Natural areas of Kaipara Ecological District (Northland Conservancy)

Reconnaissance survey report for the Protected Natural Areas Programme

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M.C. Smale, B.R. Clarkson, B.D. Clarkson, C.G. Floyd, T.S. Cornes, F. M. Clarkson, D.C. Gilmour, T.M. Snell, C.M. Briggs

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Department of Conservation
Northland Conservancy
PO Box 842
149-151 Bank Street
Whangarei 0140
New Zealand

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Foreword

This report forms part of a series of reconnaissance survey reports for the Protected Natural Areas Programme (PNAP) in the Northland Conservancy of the Department of Conservation. It describes the significant natural areas of the Northland Conservancy portion of Kaipara Ecological District, which were surveyed in the summer of 2006–2007. To date, there has been no comprehensive review of ecological information of this geographic area. This report provides a significant information resource for the Department of Conservation, Northland Regional Council, Kaipara District Council, iwi, landowners, planners, interest groups, and the general public to further the conservation of remaining natural areas.

The Northland Conservancy portion of Kaipara Ecological District encompasses a long narrow strip mostly of consolidated sand country, bordered for much of its length by the Kaipara Harbour and its northern extension, the Northern Wairoa River. The harbour, the largest in New Zealand and the Southern Hemisphere, is a nationally and internationally important habitat for migratory and non-migratory bird species. Terrestrial indigenous ecosystems are almost all secondary and much fragmented; notable exceptions are the two oustanding old-growth forest remnants at Pouto and the largest gumland left in lower Northland, at Maitahi. The most extensive are kanuka forest/shrubland and coastal sand dunes, especially the very extensive and extremely important Pouto dune system in the southwest corner of the district. Wetlands, both freshwater and estuarine, flaxland, and manuka shrubland are also significant.

This study provides an objective assessment of the ecological value of the remaining natural areas, both protected and unprotected, of the District. The subsequent need is then for the community to work collaboratively to protect the better of these areas.

The Kaipara (Northland Conservancy) PNAP survey report was prepared by Landcare Research and the University of Waikato under contract to the Department of Conservation.

Chris Jenkins

Conservator Northland

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Abbreviations used in this report

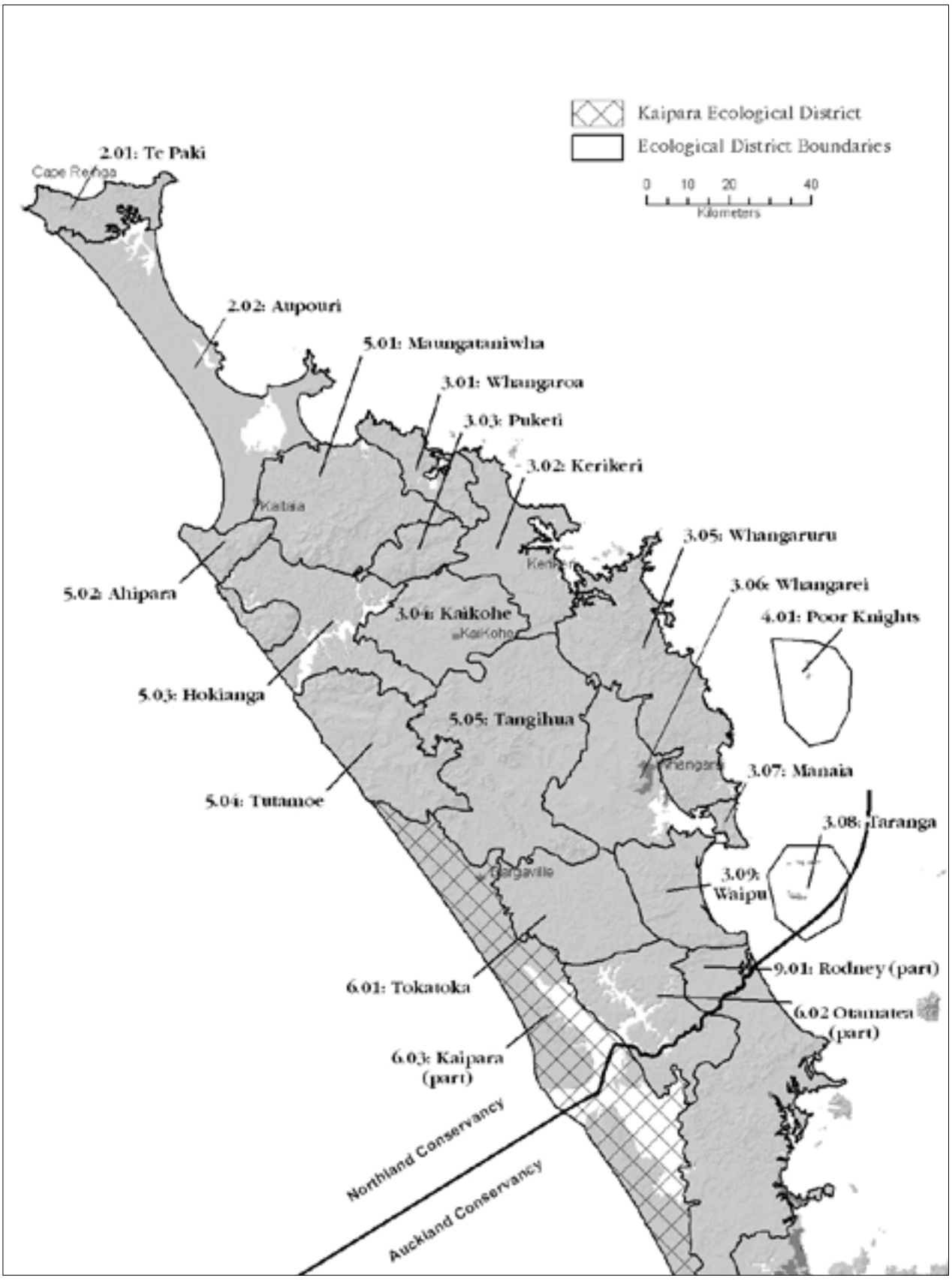
BP	before present
CA	Conservation Area
CSN	Classified Summarised Notes in Notornis, the Journal of the Ornithological Society of New Zealand
DOC	Department of Conservation
ED	Ecological District
FSU	Fauna Survey Unit
GPWMR	Government Purpose Wildlife Management Reserve
HA	Historic Area
HR	Historic Reserve
MfE	Ministry for the Environment
MS	Marginal Strip
NIWA	National Institute of Water and Atmospheric Research
NRC	Northland Regional Council
NZWS	New Zealand Wildlife Service
OSNZ	Ornithological Society of New Zealand
QEII	Queen Elizabeth II
RMA	Resource Management Act
SR	Scientific Reserve
WMR	Wildlife Management Reserve
WR	Wildlife Reserve

ABSTRACT

Kaipara Ecological District lies in the Kaipara Ecological Region. The portion in the Northland Conservancy encompasses the western coast of Northland between Maunganui Bluff and North Kaipara Head, including what is known colloquially as the 'Pouto Peninsula', and the adjacent Kaihu River valley and Ruawai Plains, and covers a land area of 87 700 ha. Natural areas of ecological significance in Kaipara Ecological District (Northland Conservancy), hereafter Kaipara ED (Northland), were identified from a reconnaissance survey undertaken over the summer of 2006/2007, together with existing published and unpublished information.

Kaipara ED (Northland) embraces one of the most extensive and least modified duneland and wetland complexes in the country, of regional, national, and international significance. The District encompasses a long narrow strip mostly of consolidated sand country, bordered for much of its length by the Kaipara Harbour and its northern extension, the Northern Wairoa River. The harbour is a nationally and internationally important habitat for migratory and non-migratory bird species. Estuarine and harbour areas in the Ecological District support populations of eight 'acutely threatened', five 'chronically threatened', and eight 'at risk' bird species. Remaining indigenous ecosystems are mostly secondary and much fragmented. The most extensive are kanuka forest/shrubland and coastal sand dunes, notably the very extensive Pouto dune system, one of the best examples of a large, relatively unmodified sand dune systems remaining in New Zealand. Wetlands, both freshwater (especially those at Omamari and Maitahi) and estuarine (especially the Kaipara estuaries), flaxland, and manuka shrubland are also significant. Tall forest of any kind is rare, old-growth forest extremely rare. The old-growth forest remnants, Tapu Bush and Pretty Bush, at Pouto are outstanding. Dune lakes are a feature of the western side of the ED and have been augmented in recent decades by farm ponds.

A total of 113 natural areas was identified, comprising a total area of 23 652 ha (including fresh and the estuarine waters of Kaipara Harbour). Of these, 62 are considered to be of particular ecological significance (Level 1 sites). Although much of the former indigenous biodiversity of Kaipara ED (Northland) has undoubtedly been lost, 13% of the land area remains under indigenous vegetation. A relatively high proportion (54%) of the identified natural areas (excluding estuarine waters) is also currently legally protected, comprising 8% of the total extent of Kaipara ED (Northland). However, some ecosystems (tall forest, flaxland) are under-represented in the existing reserves network. Some 11% by area of remaining natural areas fall within land environments classified as Acutely or Chronically Threatened, but the current level of protection in any of these land environments does not exceed 2%. Twenty-one sites covering some 4% of the land area of the ED have been recommended as having priority for protection.



Map 1. Location map of Kaipara Ecological District (Northland Conservancy). Brook 1996

1. Introduction

1.1 THE PROTECTED NATURAL AREAS PROGRAMME

The Protected Natural Areas Programme (PNAP) was established in 1982 to implement Section 3 (b) of the Reserves Act 1977:

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

The goal of the programme is:

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

The specific aim of the PNAP is to identify, by a process of field survey and evaluation, natural areas of ecological significance throughout New Zealand that 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 that are special or unique.

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

This report differs from many PNAP reports in that:

- it is based mainly on a reconnaissance survey of all natural areas supplemented by existing published and unpublished information; and
- it includes descriptions of all natural areas within the study area.

All natural areas described have been evaluated and classified using two levels of significance, based on specified criteria (see Section 2.4). Thus evaluation is not confined to recommended areas for protection (RAPs), as is the case in many PNAP reports outside of Northland.

This approach was adopted so that the survey report better meets the broader information requirements of the Department of Conservation arising from the Resource Management Act 1991 (RMA), the Convention on Biological Diversity (Anon 1992), and the more recent New Zealand Biodiversity Strategy (Anon 2000).

The Purpose and Principles of the RMA 1991 are set out in Part II of that Act and include:

- safe-guarding 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.

Of particular relevance is Section 6 (c) of the RMA 1991, which lists as a 'matter of national importance':

> *The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna.*

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 considerable diversity of indigenous plant and animal communities. In recognition of the biogeographic variation New Zealand, a classification of Ecological Regions and Districts has been established (McEwen 1987). An Ecological District (ED) is a local part of New Zealand where the topographical, geological, climatic, pedological, and biological features, including the broad cultural pattern, produce a characteristic landscape and range of biological communities. Ecological Districts are grouped together into Ecological Regions on the basis of shared general geological and ecological 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 mapping of the country into more than 268 Districts in 1982. Ecological Regions and Districts in northern New Zealand have since been refined to classify ecological variation more accurately (Brook 1996).

The PNAP programme uses the Ecological District system as a framework throughout the country for determining the ecological significance, including representativeness, of remaining natural areas.

1.3 CONTENTS OF THIS REPORT

This report presents the findings of a PNAP survey of the Kaipara ED (Northland). The methods and terminology follow those defined and specified in the Otamatea Ecological District PNAP report of Lux and Beadel (2006) except that the vast majority of natural areas were surveyed on site and assessed using a LENZ framework (Leathwick et al. 2002). This report includes maps and brief descriptions of all of the indigenous natural areas within the ED which were surveyed during the summer of 2006/2007, together with an analysis of the main vegetation types and information on threatened species and other taxa of scientific and/or conservation interest.

Two 'Nationally Important' soil sites occur within Kaipara ED (Northland): Kaipara Soils at Kidd's Open Space covenant at Tatarariki, and unspecified soil types (aeolian sand, alluvium, and peat) at Pouto Point Wildlife Reserve (Arand et al. 1993). Three 'Nationally Important' geological sites and landforms occur: lignites and dune sands at Bayly's Beach; the dammed dune lakes at Kai Iwi; and the extensive dune system at Pouto (Kenny & Hayward 1996). See Appendix 3 for ranking criteria.

1.4 KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

Kaipara ED (Northland) covers a land area of approximately 87 700 ha, encompassing a long, narrow strip of mostly consolidated sand country between Maunganui Bluff and North Kaipara Head, including what is colloquially known as the 'Pouto Peninsula'. It is bordered for much of its length by the long, convoluted coastline of the Kaipara Harbour and its northern extension, the Northern Wairoa River on the eastern side, and by the Tasman Sea on the west. Significant natural features of particular note are:

- The Kaipara Harbour and its estuaries at Pouto that provide habitat for a range of estuarine wetland flora and fauna. They are nationally and internationally important feeding and roosting grounds for migratory waders such as godwits, and also constitute an important habitat for resident species such as rails, herons, gulls, terns, shags, and fernbirds.
- The dune lakes along the western coast, particularly in the north at Kai Iwi, west of Dargaville, and south at Pouto. They have been augmented in recent decades by farm ponds. Both provide habitat for a range of wetland flora and fauna. Fauna includes species such as grebes, waterfowl, rails, and shags, including some rarer species such as banded rail and spotless crake (both sparse).
- The very extensive Pouto dune system and its associated lakes and wetlands that provides habitat for a range of littoral, sand dune, and freshwater wetland flora and fauna. Fauna include resident waders

(such as dotterels and oystercatchers), rails, herons, gulls, terns, shags, fernbirds, katipo, and the moth *Notoreas* sp. "northern".

- Two substantial remnants of old-growth forest, Tapu Bush and Pretty Bush, on sand dunes at Pouto.
- The large gumland-wetland complex at Maitahi.

Kaipara ED adjoins four other Ecological Districts: Tutamoe to the north, Tangihua to the northeast, Tokatoka to the east, and Otamatea to the southeast.

Of the natural areas identified, comprising some 23 652 ha, < 1% (324 ha) of the total area is forest, 17% (4037 ha) forest/shrubland, 4% (901 ha) shrubland, 3% (687 ha) flaxland, 4% (857 ha) freshwater wetland (including small areas of open water), 2% (532 ha) open water, 4% (1027 ha) estuarine wetland, 47% (11145 ha) estuarine waters (Kaipara Harbour), and 16% (3818 ha) sand communities.

2. Methods

2.1 GENERAL APPROACH

Between 1994 and 1996, reconnaissance surveys using rapid semi-quantitative methods were carried out in 12 Ecological Districts in the northern sector of Northland, to obtain information on the composition, extent, and ecological values of remaining indigenous natural areas. A rapid survey method was selected by DOC because of time constraints for the field survey, the extensive areas to be covered, and because it could be easily applied to all natural areas. These methods were also specified by DOC for the present study, in order to achieve consistency in information between surveys over several decades.

