.* "North Cape Pacific gecko" has been recorded from Matapia Island and on the Aupouri and Karikari Peninsulas.

Robust skink *Cyclodina alani*
Category B threatened species

Robust skinks are found on Matapia Island and Moturoa Islands. Robust skinks were translocated from Matapia Island to Motuopao Island (Te Paki Ecological District) in 1997.

***Hoplodactylus* "Matapia Island"**
Category B threatened species

Found on Matapia Island and the Aupouri and Karikari Peninsulas, this gecko is also found on Motuopao Island (Te Paki Ecological District) to where it was translocated in 1997.

Regionally significant species

Northland green gecko *Naultinus grayii*
A Northland endemic, with a distribution from the southern half of Aupouri Peninsula to the Bay of Islands. Recorded from several sites in this Ecological District.

Ornate skink *Cyclodina ornato*
Populations throughout the North Island, becoming more uncommon on the mainland. Recorded from several sites in this Ecological District.

Suter's skink *Oligosoma suteri*
Suter's skink is restricted to the North Island, being found on few mainland sites. Recorded from only two sites in this Ecological District.

3.4.5 Threatened fish

Banded kokopu *Galaxias fasciatus*
Category C threatened species

Recorded at several sites in the Ecological District.

Black mudfish *Neochanna diversus*
Category C threatened species

Black mudfish to date have been recorded at 10 sites in peat bogs in the District. The Aupouri Peninsula is the stronghold for this species in Northland (V. Kerr pers. comm. 2000)

3.4.6 Regionally significant fish species

Giant bully *Gobiomorphus gobioides*
Giant bully has an intermittent distribution around the New Zealand coast, with few records from Northland. They have been recorded at six sites in this Ecological District.

Inanga *Galaxias maculatus*
There are several wetlands containing genetically isolated populations of landlocked inanga (*Galaxias maculatus*). The taxonomy of these isolated populations is currently unresolved.

3.5 THREATS

The coastal dunes are under threat from invasion of weeds, off-road vehicles, conversion to exotic forestry, and, particularly on the Karikari Peninsula, residential subdivision.

Some of the rare and sensitive habitats on the Aupouri Peninsula and Karikari Peninsula (about 10% of the sites), especially herbfields, are threatened by grazing and trampling by cattle and wild horses, while orchids in open habitats are also threatened by rabbits and hares. Of note in this Ecological District is the

general absence of feral goats, although one or two goat farms do occur. Deer farming also occurs in this Ecological District, and escapes pose an ongoing threat.

Ferrets have been recently recorded from Victoria Valley and near Lake Ohia (B. Waddell pers. comm. 1996) and Ngataki (R. Pierce pers. comm.). Ferrets are a recent (1990s) arrival in the Ecological District, and together with cats, stoats, weasels, rats hedgehogs, dogs, and people and their vehicles, exert increased pressure on nesting shorebirds and other fauna species (R. Pierce pers. comm.).

Wetlands are particularly vulnerable to land drainage, pumping of ground water for horticulture, and use of adjacent land for exotic plantations posing uncertain but potentially high risk to their hydrology.

More than half the area of freshwater and estuarine wetlands on Karikari Peninsula were drained between 1978 and 1983 (Anderson et al. 1984). Persistent stock grazing is also steadily degrading some wetlands as well as effects from fertiliser use/spray drift and seepage.

Harbours are becoming increasingly pressured nationally from deteriorating water quality, development and disturbance to fauna.

The annual hunting and poaching of godwits and knots on harbours and duneland roosts is of considerable concern to the Department of Conservation, Northland Conservancy (R. Atkinson pers. comm.).

Habitats in general are constantly at risk from fire, as well as conversion for agriculture or forestry. In 1988 a fire swept through Kaimaumau, burning over 90% of the wetland (Hicks et al. 2001) and intermittent clearance of this habitat has continued throughout the preparation of this report.

Most habitat types, especially those with an open canopy, are under threat from the invasion of aggressive exotic species such as Sydney golden wattle, prickly hakea, wilding pines, gorse and pampas. Apart from eliminating or reducing human-related threats, the more open habitats need to be managed to control these plant pests, to ensure their long-term viability.

5. Summary and conclusions

The Protected Natural Areas network in the Aupouri Ecological District is summarised in Table 1. Including the area of the three harbours, approximately 26.5% of the natural areas of the Aupouri Ecological District are formally protected, which is equivalent to about 9% of the total area of the Ecological District. Excluding the three harbours, approximately 48% of the natural areas of the Aupouri Ecological District are formally protected, which is equivalent to about 10.7% of the total area of the Ecological District. Protected areas are made up primarily of Te Paki Dunes, Te Arai dunelands, East Beach, Kaimaumau, Lake Ohia, and Tokerau Beach.

A list of ecological units recorded in the Aupouri Ecological District and their current protection status is set out in Table 2 (page 300), and a summary of the site evaluations is given in Table 3 (page 328).

TABLE 1. PROTECTED NATURAL AREA NETWORK IN THE AUPOURI ECOLOGICAL DISTRICT (areas in ha).

Key: CC = Conservation Covenant; QEII = Queen Elizabeth II National Trust covenant; SL = Stewardship Land; SR = Scenic Reserve; EA = Ecological Area; WMR = Wildlife Management Reserve; ScR = Scientific Reserve; RR = Recreation Reserve; MS = Marginal Strip; NR = Nature Reserve; HR = Historic Reserve; FNDC = Far North District Council Reserve; RFBPS = Royal Forest and Bird Protection Society

Site	Survey no.	Status													Total prot. area	Total site area
		CC	QEII	SL	SR	EA	WMR	ScR	RR	MS	NR	HR	FNDC	RFBPS		
Te Paki Dunes	N02/013								1871						1871	1936
Te Paki Stream	N02/014								41.5						41.5	43
Parengarenga Harbour	N02/026							39.2							39.2	6449
Ninety Mile Beach & Dunes	N02/042	63.7		103.7						40					207.4	928
Te Arai Sandfields	N03/009			734.24		4.76									739	1253
Great Exhibition Bay	N03/015			271											271	755
Te Ramanuka Lakes & Shrubland	N03/019			340											340	423
Wairahi Swamp & Lake Taeore	N03/022						11.4								11.4	127
Rarawa Beach	N03/023			42											42	59
Kaimaumau–Motutangi Wetlands	N03/031			1889				929.3		7.3					2825.6	4075
Pohutukawa Remnant	N03/037	5.2		2.41											7.61	55
Arethusa Swamp	N03/039													12.5	12.5	15.3
East Beach	N03/040			577.9						0.4					578.3	627
Salt Lake	N03/046			3.4											3.4	9.5
Motu Puruhi Island & Terakautuhaka Island	N03/051										6.34				6.34	6.34
Far North Rd Shrublands & Wetlands	N04/002		30.65												30.65	206.8
Headquarters Pond	N04/007	5.77													5.77	5.77
Lake Ngatu Complex	N04/008								68.7						68.7	154.8
Lake Rotokawau & Pond	N04/009									3.6					3.6	24.9

Site no.	Survey CC	Status QEII	SL	SR	EA	WMR	ScR	RR	MS	NR	HR	FNDC	RFBPS	Total prot. area	Total site area
Lake Waiparera & Wetlands	N04/010	54.4							7.2					61.6	212.3
Waipapakauri Beach Coastal Shrubland	N04/015			15.8										15.8	16.6
Tangonge Wetland	N04/018			43.2										43.2	486
Lake Rotoroa & Wetlands	N04/022			29	0.4									29.4	32
Lake Heather	N04/023			7.5	0.8									8.3	11
Split Lake Wetland	N04/024	10.8												10.8	12.6
Mini & Round Lakes	N04/025	8.7												8.7	9.9
Turks Lake & Wetland	N04/026	8.1												8.1	12.4
Bacica Rd Lake	N04/027	3.5												3.5	3.5
Selwyn Flat Wetland	N04/028	8.9												8.9	11.7
Jones Lake	N04/031	0.98												0.98	1.75
Waimango Swamp	O03/001			118				20.6						138.6	297
Rotokawau Lakes & Puwheke Beach	O03/002								65.4					65.4	433.6
Maitai Bay	O03/003							10.4						10.4	23.9
Taupiroroa Range Shrublands	O03/004							21.9						21.9	945
Cape Karikari Shrubland	O03/005							64.3						64.3	444
Whangatupere Bay	O03/006						378	347	0.7					725.7	1018
Rangiputa Rd Shrublands	O03/007								3.3			5.5		8.8	73
S Urlich Rd Wetland 29	O03/008			12.79										12.79	
Karikari Bay	O03/009							24.2						24.2	136
Waiparera Creek Wetland	O04/221			7.4					0.6					8.0	22.5
Awanui River Forest Remnants	O04/222		10.4		3									13.4	46.3
Lake Ohia	O04/227			1234					29					1263	1641
Lake Waiporohita	O04/228				8.1									8.1	8.3
Southern Tokerau Swamp	O04/229			66.8										66.8	84
Northern Tokerau Swamp	O04/230			68.4										68.4	71
Tokerau Beach	O04/232			225										225	376
Rangaunu Harbour	O04/233			36					53	7.83	1.0			97.83	10185
Walker Island	O04/235									7.1				7.1	26.5

	CC	QEII	SL	SR	EA	WMR	ScR	RR	MS	NR	HR	FNDC	RFBPS	Prot.	Site
TOTAL AREA	170.05	41.05	5827.54	12.3	4.76	11.4	1346.5	2469.6	210.5	21.27	1.0	5.5	12.5	10859.6	34025.2

5.1 PRIORITY NATURAL AREAS FOR PROTECTION IN THIS ECOLOGICAL DISTRICT

1. Habitat types where the remaining examples of each type are limited to remnants or are at risk of disappearing from the Ecological District

(a) Ephemeral wetlands

Tangonge Wetlands (N04/018) – partly protected (8.8%)*.

(b) Dune forest

The rarest forest type in Northland (DOC 1999). Only a few fragmented sites remain in the Aupouri Ecological District including:

Lake Waikanae (N02/044), Te Pua Point Pohutukawa Remnant (N02/053), Puriri-Karaka Remnant (N03/027), Hukatere Lookout (N03/032), Compartment 65 Forest Remnant (N04/003).

(c) Alluvial forest

One of the most under-represented forest types in Northland (DOC 1999). Remaining examples of this habitat type occur at:

Mangatete River Bush (O04/226) and Awanui River Forest Remnants (O04/222) – the latter partly protected (26.5%).

2. Nationally under-represented habitat types

(a) Peat bogs

Kaimaumau-Motutangi Wetland (N03/031) – partly protected (69.3%), Far North Rd Shrublands & Wetlands (N04/002) – partly protected (14.8%), Heath Rd Powerline Swamp (N04/006), Sweetwater Station Depressions (N04/017), Sandhills Rd Wetland No 1 (N04/021), Sweetwater Station Peat Bowl (N04/038), Paparore Wetland & Shrubland (O04/220), West Coast Rd Shrublands (O04/223).

(b) Coastal forest and shrubland, especially pohutukawa forest (includes offshore islands)

Matapia Island (N02/073), Henderson Bay Shrubland (N03/014), Hukatere Lookout (N03/032), Mt Camel (N03/035), Pohutukawa Remnant (N03/037) – partly protected (13.8%), Te Wakatehaua Island (The Bluff) (N03/050), Taupiroroa Range Shrubland (O03/004) – partly protected (2.3%), Cape Karikari Shrublands (O03/005) – partly protected (14%), Whangatupere Bay (O03/006) – partly protected (72%), Moturoa Islands (O03/012).

(c) Dune lakes with threatened or endemic species present

Lake Waikanae (N02/044), Lake Te Kahika (N02/061), Lake Kihona & Forest Remnants (N02/060), Lake Austria (N02/069), Ngatuwhete Lake (N02/070), Lake Morehurehu (N03/021), Wairahi Swamp and Lake Taeore (N03/022) –

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* Areas protected may not encompass all of the key ecological features.

partly protected (8.9%), Lake Waihopo & Shrublands (N03/025), Lake Wahakari (N03/026), Lake Ngatu Complex (N04/008) – partly protected (44.3%), Lake Rotokawau & Pond (N04/009) – partly protected (14.4%), Lake Waiparera & Wetlands (N04/010) – partly protected (29%), West Coast Rd Lake (N04/011), Turks Lake & Wetland (N04/026), Lake Ngakapua Complex (N04/030).

3. Wetlands and other sites with threatened or endemic species present

Karatia Wetland (N02/056), Upper Karatia Swamp (N02/068), Oromanga Rd Wetlands (N03/010), Te Raite Wetland (N03/030), Kowhai Swamps (N03/036), Lambs Rd Swamp (N03/044), Coal Creek (N04/004), Herberts Swamp (N04/029) and Jones Lake (N04/031) – partly protected (56.6%), Waimimiha Lakes (N04/034), Waiparera Creek Wetland (O04/221), Waimango Swamp (O03/001) – partly protected (46.6%),Rotokawau Lakes & Puwheke Beach (O03/002) - partly protected (15%), Puheke Rd Wetland (O03/011).

4. Other dunelands and dune lakes

(a) Dunelands

Te Paki Dunes (N02/013) – partly protected (96.6%), Ninety Mile Beach & Dunes (N02/042) – partly protected (22.3%), Kokota Spit (N02/051), Great Exhibition Bay (N03/015) – partly protected (35.8%), Rarawa Beach (N03/023) – partly protected (71%), Waikokopu Shrubland (N03/041), Rotokawau Lakes & Puwheke Beach (O03/002) –marginal strip around dunelakes only; Karikari Moana (O03/009) – partly protected (27.2%), Tokerau Beach (O04/232) – partly protected (59.8%).

(b) Foredunes or soft shores where northern NZ dotterel are present

Kokota Spit (N02/051), Henderson Bay & Kowhai Beach (N03/016), Karikari Moana (O03/009) – partly protected (17.7%).

(c) Other dune lakes not included in 1–3 above.

5. Enclaves, extensions or buffers to existing protected areas and ecological sequences

- Kaimaumau, Houhora and Rangaunu Harbours (intrinsically linked via East Beach) and linked to Kaimaumau–Motutangi Wetlands (N03/031) – partly protected (69.3%), with diverse habitats, and featuring an unbroken zonation of wetland sequences from saltwater to freshwater.
- Waiparera-Sweetwaters complex (see dunelakes and wetlands above)
- Karikari Peninsula - Rotokawau Lakes & Puwheke Beach (O03/002) – partly protected (15%), a large area, containing one of the best examples in the Ecological Region of a wide diversity of habitats including coastal wetlands stretching from the Rangiputa coast to Karikari Moana and also from Whatuwhiwhi to Maitai Bay.
- Lake Ohia links Rangaunu Harbour to Tokerau Beach and South Tokerau Swamp.

