Natural areas of Hokianga Ecological District

Reconnaissance Survey Report for the Protected Natural Areas Programme

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Department of Conservation
Te Papa Atawhai

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NEW ZEALAND PROTECTED NATURAL AREAS PROGRAMME

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Foreword

This report describes the significant natural areas of the Hokianga Ecological District as surveyed between 1994 and 1995.

Northland contains 18 mainland Ecological Districts, each characterised by its own landscape type and ecological makeup. The most distinctive feature of the Hokianga Ecological District is the Hokianga Harbour, New Zealand's fourth largest harbour. Originally a large drowned valley, the harbour is long and narrow, surrounded by dense mangrove forest containing some of the largest saltmarsh areas left in Northland. The Herekino and Whangape Harbours, forest and shrubland sequences and the dunelands of Hokianga North Head, also characterise the District. A unique geological feature is the Runaruna mud volcano, Northland's only mud volcano and a nationally significant geological and landform site.

As with most of Northland, extensive areas of habitat have been cleared and modified since human settlement. The Hokianga Ecological District survey has shown that habitats such as freshwater wetlands and swamp forest are now very rare. Since 1995 habitat loss has continued, further compromising the ecological wealth of the District.

The Protected Natural Area Programme (PNAP) provides a significant tool to the Department of Conservation, local bodies, resource management planners, iwi, landowners, interest groups and the public at large to help conserve what remains in the Hokianga Ecological District.

Providing this information is the focus of this programme and guides us to cherish the remaining natural areas and work together in their protection and enhancement. This is the challenge.

Chris Jenkins

Conservator Northland

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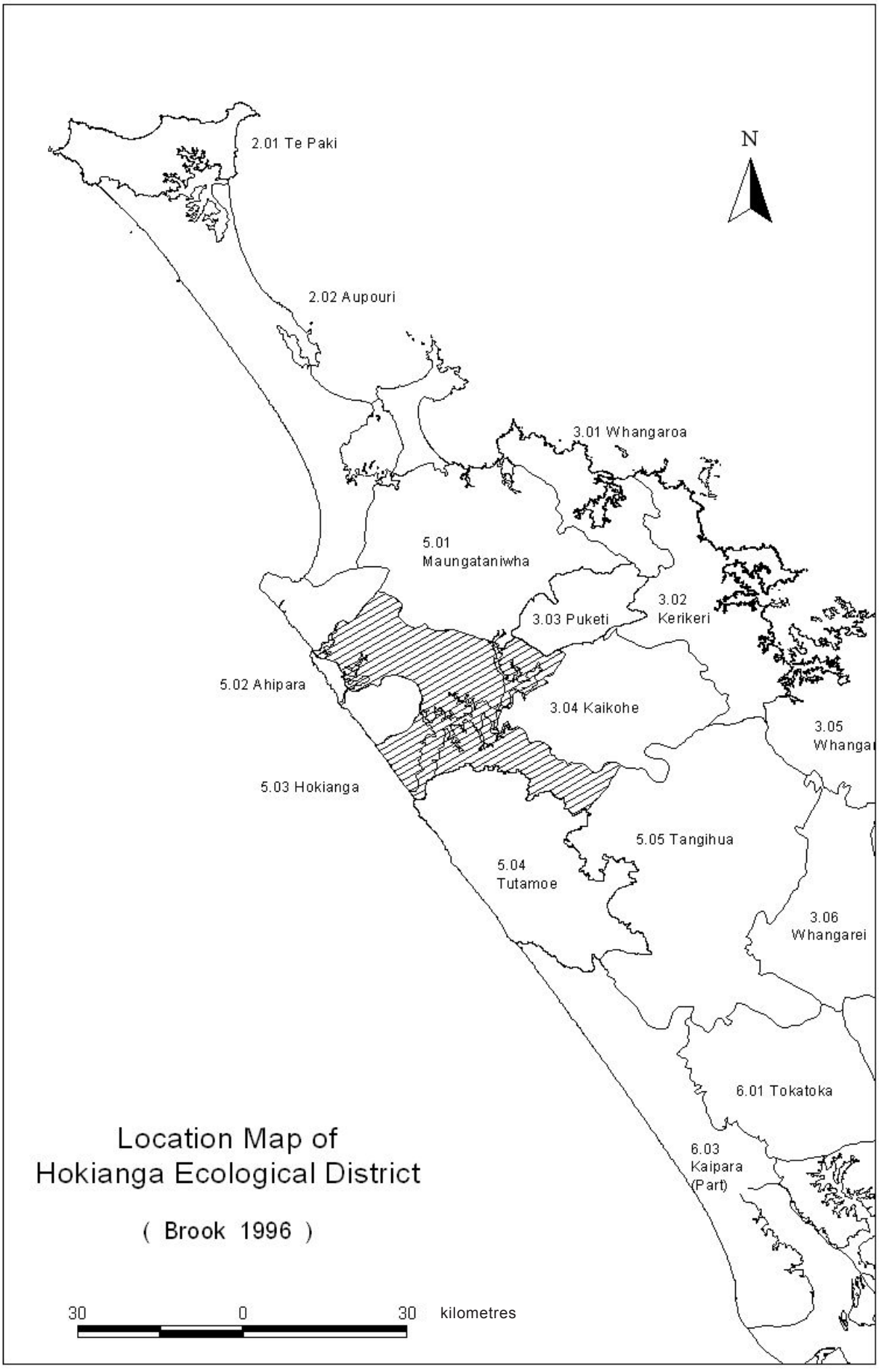
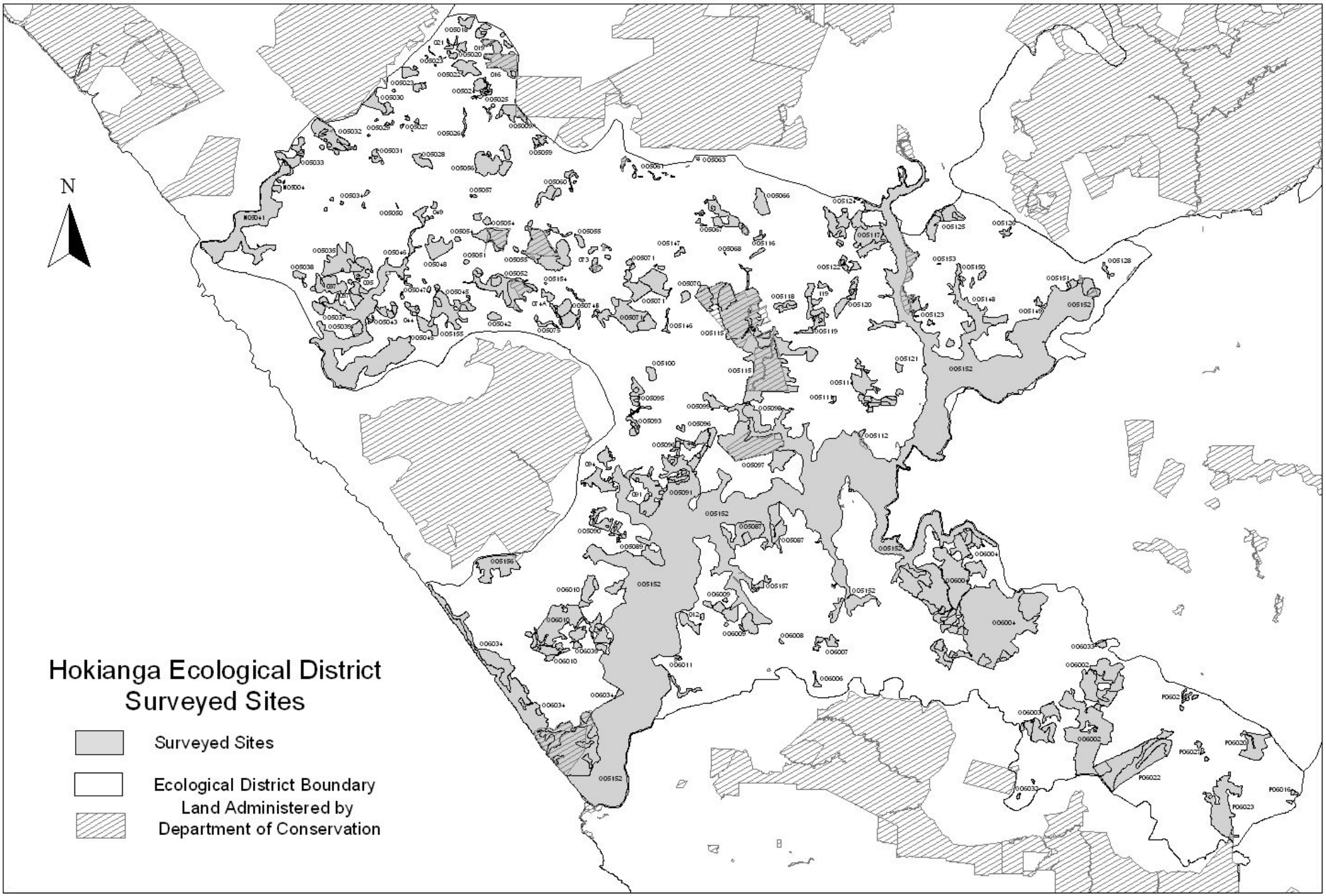


Map 1. Location map of Hokianga Ecological District.



Map 2. Map of surveyed sites, Hokianga 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 Hokianga Ecological District is centred on the Hokianga Harbour on the west coast of Northland, c. 60 km south of Kaitaia and north of the Waipoua–Waima–Mataraua large forest tract.

Natural areas of ecological significance were identified from a reconnaissance survey undertaken in 1994/95 together with information from existing databases and information systems.

Hokianga contains some large areas of forest and extensive areas of regeneration. The harbours, in particular the saltmarsh and mangrove areas which grade into freshwater wetlands, forest and shrubland sequences, and rare vegetation types such as dunelands, provide the District with its distinctiveness. Broadleaf forest and kanuka/manuka shrubland are the most common vegetation types.

A total of 125 natural areas of ecological significance were identified. Of these, 93 are considered to be of regional or national importance. In many cases the values of the remaining areas could not be fully assessed in this reconnaissance survey.

Much of the former biodiversity of the Hokianga Ecological District has been lost. The physical and legal protection of identified priority areas for protection would safeguard the remaining biodiversity of the District.

1. Introduction

1.1 THE PROTECTED NATURAL AREAS PROGRAMME

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

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

The goal of the programme is:

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

The specific aim of the PNAP is to identify by a process of field survey and evaluation, natural areas of ecological significance throughout New Zealand which are not well represented in existing protected natural areas, and to retain the greatest possible diversity of landform and vegetation patterns consistent with what was originally present. To achieve this, representative biological and landscape features that are common or extensive within an ecological district are considered for protection, as well as those features which are special or unique.

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

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

The natural areas described have been evaluated and classified 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 most PNAP reports.

This approach was adopted so that the survey report better meets the broader information requirements of the Department of Conservation arising from the Resource Management Act 1991 (RMA), the Convention on Biological Diversity (1992), and the more recent 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 by the number of sites, their size, and the emphasis on buffers and linkages in the identification and assessment of sites.

1.2 ECOLOGICAL REGIONS AND DISTRICTS

New Zealand's physical environment is very diverse and this is reflected in the diversity of indigenous plant and animal communities. In recognition of the biogeographic differences between various parts of New Zealand, a

classification of Ecological Regions and Districts has been established (McEwen 1987).

An Ecological District is a local part of New Zealand where the topographical, geological, climatic, soil and biological features, 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 phase of the PNAP survey of the Hokianga 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 (i.e. species and subspecies) of scientific interest, including information which has become available since the time of survey.

The survey was undertaken in 1994 and 1995, but since then some sites have been partially or completely destroyed, others have regenerated. As it has not been possible to re-survey or re-map any altered boundaries, the maps and descriptions apply to the sites as of the date of survey, which my differ from their current configuration.

Soil sites of international, national or regional significance are derived from Arand et al. (1993) (only one site occurs within this Ecological District, Tapuwae Forest & Outliers O05/115). Important geological sites and landforms within the Northland Region of international, national and regional significance are derived from Kenny & Hayward (1996) (two sites occur within this Ecological District, Runaruna Mud Volcano O05/154 and Hokianga North Head O06/034). See Appendix 8.4 for ranking criteria.

1.4 HOKIANGA ECOLOGICAL DISTRICT

The Hokianga Ecological District covers approximately 86,000 ha encompassing the Hokianga Harbour, Whangape and Herekino Harbours and surrounding lands. North of the harbour the boundary follows the inland edge

of the Warawara Range, taking in the coastal dune system of Hokianga North Head to Pawarenga, then follows the inland edge of the Warawara Range, and east of the coastal hills between the Whangape and Herekino Harbours. It borders the southern boundary of Herekino Forest to just south of Diggers Valley before skirting southwest of the Maungataniwha Range through Broadwood, Mangamuka and Umawera to the hill country of Rangiahua in the east. South of the Hokianga Harbour, the eastern boundary follows the Punakitere–Waima River system as far south as Three Bridges then turns west to follow the northern edge of the Waima/Mataraua Range to rejoin the harbour at Pakanae.

Hokianga adjoins six other Ecological Districts at some point: Ahipara to the northwest, Maungataniwha to the north, Puketi in the northeast, Kaikohe to the southeast, Tangihua in the far southeast, and Tutamoe to the southwest.

Of the natural areas identified, 29.5% are forest, 19% shrubland, 3% duneland, 48.6% wetlands including harbours, 0.9% excluding harbours. The total area of sites recorded in this report is 26,100 ha (including harbours), or 13,629 ha (excluding harbours).

Significant natural features in the District of particular note are:

- The large west coast harbour systems of Hokianga, Whangape and Herekino, which account for approximately 14.5% of the entire Ecological District. The Hokianga Harbour, which is the fourth largest harbour in New Zealand, and habitat for a large number of indigenous species, some of which are threatened, is especially significant.
- Possibly the rarest habitat types are the low-lying swamp forest/swamp shrubland habitats which have suffered the most from past drainage and reclamation. Since the survey began, one of the few remaining areas of this type of coastal marginal zone was partly destroyed at Rangiahua. The harbours hold some of the last remaining examples of these inherently uncommon associations which, even now, are in the process of vanishing forever.
- A 2130 hectare forest to the north of the Waima Range (Classens/Duddys Bush) is the largest contiguous area of forest in this Ecological District, performing upper catchment and water quality protection and providing habitat for threatened species such as NI brown kiwi and regionally significant plants like ongaonga or stinging nettle (*Urtica incisa*).
- Tapuwae Forest and its outliers (1174 ha) form the second largest forest remnants found within this Ecological District and contain one of the best examples of unmodified old-growth forest in Northland remaining outside of the large forest tracts.
- A strong coastal influence is evident at sites such as Motuti and Te Karaka Point Coastal Forest where pohutukawa, karaka, nikau and kowhai appear as canopy species and some uncommon coastal plants are found in the understorey.
- A raupo-dominated freshwater wetland at Lower Waihou is one of the few examples of this ecosystem type left within this Ecological District. It is a good representative example of a rare and threatened habitat as well as supporting large numbers of the nationally threatened bird, spotless crake.
- NI brown kiwi are found throughout the Ecological District, in most of the larger habitats, as well as many of the remnant forests and shrublands.

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, and have been ongoing since in southern Northland.

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 and information systems, published and unpublished reports, aerial photographs and field and aerial observations. Areas were identified irrespective of tenure. Consequently, 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 the representativeness of unprotected natural areas.

Each site recorded was mapped, allocated a generic number and described ecologically. Having evaluated the sites (see Section 2.4 below), they were grouped according to one of two levels of ecological significance. Scientific names of species for which common names have been used can be found in Appendix 8.5 (fauna) or Appendix 8.6 (flora).

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

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

2.2 CONSULTATION WITH LANDOWNERS

Personal contact with all landowners was not possible because of the magnitude and geographic range of the surveys being undertaken. 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 by the then Northland Conservancy Protection Manager with Te Rarawa at hui attended throughout the District and with Ngapuhi runanga at meetings in Kaikohe.

2.3 DATA ACQUISITION AND ANALYSIS

A rapid reconnaissance field survey was carried out to record and map the ecological and geomorphological characteristics, habitat type and canopy vegetation of each identified natural area. Most of this work was carried out from roads, foreshores or high points using telescopes and binoculars.

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 vegetation associations have not been recorded.

Natural areas were mapped using five broad categories of habitat types: forest, shrubland, wetland, duneland and estuary (see Appendix 8.7 for definitions).

At each site, the composition and relative abundance of canopy plant species were recorded on the field survey sheet (see Appendix 8.1) in the following four categories: greater than 50% cover was described 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 an appropriate method of describing forest stands. This technique and variations of it, 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 & Ellenburg 1974). The specific technique for vegetation description at each site is based on the approach described in Myers et al. (1987).

This semi-quantitative method was favoured because of the time constraints for the field survey and the extensive areas to be covered, and because it could be applied to all vegetation types, with ground cover plant species or substrate being recorded in non-forest habitats.

More detailed, and therefore more time-consuming and expensive methods, would not necessarily provide more useful information for assessing representativeness. The disadvantage of this survey approach is that it did not

provide a great deal of information on the distribution of uncommon and threatened species and understorey species.

Species present in the "abundant" and/or "common" columns of the survey sheets were used to define the dominant vegetation component of each ecological unit. Details of each site were entered into an ACCESS database, and each ecological unit recorded at that site was listed on the database. 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. 250). Ecological units recorded in the Hokianga Ecological District and protected status).

Landform and geology were identified using information from published and unpublished maps, reports and topographical maps. This information was combined with vegetation types to determine ecological units defined by particular vegetation-geomorphological characteristics, e.g. kanuka forest on hillslope, raupo reedland in swamp. Most sites contained 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 and information systems, e.g. SSBI and threatened species information, was incorporated into the site descriptions. Survey forms are held by the Department of Conservation, Northland Conservancy Office, Whangarei.

2.4 CRITERIA FOR ASSESSING HABITAT SIGNIFICANCE

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

- They are predominantly of indigenous character, by virtue of physical dominance or species composition in the canopy.
- 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. 272).

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

A level one site contains significant vegetation and/or significant habitats of indigenous fauna and is defined by the presence of one or more of the following ecological characteristics:

1. Contains 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.
2. Contains or is regularly used by indigenous or endemic taxa that are threatened, rare, or of local occurrence in Northland or in the Ecological District.
3. Contains the best representative examples in the Ecological District of a particular ecological unit or combination of ecological units.
4. Has high diversity of taxa or habitat types for the Ecological District.
5. Forms ecological buffers, linkages or corridors to other areas of significant vegetation or significant habitats of indigenous fauna.
6. Contains habitat types that are rare or threatened in the Ecological District or regionally or nationally.
7. Supports good populations of taxa which are endemic to Northland or Northland–Auckland.
8. Is important for endemic and indigenous migratory taxa.
9. Covers a large geographic area relative to other similar habitat types within the Ecological District.

Level 2 sites

A Level 2 site is a natural area that supports populations of indigenous flora and fauna not identified as meeting the criteria for Level 1. It is a site which:

- contains common indigenous species but which is not one of the best representative examples of its 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;
- **has not been surveyed sufficiently to determine whether it meets the criteria for Level 1 sites.**

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

2.5 UPDATING OF DATA

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

LINKS BETWEEN THE PNAP CRITERIA AND LEVELS 1 AND 2.

PNAP CRITERIA	LEVEL 1	LEVEL 2
Representativeness[1]	Contains the best representative examples in the Ecological District of a particular ecological unit or combination of ecological units. (3) Supports 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	Contains 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). Contains 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). Contains habitat types that are rare or threatened in the Ecological District or regionally or nationally (6). Is important for endemic and indigenous migratory taxa (8).	Does not regularly contain, or there is no currently known threatened, rare, or species of local occurrence. Contains common habitat types. No currently known special features.
Diversity and Pattern	Has a 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	Exhibits a higher level of naturalness than other examples of its type.	Exhibits a lower level of naturalness than other examples of its type.
Buffering/corridors and Linkages	Forms 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	Covers a large geographic area relative to other similar habitat types within the Ecological District. (9)	Is 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).

Human-induced activities and changes, both within or adjoining significant natural areas, can accelerate 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, thereby 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.

It should also be noted that it is close to ten years since most of the sites in this report were surveyed, and it would be expected that the majority of fern and

shrubland areas, if they still exist, would exhibit notable changes in terms of succession. Some ecological units may have altered significantly or even be replaced completely, and descriptions of vegetation height may no longer be accurate.