For the present survey, natural areas (henceforth called 'sites') were identified regardless of tenure using recent aerial photography (orthophotography flown in 2002 for Northland Regional Council and Kaipara District Council) and the Sites of Special Biological Interest (SSBI) information system held by DOC. Consequently, sites administered by DOC as well as other protected areas were surveyed using the same methods, providing a consistent approach to determine the representativeness of all sites.

Each site was mapped, allocated a specific number, and described. After evaluation, each site was allocated to one of two levels of ecological significance.

Scientific names of species for which common names have been used are given in Appendix 6 (flora) and Appendix 8 (fauna).

Extensive use was made of information from biological databases and information systems such as the SSBI, the Bioweb Threatened Plants and

Herpetofauna Databases, the NIWA Freshwater Fish Database (NIWA 2007), published information and DOC internal reports. Herbarium records from Auckland Institute and Museum (prefixed 'AK '), Te Papa, Wellington (prefixed 'WELT '), and the Allan Herbarium (prefixed 'CHR ') were also consulted. Geographical and geological information was gained from existing published and unpublished maps.

2.2 CONSULTATION WITH LANDOWNERS

Initially, all ratepayers were advised by the Northland Conservator of DOC by letter (Appendix 2) of the survey programme and the reasons for it, and a press release on the survey methods featured in the local newspapers (see Appendix 2). In most instances, permission for access was sought from landowners in person, including Te Uri o Hau; with one exception this was obtained.

2.3 DATA ACQUISITION AND ANALYSIS

Methods followed those prescribed by DOC (see Lux & Beadel 2006) but additionally, an effort was made to visit all sites and assess ecological units (vegetation composition and structure, and landform) on site following Myers et al. (1987). The location of each site was recorded by Global Positioning Systems (GPS). In each ecological unit, the composition and relative abundance of canopy plant species was recorded on the field survey form (Appendix 1) in four categories: greater than 50% cover 'abundant'; 20–50% cover 'common'; 5–20% cover 'frequent'; and less than 5% cover 'occasional'. Dominant species in understorey and ground cover layers were also recorded, and at several of the better sites, comprehensive vascular plant species lists were compiled. Fauna observations during the survey were incidental only.

All field data from each site were entered into a Microsoft Excel spreadsheet. The canopy vegetation composition of ecological units was then classified by multivariate cluster analysis within PATN (Belbin 1995) to delineate the major vegetation types of Kaipara ED (Northland). Specifically, the cluster analysis was agglomerative and hierarchical using the Bray and Curtis similarity index. Vegetation types are named based on 'abundant' (species which form > 50% of the canopy) or 'common' (20–50% of the canopy) species, and structure. If there are no abundant or common canopy species, vegetation types are named based on 'frequent' species (which form 10–20% of the canopy). Structural names follow Myers et al. (1987), except scrub and shrubland are both referred to as shrubland. Each site was mapped by GIS, including where possible, the ecological units identified in the field. In some cases where two or more ecological units occurred in a fine mosaic and/or could not be distinguished clearly on aerial photographs, they were mapped as a single unit.

In contrast to previous Northland PNAP surveys, the LENZ classification

(Leathwick et al. 2002) was used to provide the underlying environmental framework within which sites were assessed. Levels II and IV were used to provide a broad environmental framework (at which 7 and 13 environments respectively were mapped) and a national biodiversity priorities framework, respectively. The representativeness of each ecological unit was assessed based on distribution, extent, existing degree of statutory protection, and threat classification (MfE 2007) of each land environment.

Other relevant information such as condition, threats, and site history and management (from landowners) was also recorded for each site. After completion of the field survey, sites were numbered and information from other databases and information systems incorporated into the site descriptions. Copies of completed field survey forms are held by the Northland Conservancy of the Department of Conservation.

After the field survey, 5 wetlands, Omamari GPWMR (P07/127), Maitahi Wetland SR (P07/133), Lake Rotopouua (P09/014), and Lakes Oteone and Matthews (P09/001), representative of the range present in Kaipara ED (Northland), were selected for research on the biotic composition of New Zealand wetlands within the FRST-funded Maintaining and Restoring Wetlands programme. Vegetation, invertebrate, and nutrient data were collected and entered into the National Wetlands Database at Landcare Research, Hamilton. Maitahi Wetland SR (P07/133) was selected as a representative 'gumland' (northern heathland) site for a comprehensive ecological survey of the Northland gumlands in the summer of 2007/2008 in the FRST-funded Maintaining Threatened Rare Ecosystems programme.

2.4 CRITERIA FOR ASSESSMENT OF THE SIGNIFICANCE OF ECOLOGICAL UNITS

Following on from the use of the LENZ framework, sites were also assessed using the criteria of Conning et al. (2004).

All sites meet at least one of the following criteria:

- They are predominantly indigenous in character, by virtue of physiognomic dominance in or species composition of 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 or regionally uncommon or much reduced from its former extent.

The conservation values of these sites 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, and characteristics such as buffering, linkages or corridors, size and shape, and long-term viability that are important for the maintenance of ecosystems (Table 1).

2.4.1 Level 1 sites

A level 1 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 (cf. Lux & Beadel 2006), except where the level of modification meets Level 2 criteria.

- 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.
- 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.
- Contains the best representative examples in the Ecological District of a particular ecological unit or combination of ecological units.
- Has high diversity of taxa or habitat types for the Ecological District.
- Forms ecological buffers, linkages or corridors to other areas of significant vegetation or significant habitats of indigenous fauna.
- Contains habitat types that are rare or threatened in the Ecological District or regionally or nationally.
- Supports good populations of taxa which are endemic to Northland.
- Is important for endemic and indigenous migratory taxa.
- Covers a large geographic area relative to other similar habitat types within the Ecological District.

2.4.2 Level 2 sites

A Level 2 site (Lux & Beadel 2006) supports populations of indigenous flora and fauna, and meets one or more of the following criteria:

- 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 adventive species;
- may be structurally modified, e.g., has a grazed forest understorey;
- has not been surveyed sufficiently to determine whether it meets the criteria for Level 1 sites.

TABLE 1: LINKS BETWEEN THE PNAP CRITERIA AND LEVELS 1 AND 2

PNAP CRITERIA	LEVEL 1	LEVEL 2
Representativeness	Contains one or more of the best examples of ecological units representative of the diversity in the Ecological District. Includes ecological units with high representative value, e.g., severe depletion from original extent, and/or high representative quality, e.g., highest level of naturalness, diversity, in the best condition. Supports good populations of taxa which are endemic to Northland-Auckland.	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. 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. Contains habitat types that are rare or threatened in the Ecological District or regionally or nationally. Is important for endemic and indigenous migratory taxa.	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.	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.	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.	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.

3. Ecological character

3.1 TOPOGRAPHY/GEOLOGY

The salient geographical features of the ED are the broad Northern Wairoa River (comprising the upper arm of the Kaipara Harbour) in the east, the narrow, shallow Kaihu River valley in the northeast, the substantial Ruawai Plains ('Ruawai Flats') in the southeast, the long, narrow, hilly Pouto Peninsula in the south, and the long sandy coastline in the west. The massifs of Maunganui Bluff (459 m asl) and Mt Tutamoe (at 774 m, the second highest peak in Northland) overshadow the northern part of the ED but lie outside it. Elsewhere, topography is predominantly rolling low hills (highest points Puketi Hill 282 m asl in the north, Muarangi Hill 214 m in the south) with intervening shallow basins and valleys. Dune lakes are a feature of the western side of the ED, particularly in the north at Kai Iwi (largest, Lake Taharoa), west of Dargaville and south at Pouto (largest, Lake Mokeno), and have been augmented in recent decades by farm ponds. The larger Kai Iwi lakes, Taharoa and Waikere, are the deepest (37 m, 30 m respectively) dune lakes in New Zealand (Tanner et al. 1986).

With a shoreline of 3500 km, the Kaipara Harbour is the largest in New Zealand. The north and south Kaipara barriers forming the seaward boundary to the harbour comprise Quaternary dune sand. Consolidated and leached early Pleistocene sands outcropping along the western sides of both barriers are dissected by steep-sided eastwards-draining valleys floored by Holocene alluvial, swamp and estuarine deposits. Younger Pleistocene consolidated sands with partly eroded dune morphology outcrop west of the older sands at up to 214 m elevation. They extend to the west coast forming an eroding, cliffed coastline along the northern part of the north Kaipara barrier, but further south are mantled to seawards by unconsolidated Holocene dunefields with common interdune wetlands. There are also extensive flats of Holocene alluvial swamp and estuarine deposits in the Dargaville and Ruawai areas.

3.2 CLIMATE OF KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

Like much of Northland, Kaipara ED (Northland) has a mild climate because of its northern latitude, proximity to the sea (no part of the ED is more than 8 km from the coast), and low relief (maximum elevation is less than 300 m asl and most of the ED is much lower). Summers are warm and humid and winters mild (New Zealand Meteorological Service 1985). Although mean annual temperature is mapped as 12.5 to 15°C (Wards 1976), the mean annual temperature at Pouto of 17.2°C between 1993 and 2004 (Pearce et al. 2005) was significantly warmer.

Mean annual rainfall is somewhat variable, averaging 800–1200 mm on the Pouto Peninsula and 1200–1600 mm in the northern third of the ED, spread over 120–150 days per year and with a winter maximum. The ED is moderately windy, with winds of all speeds having a slight sou'westerly predominance (Wards 1976; New Zealand Meteorological Service 1985).

3.3 SOILS OF KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

Soils of the Pouto Peninsula and its northern extension to Maunganui Buff fall into two broad categories: sands on the rolling hills and organic soils in the intervening shallow basins. Sandy soils are recent (Holocene) sands at three stages of development and fertility (Taylor & Pohlen 1954; Burridge 1964; Cox 1977). The youngest and most fertile type is Pinaki Sand, well drained and nearly neutral; the oldest and least fertile is Te Kopuru Sand, a poorly drained, acidic soil with a peaty subsoil. Intermediate between them is Red Hill Sand, well drained and mildly acidic. Organic soils (poorly drained acidic peats) occur locally in low-lying basins. Recent soils from alluvium occupy the floor of the Kaihu River valley, while lower flats of the Pouto Peninsula and the Ruawai Plains are characterised by Kaipara Soils, gley soils with heavy clay textures derived from estuarine alluvium (Taylor & Pohlen 1954).

3.4 HISTORY OF KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

Before human settlement of New Zealand 800 years BP (McGlone & Wilmshurst 1999), most of Kaipara ED (Northland) would have supported dense rain forest. Pollen and charcoal analyses from Northland show that fire and fire-tolerant heathland was abundant during the last Ice Age (14 000–10 000 years BP), decreased during most of the Holocene (began 10 000 years BP), and then increased dramatically after the arrival of humans (Dodson et al. 1988). During the Polynesian period (800–200 years BP), about half of New Zealand was cleared by fire, mostly in the lowlands (McGlone 1983).

There are several recent local histories of the region (e.g., Bradley 1982; Forrest 1984; Ryburn 1999; Byrne 2002) as well as more general texts (e.g., McKinnon 1997). Like most of the coastal north, parts of Kaipara ED such as Pouto (settled by the 15th century but probably earlier, and the centre of the Ngati Whatua subtribe Te Uri o Hau from the late 17th/early 18th century) and the Kaihu valley supported substantial Maori populations in the past. There was extensive gardening on the older, consolidated sands of the ED, and it is likely to have had a long fire history, facilitated by seasonal (summer) droughts and the drought-prone nature of most of the (sandy) soils. Although largely depopulated by internecine warfare in the 1820s, much of the ED remained in Te Uri o Hau ownership until at least the 1860s. As in much of Northland, there

was early missionary activity among Maori, with a Wesleyan church, for example, in existence at least between 1838 and 1854 at now deserted Okaro Creek (Buller 1878).

From the 1870s to the 1920s, the Northern Wairoa was a major centre of the kauri timber industry, and the first substantial European settlements were associated with it. Although some of the largest sawmills ever to operate in New Zealand were located on the river at Aoroa, Aratapu, and Te Kopuru, the timber that fed them mostly came from outside the ED; the adjacent Tutamoe, Tangihua, Tokatoka, and Otamatea EDs to the north and east were major strongholds of kauri, and the Northern Wairoa River was used extensively for transporting logs to the mills. Despite a notorious bar that claimed many ships and lives, the Port of Kaipara (1854-1947) at Pouto was for a time one of the most important in the country; the former custom house (1874) and lighthouse (1884) survive, though the wharf itself was eventually demolished. In common with much of Northland, the district was long dependent on water transport, and rail and road links were slow to develop. The Kaihu Valley railway (1882-1959), built to transport kauri timber from the north to the Port of Dargaville, was only completed in 1923 when the timber boom was ending, Pouto was only connected by road with Dargaville in 1931, and Dargaville by rail with rest of the country in 1940.

In the late nineteenth and early twentieth centuries, Dargaville (founded 1872) was a major centre of the kauri gum industry, with vast quantities extracted from kanuka/manuka shrublands and wetlands throughout the district, but particularly the eastern side of the Pouto Peninsula; colourful locality names like Babylon and Scotty's Camp bear witness to numerous onetime gumdiggers' camps. Dune stabilisation was undertaken in the 1930s on the western coast between Dargaville and Pouto (Cutten 1934; Harrison-Smith 1939), and is likely to be the origin of the scattered marram stands there.

The old-growth kahikatea forests scattered through the wetlands, especially on the Ruawai Plains, were milled for butter boxes early in the twentieth century, replacing to some extent the rapidly dwindling supplies of kauri. As throughout the country, the fertile river flats were subsequently cleared for dairying and the extant kahikatea stands comprise secondary forest that has developed since clearfelling of earlier old-growth stands. Since the Second World War, further extensive land development for agriculture has taken place, much of it on poorer soils and sponsored by the Government (e.g., the large Department of Lands and Survey schemes at Omamari and Pouto). Most remaining shrublands have been cleared and wetlands drained, and the ED is now a centre for dairying. The Ruawai Plains are also an important horticultural area, being the centre of the national kumara industry. Substantial tracts of unconsolidated sands on southern Pouto Peninsula were afforested by the Government (Pouto State Forest) and Maori landowners (Pouto Forest Farms) with radiata pine from the late 1960s onward to control eastward sand drift onto neighbouring farms.

3.6 BOTANICAL EXPLORATION OF KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

With the exception of the two best-known Pouto forest remnants (Tapu Bush and Pretty Bush) and the well-known dune lakes at Kai Iwi and Pouto, Kaipara ED (Northland) seems largely to have escaped the attention of botanists until quite recently (e.g., Andersen 1975). Pioneer missionary-botanist William Colenso visited the ED briefly in the 1880s, and described a new species of sun orchid, *Thelymitra cornuta*, from North Kaipara (Colenso 1888), later reduced to synonomy with *T. pauciflora*. Even the now well-known old-growth forest remnants at Pouto have been described only since the late 1970s. Unlike some other parts of New Zealand, there appear to have been no amateur botanists of note resident in the area. Notable recent professional collectors have been the late Dr R.C. Cooper, L.J. Forester, A.E. Wright, and E.K. Cameron. The dune lakes were first studied by Cunningham et al. (1953) as part of a much wider survey, and later by Tanner et al. (1986) and others, e.g., Wells et al. (2007). Tapu Bush was first described in some detail by Reid (1977). An Auckland Botanical Society field trip visited in 1991, leading to listing of mosses (including Pretty Bush) by Beever (1991), lichens by Hayward and Hayward (1991), and vascular plants by Wright and Young (1991). The most comprehensive survey is that of the second Auckland Botanical Society visit in 2001 (Cameron et al. 2001), whose focus naturally was on individual species rather than plant communities as a whole.