6. Protective measures

Measures which facilitate the exclusion of stock from estuarine zones (especially Parengarenga), protect roost sites for waders (including migratory bird species) around all three harbours, and protect shore birds from off-road vehicles.

7. Priority sites

This District is (or previously was) habitat for approximately 50 plant species listed in de Lange et al. (1999). This very high figure is indicative of the sensitivity of the habitats within the Ecological District to modification. For this reason, it is proposed that sites containing any of these species be considered priority sites, not least as indicators of the rarity of the habitat type and potential to support a diversity of species: (sites not otherwise included above):

Tangoake Shrublands (N02/052), Emauhu Point Shrublands (N02/058), Sandhills Rd Swamp (N04/016).

8. Habitats containing ecological units not represented elsewhere which do not fall into any of the above categories

Whakatereohao Stream Swamp (N02/057), Waipara & Dead Lakes (N02/065), Pretty Lake (N02/066), Wagener's Swamps (N03/024) and Waimanoni Creek Shrubland (O04/217).

TABLE 2. ECOLOGICAL UNITS RECORDED IN THE AUPOURI ECOLOGICAL DISTRICT AND PROTECTED STATUS.

Key: Pt = Site is partially protected, but unknown whether ecological unit falls within the protected area, CC = Conservation Covenant; QEII = Queen Elizabeth II National Trust Covenant; RR = Recreation Reserve; SL = Stewardship Land; SR = Scenic Reserve; EA = Ecological Area; WMR = Wildlife Management Reserve; NR = Nature Reserve; MS = Marginal Strip; * = Level 2 site; Part of = part of site is within geological description; **Bold pna numbers** = representative ecological units.

			DUNE BELTS				**WETLANDS**
	Coastal foredunes	Holocene transverse dunes and deflation zones	Holocene fixed parabolic dunes	Pleistocene consolidated parabolic dunes & interdune flats	Pleistocene eroded and leached Awhitu Complex dunes	Pleistocene consolidated intertidal & estuarine sands forming low terraces	Ponded by Holocene dunes
FRESHWATER WETLANDS							
Baumea spp.							
Baumea articulata				**N03/025**			N02/065 **N04/010** (PtCC,MS)
Baumea articulata– *Eleocharis sphacelata*			**N03/019** (PtSL)				N04/029 **N04/022** (PtSL,SR) **N04/026** (PtCC) **N04/030**
Baumea articulata– *Eleocharis sphacelata*– harakeke–manuka							
Baumea articulata– *Eleocharis spacelata*– *Isolepis prolifer*							
Baumea articulata– *Eleocharis sphacelata*–raupo							
Baumea articulata– giant umbrella sedge– manuka–raupo							
Baumea articulata– *Juncus pallidus*							**N02/065**
Baumea articulata–manuka							**N03/022** (PtWMR)
Baumea articulata– raupo							**N04/028** (PtCC)
Baumea huttonii							

WETLANDS	OTHER HOLOCENE		CRETACEOUS–CENOZOIC ROCK UNITS				MIXED
Ponded by Pleistocene dunes	Alluvial and swamp deposits	Harbour and estuaries	Mangakahia Complex mudstone & sandstone	Tangihua Complex igneous rocks	Houhora Complex sedimentary & igneous rocks	Matapia Formation pebbly sandstone	Karikari Plutonics intruding Houhora Complex	
O04/223							O03/006 (PtRR,MS,SR)	
N04/038								
N04/007 (PtCC) N03/039 N03/ 044 N04/037								
	N02/056							
N04/021								
N03/020								
N04/002 (PtQEII)								
N03/004								
O04/227 (PtSL,MS)								

	DUNE BELTS					WETLANDS
	Coastal foredunes	Holocene transverse dunes and deflation zones	Holocene fixed parabolic dunes	Pleistocene consolidated parabolic dunes & interdune flats	Pleistocene eroded and leached Awhitu Complex dunes	Pleistocene consolidated intertidal & estuarine sands forming low terraces	Ponded by Holocene dunes
FRESHWATER WETLANDS *(continued)*							
Baumea buttonii–B. juncea							**O03/001** (PtSL,RR)
Baumea juncea							
Baumea juncea–Eleocharis sphacelata–manuka							
Baumea juncea–manuka							**N02/065**
Baumea rubiginosa							
Baumea rubiginosa/teretifolia–manuka							**N02/068**
Baumea teretifolia–Gleichenia dicarpa							
Baumea teretifolia–Schoenus brevifolius							
Coprosma spp.–giant umbrella sedge association							
Coprosma tenuicaulis–manuka							
dune lake/open water		**N03/009** (PtSL,EA)		N03/025			**N02/061** N02/065 N02/066 **N02/069** N03/003 N03/018 **N03/021** N03/022 (PtWMR) N03/046 (PtSL) **N04/010** (PtCC,MS) N04/011

WETLANDS	OTHER HOLOCENE		CRETACEOUS–CENOZOIC ROCK UNITS					MIXED
Ponded by Pleistocene dunes	Alluvial and swamp deposits	Harbour and estuaries	Mangakahia Complex mudstone & sandstone	Tangihua Complex igneous rocks	Houhora Complex sedimentary & igneous rocks	Matapia Formation pebbly sandstone	Karikari Plutonics intruding Houhora Complex	
O04/227 (PtSL,MS) **N04/009** (PtMS)								
N04/002 (PtQEII)								
O04/223								
	N02/057							
N04/002 (PtQEII)								**N03/031** (PtCC, ScR,MS)
								N03/031 (PtCC, ScR,MS)
N04/008 (PtRR)								
	O04/221 (PtSL,MS)							
O03/002 (PtMS)								
N02/044 N02/070 N03/004 N03/020 N03/024 **N03/026** N03/030 N03/039 *N03/042 N03/043 N03/044 **N04/008** (PtRR)	N02/056 N02/057 N04/018 (PtSL)							N02/060

			DUNE BELTS				WETLANDS
	Coastal foredunes	Holocene transverse dunes and deflation zones	Holocene fixed parabolic dunes	Pleistocene consolidated parabolic dunes & interdune flats	Pleistocene eroded and leached Awhitu Complex dunes	Pleistocene consolidated intertidal & estuarine sands forming low terraces	Ponded by Holocene dunes
FRESHWATER WETLANDS *(continued)*							
dune lake/open water *(continued)*							**N04/022** (PtSL,SR) **N04/023** (PtSL,SR) N04/024 (PtCC) N04/025 (PtCC) N04/026 (PtCC) N04/029 **N04/030** N04/031 (PtCC) **N04/034** O04/230 (PtSL)
Eleocharis sphacelata				**N03/025**			N02/061 N02/065 **N02/069** N03/021 **N04/010** (PtCC,MS) N04/011 N04/022 (PtSL,SR) **N04/024** (PtCC) **N04/030** N04/031 (PtCC)
Eleocharis sphacelata–*Baumea articulata*–raupo							
Eleocharis sphacelata –wire rush							
Eleocharis acuta–*Isolepis prolifer*–jointed rush							**N03/036**
Eleocharis acuta–*Isolepis prolifer*–*Myriophyllum propinquum*–willow weed							

WETLANDS	OTHER HOLOCENE		CRETACEOUS–CENOZOIC ROCK UNITS					MIXED
Ponded by Pleistocene dunes	Alluvial and swamp deposits	Harbour and estuaries	Mangakahia Complex mudstone & sandstone	Tangihua Complex igneous rocks	Houhora Complex sedimentary & igneous rocks	Matapia Formation pebbly sandstone	Karikari Plutonics intruding Houhora Complex	
N04/009 (PtMS) N04/017 N04/019 N04/021 N04/027 (CC) *N04/032 N04/035 N04/038 **O03/002** (PtMS) O04/228 (PtSR)								
N03/004 N03/020 N03/024 *N03/ 042 **N03/043** N03/044 N04/002 (PtQEII) N04/006 **N04/008** (PtRR) N04/009 (PtMS) N04/017 N04/019 N04/021 **N04/027** (CC) N02/044	N02/057							
N04/017 **N03/020**								
		N02/056						
(PtRR)	**N04/008**							

	DUNE BELTS					WETLANDS
	Coastal foredunes	Holocene transverse dunes and deflation zones	Holocene fixed parabolic dunes	Pleistocene consolidated parabolic dunes & interdune flats	Pleistocene eroded and leached Awhitu Complex dunes	Pleistocene consolidated intertidal & estuarine sands forming low terraces	Ponded by Holocene dunes
FRESHWATER WETLANDS *(continued)*							
Eleocharis sphacelata–raupo		**N03/009** (PtSL,EA)					N04/025 (PtCC) **N03/030** N04/023 (PtSL,SR)
giant umbrella sedge–swamp millet							**N03/036**
Gleichenia dicarpa–manuka							
Gleichenia dicarpa–*Schoenus brevifolius*							
harakeke							
harakeke–manuka							**N04/030**
harakeke–pampas–raupo							N04/005
harakeke–pampas–reed-toetoe							N02/043
harakeke–raupo							**O04/229** (PtSL) **N04/033**
Isolepis prolifer			**N03/019** (PtSL)			**N02/044**	
Isolepis prolifer–*Myriophyllum propinquum*							
knobby clubrush–*Juncus* sp.–oioi			**N03/019** (PtSL)				
kanuka							
Lepidosperma filiforme							
manuka–*Cassytha*							

WETLANDS	OTHER HOLOCENE		CRETACEOUS–CENOZOIC ROCK UNITS				MIXED
Ponded by Pleistocene dunes	Alluvial and swamp deposits	Harbour and estuaries	Mangakahia Complex mudstone & sandstone	Tangihua Complex igneous rocks	Houhora Complex sedimentary & igneous rocks	Matapia Formation pebbly sandstone	Karikari Plutonics intruding Houhora Complex	
N03/020 N03/026 O04/228 (PtSR)								**O03/005** (PtRR)
N03/026								
								N03/031 (PtCC, ScR,MS)
O03/002 (PtMS)								**O03/008** (Pt SL)
								O03/008 (PtSL) **N03/031** (PtCC, ScR,MS)
N04/038								
	N02/056							
O04/227 (PtSL,MS)								
N03/034								

	DUNE BELTS					WETLANDS
	Coastal foredunes	Holocene transverse dunes and deflation zones	Holocene fixed parabolic dunes	Pleistocene consolidated parabolic dunes & interdune flats	Pleistocene eroded and leached Awhitu Complex dunes	Pleistocene consolidated intertidal & estuarine sands forming low terraces	Ponded by Holocene dunes
***FRESHWATER WETLANDS** (continued)*							
manuka–*Eleocharis sphacelata*							**N03/024**
manuka–gorse							
manuka–raupo				*N03/011			**N03/018**
manuka–sedge							
manuka							N02/069 **O03/001** (PtSL,RR) **N04/030** **O04/229** (PtSL)
manuka–*Schoenus brevifolius*							
oioi							N02/069 N03/003 N04/010 (PtCC,MS) **N02/014** (PtRR)
oioi–pampas–water fern							**N02/066**
raupo		N03/009 (PtSL)	N03/019 (PtSL)		N03/014		**N02/061** N03/018 **N03/022** (PtWMR) N03/024 **N03/036** *N03/045 N03/046 (PtSL) N04/010 (PtCC,MS) N04/025 (PtCC) **N04/026** (PtCC) N04/030 **N04/034** O03/001 (PtSL,RR) **O04/230** (PtSL)

WETLANDS	OTHER HOLOCENE		CRETACEOUS–CENOZOIC ROCK UNITS				MIXED
Ponded by Pleistocene dunes	Alluvial and swamp deposits	Harbour and estuaries	Mangakahia Complex mudstone & sandstone	Tangihua Complex igneous rocks	Houhora Complex sedimentary & igneous rocks	Matapia Formation pebbly sandstone	Karikari Plutonics intruding Houhora Complex	
O04/223								
N04/017	N04/018 (PtSL)							
								N02/060
N04/006 **N04/008** (PtRR) **N04/021** **O03/002** (PtMS)	N02/057 O04/220 O04/221 (PtSL,MS)				N03/035			**N03/031** (PtCC, ScR,MS)
O04/227 (PtSL,MS)								**N03/031** (PtCC, ScR,MS)
N03/004 **O03/002** (PtMS)								
N02/044 N03/002 N03/004 N03/010 **N03/026** N04/002 (PtQEII) N04/027 (CC) *N04/032 N04/035 O03/002 (PtMS) O04/227 (PtSL,MS)	**N02/056** O04/220 **O04/221** (PtSL,MS)							N02/060

	DUNE BELTS					WETLANDS
	Coastal foredunes	Holocene transverse dunes and deflation zones	Holocene fixed parabolic dunes	Pleistocene consolidated parabolic dunes & interdune flats	Pleistocene eroded and leached Awhitu Complex dunes	Pleistocene consolidated intertidal & estuarine sands forming low terraces	Ponded by Holocene dunes
FRESHWATER WETLANDS *(continued)*							
raupo–sedge							N04/033
raupo–oioi							**N04/005**
raupo–rush							
reed–sedge							
Schoenus brevifolius							
umbrella fern–*Schoenus* sp.							
wire rush							
wire rush–*Gleichenia dicarpa*							**N02/061**
ESTUARY							
Baumea sp.–manuka							
eelgrass							
glasswort							
oioi–sea rush							
mangrove							
mangrove–oioi							

WETLANDS	OTHER HOLOCENE		CRETACEOUS–CENOZOIC ROCK UNITS				MIXED
Ponded by Pleistocene dunes	Alluvial and swamp deposits	Harbour and estuaries	Mangakahia Complex mudstone & sandstone	Tangihua Complex igneous rocks	Houhora Complex sedimentary & igneous rocks	Matapia Formation pebbly sandstone	Karikari Plutonics intruding Houhora Complex	
N03/010								
N02/070								
O04/227 (PtSL,MS)								
O04/227 (PtSL,MS)								
O04/227 (PtSL,MS)								
		N03/038						
		N02/026 (PtSR) **N03/038** **O04/233** (PtSL,MS,NR,HR)						
		N03/038 **O04/233** (PtSL,MS,NR,HR)						
		N02/026 (PtSR) **O04/233** (PtSL,MS,NR,HR)						
		O04/231 **O04/233** (PtSL,MS,NR,HR) **N02/026** (PtSR)						
		N03/038						