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

3. Ecological character

3.1 TOPOGRAPHY/GEOLOGY

The topography of the Ecological District is dominated by the large drowned valley estuarine system of the Hokianga Harbour (11,065 ha), together with the smaller Whangape Harbour (916 ha) and Herekino Harbour (490 ha) to the northwest. The surrounding areas feature moderately steep, dissected, slump-prone hill country of up to 260 m elevation. There are extensive ribbons of freshwater wetlands and alluvial flats along valleys draining into the three harbours, and a large area of sand dunes on Hokianga North Head.

Geology

Hill country is predominantly on allochthonous Cretaceous–Paleocene Mangakahia Complex sandstone and in faulted thrust-slivers of mudstone and siliceous mudstone with minor Oligocene Motatau Complex muddy limestone. Lower Miocene Otaua Group cover strata, comprising mostly sandstone and igneous conglomerate, are present north of Hokianga Harbour entrance, near Otaua, and in fault slivers near Motuti. Hokianga North Head has a cover of Pleistocene consolidated dune sands and Holocene transverse dunes (Brook 1996).

Soils

Soils of most of the Hokianga Harbour catchment are moderately to strongly leached clays, with thin topsoils. The main river valleys contain free-draining alluvial soils, but this is of limited extent. Soils on the high, steep forested hills are of volcanic and/or greywacke origin. Soils of hill country and river flats are mainly of sandstone and mudstone origin (Davis & Bellingham 1984).

3.2 CLIMATE

There is little weather information from meteorological stations within the Ecological District. Data from Kaikohe, Kerikeri Airport, or Punakitere (just outside the southeast of the Ecological District) are used for consideration of inland conditions, and from Opononi, at the boundary of the District on the

southern shores of the Hokianga Harbour and Dargaville, for similarity to areas near the harbours.

The Hokianga Ecological District has a mild, humid, and rather windy climate. Much of the District lies between sea level and 200 m elevation. Prevailing winds are from the southwest. Mean annual windspeed at Punakitere is 11 km per hour, with stronger winds likely in exposed areas.

Rainfall averages 1467 mm per annum at Opononi (low altitude coastal area), and 1766 mm per annum in Kaikohe (204 m asl). The driest months are at December–March, when 24% of the annual rainfall occurs at Opononi, and 26% at Kaikohe. November and January are the driest months at Kaikohe. Heavy rainfall occurs as a result of depressions of a tropical origin, or when northeasterly flows arise between ridges of high pressure to the east and troughs over the Tasman Sea.

Mean annual temperature data are not available from stations within the Ecological District, but the temperature varies between 14°C and 15.5°C in the central and western areas of Northland. Data from both Kaikohe (204 m asl) and Dargaville (sea level) indicate that February is the warmest month, with the mean temperature being 19°C and July is the coldest month (mean 10°C). Daily temperature variations are minor, with few extremes of temperature. Ground frosts can be frequent throughout Northland in sheltered inland areas. An average of 25 ground frosts per month have been recorded at Kerikeri and 17 at Dargaville.

Fog occurs on average 74 days per year at Umawera, 36 days at Punakitere, and 54 days at Dargaville. Thunderstorms occur on approximately 6 days per year, mostly between March and August.

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

3.3 VEGETATION

3.3.1 Historical

Prior to human settlement, most of Hokianga was forested, apart from the huge dunes on the north side of the harbour entrance and extensive wetlands on the harbour margins.

Some of the earliest European visitors noted that kauri abounded "as far as my eye could reach" (Ensign McCrea from the *Dromedary* in 1820 (Sale 1978)). A later party recorded "the lofty and luxuriant cowry grows in great profusion close to the water's edge." (Sale 1978).

In 1851, Jolliffe, surgeon on the ship *Pandora*, wrote

> *the whole of the land in this district appears exceedingly rich and everywhere shows evidences of having at no very remote period been more than thinly populated than it is at present, the native villages at present are very thinly scattered and at very considerable distances from each other, and the villages themselves are small, few containing more than a hundred inhabitants; the greater part of the low ground and the hills invariably are all most thickly covered with almost impenetrable forests of fine timber trees par-*

ticularly the "kauri" and other Pines [rimu and kahikatea]; here and there are cleared patches of land well planted by the natives with corn, potatoes, taro, onions and many other useful vegetables, the neat fences and bright green colour of the fields and gardens in these spots contrast most pleasingly with the more dusky and sombre hue of the surrounding forests. (Lee 1987)

Heavy growth of kauri grew close to the Mangamuka, Orira and Waima Rivers (Lee 1987).

Harakeke (flax) was common in the wetlands.

Today few large tracts of forest remain, representing fragmented remnants of the former extensive woodlands. Freshwater wetlands are rare. Significant areas of mangrove forest, tidal flats and coastline have also been lost or modified through stop-banking, clearance and grazing. For example, approximately 27% of the Hokianga Harbour's intertidal zone has been lost to reclamation, while the vegetated intertidal zone has been reduced by 45% (Chapman 1978).

Much of the remaining habitat in the Ecological District comprises secondary shrubland and forests on steep, dissected hillsides, uneconomical for production, but which was extensively cleared in the heyday of agricultural subsidies.

3.3.2 Broad pattern

All of the largest remaining forest tracts on the west of the Far North are in other adjoining Ecological Districts (Herekino and Raetea in Maungataniwha Ecological District, the Ahipara and Warawara Forests are in Ahipara Ecological District, Puketi–Omahuta Forest is in Puketi Ecological District and Waipoua–Waima–Mataraua forest tract in Tutamoe Ecological District). Hokianga Ecological District also adjoins Tangihua and Kaikohe Ecological Districts in the south and east.

However, the remnants remaining in the Hokianga Ecological District fulfil a collectively significant role providing 'stepping stones' or partial linkages between the large forest tracts, e.g. at Waiotehue, linkages between Herekino Forest in Ahipara Ecological District are created with Raetea Forest in the Maungataniwha Ecological District. In the Broadwood area, there are numerous sites in close proximity creating linkages from Raetea to Warawara Forest in the Ahipara Ecological District; other linkages occur from Tapuwae through Mangamuka to Puketi, and from Mataraua, east into Tangihua and Kaikohe Ecological Districts.

The Hokianga Ecological District is characterised by low, broken hill country with fragmented forest remnants and regenerating shrublands and forests; there is an apparent absence of any definitive ecological gradients in the terrestial habitats, and much of the vegetation is characterised by a mosiac of canopy species.

A feature of this District is the persistence of the emergent structure in many of the forests remaining, in comparison with that remaining in other Ecological Districts in the Far North. Research efforts over the last decade (O'Donnell & Dilks 1987; Spurr et al. 1992; Warburton et al. 1992) have clearly indicated the importance of large, old, emergent trees, especially rimu, to a variety of bird

species. Bat species show a preference for old podocarps, kauri and beech for roosts (O'Donnell 2001). As most of the forests in Northland have been heavily logged, especially for emergent podocarp and kauri, any remaining large trees assume an even greater ecological importance. Several of the sites included in this report are characterised by emergent trees, which contributes considerably to their ecological significance.

Forest remnants, especially those that have corridor and linkages between them, are very important for maintaining biodiversity, especially for invertebrate abundance and species diversity (Harris & Burns 2000). Such remnants, including regenerating vegetation, are also important for the threatened NI brown kiwi.

Characteristics of the current vegetation of the District include the more conspicuous element of kahikatea when compared to adjacent Ecological Districts, especially those in Eastern Northland, and the relative lack of kauri presence.

However, the focus of the District is the Hokianga Harbour itself, New Zealand's fourth largest harbour (see Site Report O05/152), and the associated wetlands, riparian forests and shrublands adjacent to it, which reflect a coastal influence, and are of great importance. A noticeable feature of the District is the small number of wetlands outside of the margins of the harbours.

There are also very few records of plant species that are nationally threatened or regionally significant compared to adjacent Ecological Districts. Further survey work may reveal new records.

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

3.3.3 Main vegetation types

Wetlands

This Ecological District contains three extensive harbour systems; therefore estuarine vegetation types are well represented. The ecotone between saline and freshwater wetland systems contains a diversity of estuarine communities dictated by salinity, drainage, slope, and degree of sedimentation.

In contrast to other Northland harbours, e.g. Rangaunu Harbour in the Aupouri Ecological District, beds of the saline herb glasswort are rare in harbours within the Hokianga Ecological District.

Harbours/Estuarine

SALINE WETLANDS

Mangrove shrubland and forest

This is the most common estuarine vegetation type present in all three harbours. Taller mangroves generally fringe the main channels, with lower mangroves on the landward side. Where the substrate is less muddy, a sparse ribbon of mangroves may occur along the shore.

A dense understorey of seedlings usually occurs under the taller trees, and open spaces of bare ground are frequent. Sea rush, oioi, saline herbs, saltmarsh ribbonwood, and pohuehue may occur on the landward edge.

Sea rush saltmarsh
Sea rush is mostly found in mid to lower harbour regions, where it forms monospecific swards. Clumps of oioi, and occasional mangroves occur with patches of saline herbs and pohuehue on better drained areas, usually on the landward margin.

Sea rush–mangrove association
Sea rush and lower mangroves form open associations, with frequent areas of bare ground or oioi.

Oioi–sea rush saltmarsh
A mosaic of these two species is found in upper reaches of estuaries. Isolated mangroves, raupo, manuka and saltmarsh ribbonwood occur in this habitat type.

Oioi saltmarsh
This saltmarsh vegetation type is common in the brackish upper reaches of the harbours where dense swards up to 1.5 m tall occur, with occasional scattered mangrove trees. Saltmarsh ribbonwood fringes the channels and occasional patches of raupo and sea rush are present.

Bachelor's button–*Isolepis cernua*–sea primrose–*Selliera radicans* herbfield
This vegetation type is widespread but limited in area. It is found generally near the land's edge and consists of sparse saline-tolerant herb species such as bachelor's button (common where reclamation has occurred), *Isolepis cernua*, sea primrose (the most common), and *Selliera radicans. Triglochin striata* and *Paspalum vaginatum* may also be present.

***Paspalum vaginatum* grassland**
The exotic grass *Paspalum vaginatum* forms dense swards on higher ground and beneath taller mangroves.

***Spartina alterniflora* grassland**
Dense swards up to 1 m tall of the invasive exotic grass, *Spartina alterniflora* cover tidal flats beneath mangroves in the mid-Hokianga Harbour. *S.* × *townsendii* is found locally with sea rush.

BRACKISH WETLANDS

- oioi–raupo–saltmarsh ribbonwood–sea rush associations in which *Coprosma propinqua*, manuka, and harakeke may be frequent, and are found mainly in brackish, tidal arms of rivers.
- oioi–saltmarsh ribbonwood with occasional raupo and marsh clubrush (Hautau Stream Remnant).
- raupo–sea rush (Whangape Harbour).
- harakeke–*Juncus* sp. with occasional raupo (Upper Herekino River).
- harakeke–saltmarsh ribbonwood with frequent raupo and occasional mangrove (Upper Herekino River).
- manuka–saltmarsh ribbonwood with frequent ti kouka and occasional harakeke (Upper Herekino River).

- manuka–raupo with isolated kahikatea, ti kouka, harakeke, and saltmarsh ribbonwood (Upper Herekino River).
- manuka shrubland with occasional ti kouka, saltmarsh ribbonwood, and *Hebe* (Upper Herekino River).
- harakeke–raupo–ti kouka association with saltmarsh ribbonwood (Vujcich Rd Swamp—head of Omanaia River).
- marsh clubrush sedgeland—a small amount of this type occurs along riverbanks in the upper reaches of the rivers. Small, dense stands of marsh clubrush to 2 m occur with scattered *Coprosma propinqua*, raupo, harakeke and giant umbrella sedge.

FRESHWATER WETLANDS

Swamp shrubland

- kanuka/manuka–ti kouka swamp shrubland with frequent raupo and *Juncus* species at Pahangahanga Remnant.
- *Coprosma propinqua* shrubland with occasional raupo, ti kouka, kohuhu, kahikatea, mapou, harakeke, *Hebe*, kowhai, and totara at Motuti Coastal Remnants, Oraoa Stream Saltmarsh and Hautau Stream Remnant.
- *Coprosma propinqua*–manuka–ti kouka shrubland at Hautau Stream Remnant.
- harakeke–*Coprosma propinqua*–manuka–ti kouka shrubland at Rangiahua Wetland with frequent raupo, crack willow and occasional kowhai, kahikatea, *Coprosma tenuicaulis, C. robusta* and *Carex virgata.*

Raupo reedland

Raupo is the dominant freshwater wetland type in this District. It occurs at 20 wetland sites covered in this survey. The largest and most significant raupo swamps are those occurring at the head of estuaries at Herekino, Awaroa River and Lower Waihou, and at Ninihi, Whawharu, and Tapuwae. Other areas where raupo is the sole dominant species are mostly small and occur along stream valleys.

Other raupo-dominant associations in the Ecological District include:

- Raupo is abundant and harakeke common at Oraoa Stream Saltmarsh.
- Raupo is abundant with common *Juncus* sp. at Kohe Stream Remnants and Whangape Harbour.
- Raupo is co-dominant with giant umbrella sedge at Upper Herekino River and Haumanga Rd Wetland.

OTHER WETLAND TYPES

Other wetland types that occur include:

- *Baumea articulata*–kikuyu at Motuti Coastal Remnants.
- *Baumea rubiginosa* at Motuti Coastal Remnants.

OPEN WATER

No natural lakes or ponds have been identified in this Ecological District. Six constructed ponds (O05/021, O05/050, O05/068, O05/153, O06/032 (includes two ponds) and one constructed wetland (O05/027) with native plant and animal communities were recorded.

Dunelands

The only area where this type of vegetation is found in the Ecological District is on the northern side of the Hokianga Harbour entrance at Hokianga North Head. Much of the area is open, mobile sand, but *Spinifex* occurs on the foredunes with lupin. Shore bindweed is frequent and pingao and pohuehue are also present. *Spinifex* also occurs on a sandspit at Kawehitiki Point (006/034).

Sedges such as *Isolepis* and exotic grasses such as buffalo and kikuyu grass also occur on the dunes.

Shrublands

Most of the shrubland vegetation types in the District have manuka, kanuka or both as a major component.

Manuka shrubland

Manuka dominant shrubland is the most common shrubland type, occurring throughout the District at over 30 sites. At the majority of sites, manuka is solely dominant in the canopy. Associated species include bracken, mamaku, totara, towai, ti kouka and kahikatea.

Manuka occurs as a co-dominant in the following associations:

- manuka–towai shrubland occurs at Stephens Bush, Pareokawa Bush, Tutaetohia Stream Remnant and Landcorp Paponga Remnants.
- manuka–totara shrubland occurs at Upper Uwhiroa Catchment Remnants and "137" Awaroa River Shrubland.

Kanuka and manuka shrubland

Kanuka and manuka is dominant in the canopy at over 15 sites, many north of the harbour. Ti kouka, totara and towai may be frequent and puriri and kahikatea occasional. Areas of towai–kanuka/manuka shrubland occur at Mangakotukutuku Stream Forest and Rangi Point Remnants.

Kanuka shrubland

Kanuka is dominant in the canopy mainly in the northern part of the District but at only a few sites. Towai may be frequent, and totara and mamaku may also be present in the canopy. An area of kanuka–towai shrubland also occurs in this same vicinity.

Towai shrubland associations

Towai-dominant shrubland occurs at four sites, mainly towards the boundary of Maungataniwha Ecological District.

Shrub–fern associations

Shrub–fern associations identified in the Ecological District show an association with Maungataniwha Ecological District and occur near the boundary including:

- kanuka/manuka–ring fern at Central Waiotehue Rd Bush.
- bracken–mahoe at Umawera Bush.
- mamaku–manuka at Upper Herekino River.
- manuka–bracken at Upper Mangakotukutu Stream Forest.

Coastal shrubland

Coastal shrubland is represented by five vegetation types recorded in remnants adjacent to the Hokianga Harbour including:

- kanuka/manuka shrubland at five sites.
- kanuka/manuka–towai shrubland at one site.
- kanuka shrubland at one site.
- manuka shrubland at three sites.
- manuka-totara shrubland at one site.
- In the upper reaches of the Whangape Harbour, *Coprosma propinqua*-manuka-totara is recorded at Haumanga Rd.

Forest

The Hokianga Ecological District contains a large number of forest associations.

BROADLEAF FOREST

Taraire forest

Taraire-dominant forest is the most common broadleaf forest type within the District, occurring at over 30 sites. This type is more prevalent in the north and east of the District. Frequent species within the canopy include towai, kahikatea, and totara to a lesser extent.

Taraire-dominant forest contains a range of occasional canopy species including puriri, tawa, lancewood, white maire, kowhai, titoki, hinau, pukatea, karaka, rewarewa, kohekohe, toro, mamangi, kanuka, nikau, ti kouka, mamaku, northern rata, rimu, miro, matai and kauri. Northern rata, kahikatea, rimu and kauri are also present as occasional emergents.

Taraire–towai forest

Taraire and towai co-dominant forest occurs at 20 sites, mainly in the northern area of the District and is the second most common broadleaf forest type in the District. Kahikatea, totara, puriri and northern rata are the most common species found frequently within the canopy and a range of other canopy species occur occasionally.

Towai forest

Towai forest occurs at 9 sites, many of which reflect previous disturbance, and all but one are north of the Hokianga Harbour. The undisturbed sites tend to have a greater diversity of canopy trees and occasional emergents. Associated species are primarily manuka, kanuka, totara and puriri.

An unusual association occurs at Hokianga North Head where co-dominant kanuka/manuka and towai occur on sand. Pohutukawa is frequent and tanekaha and kauri occasional at this site.

Puriri–taraire forest

Co-dominant puriri and taraire forest occurs at five sites. Kahikatea, karaka and kohekohe are frequent species in the canopy with occasional emergent podocarps and northern rata.

Kanuka and manuka forest

Kanuka/manuka forest is dominant at 6 sites, kanuka alone at four, manuka alone at four and kanuka is co-dominant with towai at two sites. All kanuka/manuka and kanuka forest sites occur north of the Hokianga Harbour, with only one of manuka-dominant sites occurring south of the harbour.

Other broadleaf forest types

Other broadleaf forest types include:

- nikau–puriri–towai forest at Tapuwae Forest & Outliers.
- swamp maire forest at Waoku Coach Rd Wetlands.
- northern rata–taraire forest at Upper Uwhiroa Catchment Remnants, at the Ahipara/Maungataniwha Ecological District boundary and has similarities to both these Districts.
- pukatea–taraire–towai forest at Northern Mataraua Forest and Waiwhakaruku Bush.

PODOCARP FOREST

Kahikatea forest

Kahikatea forest occurs as a sole dominant vegetation type at 16 sites. Old-growth kahikatea forest occurs at Upokowhawha Forest Remnant, representing one of only a few unlogged pockets of this forest type in the District. Most of the examples comprise secondary forest. Within this forest type, pukatea and totara can be frequent in the canopy and a range of occasional species including rimu, rewarewa, titoki, puriri, and ti kouka.

Four sites occur on alluvial terraces, all in the southeast of the District. Totara and rimu are frequent and a range of other species occasional.

Kahikatea–totara forest

Kahikatea and totara are co-dominant at 11 sites. Vigorous regeneration of this forest type occurs on the north side of the harbour.

Totara forest

Totara forest occurs at six sites and all are secondary regrowth.

Rimu forest

A small area of secondary rimu-dominant forest occurs at Motuti, and at Rotokakahi, two unusual co-dominant associations occur with a range of broadleaf species.

BROADLEAF–PODOCARP FOREST

Kahikatea-taraire forest

Kahikatea and taraire forest is the most common broadleaf-podocarp forest in the District occurring at seven sites.

Other co-dominant associations

Kahikatea is co-dominant with a range of broadleaf canopy species including:

- kahikatea–nikau–puriri–taraire forest at Upokowhawha Forest Remnant.
- kahikatea–puriri forest at Pearce Block Remnants.
- kahikatea–ti kouka forest at Whawharu Swamp, Lower Waihou Swamp & Shrubland, and Waoku Coach Rd Wetlands.

- kahikatea–tanekaha forest at Wheoki Stream/Pukemaire Remnants.

A wide range of other co-dominant associations occur (see Coastal Forest below) primarily involving taraire, totara, kahikatea, puriri, and towai.

Regenerating forest with kanuka/manuka and a podocarp species co-dominant in the canopy occurs at various sites including:

- kanuka/manuka–kahikatea forest at Motuti Coastal Remnants.
- kanuka/manuka–tanekaha–totara forest at Maungapohatu Bush, Pukekohe Stream Bush and Paponga–Mata Rd Association.
- kanuka–rimu forest at Pukemiro Remnants.
- manuka–kahikatea forest at Otawhiti Bush.