3.6 VEGETATION OF KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

3.6.1 Pre-human vegetation pattern

By the time of European settlement (1850s onward), the ED was essentially deforested, the predominant vegetation being kanuka/manuka shrubland and wetland. The Kaihu valley on the northeastern boundary supported kauri-podocarp-broadleaved forest associations typical of Northland on a variety of sedimentary and volcanic substrates; elsewhere, almost the only old-growth forest surviving was kahikatea forest on valley floors.

Forests

Old-growth forest is now extremely scarce in the ED. Nevertheless, a handful of surviving remnants of old-growth forest (Tapu Bush, Pretty Bush, Upper Okaro Bush, and Lake Humuhumu island) provides a tantalising glimpse of the pre-human forests. Kauri/broadleaved forest similar to that in much of Northland would have been widespread except on the youngest, unconsolidated sands, the oldest, poorest consolidated sands, and the organic soils of the wetlands. Kauri would have been concentrated on upper slopes and ridges. Canopies elsewhere would have been dominated by taraire and kohekohe, with puriri, titoki, and mangeao common. Totara and narrow-leaved maire would also have

been common, as emergent and canopy tree respectively, on drier sites. On sites sheltered from the prevailing drying westerlies, rimu would have been present as an emergent and towai in the canopy. Sheltered coastal valley sides would have supported coastal forest dominated by pohutukawa (absent today from most of the west coast) and karaka, along with a variety of other species now rare (e.g., whau, wharangi) or apparently absent (e.g., tawapou). Subcanopies everywhere would have been dominated by mahoe.

Swamp and semi-swamp forests would have been dominated by kahikatea, with pukatea subdominant. Kanuka forest with divaricating shrub (e.g., *Coprosma crassifolia*, korokio) understories on drier sites and sedge (*Baumea juncea*) ground layers on damper areas would have occupied unconsolidated sands in the west, as they still do at Pouto.

Shrublands

Shrub heaths dominated by scattered shrubs (manuka, *Dracophyllum*), sedges (*Baumea*, *Lepidosperma*, *Schoenus*, *Tetraria*), and ferns (*Gleichenia*) would have occupied the oldest, poorest sandy soils, and other areas laid bare by infrequent natural fires. Some relatively intact examples (albeit with some woody weed invasion) survive in the north of the ED, at Kai Iwi and Maitahi. Shrub-flaxland on the western coastal faces – too exposed to support tall forest – would have been dominated by coastal toetoe, harakeke, knobby clubrush, and mingimingi, as it is today, except that now-widespread adventive megagrass pampas would have been absent.

Wetlands

Saline and semi-saline wetlands dominated variously by mangrove shrublands or reedlands of sea rush, oioi, and *Baumea juncea* are probably the least modified plant community of the ED; they would have been much as they are today. The notable exceptions are the stands of the notorious adventive Manchurian wild rice that fringe the Northern Wairoa River and its major tributaries.

Freshwater swamps and fens would have been common on poorly drained flats, basins, and dune swales throughout the ED. High-fertility surface and groundwater-fed swamps were probably the most common type of wetland, dominated by mosaics of varying scales dominated variously by raupo, *Baumea articulata*, *Eleocharis sphacelata*, *Baumea juncea*, and *Carex secta*. Less common would have been lower fertility fens, with less through-flow of water and characterised by less fertility-demanding species such as *Baumea teretifolia*, *Schoenus brevifolius*, manuka, tangle fern, and wire rush. Adventive species like lotus that are now widespread, even ubiquitous, in intimate mixture with the still predominant native species would have been absent.

Sand dune communities

Mobile sands on frontal dunes would have supported transient plant communities very similar to those dominated by spinifex and to a limited extent, pingao, today. More consolidated rear dunes would also have

supported mixtures of megagrasses (e.g., coastal toetoe), grasses (e.g., sand wind grass), sedges (e.g., knobby clubrush), subshrubs (e.g., sand coprosma), and shrubs (e.g., tauhinu) in communities similar to those of today, with the notable exception of widespread adventive grasses like pampas and harestail and dicotyledonous herbs like iceplant and catsear, which would have been absent.

3.6.2 Current vegetation pattern

PATN cluster analysis allowed the identification of 19 major vegetation types in Kaipara ED (Northland). These comprise 5 forest types, 1 forest shrubland type, 2 shrubland types, 1 flaxland type, 5 freshwater wetland types, 2 estuarine wetland types, 1 grassland type, and 2 sandfield types.

The LENZ environmental classification was used at Level II (Table 2) to provide the underlying framework within which sites were classified. Seven environments occur in Kaipara ED (Northland), with four dominant environments. Environment A ('Northern lowlands', mostly A5) accounts for virtually three-quarters of the ED and Environment G (mostly G1 'Coastal dunes') for the remaining one-quarter. Environments A5, A6, A7, and G1 together account for some 97% of the ED.

LENZ classification at Level IV (Tables 3, 4) revealed that just over one-quarter of the area of Kaipara ED (Northland) is within 'Acutely Threatened' land environments of MfE (2007), but only 7% of the remaining natural areas surveyed are within those environments. Another quarter of the ED is within 'Chronically Threatened' land environments, but only 4% of the remaining natural areas surveyed fall within them. Nearly half the ED is 'At Risk', and most surveyed areas (89%) fall within this category. Protection of natural areas remaining in the two most threatened environments (Acutely and Chronically Threatened) is inadequate, with no more than 2% of the natural area of individual environments protected.

The 19 major vegetation types in Kaipara ED (Northland) are described below, and their respective areas by LENZ classes are included in Table 5. In summary, the key features of the current vegetation pattern of the Kaipara ED (Northland) are

- its overwhelmingly secondary nature;
- its fragmented character;
- the importance of coastal habitats (sandfield on dunes, flaxland on coastal faces, and estuarine habitats in saltmarshes); and
- the minimal amount of old-growth forest.

The large tracts of old-growth forest that are so characteristic of the adjacent Tutamoe ED are completely absent – in fact, old-growth forest scarcely exists in the ED now. Unlike more remote parts of Northland, where secondary succession back to predominantly native plant communities on abandoned marginal land has led to the re-connecting of fragments, land clearance for agriculture and consequently, fragmentation; have continued to the present day in Kaipara ED (Northland).

TABLE 2: LAND ENVIRONMENTS OF KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

LENZ LEVEL II	CLIMATE	LANDFORM	SOILS	PERCENTAGE OF KAIPARA ED (NORTHLAND)
Northern lowlands				
A4	Very warm, very sunny, slightly drought-prone	Gently rolling hills	Poorly drained fertile saline soils	< 1
A5	Very warm, sunny, slightly drought-prone	Gently rolling hills	Poorly drained infertile peat and alluvium	42
A6	Warm, very sunny, slightly drought-prone	Rolling hills	Imperfectly drained infertile sedimentary soils	22
A7	Warm, very sunny, slightly drought-prone	Gently rolling hills	Well drained, fertile volcanic soils	10
Northern hill country				
D1	Warm, very sunny, slightly drought-prone	Strongly rolling hills	Well drained, fertile volcanic soils	<1
Northern recent soils				
G1	Very warm, very sunny, moderately drought-prone	Gently rolling coastal dunes	Well drained infertile sils from dune sands.	23
G3	Very warm, sunny, moderately drought-prone	Flood plains	Imperfectly drained infertile alluvial soils	2

TABLE 3: THREAT CATEGORIES AND PROTECTION STATUS OF LAND ENVIRONMENTS IN KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

Categories from MfE (2007). Acutely Threatened: < 10% of indigenous vegetation left. Chronically Threatened: 10–20% of indigenous vegetation left. At Risk: 20-30% of indigenous vegetation left.

THREAT CLASSIFICATION	LENZ LEVEL IV	TOTAL AREA IN KAIPARA ED (NORTHLAND) (HA)	TOTAL NATURAL AREA SURVEYED IN KAIPARA ED (NORTHLAND) (HA)	TOTAL PROTECTED AREA IN KAIPARA ED (NORTHLAND) (HA)	PERCENTAGE OF THE SURVEYED NATURAL AREA ALREADY PROTECTED IN KAIPARA ED (NORTHLAND)
Acutely Threatened	A5.1b	23 460	731	226	1
	A5.1c	654	3	0	0
	G3.1a	271	0	0	0
Chronically Threatened	A5.2a	12 621	306	100	< 1
	A6.1d	348	7	7	2
	A7.1a	49	3	0	0
	A7.3a	8755	98	31	< 1
At Risk	A4.1a	368	117	65	18
	A6.1b	17 017	1145	442	3
	A6.1c	2257	110	17	<1
	G1.1c	20 311	7692	5098	25
	G3.1b	1346	111	0	0
Less reduced and better protected	D1.1a	94	13	0	0

TABLE 4: AREA OF THREATENED LAND ENVIRONMENTS (LENZ LEVEL IV) AT PNAP SITES IN KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

Acutely Threatened: < 10% of indigenous vegetation left; Chronically Threatened: 10–20% of indigenous vegetation left; At Risk: 20-30% of indigenous vegetation left.

SITE	THREATENED ENVIRONMENT	LENZ Level IV	AREA (HA)
O07/011	Chronically Threatened	A7.3a	0.2
	At Risk	G1.1c	4.6
O07/011	Acutely Threatened	A5.1b	46.4
	Chronically Threatened	A7.1a	3.6
		A7.3a	3.4
	At Risk	A6.1b	7.0
		A6.1c	18.2
O07/012	Chronically Threatened	A5.1b	30.5
		A7.3a	3
	At Risk	A6.1b	0.6
O07/014	At Risk	A6.1b	3.0
		A6.1c	6.7
O07/015	Acutely Threatened	A5.1b	2.2
	Chronically Threatened	A5.2a	4.3
	At Risk	A6.1b	2.3
		A6.1c	13.2
O07/016	Chronically Threatened	A7.3a	2.4
	At Risk	A6.1b	5.8
		A6.1c	0.2
		G1.1c	60.6
O07/017	At Risk	A6.1b	1.6
		A6.1c	0.7
O07/018	Chronically Threatened	A5.2a	8.5
	At Risk	A6.1c	10.3
O07/022	Chronically Threatened	A5.2a	30.8
	At Risk	A6.1b	0.4
		A6.1c	0.6
O07/024	Chronically Threatened	A5.2a	6.4
	At Risk	A6.1b	0.2
		A6.1c	2.3
O07/025	At Risk	A6.1b	0.1
		G1.1c	2.9
O07/026	Acutely Threatened	A5.1b	2.4
	At Risk	A6.1b	0.9
		A6.1c	1.1
		G1.1c	3.8
O07/027	Chronically Threatened	A5.2a	36
	At Risk	A6.1b	0.9
		A6.1c	14.6

SITE	THREATENED ENVIRONMENT	LENZ Level IV	AREA (HA)
P07/025	At Risk	A6.1b	6.9
		A6.1c	0.8
P07/061	Acutely Threatened	A5.1b	3.1
	Chronically Threatened	A5.2a	1.8
		A7.3a	3.3
	At Risk	G1.1c	297.7
P07/120a	At Risk	A6.1c	2.1
	Chronically Threatened	A5.2a	1.4
P07/120b	Chronically Threatened	A5.2a	1
P07/121	Chronically Threatened	A5.2a	1.4
P07/121a	Chronically Threatened	A5.2a	0.3
	At Risk	A6.1c	0.3
P07/124a	Chronically Threatened	A7.3a	2
P07/125	Acutely Threatened	A5.1b	0.8
	At Risk	A6.1b	9.9
		A6.1c	10.4
P07/127	Acutely Threatened	A5.1b	59.1
	Chronically Threatened	A5.2a	16.4
		A7.3a	4.7
	At Risk	A6.1b	94.4
		A6.1c	2.3
P07/130	Acutely Threatened	A5.1b	2.4
	Chronically Threatened	A7.3a	2.1
	At Risk	G1.1c	111.3
P07/131	Chronically Threatened	A5.2a	5.7
	At Risk	A6.1b	0.2
P07/132	Acutely Threatened	A5.1b	5.3
	Chronically Threatened	A5.2a	4.6
	At Risk	A6.1b	5.6
P07/133	Acutely Threatened	A5.1b	130.1
	Chronically Threatened	A5.2a	126.6
	At Risk	A6.1b	92.8
P07/134	Acutely Threatened	A5.1c	0.8
	At Risk	G3.1b	10.8
P07/135	Chronically Threatened	A5.2a	
	At Risk	G3.1b	39.9
P07/136a	Chronically Threatened	A5.2a	6.8
P07/138	Chronically Threatened	A7.3a	0.9
	At Risk	G1.1c	0.8
P07/140	Acutely Threatened	A5.1b	5.7
	Chronically Threatened	A5.2a	0.8
P07/141	At Risk	G3.1b	10.3
P07/141a	Acutely Threatened	A5.1b	0.6
P07/142	Acutely Threatened	A5.1b	1.3
	At Risk	G3.1b	7.8

SITE	THREATENED ENVIRONMENT	LENZ Level IV	AREA (HA)
P07/145	Acutely Threatened	A5.1b	3.2
	Chronically Threatened	A7.3a	2.3
P07/148	At Risk	G3.1b	2
P07/149	At Risk	G3.1b	3.8
P07/150	Acutely Threatened	A5.1b	0.9
	Acutely Threatened	A5.1c	2.6
	At Risk	A6.1b	0.1
		G3.1b	2.9
P07/153	Acutely Threatened	A5.1b	14.7
	Chronically Threatened	A5.2a	22.4
P07/154	Chronically Threatened	A5.2a	1.6
	At Risk	A6.1b	0.4
		A6.1c	0.6
P07/157	Chronically Threatened	A5.2a	1.5
P07/157a	Acutely Threatened	A5.1b	4.3
	Chronically Threatened	A5.2a	0.4
P07/158	Acutely Threatened	A5.1b	3.9
	At Risk	A6.1b	5.4
P07/160	Chronically Threatened	A5.2a	7.8
P07/161	Chronically Threatened	A5.2a	10.3
	At Risk	A6.1b	0.1
P07/162	Acutely Threatened	A5.1b	5.3
P07/164	At Risk	A6.1b	0.9
P07/165	Acutely Threatened	A5.1b	2.1
		A5.1c	0.1
	At Risk	A6.1b	4.9
		A6.1c	1
P07/167	Acutely Threatened	A5.1b	21.9
	Chronically Threatened	A5.2a	2.1
	At Risk	A6.1b	1.3
P07/169	Acutely Threatened	A5.1b	5.8
P07/169a	Acutely Threatened	A5.1b	8.5
	At Risk	A6.1b	0.9
P07/171	Chronically Threatened	A7.3a	4.8
P07/171a	Acutely Threatened	A5.1b	2.1
	Chronically Threatened	A5.2a	6.8
	At Risk	A6.1b	2.6
P07/171b	Acutely Threatened	A5.1b	1.3
	Chronically Threatened	A7.3a	6.7
P07/172	Acutely Threatened	A5.1b	2.1
	Chronically Threatened	A5.2a	0.3
	At Risk	A6.1b	0.8
P07/173	Acutely Threatened	A5.1b	1.8
P07/174a	Acutely Threatened	A5.1b	3.1
	At Risk	G1.1c	1.8
P07/177	Acutely Threatened	A5.1b	2.9