	DUNE BELTS					WETLANDS
	Coastal foredunes	Holocene transverse dunes and deflation zones	Holocene fixed parabolic dunes	Pleistocene consolidated parabolic dunes & interdune flats	Pleistocene eroded and leached Awhitu Complex dunes	Pleistocene consolidated intertidal & estuarine sands forming low terraces	Ponded by Holocene dunes
***ESTUARY** (continued)*							
oioi							
saltmarsh							
sea rush							
shell bank							
COASTAL ASSOCIATIONS/SAND FIELDS							
buffalo grass							
Coprosma acerosa–oioi – pohuehue							
Coprosma acerosa– pohuehue							
Dichondra aff. *brevifolia*– native iceplant							
harakeke– pohuehue							
glasswort							
kikuyu–pohuehue	N02/042 (PtCC,SL,MS)						
kikuyu–sedge		N03/032					
knobby clubrush	**O04/232** (PtSL)						
knobby clubrush–oioi	**N02/042** (PtCC SL,MS)						
knobby clubrush–oioi–pampas	N03/040 (PtSL,MS)						

WETLANDS	OTHER HOLOCENE		CRETACEOUS–CENOZOIC ROCK UNITS				MIXED
Ponded by Pleistocene dunes	Alluvial and swamp deposits	Harbour and estuaries	Mangakahia Complex mudstone & sandstone	Tangihua Complex igneous rocks	Houhora Complex sedimentary & igneous rocks	Matapia Formation pebbly sandstone	Karikari Plutonics intruding Houhora Complex	
	O04/221 (PtSL,MS) **N02/057**	**N03/038**						N03/023 (PtSL)
			N02/058					
		O04/231						
		O04/233 (PtSL,MS,NR,HR)						
					N03/050			
O03/002 (PtMS)								
O03/002 (PtMS)								
					N03/050			
								N03/023 (PtSL)
					N03/050			

			DUNE BELTS				WETLANDS
	Coastal foredunes	Holocene transverse dunes and deflation zones	Holocene fixed parabolic dunes	Pleistocene consolidated parabolic dunes & interdune flats	Pleistocene eroded and leached Awhitu Complex dunes	Pleistocene consolidated intertidal & estuarine sands forming low terraces	Ponded by Holocene dunes
COASTAL ASSOCIATIONS/SAND FIELDS *(continued)*							
marram–pohuehue	N03/009 (PtSL,EA)						
marram–*Spinifex*		N03/015 (PtSL)					
mixed coastal turf		N03/009 (PtSL,EA)					**N02/014** (PtRR)
native iceplant							
oioi		**N03/032**					
pingao		**N03/016**					
pingao–*Spinifex*		**N02/051**					
sandfield		**N02/013** (PtRR) **N02/051** *N03/006 **N03/015** (PtSL) **N03/016** **N03/009** (PtSL,EA)					
Spinifex	**N02/042** (PtCC SL,MS) **N03/040** (PtSL,MS) **O03/009** (PtRR) O04/232 (PtSL)	N03/016					
Spinifex–cape honey flower	O03/003 (PtRR)						
Spinifex–kanuka–pohutukawa		**N03/037** (PtCC,SL)					
toetoe	**N02/042** (PtCC SL,MS)						
toetoe–harakeke–oioi	**N02/042** (PtCC SL,MS)						

WETLANDS	OTHER HOLOCENE		CRETACEOUS–CENOZOIC ROCK UNITS				MIXED
Ponded by Pleistocene dunes	Alluvial and swamp deposits	Harbour and estuaries	Mangakahia Complex mudstone & sandstone	Tangihua Complex igneous rocks	Houhora Complex sedimentary & igneous rocks	Matapia Formation pebbly sandstone	Karikari Plutonics intruding Houhora Complex	
					N03/050			
O03/002 (PtMS)								
O03/002 (PtMS)					**N03/050**			N03/023 (PtSL)

	DUNE BELTS					WETLANDS
	Coastal foredunes	Holocene transverse dunes and deflation zones	Holocene fixed parabolic dunes	Pleistocene consolidated parabolic dunes & interdune flats	Pleistocene eroded and leached Awhitu Complex dunes	Pleistocene consolidated intertidal & estuarine sands forming low terraces	Ponded by Holocene dunes
ISLANDS							
buffalo grass							
coastal herbfield							
Cook's scurvy grass							
giant umbrella sedge–harakeke							
giant umbrella sedge							
glasswort–Mercury Bay weed							
harakeke							
kanuka						**N02/055**	
karo							
karamu–manuka–taupata							
manuka							
Melicytus novae-zelandiae–taupata							
native iceplant							
native iceplant–knobby clubrush							
Pimelea arenaria–Spinifex							
Poa pusilla							
pohuehue							
pohutukawa							
rock platform							
Samolus repens–glasswort							

WETLANDS	OTHER HOLOCENE		CRETACEOUS–CENOZOIC ROCK UNITS				MIXED
Ponded by Pleistocene dunes	Alluvial and swamp deposits	Harbour and estuaries	Mangakahia Complex mudstone & sandstone	Tangihua Complex igneous rocks	Houhora Complex sedimentary & igneous rocks	Matapia Formation pebbly sandstone	Karikari Plutonics intruding Houhora Complex	
							O03/012	
							O03/012	
						N02/073		
							O03/012	
						N02/073		
						N02/073		
							O03/012	
							O03/012	
							O03/012	
							O03/012	
							O03/012	
							O03/012	
						N02/073		
		O04/235 (PtNR)						
							O03/012	
							O03/012	
					N03/051 (NR)			
						N02/073		
					N03/051 (NR)			

	DUNE BELTS					WETLANDS
	Coastal foredunes	Holocene transverse dunes and deflation zones	Holocene fixed parabolic dunes	Pleistocene consolidated parabolic dunes & interdune flats	Pleistocene eroded and leached Awhitu Complex dunes	Pleistocene consolidated intertidal & estuarine sands forming low terraces	Ponded by Holocene dunes
***ISLANDS** (continued)*							
Spinifex							
tawapou							
ti kouka– harakeke– manuka–pampas							
Zoysia pauciflora							
GRASSLAND							
marram							N02/066
pampas							
pasture							
SHRUBLAND							
black wattle– Sydney golden wattle							
bracken			**N03/019** (PtSL)				
gorse			N03/019 (PtSL)				
gorse–kanuka							
gorse–manuka				*N03/ 013 (Part of)			
gorse–pampas–wattle							

WETLANDS	OTHER HOLOCENE		CRETACEOUS–CENOZOIC ROCK UNITS				MIXED
Ponded by Pleistocene dunes	Alluvial and swamp deposits	Harbour and estuaries	Mangakahia Complex mudstone & sandstone	Tangihua Complex igneous rocks	Houhora Complex sedimentary & igneous rocks	Matapia Formation pebbly sandstone	Karikari Plutonics intruding Houhora Complex	
		O04/235 (PtNR)						
					N03/051 (NR)			
							O03/012	
							O03/012	
N04/035								
O03/011								
								N03/031 (PtCC, ScR,MS)
	*N04/013 (Part of) N04/018 (PtSL)	*N04/013 (Part of)						
*N04/012								
N04/016 *N03/013 (Part of)								
	O04/221 (PtSL,MS)							

	DUNE BELTS					WETLANDS
	Coastal foredunes	Holocene transverse dunes and deflation zones	Holocene fixed parabolic dunes	Pleistocene consolidated parabolic dunes & interdune flats	Pleistocene eroded and leached Awhitu Complex dunes	Pleistocene consolidated intertidal & estuarine sands forming low terraces	Ponded by Holocene dunes
***SHRUBLAND** (continued)*							
gorse–tobacco weed							N04/023 (PtSL,SR)
Hakea sp.–manuka							N02/061
kanuka			**N03/041** **N03/019** (PtSL)	*N03/011 *N03/013 N03/025 *N03/028 *N04/004	*N03/001	*N02/ 046 (Part of)	N02/065 N02/066 N02/069 N04/010 (PtCC,MS)
kanuka–*Callistachys lanceolata*					N02/052		
kanuka/ manuka			*N02/ 049				N03/022 (PtWMR) N03/036
kanuka–manuka–gorse						N04/022 (PtSL,SR)	
kanuka–manuka–wattle				*N03/017 (Part of)			
kanuka–Sydney golden wattle				*N02/048		*N02/ 046 (Part of)	
manuka				*N03/008	*N03/005		**N02/068** N03/018 N04/010 (PtCC,MS) N03/046 (PtSL) N03/021 N04/026 (PtCC) **N04/030**
prickly hakea–kanuka–kumarahou							

WETLANDS	OTHER HOLOCENE		CRETACEOUS–CENOZOIC ROCK UNITS				MIXED
Ponded by Pleistocene dunes	Alluvial and swamp deposits	Harbour and estuaries	Mangakahia Complex mudstone & sandstone	Tangihua Complex igneous rocks	Houhora Complex sedimentary & igneous rocks	Matapia Formation pebbly sandstone	Karikari Plutonics intruding Houhora Complex	
N03/026 N04/002 (PtQEII) **N04/008** (PtRR) *N04/012 *N04/013 (Part of) **N02/044**	*N04/013 (Part of) **N02/056**		*N02/045 N02/058					*N02/046 (Part of) *N02/054 *N02/059 *N03/007 *N02/049
N02/047 N04/002 (PtQEII) N04/008 (PtRR) N04/006 **O04/227** (PtSL,MS)	O04/220 **O04/222** (PtQEII, SR)			N03/002				*N02/049 **N03/031** (PtCC, ScR,MS) N02/060
N03/039								*N02/046 (Part of)
N03/010 N03/020 *N03/047 N04/009 (PtMS)								**N02/060**
				N03/002				

	DUNE BELTS					WETLANDS
	Coastal foredunes	Holocene transverse dunes and deflation zones	Holocene fixed parabolic dunes	Pleistocene consolidated parabolic dunes & interdune flats	Pleistocene eroded and leached Awhitu Complex dunes	Pleistocene consolidated intertidal & estuarine sands forming low terraces	Ponded by Holocene dunes
***SHRUBLAND** (continued)*							
sandfield			**N03/019** (PtSL)				
Sydney golden wattle					*N03/001		
Sydney golden wattle–kanuka/manuka							
ti kouka–manuka							
toetoe–bracken–kanuka							
wattle			N03/019 (PtSL)				N03/018
wattle–kanuka							
COASTAL SHRUBLAND							
Astelia sp.–kanuka							
harakeke					**N03/014**		
harakeke–kanuka		**N04/015** (PtSL)					
harakeke–manuka		**N03/032**			**N03/014**		
gorse							O03/001 (PtSL,RR)
gorse–kanuka							
gorse–kikuyu							
gorse–kanuka/ manuka							
kanuka		**N03/009** (PtSL,EA)			N03/014		

WETLANDS	OTHER HOLOCENE			CRETACEOUS–CENOZOIC ROCK UNITS				MIXED
Ponded by Pleistocene dunes	Alluvial and swamp deposits	Harbour and estuaries	Mangakahia Complex mudstone & sandstone	Tangihua Complex igneous rocks	Houhora Complex sedimentary & igneous rocks	Matapia Formation pebbly sandstone	Karikari Plutonics intruding Houhora Complex	
O04/223								*N03/007
N04/006								
	O04/222 (PtQEII SR)							
N02/044								
O04/223								
N03/034								
					N03/035			
							O03/006 (PtRR,MS,SR)	
O03/002 (PtMS)								
								O03/004 (PtRR)
								O03/008 (PtSL)

		DUNE BELTS				WETLANDS
	Coastal foredunes	Holocene transverse dunes and deflation zones	Holocene fixed parabolic dunes	Pleistocene consolidated parabolic dunes & interdune flats	Pleistocene eroded and leached Awhitu Complex dunes	Pleistocene consolidated intertidal & estuarine sands forming low terraces	Ponded by Holocene dunes
***COASTAL SHRUBLAND** (continued)*							
kanuka–gorse							
kanuka–Sydney golden wattle		N03/037 (PtCC,SL)					
kanuka/ manuka–marram–toetoe		N03/009 (PtSL,EA)					
kanuka–manuka–wattle					N03/014 N03/029		
kanuka–manuka–Sydney golden wattle							
kanuka/ manuka							**O03/001** (PtSL,RR)
manuka		**N03/032**			N03/014 N03/029		
taupata							
wattle		N03/016			N03/014 N03/029		
BROADLEAF FOREST							
kanuka							
kohekohe–puriri–taraire							
puriri							
puriri–taraire							

WETLANDS	OTHER HOLOCENE		CRETACEOUS–CENOZOIC ROCK UNITS				MIXED
Ponded by Pleistocene dunes	Alluvial and swamp deposits	Harbour and estuaries	Mangakahia Complex mudstone & sandstone	Tangihua Complex igneous rocks	Houhora Complex sedimentary & igneous rocks	Matapia Formation pebbly sandstone	Karikari Plutonics intruding Houhora Complex	
								O03/004 (PtRR)
								*O03/007 (PtFNDC, MS)
O03/002 (PtMS)					**N03/035**		**O03/006** (PtRR,MS, SR)	**O03/005** (PtRR) **O03/004** (PtRR)
O04/223								*O03/007 (PtFNDC, MS)
					N03/050			
								N03/023 (PtSL)
								N02/060
								N02/060
	O04/222 (PtQEIISR)							
N02/044	**O04/222** (PtQEII SR)							

	DUNE BELTS						WETLANDS
	Coastal foredunes	Holocene transverse dunes and deflation zones	Holocene fixed parabolic dunes	Pleistocene consolidated parabolic dunes & interdune flats	Pleistocene eroded and leached Awhitu Complex dunes	Pleistocene consolidated intertidal & estuarine sands forming low terraces	Ponded by Holocene dunes
COASTAL BROADLEAF FOREST							
kanuka							
kanuka–pohutukawa							
kanuka–puriri							
kohekohe							
pohutukawa	**O03/003** (PtRR)	**N03/032** **N04/003** **N03/009** (PtSL,EA)			**N03/014**	**N02/053**	
pohutukawa–kanuka–puriri							
pohutukawa–toetoe							**N04/033**
puriri–karaka				**N03/027**			
towai							
PODOCARP–BROADLEAF FOREST							
kahikatea–kanuka							
PODOCARP FOREST							
kahikatea							
totara							

WETLANDS	OTHER HOLOCENE		CRETACEOUS–CENOZOIC ROCK UNITS				MIXED
Ponded by Pleistocene dunes	Alluvial and swamp deposits	Harbour and estuaries	Mangakahia Complex mudstone & sandstone	Tangihua Complex igneous rocks	Houhora Complex sedimentary & igneous rocks	Matapia Formation pebbly sandstone	Karikari Plutonics intruding Houhora Complex	
							O03/006 (PtRR,MS,SR)	
							O03/006 (PtRR,MS,SR)	**O03/004** (PtRR)
								O03/004 (PtRR)
							O03/006	
O03/002 (PtMS)								**O03/005** (PtRR)
					N03/035			
							O03/006 (PtRR,MS,SR)	
	O04/226							
	O04/222 (PtQEII SR)							
	O04/217							