Numerous other combinations of secondary manuka, kanuka, kahikatea and totara forest occur (see Table 2, page 250). In general, these combinations occur over small or fragmented areas and reflect a history of vegetation disturbance. Although the extent of some of these ecological units is small, collectively, they are important reservoirs of podocarp forest (many are found in Level 2 sites), with considerable potential for restoration and enhancement.

Tanekaha occurs as a co-dominant species in other broadleaf-podocarp forest types including:

- kanuka/manuka–tanekaha–totara forest at Maungapohatu Bush and Mata Rd Intersection Remnant.
- tanekaha–kanuka/manuka–totara forest at Te Konoke Bush.
- tanekaha–taraire–towai forest at Matawera Rd Bush.
- tanekaha–taraire–totara forest at Mata Rd Intersection Remnant.
- taraire–tanekaha forest at Wheoki Stream/Pukemaire Remnants.
- tanekaha–totara forest at Blue Mountain Rd Bush.
- kanuka/manuka–tanekaha–towai forest at Tapuwae Scenic Reserve and Te Karae Station Remnants.
- manuka–tanekaha forest at Opara Rd QEII Remnant (also coastal).

Tanekaha also occurs as a co-dominant in some coastal forest types (see below).

Kauri forest associations

The Hokianga Ecological District contains very few sites in which kauri is abundant or common in the canopy.

Those represented are restricted to broadleaf–kauri forest types which have only been recorded once including:

- kauri–rewarewa–taraire forest with frequent kahikatea at Taumatawhauwhau Forest Outlier representing a very unusual forest association.
- kanuka/manuka–kauri forest at Waiotehue Reserve.
- manuka–kauri forest at Te Hurunga Forest.
- manuka–kauri–mamangi coastal forest at Wheoki Stream/Pukemaire Remnants.

COASTAL FOREST

Coastal forest occurs at Hokianga North Head and as remnants adjacent to the Hokianga Harbour including:

- pohutukawa forest at Hokianga North Head Coastal Associations.
- nikau–taraire forest at Motuti Coastal Remnants.
- kanuka/manuka–tanekaha–totara forest at Te Karaka Point Coastal Forest, Motukaraka Remnant and Hautau Stream Remnant.
- puriri–totara forest at Orira River Remnant.
- kahikatea–tanekaha forest at Wheoki Stream/Pukemaire Remnants.
- mamaku–nikau–ti kouka forest at Wheoki Stream/Pukemaire Remnants.
- kanuka/manuka–puriri forest at Herekino River South Remnants and Rawhia Forest Remnants.

Kowhai is common or frequent at seven coastal sites, all of which contain different assemblages of species. They include:

- manuka shrubland with frequent kowhai at Rotowhenua River Shrubland.
- kanuka/manuka forest with frequent totara, kahikatea, kowhai and occasional puriri, kohuhu, kauri and pohutukawa at Te Karaka Point Coastal Forest.
- kanuka/manuka–kowhai–mamangi forest with frequent karaka and pohutukawa at Te Karaka Point Coastal Forest.
- karaka–kohekohe–kowhai–puriri forest at Hokianga North Head Coastal Associations.
- kowhai–puriri–taraire forest with frequent tawa, kahikatea, kohekohe, totara, and kanuka and occasional titoki, northern rata, nikau, karaka, rewarewa, and pukatea at Panguru/Pukepoto Shrublands.
- kahikatea–kowhai–manuka-puriri forest with frequent titoki and ti kouka and occasional rewarewa, pukatea, karaka, kauri, taraire, nikau and totara at Wheoki Stream/Pukemaire Remnants.
- kahikatea–kowhai–puriri forest with frequent kanuka and occasional rewarewa at Tapuwae Scenic Reserve.

3.3.4 Species of botanical interest

There is very little recent information about specific botanical values in the Hokianga Ecological District. This probably reflects the limited survey work done in this area as well as the extensive loss of biodiversity, and possibly the physical homogeneity of western Northland hill country.

The Hokianga Ecological District was a popular collecting area of the early New Zealand botanists. Indeed, several specimens collected from the Hokianga by Alan and Richard Cunningham early in the 19th century were used to describe and name the plant species making these collection points the 'type localities'. These plants include the Northland endemic *Ackama rosifolia* (makamaka), *Alseuosmia macrophylla*, and the dune species *Pimelea arenaria*, and *Coprosma acerosa*.

Pseudowintera axillaris (horopito) and *Ranunculus rivularis* were collected by Alan Cunningham in 1826 on the banks of both Kawakawa and Hokianga Rivers (Cunningham 1838). Today horopito only occurs sparsely in Northland mostly at higher altitudes.

Notable plants include kawaka and wharangi, which have a local but widespread distribution in Northland. In this Ecological District these species are uncommon.

3.3.5 Threatened plant species

(See Appendix 8.3 for Categories of threat)

Of the plant species listed in the New Zealand Threat Classification System lists (Hitchmough 2002) 10 have been recorded in this Ecological District. However, four of these have not been recorded recently and are likely to have disappeared from the District. This could reflect the extent of modification of natural areas, or simply the limited botanical surveying which has occurred.

***Mazus novaezeelandiae* subsp. *impolitus* f. *impolitus* – Serious Decline**

A perennial creeping herb found in New Zealand from near Cape Maria van Diemen (Te Paki Ecological District) south to Dunedin. Grows mainly in coastal sites, particularly damp hollows and sand flats. In 2000, plants were found in this Ecological District by K. Riddell/N. Syddall at Wairoa Stream, Hokianga North Head (Threatened Plants Database). Previously recorded by Mason (1949) from Te Waihopai Stream.

***Desmoschoenus spiralis* – Gradual Decline**

An increasingly uncommon sand binder, forming colonies on less stable sand dunes throughout New Zealand. Recorded from Hokianga North Head and Hokianga Harbour in this Ecological District.

***Eleocharis neozelandica* – Gradual Decline**

A sedge that grows on sandy margins of dune lakes and tidal creeks and damp sandy areas. Forms distinctive dark patches, often on sand flats at stream exits on open beaches. In Northland found north of Hokianga Harbour at Mitimiti, Ahipara, Aupouri Peninsula, and Te Paki and also at Pouto Peninsula. Pouto Peninsula is the stronghold.

***Pimelea arenaria* – Gradual Decline**

Known as sand daphne. A low spreading silky-leaved shrub found growing on coastal dunes and hollows. Relatively widespread in parts north of Auckland (Given 1981). However, decreasing in other parts of New Zealand and perhaps extinct in the Canterbury/Westland region (Wilson & Galloway 1993). The northern populations differ from southern plants. Recorded by K. Riddell from Hokianga North Head in 1999 (Threatened Plants Database).

***Korthalsella salicornioides* – Sparse**

A distinctive hemi-parasitic herb usually found on manuka and kanuka in Northland. Endemic to North and South Islands, it is found in several localities in Northland where it may be locally common. Often found on saltmarsh edges. In this District recorded from Motuti Coastal Remnants and the Hokianga Harbour.

***Pittosporum virgatum* – Sparse**

Confined to scattered locations in Coromandel and Northland, this species has a distinct juvenile form in which leaves and branchlets are densely hairy and the leaves diverse in form, often lobed. Plants may flower while still in the semi-

juvenile stage (Allan 1961). Found at Maungakotukutuku, Pearce Block Remnants (1986) and Rawene (1987, one plant seen) (Threatened Plants Database).

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

***Sebaea ovata* – Nationally Critical**

A short-lived, small herb which only lives 8–10 weeks over summer. Now probably extinct in Northland. In this District it was previously recorded by Richard Cunningham in 1834 from 'bogs at Mangamuka' (Threatened Plants Database). Now only occurs in Wanganui dune hollows, although recently translocated (2002) to Pouto Peninsula (Kaipara Ecological District).

***Colensoa physaloides* – Gradual Decline**

A distinctive sprawling leafy shrub-like herb with hydrangea-like foliage and large blue and white flowers hanging in bunches and blue berries. It is a monotypic genus endemic to Northland, including some of its offshore islands. It is found scattered throughout forest areas, generally beside streams and tracksides and on talus slopes. Being vulnerable to browsing, it is not usually seen where feral goats or stock are present.

Last recorded in the Ecological District in 1977 beside a stream alongside the Herekino Harbour.

***Peperomia tetraphylla* – Sparse**

A spreading succulent herb also found in Australia and Polynesia. It is scarce in Northland, where it is usually known as an epiphyte. This species was recorded in 1987 from Rawene epiphytic on taraire (Threatened Plants Database), however, it is no longer present at this site (P.J. de Lange pers. comm.).

3.3.7 Regionally significant plant species

Australina pusila

A creeping herb with a very local distribution in Northland. Recorded from Reena Bush in this Ecological District.

Coprosma parviflora

Coprosma parviflora is endemic to Northland and is a distinctive shrub with branches lying on a flat plain. It is more common in Eastern Northland, but less so elsewhere. Recorded at Awaroa River Rd Remnant in this Ecological District.

Ileostylus micranthus

Also known as the green mistletoe, this species is a hanging hemi-parasitic shrub, which is attached to a host by a ball-like mass with twiggy suckers lying along host branches. Plants in Northland are recognised by their trailing lantern shape, with hosts including totara (often on fertile flats), *Coprosma* (especially *C. propinqua* in saltmarshes) and occasionally manuka, though many other hosts are known. Flowers are yellow-green, with plants producing masses of yellow fruit which are extremely sticky and are spread by birds. A common mistletoe throughout New Zealand but only locally common in Northland, where it is known to have declined. Also found on Norfolk Island. Known from

three sites within this District including a large population which was recently discovered at Rangiahua in the upper reaches of the Hokianga Harbour.

Ixerba brexioides tawari
Widespread in the central North Island, this tree is uncommon in Northland, where it is generally only found in higher altitude and wetter sites. Recorded in this District from Te Karae Station Remnants.

Loxsoma cunninghamii
An endemic fern known from East Cape to Kaitaia, and found in this District at Mangakotukutuku Stream Forest.

Nestegis cunninghamii black maire
An uncommon tree in Northland, found at Motuti and an isolated tree in the Umawera/Rangiahua area.

Olearia albida
A small coastal tree of local distribution; very similar to *O. angulata*. Recorded from Mangonuiowae Bush and Stephen's Bush in this District.

O. solandri
A coastal shrub found throughout the North Island with a restricted distribution in Northland, where it is only found in the Kaipara and Hokianga regions. In this District recorded from Motuti and Tapuwae.

Urtica incisa
Small nettle found throughout New Zealand but with a restricted distribution in Northland. Recorded in this District from Classens/Duddys Bush.

3.4 FAUNA

Information on fauna in this report has been compiled from SSWI (Sites of Special Wildlife Interest) and SSBI information systems, from Davis & Bellingham (1984), and from field observations during this survey. The conservation status of individual species is derived from Hitchmough (2002). 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, including snails and lizards, 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.

Most of the common bird species of Northland, both indigenous and introduced, are to be found in the Ecological District.

Migrants to the harbours include royal spoonbill (Hokianga Harbour), SI pied oystercatcher (Hokianga Harbour), banded dotterel (Hokianga and Whangape

Harbours), pied stilt (Hokianga Harbour), lesser knot (Hokianga and Herekino Harbours), and bar-tailed godwit (Hokianga and Herekino Harbours).

A checklist of fauna recorded in this Ecological District is included in Appendix 8.5.

3.4.1 Threatened bird species

The Hokianga Harbour supports a large diversity of aquatic bird species, in particular good numbers of New Zealand waders, shags, ducks, gulls, and terns (Ogle 1982).

NATIONALLY CRITICAL

White heron *Egretta alba modesta*
Indigenous

Recorded in this District as an occasional visitor to the Hokianga Harbour. Recently recorded from the Waima River arm of the Hokianga Harbour in 2002 (R. J. Pierce pers. comm.).

NATIONALLY ENDANGERED

Australasian bittern *Botaurus poiciloptilus*
Indigenous

Recorded mainly from coastal wetlands at Whangape, Hokianga, and Herekino Harbours, although thought to be present in some other wetlands also. Davis & Bellingham's 1984 Hokianga Harbour study observed 42 bitterns on the harbour in mostly saline marshes and less commonly brackish marshes. Bittern also frequent mangroves and freshwater wetlands.

Brown teal *Anas chlorotis*
Endemic

Brown teal or pateke were formerly recorded from marshy upper areas around the Hokianga Harbour. There have been unconfirmed reports of brown teal from Waima since 2000 (R.J. Pierce pers. comm.).

Reef heron *Egretta s. sacra*
Indigenous

Reef herons have a scattered distribution around the rocky coastlines of New Zealand, with their decline attributed to increased human disturbance on the coast (Heather & Robertson 1996). Found in the Hokianga Harbour and coastline in this Ecological District.

NATIONALLY VULNERABLE

Caspian tern *Sterna caspia*
Indigenous

Found in the Herekino and Hokianga Harbours and coastline. Non-breeding visitors, fishing well up the harbours.

SERIOUS DECLINE

Grey duck *Anas s. superciliosa*
Indigenous

Recorded within the Hokianga Harbour and nearby wetlands in this Ecological District, the grey duck is threatened due to loss of habitat, hunting, competition and hybridisation with the mallard (Heather & Robertson 2000).

NI brown kiwi *Apteryx australis mantelli*
Endemic

Although reduced from former numbers due to habitat loss, predation by dogs, small predators and possibly pigs, NI brown kiwi are found throughout the District. Shrubland and regenerating forest areas are as important habitat as the mature forests. Many of the kiwi records in this District have come from Wendy Sporle (Kiwi Advocate) as a result of her advocacy role in the area over the last 6–10 years. Based on existing information, numbers of NI brown kiwi have heavily declined in the District, with only very few sites supporting moderate to high kiwi densities (R.J. Pierce pers. comm. 2003).

GRADUAL DECLINE

Banded dotterel *Charadrius b. bicinctus*
Endemic

Found in small numbers on west coast beaches and at Hokianga and Whangape Harbour.

Kukupa *Hemiphaga novaeseelandiae*
Endemic

Over recent years the population of kukupa has been severely depleted in this District from the combined effects of predation, competition, and heavy poaching. Found throughout the District.

Northern little blue penguin *Eudyptula minor iredalei*
Present in Hokianga Harbour and possibly other harbours; also along the coast. Breeding reported.

White-fronted tern *Sterna striata*
Indigenous

The most common tern around the New Zealand coast, white-fronted tern favour coastal waters and harbours. Recorded from the Hokianga Harbour in this Ecological District.

SPARSE

Banded rail *Rallus philippensis assimilis*
Indigenous

A species which was once widespread. Northland is its national stronghold.

Found mainly in saline marshes adjoining the Herekino and Hokianga Harbours (in high numbers).

Black shag ***Phalacrocorax carbo novaehollandiae***
Indigenous

The second most common shag in the Hokianga Harbour, mainly found up sheltered arms (Davis & Bellingham 1984).

Little black shag ***Phalocrocorax sulcirostris***
Indigenous

Frequents Hokianga Harbour and probably Whangape and Herekino Harbours. Less commonly encountered than pied and little shags.

Pied shag ***Phalacrocorax v. varius***
Indigenous

Recorded from Hokianga Harbour and Paponga Pond. In 1984, pied shag were the most common shag in the Hokianga Harbour (Davis & Bellingham 1984).

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

There are only a handful of records of marsh crake in Northland (P. Anderson pers. comm.). In this District recorded from coastal wetlands in the Mangamuka, Waihou, and unconfirmed records from Orira areas.

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

Found mainly in wetlands (brackish marshes) and shrubland adjoining the Hokianga (high numbers) and Herekino Harbours.

Northern NZ dotterel ***Charadrius obscurus aquilonius***
Endemic

Found in small numbers on west coast beaches, Herekino Harbour and sandy beaches on the north side of the Hokianga Harbour. Northern NZ dotterel are highly susceptible to disturbance by people and dogs during summer breeding periods.

NZ dabchick ***Poliocephalus rufopectus***
Endemic

Recorded only from wetlands at Classens/Duddys Bush in this Ecological District.

Spotless crake ***Porzona tabuensis plumbea***
A species with restricted distribution, confined on the mainland largely to raupo swamps. In this District found mainly in wetlands adjoining the Hokianga and Herekino Harbours, but also in some other wetlands. Hokianga Harbour is one of only a few sites in New Zealand where the three swamp rails all occur.

COLONISER

Royal spoonbill ***Platalea regia***
Indigenous

Recorded from the Waima River arm of the Hokianga Harbour in 2002 (R.J. Pierce pers. comm. 2002).

3.4.2 Regionally significant bird species

NI tomtit *Petroica macrocephala toitoi*
Endemic

Populations have been restricted by habitat fragmentation generally to large mature forested areas. In this District recorded from Classens/Duddys Bush, Tongaroa Stream Remnant (margin of Herekino Forest) and Te Karaka Point Coastal Forest.

Variable oystercatcher *Haematopus unicolor*
Endemic

Found in small numbers along the western coastline and around the Herekino and Hokianga Harbours. Variable oystercatchers are susceptible to disturbance during the summer nesting period.

3.4.3 Threatened mammal species

Northern short-tailed bat (*Mystacina tuberculata aupourica,* Endemic - Nationally Endangered) and long-tailed bat (*Chalinolobus tuberculata*, Endemic - Nationally Vulnerable) are known from three adjoining Ecological Districts (Puketi, Tutamoe, and Ahipara) and may be present within the Hokianga Ecological District. Survey is needed.

3.4.4 Threatened invertebrate species

Northland tusked weta *Hemiandrus monstrosus*
Endemic Sparse

Northland tusked weta are found in the Paponga–Mata and Kohukohu areas in this Ecological District.

3.4.5 Threatened snail species

Kauri snail *Paryphanta busbyi*
Endemic Gradual Decline

The kauri snail is endemic to Northland and North Auckland region and is found throughout this Ecological District. Habitat loss/modification and heavy predation by animal pests continue to impact on kauri snail populations.

Phrixgnathus murdochi
Endemic Nationally Endangered

This snail is endemic to Northland and is recorded from only two locations; Rawene (in this District) and Waima (Tutamoe Ecological District). There are no recent records of this species (last recorded a few decades back), and therefore survey is required to determine its current distribution and abundance.

Punctidae sp. 30 (referred to in Brook 2002 as Puncidae sp. 155)
Endemic Data Deficient

This snail is endemic to western Northland, found only at Panguru. Further survey work is required to establish the abundance and distribution of this species.

3.4.6 Threatened lizard species

Pacific gecko *Hoplodactylus pacificus*
Endemic Gradual Decline

A strictly nocturnal gecko, recorded from Waihou River in this Ecological District.

Northland green gecko *Naultinus grayii*
Endemic Gradual Decline

An arboreal lizard endemic to Northland, recorded from only one site in this Ecological District near Rangi Point Remnants in North Hokianga Harbour. This is the southern limit for this gecko in New Zealand (P. Anderson pers. comm.).

Auckland green gecko *Naultinus e. elegans*
Endemic Gradual Decline

There are unconfirmed reports of this gecko from southern Hokianga, which is close to the northern limit in New Zealand for this species (P. Anderson pers. comm.).

3.4.7 Threatened and regionally signficant fish species

Long-finned eel *Anguilla dieffenbachii*
Endemic Gradual Decline

Long-finned eels are found throughout New Zealand, and are threatened by harvest and habitat modification.

Short-jawed kokopu *Galaxias postvectis*
Endemic Gradual Decline

Short-jawed kokopu occurs in some surrounding Ecological Districts (Ahipara, Maungataniwha, Tutamoe, and Puketi) and, as a migratory species, must pass through the Hokianga Ecological District waterways during different lifecycle stages.

Banded kokopu *Galaxias fasciatus*
Endemic Regionally significant species

Occurs throughout Northland, although there is only one record of banded kokopu in this Ecological District (Classens/Duddys Bush).

Giant bully *Gobiomorphus gobioides*
Endemic Regionally significant species

Intermittent distribution around the New Zealand coast and Northland appears to be the stronghold for this species. Recent records in this District are from Pakirikiri Stream in 2001 and Whakarapa Stream in 2000.

3.7 THREATS

The clearance of land for agriculture has resulted in considerable loss of biodiversity. The fragmented nature of surviving habitats has made them vulnerable to stock and weed invasion. Pest plant species such as Mexican devil are found in almost all forest and shrubland areas. Kahili ginger, pampas and lantana are also widespread in the District and the roadsides are particularly infested with a wide range of weed species.

Spartina, an aggressively invasive estuarine grass, is a major threat to the Hokianga Harbour, with extensive infestations at the Wairere, Tapuwae, and Waima River mouths. This plant traps sediments and is replacing indigenous saltmarsh species as well as impeding mangrove regeneration.

In the forest and shrubland areas, livestock, possums, goats, and pigs constitute the main threats to habitat. However, uncontrolled dogs are posing a serious threat to ground-dwelling species, particularly kiwi. Increased settlement brings more domestic animals, e.g. dogs and cats which pose increased problems in these areas (Pierce & Sporle 1998).