SITE	THREATENED ENVIRONMENT	LENZ Level IV	AREA (HA)
P07/182	Acutely Threatened	A5.1b	2.9
P07/185	Acutely Threatened	A5.1b	2.2
P07/206	Chronically Threatened	A7.3a	0.9
P08/029	At Risk	G1.1c	1.1
P08/056	Acutely Threatened	A5.1b	2.2
P08/060	Acutely Threatened	A5.1b	7.6
P08/061	At Risk	G1.1c	248.3
P08/062	Acutely Threatened	A5.1b	2
	Chronically Threatened	A7.3a	7.5
	At Risk	A6.1b	33.9
P08/063	Acutely Threatened	A5.1b	2
P08/067a	Acutely Threatened	A5.1b	1.4
P08/067b	Acutely Threatened	A5.1b	2.5
P08/068a	Acutely Threatened	A5.1b	2.8
P08/068b	Acutely Threatened	A5.1b	6.1
P08/068c	Acutely Threatened	A5.1b	0.9
P08/072	At Risk	G1.1c	758.4
P08/073	Chronically Threatened	A7.3a	0.1
	At Risk	G1.1c	7.3
P08/080	Chronically Threatened	A7.3a	1
P08/081	Acutely Threatened	A5.1b	9
	At Risk	A6.1b	91.1
P08/087	Acutely Threatened	A5.1b	4.4
	At Risk	A6.1b	8.8
P08/088	Acutely Threatened	A5.1b	0.3
	At Risk	A6.1b	9.3
P08/092	Acutely Threatened	A5.1b	8.4
	Chronically Threatened	A7.3a	0.1
	At Risk	A6.1b	0.8
P08/094a	Acutely Threatened	A5.1b	6.3
P08/095	Acutely Threatened	A5.1b	5.5
	At Risk	A6.1b	7.6
P08/096	Acutely Threatened	A5.1b	7.2
	At Risk	A6.1b	1
P08/096a	Acutely Threatened	A5.1b	11.9
	At Risk	A6.1b	2.2
P08/099	Acutely Threatened	A5.1b	14.7
	At Risk	A6.1b	3
P08/101	Acutely Threatened	A5.1b	25.1
	At Risk	A6.1b	6
P08/200	Acutely Threatened	A5.1b	64.7
	Chronically Threatened	A5.2a	0.9
		A6.1d	2.7
	At Risk	A4.1a	89.3
		A6.1b	3.5
P08/207	At Risk	G1.1c	0.8

SITE	THREATENED ENVIRONMENT	LENZ Level IV	AREA (HA)
P08/208	Chronically Threatened	A7.3a	1.1
P08/210	At Risk	G1.1c	2.4
P08/211	At Risk	G1.1c	1.6
P08/212	At Risk	G1.1c	3.7
P08/213	Acutely Threatened	A5.1b	24.7
	At Risk	A6.1b	7.5
P09/001	At Risk	G1.1c	5265.1
P09/002	At Risk	A6.1b	1.3
	At Risk	G1.1c	3
P09/003	Acutely Threatened	A5.1b	64.2
	Chronically Threatened	A7.3a	1.9
	At Risk	A6.1b	334.7
P09/008	Acutely Threatened	A5.1b	2.9
	Chronically Threatened	A7.3a	1.6
	At Risk	A6.1b	29.4
P09/011	Chronically Threatened	A7.3a	1.1
	At Risk	G1.1c	208.1
P09/011a	At Risk	G1.1c	1
P09/014	Chronically Threatened	A7.3a	4.5
	At Risk	G1.1c	40.1
P09/020	Acutely Threatened	A5.1b	25.4
	Chronically Threatened	A7.3a	13.4
	At Risk	G1.1c	0.8
P09/025	Chronically Threatened	A7.3a	1.3
Q09/051	Acutely Threatened	A5.1b	47.6
	Chronically Threatened	A7.3a	8.2
	At Risk	A4.1a	35.8
	At Risk	A6.1b	250.9
Q09/051	Chronically Threatened	A7.3a	0.2
	At Risk	G1.1c	19.3
Q09/054	Chronically Threatened	A7.3a	6.8
	At Risk	G1.1c	125
Q09/055	Chronically Threatened	A7.3a	7.2
	Chronically Threatened	A7.3a	0.7
Q09/056	At Risk	A4.1a	7.4
		A6.1b	25.7
Q09/057	Chronically Threatened	A7.3a	9.1
Q09/058	Chronically Threatened	A7.3a	5.9
	At Risk	G1.1c	117.4
Q09/060	Chronically Threatened	A7.3a	2
	At Risk	G1.1c	43.2
Q09/061	At Risk	G1.1c	62
Q09/063	Chronically Threatened	A7.3a	3.3
	At Risk	G1.1c	88.2
Q09/150	Acutely Threatened	A5.1b	39.3
	At Risk	A6.1b	64.5

SITE	THREATENED ENVIRONMENT	LENZ Level IV	AREA (HA)
Q09/201	Chronically Threatened	A7.3a	1.8
	At Risk	G1.1c	0.1
Q09/202	Chronically Threatened	A7.3a	4.3
Q09/203	Chronically Threatened	A7.3a	1.9
Q09/204	Chronically Threatened	A7.3a	4.1

TABLE 5: CLASSIFICATION OF VEGETATION AND RELATED LAND ENVIRONMENTS IN KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

VEGETATION CLASS	LENZ LEVEL II ENVIRONMENTS (PREDOMINANT IN BOLD)	VEGETATION TYPE (N=19)	AREA, % OF TOTAL[1]
Forest (324 ha, 2%)	**A6, G1**	Pohutukawa forest	7 ha, < 0.1%
	A5, A6, A7, D1, G3	Totara forest	78 ha, 0.7%
	A5, G3	Kahikatea forest	76 ha, 0.6%
	A5, A6, G3	Ti kouka-kahikatea forest	25 ha, 0.2%
	A5, A7, G1	Puriri forest	138 ha, 1%
Forest/shrubland (4037 ha, 34%)	A4, **A5**, **A6**, A7, **G1**, G3	Kanuka forest/shrubland	4037 ha 34%
Shrubland (901 ha, 8%)	A4, **A5, A6, A7, G1**	Kanuka/manuka shrubland	133 ha, 1%
	A4, **A5, A6**, A7, D1, G1, G3	Manuka shrubland	768 ha, 6%
Flaxland (687 ha, 6%)	**A5, A6**, A7, D1, G1	Harakeke-knobby clubrush flaxland	687 ha, 6%
Freshwater wetland (857 ha, 7%)	**A5, A6, A7**, D1, **G1**	Raupo reedland	312 ha, 3%
	A5, A6, A7, G1	Raupo-*Baumea articulata* reedland	323 ha, 3%
	A5, A6, A7, D1, **G1**	*Baumea arthrophylla* sedgeland	199 ha, 1.7%
	A5, A6, A7, **G1**	*Eleocharis sphacelata* reedland	17 ha, 0.2%
	A5, A6, A7	*Baumea articulata* reedland	6.3 ha, <0.1%
Estuarine wetland (927 ha, 8%)	A4, **A5, A6**, A7	Mangrove shrubland	426 ha, 4%
	A4, **A5, A6**, D1, G3	Oioi rushland	501 ha, 4%
Grassland (197 ha, 2%)	**A5, A6,** A7, D1, G1	Pampas grassland	197 ha, 2%
Sandfield (3818 ha, 29%)	A4, A5, A6, **G1**	Spinifex sandfield	625 ha, 5%
	A4, A5, A6, **G1**	Sandfield	3193 ha, 26%

[1]Excluding fresh and estuarine waters.

Forest

1. Pohutukawa forest was recorded from five coastal sites, all small or very small stands, on rolling sedimentary hills (A6) or dunes sands (G1) mostly in the northwest of the ED. Several have been planted (B. Searle, pers. comm.). Karaka and hangehange are present occasionally in the canopy and harakeke and coastal toetoe in canopy gaps. Ground cover consists of New Zealand spinach and introduced grasses.
2. Totara forest occurs mostly on poorly drained peaty or alluvial soils (A5) and imperfectly drained sedimentary soils (A6) in the northeast of the ED. It is entirely secondary forest containing abundant or frequent totara in the canopy and range of other coniferous (kahikatea, kauri, tanekaha, matai) and broadleaved (puriri, taraire, titoki) canopy tree species, as well as some relictual kanuka from the earlier seral stage.
3. Kahikatea-dominant forest occurs mostly on poorly drained peaty and alluvial soils (A5). It is entirely secondary forest on alluvium and colluvial footslopes, mostly in the northeast of the ED, and has developed after previous old-growth kahikatea forest was milled late in the 19th or early 20th centuries. Of a small range of other species rarely present in the canopy, only ti kouka, pukatea, and nikau are consistently present. Where stands have been protected for some time from grazing by domestic stock, dense subcanopy, understorey, and ground layer tiers dominated by characteristic kahikatea associates (e.g., mahoe, small-leaved mahoe, *Coprosma areolata*), have developed.
4. Ti kouka-kahikatea forest, again mostly on poorly or imperfectly drained peat and alluvium (A5), has ti kouka and kahikatea sharing canopy dominance. A range of other tree species is present, but none consistently. This vegetation type occurs solely in the northeast of the ED.
5. Puriri forest is the most common forest type of the ED, occurring on alluvium (A5), volcanic substrates (A7), and old consolidated sands (G1). It covers a diverse assemblage of forest stands dominated by broadleaved tree species, some with conifers (kauri, kahikatea, totara) present in small numbers. Apart from puriri, the only tree species consistently present are karaka, mahoe, and rewarewa. Other quite widespread species are kauri, totara, kohekohe, taraire, pukatea, towai, narrow-leaved maire, and mapau. Puriri forest occurs in diverse locations throughout the ED on sites with diverse lithologies, and includes the three outstanding forest remnants at Pouto (Tapu Bush, Pretty Bush, and Upper Okaro Bush).

Forest/shrubland

6. Kanuka forest/shrubland is the most common vegetation type in the ED, occurring across a wide range of environments, and comprises extensive shrublands, much smaller areas of forest, and many seamless intermediate stages between them. It is secondary

vegetation almost exclusively dominated by kanuka; a large suite of other canopy tree species is present but only six (radiata pine, pampas, ti kouka, rewarewa, mapau, hangehange) with any frequency. It includes some quite extensive tracts and occurs mostly on older consolidated sands in the south of the Pouto Peninsula, where a long fire history has greatly reduced or eliminated altogether seed sources of other secondary and later successional tree species. Where protected from domestic stock grazing, understories dominated by small-leaved *Coprosma* species have developed. The total area is somewhat smaller than the figure given, because small unmappable areas of manuka shrubland on the Pouto dune system are included within it.

Shrubland

7. Kanuka/manuka shrubland occurs widely in the ED in a range of environments. Kanuka is dominant and manuka subdominant. Of the wide range of associated species, only two, radiata pine and mamaku, are present with any frequency. Kanuka/manuka shrubland has the widest range of adventive species in the canopy of any vegetation type in the ED, but at very low frequencies. The total area is somewhat larger than the figure given, because small unmappable areas of kanuka/manuka shrubland are included within other vegetation types.
8. Manuka shrubland occurs throughout the ED in a range of environments. Manuka is overwhelmingly dominant; a wide range of mostly shrubby native and adventive species (e.g., pampas, ti kouka, mamaku, harakeke, bracken, raupo) can also be present but none of them consistently. The total area is somewhat larger than the figure given, because small unmappable areas of manuka shrubland on the Pouto dune system are excluded.

Flaxland

9. Coastal flaxland is widespread along the coastal faces between Aranga Beach in the north and Glinks Gully south of Dargaville, and also extends a short distance inland along the sides of some larger gully systems. It occurs in a wide variety of environments. Harakeke, knobby clubrush, pohuehue, and coastal toetoe form the bulk of the vegetative cover, with a range of other shrubs (mingimingi, tauhinu, and hangehange), dicotyledonous herbs (adventive iceplant), and grasses (pampas and marram) present. A high proportion of the flora is adventive. Degraded variants occur south of Glinks Gully towards Pouto, where domestic stock has access to long stretches of the coastline. *Schoenus* sedgeland, a gumland vegetation type dominated by *Schoenus brevifolius* and with frequent harakeke, occurs at Maitahi Wetland SR.

Freshwater wetland

10. Raupo reedland is widespread in Kaipara, occurring throughout the ED as lacustrine fringes of natural lakes and man-made farm

ponds and in the wetter parts of freshwater wetlands, including the upper reaches of Omamari GPWMR and the Kaipara Harbour estuaries at Pouto. It is overwhelmingly dominated by raupo, but the other reedland species widespread in the ED, *Eleocharis sphacelata, Baumea articulata*, and kuta are locally present, as well as harakeke and pampas. A wide range of other native and adventive wetland species is rarely present. The abundance of this eutrophic wetland community in a landscape dominated by relatively infertile soils on old consolidated sands may in part reflect the widespread use of fertilisers for agriculture in the ED.

11. Raupo-*Baumea articulata* reedland is also widespread and occurs across a similar range of environments as raupo reedland. Other species consistently present are ti kouka, kuta, manuka, harakeke, pampas, native willow weed, and *Eleocharis sphacelata.*

12. *Baumea arthrophylla* sedgeland is the third major wetland type in the ED, occurring in a wide range of environments. As well as *B. arthrophylla*, substantial components are *B. juncea*, raupo, lotus, oioi, and swamp millet.

13. *Eleocharis sphacelata* reedland occurs throughout the ED, as lacustrine fringes around dune lakes and farm ponds in wide range of environments. It is overwhelmingly dominated by *E. sphacelata*, but a small range of other wetland species is occasionally present.

14. *Baumea articulata* reedland occurs throughout the ED, as lacustrine fringes around dune lakes and farm ponds in a wide range of environments.

Estuarine wetland

15. Mangrove communities are dispersed over long stretches of the Kaipara Harbour coastline, including the lower and middle reaches of the larger Pouto estuaries, mostly in environments A5 and A6. They are totally dominated by mangrove but include frequent enclaves of salt meadow characterised by herbaceous species such as sea primrose and the adventive saltwater paspalum. Mangroves are taller on the edges of channels, where water movement controls salinity and provides fresh nutrient inputs, and shorter in upper tidal areas, bordering saltmarsh habitats.

16. Oioi rushland occurs mostly in environments A5 and A6 in several distinct locations: as freshwater wetlands around the Kai Iwi dune lakes (especially Taharoa) in the north, and as semi-saline and saline wetlands of the larger gully systems on the central west coast, in the Kaipara Harbour estuaries at Pouto, and in dune slacks of the Pouto dune system. Oioi is the overwhelming canopy dominant; the very wide range of occasional associated woody and herbaceous species reflects the diversity of the habitats occupied by the dominant species. The total area is somewhat larger than the figure given, because numerous small dune slacks dominated by oioi on the Pouto dune system could not be mapped separately.