TABLE 3. SUMMARY OF SITE EVALUATIONS

(e.u. = ecological unit; reg. sign. = regionally significant species; rep. = representative)

LEVEL 1 SITES, Survey no.	REPRESENT-ATIVENESS[1]	RARITY[2]/ SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURAL-NESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Te Paki Dunes N02/013	Rep. site.	Coastal dunes. Geo-preservation site of national importance. Flora: 1 threatened. Fauna: 2 threatened.	1 e.u.	Absence of adventive species. Pines border southeast.	N02/014 dissects. Adjoins N02/042. Adjacent to Te Paki ED sites.	1936 ha
Te Paki Stream N02/014	Rep. site.	Coastal, freshwater stream. Flora: 2 threatened, 1 reg. sign. Fauna: 3 threatened, 2 reg. sign.	2 e.u.s.	Relatively natural. High public use.	Dissects N02/013.	43 ha
Parengarenga Harbour N02/026	Rep. site.	High water quality. Diversity richness of biota. Important for endemic & indigenous migratory taxa. Geo-preservation site of national importance. Flora: 1 threatened (historical). Fauna: 10 threatened, 4 reg. sign. (1 historical).	3 e.u.s.	Few buffers on western side, some pine.	Vital stepping stone for migratory species; adjoins many other sites including a number in the Te Paki ED.	6449 ha
Ninety Mile Beach & Dunes N02/042	Rep. site for 4 e.u.s.	Coastal foredunes. Fauna: 6 threatened, 1 reg. sign. Flora: 3 threatened	5.e.u.s.	Pine forest adjoins. Weeds present.	Dune band. Buffers N02/043 from pine forestry. Adjoins numerous remnts/habitats.	928 ha, narrow band stretching N– S along W coast-line of ED.
Waikanae Stream Wetland N02/043		West coast dune wetland. Fauna: Not surveyed.[3]	1 e.u.	Weed component.	Enclosed within N02/042, links to N02/044.	2 ha
Lake Waikanae N02/044	Rep. site for 4 e.u.s.	Dune lake, broadleaf forest, shrubland. Flora: 1 threatened. Fauna: 1 threatened, 1 reg. sign.	7.e.u.s.	Weeds present. Pine forest adjoins.	Most of lake is buffered from adjacent pine forest. Partial link to N02/043.	252 ha, 6 remnts[4], irregular shapes.

[1] Note that most sites have more than one ecological unit present. This column indicates whether or not the site has been selected as being a representative site for one or more ecological units.

[2] The rapid quantitative method used in this survey did not cover survey for rare species; in most cases species information in this column has been collated from other databases. It is likely that specific species surveys for all sites would reveal additional data on threatened and rare species, and in the case of Level 2 sites, a change in ranking.

[3] Not surveyed: The Department of Conservation, Northland Conservancy, has not to date (April 2002) specifically surveyed for threatened species at this site.

[4] Remnants in this column refers to the number of separate areas of habitat within the site.

LEVEL 1 SITES, Survey no.	REPRESENT-ATIVENESS	RARITY/ SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURAL-NESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Ngatuwhete Wetland N02/047		Swamp shrubland. Fauna: Not surveyed.	1 e.u.	Occasional willow.	Adjacent to N02/044.	8.7 ha, compact.
Kokota Spit N02/051	Rep. site.	Geo-preservation site of national importance. High tide roost site. Fauna: 7 threatened. Flora: 3 threatened.	2 e.u.s.	Pine forest adjoins; otherwise largely unmodified.	Southern entrance to Parengarenga Harbour. Adjoins N02/052.	1344 ha
Tangoake Shrubland N02/052		Fauna: Not surveyed. Flora: 1 threatened.	1 e.u.	Weeds present. Pine forest adjoins.	Buffer for Parengarenga Harbour.	138 ha, elongated.
Te Pua Point Pohutukawa Remnt N02/053	Rep. site.	Pohutukawa coastal forest. Fauna: Not surveyed.	1 e.u.	Small, isolated remnt.	Small buffer for Parengarenga Harbour.	6.3 ha, narrow strip.
Kaipohue Island N02/055	Rep. site.	Island habitat. Fauna: 5 threatened, 1 reg. sign. (past).	1 e.u.	Some weeds.	Part of Parengarenga Harbour ecosystem.	14.5 ha, compact.
Karatia Wetland N02/056	Rep. site for 4 e.u.s.	Dune wetland. Fauna: 1 threatened, 2 reg. sign. Flora: 2 threatened, 1 reg. sign.	5 e.u.s.	Pine forest adjoins. Limited exotics present, otherwise in good condition.	Links to Parengarenga Harbour & N02/068.	44 ha, elongated.
Whakatereohao Stream Swamp N02/057	Rep. site for 2 e.u.s.	Dune swamp/uncommon ecological sequence. Fauna: 2 threatened, 1 reg. sign.	5 e.u.s.	Good condition, forestry surrounds.	Links to Parengarenga Harbour.	18.4 ha, elongated with fork.
Emauhu Point Shrublands N02/058		Flora: 1 threatened (historical). Fauna: Not surveyed.	2 e.u.s.	Some weeds.	Buffer to upper reaches of Parengarenga Harbour.	31 ha, irregular.
Lake Kihona & Forest Remnants N02/060	Rep. site for 4 e.u.s.	Rare/uncommon vegetation types. Flora: 1 threatened (1984). Fauna: 2 reg. sign.	7 e.u.s. Habitat diversity.	Largely unmodified dune lake, some weeds. Forestry borders.	Part of suite of wetlands.	19 ha, elongated.
Lake Te Kahika N02/061	Rep. site for 3 e.u.s.	Wetland ecosystem/rare mosaic. Flora: 1 threatened, 1 reg. sign. Fauna: 1 threatened, 2 reg. sign.	5 e.u.s.	Unmodified lake/ swamp. Weeds present. Forestry surrounds.	Link to coast & N02/051.	17.4 ha, 2 lakes, Lake Te Kahika is forked, smaller lake is narrow.
Waipara & Dead Lakes N02/065	Rep. site for 2 e.u.s.	Dune lakes. Fauna: 1 reg. sign. (reported).	6 e.u.s.	Some weeds present.	Proximity to N02/066 & N02/044.	9.8 ha, 2 remnts, main one compact.

LEVEL 1 SITES, Survey no.	REPRESENT-ATIVENESS	RARITY/ SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURAL-NESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Pretty Lake N02/066	Rep. site for 1 e.u.	Dune lake.	4 e.u.s.	Weeds present. Forestry surrounds.	Part of dune suite.	44.8 ha, elongated.
Upper Karatia Swamp N02/068	Rep. site.	Dune swamp. Flora: 1 threatened. Fauna: 1 reg. sign.	2 e.u.s.	Good condition. Mostly bordered by pines.	Links to N02/056.	34 ha, irregular.
Lake Austria & Shrubland N02/069	Rep. site for 2 e.u.s.	Dune lake. Fauna: 1 threatened, 4 reg. sign.	5 e.u.s.	Weeds present. Forestry surrounds.	Part of suite of wetlands.	19.7 ha
Ngatuwhete Lake N02/070		Large freshwater dune lake. Fauna: 1 threatened.	2 e.u.s.		Part of wetland chain. Close to N02/044. Unbuffered.	10 ha, compact round lake.
Matapia Island N02/073	Rep. site.	Island. Site endemic species Only known outcrop of Matapia Formation rocks. Fauna: 3 threatened, 1 reg. sign. Flora: 1 threatened.	5 e.u.s.	High quality.		2.3 ha
Te Ahu Rd N03/002		Flora: 1 threatened. Fauna: Not surveyed	3 e.u.s.	Weeds conspicuous.	Corridor between habitats.	179 ha, irregular.
Wild Horse Wetland N03/003	Rep. site for 1 e.u.	Dune wetland. Fauna: Not surveyed.	2 e.u.s.	Weeds present. Pines border.	Adjacent to coast & N02/042.	7.9 ha, compact round lake.
Pukekura Stream Wetland N03/004		Dune wetlands. Fauna: 2 reg. sign.	5 e.u.s.	Pines surround. Weeds present.	Series of linking wetlands to coast.	12 ha, 5 small remnts.
Te Arai Sandfields N03/009	Rep. site for 5 e.u.s.	Mobile duneland/rare mosaic of habitat types. Flora: 7 threatened, 2 reg. sign. Fauna: 3 threatened, 1 reg. sign.	9 e.u.s.	Habitat diversity. Pine forest adjacent. Weeds & horses present but retains a high level of naturalness.	Adjacent to coast & N02/042.	1253 ha
Oromanga Rd Wetlands N03/010		Dune wetland. Flora: 1 threatened. Fauna: Not surveyed.	3 e.u.s	Forestry surrounds	Coastal link. Adjacent to N02/042	9.6 ha, elongated.
Henderson Bay Shrubland N03/014	Rep. site for 3 e.u.s.	Coastal shrubland. Flora: 2 reg. sign., at least 7 native orchids present. Fauna: 1 threatened, 1 reg. sign.	8 e.u.s.	Weeds present.	Adjacent to N03/016.	139.5 ha, 4 remnts, irregular shapes.
Great Exhibition Bay N03/015	Rep. site for 1 e.u.	Coastal dunes/rare habitat type. Flora: 1 threatened Fauna: 3 threatened.	2 e.u.s.	Limited modification. Marram & other weeds. Some pines.	Adjacent to N03/021–023, N02/051.	755 ha, stretching along E coast for c. 13 km.

LEVEL 1 SITES, Survey no.	REPRESENT-ATIVENESS	RARITY/ SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURAL-NESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Henderson Bay & Kowhai Beach N03/016	Rep. site for 2 e.u.s.	Important roost site. Flora: 1 threatened. Fauna: 5 threatened.	4 e.u.s.	Limited modification. Some weeds.	Adjoins N03/014, N03/024, 016, 036, N03/029, 038.	410 ha
Te Kao South Swamp N03/018	Rep. site for 1 e.u.	Dune wetland. Fauna: 1 threatened.	5 e.u.s.	Modified & weeds present. Portion adjacent to pine forest.	Linking wetlands. Part of suite.	83 ha, 2 remnts.
Te Ramanuka Lakes & Shrubland N03/019	Rep. site for 6 e.u.s.	Complex of lakes, wetlands, shrubland. Rare landform. Flora: 5 threatened. Fauna: 2 threatened, 4 reg. sign.	9 e.u.s.	Some water levels lowering, exotic weeds present.	Part of wetland suite of habitats.	423 ha, 1 main large remnt, sprawling, with 3 small outliers.
Henderson Bay Rd Wetlands N03/020	Rep. site for 1 e.u.	Dune wetlands. Fauna: 2 threatened, 1 reg. sign.	5 e.u.s.	Some weeds (margins). Surrounded by pasture.	Corridor.	10 ha, 3 remnts.
Lake Morehurehu & Wetland N03/021	Rep. site for 1 e.u.	Dune lake/ wetland. Flora: 1 threatened. Fauna: 1 threatened, 1 reg. sign.	3 e.u.s.	Pine forest surrounds majority of site. Good condition but some exotics present.	Adjoins N03/015.	56.6 ha, 3 remnts.
Wairahi Swamp & Lake Taeore N03/022	Rep. site for 2 e.u.s.	Dune wetland/ swamp. Soils of national importance. Flora: 1 threatened. Fauna: 3 threatened (2 past), 4 reg. sign. (1 past).	4 e.u.s	Lake appears to be drying out. Weeds present.	Links to coast. Adjoins N03/015.	127 ha, 1 large & 1 smaller remnt.
Rarawa Beach N03/023	Rep. site for 1.e.u.	Coastal. Flora: 3 threatened. Fauna: 4 threatened.	4 e.u.s.	Mixed – some weeds, some areas in good condition.	Adjacent to N03/015 & N03/014.	59 ha
Wagener's Swamps N03/024	Rep. site for 1 e.u.	Swamp/ wetland. Fauna: 4 threatened.	5 e.u.s.	Pines & pasture border. Weeds present.	Link to coast. Adjoins N03/016 & 033. Close to N03/029	45 ha, 9 irregular shaped remnts.
Lake Waihopo & Shrublands N03/025	Rep. site for 2 e.u.s.	Dune lake/ wetland. Flora: 2 threatened. Fauna: 2 threatened, 1 reg. sign.	4 e.u.s	Weeds present. Pines & pasture border.	Part of wetland suite of habitats.	101 ha, 3 irregular shaped remnts.
Lake Wahakari N03/026	Rep. site for 4 e.u.s.	Lake. Flora: 3 threatened. Fauna: 3 reg. sign.	5 e.u.s.	Generally good condition, some weeds present. Pines & pasture border.	Adjoins N03/002 & 007. Close to N03/008.	239 ha, large sprawling wetland.
Puriri-Karaka Remnant N03/027	Rep. site.	Broadleaf forest. Unique vegetation/ geomorphological combination. Flora: 1 notable.	1 e.u.	Isolated habitat type. Surrounded by pine.	Close to N03/009.	1.2 ha