Mustelids, and also rodents, are significant predators of bird species. The effect of ferrets as they increase in numbers in the District is a cause for concern due to the impact they are known to have on adult kiwi, whereas stoats kill only juvenile kiwi. (A list of introduced mammals is produced in Appendix 8.5).

Over recent years the population of kukupa in the Far North has been severely depleted, with heavy poaching pressure considered a significant factor, together with predation from rats, possums, and stoats and competition (Pierce & Graham 1995). Although no specific studies have been undertaken in Hokianga Ecological District, it is likely that the findings of Pierce & Graham apply here too.

Habitats on margins or in successional stages are under considerable pressure from deforestation, with several surveyed areas having been cleared since reconnaissance was undertaken. Most of these areas were known kiwi habitat. Regenerating areas are also threatened by the invasion of exotic species, such as gorse, tobacco weed, and pampas.

Coastal vegetation in the District has been greatly diminished, largely by pastoral development. However, if all remaining coastal habitats are protected now, many of the original coastal vegetation types would still be represented.

The physical and/or legal protection of priority areas for protection will go a long way towards safeguarding the habitats/biodiversity of the Ecological District. Additional management will be needed to ensure long-term viability of natural habitats and species populations.

5. Summary and conclusions

5.1 ANALYSIS OF EXISTING PROTECTED AREAS

The Protected Natural Areas network in the Hokianga Ecological District, which includes the three harbours, is summarised in Table 1.

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

Key: QEII = Queen Elizabeth National Trust Covenant; CC = Conservation Covenant; SL = Stewardship Land; SR = Scenic Reserve; GP = Government Purpose Reserve; RR=Recreation Reserve; MS = Marginal Strip

Site	Survey no.	Status							Total area protected	Total site area
		CC	SL	SR	GP	RR	MS	QEII		
Eaton Rd Bush	O05/009A	15							15	67
Mangakotukutuku Stream Forest	O05/016	94							94	155
Waiotehue Reserve	O05/019		11						11	12
Pearce Block Remnants	O05/020	13.8							13.8	41
Wiseman Block	O05/022	31.4							31.4	61
Upper Uwhiroa Catchment Remnants	O05/023							54	54	54
Otaneroa Scenic Reserve	O05/025			2					2	10
Waiotehue Stream Bush	O05/026						4		4	11
Dysart/Powell Rd Bush	O05/032		1						1	144
Upper Herekino River	O05/033						2		2	81
Rotokakahi River & Surrounds	O05/052			47					47	250
Pareokawa Bush	O05/054			69					69	132
Mangonuiowae Bush	O05/055		1		123				124	322
Broadwood Riparian Remnants	O05/061			7			2		9	25
Mansbridge Scenic Reserve	O05/063			1					1	1
Landcorp Paponga Remnants	O05/067		9						9	119
Runaruna Scenic Reserve	O05/073			8					8	44
Wharekauere Bush Remnants	O05/087						1		1	265
Tapuwae Scenic Reserve	O05/097			208					208	406
Tapuwae Forest & Outliers	O05/115		507	305					812	1174
Te Tio Rd Bush	O05/123		1					3.8	4.8	40.5
Rawhia Remnants	O05/149						2		2	18
Hautau Stream Remnant	O05/151		2						2	55
Hokianga Harbour	O05/152		114				35		149	11065
Reena Bush	O05/156	3							3	165
Opara Rd QEII Remnant	O05/157							10	10	19
Waoku Rd Bush	O06/003						2		2	175
Koutu Shrubland	O06/011					1			1	5
Hokianga North Head Coastal Associations	O06/034		415				69		484	1155
Rangi Point Remnants	O06/035		1						1	99
Taumatawhauwhau Forest Outlier	P06/023	5							5	262
TOTAL		117	1062	647	123	1	117	67.8	2180	16432.5

Approximately 8.3 % of the natural areas of the Hokianga Ecological District are formally protected which is equivalent to about 2.5 % of the total area of the Ecological District. Excluding the three harbours, approximately 15.6 % of the natural areas of the Hokianga Ecological District are formally protected (2.9% of total District).

A list of ecological units recorded in the Hokianga Ecological District and their current protection status is set out in Table 2 (page 250) and a summary of the site evaluations is given in Table 3 (page 272).

Ecological units protected

Freshwater wetlands

Only a very small area of freshwater wetlands is protected in this Ecological District:

- Wiseman Block (O05/022) – raupo reedland – approximately 0.5 ha.
- Hautau Stream Remnant (O05/151) – *Coprosma propinqua* swamp shrubland – 2 ha.
- Upper Herekino River (O05/033) – estuarine/freshwater wetlands – 2 ha.

Estuarine

One of the most significant areas in the Ecological District (and Northland) is the Hokianga Harbour (O05/152); 149 ha are protected, most of which is saltmarsh, with an estimated 10% being mangroves.

This equates to only 2.3% of the exposed intertidal area, and assuming the majority of the protected area is vegetated, just 5% of the vegetated area. Combined with the fact that much of the vegetated harbour margin is grazed, this entire habitat type is very much under-represented in the protected areas network.

In the Herekino Harbour (N05/041) only 2 ha of marginal strip protects values in an 81 ha site. No intertidal areas are protected in Whangape Harbour (O05/143).

Coastal

The total area protected is 263.8 ha or about 9% of the remaining coastal habitats, most of which lies within Tapuwae Scenic Reserve (O05/097) (208 ha of mostly (at least 98%) secondary coastal forest). This is less than 2% of the remaining terrestrial habitat in the Ecological District. The other coastal vegetation types protected include:

- Te Tio Rd Bush (O05/123) – puriri-tanekaha-taraire-totara coastal forest, kanuka forest (4.8 ha).
- Rawhia Remnants (O05/149) – kanuka/manuka coastal forest (2 ha).
- Opara Rd QEII Remnant (O05/157) – manuka-tanekaha coastal forest (10 ha).
- Koutu Shrubland (O06/011) – manuka shrubland (1 ha).
- Wharekauere Bush Remnants (O05/087) – manuka shrubland (1 ha).
- Hokianga North Head Coastal Associations (O06/034) – pohutukawa forest, kanuka/manuka-towai forest and karaka-kohekohe-kowhai-puriri forest (37 ha).
- Rangi Point Remnants (O06/035) – kanuka/manuka shrubland (1 ha).

TABLE OF COASTAL SITES

SITE NAME	SITE NO.	AREA OF SITE (ha)
Rotowhenua River Shrubland	O05/037A	5
Kohe Stream Remnants	O05/046	21
Wharekauere Bush Remnants	O05/087	265
Te Karaka Point Coastal Forest	O05/089	60
Motuti Coastal Remnants	O05/091	203
Panguru/Pukepoto Shrublands	O05/094	125
Tapuwae Scenic Reserve	O05/097	406
Tapuwae River Bush	O05/098	78
Motukaraka Remnant	O05/112	7
Te Tio Rd Bush	O05/123	36
Orira River Remnants	O05/148	68
Hautau Stream Remnant	O05/151	56
Opara Rd QEII Remnant	O05/157	20.7
Wheoki Stream/Pukemaire Remnants	O06/009	135
Hokianga North Head Coastal Associations	O06/034	1155
Rangi Point Remnants	O06/035	99
Herekino River South Remnants	N05/004	16
Rawhia Remnants	O05/149	38
Otawhiti Bush	O06/012	46
TOTAL		2839.7

Coastal dunes

41% of the Hokianga North Head site (O06/034) is protected including 37 ha of forest. However this does not include the faces visible from the south side of the Hokianga Harbour.

Forest and shrubland

1501.8 ha is protected, including coastal forest. This equates to 1.75% of the total District or 11% of the sites (excluding harbours). Of this, 1020 ha (68%) of the protected forest and shrubland occurs in two sites, Tapuwae Scenic Reserve (O05/097) and Tapuwae Forest & Outliers (O05/115). Tapuwae Scenic Reserve protects 208 ha of mostly (at least 98%) secondary coastal forest and Tapuwae Forest & Outliers contains 812 ha of protected lands (69 %of the site), including old-growth taraire–towai forest, secondary kanuka/manuka–totara forest, and some secondary podocarp forest (kahikatea–totara).

As can be seen from Table 1A (page 247), the majority of vegetation types protected include taraire and towai–taraire forest, secondary kanuka/manuka, totara and towai forest, and kanuka/manuka shrubland, in other words, the most common vegetation types. It is estimated that about 14% of the protected forest and shrubland is secondary podocarp forest, but this figure has not been verified.

TABLE 1A. SUMMARY OF VEGETATION TYPES PROTECTED IN HOKIANGA ECOLOGICAL DISTRICT (areas in ha).

Site	Vegetation protected	Total area protected	Total site area	Estimated area of podocarp forest
Eaton Rd Bush O05/009A	Taraire–towai forest, fernland, kanuka & towai shrubland.	15	67	
Mangakotukutuku Stream Forest O05/016	Kanuka, manuka & towai shrubland. Secondary taraire–towai forest, kahikatea–taraire, kanuka–totara and kahikatea forest.	94	155	5
Waiotehue Reserve O05/019	Secondary taraire, kahikatea, kahikatea–towai, kanuka/manuka–kauri forest; some manuka shrubland?	11	12	9
Pearce Block Remnants O05/020	Taraire–towai forest and towai–kanuka forest.	13.8	41	
Wiseman Block O05/022	Taraire–towai forest, secondary kahikatea forest and raupo reedland.	31.4	61	5
Upper Uwhiroa Catchment Remnants O05/023	Northern rata–taraire forest, taraire forest, manuka–totara–towai forest, manuka and totara shrubland.	54	54	
Otaneroa Scenic Reserve O05/025	Taraire forest.	2	10	
Waiotehue Stream Bush O05/026	Taraire treeland and secondary totara forest.	4	11	7
Dysart/Powell Rd Bush O05/032	Quarry reserve – manuka shrubland.	1	144	
Upper Herekino River Remnants O05/033	Wetland.	2	81	
Rotokakahi River & Surrounds O05/052	Secondary kanuka and kanuka–totara–towai forest, taraire forest, mixed podocarp broadleaf forest with rimu element.	47	250	5
Pareokawa Bush O05/054	Taraire and taraire–towai forest.	69	132	
Mangonuiowae Bush O05/055	Taraire forest, taraire–towai forest.	124	322	
Broadwood Riparian Remnants O05/061	Taraire forest.	9	25	
Mansbridge Scenic Reserve O05/063	Taraire forest.	1	1	
Landcorp Paponga Remnants O05/067	Taraire forest.	9	119	
Runaruna Scenic Reserve O05/073	Mostly kanuka/manuka shrubland.	8	44	
Wharekauere Bush Remnants O05/087	Manuka shrubland.	1	265	
Tapuwae Scenic Reserve O05/097	Secondary coastal forest.	208	406	
Tapuwae Forest & Outliers O05/115	Taraire–towai forest, secondary kanuka/manuka–totara forest, and some secondary podocarp forest (kahikatea–totara).	812	1174	165
Te Tio Rd Bush O05/123	Puriri–tanekaha–taraire–totara coastal forest, kanuka forest.	4.8	40.5	
Rawhia Remnants O05/149	Kanuka/manuka coastal forest.	2	18	
Hautau Stream Remnant O05/151	*Coprosma propinqua* swamp shrubland.	2	55	
Hokianga Harbour O05/152	See discussion above.	149	11065	
Reena Bush O05/156	Kanuka/manuka forest.	3	165	
Opara Rd QEII Remnant O05/157	Manuka–tanekaha coastal forest.	10	19	10
Waoku Rd Bush O06/003	Kahikatea–pukatea–taraire forest.	2	175	
Koutu Shrubland O06/011	Manuka shrubland.	1	5	
Hokianga North Head Coastal Associations O06/034	Sandfield, coastal forest.	484	1155	
Rangi Point Remnants O06/035	Kanuka/manuka shrubland.	1	99	
Taumatawhauwhau Forest Outlier P06/023	Forest.	5	262	
TOTAL		2180	16432.5	206

5.2 PRIORITY NATURAL AREAS FOR PROTECTION IN THIS ECOLOGICAL DISTRICT

1. **Sites adjoining the coast or harbours, including coastal wetlands, freshwater wetlands and coastal forest and shrubland**, especially where sequences occur and areas joining the Tapuwae and Motuti Rivers, including:

   Upper Herekino River (O05/033) – site partly protected (2.4%), Kohe Stream Remnants (O05/046), Haumanga Rd Wetland (O05/049), Wharekauere Bush Remnants (O05/087), Te Karaka Point Coastal Forest (O05/089), Motuti Coastal Remnants (O05/091), Hautau Stream Remnant (O05/151) – partly protected (3.5%), Classens/Duddys Bush (O06/004), Wheoki Stream/Pukemaire Remnants (O06/009), Rangi Point Remnants (O06/035) – partly protected (1%), Hokianga North Head Coastal Associations (O06/034) – partly protected (41%).

   Exclusion of stock from the Hokianga Harbour is a very high priority.

2. **Podocarp, broadleaf and broadleaf–podocarp forest on alluvium**, including:

   Kahikatea–ti kouka swamp forest on alluvium at Lower Waihou Swamp & Shrubland (O05/090)

   Kahikatea forest on alluvial terrace and Rimu forest on alluvial terrace at Motuti Coastal Remnants (O05/091)

   Pukatea–taraire–towai forest on alluvium at Waiwhakaruru Bush (O05/146)

   Waoku Rd Bush (O06/003) contains one of the best lowland alluvial podocarp dominant forests in the District including kahikatea secondary forest on alluvial terrace – site partly protected (1%)

   Kahikatea forest (old growth) on alluvium at Upokowhawha Forest Remnant (O06/006)

   Kahikatea–pukatea forest on alluvium and kahikatea forest on alluvium at Araiwhenua Stream Swamp Forest Remnants (P06/016)

   Kahikatea forest on alluvium at Amazon Rd Forest (P06/027).

3. **Sites adjoining the Waipoua–Waima–Mataraua Forest tract and Warawara Forest**, including:

   Warawara Forest

   Reena Bush (O05/156) – partly protected (1.8%)

   Waipoua–Waima–Mataraua Forest

   Northern Mataraua Forest (O06/002), Waoku Rd Bush (O06/003), Mangatawa Bush (P06/022), Taumatawhauwhau Forest Outlier (P06/023) – partly protected (1.9%).

4. **Freshwater wetlands**, including:

   Lower Waihou Swamp & Shrubland (O05/090) is one of the largest mineral freshwater wetlands in the Ecological District, Te Hurunga Forest (wetland and catchment) (O06/010), Whawharu Swamp (O06/033), Ninihi Rd Swamp & Catchment (P06/020).

5. **Corridors between Raetea (Maungataniwha Ecological District) and Herekino Forests (Ahipara Ecological District)**, including:

   Mangakotukutuku Stream Forest (O05/016) – partly protected (60.6%), Otaneroa Stream Remnants (O05/018), Wiseman Block (O05/022), (Tongaroa Stream Remnant (O05/030) (contiguous with Herekino Forest).

6. **Habitats containing ecological units that are uncommon in the Ecological District and which do not fall into any of the above categories**, including:

   Runaruna Mud Volcano (O05/154) is the only mud volcano in Northland.

   Kowhai–puriri–totara forest on toeslope, a lowland forest type once common in the Ecological District but now virtually absent, is recorded at Wairupe Forest Remnant (O05/111).

   Ecological units with kauri as a component have only been recorded in three sites within the Ecological District: Taumatawhauwhau Forest Outlier (P06/023) contains unmodified kauri (emergent)–rewarewa–taraire forest (the extent of which is unknown, further survey required) – site partly protected (1.9%); manuka–kauri forest makes up a significant area (survey records around 195 ha of this type) of the Te Hurunga Forest (O06/010); and Waiotehue Reserve (O05/019), which contains kanuka/manuka–kauri forest (this site is 91% protected).

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

Key: * = Level 2 site; **Bold pna numbers** = representative ecological units; part of = part of site is within geological description; pt = site is partially protected, but unknown whether ecological unit falls within the protected area, CC = Conservation Covenant; QEII = Queen Elizabeth II National Trust Open Space Covenant; RR = Recreation Reserve; SL = Stewardship Land; SR = Scenic Reserve; GP = Government Purpose Reserve; MS = Marginal Strip.

	Drowned river valley	Alluvium	Otaua Group sandstone	Mangakahia Complex sandstone	Waipoua basalt	Mangakahia Complex (siliceous) mudstone
WETLANDS						
Baumea articulata–kikuyu				O05/091(part of)		
Baumea rubiginosa				**O05/091**(part of)		
constructed pond				*O05/021(part of) *O05/050 *O05/068		*O05/021(part of) *O05/150 *O05/153
constructed wetland				*O05/027		
Coprosma propinqua		**O05/124**		**O05/091**(part of)		
harakeke–*Coprosma propinqua*–manuka–ti kouka		**O05/128**				
harakeke–raupo				*O05/068		
harakeke–raupo–ti kouka		**O06/008**				
kanuka/manuka–ti kouka		**O05/120**(part of)		**O05/120**(part of)		
manuka–raupo		**O05/033**(ptMS)				
raupo		O05/071(part of) **O05/090**(part of) **O05/099** **O06/033**	**O06/010**(part of) **P06/020**	O05/022 (ptCC) O05/052(ptSR) O05/071(part of) **O05/090**(part of) O05/091(part of) O05/122 O06/032 *O05/021(part of) *O05/050		**O05/090**(part of) **O06/010**(part of) **O06/035**(part of,ptSL) *O05/021(part of)
raupo–harakeke		**O05/124**				
ESTUARINE & ASSOCIATED WETLANDS						
bachelor's button–*Isolepis cernua*–sea primrose–*Selliera radicans* herbfield	**O05/152** (ptMS,SL)					
Coprosma propinqua	**O05/152** (ptMS,SL)	**O05/151** (part of,ptSL)				**O05/151** (part of,ptSL)

	Holocene alluvium/ estuarine	Eroded muddy limestone peak	Motatau Complex muddy limestone	Akarua Supergroup conglom-erate	Pleistocene eroded consolidated dunes	Tangihua Complex
WETLANDS						
Baumea articulata–kikuyu	O05/091(part of)					
Baumea rubiginosa	**O05/091**(part of)					
constructed pond						
constructed wetland						
Coprosma propinqua	**O05/091**(part of)					
harakeke–*Coprosma propinqua*–manuka–ti kouka						
harakeke–raupo						
harakeke–raupo–ti kouka						
kanuka/manuka–ti kouka						
manuka–raupo						
raupo	O05/091(part of) **O06/010**(part of)		**O06/035**(part of,ptSL)			
raupo–harakeke						
ESTUARINE & ASSOCIATED WETLANDS						
bachelor's button–*Isolepis cernua*–sea primrose–*Selliera radicans* herbfield						
Coprosma propinqua						

	Drowned river valley	Alluvium	Otaua Group sandstone	Mangakahia Complex sandstone	Waipoua basalt	Mangakahia Complex (siliceous) mudstone
ESTUARINE AND ASSOCIATED WETLANDS (*continued*)						
Coprosma propinqua–manuka–ti kouka		**O05/151** (part of,ptSL)				**O05/151** (part of,ptSL)
giant umbrella sedge–raupo		**O05/033**(ptMS) **O05/049**(part of)		**O05/049**(part of)		
harakeke–*Juncus* sp.		**O05/033**(ptMS)				
harakeke–saltmarsh ribbonwood		**O05/033**(ptMS)				
Juncus sp.–oioi	**O05/143**					
mangrove	**N05/041** **O05/143** **O05/152**(ptMS,SL)					**O06/035** (part of,ptSL)
mangrove–sea rush	**O05/152**(ptMS,SL)					
manuka		**O05/033**(ptMS) **O05/049**(part of)		**O05/049**(part of)		
manuka–saltmarsh ribbonwood		**O05/033**(ptMS)				
marsh clubrush	**O05/152**(ptMS,SL)					
mud and sandflats	**O05/152**(ptMS,SL)					
oioi	**O05/152**(ptMS,SL)			**O06/004**		
oioi–raupo–saltmarsh ribbonwood–sea rush	**O05/152**(ptMS,SL)					
oioi–saltmarsh ribbonwood		**O05/151** (part of,ptSL)				**O05/151** (part of,ptSL)
oioi–sea rush	**N05/041** **O05/143** **O05/152**(ptMS,SL)					
Paspalum vaginatum	O05/152(ptMS,SL)					
raupo		**O05/033**(ptMS) **O05/049**(part of)		**O05/049**(part of) **O06/004**		
raupo–*Juncus* sp.				**O05/046**		
raupo–sea rush	**O05/143**					
rock platforms	**O05/152**(ptMS,SL)					