Grassland

17. Pampas grassland, mostly in environments A5 and A6, comprises a diverse range of modified communities dominated by pampas. They are mostly partially drained shrubby wetlands, with a wide range of other wetland and mesophytic species present but only four of them (manuka, harakeke, mamaku, raupo) consistently. Because pampas grassland is dominated by adventives and scarcely meets PNAP criteria, it is not considered further in this study.

Sandfield

18. Spinifex sandfield occurs in one long, virtually continuous belt on the inland side of unconsolidated frontal dunes on the coastline between Aranga Beach and Pouto Point, mostly in environment G1. Apart from spinifex, a wide range of other native and adventive species is present, but only six of them (knobby clubrush, tauhinu, tree lupin, sand coprosma, adventive iceplant, coastal toetoe) occur consistently. About half the flora is adventive.
19. Sandfield occurs in one long, virtually continuous belt on the seaward side of unconsolidated frontal dunes on the coastline between Aranga Beach and Pouto Point, again mostly in G1. Much smaller dispersed areas occur in the littoral zone around some of the Kai Iwi dune lakes, and at the mouths of some of the Kaipara Harbour estuaries at Pouto. Vegetative cover is minimal, consisting of a similar range of species as spinifex sandfield. Only spinifex is consistently present.

3.6.3 Species of botanical interest

Observations made during the survey suggest that some plant species that are relatively common in other parts of Northland are uncommon (e.g. taraire, tawa, towai, mangeao, northern rata, miro, swamp maire, and *Alseuosmia* spp.) or apparently absent (e.g., manatu/lowland ribbonwood) from Kaipara ED (Northland). Their rarity may be either natural or caused by human intervention. Some have been recognised as 'Regionally Significant' by Northland Conservancy (W.R. Holland, DOC, pers. comm.), and are discussed below (3.5.5).

3.6.4 Threatened plant species in Kaipara Ecological District (Northland Conservancy)

The current threat status of species listed below follows Hitchmough et al. (2007). Appendix 3 gives the definitions of threat categories as set out in Molloy et al. (2002). Records have been compiled from herbaria, DOC Bioweb, SSBI, unpublished reports, and field observations made during this survey.

A checklist of flora in Kaipara ED (Northland) is listed in Appendix 5.

Qualifiers: CD—Conservation Dependent; DP—Data Poor; EF—Extreme Fluctuations; HI—Human Induced; RF—Recruitment Failure; SO—Secure Overseas.

ACUTELY THREATENED

***Calochilus* aff. *herbaceus* Copper bearded orchid**
(Nationally Critical, EF, SO) Endemic

One of the attractive tall bearded orchids that grow in open places with very depauperate soils. Recorded from Maitahi Wetland SR (P07/133) in 1999 (AK 241957).

***Centipeda minima* ssp. *minima* Sneezeweed**
(Nationally Critical, EF, SO) Indigenous

A small, prostrate, annual herb; typically grows in ephemeral wetlands. Recorded from the Kai Iwi lakes (Forester & Townsend 2004). There is also a 1981 record from Lake Taharoa (O07/022) (DOC Bioweb).

***Juncus holoschoenus* var. *holoschoenus* Angled rush**
(Nationally Endangered) Endemic

A small rush. Collected from Dargaville by D. Petrie in 1896 (DOC Bioweb).

***Kunzea ericoides* var. *linearis* Sand kanuka**
(Serious Decline, HI) Endemic

A small tree with silky hairy branchlets and leaves that grows on coastal sands and podzols in northern New Zealand. Recorded from Sail Pt near Clark's Bay in 1995 (AK 288776).

Phylloglossum drummondii
(Nationally Endangered, HI, SO) Indigenous

A small wintergreen lycopod that typically colonises burnt areas on very infertile soils. Recorded from Maitahi Wetland SR (P07/133) (AK 286617).

***Pomaderris phylicifolia* Tauhinu**
(Nationally Endangered, HI, SO) Indigenous

A small shrub of poor soils in coastal places in northern New Zealand. Recorded from Maitahi Wetland SR (P07/133) in 1999 (AK 286611).

Sebaea ovata
(Nationally Critical, CD, SO, HI, EF) Indigenous

An erect yellow-flowered herb in the gentian family that grows on seasonally damp sand flats. Translocations to the Pouto dunes (P09/001), where it had previously been recorded (Forester & Townsend 2004), have been attempted recently but proved unsuccessful. The sites chosen for planting appear to be too dynamic for the species to establish successfully (A. Townsend, pers. comm.).

***Utricularia australis* Yellow bladderwort**
(Nationally Endangered, HI) Indigenous

A submerged, carnivorous aquatic herb with deep yellow flowers that grows in peaty wetlands. Recorded from Omamari GPWMR (P07/127) in 2000 (AK 248055) and Maitahi Wetland SR (P07/133) in 1999 (AK

292387). One shoot was found at Freidrich's Lake (P07/171) in 2005 (Wells et al. 2007).

CHRONICALLY THREATENED

Cyclosorus interruptus
(Gradual Decline, SO) Indigenous

A large creeping fern that occurs in New Zealand in geothermal areas as well as northern wetlands. Recorded from Omamari GPWMR (P07/127) in 2000 (AK 248058).

Desmoschoenus spiralis **Pingao/Golden sand sedge**
(Gradual Decline, CD, EF) Endemic

A large, strikingly handsome sedge that grows only on mobile foredunes. Occurs in scattered populations on frontal sand dunes between Aranga Beach and Pouto Point (recorded during this survey at O07/011, O07/026, P08/061, P09/001, and Q09/063), and also on small dune systems at some of the Kaipara Harbour estuaries, e.g., Okaro Creek (part Q09/051) (SSBI Q08/H047*1).

Dianella haematica
(Serious Decline, DP) Endemic

Recently segregated from *Dianella nigra*. It is larger, with reddish leaf sheaths, and grows in peaty soils such as those of gumlands. Recorded as *Dianella* aff. *nigra* (b) and Taxonomically Indeterminate in Hitchmough et al. (2007). Recorded during the present survey from Maitahi Wetland SR (P07/133).

Drosera pygmaea
(Gradual Decline, SO) Indigenous

A diminutive sundew of open places on very infertile, peaty soils. Recorded from Lake Kai Iwi in 2003 (AK 288711).

Eleocharis neozelandica **Sand spike-sedge**
(Gradual Decline, EF) Endemic

A small rhizomatous sedge that grows on damp sand flats.

The Pouto dune system (P09/001) is its national stronghold (Forester & Townsend 2004). Records include AK 284635 (2003).

Fimbristylis velata
(Sparse, SO) Indigenous

A small, spreading sedge that grows in ephemerally wet places. Recorded from Lake Parawanui (P08/212) in 2005 (AK 254137), and Lakes Wainui (P08/211) in 2007 and Kapoai (P08/210) in 2001 (Wells et al. 2007).

Hydatella inconspicua
(Serious Decline, EF) Endemic

An aquatic, rush-like monocot that grows in water of shallow to medium depth. Recorded from Kai Iwi lakes: Kai Iwi (O07/024) in 2001 (AK 256186), and Waikere (O07/018) and Taharoa (O07/022) by Wells et

al. (2007). Also recorded from the Pouto lakes: Humuhumu (Q09/054), Rotootuauru (Q09/055), Rotokawau (Q09/057), which apparently has the largest population in Northland, and formerly Waingata (Q09/204) by Wells et al. (2007).

Mida salicifolia **Willow-leaved maire**
(Gradual Decline, RF) Endemic

A small, hemiparasitic subcanopy tree that is a favoured food of the introduced possum. Recorded during this survey from Opanake Road Reserve (P07/148), and from Lake Humuhumu Wetland and Forest (Q09/054) (SSBI Q09/H004).

Pimelea tomentosa
(Serious Decline, EF) Endemic

A white-flowered shrub that characteristically occurs in short secondary vegetation. Recorded on this survey in shrubland beside Okaro Creek (part Q09/051) and also at Lake Kahuparere (Q09/060) in 1999 (SSBI Q09/H015); possibly more widespread. Also recorded from Pouto Point (part Q09/063) in 1999 (DOC Bioweb) and Lake Humuhumu Wetland and Forest (Q09/054) in 1999 (DOC Bioweb).

Schoenus carsei
(Gradual Decline, SO, HI) Indigenous

A tall sedge that grows in moderately acidic to highly acidic peat bogs and mires. Previously thought extinct in Northland (P.J. de Lange, DOC, pers. comm.), it was recorded from Maitahi Wetland SR (P07/133) in 1999 (AK 246919).

Stuckenia pectinata **Fennel-leaved pondweed**
(Gradual Decline) Indigenous

A cosmopolitan rhizomatous aquatic herb of slow-moving waters, usually coastal. Recorded from Lake Rototuna (P09/205) by NIWA in 2005 but not in a later survey in 2007 (Wells et al. 2007).

Thelypteris confluens **Marsh fern**
(Gradual Decline, CD, SO) Indigenous

A large tufted fern that typically grows on 'floating suds' in northern wetlands and geothermal areas. Locally common in wetlands around the Pouto dune lakes (part P09/001) (including AK 252344, AK 220594, AK 202660), the major population in New Zealand (Forester & Townsend 2004). Also recorded from Omamari GPWMR (P07/127) in 2000 (AK 248057), Maitahi Wetland SR (P07/133) in 2000 (AK 287536), Punahaere Creek (Q08/H047*4) in 1985, and Mosquito Gully (P08/099) in 1996 (SSBI P08/H021). Recorded during this survey at Lake Rotopouua (P09/014) and Lake Humuhumu (Q09/054).

Utricularia delicatula
(Gradual Decline, HI) Endemic

A tiny bladderwort of damp, poor soils such as peats and restiad bogs throughout New Zealand. Recorded from Maitahi Wetland SR (P07/133) in 1999 (AK 292388).

AT RISK

Doodia mollis
(Sparse) Endemic

A small tufted fern of fertile soils, usually under alluvial forest. Recorded on this survey at one site, Rotu Stream (P07/141), in the Kaihu valley, and also at Tatariki in NRC Creamery Road Reserve (P07/068b) in 1998 (AK 235015).

Pseudopanax ferox **Fierce lancewood**
(Sparse, CD, RF) Endemic

An uncommon small tree with a striking juvenile form with deeply lobed leaves. Recorded at Pretty Bush (Q09/061) in 1990 (AK 203129), Pouto Point WR (Q09/063) in 2001 (AK 252746), and Lake Kahuparere (Q09/060) in 1999 (AK 300268). Previously recorded from Tapu Bush (P09/001) in 1977, but not in subsequent surveys (Cameron et al. 2001).

Sticherus flabellatus
(Sparse, SO) Indigenous
A large, handsome fern with creeping rhizomes and pale-green forked fronds that grows in well-lit places in scrub and forest in the north of both main islands. Recorded during this survey from a roadside batter on Maitahi Road beside Maitahi Wetland SR (P07/133).

Thelymitra tholiformis **Domed sun orchid**
(Sparse, EF) Endemic
A stout mauve-flowered orchid that grows on infertile soils that have formerly supported kauri forest. Recorded from Maitahi Wetland SR (P07/133) in 1999 (SSBI P07/H056).

DATA DEFICIENT

Centipeda aotearoana
Endemic
A small creeping herb that forms circular patches on damp ground. Recorded from Q09/201 in 2007 (AK 299835) and Lake Kapoai (P08/201) by Wells et al. (2007).

Spiranthes aff. novae-zelandiae **Ladies tresses**
Endemic
A wetland orchid notable for its pink spiralled inflorescences, usually found on acidic peats. Recorded from the Kai Iwi lakes in 1992 (DOC Bioweb), Maitahi Wetland SR (P07/133) in 1999 (SSBI P07/H056), and the Pouto dune system (P09/001) in 2001 (AK 252671).

3.6.5 Regionally Significant plant species in Kaipara Ecological District (Northland Conservancy)

The following species are provisionally listed as 'Regionally Significant' by DOC Northland Conservancy (W.R. Holland, DOC, pers. comm.). Unless otherwise specified, records are from this survey.

Adiantum aethiopicum **True maidenhair**
Indigenous

A small, delicate fern that occurs locally under scrub or light forest in northern New Zealand. Recorded at Pouto Point WR (Q09/063) in 2000 (AK 252590) and P09/001 (Reid 1977).

Alternanthera **aff.** ***sessilis***
Possibly endemic

A semi-aquatic herb of uncertain taxonomic status. Recorded near Lake Kanono (Q09/058) in 2003 (AK 299836) and Lake Kapoai (P08/201) (Wells et al. 2001).

Asplenium hookerianum
Indigenous

A small spleenwort of semi-shaded places in drier forests. Recorded in Tapu Bush (P09/011) in 1991 (AK 205258).

Astelia grandis **Swamp lily**
Endemic

A tufted megaherb of semi-shaded damp places. Recorded at Maitahi Wetland SR (P07/133) in 2006 (AK 297736).

Blechnum fluviatile **Kiwakiwa**
Indigenous

A tufted fern of shady places on damp, fertile soils. Recorded from the Lake Humuhumu island (Q09/054) in 2001 (AK 252702).

Callitriche petriei **ssp.** ***petriei***
Endemic

A tiny, creeping herb of damp, peaty places. Recorded from Lake Kapoai (P08/210) by Wells et al. (2007).

Centrolepis strigosa
Endemic

A delicate, tufted, rush-like annual that grows in damp, open places. Recorded from Lake Kai Iwi (O07/024) in 1980 (CHR 319045) and on the west coast near Dargaville (CHR 214231).

Coprosma acerosa **Sand coprosma**
Endemic

A sprawling subshrub with yellow stems that is characteristic of semi-consolidated sand dunes. Widespread on the extensive western dune system and some distance inland on consolidated sands between Aranga Beach and Pouto Point. Recorded during this survey from O07/011, O07/014, O07/025, O07/026, P07/130, P08/061, and P09/001.

Coprosma crassifolia **Thick-leaved coprosma**
Endemic

A divaricating shrub typical of dry shrubland habitats distinguished by its thick leaves with whitish undersides. Locally common in the understorey of hillslope kanuka forest at Pouto (P09/001, Q09/063).

Coprosma parviflora
Endemic

A large understorey shrub characterised by its flattened branching habit and grey-green leaves that is endemic to Northland.

Recorded in forest, shrubland, and wetland from Dargaville north (P07/135, P07/141, P07/150, P07/157a, P07/169a), and at Pouto (P09/001, P09/008).

Coprosma rigida
Endemic

A large understorey shrub of fertile soils characterised by orange bark and twinned drupes.

Occurs locally in secondary kahikatea forest on alluvium in the north. Recorded during this survey from P07/135, P07/141, P07/157, P07/169, and P08/068b.

Coprosma rotundifolia **Round-leaved coprosma**
Endemic

A tall understorey shrub of damp, fertile soils with distinctive soft, red-blotched leaves. Recorded during this survey at two sites (P07/135 and P07/142) in secondary kahikatea forest on alluvium in the north.