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Jackson Point Shrubland N03/029		Harbour habitat.	3 e.u.s.	Weeds present. Forestry borders NW end.	Important buffer to Harbour. Adjoins N03/024.	89 ha, 2 remnts. Elongated.
Te Raite Wetland N03/030	Rep. site for 1 e.u.	Dune wetland. Fauna: 1 threatened, 1 reg. sign.	2 e.u.s.	Weeds to margins.	Part of wetland suite of habitats.	9.9 ha, elongated.
Kaimaumau-Motutangi Wetlands N03/031	Rep. site for 7.e.u.s.	Oligotrophic wetland complex. Diverse habitats. Flora: 14 threatened, 3 reg. sign. Fauna: 8 threatened, 5 reg. sign.	9 e.u.s.	Weeds present. Mixed – some areas in excellent condition, others very weedy depending on water levels. Drier areas the weediest.	Adjoins Rangaunu Harbour & N03/040. Links with Houhora Harbour.	4075 ha
Hukatere Lookout N03/032	Rep. site for 4 e.u.s.	Coastal habitat. Fauna: Not surveyed.	5 e.u.s.	Weeds present but southern area in good condition. Forestry borders landward.	Adjoins N02/042.	207 ha, 5 remnts, 3 main, 2 outliers.
Houhora Heads Rd Wetland N03/034	Rep. site for 1 e.u.	Dune wetland. Fauna: Not surveyed.	2 e.u.s.	Limited modification. Weeds on border.	Buffered by shrubland.	9 ha, compact.
Mt Camel N03/035	Rep. site for 3 e.u.s.	Coastal forest/shrubland. Flora: 6 threatened (incl. 2 historical), 1 reg. sign. Fauna: 3 threatened, 3 reg. sign. (2 historical), & Northland endemic snails.	4 e.u.s.	Highly modified, regenerating. Weeds present, heavily grazed.	Buffer northern entrance to Houhora Harbour. Links N03/035 to Harbour.	291 ha, discon-tinuous, 1 main remnt, 7 outliers.
Kowhai Swamps N03/036	Rep. site for 3 e.u.s.	Wetland system/ uncommon habitat type. Fauna: 2 threatened.	4 e.u.s.	Forestry borders W side. Relatively weed free.	Coastal link. Adjacent to N03/016.	48 ha,frag-mented, 3 remnts.
Pohutukawa Remnant N03/037	Rep. site for 1 e.u.	Rare habitat. Fauna: Not surveyed.	2 e.u.s.	Weeds present. Pine borders majority of site.	Coastal link. Adjoins N02/042.	55 ha, compact.
Houhora Harbour N03/038	Rep. site.	Harbour/ important for endemic & indigenous migratory taxa. Fauna: 9 threatened, 3 reg. sign.	5 e.u.s.	W side of harbour devoid of buffering vegetation. Modified in W & N by settle-ment & agriculture.	Vital habitat link with Rangaunu & Parengarenga Harbours.	c. 1534 ha
Arethusa Swamp N03/039		Dune wetland. Fauna: 1 threatened, 2 reg. sign.	3 e.u.s.	Prevalence of exotic/ weed sp. Pine borders E side.	Part of wetland suite of habitats.	15.3 ha, 4 remnts.
East Beach N03/040	Rep. site for 1 e.u.	Coastal foredune/ rare habitat type. Flora 2 threatened. Fauna: 6 threatened.	2 e.u.s.	Primarily indigenous foredune. Marram present.	Southern entrance Houhora Harbour. Adjoins N03/031 & O04/233.	627 ha

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Waikokopu Shrubland N03/041	Rep. site.	Rare habitat type. Fauna: Not surveyed.	1 e.u.	Largely devoid of exotics. Surrounded by forestry.	Corridor habitat.	42 ha, rect-angular.
Salvation Rd Swamp N03/043	Rep. site for 1 e.u.	Dune wetland. Fauna: 1 threatened, 1 reg. sign.	2 e.u.s.	Surrounded by pasture.	Part of suite of wetlands.	6.6 ha, rect-angular.
Lambs Rd Swamp N03/044		Dune wetland. Fauna: 1 threatened.	3 e.u.s.	Grazed to margins.	Part of suite of wetlands.	8.4 ha, 2 remnts, irregular.
Salt Lake N03/046		Dune lake. Common waterbirds.	3 e.u.s.	Fenced.	Corridor.	9.5 ha, irregular.
Te Wakatehaua (The Bluff) Island N03/050	Rep. site for 5 e.u.s.	Island. Flora: 2 threatened, 1 notable. Fauna: 2 threatened	6 e.u.s.	Modification leeward side, otherwise high degree of naturalness.	Coastal. Links to N02/042.	7.2 ha
Motu Puruhi I. & Terakautuhaka I. N03/051	Rep. site for 3 e.u.s.	Island. Flora: 2 reg. sign. Fauna: 5 threatened.	4 e.u.s.	Predator & browser free. Good condition.		6.34 ha
Far North Rd Shrublands & Wetlands N04/002	Rep. site for 3 e.u.s.	Mosiac of shrubland & wetland habitats. Fauna: 2 threatened, 2 reg. sign.	8 e.u.s.	Weeds present. Some areas heavily grazed.	Corridor link.	206.8 ha, 8 remnts.
Compartment 65 Forest Remnant N04/003	Rep. site.	Coastal forest. Isolated vegetation type.	1 e. u.	Pines border. Small isolated habitat.	Close to N03/032, N02/042.	2.4 ha, compact.
Coal Creek Wetland N04/005	Rep. site for 1 e.u.	Rare habitat type. Flora: 1 threatened.	2 e.u.s.	3 separate small wetlands. Weeds present, pines border.	Coastal link. All 3 adjoin N02/042.	3.9 ha, 3 remnts.
Heath Rd Power-line Swamp N04/006	Rep. site for 1 e.u.	Swamp. Fauna: 2 threatened.	4 e.u.s.	Weeds present.	Close to Rangaunu Harbour & N04/002.	84.5 ha, 2 remnts.
Headquarters Pond N04/007	Rep. site.	Dune wetland. Flora: 1 threatened . Fauna: 2 threatened, 3 reg. sign.	1 e.u.	Some weeds. Forestry border.	Close to N04/002, 030	5.77 ha, elongated.
Lake Ngatu Complex N04/008	Rep. site for 6 e.u.s.	Dune lakes/wetlands. Flora: 1 threatened, 1 reg. sign. Fauna: 4 threatened, 2 reg. sign.	7 e.u.s.	Some weeds. Forestry & farming partially borders.	Close links to various wetland habitats.	154.8 ha, discon-tinuous, 1 main, 6 outliers.
Lake Rotokawau & Pond N04/009	Rep. site for 1 e.u.	Shallow lake. Flora: 2 threatened. Fauna: 2 threatened, 3 reg. sign.	4 e.u.s.	Good quality. Weeds on margin. 1 remnt grazed to margin.	Close links to various wetland habitats.	24.9 ha, 2 remnts.

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Lake Waiparera & Wetlands N04/010	Rep. site for 3 e.u.s.	One of the best lake/ wetland systems in ER. Flora: 3 threatened. Fauna: 3 threatened, 3 reg. sign.	7 e.u.s.	High quality. Exotics/ weeds to margins. Forestry border SW portion.	Large area part of ED suite of wetland habitats.	212.3 ha, discon-tinuous, 1 main, 3 outliers.
West Coast Rd Lake N04/011		Dune lake. Flora: 1 threatened. Fauna: 2 threatened, 1 reg. sign.	2 e.u.s.	Good quality. Weedy margins, forestry & grassland border.	Corridor to various wetland habitats.	3.5 ha
Waipapakauri Beach Coastal Shrubland N04/015	Rep. site.	Rare vegetation type. Flora: 1 threatened. Fauna: Not surveyed.	1 e.u.	Kikuyu present.	Coastal link.	16.6 ha, compact, rect-angular.
Sandhills Rd Swamp N04/016		Orchid habitat. Flora: 2 threatened, 2 reg. sign. Fauna: Not surveyed.	1 e.u.	Highly modified, planted exotics & weeds.	Close to N04/019.	0.6 ha
Sweetwater Station Depressions N04/017		Seasonally wet. Fauna: 1 threatened.	5 e.u.s.	Modified, weeds present. Grazed.	Close to N04/013, 021.	15 ha, 8 remnts.
Tangonge Wetland N04/018		Seasonally wet shrubland. Flora: 1 threatened (5 are historical). Fauna: 2 threatened, 2 reg. sign.	3 e.u.s.	Weeds present. Lowered watertable. Highly modified.	Close to O04/222 & various wetlands to the west.	486 ha, elongated.
Clarke Rd Wetland N04/019		Wetland. Common waterbirds.	2 e.u.s.	Grazed to margins.	Close to N04/016, 018.	3.1 ha, triangular.
Sandhills Rd Wetland No 1 N04/021	Rep. site for 1.e.u.	Peat swamp. Flora: 1 threatened. Fauna: 2 threatened.	4 e.u.s.	Some weeds. Areas grazed to margins.	Close to N04/017, N04/018,013.	14.1 ha, 3 remnts.
Lake Rotoroa & Wetlands N04/022	Rep. site for 2 e.u.s.	Dune lake. Flora: 2 threatened. Fauna: 2 threatened, 2 reg. sign.	4 e.u.s.	Some grazed, some weeds to margins/ planted exotics.	Largest lake in wetland suite in this area.	32 ha, discon-tinuous, 1 main, 2 outliers.
Lake Heather N04/023	Rep. site for 1 e.u.	Dune lake. Flora: 4 threatened, (1 historicial). Fauna: 3 threatened, 1 reg. sign.	3 e.u.s.	Weeds present, fenced & being restored.	Part of suite of wetlands.	11 ha, 1 main, 1 outlier.
Split Lake Wetland N04/024	Rep. site for 1 e.u.	Suspended floating bog. Fauna: 1 threatened.	2 e.u.s.	Grazed to margins.	Part of suite of wetlands.	12.6 ha, irregular.
Mini & Round Lakes N04/025		Dune lake. Fauna: 2 threatened, 2 reg. sign.	3 e.u.s.	Grazed to margins.	Part of suite of wetlands.	9.9 ha, 4 remnts.
Turks Lake & Wetland N04/026	Rep. site for 2 e.u.s.	Dune lake. Flora: 1 threatened. Fauna: 1 reg. sign.	4 e.u.s.	Good quality. Exotics planted to margins. Forestry surrounds.	Part of suite of wetlands.	12.4 ha, rect-angular.

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Bacica Rd Lake N04/027	Rep. site.	Dune lake. Flora: 1 notable. Fauna: 1 threatened, 1 reg. sign.	3 e.u.s.	Fenced. Forestry borders W boundary.	Part of suite of wetlands.	3.5 ha, compact.
Selwyn Flat Wetland N04/028	Rep. site for 1.e.u.	Dune lake. Flora: 1 threatened, 1 notable. Fauna: 1 reg. sign.	1 e.u.	Exotics planted to margins. Weeds present. Forestry border.	Part of suite of wetlands.	11.7 ha, triangular.
Herberts Swamp N04/029		Dune lake. Fauna: 2 threatened, 2 reg. sign.	2 e.u.s.	Relatively unmodified. Forestry SE. Some weeds, otherwise pasture to margins.	Part of suite of wetlands.	1.7 ha
Lake Ngakapua Complex N04/030	Rep. site for 5 e.u.s.	Dune lake/wetland complex. Flora: 3 threatened, 1 notable. Fauna: 2 threatened, 3 reg. sign.	8 e.u.s.	Weeds/exotics, some grazing, some fenced, some pines border.	Part of suite of wetlands.	30.6 ha, discon-tinuous, 7 remnts.
Jones Lake N04/031		Dune lake. Fauna: 1 threatened, 1 reg. sign.	2 e.u.s.	Some exotics to margins, incl. pines. Fenced.	Part of suite of wetlands.	1.75 ha
Gleeson's Lake N04/032		Dune lake. Common waterbirds.	2 e.u.s.	Grazed to margin.	Part of wetland suite.	2.6 ha
Ninety Mile Swamp N04/033	Rep. site for 2 e.u.s.	Freshwater wetlands. Flora: 1 threatened. Fauna: 1 threatened, 1 reg. sign.	3 e.u.s.	Pines border. Some weeds but relatively good condition.	Coastal link.	5.1 ha, 2 remnts.
Waimimiha Lakes N04/034	Rep. site.	Dune lake/wetland. Flora: 1 threatened (hist.). Fauna: 1 reg. sign.	2 e.u.s.	Grazed to margins.	Coastal link.	16.4 ha, 2 remnts.
Kaikoura Farms Wetland N04/035		Fauna: 1 threatened.	3 e.u.s.	Highly modified.	Part of wetland suite.	0.9 ha
Woolshed Swamp N04/037		Dune lake. Fauna: 1 reg. sign.	1 e.u.	Good quality.	Part of wetland suite.	1.15 ha
Sweetwater Station Peat Bowl N04/038	Rep. site for 2 e.u.s.	Dune wetland. Fauna: 1 reg. sign.	3 e.u.s.	Seasonally wet.	Part of wetland suite.	4.2 ha
Waimango Swamp O03/001	Rep. site for 3 e.u.s.	Coastal wetland. Flora: 5 threatened. Fauna: 10 threatened, 1 reg. sign.	5 e.u.s.	Some weeds but generally good condition.	Coastal link. Adjoins O03/004, O03/009.	297 ha, elongated.

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Rotokawau Lakes & Puwheke Beach O03/002	Rep. site for 10 e.u.s.	Coastal complex/wetlands. Flora: 7 threatened (1 historical), 3 reg. sign. Fauna: 8 threatened, 3 reg. sign. (1 historical).	13 e.u.s. Dunes/ wetlands/ shrubland, dune lakes.	Weeds present, mostly at E end. Forestry adjoins SW corner. Recently cutover by subdivision development.	Coastal link/ buffer. Close to O03/001.	433.6 ha, rect-angular.
Maitai Bay O03/003	Rep. site for 1 e.u.	Sandy bay. Flora: 2 threatened, 1 reg. sign. Fauna: 5 threatened.	2 e.u.s.	Weeds present.	Coastal. Adjoins O03/006, 005.	23.9 ha, 2 remnts, coastal fringe.
Taupiroroa Range Shrublands O03/004	Rep. site for 3 e.u.s.	Large shrubland, coastal forest pockets. Flora: 5 threatened (incl. historical records).	7 e.u.s, sea level to 190 m.	Modified-regenerating by former & present clearance & fire. Some weeds/ exotics. Forestry adjoins SE & some in N.	Coastal & inland. Adjoins O03/009, 001.	945 ha, 6 remnts.
Cape Karikari Shrubland O03/005	Rep. site.	Area of pohutukawa coastal forest. Flora: 1 threatened (historical). Fauna: 1 threatened, 1 reg. sign.	3 e.u.s. Forest/ shrubland/ wetland.	Weeds present.	Link between Maitai & Karikari Moana (O03/009)	444 ha, 1 large area & remnt.
Whangatupere Bay O03/006	Rep. site for 5 e.u.s.	Coastal forest/shrubland. Flora: 2 threatened, 1 reg. sign. Fauna: 4 threatened, 3 reg. sign. & notable invertebrate	7 e.u.s.	Weeds present. Forestry border SW corner. Sense of naturalness aug-mented by size of area.	Coastal. Adjoins O03/003, links to O03/004.	1018 ha, large compact habitat.
S Urlich Rd Wetland O03/008	Rep. site for 2 e.u.s.	Harakeke wetland. Fauna: 1 threatened.	3 e.u.s.	Weeds present in dry areas.	Coastal. Adjoins O04/232, O04/230.	29 ha, 2 remnts, separate wetlands, shrubland.
Karikari Moana O03/009	Rep. site.	Duneland. Flora: 4 threatened (1 historical). Fauna: 6 threatened.	1 e.u.	High quality.	Coastal. Adjoins O03/004 O03/001, 005.	136 ha, coastal band.
Puheke Rd Wetland O03/011		Flora: 2 threatened, 1 reg. sign. Fauna: Not surveyed.	1 e.u.	Drained pasture.	Close to O03/002.	0.4 ha
Moturoa Islands O03/012	Rep. site for 12 e.u.s.	Collection of islands. Important breeding area for seabirds. Fauna: 5 threatened, 2 reg. sign.	13 e.u.s.	Herbaceous weeds. 1 island modified but remainder in good condition. Islands possibly rat-free.		27.2 ha, 5 islands.
Waimanoni Creek Shrubland O04/217	Rep. site.	Alluvial flat. Fauna: Not surveyed.	1 e.u.	Weeds present.	Borders harbour.	3.4 ha
Paparore Wetland & Shrubland O04/220		Peat swamp shrubland. Flora: 1 reg. sign. Fauna: 2 threatened, 2 reg. sign.	3 e.u.s.	Some weeds.	Harbour link.	38 ha, 2 remnts, elongated.