	Holocene alluvium/ estuarine	Eroded muddy limestone peak	Motatau Complex muddy limestone	Akarua Supergroup conglom-erate	Pleistocene eroded consolidated dunes	Tangihua Complex
ESTUARINE AND ASSOCIATED WETLANDS (continued)						
Coprosma propinqua–manuka–ti kouka						
giant umbrella sedge–raupo						
harakeke–*Juncus* sp.						
harakeke–saltmarsh ribbonwood						
Juncus sp.–oioi						
mangrove						
mangrove–sea rush						
manuka						
manuka–saltmarsh ribbonwood						
marsh clubrush						
mud and sandflats						
oioi						
oioi–raupo–saltmarsh ribbonwood–sea rush						
oioi–saltmarsh ribbonwood						
oioi–sea rush						
Paspalum vaginatum						
raupo						
raupo–*Juncus* sp.						
raupo–sea rush						
rock platforms						

	Drowned river valley	Alluvium	Otaua Group sandstone	Mangakahia Complex sandstone	Waipoua basalt	Mangakahia Complex (siliceous) mudstone
ESTUARINE AND ASSOCIATED WETLANDS (*continued*)						
sea rush	**N05/041** **O05/143** **O05/152**(ptMS,SL)					
sea rush–mangrove	**O05/143** **O05/152**(ptMS,SL)					
Spartina alterniflora	O05/152(ptMS,SL)					
COASTAL ASSOCIATIONS/SANDFIELDS						
exotic pasture grass–native grass–rush						
lupin–*Spinifex*						
sandfield						
Spinifex						
FERNLAND						
bracken–ring fern				**O05/009A**(ptCC)		
SHRUBLAND						
bracken–mahoe				**O05/125**(part of)		**O05/125**(part of)
Coprosma propinqua–manuka–totara		**O05/049**(part of)		**O05/049**(part of)		
kanuka		O05/025 (part of,ptSR) *O05/074B (part of)		O05/016(ptCC) O05/025 (part of,ptSR) **O05/052**(ptSR) **O05/009A**(ptCC) *O05/074B(part of)		
kanuka/manuka		**O05/049**(part of) O05/071(part of) **O05/090**(part of) O05/120(part of)		O05/032(ptSL) **O05/035** O05/048 **O05/049**(part of) O05/056 O05/071(part of) **O05/090**(part of) **O05/096**(part of) O05/114 O05/116(part of) **O05/117**		**O05/090**(part of) O05/116(part of) *O05/150

	Holocene alluvium/ estuarine	Eroded muddy limestone peak	Motatau Complex muddy limestone	Akarua Supergroup conglom-erate	Pleistocene eroded consolidated dunes	Tangihua Complex
ESTUARINE AND ASSOCIATED WETLANDS (continued)						
sea rush						
sea rush–mangrove						
Spartina alterniflora						
COASTAL ASSOCIATIONS/SANDFIELDS						
exotic pasture grass–native grass–rush		**O06/034**(part of,ptMS,SL)			**O06/034**(part of,ptMS,SL)	
lupin–*Spinifex*		O06/034(part of,ptMS,SL)			O06/034(part of,ptMS,SL)	
sandfield		**O06/034**(part of,ptMS,SL)			**O06/034**(part of,ptMS,SL)	
Spinifex		**O06/034**(part of,ptMS,SL)			**O06/034**(part of,ptMS,SL)	
FERNLAND						
bracken–ring fern						
SHRUBLAND						
bracken–mahoe						
Coprosma propinqua–manuka–totara						
kanuka						
kanuka/manuka				**O05/096**(part of)		

	Drowned river valley	Alluvium	Otaua Group sandstone	Mangakahia Complex sandstone	Waipoua basalt	Mangakahia Complex (siliceous) mudstone
SHRUBLAND (*continued*)						
kanuka/manuka (*continued*)				O05/118 O05/119 O05/120(part of) O05/122 *O05/027 *O05/028 *O05/031 *O05/073(ptSR)		
kanuka/manuka–ring fern				O05/024		
kanuka–towai				O05/024		
mamaku–manuka		**O05/033**(ptMS)				
manuka		O05/060(part of) O05/071(part of) **O06/003**(part of,ptMS) **P06/022**(part of)	O06/010(part of) **P06/023**(part of,ptCC)	O05/016(ptCC) O05/023 O05/024 O05/030(part of) O05/032(ptSL) **O05/035** O05/037 *O05/043 O05/045 O05/052(ptSR) **O05/055**(pt GP,SL) O05/056 O05/060(part of) O05/067(ptSL) O05/071(part of) O06/002 **O06/003**(part of,ptMS) **O06/004** **P06/022**(part of) *O05/031 *O05/038 *O05/039 *O05/042 *O05/043 *O05/044 *O05/073(ptSR) *O05/074A	**P06/023**(part of, ptCC)	O05/019(ptSL) **O06/003**(part of,ptMS) O06/010(part of)
manuka–bracken				*O05/021(part of)		*O05/021 (pt of)
manuka–totara				O05/023(QEII) *O05/028 *O05/067(ptSL)		
manuka–towai		**O05/059**(part of)		O05/054(ptSR) **O05/059**(part of) O05/067(ptSL) *O05/038		**O05/059**(pt of)

	Holocene alluvium/ estuarine	Eroded muddy limestone peak	Motatau Complex muddy limestone	Akarua Supergroup conglom-erate	Pleistocene eroded consolidated dunes	Tangihua Complex
SHRUBLAND (continued)						
kanuka/manuka (*continued*)						
kanuka/manuka–ring fern						
kanuka–towai						
mamaku–manuka						
manuka	O06/010(part of)					O05/030(part of)
manuka–bracken						
manuka–totara						
manuka–towai						

	Drowned river valley	Alluvium	Otaua Group sandstone	Mangakahia Complex sandstone	Waipoua basalt	Mangakahia Complex (siliceous) mudstone
SHRUBLAND (*continued*)						
towai				O05/009A(ptCC) **O05/023**(QEII) **O05/024**		
towai–kanuka/manuka				O05/016(ptCC)		
BROADLEAF FOREST						
kanuka		**O05/049**(part of)		O05/018(part of) **O05/049**(part of) **O05/052**(ptSR) O05/114		O05/018(part of)
kanuka–towai				O05/020 (ptCC) **O06/004**		
kanuka/manuka				**O05/115**(part of, ptSL,SR) *O05/095 *O05/100		**O05/115**(part of, ptSL,SR)
kanuka/manuka–towai		O05/071(part of)		O05/071(part of) **O05/117**		
manuka			P06/020	O05/046 **O05/045**		
nikau–puriri–taraire				*O05/031		
nikau–puriri–towai				**O05/115**(part of, ptSL,SR)		**O05/115**(part of, ptSL,SR)
northern rata–taraire				**O05/023**(QEII)		
pukatea–taraire–towai				**O05/146** **O06/002**		
puriri–taraire		O05/059(part of)	**O06/010**(part of)	O05/048 O05/059(part of) **O05/119** **O05/114**		O05/059(part of) **O06/010**(part of)
puriri–taraire–towai		**O05/090**(part of)		**O05/090**(part of) **O05/116**(part of) *O05/126		**O05/090**(part of) **O05/116**(part of)
swamp maire				**O06/032**		
taraire		**O05/025**(part of,ptSR) O05/049(part of) **O05/060**(part of)	**P06/023**(part of,ptCC)	O05/018(part of) O05/020 (ptCC) O05/023(QEII) O05/024	**P06/023**(part of,ptCC)	O05/018(part of) **O05/019**(ptSL) **O05/116**(part of) *O05/047(part of)

	Holocene alluvium/ estuarine	Eroded muddy limestone peak	Motatau Complex muddy limestone	Akarua Supergroup conglom-erate	Pleistocene eroded consolidated dunes	Tangihua Complex
SHRUBLAND (continued)						
towai						
towai–kanuka/manuka						
BROADLEAF FOREST						
kanuka						
kanuka–towai						
kanuka/manuka						**O05/156**(ptCC)
kanuka/manuka–towai						
manuka						
nikau–puriri–taraire						
nikau–puriri–towai						
northern rata–taraire						
pukatea–taraire–towai						
puriri–taraire	**O06/010**(part of)					
puriri–taraire–towai						
swamp maire						
taraire						O05/030(part of)

	Drowned river valley	Alluvium	Otaua Group sandstone	Mangakahia Complex sandstone	Waipoua basalt	Mangakahia Complex (siliceous) mudstone
BROADLEAF FOREST (*continued*)						
taraire (*continued*)		**O05/061**(part of,ptMS,SR) **O05/071**(part of) *O05/026(part of) *O05/063(part of,SR)* O05/074B(part of)		**O05/025**(part of,ptSR) O05/030(part of) O05/032(ptSL) O05/035 O05/045 O05/046 O05/049(part of) **O05/052**(ptSR) **O05/054**(ptSR) **O05/055** (ptGP,SL) O05/056 **O05/060**(part of) **O05/061**(part of,ptMS,SR) O05/067(ptSL) **O05/071**(part of) O05/114 **O05/116**(part of) O05/117 O06/004 *O05/026(part of) *O05/031 *O05/038 *O05/043 *O05/044 *O05/047(part of) *O05/051 *O05/057 *O05/063(part of,SR) *O05/070* O05/073(ptSR) *O05/074B(part of)		
taraire–pukatea–puriri				**O06/007**		
taraire–towai		O05/071(part of) **P06/022**(part of)		O05/009A(ptCC) O05/016(ptCC) O05/018(part of) O05/020 (ptCC) **O05/022** (ptCC) **O05/030**(part of) O05/052(ptSR) **O05/054**(ptSR) **O05/055**(ptGP,SL) O05/056 **O05/066** O05/071(part of) O05/067(ptSL) O05/114 **O05/115**(part of, ptSL,SR) **O05/118** **P06/022**(part of) *O05/095 *O05/100 *O05/121		O05/018(part of) **O05/115**(part of, ptSL,SR)

	Holocene alluvium/ estuarine	Eroded muddy limestone peak	Motatau Complex muddy limestone	Akarua Supergroup conglom-erate	Pleistocene eroded consolidated dunes	Tangihua Complex
BROADLEAF FOREST (continued)						
taraire (*continued*)						
taraire–pukatea–puriri						
taraire–towai						**O05/030**(part of)

	Drowned river valley	Alluvium	Otaua Group sandstone	Mangakahia Complex sandstone	Waipoua basalt	Mangakahia Complex (siliceous) mudstone
BROADLEAF FOREST (*continued*)						
towai				O05/024 **O05/030**(part of) O05/035 O05/052(ptSR) O05/118 **O06/004** *O05/073(ptSR) *O05/093 *O05/095		
willow		O06/033				
PODOCARP FOREST						
kahikatea		**O06/003**(part of, ptMS) **O06/006** O05/120(part of) **P06/016** **P06/027**		O05/016(ptCC) O05/018(part of) O05/022 (ptCC) O05/030(part of) O05/045 O05/120(part of) **O06/003**(part of, ptMS) O06/007 **P06/021** *O05/034 *O05/047(part of)		O05/018(part of) **O05/019**(ptSL) **O06/003**(part of, ptMS) *O05/047(part of)
kahikatea–totara		O05/071(part of) **O05/120**(part of) *O05/074B(part of)		O05/024 O05/032(ptSL) O05/055 (ptGP,SL) O05/071(part of) O05/114 **O05/115**(part of, ptSL,SR) **O05/120**(part of) *O05/070 *O05/073(ptSR) *O05/074B(part of)		**O05/115**(part of, ptSL,SR)
kahikatea–totara				**O05/075**		
tanekaha–totara				**O05/114**		
totara		*O05/026(part of) *O05/029 **P06/022**(part of)		O05/067(ptSL) **O05/119** **P06/022**(part of) *O05/026(part of) *O05/029		*O05/150
BROADLEAF–PODOCARP FOREST						
kahikatea–kanuka–puriri				*O05/034		

	Holocene alluvium/ estuarine	Eroded muddy limestone peak	Motatau Complex muddy limestone	Akarua Supergroup conglom-erate	Pleistocene eroded consolidated dunes	Tangihua Complex
BROADLEAF FOREST (continued)						
towai						**O05/030**(part of)
willow						
PODOCARP FOREST						
kahikatea						O05/030(part of)
kahikatea–totara						
kahikatea–totara						
tanekaha–totara						
totara						
BROADLEAF–PODOCARP FOREST						
kahikatea–kanuka–puriri						

	Drowned river valley	Alluvium	Otaua Group sandstone	Mangakahia Complex sandstone	Waipoua basalt	Mangakahia Complex (siliceous) mudstone
BROADLEAF–PODOCARP FOREST (*continued*)						
kahikatea–kanuka–taraire–totara				*O05/147		
kahikatea–kanuka/manuka–totara				O05/115(part of, ptSL,SR)		O05/115(part of, ptSL,SR)
kahikatea–manuka				O05/037		
kahikatea–manuka–totara				O05/055(ptGP,SL)		
kahikatea–nikau–puriri–taraire		**O06/006**				
kahikatea–pukatea		**P06/016**				
kahikatea–pukatea–taraire		**O06/003**(part of, ptMS)		**O06/003**(part of, ptMS)		**O06/003**(part of, ptMS)
kahikatea–pukatea–ti kouka		**O05/155**				
kahikatea–puriri				**O05/020** (ptCC)		
kahikatea–puriri–towai				*O05/100		
kahikatea–rewarewa–taraire				**O06/004**		
kahikatea–taraire		**O05/061**(part of,ptMS,SR) **O06/033*** O05/074B(part of)		O05/016(ptCC) O05/020 (ptCC) O05/023(QEII) **O05/035** **O05/061**(part of,ptMS,SR) *O05/074B(part of)		
kahikatea–taraire–totara				**O05/055** (ptGP,SL) **O05/116**(part of)		**O05/116**(part of)
kahikatea–ti kouka		**O05/090**(part of) **O06/033**		O06/032 **O05/090**(part of)		**O05/090**(part of)
kahikatea–totara–towai			**P06/020**			
kahikatea–towai		**O05/061**(part of,ptMS,SR)		**O05/061**(part of,ptMS,SR) **O06/002**		**O05/019**(ptSL)
kanuka/manuka–kahikatea				O05/032(ptSL)* O05/034		
kanuka/manuka–tanekaha–towai				**O05/116**(part of)		**O05/116**(part of)

	Holocene alluvium/ estuarine	Eroded muddy limestone peak	Motatau Complex muddy limestone	Akarua Supergroup conglom-erate	Pleistocene eroded consolidated dunes	Tangihua Complex
BROADLEAF–PODOCARP FOREST (continued)						
kahikatea–kanuka–taraire–totara						
kahikatea–kanuka/manuka–totara						
kahikatea–manuka						
kahikatea–manuka–totara						
kahikatea–nikau–puriri–taraire						
kahikatea–pukatea						
kahikatea–pukatea–taraire						
kahikatea–pukatea–ti kouka						
kahikatea–puriri						
kahikatea–puriri–towai						
kahikatea–rewarewa–taraire						
kahikatea–taraire						
kahikatea–taraire–totara						
kahikatea–ti kouka						
kahikatea–totara–towai						
kahikatea–towai						
kanuka/manuka–kahikatea						
kanuka/manuka–tanekaha–towai						

	Drowned river valley	Alluvium	Otaua Group sandstone	Mangakahia Complex sandstone	Waipoua basalt	Mangakahia Complex (siliceous) mudstone
BROADLEAF–PODOCARP FOREST (*continued*)						
kanuka/manuka–tanekaha–totara				O05/117 **O05/122** *O05/121		
kanuka/manuka–totara				O05/114 **O05/115**(part of, ptSL,SR) O05/117 O05/118 **O05/119** *O05/093		**O05/115**(part of, ptSL,SR)
kanuka–rimu		O05/060(part of)		O05/060(part of)		
kanuka–totara				O05/016(ptCC) O05/056 **O05/125**(part of) *O05/051 *O05/073(ptSR)		**O05/125**(part of)
kanuka–totara–towai				O05/052(ptSR)		
kowhai–puriri–totara				**O05/111**		
manuka–totara				O05/045 *O05/043		
manuka–totara–towai		O05/071(part of)		**O05/023**(QEII) O05/030(part of) O05/071(part of)		
mixed broadleaf–podocarp				**O05/052**(ptSR)		
tanekaha–taraire–towai				**O05/096**(part of)		
tanekaha–taraire–totara				**O05/122**		
taraire–totara				**P06/021**		
totara–towai				O05/055(ptGP,SL)		
BROADLEAF–KAURI FOREST						
kanuka/manuka–kauri						**O05/019**(ptSL)
kauri–rewarewa–taraire			**P06/023**(part of,ptCC)		**P06/023**(part of,ptCC)	
manuka–kauri			**O06/010**(part of)			**O06/010**(part of)

	Holocene alluvium/ estuarine	Eroded muddy limestone peak	Motatau Complex muddy limestone	Akarua Supergroup conglom-erate	Pleistocene eroded consolidated dunes	Tangihua Complex
BROADLEAF–PODOCARP FOREST (continued)						
kanuka/manuka–tanekaha–totara						
kanuka/manuka–totara						
kanuka–rimu						
kanuka–totara						
kanuka–totara–towai						
kowhai–puriri–totara						
manuka–totara						
manuka–totara–towai						**O05/030**(part of)
mixed broadleaf–podocarp						
tanekaha–taraire–towai				**O05/096**(part of)		
tanekaha–taraire–totara						
taraire–totara						
totara–towai						
BROADLEAF–KAURI FOREST						
kanuka/manuka–kauri						
kauri–rewarewa–taraire						
manuka–kauri	**O06/010**(part of)					

	Drowned river valley	Alluvium	Otaua Group sandstone	Mangakahia Complex sandstone	Waipoua basalt	Mangakahia Complex (siliceous) mudstone
COASTAL SHRUBLAND						
kanuka				*N05/004		
kanuka/manuka		**O05/151**(part of,ptSL)		**O05/094**		**O05/151**(part of,ptSL)
manuka				**O05/037A** O05/046 **O05/087**(part of,ptMS) **O06/009**(part of)		**O05/087**(part of,ptMS) *O06/011(ptRR) **O06/009**(part of)
manuka–totara				**O05/148**(part of)		**O05/148**(part of)
COASTAL FOREST						
kahikatea				**O05/091**(part of)		
kahikatea–taraire				**O06/012**		
kahikatea–kowhai–manuka–puriri				**O06/009**(part of)		
kahikatea–kowhai–puriri				**O05/097**(ptSR)		
kahikatea–tanekaha				**O06/009**(part of)		
kanuka				**O05/123**(ptSL,QEII)		
kanuka–puriri				*N05/004		
kanuka–tanekaha–totara		**O05/151**(part of,ptSL)		**O05/089** **O05/112** **O05/123** (ptSL,QEII)		**O05/151**(part of,ptSL)
kanuka/manuka		**O05/151**(part of,ptSL)		**O05/089** **O05/091**(part of) **O05/097**(ptSR)	O06/035(part of,ptSL)	O05/149(ptMS) **O05/151**(part of,ptSL)
kanuka/manuka–kahikatea				**O05/091**(part of)		
kanuka/manuka–kowhai–mamangi					**O05/089**	
kanuka/manuka–puriri						**O05/149**(ptMS)
kanuka/manuka–tanekaha–towai				**O05/097**(ptSR)		
kanuka/manuka–totara				**O05/098**		O05/149(ptMS)
kanuka/manuka–towai						O06/035(part of,ptSL)

	Holocene alluvium/ estuarine	Eroded muddy limestone peak	Motatau Complex muddy limestone	Akarua Supergroup conglom-erate	Pleistocene eroded consolidated dunes	Tangihua Complex
COASTAL SHRUBLAND						
kanuka						
kanuka/manuka						
manuka						
manuka–totara						
COASTAL FOREST						
kahikatea	**O05/091**(part of)					
kahikatea–taraire						
kahikatea–kowhai–manuka–puriri	**O06/009**(part of)					
kahikatea–kowhai–puriri						
kahikatea–tanekaha	**O06/009**(part of)					
kanuka						
kanuka–puriri						
kanuka–tanekaha–totara						
kanuka/manuka	**O05/091**(part of)	O06/035(part of,ptSL)				
kanuka/manuka–kahikatea	**O05/091**(part of)					
kanuka/manuka–kowhai–mamangi						
kanuka/manuka–puriri						
kanuka/manuka–tanekaha–towai						
kanuka/manuka–totara						
kanuka/manuka–towai		**O06/034**(part of,ptMS,SL)	O06/035(part of,ptSL)		**O06/034**(part of,ptMS,SL)	

	Drowned river valley	Alluvium	Otaua Group sandstone	Mangakahia Complex sandstone	Waipoua basalt	Mangakahia Complex (siliceous) mudstone
COASTAL FOREST (*continued*)						
karaka–kohekohe–kowhai–puriri						
kowhai–puriri–taraire				**O05/094**		
mamaku–nikau–ti kouka				**O06/009**(part of)		
manuka–kahikatea				**O05/091**(part of) **O06/012**		
manuka–kauri–mamangi				**O06/009**(part of)		
manuka–nikau–taraire				**O05/087**(part of,ptMS)		**O05/087**(part of,ptMS)
manuka–tanekaha				**O05/157**(part of,ptQEII)		**O05/157**(part of,ptQEII)
manuka–tanekaha–taraire				**O05/087**(part of,ptMS)		**O05/087**(part of,ptMS)
nikau				**O06/009**(part of)		
nikau–taraire				**O05/091**(part of)		
pohutukawa						
puriri–tanekaha–taraire–totara				**O05/123**(ptSL,QEII)		
puriri–taraire				**O06/009**(part of)		
puriri–totara				**O05/148**(part of)		**O05/148**(part of)
rewarewa–taraire–towai				**O05/089**		
rimu				**O05/091**(part of)		
taraire–nikau				**O05/087**(part of,ptMS)		**O05/087**(part of,ptMS)
taraire–tanekaha				**O06/009**(part of)		
towai		**O05/151**(part of,ptSL)				**O05/151**(part of,ptSL)
OTHER						
grass–sedge association		O05/035				

	Holocene alluvium/ estuarine	Eroded muddy limestone peak	Motatau Complex muddy limestone	Akarua Supergroup conglom-erate	Pleistocene eroded consolidated dunes	Tangihua Complex
COASTAL FOREST (*continued*)						
karaka–kohekohe–kowhai–puriri		**O06/034**(part of,ptMS,SL)			**O06/034**(part of,ptMS,SL)	
kowhai–puriri–taraire						
mamaku–nikau–ti kouka	**O06/009**(part of)					
manuka–kahikatea	**O05/091**(part of)					
manuka–kauri–mamangi	**O06/009**(part of)					
manuka–nikau–taraire						
manuka–tanekaha						
manuka–tanekaha–taraire						
nikau	**O06/009**(part of)					
nikau–taraire	**O05/091**(part of)					
pohutukawa		**O06/034**(part of,ptMS,SL)			**O06/034**(part of,ptMS,SL)	
puriri–tanekaha–taraire–totara						
puriri–taraire	**O06/009**(part of)					
puriri–totara						
rewarewa–taraire–towai						
rimu	**O05/091**(part of)					
taraire–nikau						
taraire–tanekaha	**O06/009**(part of)					
towai						
OTHER						
grass–sedge association						

TABLE 3. SUMMARY OF SITE EVALUATIONS.