Coprosma tenuicaulis **Swamp coprosma**
Endemic

A large erect shrub with distinctly veined leaves that grows mostly in open fertile wetlands but also in the understorey of open-canopied alluvial forest. Occurs locally in the understorey of secondary kahikatea forest on alluvium in the north. Recorded during this survey from P07/135, P07/140, P07/142, and P07/157.

Corokia cotoneaster **Korokio**
Endemic

An attractive yellow-flowered divaricating shrub with tomentose on the undersides of the leaves. Locally common in the understorey of secondary forest at Pouto. Recorded from Lake Kahuparere (Q09/060) in 1991 (AK 205024), Tapu Bush (P09/011) in 1991 (AK 205262), Pretty Bush (Q09/061) in 1987 (AK 180236), and on this survey at Lake Rotopouua (P09/014).

Dracophyllum sinclairii
Endemic

A large heathland shrub of northern New Zealand. Recorded from the edge of Lake Taharoa (O07/022) in 1999 (SSBI O07/H007).

Drosera binata **Forked sundew**
Indigenous

A small carnivorous herb of peaty wetlands distinguished by its characteristically forked leaves. Recorded during this survey from wetlands at Omamari GPWMR (P07/133), Lake Taharoa (O07/022), Russell Wetland (P08/096), and Lake Humuhumu (Q09/054).

***Empodisma minus* Wire rush**
Indigenous

A rush-like plant that forms extensive patches, this is one of the most important peat-forming plants in New Zealand bogs. Recorded during this survey at Omamari GPWMR (P07/133), Maitahi Wetland SR (P07/133) and a wetland east of Lake Rotopouua (Q09/053), the latter the only record from the Pouto Peninsula. Recorded earlier from Maitahi Wetland SR (P07/133) in 2000 (AK 248062).

***Epacris pauciflora* var. *pauciflora* Tamingi**
Endemic

A slender, fine-leaved shrub with conspicuous white flowers that grows on infertile, often peaty soils.

Recorded in manuka heath in Maitahi Wetland SR (P07/133) (SSBI P07/H056).

Glossostigma elatinoides
Indigenous

A small mat-forming herb that grows in ephemerally wet places or shallow permanent water. Occurs on the shores of several lakes in the ED: Shag Lake (O07/014) (SSBI O07/H005), Lake Rototuna (P09/205), Lake Waingata (Q09/204), Lake Humuhumu (Q09/054), Lake Kanono (Q09/058) and Lake Mokeno (part P09/001) by Wells et al. (2007), and Lake Kahuparere (Q09/060) by Champion et al. (2002).

Gratiola sexdentata
Endemic

Erect, patch-forming herb of ephemerally wet places or shallow water with conspicuous white flowers. Recorded from Lake Rotootuauru (Q09/055) by Wells et al. (2007).

Gunnera dentata
Endemic

A patch-forming herb of ephemerally wet places. Recorded from wetlands on the Pouto dune system (P09/001) by Cameron et al. (2001).

Gunnera prorepens
Endemic

A patch-forming herb with bronze leaves and conspicuous clusters of red berries that grows in ephemerally wet places. Recorded from wetlands south of Lake Matthews (Stick Lake) on the Pouto dune system (P09/001) in 2000 (AK 248035).

Hebe diosmifolia
Endemic

A widely-grown ornamental shrub with conspicuous white to purple inflorescences in either spring or autumn. Recorded from the understorey of Tapu Bush (P09/011) in 1991 (AK 205265) and Pretty Bush (Q09/061) in 1991 (AK 205275), and at North Kaipara Head (part P09/001) in 1987 (AK 180253).

Lagenifera stipitata
Indigenous

A small, tufted, composite herb occurring in scattered locations in northern New Zealand.Recorded from Pouto Point (Q09/063) in 2001 (AK 252734).

Lophomyrtus obcordata **Rohutu**
Endemic

An attractive myrtle that grows in well-lit places on fertile sites.

Recorded from P09/001 in 1987 (AK 180267) and Pretty Bush (Q09/061) in 1990 (AK 203113).

Metrosideros robusta **Northern rata**
Endemic

A massive emergent forest tree that often begins life as an epiphyte, eventually forming a trunk coalescing around that of the host tree. Now much reduced in many localities by possum browsing. Recorded during this survey in one forest remnant, Te Kawa Stream forest (P07/121a), in the north. There is also an earlier record from Tapu Bush (P09/011) by Reid (1977).

Myriophyllum votschii
Endemic

A sprawling or erect emergent aquatic herb of shallow waters. Recorded from the Pouto dune system (P09/001) (including AK 252641), and from Lake Humuhumu (Q09/054), Lake Rotootuauru (Q09/055), and Lake Rotokawau (Q09/057) by Wells et al. (2007). Also recorded from Lake Kai Iwi (O07/024) in 2001, where it occurs in association with *Hydatella inconspicua*.

Olearia albida
Endemic

A tall shrub of forest margins that has distinctive yellow-green leaves with wavy margins. Occurs in the understorey of Tapu Bush (P09/011) (Wright & Young 1991) and Pretty Bush (Q09/061) (SSBI Q09/H016) at Pouto (Cameron et al. 2001).

Olearia solandri
Endemic

A tall shrub with sticky yellow branches and fine rolled leaves that typically grows at the edges of saltmarshes, in Northland found only in the Hokianga and Kaipara Harbours. Recorded at Tauhara Creek (part Q09/056) in 2001 (AK 252693).

Pennantia corymbosa **Kaikomako**
Endemic

A small subcanopy or forest margin tree of fertile soils with a very distinctive juvenile habit. Recorded during this survey in the subcanopy of secondary kahikatea forest on alluvium at several sites in the northeast, including P07/135, P07/141, and P07/142.

Psilotum nudum
Indigenous

A fern-ally that lacks true leaves and roots, and has distinctive forked stems and yellow sporangia. Recorded near Lake Mokeno (P09/001) in 1996 (AK 228957).

Ranunculus urvilleanus
Indigenous

A tall buttercup of swamps and wet places. Recorded from Maitahi Wetland SR (P07/133) in 2000 (SSBI P07/H056).

Sparganium subglobosum **Burr-reed/maru**
Indigenous

A tall, rhizomatous herb with tufts of grassy leaves that usually grows in shallow water. Recorded during this survey from in freshwater wetlands at P07/131, P07/145, and Q09/054. Also recorded from P07/133 (SSBI P07/H056) and P09/001 (2001, AK 252720).

Triglochin striata **Arrow grass**
Endemic
A tufted grass-like monocot herb; occurs in a wide variety of damp places. Recorded during this survey from a number of freshwater–Kernot Farm Wetland (P08/081), Lake Rotopouua (P09/014), Lake Humuhumu (Q09/054)–and semi-saline–Punahaere Creek (part P09/003), Kaipara Harbour (P09/200), Tauhara Creek (Q09/056), Ongange Creek (Q09/150)–wetlands. Also recorded from Lake Taharoa (O07/022) by Wells et al. (2007).

Utricularia dichotoma
Indigenous
A small bladderwort of damp places. Recorded by DOC from Maitahi Wetland SR (P07/133) (SSBI P07/H056).

Viola lyallii
Endemic
A small forest herb of damp and shady places with conspicuous white flowers. Recorded during this survey from two sites (P07/135 and P07/141) in the Kaihu valley.

3.6.6 Threatened and Regionally Significant plant species not recorded recently in Kaipara Ecological District (Northland Conservancy)

CHRONICALLY THREATENED

Myriophyllum robustum **Stout water milfoil**
(Gradual Decline, CD) Endemic
A sprawling or erect emergent aquatic herb of shallow waters. Historic records only from Lake Kahuparere (Q09/060) in 1928 (WELT SP44985) and Lake Rotootuauaru in 1950 (DOC Bioweb).

Pimelea arenaria **Sand pimelea**
(Serious Decline, HI, RF) Endemic
A sprawling, low-growing shrub with small, fragrant white flowers that grows on sand dunes. There are old records of this species from Lake Humuhumu (Q09/054) by Matthews in 1920 (AK 101198 and 101199).

REGIONALLY SIGNIFICANT

Dicksonia fibrosa **Wheki-ponga**
Endemic

A very distinctive tree fern with a massive fibrous caudex that typically grows in cool, moist sites. There is an unvouchered record of a single specimen from Lake Rototuna (P09/205) in the 1990s that had disappeared by the time of a subsequent visit (P. Anderson, pers. comm.).

Myrsine divaricata **Weeping mapou**
Endemic

A large understorey shrub with very distinctive weeping branches and small heart-shaped leaves. Recorded in the past from the understorey of Tapu Bush (P09/011) (Reid 1977).

3.7 FAUNAOF KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

3.7.1 Overview of indigenous fauna

Information on indigenous fauna in this report has been compiled from the following sources:

- Unpublished OSNZ survey records 1972–1995 held at Northland Conservancy, Department of Conservation in the SSBI system.
- Unpublished SSBI survey records (NZWS 1977–1987, DOC 1987–2005) held at Northland Conservancy, Department of Conservation.
- The Bioweb Herpetofauna database (DOC Bioweb).
- The NZ Freshwater Fish Database (NIWA 2007).
- Incidental field observations during November/December 2006 and January 2007 during the current study.

The freshwater and estuarine wetlands, shrublands, and dunelands of Kaipara ED (Northland) and adjacent Kaipara Harbour with its 3500 km shoreline provide significant habitat for birds (McKenzie 1972). The dune lakes of the ED, especially those of the Pouto Peninsula, are well known for grebes and waterfowl. They are a national stronghold of New Zealand dabchick and Australasian little grebe, and are also noted for New Zealand scaup and Australasian shoveler. Wetlands throughout the ED support populations of Australasian bittern and banded rail, the latter especially in estuarine mangrove shrublands. North Island fernbird are widespread in shrublands and wetlands. The Pouto dunes support northern New Zealand dotterel, banded dotterel, and New Zealand pipit. Some of the larger harbour estuaries, e.g., Okaro and Tauhara Creeks, provide limited roosts

for waders such as variable oystercatcher and migratory species such as bar-tailed godwit, while the rocky coastline at the southern end of Pouto Peninsula affords refuge for reef heron. Four species of shag/cormorant, black, pied, little, and little black, are widespread.

The Kaipara Harbour is the largest enclosed harbour and estuarine system in New Zealand, with a total surface area of 947 km^2 (Cromarty & Scott 1996). It is predominantly shallow, with 409 km2 of the total surface area exposed as mudflats at low tide (Heath 1975). The shallow intertidal areas of the harbour are vital non-breeding sites for New Zealand-breeding waders such as South Island pied oystercatcher, variable oystercatcher, Australasian pied stilt, black stilt, banded dotterel, northern New Zealand dotterel, and wrybill (Dowding & Moore 2006), some of which are threatened (see below). Even greater numbers of waders and other waterbirds are present in the Kaipara Harbour in summer when transequatorial migrants, such as bar-tailed godwit, lesser knot and turnstone, flock to the harbour to feed. Year-round seabirds or waterbirds that are common or regularly encountered in the ED include white-faced heron, royal spoonbill, black-backed gull, red-billed gull, pied shag, and Australasian gannet. Arctic skua are seasonal visitors, while white heron and little egret are irregular visitors. The harbour waters are also feeding grounds for four threatened tern species, at least three of which, Caspian tern, white-fronted tern and New Zealand fairy tern, occur in Kaipara ED (Northland).

Widespread indigenous birds of forests and shrublands are grey warbler, North Island fantail, silvereye, tui, New Zealand kingfisher, morepork, and shining cuckoo. Common birds of open country are Australasian harrier, Pacific swallow, New Zealand pipit, paradise shelduck, pukeko, spur-winged plover, and black-backed gull.

Three endemic species of lizard have been recorded from the ED, the threatened Auckland green gecko, and the copper and shore skink. Four species of turtle, green turtle, hawksbill sea turtle, leatherback turtle, and loggerhead sea turtle, and two species of sea snake, banded sea snake and yellow-bellied sea snake, have been recorded from Kaipara ED (Northland).

At least two threatened insects occur in the ED. Black katipo and an unnamed moth, *Notoreas* sp. 'northern', occur locally on the west coast of the ED.

Threatened endemic landsnails may occur in Kaipara ED (Northland). A snail survey was conducted by DOC in Pretty Bush in 1987 and Tapu Bush in 1988, but no threatened species were recorded. Further investigation is needed.

The New Zealand conservation status of species is derived from Hitchmough et al. (2007) which uses the threat classification system of Molloy et al. (2002) (see Appendix 3). Species classed determined as 'Regionally Significant' by DOC Northland Conservancy were provided by W.R.Holland (DOC). Nomenclature follows Heather and Robertson (2005) for birds, Gill and Whitaker (1996) for reptiles, McDowall (1990) for fishes, and King (ed.) (2005) for mammals.

A checklist of fauna recorded in Kaipara ED (Northland) is presented in Appendix 7.

3.7.2 Threatened bird species in Kaipara Ecological District (Northland Conservancy)

Kaipara ED (Northland) has high numbers of threatened bird species: nine species are currently Acutely Threatened, six species are Chronically Threatened, and a further eight species are At Risk. Unless otherwise specified, records are from this survey.

ACUTELY THREATENED

Egretta alba modesta **White heron/kotuku**
(Nationally Critical, ST, SO, OL) Indigenous

Recorded from Tikinui (part P08/200) on the Northern Wairoa River in 1973 (OSNZ CSN 1973), and likely to be a regular Kaipara Harbour visitor (P08/200). Also recorded from Pouto Point (Q09/063) (OSNZ CSN 2002).

Anarhynchus frontalis **Wrybill/ngutuparore**
(Nationally Vulnerable) Endemic

The Kaipara Harbour (P08/200) is the fourth most important non-breeding site in the country for wrybill (Dowding & Moore 2006), with peak numbers between midsummer and midwinter. Also recorded on the west coast north of Glinks Gully (P08/061) (OSNZ CSN 1978), south of Glinks Gully (P08/072), and at Roundhill (P09/001) (OSNZ CSN 1978).