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Waiparera Creek Wetland O04/221	Rep. site for 3.e.u.s.	Freshwater wetland on margin of Rangaunu Harbour. Fauna: 2 reg. sign.	5 e.u.s.	Weeds present. Some stock damage.	Harbour link.	22.5 ha, rect-angular.
Awanui River Forest Remnants O04/222	Rep. site.	On alluvial flat. Flora: 3 threatened, 3 reg. sign. Fauna: 3 threatened, 1 reg. sign.	5 e.u.s.	Highly modified. Most grazed.	River link, corridor.	50.5 ha, 18 remnts.
West Coast Rd Shrubland O04/223	Rep. site for 1 e.u.	Peat swamp/potential mudfish habitat. Flora: 1 threatened orchid. Fauna: 1 reg. sign.	4 e.u.s.	Weeds present.	Corridor.	21.8 ha, 1 main remnt, 3 outliers.
Mangatete River Bush O04/226	Rep. site.	Riverine forest. Fauna: Not surveyed.	1 e.u.	Unfenced, grazed and exotics, highly modified.	Links with harbour.	3.8 ha
Lake Ohia O04/227	Rep. site for 9 e.u.s.	Heath/ boglands. Nationally sign. soils. Flora: 10 threatened (1 historical), 3 reg. sign. Fauna: 4 threatened, 2 reg. sign.	11 e.u.s.	Some weeds present but large areas in good condition.	Links coast & inner harbour. Adjoins O04/232.	1641 ha, large sprawling habitat.
Lake Waiporohita O04/228		Freshwater lake. Flora: 2 threatened. Fauna: 3 threatened.	2 e.u.s.	Exotics/weeds present. Modified margins.		8.3 ha, compact.
Southern Tokerau Swamp O04/229	Rep. site.	Nationally threatened habitat type. Flora: 3 threatened (1 hist.), 1 reg. sign. Fauna: 2 reg. sign.	2 e.u.s.	Weeds present.	Contiguous with O04/227, 232.	84 ha, 2 remnts, irregular.
Northern Tokerau Swamp O04/230	Rep. site for 1 e.u.	Mineralised swamp. Flora: 2 threatened (historical). Fauna: 1 threatened, 1 reg. sign.	2 e.u.s.	Some weeds.	Adjoins O04/232.	71 ha, irregular.
Awapoko Estuary O04/231	Rep. site for 1 e.u.	Estuarine. Fauna: 7 threatened.	2 e.u.s.	Margins modified.	Coastal link. Adjoins O04/232, O04/227.	65 ha, elongated.
Tokerau Beach O04/232	Rep. site for 1 e.u.	Beach. Flora: 2 threatened. Fauna: 4 threatened, 1 reg. sign.	2 e.u.s.	Weeds throughout.	Adjoins O04/227, O04/229, 230, O03/ 008.	376 ha, coastal band.
Rangaunu Harbour O04/233	Rep. site.	Harbour/important for endemic & indigenous migratory taxa. Fauna: 9 threatened.	5 e.u.s.	High quality.	Vital habitat link with Houhora & Parengarenga Harbours. Adjoins many habitats incl. Lake Ohia, Kaimau-mau & Puwheke.	10 185 ha
Walker Island O04/235	Rep. site.	Island. Major roost site. Flora: 2 threatened. Fauna: 5 threatened.	2 e.u.s		Major roost site.	26.5 ha, 2 islands.

LEVEL 2 SITES, Survey no.	RARITY/ SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Tetehakehake Stream Shrubland N02/045	Fauna: Not surveyed.	1 e.u.	Regenerating.	Parengarenga Harbour buffer.	62 ha, discontinuous, 2 remnts, along harbour fringe.
Mitimiti Stream & Streak Hill Shrubland N02/046	Fauna: 1 threatened, 1 reg. sign.	2 e.u.s.	Regenerating. Weeds prevelant.	Buffer along stream, harbour from farmland.	76 ha, along harbour fringe & inland.
Sandhills Shrubland N02/048	Fauna: Not surveyed.	1 e.u.	Regenerating. Weeds common.	Corridor between forestry.	12 ha, narrow forked.
Te Karaka Point & Ngakarapu Stream Shrubland N02/049	Fauna: Not surveyed.	3 e.u.s.	Regenerating. Frequent weeds. Forestry adjacent N & W.	Buffer for harbour.	87 ha, 2 remnts separated by road.
Parengarenga Shrubland N02/054	Common bird species.	1 e.u.	Regenerating. Some weeds.	Buffer to harbour.	27 ha, 2 remnts.
Whawhakou Channel Shrublands N02/059	Fauna: Not surveyed.	1 e.u.	Regenerating.	Buffer to harbour. Narrow strip.	108 ha, discontinuous, 5 remnts, mostly narrow band along harbour edge.
Te Kao Shrublands N03/001	Fauna: Not surveyed.	2 e.u.s.	Regenerating. Weeds throughout. Forestry adjoins portion.	Corridor between habitats.	102 ha, 2 remnts, almost contiguous.
Te Keena Rd Shrublands N03/005	Fauna: Not surveyed.	1 e.u.	Regenerating. Weeds throughout. Forestry E side.	Corridor. Close to N03/021	58 ha, 2 remnts, adjacent, compact.
Oromanga Sandfield N03/006	Inland, dunes. Fauna: Not surveyed.	1 e.u.	Weeds throughout. Forestry surrounds.	Isolated.	2.3 ha
Te Kao Trig Shrubland N03/007	Fauna: Not surveyed.	2 e.u.s.	Regenerating. Weeds throughout. Forestry adjoins south.	Buffer to stream & corridor between N03/018, & 026.	44 ha, irregular.
Arterial Rd Shrublands N03/008	Fauna: Not surveyed.	1 e.u.	Regenerating. Some weeds. Forestry abuts south.	Partial corridor – N03/026 to N02/060.	12 ha, rectangular.
Salt Rd Shrubland N03/011	Fauna: Not surveyed.	2 e.u.s.	Regenerating. Some weeds.	Partial corridor.	19 ha, irregular.
Ngatumoroki Shrubland N03/013	Fauna: Not surveyed.	1 e.u.	Regenerating. Weeds present.	Buffer to wetland & corridor. Close to N03/009.	29 ha, rectangular.
Pahara Shrublands N03/017	Fauna: Not surveyed.	1 e.u.	Regenerating. Weeds conspicuous. Forestry adjoins portion.	Partial link to various habitats.	69 ha, rectangular with fork.

LEVEL 2 SITES, Survey no.	RARITY/ SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Kimberley Shrubland N03/028	Not surveyed.	1 e.u.	Regenerating. Some weeds.	Isolated.	8.1 ha, compact.
Cemetery Rd Pond N03/042	Wetland. Common bird species.	2 e.u.s.	Very small area. Weeds on margins.		0.59 ha
Onepu Swamp N03/045	Raupo swamp Fauna: Not surveyed	1 e.u.	Fenced.	Near N03/046.	0.5 ha
Gully Lake N03/047	Common duck species.	1 e.u.	Weeds present. Forestry adjoins. Drying out.	Partial linkage.	1.2 ha
Big Flat Shrubland N04/004	Fauna: Not surveyed.	1 e.u.	Regenerating. Weeds frequent. Forestry borders south.	Partial link between various habitats.	11.9 ha, rectangular.
Airstrip Shrubland N04/012	Fauna: Not surveyed.	2 e.u.s.	Regenerating. Weeds frequent.	Partial link between various habitats.	71 ha, 2 remnts, almost contiguous.
Sweetwater Station Shrublands N04/013	Fauna: Not surveyed.	2 e.u.s.	Highly modified.	Partial link between various habitats.	43 ha, 2 remnts, elongated.
Rangiputa Rd Shrublands O03/007	Common waterbirds.	2 e.u.s.	Weeds present. Some forestry adjoins remnts.	Buffer to harbour/ coast. Close to O03/002 & O04/223.	73 ha, mostly compact.

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8. Appendices

8.1 FIELD SURVEY FORM

DEPARTMENT OF CONSERVATION
PROTECTED NATURAL AREAS PROGRAMME

NAME OF HABITAT:..... DATE: .....
GRID REF.: .....SSBI NO.: ..... PNA NO.: .....
HABITAT TYPE(S):.....

GEOMORPHOLOGICAL TYPE(S): .....

VEGETATION TYPE(S):

Vegetation Type	% of Total Habitat	Percentage of Cover Value (canopy)			
		Abundant (50-100)	Common (20-50)	Uncommon (5-20)	Rare (0-5)

Vegetation Type	% of Total Habitat	Percentage of Cover Value (canopy)			
		Abundant (50-100)	Common (20-50)	Uncommon (5-20)	Rare (0-5)

Department of Conservation
Te Papa Atawhai

Dear Landowner,

Department of Conservation officers are currently surveying significant natural areas, e.g. bush, wetlands, gumland etc within the Far North District. This has involved mapping natural areas from roadsides or (with the permission of landowners) from other viewpoints, and recording information on their type and condition.

You may well have already talked to staff working in your area. If not, at a later stage departmental staff may ask for permission to enter your land and gather more detailed information on your properties natural areas.

Why are we doing this survey? Northland's natural areas, especially bush pockets, contribute significantly to the character and quality of the region. Many of these areas are habitat for some of our increasingly rare native wildlife.

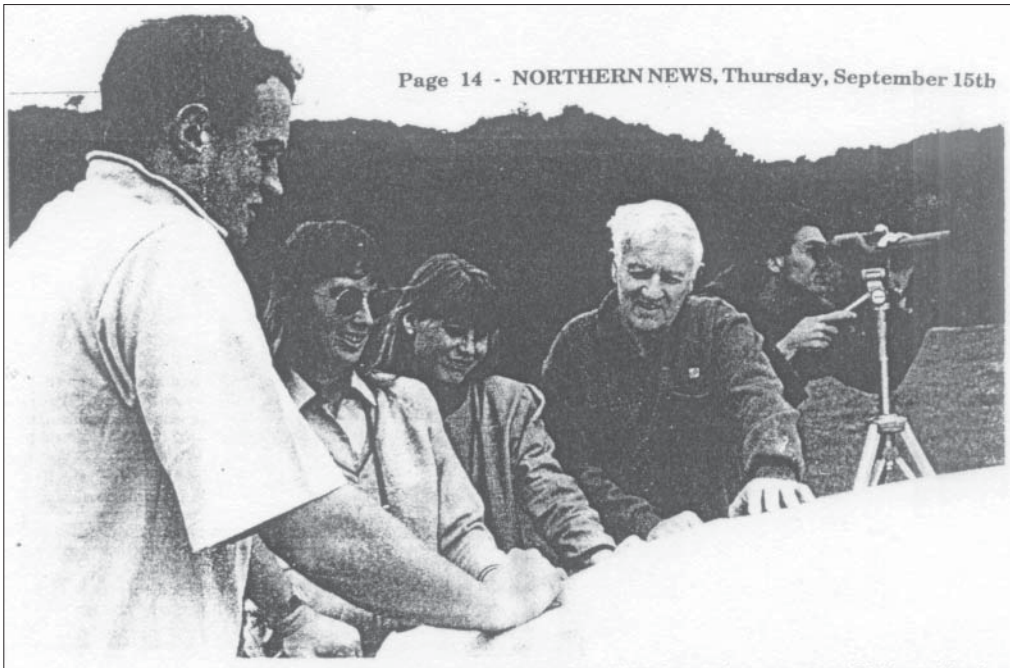
The Resource Management Act 1991 requires District Councils to consider the natural areas they administer when preparing the District Plan. The information compiled from this survey will be given to the Far North District Council to provide them with a "snapshot" of the distribution and condition of natural areas in the various parts of Northland at a single point in time. The information will be valuable as a reference point for assessing habitat changes over time.

Perhaps the principal value of this survey will be to provide you, the landowners, with information on the significance and makeup of the natural areas that you have preserved on your property so you can better plan the way you wish to manage these areas.

If you have any questions or concerns about the survey process, please contact your local Department of Conservation Field Centre or ring **Peter Anderson, Fraser Moors or John Beachman** at our Whangarei Office, telephone **(09) 438 0299, fax (09) 438 9886.**

If you wish to contact the Far North District Council about this aspect of the District Plan, please phone Peggy Kilberg at the Kaikohe office, telephone **(09) 401 2101.**

Gerry Rowan
REGIONAL CONSERVATOR



Discussing natural habitats on Geoff Wightman's property at Waimate North are, from left, Department of Conservation officers Fraser Moors and Linda Winch, Far North District Council resource planner Kaylee Wilson, Mr Wightman and DOC officer Nigel Miller.

Natural sites studied in the Far North

Northland's most important natural habitats are being identified in a joint Department of Conservation and Far North District Council project.

Conservation officers have started working on the year-long project, which aims to identify significant habitat areas outside the department's protected land area.

The study is being done for a number of reasons, including the fact that many lowland forests, gumlands, dunelands, wetlands and sea coasts are under-represented in the existing reserve system.

There is also insufficient information about the location and extent of remnant areas of native bush, wetlands, dune systems and other areas.

Conservation officers Nigel Miller, Fraser Moors and Linda Winch have begun gathering information by checking DOC's database and then looking at areas from the roadside.

Identification

Once the team has broadly noted the natural features and habitat types which exist in the district, the more important sites will be identified and permission asked from landowners to complete a more indepth survey.

This will provide valuable information for the FNDC's district plan, which is required under the 1991 Resource Management Act to consider the environmental values of any proposed activity, and for DOC to advise and assist landowners to voluntarily manage and protect key sites.

It is the first time a Protected Natural Areas programme survey has been done in Northland. The last major Northland survey by the Wildlife Service in 1977-79 did not include observations of vegetation and landform types.

DOC officer Peter Anderson said that five years later it was found 40 per cent of all surveyed wildlife habitats had been modified in some way or totally lost through land development.