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

LEVEL 1 SITES Survey no.	REPRESENT-ATIVENESS*	RARITY**/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Herekino Harbour N05/041	Rep.site	Estuary.Fauna: 8 threat-ened, 1 reg.sign.	3 e.u.s	High quality	Little riparian vegetation	490 ha
Eaton Rd Bush O05/009A		Fauna: 1 threatened	4 e.u.s	Part regenerating	Adjoins Maungataniwha Forest	67 ha
Mangakotukutuku Stream Forest O05/016		Flora: 1 threatened, 1 reg. sign.Fauna: 3 threatened	7 e.u.s	Mostly regenerating	Contiguous with Raetea Forest	155 ha 3 remnants†
Otaneroa Stream Remnants O05/018		Fauna: 3 threatened	5 e.u.s	Regenerating	Corridor between Herekino and Raetea Forests	54.9 ha 3 remnants
Waiotehue Reserve O05/019	Rep.site for 4 e.u.s	Fauna: 3 threatened	5 e.u.s	Strong regeneration	Link between Herekino and Raetea Forests	12 ha
Pearce Block Remnants O05/020	Rep.site for 1 e.u	Flora: 1 threatened. Fauna: 1 threatened	6 e.u.s		Link between Herekino and Raetea Forests	41 ha 3 remnants
Wiseman Block O05/022	Rep.site for 1 e.u	Fauna: 3 threatened	3 e.u.s	Diverse, includes emergents	Link between Herekino and Raetea Forests	61 ha
Upper Uwhiroa Catchment Remnants O05/023	Rep.site for 2 e.u.s	Fauna: 2 threatened	7 e.u.s	Older growth and regenerating	Close to Herekino Forest	54 ha 2 main and 4 small remnants
Central Waiotehue Rd Bush O05/024	Rep.site	Fauna: 1 threatened for 1 e.u	7 e.u.s	Regenerating	Part of a cluster of remnants	51 ha 3 remnants
Otaneroa Scenic Reserve O05/025	Rep.site for 1 e.u	Fauna: 1 threatened	2 e.u.s	Forest dominant	Riparian protection, close to O05/025	10 ha
Tongaroa Stream Remnant O05/030	Rep.site for 2 e.u.s	Fauna: 1 threatened, 1 reg.sign.	6 e.u.s	Emergents present	Contiguous with Herekino Forest	66 ha
Dysart/Powell Rd Bush O05/032		Fauna: 1 threatened	5 e.u.s	Mostly successional	Contiguous with Herekino Forest	144 ha 1 large and 2 small remnants

* 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.

** 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.

† 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	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Upper Herekino River O05/033	Rep.site	Fauna: 4 threatened	8 e.u.s Saltwater/ freshwater/ shrubland sequence	High-quality wetland, some weeds in shrubland	Contiguous with Herekino Harbour	81 ha 3 remnants, dissected by the road
Pauanui Bush O05/035	Rep.site for 3 e.u.s	Fauna: 3 threatened	6 e.u.s	Modified, mostly secondary vegetation	Vegetation to Hokianga Harbours edge	280 ha 1 large, 1 medium and 1 small remnant
Ngatauhe Stream Remnants O05/037		Fauna: 1 threatened	2 e.u.s	Fragmented and modified	Catchment protection, Whangape Harbour	139 ha 3 remnants
Rotowhenua River Shrubland O05/037A	Rep.site	Coastal shrubland. Not surveyed‡	1 e.u	Part of cluster of habitats	Grades into Whangape Harbour	5 ha
Kohe Bush O05/045	Rep.site for 1 e.u	Fauna: 1 threatened	5 e.u.s	Pockets of good-quality broadleaf–podocarp forest		234 ha 1 large and 1 small remnant
Kohe Stream Remnants O05/046	Rep.site for 2 e.u.s	Coastal riparian. Fauna: 1 threatened	4 e.u.s Forest, wetland	High quality	Contiguous with Whangape Harbour	11 ha 2 remnants
Awaroa River Rd Remnant O05/048		Flora: 1 reg.sign. Fauna: 1 threatened	2 e.u.s	Large shrubland area		86 ha
Haumanga Rd Wetland O05/049	Rep.site for 6 e.u.s	Saltmarsh to terrestrial vegetation. Not surveyed	7 e.u.s Forest,shrub-land, wetland		Contiguous with Whangape Harbour	38 ha 1 main and 2 small remnants
Rotokakahi River Scenic Reserve & Surrounds O05/052	Rep.site for 4 e.u.s	Fauna: 3 threatened	9 e.u.s Forest, shrub-land, wetland	Regenerating, some weeds	Adjoins Rotokakahi River	250 ha
Pareokawa Bush O05/054	Rep.site for 2 e.u.s	Fauna: 1 threatened	3 e.u.s	Emergents	Part of cluster of habitats	132 ha 1 large and 3 small remnants
Mangonuiowae Bush O05/055	Rep.site for 4 e.u.s	Flora: 1 reg.sign. Fauna: 3 threatened	7 e.u.s	Diverse forest	Mangonuiowae River dissects site	322 ha 1 large and 5 small remnants
Waiotehue Rd Bush O05/056		Fauna: 2 threatened	5 e.u.s		Link to O05/054 and O05/055 via pine forest	157 ha 1 main and 1 smaller outlier

‡ Not surveyed. The Department of Conservation, Northland Conservancy, has not to date (August 2003) specifically surveyed for animal species at this site.

LEVEL 1 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Tutaetohia Stream Remnant O05/059	Rep.site for 1 e.u	Fauna: 1 threatened	2 e.u.s	Some emergents	Close to Raetea Forest	25 ha
Pukemiro Remnants O05/060	Rep.site for 1 e.u	Alluvial forest. Fauna: 1 threatened	3 e.u.s		Close to Raetea Forest. Remnant alongside Mangonuiowae Strm	71 ha 2 main and 1 small remnant
Broadwood Riparian Remnants O05/061	Rep.site	Alluvial forest. Fauna: 2 threatened	3 e.u.s	Environmental weed issues, sparse understorey	Remnants alongside Mangonuiowae Strm	25 ha 7 remnants
Ngatieke Airstrip Bush O05/066	Rep.site	Fauna: 2 threatened	1 e.u	Diverse	Close to Raetea Forest	63 ha
Landcorp Paponga Remnants O05/067		Fauna: 1 threatened	5 e.u.s			119 ha 1 large and 3 small remnants
Humphreys Bush O05/071	Rep.site for 1 e.u.s	Fauna: 3 threatened	8 e.u.s Forest, shrub-land, wetland	Large, diverse	Pine forest adjoins	438 ha 2 large and 3 small remnants
Kawaka Stream Remnant O05/075	Rep.site	Podocarp forest. Not surveyed	1 e.u	Secondary forest	Close to Warawara Forest	18 ha
Wharekauere Bush Remnants O05/087	Rep.site	Coastal forest and shrubland. Fauna: 1 threatened	4 e.u.s	Range of successional stages	Vegetation to Hokianga Harbour	265 ha 2 large and 1 small remnant
Te Karaka Point Coastal Forest O05/089	Rep.site	Coastal forest. Fauna: 1 threatened, 1 reg.sign.	4 e.u.s	One of largest and best quality coastal remnants. Stock access, kahili ginger	Vegetation to Hokianga Harbour	60 ha
Lower Waihou Swamp & Shrubland O05/090	Rep.site	Swamp forest. Fauna: 2 threatened	4 e.u.s Forest, shrub-land, wetland	Modified, *Gambusia* present	Close to Warawara Forest	95 ha 2 remnants, blocks linked by pine
Motuti Coastal Remnants O05/091	Rep.site for 7 e.u.s	Coastal forest, shrubland and alluvial forest. Flora: 1 threatened, 2 reg.sign. Fauna: 2 threatened	10 e.u.s	High quality, diverse	Vegetation sequence down to Hokianga Harbour	203 ha 1 large and 1 smaller remnant
Panguru/Pukepoto Shrublands O05/094	Rep.site	Coastal forest	2 e.u.s	Mostly regenerating	Contiguous with Warawara Forest	125 ha 2 remnants
Matawera Rd Bush O05/096	Rep.site	Fauna: 2 threatened species	2 e.u.s		Remnants linked by pine forest. Close to O05/097	160 ha 1 large and 3 smaller remnants

LEVEL 1 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Tapuwae Scenic Reserve O05/097	Rep.site	Coastal forest. Fauna: 4 threatened	3 e.u.s	Large site, reason-ably good condition, successional stages	Sequence from hill country to estuarine on Hokianga Harbour	406 ha
Tapuwae River Bush O05/098	Rep.site	Coastal forest. Fauna: 1 threatened	1 e.u		Vegetation sequence down to Hokianga Harbour	78 ha
Tapuwae Wetland O05/099	Rep.site	Rare e.u. Not surveyed	1 e.u	Very small,isolated, stock access	Adjacent to Hokianga Harbour	0.4 ha
Wairupe Forest Remnant O05/111	Rep. site	Lowland forest. Not surveyed	1 e.u	Small, adjacent to road edge		6 ha
Motukaraka Remnant O05/112	Rep.site	Coastal forest	1 e.u	Cutover, otherwise intact	Close to harbour's edge	7 ha
Blue Mountain Rd Bush O05/114	Rep.site for 2 e.u.s	Fauna: 1 threatened	8 e.u.s	Cutover old growth and regenerating forest		187 ha 1 large and 1 small remnant
Tapuwae Forest & Outliers O05/115	Rep.site for 5 e.u.s	Fauna: 2 threatened	6 e.u.s	Diverse including old growth forest	Largest forest north of Hokianga Harbour in ED	1174 ha 2nd largest forest in ED
Te Karae Stn Remnants O05/116	Rep.site for 4 e.u.s	Flora: 1 reg.sign. Fauna: 2 threatened	5 e.u.s	Southern remnant fenced		22 ha 2 remnants
Maungapohatu Bush O05/117	Rep.site for 2 e.u.s	Flora: 1 reg.sign. Fauna: 3 threatened	5 e.u.s	Regenerating and cutover old-growth forest	Vegetation sequence to Hokianga Harbour edge	321 ha 1 large and 1 small remnant
Pukekohe Stream Bush O05/118	Rep.site for 1 e.u.	Fauna: 2 threatened	4 e.u.s	Fenced with occas-ional stock access. Cutover and secondary forest, emergents evident	Close link to Tapuwae Forest O05/115	38 ha
Paponga–Mata Rd Association O05/119	Rep.site for 2 e.u.s	Fauna: 3 threatened	4 e.u.s	Cutover and regenerating forest	Close link to Tapuwae Forest O05/115	126 ha 1 large and 1 small remnant
Pahangahanga Remnant O05/120	Rep.site for 1 e.u.	Alluvial forest e.u. and rare swamp shrubland e.u. Fauna: 2 threatened	4 e.u.s	Forest area is unfenced	Part of chain of linking remnants	64 ha
Mata Rd Intersection Remnant O05/122	Rep.site for 2 e.u.	Fauna: 1 threatened	4 e.u.s Forest, shrub-land, wetland	Small wetland and secondary vegetation	Part of cluster of remnants	34 ha
Te Tio Rd Bush O05/123	Rep.site	Coastal forest. Fauna: 2 threatened	3 e.u.s	Forested remnant	Forest to harbour's edge	40.5 ha 2 remnants

LEVEL 1 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Oraoa Stream Saltmarsh O05/124	Rep.site	Saltmarsh/freshwater wetland.Fauna: 1 threatened	2 e.u.s	Very small. Environmental weeds present	Adjacent to Oraoa Stream	1 ha
Umawera Bush O05/125	Rep.site	Fauna: 2 threatened species	2 e.u.s	Partially fenced	Corridor between larger forests	117 ha
Rangiahua Wetland O05/128	Rep.site	Rare swamp association. Not surveyed	1 e.u	Modification since 1994 survey	Contiguous with Waihou River	12 ha
Whangape Harbour O05/143	Rep.site	Harbour Fauna: 5 threatened	5 e.u.s	Little riparian vegetation, large intertidal area		916 ha
Waiwhakaruku Bush O05/146	Rep.site	Alluvial forest. Fauna: 1 threatened	1 e.u	Old-growth forest, environmental weed present		11 ha
Orira River Remnants O05/148	Rep.site for 1 e.u.	Coastal forest and shrubland. Not surveyed	2 e.u.s	Forest understorey mostly grazed out	2 remnants adjoining Hokianga Harbour	88 ha 5 remnants
Rawhia Remnants O05/149	Rep.site for 1 e.u.	Coastal forest. Not surveyed	3 e.u.s		Buffer to Hokianga Harbour	18 ha 2 remnants
Hautau Stream Remnant O05/151	Rep.site	Coastal forest and shrubland, rare wetland types. Flora: 1 reg.sign. Fauna: 2 threatened	6 e.u.s Forest, shrubland, wetland		Vegetation sequence down to Hokianga Harbour	55 ha
Hokianga Harbour O05/152	Rep.site for 11 e.u.s	4th largest harbour in NZ. Flora: 3 threatened, 3 reg. sign. Fauna: 18 threatened, 2 reg.sign.	13 e.u.s	*Spartina* present in in parts. Stock access common		11 065 ha
Runaruna Mud Volcano O05/154	Rep.site	Nationally important geological site and landform, Northland's only mud volcano. Not surveyed	1 e.u		Isolated	1 ha
Herbert Rd Swamp Forest O05/155	Rep.site	Alluvial forest. Not surveyed	1 e.u	Very small remnant, degraded		2 ha
Reena Bush O05/156	Rep.site	Flora: 1 reg.sign. Fauna: 1 threatened	1 e.u	Largest and best examples of its type in ED	Contiguous with Warawara Forest	165 ha
Opara Rd QEII Remnant O05/157	Rep.site	Coastal forest. Fauna: 2 threatened	1 e.u		Vegetation to harbour's edge	20.7 ha
Northern Mataraua Forest O06/002	Rep.site for 1 e.u.	Not surveyed	3 e.u.s	Some historical modification, emergents	Contiguous with Waipoua–Waima–Mataraua Forest tract and P06/022	796 ha

LEVEL 1 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Waoku Rd Bush O06/003	Rep.site	Alluvial forest e.u.	3 e.u.s		Southern remnant contiguous with Waima Forest, close to O06/002	175 ha 2 remnants
Classens/Duddys Bush O06/004	Rep.site for 6 e.u.s	Saltmarsh e.u. Fauna: 3 threatened, 2 reg.sign. Flora: 1 reg.sign.	7 e.u.s Forest, shrub-land, wetland	Cutover, modified, strong regeneration. *Gambusia* present	Vegetation sequence to harbour's edge Not contiguous	2130 ha Largest terrestial habitat in ED 6 remnants
Upokowhawha Forest Remnant O06/006	Rep.site	Alluvial forest e.u. Not surveyed	2 e.u.s	Contains old-growth forest, unfenced	Close to Waima Forest	11 ha
Karangi Bush Remnants O06/007	Rep.site for 1 e.u	Not surveyed	2 e.u.s	Stock access to western remnant, little understorey		39 ha 2 remnants
Vujcich Rd Swamp O06/008	Rep.site	Rare swamp association. Not surveyed	1 e.u	Modified	Isolated	3 ha
Wheoki Stream/Pukemaire Remnants O06/009	Rep.site	Coastal forest and shrubland. Fauna: 1 threatened	8 e.u.s Forest, shrubland	Regenerating	Vegetation sequence to harbour's edge	135 ha 2 large and 2 small remnants
Te Hurunga Forest O06/010	Rep.site for 3 e.u.s	Lowland forest. Flora: 1 (historic) threatened. Fauna: Not surveyed	4 e.u.s Forest, shrub-land, wetland	Significant emergent element	Contiguous with O06/035	470 ha
Otawhiti Bush O06/012		Coastal forest. Fauna: 1 threatened	2 e.u.s		Adjacent to Hokianga Harbour	46 ha 1 main and 1 smaller remnant
Waoku Coach Rd Wetlands O06/032	Rep.site for 1 e.u.	Swamp forest. Fauna: 1 threatened	3 e.u.s Forest, wetland	Artificial ponds	Northern remnant isolated, southern remnant linked to Waima Forest by pine forest	4 ha 2 remnants
Whawharu Swamp O06/033	Rep.site for 3 e.u.s	Swamp forest. Fauna: 1 threatened	4 e.u.s Forest, wetland	High quality/high water table. Some willow	Close to O06/002	11 ha
Hokianga North Head Coastal Associations O06/034	Rep.site for 6 e.u.s	Nationally important geological site and land-form (large area active sand dunes), forest on dunes.Flora: 4 threatened. Fauna: 5 threatened	7 e.u.s Forest, dune-land, shrubland	Weed component	Significant duneland around North Head and along west coast and small duneland area at Kawehitiki Point	1163 ha 2 remnants
Rangi Point Remnants O06/035	Rep.site for 3 e.u.s	Coastal shrubland. Fauna: 1 threatened	4 e.u.s Shrubland, wet-land, estuarine	Vegetation gradients to Hokianga Harbour	Contiguous with O06/010 and harbour	99 ha

LEVEL 1 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Araiwhenua Stream Swamp Forest Remnants P06/016	Rep.site	Alluvial forest. Not surveyed	2 e.u.s	Isolated remnants, unfenced, sparse understorey	Riparian	9 ha 2 small remnants
Ninihi Rd Swamp & Catchment P06/020	Rep.site for 2 e.u.s	Not surveyed	3 e.u.s Forest, wetland		Corridor to Kaipeha Swamp (Kaikohe ED)	120 ha
Mangatawa Stream Forest Remnants P06/021	Rep.site	Alluvial forest e.u. Not surveyed	2 e.u.s	Unfenced, some emergents		20 ha 4 small remnants
Mangatawa Bush P06/022	Rep.site	Fauna: 2 threatened	3 e.u.s	Historic modification	Contiguous with Waipoua–Waima–Mataraua Forest tract	433 ha 2 remnants
Taumatawhauwhau Forest Outlier P06/023	Rep.site	Fauna: 1 threatened	3 e.u.s	Contains unmodified forest	Contiguous with Waipoua–Waima–Mataraua Forest tract	262 ha
Amazon Rd Forest P06/027	Rep.site	Alluvial forest. Not surveyed	1 e.u.	One remnant partly fenced	Contiguous with pine forest linking to Waipoua–Waima–Mataraua Forest tract	14 ha 3 small remnants
Total Level 1 sites						25523.5 ha