Anas superciliosa superciliosa **Grey duck/parera**
(Nationally Endangered, SO) Indigenous

Birds which appeared to be predominantly of this species, but in fact some of which are likely to have been hybrids with introduced mallards, have been recorded widely from lakes and wetlands in the district: O07/012 (SSBI O07/H004), O07/014 (OSNZ survey 1986), O07/018 (SSBI O07/H007), O07/022 (SSBI O07/H007), O07/024 (SSBI O07/H007), P07/174a (OSNZ surveys 1977–1994), P07/206 (OSNZ surveys 1979–1982), P08/073 (OSNZ surveys 1977–1992), P08/208 (SSBI P08/H016), P08/209 (SSBI P08/H006), P08/210 (OSNZ surveys 1977–1994), P08/211 (SSBI P08/H015), P08/212 (SSBI P08/H008), P09/001 (SSBI P08/H015), P09/011a (OSNZ surveys 1973–1995), P09/014 (OSNZ surveys 1977–1994), P09/205 (OSNZ surveys 1972–1994), Q09/060 (SSBI Q09/H015), Q09/051 (SSBI Q08/H047*1), Q09/054 (SSBI Q09/H004), Q09/204 (SSBI Q09/H010), Q09/203 (OSNZ surveys 1977–1994), Q09/202 (SSBI Q09/H013),

Botaurus poiciloptilus **Australasian bittern/matuku**
(Nationally Endangered, TO, HI) Indigenous

Recorded widely in a variety of wetland habitats throughout the ED, which is a stronghold for the species: O07/014 (OSNZ surveys 1977-1991), O07/022 (O07/H007), O07/024 (SSBI O07/H007), P07/127 (SSBI P07/H026), P07/169a (this survey), P07/141 (SSBI P07/H034), P07/145 (SSBI P07/H029), P08/072 (SSBI P08/H029), P08/073 (SSBI P08/H014), P08/081 (SSBI P08/H049), P08/101 (SSBI P08/H020), P08/208 (SSBI P08/016), P09/209 (SSBI P08/H006), P08/211 (SSBI P08/H015), P08/212 (OSNZ surveys 1977–1994), P09/001 (various, including SSBI P09/H003), P09/003 (SSBI Q08/H047), P09/205 (OSNZ surveys 1972–1994), Q09/054 (SSBI Q09/H004), Q09/057 (SSBI Q09/H009), Q09/058 (SSBI Q09/H011), and

Q09/060 (SSBI/H015). Recorded from Okaro Creek (Q09/051) in 2007 (R.J. Pierce, EcoOceania Ltd, pers. comm.) and from Omamari Road Grassland and Wetland (P07/130) in 2008 (A. Booth, DOC, pers. comm.).

***Charadrius obscurus aquilonius* Northern New Zealand dotterel/ tuturiwhatu pukunui**
(Nationally Vulnerable, CD, ST) Endemic

The western coast of the Kaipara ED (Northland) is a stronghold for this race. Encountered at a number of locations in the north (O07/011, O07/016) and on the Pouto dune system (P09/001) and beyond (QQ09/063), and recorded from Okaro Creek (part Q09/051) (SSBI Q08/ H047*1) where they breed (R. Parrish, pers. comm.).

***Egretta sacra sacra* Reef heron/matuku-moana**
(Nationally Vulnerable, DP, SO) Indigenous

Reef herons have been recorded from Lake Rototuna (P09/205) (SSBI P09/H002), and were noted during the present survey on the Kaipara Harbour south of Tauhara Creek (Q09/056).

***Himantopus novaezelandiae* Black stilt/kaki**
(Nationally Critical, CD, ST, HI, OL) Endemic

The Kaipara Harbour (P08/200) is the fifth most important wintering site in the country for this species (Dowding & Moore 2006), and they mostly visit the southern part of the ED (R. Parrish, pers. comm.).

***Sterna nereis davisae* New Zealand fairy tern**
(Nationally Critical, OL, CD, HI) Endemic

Virtually the entire population once overwintered on the Kaipara Harbour (P08/200), but it is uncertain whether they still do (R. Parrish, pers. comm.). They breed at South Kaipara Head and it is likely that some birds feed over the harbour waters of the ED and roost at shellbanks (R.J. Pierce, EcoOceania Ltd, pers. comm.).

***Nestor meridionalis septentrionalis* North Island kaka**
(Nationally Endangered, HI) Endemic

An occasional visitor, e.g., to secondary kahikatea fragments at Turiwiri (P07/182) in 2003 (SSBI P07/H067).

***Sterna caspia Caspian* tern/taranui**
(Nationally Vulnerable, SO) Indigenous

The Kaipara Harbour (P08/200) supports one of the largest breeding colonies of Caspian tern in New Zealand (McKenzie 1972). They were encountered regularly on the present survey on the western coast (O07/011, O07/016, P08/061, P09/001, Q09/063), and on the Kaipara Harbour (P08/200) and two of its estuaries (P09/003, Q09/051). They have also been recorded from other Kaipara estuaries: P08/213 (SSBI Q08/H047*9), Q09/051 (SSBI Q09/H015), and some eastern Pouto lakes: P09/205 (OSNZ surveys 1972–1994), Q09/054 (SSBI Q09/H054), Q09/058 (SSBI Q09/H011), and Q09/060 (SSBI Q09/H015).

CHRONICALLY THREATENED

Apteryx mantelli **North Island brown kiwi**
(Serious Decline, HI, RF, CD) Endemic

North Island brown kiwi were recorded in Tapu Bush (P09/011) in 1989 (SSBI P09/H007), and at Kai Iwi between Lakes Taharoa (O07/022) and Kai Iwi (O07/024) in 2002 (SSBI O07/H007).

Larus bulleri **Black-billed gull**
(Serious Decline) Endemic

Recorded recently from the Pouto dune system (P09/001) (Robertson et al. 2007).

Charadrius bicinctus bicinctus **Banded dotterel/tuturiwhatu**
(Gradual Decline) Endemic
The Kaipara Harbour (P08/200) is the fourth most important wintering site in the country for banded dotterel (Pierce 1999). They were recorded on the present survey on the Pouto dune system (P09/001), and have also been recorded at Kelly's Bay (part P09/003) (SSBI P08/H047*5).

Eudyptula minor iredalei **Northern little blue penguin/korora**
(Gradual Decline, HI, EF) Endemic
Present in the waters of the Kaipara Harbour (P08/200), and reputed to breed on the shore south of Waikere Creek (part Q09/051) estuary (L. Forrest, pers. comm.).

Hemiphaga novaeseelandiae novaeseelandiae **New Zealand pigeon/ kukupa**
(Gradual Decline, RF) Endemic

Encountered during this survey at one site (P07/141) in the Kaihu valley. Also recorded recently from two sites at Tatariki, P08/068a and P08/068c (SSBI P08/H028), and two at Pouto: the Pouto dune system (P09/001) (Robertson et al. 2007) and upper Okaro Bush (P09/008) (R.J. Pierce, EcoOceania Ltd, pers. comm.), but appear to be very rare on the Pouto Peninsula.

Larus novaehollandiae scopulinus **Red-billed gull/tarapunga**
(Gradual Decline) Indigenous
Recorded widely from the Kai Iwi lakes, the western coastline, the Kaipara estuaries, and the Pouto lakes: O07/018 (SSBI O07/H007), O07/022 (SSBI O07/H007), O07/024 (SSBI O07/H007), P08/072 (SSBI O07/H029), P08/101 (SSBI O07/H020), P08/200 (SSBI O07/H047*2), P08/213 (SSBI O07/H047*9), P09/003 (SSBI O07/H047*5), 09/054 (SSBI Q09/H004), Q056/056 (SSBI Q08/H047*2), Q09/057 (SSBI Q09/H011), Q09/201 (OSNZ surveys 1978–1994), and Q09/202 (OSNZ surveys 1973–1995).

Sterna striata striata **White-fronted tern/tara**
(Gradual Decline) Endemic

Encountered regularly on the western coast between Aranga Beach (O07/011) and Pouto Point (Q09/063), and also at some of the eastern Pouto dune lakes. Records include P08/072 (SSBI P08/H029), P08/200 (this

survey), P09/001 (this survey), P09/003 (SSBI Q08/H047), Q09/057 (OSNZ surveys 1972–1995), Q09/058 (OSNZ surveys 1972–1995), and Q09/063 (this survey). Breeds irregularly at South Kaipara Head and on shellbanks elsewhere in the Kaipara Harbour (P08/200) (R. Parrish, pers. comm.).

AT RISK

Bowdleria punctata vealeae North Island fernbird/matata
(Sparse) Endemic
Recorded (mostly heard and only occasionally seen) widely in larger tracts of shrubland and wetland throughout the ED. Records include O07/012 (SSBI O07H004), P07/127 (SSBI P07/H026), P07/133 (SSBI P07/H056), P07/169a (this survey), P07/171b (SSBI P07/H032), P08/099 (SSBI P08/H021), P08/101 (SSBI P08/H020), P08/200 (this survey), P09/001 (this survey), P09/002 (SSBI P09/H003), P09/003 (SSBI Q08/H047), P09/014 (SSBI Q09/H003), P09/020 (SSBI P09/H009), Q09/053 (this survey), Q09/056 (SSBI Q08/H047*2), Q09/058 (OSNZ surveys 1973–1994), and Q09/150 (this survey). Common in most saltmarshes at eastern Pouto, e.g., Kelly's Bay/Punahaere Creek (P09/003), and Okaro Creek (part Q09/051) (R Parrish, pers. comm.)

Gallirallus philippensis assimilis **Banded rail/moho-peruru**
(Sparse) Indigenous

Northland is a stronghold for banded rail, which have been recorded at several Kaipara Harbour estuaries between Tangitiki Bay (P08/101) (SSBI P08/H020) and Okaro Creek (part Q09/051) (SSBI Q08/H047); common at the latter site in mangroves and adjacent saltmarsh in 2007 (R.J. Pierce, EcoOceania Ltd, pers. comm.). Records include P08/200 (Robertson et al. 2007), P08/213 (SSBI Q08/H047), P09/003 (SSBI P09/H005), and Q09/056 (SSBI Q08/H077). Unrecognised bird calls heard at several wetlands on the Pouto dune system (P09/001) during this survey were subsequently identified as those of banded rail.

Phalacrocorax carbo novaehollandiae **Black shag/kawau**
(Sparse) Indigenous
Encountered regularly at lakes and wetlands throughout the ED: O07/014 (OSNZ surveys 1977–1991), O07/018 (OSNZ surveys 1977–1991), O07/022 (SSBI O07/H007), O07/024 (SSBI O07/H007), P07/169a (this survey), P07/171 (OSNZ surveys 1979–1991), P07/174a (OSNZ surveys 1977–1994), P07/206 (OSNZ surveys 1979–1982), P08/072 (this survey), P08/087 (this survey), P08/209 (OSNZ surveys 1977–1994), P08/210 (OSNZ surveys 1977–1994), P08/212 (SSBI P08/H008), P08/213 (Q08/H047*9), P09/001 (various records), P09/002 (SSBI P09/H003), P09/011a (OSNZ surveys 1973-1995), P09/014 (OSNZ surveys 1977–1994), P09/205 (SSBI P08/H002), Q09/054 (SSBI Q09/H004), Q09/055 (SSBI Q09/H005), Q09/056 (SSBI Q09/H077*2), Q09/057 (SSBI OSNZ surveys 1973–1995), Q09/058 (OSNZ surveys 1972–1995), Q09/201 (OSNZ surveys 1979–1982), Q09/202 (OSNZ surveys 1873–1995), Q09/203 (OSNZ surveys 1977–1994), and Q09/204 (SSBI Q09/H010).

Phalacrocorax sulcirostris **Little black shag**
(Sparse) Indigenous

Encountered during this survey on the west coast south of Glinks Gully (P08/072) and at lakes on the Pouto dune system (P09/001). Also reported widely from dune lakes throughout the ED: O07/014 (OSNZ surveys 1977–1991), O07/022 (OSNZ surveys 1977–1992), P07/171 (OSNZ surveys 1979–1991), P08/209 (OSNZ surveys 1977–1994), P08/210 (OSNZ surveys 1977–1994), P08/211 (OSNZ surveys 1977–1994), P08/205 (SSBI P09/H002), P08/212 (OSNZ surveys 1977–1994), Q09/054 (SSBI Q09/H004), Q09/055 (OSNZ surveys 1973–1995), Q09/057 (OSNZ surveys 1973–1995), Q09/058 (OSNZ surveys 1972–1995), Q09/201 (SSBI Q09/H014), Q09/202 (SSBI Q09/H013), and Q09/204 (SSBI Q09/H010).

Phalacrocorax melanoleucos **Little shag/kawaupaka**
(Sparse) Indigenous

Recorded widely from dune lakes in the ED: O07/014 (OSNZ surveys 1977–1991), O07/018 (SSBI O07/H007), O07/022 (SSBI O07/H007), O07/024 (SSBI O07/H007), P07/127 (SSBI P07127/H026), P07/171 (OSNZ surveys 1979–1991), P07/174a (OSNZ surveys 1977–1994), P08/101 (SSBI P08/H020), P08/208 (SSBI P08/H016), P08/209 (OSNZ surveys 1977–1994), P08/211 (SSBI P08/H015), P08/212 (SSBI P08/H008), P08/213 (Q08/H047*2), P09/001 (various records), P09/011a (OSNZ surveys 1973–1995), P09/014 (OSNZ surveys 1977–1994), Q09/051 (SSBI Q08/H047), Q09/054 (SSBI Q09/H004), Q09/055 (OSNZ surveys 1973–1995), Q09/057 (SSBI Q09/H008), Q09/058 (SSBI Q09/H015), Q09/201 (SSBI Q09/H014), Q09/202 (SSBI Q09/H013), Q09/203 (SSBI Q09/H006), and Q09/204 (SSBI Q09/H010).

Porzana pusilla affinis **Marsh crake/koitareke**
(Sparse) Indigenous

There is one record from the Pouto dune system (P09/001) (Cromarty & Scott 1996).

Poliocephalus rufopectus **New Zealand dabchick/weweia**
(Sparse) Endemic

Recorded widely from dune lakes throughout the ED, which is a national stronghold of the species. Recorded from O07/014 (SSBI O07/H005), O07/018 (SSBI O07/H007), O07/022 (SSBI O07/H007), O07/024 (SSBI O07/H007), P07/171 (OSNZ survey 1979–1991), P07/174a (SSBI (07/H034), P08/072 (this survey), P08/208 (SSBI P08/H016), P08/209 (OSNZ survey 1977–1991), P08/210 (SSBI P08/H07), P08/211 (SSBI P08/H015), P09/001 (various records), P09/002 (SSBI P09/H003), P09/011a (SSBI P09/H008), P09/205 (SSBI P09/H002), Q09/054 (SSBI Q09/H004), Q09/055 (SSBI Q09/H009), Q09/057 (SSBI Q09/H009), Q09/H058 (SSBI Q09/H011), Q09/060 (SSBI Q09/H015), Q09/202 (SSBI Q09/H013), Q09/203 (SSBI Q09/H006), Q09/204 (SSBI Q09/H010).

Porzana tabuensis plumbea **Spotless crake/puweto**
(Sparse) Indigenous

Recorded from wetlands throughout the ED. Records include O07/018 (OSNZ survey 1977–1991), P07/145 (SSBI P07/H029), P07/171b (SSBI P07/H032), P07/174a (OSNZ surveys 1977–1994), P08/099 (SSBI Q08/H047), P09/001 (OSNZ surveys 1979–1994), P09/014 (OSNZ surveys 1977–1984), P09/020 (SSBI P09/H009), Q09/051 (SSBI Q09/H004), Q09/058 (SSBI Q09/H011), and Q09/060 (SSBI Q09/H015).

NON-RESIDENT NATIVE

Sterna hirundo **Common tern**
(Migrant) Indigenous

Recorded at Lake Rotokawau (Q09/057) (SSBI Q09/H009, OSNZ survey 1990).

Limosa lapponica **Bar-tailed godwit/kuaka**
(Migrant) Indigenous

The most common transequatorial migrants arriving at Kaipara ED (Northland) each summer. Recorded from the larger Kaipara estuaries, including P08/101 (SSBI P08/H020), P08/213 (SSBI P08/H047), P09/003 (SSBI Q08/H047), and Q09/051 (this survey), and mouth: Q09/063 (SSBI Q09/H047).