8.3 CATEGORIES OF THREAT

New Zealand Threatened Plant List

In this report, categories of threat are taken from 'Threatened and uncommon plants of New Zealand' (de Lange et al. 1999), which is a revision of Cameron et al. (1995) by the New Zealand Threatened Plant Committee. These categories are:

Appendix 1 New Zealand threatened and uncommon vascular plant list

Presumed Extinct

Taxa that are no longer known to exist in the wild both within New Zealand and (if applicable) their overseas range, or in cultivation after repeated searches of known or likely localities.

Threatened

Taxa whose classification places them within Critically Endangered, Endangered, or Vulnerable categories. These are taxa whose survival is now a matter of conservation priority. Their classification within the three subheadings of threat provides a measure of the degree of risk associated with each taxon.

Critically Endangered

Taxa whose extinction is considered inevitable within a stated time period (10 years) unless there is direct conservation intervention, or which persist as individuals or populations reduced to sufficiently critically low levels that extinction through stochastic events is a distinct possiblility. Some critical taxa are now only known from cultivation.

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 populations are decreasing because of over-exploitation, extensive destruction of habitat, or other environmental disturbance; and taxa with populations that continue to be seriously depleted and whose ultimate security is not yet assured.

Declining

Taxa that are numerically abundant but which are either under threat from serious adverse factors throughout their range, or occur as widely scattered, typically small populations of which are undergoing declines through loss of reproductive ability, recruitment failure, predation, or through other processes of often subtle habitat change. Declining taxa are listed to highlight their plight, for without some level of management they are destined to become the future threatened plants of New Zealand.

Recovering

Taxa whose populations are either: (1) naturally restricted to susceptible habitats (e.g. offshore islands), where their survival is utterly dependent on continual rigid conservation measures (e.g. rodent control), or (2) taxa whose populations were once under serious threat and, as a result of past conservation intervention (e.g. goat eradication), have shown the capacity to recover naturally without further management measures.

Conservation Dependent

Taxa whose survival is now dependent on the continuation of existing conservation measures.

Natural Population Recovery

Taxa whose populations were once reduced to precariously low levels and still occur as small populations. As a result of past conservation intervention, the candidate taxa have demonstrated the ability to recover their former range through natural means, to such an extent that further conservation assistance is no longer required.

Naturally Uncommon

Taxa that are not considered under immediate or obvious threat but which, for varying reasons, have the potential to become threatened. Three subheadings are recognised to accommodate the different situations whereby taxa can be naturally uncommon.

Sparse

Taxa that, for largely undetermined reasons, occur within typically small and widely scattered populations. This distribution appears wholly natural and is not considered the result of past or recent anthropogenic disturbance. However, as the candidate taxa usually occur in small numbers at any given site, they are naturally susceptible to extirpations within parts of their range.

Vagrant

Taxa whose presence within the New Zealand botanical region is naturally transitory. These are invariable taxa that have failed to establish themselves significantly beyond their point of introduction through reproductive failure or for quite specific ecological reasons. Many vagrants are able to reproduce only by vegetative means and, in such instance, when in suitable habitats, they can form extensive clonal populations.

Range Restricted

Taxa whose distribution is naturally confined to specific substrates (e.g. ultramafic rock), habitats (e.g. high alpine fell field), or geographic areas (e.g. subantarctic islands). Typically, Range Restricted taxa are under no obvious or immediate anthropogenic threat.

Insufficiently known

Taxa that are suspected but not definitely known to belong to any of the above categories because of a lack of information. It is hoped that listing a taxon as 'Insufficiently Known' will stimulate studies to find out its true category of threat.

Taxonomically indeterminate

This appendix includes described taxa about which there is doubt regarding taxonomic status and which require further investigation, and those recently discovered taxa whose taxonomic status has yet to be determined. In both instances, available information suggests that candidate taxa could be under some level of threat. A total of 92 taxa are included.

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.

Arand et al. (1993) Categories of Importance

Importance

Importance of the site is ranked in three categories:

1. International

- contains the best example of a soil (generally soil group) or soil-vegetation or soil-landform association that is unique to New Zealand (or these latitudes)
- contains a soil that is naturally uncommon or greatly reduced in extent in other parts of the world
- contains a wide range of extensive soils with a relatively unmodified vegetation cover
- has been studied in detail and is known internationally.

2. National

- contains the best or a 'classic' example of a soil (either a soil group or a mapping unit) or a soil-vegetation or soil-landform association in New Zealand
- contains a soil or soil-vegetation or soil-landform association that is nationally uncommon or reduced in extent

- contains a moderate range of extensive soils with a relatively unmodified vegetation cover
- has been studied in detail and is known nationally.

3. Regional

- contains the best regional examples of a soil (generally a mapping unit) or a soil-vegetation or soil-landform association
- contains a limited range of soils under vegetation that is relatively unmodified.

Kenny & Hayward (1996) Categories of Importance

Sites are listed in this inventory under three levels (A–C) of significance. The importance assessment given to each site has been made by those informants familiar with the site:

A. International – site of international scientific importance.

B. National – site of national scientific, educational or aesthetic importance.

C. Regional – site of regional scientific, educational or aesthetic importance.

8.4 FAUNA

A. Checklist of birds of the Aupouri Ecological District

Species recorded in the Aupouri Ecological District, including the Parengarenga, Houhora and Rangaunu Harbours [Data from Pierce (unpublished) 1991, Bellingham & Davis 1983 (unpublished), OSNZ classified summarised notes, and Sites of Special Biological Interest database].

Nomenclature follows Turbott (1990) and Heather & Robertson (2000).

Key

PL = Present in large numbers (> 100); P = Present in small numbers (< 100); R = Recorded (< 10); Ex = Presumed extinct locally – not seen since 1980s (brown teal), 1890s (weka)

* Breeding confirmed; ** Introduced

Species	Other name	Scientific name	Parenga-renga	Houhora	Rangaunu	Mainland	Offshore (+ islands)
NZ dabchick	Weweia	*Poliocephalus rufopectus*				P*	
Hoary-headed grebe		*P. poliocephalus*				R	
Australasian little grebe		*Tachybaptus n. novaehollandiae*					P*
Southern giant petrel		*Macronectes giganteus*					R
Grey-faced petrel	Oi	*Pterodroma macroptera gouldi*					P*
Black-winged petrel		*P. nigripennis*					P*
Buller's shearwater		*Puffinus bulleri*					P
Fluttering shearwater	Pakaha	*P. gavia*					P*
NI little shearwater		*P. assimilis haurakiensis*					P*
Blue penguin	Korora	*Eudyptula minor*	P	P	P		P*
White-faced storm petrel	Takahikare-moana	*Pelagodroma marina*					P*
Common diving petrel	Kuaka	*Pelecanoides u. urinatrix*					P*
Red-tailed tropic bird	Amokura	*Phaethon rubricauda*	R				R
Australasian gannet	Takapu	*Morus s. serrator*	P	P	P		P
Brown booby		*Sula leucogaster plotus*		R			
Black shag	Kawau	*Phalacrocorax carbo novaehollandiae*	P	P	P*	P*	
Pied shag	Karuhiruhi	*P. v. varius*	P*	P	P*	P*	P
Little black shag		*P. sulcirostris*	P	P	P	P*	
Little shag		*P. melanoleucos brevirostris*	P*	P	P*	P	
Darter		*Anhinga melanogaster rufa*				R	
White-faced heron		*Ardea novaehollandiae*	PL*	PL*	PL*	PL*	
White-necked heron		*A. pacifica*				R	
White heron	Kotuku	*Egretta alba modesta*	R	R		R	
Little egret		*E. garzetta nigripes*	R			R	
Reef heron	Matuku-moana	*E. s. sacra*	R	R	R	R	P*
Cattle egret		*Bubulcus ibis coromandus*	P		P	P	
Australasian bittern	Matuku	*Botaurus poiciloptilus*	P	P	P	P	
Glossy ibis		*Plegadis falcinellus*	R			R	
White ibis		*Threskiornis molucca strictipennis*				R	
Royal spoonbill	Kotuku-ngutupapa	*Platalea regia*	P*		P	P	
Yellow-billed spoonbill		*P. flavipes*			R	R	
**Black swan		*Cygnus atratus*	PL*	PL*	PL*	PL*	
**Canada goose		*Branta canadensis*		P		P	

Species	Other name	Scientific name	Parenga-renga	Houhora	Rangaunu	Mainland	Offshore (+ islands)
Paradise shelduck	Putangi-tangi	*Tadorna variegata*	PL*	P*	PL*	PL*	
Chestnut-breasted shelduck		*T. tadornoides*				R	
**Mallard		*Anas platyrhynchos*	PL*	P*	PL*	PL*	
Grey duck	Parera	*A. s. superciliosa*	P*	P*	P*	PL*?	
Grey teal	Tete	*A. gracilis*				P	
Brown teal	Pateke	*A. aucklandica chlorotis*				Ex	
NZ shoveler	Kuru whengi	*A. rhynchotis variegata*	P			P	
NZ scaup	Papango	*Aythya novaeseelandiae*				P*	
Australasian harrier	Kahu	*Circus approximans*	P*	P*	P*	P*	P
Nankeen kestrel		*Falco cenchroides*				R	
**California quail		*Callipepla californica*				P*	
**Brown quail		*Synoicus ypsilophorus*				P*	
**Ring-necked pheasant		*Phasianus colchicus*				P*	
Banded rail	Moho-pereru	*Rallus philippensis assimilis*	PL*	P*	PL*	P	
NI weka	Woodhen	*Gallirallus australis greyi*				Ex	
Marsh crake	Koitareke	*Porzana pusilla affinis*				P*	
Spotless crake	Puwheto	*P. tabuensis plumbea*	P	P	P	P	
Pukeko	Purple swamphen	*Porphyrio porphyrio melanotus*		P*	P*	P*	P*
Pied oystercatcher	Torea	*Haematopus ostralegus finschi*	P	P	P	P	
Variable oystercatcher	Torea	*H. unicolor*	P*	P*	P*	P*	P*
Pied stilt	Poaka	*Himantopus himantopus leucocephalus*	PL*	PL*	PL*	P*	
Northern NZ dotterel	Tuturi-whatu	*Charadrius obscurus aquilonius*	P*	P*	P*	P*	
Banded dotterel	Tuturi-whatu	*C. b. bicinctus*	PL*	PL	PL*	P*	
Black-fronted dotterel		*C. melanops*			R	R	
Large sand dotterel		*C. l. leschenaultii*	R		R		
Mongolian dotterel		*C. mongolus*	R				
Oriental dotterel		*C. veredus*	R		R		
Wrybill	Ngutu-parore	*Anarhynchus frontalis*	PL	P	P	P	
Pacific golden plover	Eastern golden plover	*Pluvialis fulva*	PL	PL	PL	P	
American golden plover		*P. dominica*			R		
Grey plover		*P. squatarola*	R	R	R		
Spur-winged plover	Masked lapwing	*Vanellus miles novaehollandiae*	PL*	P*	P*	PL*	
Turnstone	Ruddy turnstone	*Arenaria interpres*	PL	PL	PL	P	
Lesser knot	Huahou	*Calidris canutus rogersi*	PL	PL	PL	P	
Great knot		*C. tenuirostris*				R	
Sanderling		*C. alba*	R		R		
Curlew sandpiper		*C. ferruginea*	P		P	P	
Sharp-tailed sandpiper		*C. accuminata*	P		P	P	
Pectoral sandpiper		*C. melanotos*	R		R	R	
White-rumped sandpiper		*C. fuscicollis*	R				
Red-necked stint		*C. ruficollis*	P	R	P	P	
Western sandpiper		*C. mauri*	R		R		

Species	Other name	Scientific name	Parenga-renga	Houhora	Rangaunu	Mainland	Offshore (+ islands)
Broad-billed sandpiper		*Limicola falcinellus*	R				
Eastern curlew		*Numenius madagascariensis*	R	R	R		
Asiatic whimbrel		*N. phaeopus variegata*	P	P	P		
American whimbrel		*N. phaeopus hudsonicus*	R		R		
Little whimbrel		*N. minutus*	R				
Bar-tailed godwit	Kuaka	*Limosa l. lapponica*	PL	PL	PL	P	
Asiatic black-tailed godwit		*L. limosa melanuroides*	R		R	R	
Hudsonian godwit		*L. haemastica*	R		R	R	
Wandering tatler		*Tringa incana*	R		R		
Siberian tatler		*T. brevipes*	R		R		
Common sandpiper		*T. hypoleucos*			R		
Greenshank		*T. nebularia*	R	R		R	
Marsh sandpiper		*T. stagnatilis*	R		R	R	
Terek sandpiper		*T. terek*	R		R		
Arctic skua		*Stercorarius parasiticus*	P	P	P	P	P
Pomarine skua		*S. pomarinus*	P				P
Black-backed gull	Karoro	*Larus dominicanus*	PL*	PL*	PL*	PL	PL
Red-billed gull	Tarapunga	*L. novaehollandiae scopulinus*	PL	PL	PL*	PL	PL
White-winged black tern		*Chlidonias leucopterus*				R	
Black-fronted tern		*Sterna albostriata*				R	R
Caspian tern	Taranui	*S. caspia*	P*	P*	PL*	P	P
White-fronted tern	Tara	*S. striata*	PL	PL	PL*	P	PL
Eastern little tern		*S. albifrons sinensis*	R	R	P		
White-capped noddy		*Anous tenuirostris*		R		R	
Kukupa	NZ pigeon, kereru	*Hemiphaga novaeseelandiae*				R	
**Eastern rosella		*Platycercus eximius*				P	
Oriental cuckoo		*Cuculus saturatus*				R	
Fan-tailed cuckoo		*Cacomantis flabelliformis*				R	
Shining cuckoo	Pipi-wharauroa	*Chrysococcyx lucidus*				P	
Long-tailed cuckoo	Koekoea	*Eudynamis taitensis*				R	
Channel-billed cuckoo		*Scythrops novaehollandiae*				R	
Morepork	Ruru	*Ninox n. novaeseelandiae*				P	
NZ kingfisher	Kotare	*Halcyon sancta vagans*	PL*	P*	PL*	PL*	
Dollarbird	Eastern broad-billed roller	*Eurystomus orientalis*				R	
**Skylark		*Alauda arvensis*				PL	
Welcome swallow		*Hirundo tahitica neoxena*	PL*	PL*	PL*	PL*	
**Dunnock	Hedge sparrow	*Prunella modularis*				PL	
NZ pipit	Pihoihoi	*Anthus novaeseelandiae*	P	P	P	P	
**Blackbird		*Turdus merula*				PL*	
**Song thrush		*T. philomelos*				PL*	
NI fernbird	Matata	*Bowdleria punctata vealeae*	P*	P*	P*	PL*	
NI fantail	Piwaka-waka	*Rhipidura fuliginosa placabilis*				PL	
Grey warbler	Riroriro	*Gerygone igata*				PL	
Silvereye	Tahou, whiteye	*Zosterops l. lateralis*				PL	
Tui		*Prosthemadera n. novaeseelandiae*					P
**Yellowhammer		*Emberiza citrinella*				PL	
**Chaffinch		*Fringilla coelebs*				PL	