LEVEL 2 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Herekino River South Remnants N05/004		Coastal forest/shrubland. Fauna: 1 threatened	2 e.u.s	Fragmented	Shrubland adjoins Herekino Harbour	16 ha 3 remnants
Upper Mangakotukutuku Stream O05/021		Not surveyed	3 e.u.s	Artificial ponds		2 ha
Waiotehue Stream Bush O05/026		Alluvial treeland. Not surveyed	2 e.u.s	Riparian strip	Riparian along Waitohue Stream	11 ha
Yuretich Rd Shrubland O05/027		Fauna: 1 threatened (reported)	2 e.u.s	Mostly regenerating		10 ha 4 remnants
"137" Awaroa River Shrubland O05/028		Not surveyed	2 e.u.s		Partial linkage	36 ha
Uwhiroa Stream Remnants O05/029		Alluvial treeland. Not surveyed	2 e.u.s	Small, fragmented	Riparian to Uwhiroa Stream	6 ha 3 remnants
McDonald Rd Bush O05/031		Not surveyed	4 e.u.s	Fragmented. Successional	Partial linkage	24 ha
Smith Rd Forest Remnants O05/034		Not surveyed	3 e.u.s	Small fragmented remnants		13 ha 5 remnants
Stephens Bush O05/038		Flora: 1 reg sign	3 e.u.s	Degraded	Part of cluster of remnants	21 ha
Poutawhera Pa Shrubland O05/039		Not surveyed	1 e.u.	Discontinuous canopy	Catchment protection, Whangape Harbour	26 ha
Pawarenga Rd Shrubland O05/042		Not surveyed	1 e.u.	Successional	Adjacent to Rotokakahi River	19 ha
Tamaho Rd Bush O05/043		Not surveyed	3 e.u.s	Erosion present	Catchment protection, adjacent to Whangape Harbour	45 ha 4 remnants
"165" Kohe Bush O05/044		Not surveyed	3 e.u.s	Regenerating	Catchment protection	25 ha
Candy Bush O05/047		Not surveyed	2 e.u.s	Small fragmented remnants		10 ha 3 remnants
Maire Stream Pond O05/050		Not surveyed	2 e.u.s	Constructed pond		1 ha
Grounds–Haumanga Rd Bush O05/051		Not surveyed	2 e.u.s	Fenced		4 ha
Awaroa Rd Bush O05/057		Not surveyed	1 e.u.	Small		3 ha 2 remnants

LEVEL 2 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Mansbridge Scenic Reserve O05/063		Alluvial forest. Not surveyed	1 e.u.	Degraded, environmental weeds present	Close to Raetea Forest	1 ha
Paponga Pond O05/068		Not surveyed	2 e.u.s	Constructed pond		1 ha
Beer Bush O05/070		Not surveyed	2 e.u.s		Part of cluster of remnants	18 ha
Runaruna Scenic Reserve O05/073		Fauna: 2 threatened	6 e.u.s	Grazed	Part of cluster of remnants	42 ha 4 remnants
Runaruna Rd Shrubland O05/074A		Not surveyed	1 e.u	Successional		20 ha
Irvine Rd Bush O05/074B		Not surveyed	4 e.u.s	Diverse but heavily grazed, canopy dis-continuous in areas		112 ha 5 remnants
Panguru Bush Remnant O05/093		Not surveyed	2 e.u.s		Continuous with pine forest	32 ha
Puketawa Rd Bush O05/095		Not surveyed	3 e.u.s		Close to Warawara Forest, pine forest adjoins	65 ha 1 main and 1 small remnant
Mihirau Bush O05/100		Not surveyed	3 e.u.s		Pine forest enclave	24 ha
Te Konoke Bush O05/121			2 e.u.s	Cutover and secondary forest		12 ha
Mudgeway Rd Bush O05/126		Not surveyed	1 e.u.	Good diversity	Close to Omahuta Forest	12 ha
Upper Mangawero Stream Tributary Remnant O05/147		Not surveyed	1 e.u.		Adjacent to pine forests	11 ha
Whakaoma/Huraunui Stream Secondary Forest Remnant O05/150		Not surveyed	2 e.u.s	Small secondary forest		11 ha
Kahikatoa Rd Pond O05/153			1 e.u.	Constructed pond, weed species present		1 ha
Koutu Shrubland O06/011		Coastal. Fauna: 1 threatened	1 e.u.	Small	Adjacent to Hokianga Harbour	5 ha 2 remnants
Total Level 2 sites						639 ha

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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.

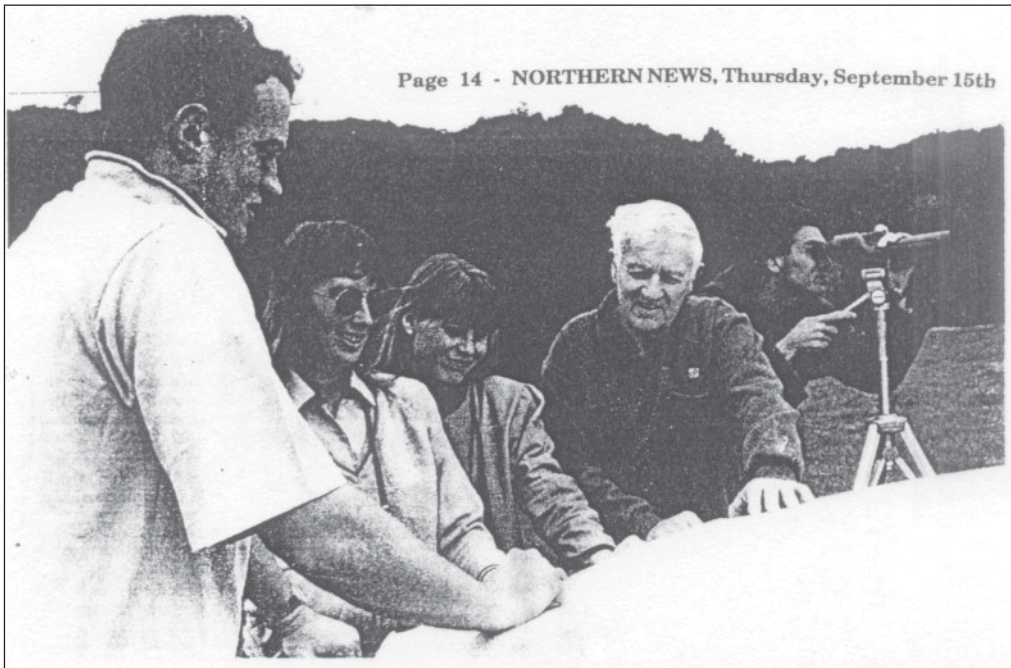
The Resource Management Act 1991 requires District Councils to consider the natural areas they administer when preparing the District Plan. The information compiled from this survey will be given to the Far North District Council to provide them with a "snapshot" of the distribution and condition of 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

In this report the categories of threat are taken from the New Zealand Threat Classification developed by Molloy et al. (2002). This new system replaces Molloy & Davis (1994), the prioritising system used previously for threatened species work by the Department of Conservation.

Below are Sections 3 and 7, which have been taken from Molloy et al. (2002) to explain the new species classification system.

3. Classification structure and categories

... This section describes each of the categories (shown in Fig. 1).

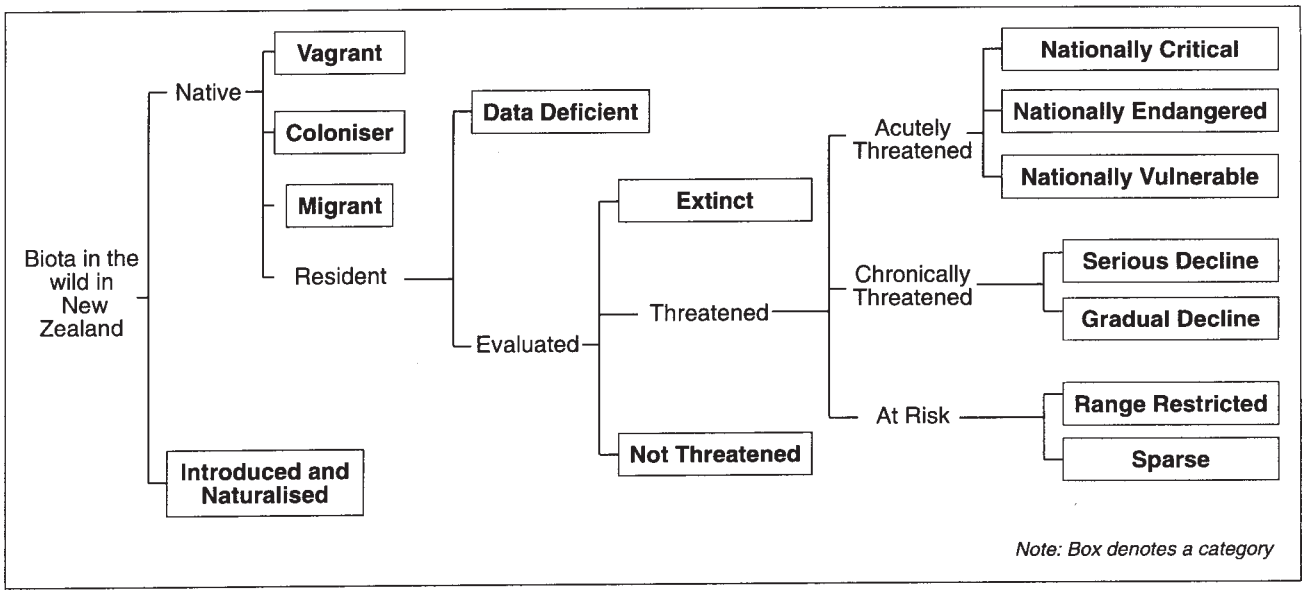


Figure 1. Structure of the New Zealand Threat Classification System.

INTRODUCED AND NATURALISED

Introduced and Naturalised taxa are those that have become naturalised in the wild after being deliberately or accidentally introduced to New Zealand by human agency.

If an Introduced and Naturalised taxon has an IUCN Red Listing in its country (or countries) of origin, the IUCN category and source of the listing are shown after the taxon's name in the New Zealand list. Current examples of this include the cress *Lepidium hyssopifolium* and the southern bell frog (*Litoria raniformis*), both of which are listed as Endangered in Australia; and the Parma wallaby (*Macropus parma*), listed as Lower risk/Near threatened.

VAGRANT

For the purposes of this document, vagrants are taxa that are found unexpectedly and rarely in New Zealand, and whose presence in our region is naturally transitory. These are taxa that do not establish themselves beyond their point of arrival because of reproductive failure or for specific ecological reasons (see de Lange & Norton 1998).

Examples include the red-kneed dotterel (*Erythrogonys cinctus*) and the blue moon butterfly (*Hypolimnas bolina nerina*), both from Australia, and the spotted sawtail (*Prionurus maculatus*) from the tropical south-west Pacific Ocean.

If a taxon in the Vagrant category has been listed in an IUCN Red List in its country of origin, the IUCN category and source of the listing are shown beside the taxon's name in the New Zealand list.

COLONISER

Colonisers are taxa that have arrived in New Zealand without direct or indirect help from humans and have been successfully reproducing in the wild for less than 50 years. Three examples are the Nankeen night heron (*Nycticorax caledonicus*), the scoliid wasp *Radumeris tasmaniensis* and the orchid *Cryptostylis subulata*.

The IUCN Red List category and source of the listing is included where this exists.

MIGRANT

Taxa that predictably and cyclically visit New Zealand as part of their normal life cycle, but do not breed here are included in the category Migrant. Examples include the Arctic skua (*Stercorarius parasiticus*) and striped marlin (*Tetrapturus audax*).

In contrast, taxa that either breed here and migrate beyond New Zealand during their life cycle, e.g. Chatham Island albatross (*Thalassarche eremita*), or taxa that are resident in New Zealand for most of their lives, such as longfinned eels (*Anguilla dieffenbachii*), are not included in this category.

The IUCN Red List category and source of the listing is included where this exists.

DATA DEFICIENT

The amount of information available for assessing the threat of extinction is highly variable between taxa and groups of taxa. At one extreme there are taxa such as kakapo, *Gunnera hamiltonii* and *Tecomanthe speciosa* where every wild individual is known, while at the other extreme there are taxa whose ecology and biology is virtually unknown (e.g. *Koeleria riguorum*, a recently described grass).

Certain criteria and/or definitions must be met for a taxon to be listed in a category. Where information is so lacking that an assessment is not possible, the taxon is assigned to the Data Deficient category. If a taxon is listed in a category other than Data Deficient but confidence in the listing is low due to poor quality data, then the listing can be qualified with the letters DP (Data Poor) to indicate this ...

EXTINCT

A taxon is listed as Extinct when there is no reasonable doubt, after repeated surveys in known or expected habitats at appropriate times (diurnal, seasonal and annual) and throughout the taxon's historic range, that the last individual has died. Examples include huia (*Heteralocha acutirostris*) and Adams's mistletoe (*Trilepidea adamsii*). Only taxa that have become extinct since 1840

are included in the list. Taxa that are extinct in the wild but occur in captivity or cultivation are not listed in this category. These are listed as Critically Endangered and are qualified with the letters EW (Extinct in the Wild).

THREATENED

The threatened categories are grouped into three major divisions: 'Acutely Threatened', 'Chronically Threatened' and 'At Risk'.

Acutely Threatened

The categories in the 'Acutely Threatened' division—Nationally Critical, Nationally Endangered and Nationally Vulnerable—equate with the IUCN categories of Critically Endangered, Endangered and Vulnerable. Taxa in these three categories are facing a very high risk of extinction in the wild, as defined by criteria that quantify:

- Total population size
- Area of occupancy
- Fragmentation of populations
- Declines in total population
- Declines in habitat area
- Predicted declines due to existing threats

Although the criteria (described in Section 6) measure similar population features as those in the IUCN Red List criteria, numerical limits and timeframes are tailored to suit New Zealand circumstances. These were set through a process of testing and refinement by the project team and as a result of feedback from New Zealand species experts. Criteria that attempt to predict declines due to possible future threats are not included because of the highly speculative nature of this type of assessment.

Chronically Threatened

Taxa listed in either of the two categories in the 'Chronically Threatened' grouping (Serious Decline and Gradual Decline) also face extinction, but are buffered slightly by either a large total population, or a slow decline rate (see Section 6).

At Risk

Taxa that do not meet the criteria for Acutely Threatened or Chronically Threatened, but have either restricted ranges or small scattered sub-populations, are listed in one of two categories (Range Restricted and Sparse) that fall under the division 'At Risk'. Although these taxa are not currently in decline, their population characteristics mean a new threat could rapidly deplete their population(s). Range Restricted taxa either occur in a small geographic area (e.g. Three Kings Islands), are restricted to a particular habitat (e.g. geothermal areas), or require very specific substrates (e.g. ultramafic rock), and for colonial breeders, have fewer than 10 subpopulations. Taxa that have naturally restricted ranges and taxa that have become restricted as a result of human activities are both included in this category. This is because both would face the same risk of extinction in the face of a new threat. The two groups are differentiated by the use of a qualifier (see Section 4).

Sparse taxa have very small, widely scattered populations, e.g. New Zealand spinach (*Tetragonia tetragonoides*). As with the Range Restricted category, taxa that are either naturally sparse or have become sparse as a result of human activities are included in this category.

NOT THREATENED

Taxa that are assessed and do not fit any of the Threatened categories are listed in the Not Threatened category.

7. Criteria for the Acutely Threatened and Chronically Threatened categories

... a taxon must meet specific criteria to be listed in one of the Acutely Threatened or Chronically Threatened categories. The criteria for each category are set out below ...

NATIONALLY CRITICAL

Very small population *or* a very high predicted decline

A taxon is Nationally Critical when available scientific evidence indicates that it meets any of the following three criteria:

1. The total population size is < 250 mature individuals.
2. Human influences have resulted in < 2 sub-populations *and either*:
   a. < 200 mature individuals in the largest sub-population, *or*
   b. the total area of occupancy is < 1 ha (0.01 km^2).
3. There is a predicted decline of > 80% in the total population in the next 10 years due to existing threats.

NATIONALLY ENDANGERED

A: Small population *and* moderate to high recent or predicted decline

A taxon is Nationally Endangered when available scientific evidence indicates that it fits at least one Status criterion *and* one Trend criterion as follows:

Status criteria

1. The total population size is 250–1000 mature individuals.
2. There are < 5 sub-populations *and either*:
   a. < 300 mature individuals in the largest sub-population, *or*
   b. the total area of occupancy is < 10 ha (0. 1 km^2).

Trend criteria

1. There has been a decline of > 30% in the total population or habitat area in the last 100 years.
2. There is a predicted decline of > 30% in the total population in the next 10 years due to existing threats.

B: Small to moderate population *and* high recent or predicted decline

A taxon is Nationally Endangered when available scientific evidence indicates that it fits at least one Status criterion *and* one Trend criterion:

Status criteria

1. The total population size is 1000–5000 mature individuals.
2. There are < 15 sub-populations *and either*:
   a. 300-500 mature individuals in the largest sub-population, *or*
   b. the total area of occupancy is 10–100 ha (0.1–1 km^2).

Trend criteria

1. There has been a decline of > 60% in the total population or habitat area in the last 100 years.
2. There is a predicted decline of > 60% in the total population in the next 10 years due to existing threats.

NATIONALLY VULNERABLE

Small to moderate population *and* moderate recent or predicted decline

A taxon is Nationally Vulnerable when scientific evidence indicates that it fits at least one Status criterion *and* one Trend criterion:

Status criteria

1. The total population size is 1000–5000 mature individuals.
2. There are < 15 sub-populations *and either*:
   a. 300–500 mature individuals in the largest sub-population, *or*
   b. the total area of occupancy is 10–100 ha (0.1–1 km^2).

Trend criteria

1. There has been a decline of 30–60% in the total population or habitat area in the last 100 years and the total population or habitat area is still in decline.
2. There is a predicted decline of 30–60% in the total population in the next 10 years due to existing threats.

SERIOUS DECLINE

A. Moderate to large population *and* moderate to large predicted decline

A taxon is listed in Serious Decline when scientific evidence indicates that it fits at least one Status criterion *and* the Trend criterion:

Status criteria

1. The total population size is > 5000 mature individuals.
2. There are > 15 sub-populations *and either*:
   a. > 500 mature individuals in the largest sub-population, *or*
   b. the total area of occupancy is >100 ha (1 km^2).

Trend criterion

1. There is a predicted decline of > 30% in the total population in the next 10 years due to existing threats.

B. Small to moderate population *and* small to moderate predicted decline

A taxon is listed in Serious Decline when available scientific evidence indicates that it fits at least one Status criterion *and* the Trend criterion:

Status criteria

1. The total population size is < 5000 mature individuals.
2. There are < 15 sub-populations *and either*:

   a. < 500 mature individuals in the largest sub-population, *or*

   b. the total area of occupancy is < 100 ha (1 km^2).

Trend criterion

1. There is a predicted decline of 5–30% in the total population in the next 10 years due to existing threats.

GRADUAL DECLINE

Moderate to large population *and* small to moderate decline

A taxon is fisted in Gradual Decline when available scientific evidence indicates that it fits at least one Status criterion *and* the Trend criterion:

Status criteria

1. The total population size is > 5000 mature individuals.
2. There are > 15 sub-populations *and either*:

   a. > 500 mature individuals in the largest sub-population, *or*

   b. the total area of occupancy is > 100 ha (1 km^2).

Trend criterion

1. There is a predicted decline of 5–30% in the total population in the next 10 years due to existing threats, and *the decline is predicted to continue beyond 10 years*.

8.4 CATEGORIES OF IMPORTANCE FOR GEOLOGICAL AND SOIL SITES

Geological sites

Ranking criteria for important geological sites and landforms in the Northland Region follow Kenny & Hayward (1996).

Sites are listed under three levels of importance:

(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.

Soil sites

Ranking criteria for New Zealand soil sites of international, national, and regional significance, from Arand et al. (1993).

Soil sites are listed under three levels of importance:

(a) International

- contains the best example of a soil (generally a 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.

(b) National

- Contains the best or a 'classic' example of a soil (either a soil group or a mapping unit) or a soil–vegetation or a soil–landform association in New Zealand
- contains a soil or soil–vegetation or a 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.