Species	Other name	Scientific name	Parenga-renga	Houhora	Rangaunu	Mainland	Offshore (+ islands)
**Greenfinch		*Carduelis chloris*				PL	
**Goldfinch		*C. carduelis*				PL	
**Redpoll		*C. flammea*				PL	
**House sparrow		*Passer domesticus*				PL*	
**Starling		*Sturnus vulgaris*				PL*	
**Common myna		*Acridotheres tristis*				PL*	
**Australasian magpie		*Cymnorhina tibicern*				PL	
**Rook		*Corvus frugilegus*				R	

B. Other fauna in the Aupouri Ecological District

Aquatic fauna

Fish		
long-finned eel	*Anguilla dieffenbachii*	
short-finned eel	*A. australis*	
inanga	*Galaxias maculatus*	
banded kokopu	*G. fasciatus*	
koaro	*G. brevipennis*	
common bully	*Gobiomorphus cotidianus*	
giant bully	*G. gobioides*	
red-finned bully	*G. huttoni*	
common smelt	*Retropinna retropinna*	
grey mullet	*Mugil cephalus*	
black mudfish	*Neochanna diversus*	
cockabully	*Tripterygion nigripenne*	
Introduced fish		
goldfish	*Carassius auratus*	
mosquito fish	*Gambusia affinis*	
rudd	*Scardinius erythropthalmus*	
rainbow trout	*Oncorhynchus mykiss*	
Freshwater crustacea		
mussel	*Hydriella menziesii*	
shrimp	*Paratya curvirostris*	
Lizards		
Northland green gecko	*Naultinus grayi*	Restricted to Northland
Pacific gecko	*Hoplodactylus pacificus*	Northland Island only
shore skink	*Oligosoma smithi*	East Coast to Te Paki in Northland
Suter's skink	*O. suteri*	Few mainland sites in North Island, more widespread on islands
robust skink	*Cyclodina alani*	Restricted to islands
copper skink	*C. aenea*	Widespread
ornate skink	*C. ornata*	Fairly widespread
	Hoplodactylus "Matapia Island"	Matapia Island and also Motuopao Island (Te Paki ED)

Snails		
Archey's dune snail	*Succinea archeyi*	Cape Maria van Diemen to Bay of Plenty
	Allodiscus fallax	Known from a single population on Karikari Peninsula
	Allodiscus sp. "Houhora"	Apparently endemic to Mt Camel
	Climocella reinga	Endemic to northern Aupouri Peninsula
	Cytora sp."whangatupere"	Single population at Whangatupere Bay
	Egestula pandora	Endemic to northern Aupouri Peninsula
	Onychophoran	
	Serpho matthewsii	Endemic to northern Aupouri Peninsula
Spiders		
Black katipo	*Latrodectus atritus*	Native occurring in both North and South Islands
Frogs		
green frog	*Litorea aurea*	Introduction from Australia to New Zealand
Marine reptiles		
leathery turtle	*Dermochelys coriacea*	
loggerhead turtle	*Caretta caretta*	
yellow-bellied sea snake	*Pelamis platurus*	
hawksbill turtle	*Eretmochelys imbricata*	
green turtle	*Chelonia mydas*	
Marine mammals		
NZ fur seal	*Arctocephalus forsteri*	
Introduced mammals		
house mouse	*Mus musculus*	
ship rat	*Rattus rattus rattus*	
Norway rat	*R. norvegicus*	
weasel	*Mustela nivalis*	
stoat	*M. erminea*	
ferret	*M. furo*	Extending its range into the ED
house cat	*Felis catus*	
house dog	*Canis familaris*	
cattle	*Bos taurus*	
goat	*Capra hircus*	
brushtail possum	*Trichosurus vulpecula*	
pig	*Sus scrofa*	
hedgehog	*Erinaceus europeus occidentalis*	

8.5A COMMON AND SCIENTIFIC PLANT NAMES

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 plants	
akeake	*Dodonaea viscosa*
black maire	*Nestegis cunninghamii*
bracken	*Pteridium esculentum*
brake fern	*Pteris tremula*
Cassytha	*Cassytha paniculata*
common maidenhair	*Adiantum cunninghamii*
common shield fern	*Polystichum richardii*
Cook's scurvy grass	*Lepidium oleraceum*
eelgrass	*Zostera capricorni*, *Z. novazelandica*
five-finger	*Pseudopanax arboreus*
giant umbrella sedge	*Cyperus ustulatus*
glasswort	*Sarcocornia quinqueflora*
hangehange	*Geniostoma rupestre*
harakeke, flax	*Phormium tenax*
Hebe	*Hebe* sp.
hook grass	*Uncinia uncinata*
hound's tongue	*Microsorium pustulatum*
houhere, lacebark	*Hoheria populnea*
houpara	*Pseudopanax lessonii*
kahikatea	*Dacrydium dacrydioides*
kanono	*Coprosma grandifolia*
kanuka	*Kunzea ericoides*
karaka	*Corynocarpus laevigatus*
karamu	*Coprosma robusta*
karo	*Pittosporum crassifolium*
kauri	*Agathis australis*
kawakawa	*Macropiper excelsum*
kiokio	*Blechnum novae-zelandiae*
knobby clubrush	*Isolepis nodosa*
kohekohe	*Dysoxylum spectabile*
kowhai	*Sophora microphylla*
kowharawhara	*Astelia banksii*
kumarahou	*Pomaderris kumeraho*
kuta	*Schoenoplectus tabernaemontani*
leather-leaf fern	*Pyrrosia eleagnifolia*
mahoe	*Melicytus ramiflorus*
maire tawake	*Syzygium maire*
mamaku	*Cyathea medullaris*
mangrove	*Avicennia marina*
manuka	*Leptospermum scoparium*
mapou	*Myrsine australis*
matai	*Prumnopitys taxifolia*
Mercury Bay weed	*Dichondra repens*
mingimingi	*Leucopogon fasciculatus*
miro	*Prumnopitys ferruginea*

Indigenous plants

native broom	*Carmichaelia australis*
native iceplant	*Disphyma australe*
ngaio	*Myoporum laetum*
nikau	*Rhopalostylis sapida*
NZ spinach	*Tetragonia* sp.
oioi	*Apodasmia similis*
pingao	*Desmoschoenus spiralis*
pohuehue	*Muehlenbeckia complexa*
pohutukawa	*Metrosideros excelsa*
Pondweed	*Potamogeton* sp.
ponga	*Cyathea dealbata*
poroporo	*Solanum aviculare*
pokaka	*Elaeocarpus hookerianus*
puriri	*Vitex lucens*
rangiora	*Brachyglottis repanda*
rasp fern	*Doodia australis*
raupo	*Typha orientalis*
rengarenga lily	*Arthropodium cirratum*
rewarewa	*Knightia excelsa*
ring fern	*Paesia scaberula*
rosy maidenhair	*Adiantum hispidulum*
saltmarsh ribbonwood	*Plagianthus divaricatus*
sea primrose	*Samolus repens*
sea rush	*Juncus kraussii*
sea spurrey	*Spergularia media*
shaking brake	*Pteris tremula*
shining spleenwort	*Asplenium oblongifolium*
shore bindweed	*Calystegia soldanella*
silver pine	*Manoao colensoi*
Spinifex	*Spinifex sericeus*
sundew	*Drosera* sp.
swamp millet	*Isachne globosa*
taraire	*Beilschmiedia tarairi*
tauhinu	*Ozothamnus leptophyllus*
taupata	*Coprosma repens*
tawa	*Beilschmiedia tawa*
tawapou	*Pouteria costata*
ti kouka, cabbage tree	*Cordyline australis*
titoki	*Alectryon excelsus*
toetoe	*Cortaderia splendens*
totara	*Podocarpus totara*
towai	*Weinmannia silvicola*
turepo	*Rhabdothamnus solandri*
turutu	*Dianella nigra*
tutu	*Coriaria arborea*
umbrella fern	*Gleichenia* sp.
water fern	*Histiopteris incisa*
wharangi	*Melicope ternata*
wheki	*Dicksonia squarrosa*
willow weed	*Polygonum* sp. (native or introduced)
wire rush	*Empodisma minus*

Adventive plants	
apple of Sodom	*Solanum linnaeanum*
balsam	*Impatiens sodenii*
blackberry	*Rubus fruticosus*
black wattle	*Racosperma mearnsii*
blue pine	*Psoralea pinnata*
boneseed	*Chrysanthemoides monilifera*
bottlebrush	*Callistemon rigidus*
broom	*Cytisus scoparius*
brush wattle	*Paraserianthes lophantha*
buffalo grass	*Stenotaphum secundatum*
Cape honey flower	*Melianthus major*
dandelion	*Taraxacum officinale*
downy hakea	*Hakea gibbosa*
Eucalyptus	*Eucalyptus* sp.
flame tree	*Erythrina x sykesii*
fleabane	*Pulicaria dysenterica*
gorse	*Ulex europaeus*
hakea	*Hakea* sp.
harestail	*Lagarus ovatus*
inkweed	*Phytolacca octandra*
jointed rush	*Juncus articulatus*
kikuyu	*Pennisetum clandestinum*
lupin	*Lupinus arboreus*
macrocarpa	*Cupressus macrocarpa*
marram	*Ammophila arenaria*
Mexican devilweed	*Ageratina adenophora*
Norfolk pine	*Araucaria heterophylla*
papyrus	*Cyperus papyrus*
pampas	*Cortaderia selloana*
pine	*Pinus radiata*
prickly hakea	*Hakea sericea*
prickly moses	*Racosperma verticillatum*
poplar	*Populus* sp.
purple pampas	*Cortaderia jubata*
sand wind grass	*Lachnagrostis billardierei*
sea rocket	*Cakile edentula*
shore groundsel	*Senecio lautus*
Spartina	*Spartina alterniflora*, *S. anglica*, *S* x *townsendii*
Sydney golden wattle	*Racosperma longifolia*
thistle	*Carduus* sp.
tobacco weed	*Solanum mauritianum*
wattle	*Racosperma* sp.
watercress	*Rorippa nasturtium-aquaticum*
water lily	*Nymphaea* sp.
wild gladiolus	*Gladiolus undulatus*
willow weed	*Polygonum* sp. (Note: there is one native *Polygonum*)

8.5B ORCHID SPECIES RECORDED WITHIN THE AUPOURI ECOLOGICAL DISTRICT

From St George (1999) (as editor for New Zealand Native Orchid Group from records post-1972) and information gained from several sources in the writing of this report. (* = historical records.)

Acianthus sinclairii	*Microtis unifolia* agg.
Adelopetalum tuberculatum	*Orthoceras novae-zeelandiae*
Caleana minor *	*Petalochilus alatus*
C. bartlettii	*Prasophyllum colensoi*
Calochilus aff. *herbaceus*	*Pterostylis micromega* *
C. paludosus	*P. nutans* *
Chiloglottis formicifera *	*P. tasmanica*
Corybas carsei *	*P. trullifolia*
C. oblongus	*Spiranthes sinensis*
C. rotundifolius	*S.* aff. *novae-zelandiae*
C. trilobus agg.	*Thelymitra aemula*
Cryptostylis subulata	*T. carnea*
C. oblonga	*T.* "darkie" AK 231761
C. reniformis	*T. malvina*
Earina mucronata	*T. matthewsii*
Gastrodia minor	*T. pauciflora*
Genoplesium pumilum	*T. pulchella*
Ichthyostomum pygmaeum	*T.* "rough leaf" AK 229531
Microtis arenaria	*T. sanscilia*
M. parviflora	

8.6 GLOSSARY

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).

Bog
Infertile/acid wetland. Usually characterised by a peat substrate, sedges, manuka and umbrella fern. Water arrives via rainfall rather than by streams and other run-off.

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.

Dune complex
An association of mobile and consolidated sand dunes, which may include small interdune lakes, wetlands and shrubland communities.

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.

Exotic
Introduced from outside New Zealand.

Fernland
Dominated by ferns such as umbrella fern, 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.

Hemi-parasitic
A plant which is attached to another living plant where it derives part of its nourishment. In this Ecological District, *Cassytha paniculata* is a relatively common hemi-parasitic plant.

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.

Oligotrophic
Wetlands with low fertility that are either fed by rainwater alone or are open water wetlands in stable catchments that receive high rainfall.

Podsol
A soil type formed under some types of forest and characterised by very strong leaching and the development of whitish-grey clay sub-soils.

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
Vegetation in which the cover of reeds in the canopy is 20–100% and in which the reed cover exceeds that of any other growth form or open water. Reeds are herbaceous plants growing in standing or slowly running water that have tall, slender, erect, unbranched leaves or culms that are either hollow or have a very spongy pith. Examples include: *Typha*, *Bolboschoenus, Scirpus lacustris* [*Schoenoplectus tabernaemontani*], *Eleocharis sphacelata,* and *Baumea articulata* (Atkinson 1985).

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.

Rushland

Vegetation in which the cover of rushes in the canopy is 20–100% and in which the rush cover exceeds that of any other growth from or bare ground. Included in the rush growth form are some species of *Juncus* and all species of *Sporadanthus, Leptocarpus* [*Apodasmia*], and *Empodisma*. Tussock-rushes are excluded (Atkinson 1985).

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).

Sedgeland

Vegetation in which the cover of sedges in the canopy is 20-100% and in which the rush cover exceeds that of any other growth form or bare ground. Included in the sedge growth form are many species of *Carex, Uncinia,* and *Scirpus* [*Isolepis*]. Tussock-sedges and reed-forming sedges (cf. ***Reedland***) are excluded (Atkinson 1985).

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 two main types:

(i) Successional vegetation dominated by seral species such as manuka, kanuka, mahoe etc or shrubs such as hangehange, bracken, kumarahou.

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, e.g. gumland manuka shrubland, pohuehue 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 identity 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* sp., *Baumea articulata*, harakeke and ti kouka.

Swamp shrubland
A transitional type of wetland with woody co-dominants, primarily manuka, but including kanuka, *Coprosma propinqua,* ti kouka*, Coprosma tenuicaulis*, and other shrubs, as well as rushes, sedges or reeds.

Tombolo
A spit or bar joining an island to the mainland or to another island.

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.

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