(c) Regional

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

A. Checklist of birds of Northland recorded in the Hokianga Ecological District

Nomenclature follows *Checklist of birds of New Zealand* (Turbott 1990) and *The field guide to the birds of New Zealand* (Heather & Robertson 2000)

Species	Other name	Scientific name	Harbour	Mainland
NI brown kiwi		*Apteryx australis mantelli*		P
Northern blue penguin	Korora	*Eudyptula minor iredalei*	P	P
NZ dabchick	Weweia	*Poliocephalus rufopectus*		P
Black-winged petrel		*Pterodroma nigripennis*	Record from harbour entrance	
Grey-faced petrel	Oi	*P. macroptera gouldi*	P	
Australasian gannet	Takapu	*Morus serrator serrator*	P	
Black shag	Kawau	*Phalacrocorax carbo novaehollandiae*	P	P
Pied shag	Karuhiruhi	*P. v. varius*	P	
Little black shag		*P. sulcirostris*	P	P
Little shag	Kawaupaka	*P. melanoleucos brevirostris*	P	P
White-faced heron		*Ardea novaehollandiae*	PL	PL
White heron	Kotuku	*Egretta alba modesta*	R	
Little egret		*E. garzetta nigripes*	R	
Reef heron	Matuku moana	*E. s. sacra*	R	
Cattle egret		*Bubulcus ibis coromandus*	R (occasional)	P
Australasian bittern	Matuku	*Botaurus poiciloptilus*	P	P
White ibis		*Threskiornis molucca strictipennis*	R	
*Black swan		*Cygnus atratus*	P	P
*Feral goose		*Anser anser*	R	P
Paradise shelduck	Putangitangi	*Tadorna variegata*	P	PL
*Mallard		*Anas platyrhynchos*	PL	PL
Grey duck	Parera, karakahia	*A. s. superciliosa*	PL	P
Australasian harrier	Kahu	*Circus approximans*	P	PL
*Californian quail		*Callipela californica*		PL
*Brown quail		*Synoicus ypsilophorus*		PL
*Ring-necked pheasant		*Phasianus colchicus*	P	PL
Royal spoonbill	Kotuku-ngutea	*Platalea regia*	P	
Banded rail	Moho-pereru	*Rallus philippensis assimilis*	PL	P
Marsh crake	Koitareke	*Porzana pusilla affinis*	R	
Spotless crake	Puweto	*P. tabuensis plumbea*	P	P
Pukeko	Purple swamphen	*Porphyrio porphyrio melanotus*	PL	PL
SI pied oystercatcher	Torea	*Haematopus finschi*	P	
Variable oystercatcher	Torea	*H. unicolor*	R	
Pied stilt	Poaka	*Himantopus himantopus leucocephalus*	PL	P
Arctic skua		*Stercorarius parasiticus*	1978 record	
Northern NZ dotterel	Tuturi whatu	*Charadrius obscurus aquilonous*	R	
Banded dotterel	Tuturiwhatu	*C. bicinctus bicinctus*	R	
Spur-winged plover	Masked lapwing	*Vanellus miles novaehollandiae*	PL	PL

Excludes vagrants; * = introduced.

PL = Present in large numbers (>100); P = Present in small numbers (<100); R = Recorded (<10).

Source: Department of Conservation, Northland Conservancy records, Davis & Bellingham (1984).

Species	Other name	Scientific name	Harbour	Mainland
Lesser knot	Huahou	*Calidris canutus rogersi*	R	
Wrybill	Ngutuparore	*Anarhynchus frontalis*	R	
Bar-tailed godwit	Kuaka	*Limosa l. lapponica*	PL	
Black-backed gull	Kararo	*Larus d. dominicanus*	PL	PL
Red-billed gull	Tarapunga	*L. novaehollandiae scopulinus*	PL	P
Caspian tern	Taranui	*Sterna caspia*	P	
White-fronted tern	Tara	*S. striata*	P	
Little tern	Eastern little tern	*S. albifrons sinensis*	1978 record	
Kukupa	NZ pigeon, kereru	*Hemiphaga n. novaeseelandiae*		P
*Eastern rosella		*Platycercus eximius*	P	P
Shining cuckoo	Pipiwharauroa	*Chrysococcyx lucidus*		PL
Morepork	Ruru	*Ninox novaeseelandiae*		PL
NZ kingfisher	Kotare	*Halcyon sancta vagans*	PL	PL
*Skylark		*Alauda arvensis*		PL
Welcome swallow		*Hirundo tahitica neoxena*	P	PL
*Dunnock	Hedge sparrow	*Prunella modularis*		PL
NZ pipit	Pihoihoi	*Anthus n. novaeseelandiae*		P
*Blackbird		*Turdus merula*	P	Pl
*Song thrush	Piopio	*T. philomelos*		PL
NI fernbird	Matata	*Bowdleria punctata vealeae*	PL	P
NI fantail	Piwakawaka	*Rhipidura fuliginosa placabilis*	P	PL
NI tomtit	Miromiro	*Petroica macrocephala toitoi*		P
Grey warbler	Rironiro	*Gerygone igata*	P	PL
Silvereye	Tahou, whiteye	*Zosterops l. lateralis*	P	PL
Tui		*Prosthemadera n.novaeseelandiae*		PL
*Yellowhammer		*Emberiza citrinella*	P	PL
*Chaffinch		*Fringilla coelebs*	P	PL
*Greenfinch		*Carduelis chloris*		PL
*Goldfinch		*C. carduelis*		PL
*Redpoll		*C. flammea*		P
*House sparrow		*Passer domesticus*	P	PL
*Starling		*Sturnus vulgaris*		PL
*Common myna		*Acridotheres tristis*	P	PL
Australian magpie		*Gymnobina tibicen*		PL

B. Other fauna recorded in the Hokianga Ecological District

Fish		
Short-finned eel	*Anguilla australis*	
Long-finned eel	*A. dieffenbachii*	Gradual Decline
Torrentfish	*Cheimarrichthys fosteri*	
Banded kokopu	*Galaxias fasciatus*	Regionally significant species
Inanga	*G. maculatus*	
Common smelt	*Retropinna retropinna*	
Red-finned bully	*Gobiomorphus huttoni*	
Common bully	*G. cotidianus*	
Giant bully	*G. gobioides*	Regionally significant species
Cran's bully	*G. basalis*	
Lizards		
Pacific gecko	*Hoplodactylus pacificus*	Gradual Decline
Northland green gecko	*Naultinus grayi*	Northland endemic – Gradual Decline
Auckland green gecko	*N. e. elegans*	Gradual Decline
Forest gecko	*Hoplodactylus granulatus*	Widespread
Shore skink	*Oligosoma smithi*	Widespread
Invertebrates		
Kauri snail	*Paryphanta busbyi*	Found throughout
	Phrixgnathus murdochi	Snail – old record from Rawene
	Punctidae sp. 30 (recorded as Punctidae sp. 155 by Brook (2002)	Snail recorded from Pangaru
Northland tusked weta	*Hemiandrus monstrosus*	Sparse
Freshwater invertebrates		
Koura, freshwater crayfish	*Parenephrops planifrons*	
Freshwater shrimp	*Paratya curviroistrus*	
Freshwater mussel	*Hydriella menziesi*	
Introduced fish		
Catfish	*Ameiurus nebulosus*	Recorded at Waireia (near site O05/090)
Gambusia	*Gambusia affinis*	Widespread
Koi carp	*Cyprinus carpio*	Recorded just outside this District in the Whakanekeneke River which drains into the Waihou River
Introduced mammals		
House mouse	*Mus musculus*	
Ship rat	*Rattus rattus*	
Norway rat	*R. norvegicus*	
Common weasel	*Mustela nivalis*	
Stoat	*M. erminea*	
Ferret	*M. furo*	
Feral cat	*Felis catus*	
Feral dog	*Canis familaris*	
Feral cattle	*Bos taurus*	
Feral goat	*Capra hircus*	
Brushtail possum	*Trichosurus vulpecula*	
Feral pig	*Sus scrofa*	
European hedgehog	*Erinaceus europaeus*	
European rabbit	*Orytologus cuniculus*	
Brown hare	*Lepus europaeus*	

8.6 COMMON AND SCIENTIFIC PLANT NAMES USED IN THE TEXT

This is not a definitive list of common names used for plants from the Ecological District. Rather it is a guide to the reader as to exactly which species is referred to when the common name is used in the text.

Indigenous plants	
black maire	*Nestegis cunninghamii*
bachelor's button	*Cotula coronopifolia*
bracken	*Pteridium esculentum*
filmy ferns	*Hymenophyllum* sp.
five-finger	*Pseudopanax arboreus*
giant umbrella sedge	*Cyperus ustulatus*
glasswort	*Salicornia quinqueflora*
hangehange	*Geniostoma rupestre*
harakeke	*Phormium tenax*
Hebe	*Hebe* sp.
heketara	*Olearia rani*
hinau	*Elaeocarpus dentatus*
hook grass	*Uncinia uncinata*
houhere	*Hoheria populnea*
kahikatea	*Dacrycarpus dacrydioides*
kanuka	*Kunzea ericoides*
karaka	*Corynocarpus laevigatus*
karamu	*Coprosma robusta*
kauri	*Agathis australis*
kawaka	*Libocedrus plumosa*
kiekie	*Freycinetia banksii*
kiokio	*Blechnum novae-zelandiae*
kohekohe	*Dysoxylum spectabile*
kohuhu	*Pittosporum tenuifolium*
koromiko	*Hebe stricta*
kotukutuku	*Fuchsia excorticata*
kowhai	*Sophora microphylla*
lancewood	*Pseudopanax crassifolius*
large-leafed mahoe	*Melicytus macrophyllus*
mahoe	*M. ramiflorus*
maidenhair fern	*Adiantum* sp.
makamaka	*Ackama rosifolia*
mamaku	*Cyathea medullaris*
mamangi	*Coprosma arborea*
manuka	*Leptospermum scoparium*
mangrove	*Avicennia marina*
mapou	*Myrsine australis*
marsh clubrush	*Bolboschoenus fluviatilis*
matai	*Prumnopitys taxifolia*
mingimingi	*Leucopogon fasciculatus*
miro	*Prumnopitys ferruginea*
native grass	*Oplismenus imbecilis*
nettle	*Urtica incisa*
ngaio	*Myoporum laetum*

Indigenous plants	
nikau	*Rhopalostylis sapida*
northern rata	*Metrosideros robusta*
oioi	*Apodasmia similis*
parataniwha	*Elatostema rugosum*
pate	*Schefflera digitata*
pigeonwood	*Hedycarya arborea*
pingao	*Desmoschoenus spiralis*
pohuehue	*Muehlenbeckia complexa*
pohutukawa	*Metrosideros excelsa*
ponga	*Cyathea dealbata*
puka	*Griselinia lucida*
pukatea	*Laurelia novae-zelandiae*
puriri	*Vitex lucens*
putaputaweta	*Carpodetus serratus*
rangiora	*Brachyglottis repanda*
rasp fern	*Doodia media*
raupo	*Typha orientalis*
rewarewa	*Knightia excelsa*
rimu	*Dacrydium cupressinum*
ring fern	*Paesia scaberula*
saltmarsh ribbonwood	*Plagianthus divaricatus*
sea primrose	*Samolus repens*
sea rush	*Juncus kraussii*
shore bindweed	*Calystegia soldanella*
small-leaved milktree	*Streblus heterophyllus*
Spinifex	*Spinifex sericeus*
supplejack	*Ripogonum scandens*
swamp maire	*Syzygium maire*
swamp millet	*Isachne globosa*
tanekaha	*Phyllocladus trichomanoides*
taraire	*Beilschmiedia tarairi*
tarata	*Pittosporum eugenoides*
taurepo	*Rhabdothamnus solandri*
tawa	*Beilschmiedia tawa*
tawari	*Ixerba brexioides*
thread fern	*Blechnum filiforme*
ti kouka	*Cordyline australis*
titoki	*Alectryon excelsus*
toro	*Myrsine salicina*
toru	*Toronia toru*
totara	*Podocarpus totara*
towai	*Weinmannia silvicola*
tutu	*Coriaria arborea*
wharangi	*Melicope ternata*
whau	*Entelea arborescens*
wheki	*Dicksonia squarrosa*
white maire	*Nestegis lanceolata*
white rata vine	*Metrosideros perforata*
wineberry	*Aristotelia serrata*

Adventive plants	
African club moss	*Selaginella kraussiana*
apple of Sodom	*Solanum linnaeanum*
blackberry	*Rubus fruticosus*
blue pine	*Psoralea pinnata*
buffalo grass	*Stenotaphrum secundatum*
crack willow	*Salix fragilis*
Elaeagnus	*Elaeagnus* x *reflexa*
fireweed	*Senecio* sp.
gorse	*Ulex europaeus*
honeysuckle	*Lonicera japonica*
kahili ginger	*Hedychium gardnerianum*
kikuyu	*Pennisetum clandestinum*
lantana	*Lantana camera* var. *aculeata*
lupin	*Lupinus luteus*
macrocarpa	*Cupressus macrocarpa*
Mexican daisy	*Erigeron karvinskianus*
Mexican devilweed	*Ageratina adenophora*
mistflower	*A. riparia*
pampas	*Cortaderia selloanoa*
paspalum	*Paspalum dilatatum*
pine	*Pinus radiata*
poplar	*Populus* sp.
prickly hakea	*Hakea sericea*
thistle	*Carduus* sp.
tobacco weed	*Solanum mauritianum*
wattle	*Racosperma* sp.
wandering willy	*Tradescantia fluminensis*
wild ginger	*Hedychium* sp.
willow	*Salix babylonica* or *S. fragilis*
willow weed	*Polygonum* sp.

8.7 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)

Buffer
A zone surrounding a natural area which reduces the effects of external influences on the natural area. For example shrubland, scrub and exotic trees around native forested areas provide a gradation of habitats from fully modified to a natural state. This effect also applies to waterways - riparian vegetation and wetlands protect both water quality and habitat from influences arising from the surrounding land.

Community
An association of populations of plants and animals which occur naturally together in a common environment.

Diversity and Pattern
Diversity is the variety and range of species of biological communities, ecosystems and landforms. Pattern refers to changes in species composition, communities and ecosystems along environmental gradients.

Ecological District
A local part of New Zealand where geological, topographical, climatic and biological features and processes, including the broad cultural pattern, interrelate to produce a characteristic landscape and range of biological communities.

Ecological Region
A group of adjacent Ecological Districts which have diverse but closely related characteristics, or in some cases a single very distinctive Ecological District.

Ecological unit
Vegetation type occurring on a particular landform or soil or rock type.

Ecosystem
Any inter-related and functioning assemblage of plants, animals and substrates (including air, water and soil) on any scale including the processes of energy flow and productivity. (Myers et al. 1987)

Endemic
Occurring naturally in, and restricted to, a particular country, region or locality.

Exotic
Introduced from outside New Zealand.

Fernland
Dominated by ferns such as *Gleichenia*, bracken, tree ferns, with occasional woody plants.

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.

Flood forest
Forest situated on a floodplain alongside a stream/river and subject to periodic inundation by floodwaters.

It is characterised by species such as ti kouka, kowhai, kahikatea, pukatea, kaikomako, titoki and divaricating shrubs. On drier areas totara, taraire, kohekohe, matai and kanuka may occur. It commonly occurs only as narrow strips due to the deforestation of flat land for pasture.

Habitat
The part of the environment where a plant or animal lives. It includes both the living and non-living features of the area.

Indigenous
Native to and occurring naturally within the New Zealand Biogeographic region.

Landform
A part of the land's surface with distinctive naturally formed physical characteristics e.g. a hill, valley, etc.

Linkages/Corridors
Vegetated or aquatic areas (can be forest, shrubland, wetland, streams, beach or exotic vegetation such as pine) that link up two or more habitats. With a link between habitats the gene pool for a species is greater, which enhances the viability of that population. The corridor does not have to be continuous for many species to utilise it. Small remnants can act as stepping stones between two larger habitats so that birds such as kiwi can move from remnant to remnant up to 500 m apart.

Natural area
A tract of land which supports natural landforms and predominantly native vegetation or provides habitat for indigenous species; identified as a unit for evaluation of ecological quality and representativeness and has potential to be ecologically significant.

Naturalness
The degree to which a habitat is modified and disturbed by human activity or introduced plants and animals and what natural values are retained despite these factors, i.e. to what extent native species are functioning according to natural processes.

Rarity
This is a measure of commonness and may apply to entire ecosystems through to single species. It may refer to the threatened status of a species (see Appendix 8.3) or habitat type in any one of the following ways: formerly common but now rare; rare elsewhere but common in the district; rare in the district but common elsewhere; confined to a limited geographic area; at the limit of its range; or with a contracting or fragmented range.

For example, old-growth alluvial swamp forests are an extremely rare ecosystem type in Northland, and indeed nationally, even though they contain no species which are regarded as rare in themselves.

Reedland
A swampy area dominated by reeds such as raupo, *Eleocharis, Glyceria,* harakeke.

Refuge
Native bush enclaves in production pine forest become a refuge for some native species during the logging phase. For example, they allow bird species, such as kiwi, a retreat from logged areas.

Representativeness
The extent to which an area represents or exemplifies the components of the natural diversity of the ecological district. This implies consideration of the full range of natural ecosystems and landscapes that were originally found in the ecological district, how well they are represented in today's environment, and the extent to which they are included in the protected areas network.

Riparian functions
Riparian vegetation performs important functions such as providing corridors linking habitats and providing shading to streams, which is important in Northland, with many streams having small catchments, the water temperature can rise depleting the available oxygen and leading to the death of aquatic life. Litter debris enters into the nutrient cycle with invertebrates like mayfly, caddisfly and stonefly feeding on it. Riparian vegetation acts as a filter for non-point water discharges.

Riparian zone
An area of land immediately adjacent to a watercourse.

Rush/Sedgeland
Swampy areas dominated by rushes, sedges, or rush-like sedges, e.g. *Baumea, Juncus* (rush), *Carex*, *Schoenus, Isolepis,* marsh clubrush.

Scrub
Refers to seral communities, often dominated by or with a large component of exotic species such as gorse, *Hakea,* tobacco weed, etc. and/or commonly lacking a closed canopy and in which an understorey is either absent or composed primarily of exotic species.

Secondary vegetation
Native vegetation established after destruction or disturbance of the previous vegetation and which is essentially different from the original vegetation. (See Succession, below).

Seral
Describes a plant community in the process of succession.

Shrubland
Vegetation in which the canopy is dominated by woody plants less than 10cm diameter at breast height.

There are 2 main types:

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

As used in this report it implies a closed canopy and in more advanced stages contains an understorey of indigenous species.

(ii) Seral vegetation where the rate of further succession is extremely slow, being limited by abiotic factors such as soil structure and fertility, wind shear, etc., e.g. Gumland manuka shrubland, 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.

Some small habitats occurring in close geographical proximity, with similar characteristics and functions, have been grouped and addressed as one site, e.g small broadleaf remnants.

Some large contiguous habitats have been subdivided into separate sites on the basis of catchment or vegetation type, for convenience of administration.

Succession
The process of change in the appearance, composition and structure of a community, usually over a period of time. Change may be due to natural or human-induced factors, or both. For example the colonisation of bare rock, or soil by algae and lichens ending with a stable climax community in equilibrium with the environment. Secondary succession occurs where the original vegetation has been destroyed, e.g. by fire.

Survey no.
The identifier number given to each site. The first three figures refer to the NZMS 260 topographical map sheet that the habitat is on.

Sustainability
The long-term ecological viability of a natural area. This is related to the size and shape of the area as well as to threats from introduced pests.

Swamp
Fertile or eutrophic wetland, usually dominated by raupo, *Carex*, *Baumea articulata*, harakeke and ti kouka.

Swamp forest
A forest type containing water tolerant trees and swamp species such as kahikatea, swamp maire, and pukatea. It may occur on alluvial valley areas but also occurs on poorly drained, semi-level sites within forests at higher altitudes.

Swamp shrubland
A transitional type with woody co-dominants like *Coprosma propinqua*-manuka-ti kouka with putaputaweta, *Coprosma tenuicaulis*, and other divaricating shrubs.

Toeslope
The area at the base of a slope where debris and topsoil have accumulated and often more fertile than higher up the slope.

Vegetation type
Defined by the dominant canopy species and the structure of the vegetation e.g. taraire forest, manuka shrubland

Viability
The ability of an area's natural communities to maintain themselves in the long term in the absence of particular management efforts to achieve this. Regeneration and vigour of species within these communities and stability of communities and processes contribute to viability.

Wetland
An area of land that is permanently or intermittently waterlogged and supports flora and fauna adapted to wet conditions. Wetland is used as a broad definition for several types of aquatic systems, e.g. swamps, bogs and ephemerals.

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