Calidris canutus **Lesser knot/huahou**
(Migrant) Indigenous

Recorded in 1989 from Kelly's Bay (part P09/003) (SSBI Q08/H047*5). The southern Kaipara Harbour supports major concentrations (R. Parrish, pers. comm.).

Chlidonias leucopterus **White-winged black tern**
(Migrant) Indigenous

Recorded at Lake Rotokawau (Q09/057) (SSBI Q09/H009) (OSNZ survey 1990).

COLONISER

Tachybaptus novaehollandiae **Australasian little grebe**
Indigenous

Recorded from Shag Lake (O07/014) (SSBI O07/H005, OSNZ surveys 1977-1991), Lake Rehutai (P07/174a) (SSBI P07/H034, OSNZ surveys 1977–1994), and Lake Kanono (Q09/058) (SSBI Q09/HO11, OSNZ surveys 1972–1995).

Charadrius melanops **Black-fronted dotterel**
Indigenous

Recorded at Lake Taharoa (O07/022) (SSBI O07/H007) (OSNZ survey 1984).

3.7.3 Regionally Significant bird species in Kaipara Ecological District (Northland Conservancy)

The following species are provisionally listed as 'Regionally Significant' by DOC Northland Conservancy. Unless otherwise specified, records are from this survey.

Anas gracilis **Grey teal/tete**
Indigenous

Widely recorded from the Kai Iwi lakes, the west Dargaville lakes, and the larger Pouto dune lakes. Records include O07/018 (SSBI O07H007), O07/022 (SSBI O07/H007), O07/024 (SSBI O07/H007), P07/171 (OSNZ surveys 1979–1991), P07/174a (SSBI P07/H034), P09/001 (various records), P09/205 (OSNZ surveys 1973–1995), Q09/055 (SSBI Q09//H005), Q09/057 (OSNZ surveys 1973–1995), Q09/060 (SSBI Q09/H015), Q09/201 (OSNZ surveys 1978–1994), Q09/202 (OSNZ surveys 1973–1995), Q09/203 (SSBI Q09/H006), and Q09/204 (OSNZ surveys 1973–1995).

Anas rhynchotis **Australasian shoveler/kuruwhengi**
Indigenous

Recorded widely in the district: O0/017 (OSNZ surveys 1977–1991), O0/018 (SSBI O07/H007), O0/022 (SSBI O07/H007), O0/024 (SSBI O07/H007), P07/171 (OSNZ surveys 1979–1991), P07/174a (OSNZ surveys 1977–1994), P08/208 (SSBI P08/H016), P08/209 (SSBI P08/H006), P08/212 (SSBI P08/H008), P09/001 (SSBI P09/H001*4), P09/205 (OSNZ surveys 1972–1994), Q09/054 (SSBI Q09/H004), Q09/055 (OSNZ surveys 1973–1995), Q09/057 (SSBI Q09/H009), Q09/058 (SSBI Q09/H011), Q09/060 (SSBI Q09/H015), Q09/201 (SSBI Q09/H014), Q09/202 (OSNZ surveys 1973–1995), Q09/203 (OSNZ surveys 1977–1994), Q09/204 (SSBI Q09/H010).

Aythya novaeseelandiae **New Zealand scaup/papango**
Endemic

Widely recorded from some of the west Dargaville lakes and the larger Pouto dune lakes.

Records include P07/138 (OSNZ surveys 1977–1984), P08/211 (SSBI P08/H015), P08/212 (SSBI P08/H008), P09/001 (various records), P09/002 (SSBI P09/H003), P09/205 (Q09/H002), Q09/054 (SSBI Q09/H004), Q09/055 (SSBI Q09/H005), Q09/057 (SSBI Q09/H009), Q09/059 (SSBI Q09/H015), Q09/201 (OSNZ surveys 1978–1994), and Q09/202 (SSBI Q09/H010).

Haematopus unicolor **Variable oystercatcher/toreapango**
Endemic

Recorded from several locations on the western coast including O07/011 (this survey), O07/016 (this survey), P08/072 (SSBI P08/H029), P09/001 (this survey), and Q09/063 (this survey), and also at Kaipara estuaries such as Kelly's Bay (part P09/003) (SSBI Q08/H047*5) and Okaro Creek (Q09/051) (SSBI Q08/H047).

Pterodroma macroptera gouldi **Grey-faced petrel/oi**
Endemic

Recorded breeding at Pouto Point (Q09/063) as late as 1980 (P. Anderson, pers. comm.), but it is unknown whether this colony still exists. This was one of the four breeding colonies on the Northland mainland (A. Booth, DOC, pers. comm.).

3.7.4 Threatened and Regionally Significant bird species not recorded recently in Kaipara Ecological District (Northland Conservancy).

ACUTELY THREATENED

Anas aucklandica chlorotis **'North Island' brown teal/pateke**
(Nationally Endangered, HI, CD) Endemic
Recorded from the Pouto dune system in 1977/1978 (P09/001) (Cromarty & Scott 1996) and from Lake Rototuna (P09/205) in 1977 (P09/H002).

Gallirallus australis greyi **North Island weka**
(Nationally Vulnerable, HI, EF) Endemic
Last recorded at Dargaville in 1937 (OSNZ CSN 1940).

3.7.5 Threatened mammal species in Kaipara Ecological District (Northland Conservancy)

Both long-tailed bat and lesser short-tailed bat are likely to have occurred in Kaipara ED (Northland) before major habitat loss was induced by humans and introduced mammalian predators became common (Molloy 1995).

3.7.6 Regionally Significant mammals in Kaipara Ecological District (Northland Conservancy)

Arctocephalus forsteri **New Zealand fur seal**
Indigenous

Fur seals regularly haul out on the western coastline between Aranga Beach (O07/011) and Pouto (P09/001) (R. Parrish, pers. comm.) and were encountered on the present survey.

3.7.7 Threatened reptiles in Kaipara Ecological District (Northland Conservancy)

CHRONICALLY THREATENED

Naultinus elegans elegans **Auckland green gecko**
(Gradual Decline, HI) Endemic
There are two records from the ED, a live collection from Punahaere Creek (part P09/003) in 1980 (Q08/H047*4), and a 2004 record (SSBI P07/H056) from Maitahi Wetland SR (P07/133).

3.7.8 Threatened invertebrates in Kaipara Ecological District (Northland Conservancy)

ACUTELY THREATENED

Notoreas sp. ***'northern'***
(Nationally Endangered, HI) Endemic

A small, brightly coloured diurnal moth that lives on *Pimelea prostrata*, a widespread subshrub of consolidated sands on the west coast. It has recently been recorded from three sites (O07/016, P08/061, P08/072) on the west coast, but its habitat is threatened by invasion of weeds such as pines, Spanish heath, berry heath, and pampas (A. Booth, DOC, pers. comm.).

CHRONICALLY THREATENED

Latrodectus atritus **Black katipo**
(Serious Decline, HI) Endemic

A species of coastal dunes in the northern half of the North Island, black katipo have declined because of habitat loss and modification. Recorded from four localities (O07/016, P08/061, P08/072, and P09/001) on the west coast. A survey in January 2008 showed that densities were higher on the Pouto Peninsula than in most other areas surveyed in Northland, indicating the ED is a stronghold of the species in Northland (A. Booth, DOC, pers. comm.).

3.7.9 Regionally Significant reptiles in Kaipara Ecological District (Northland Conservancy)

Chelonia mydas **Green turtle**
(Migrant) Indigenous

One was recorded live between Bayly's Beach and Glinks Gully (part P08/061) in 1978 (DOC Bioweb).

Eretmochelys imbricata **Hawksbill sea turtle**
(Vagrant) Indigenous

There are several recent records from the ED. The species was sighted live in the Northern Wairoa River at Dargaville in 1979 and 1996, and on the west coast at Glinks Gully (SSBI P08/H029) in 1996 (DOC Bioweb). Dead specimens were collected at Roundhill (part P09/001) in 1972 (SSBI P09/H001*4), Glinks Gully (SSBI P08/H029) in 1984, and between Aranga Beach and Omamari (P08/061) in 1984 (DOC Bioweb).

3.7.10 Threatened fish, mollusc, and crustacean species in Kaipara Ecological District (Northland Conservancy)

ACUTELY THREATENED

Galaxias **sp. Dunelakes galaxias**
(Nationally Vulnerable, CD, HI) Endemic

An 'evolutionary species unit' of dwarf inanga, dunelakes galaxias is

currently regarded by DOC as a separate species and is confined to the Kai Iwi lakes. Formerly present in Lake Kai Iwi (O07/024), it is now apparently confined to Lakes Waikere (O07/018) and Taharoa (O07/022) (Pingram 2005). As with dwarf inanga, introduced fish species such as rainbow trout and gambusia have been implicated in its decline (Rowe & Chisnall 1997).

CHRONICALLY THREATENED

Anguilla dieffenbachii **Longfin eel**
(Gradual Decline, HI) Indigenous
Longfin eels are found throughout New Zealand, but are threatened by over-harvesting (especially of large females) and habitat modification. Recorded from some Kai Iwi (Shag Lake (O07/016), Waikere (O07/018)) and Pouto (Rotootuauru (Q09/055), Karaka (part P09/001)) lakes. Some lakes have been stocked with longfin eels (A. Macdonald, pers. comm.)

Galaxias argenteus **Giant kokopu**
(Gradual Decline, DP, HI) Endemic

The range of giant kokopu is predominantly coastal and extends around most of New Zealand. Recorded from Lake Karaka in 1977 (part P09/001) and again in 2006 (SSBI P09/H001*2), currently the only known population in Northland.

Galaxias gracilis **Dwarf inanga**
(Serious Decline, CD, HI) Endemic

Dwarf inanga is endemic to the Pouto dune lakes (Rowe & Chisnall 1997); the Kai Iwi lakes entity is currently regarded by DOC as a separate species, dunelakes galaxias (Pingram 2005). As well as habitat modification caused by changes in land use of surrounding catchments and subsequent declines in water quality, the decline of dwarf inanga appears to be largely a result of predation by introduced fish species such as rainbow trout and gambusia. Recently recorded from nine of the Pouto lakes: Rotopouua (P09/014), Rototuna (P09/205), Humuhumu (Q09/054), Rotokawau (Q09/057), Kanono (Q09/058), Kahuparere (Q09/060), Swan Egg Pond (Q09/203) (NIWA 2007), Rotootuauru (Q09/055), and Waingata (Q09/204) (Wells et al. 2007).

Hydriella menziesii **Freshwater mussel**
(Gradual Decline) Endemic

Freshwater mussels have been recorded from lakes throughout the ED (Wells et al. 2007), at Kai Iwi: Lake Kai Iwi (O07/024), west Dargaville: Lake Parawanui (P08/212), and Pouto: Lake Rotokawau (Q09/057), Lake Humuhumu (Q09/054), Lake Kauparere (Q09/060), Lake Rotootuauru (Q09/055), and Lake Mokeno (part P09/001).

Neochanna diversus **Black mudfish**
(Gradual Decline, HI) Endemic

Distinguished from the Northland mudfish (the other northern species) by the number of caudal fin rays, black mudfish occupies a range from the Mokau River catchment in the south to Kaitaia in the north. The main

threats to the species are as a result of land drainage and development. There is also a potential predation threat from the introduced gambusia on black mudfish fry. However, these may be mitigated by the ability of mudfish to survive for long periods in dry habitats, combined with winter breeding when gambusia numbers are low. Recorded from only two wetlands in Kaipara ED (Northland): Maitahi Wetland SR (P07/133) by DOC in 1999, and Tangitiki Estuary (P08/101) in 2001 (NIWA 2007), the only Pouto Peninsula record.

Parenephrops planifrons **Koura/Freshwater crayfish**
(Gradual Decline) Endemic

Recorded from some of the Kai Iwi (Waikere: O07/018, Taharoa: O07/022) and Pouto (Humuhumu: Q09/054, Kanono: Q09/058, Kahuparere: Q09/060) lakes by Wells et al. (2007).

AT RISK

Amarinus lacustris **Freshwater crab**
(Sparse, SO) Endemic

Recorded from Lake Waikere (O07/018) by NIWA (2007) and Lake Taharoa (O07/022) by Wells et al. (2007).

3.7.11 Regionally Significant fish species in Kaipara Ecological District (Northland)

Galaxias fasciatus **Banded kokopu**
Endemic

Banded kokopu were recorded in Waihaupai Stream wetland (O07/012) by the New Zealand Wildlife Service in 1978 (SSBI O07/H004).

3.7.12 Invertebrates

A comprehensive discussion and checklist of fauna, particularly invertebrates, is beyond the scope of the present study. The descriptions for each site detail known threatened fauna, as well as provide some records of non-threatened species. There are very few records of invertebrates, irrespective of their prevalence, and it is recognised that they are a significant facet of indigenous ecosystems which is often overlooked. Indigenous New Zealand insects are our largest fauna group, and are intimately associated with indigenous habitat, carrying out a wide range of roles in ecosystems. In addition to their consumption of live plant material, they are involved in pollination, breakdown of leaves, litter and logs, soil formation, general scavenging, parasitism and predation, as well as providing the main food for birds, lizards, and most freshwater fish (Watt 1975). It is generally acknowledged that although there are many 'generalist' species of insects, the great majority have particular habitat requirements that restrict their populations in both space and time. With the present state of knowledge of these species, the protection of the maximum range of habitat types is considered the most important strategic approach in order to provide a minimum basis on which populations can be maintained.

3.8 Threats

The integrity of natural areas of Kaipara ED (Northland) is threatened by various ongoing and potential threats, most of which apply widely in lowland New Zealand.

3.8.1 Invasive plants

The ground layers of forest on damp alluvium in the Kaipara ED (Northland) have been locally invaded by tradescantia and alligator weed, and subcanopies only very locally by tree and Chinese privet. Shrublands have been widely invaded by a suite of woody weeds, including three species of *Hakea* (prickly hakea, downy hakea, and willow-leaved hakea), three species of wattle (black, brush, and Sydney golden), two species of pine (radiata and maritime), two species of heath (berry and Spanish), and dally pine, but remain predominantly native. Taller invaders like pines and wattles convert shrublands into treeland and eventually forest.

Freshwater wetlands have been widely invaded by a large suite of herbaceous adventives, including the aggressive alligator weed on the wettest sites and pampas on drier ones. As elsewhere in the country, they now largely comprise intimate mixtures of native and adventive species. Although many freshwater lakes have been locally invaded by aggressive aquatic species such as lakeweed, Canadian pondweed, and oxygen weed, virtually all the Pouto dune lakes remain free of them and every effort should be made to ensure that this state continues. Saltmarshes have been widely invaded by a small suite of herbaceous adventives, especially saltwater paspalum, but remain predominantly native. Sharp rush, an aggressive adventive, appears to be actively spreading in damper places on the Kaipara Harbour estuaries and the Pouto dune system and should be controlled now. Sand dunes have been widely invaded by a suite of herbaceous adventives, most conspicuously pampas, but remain for the most part predominantly native. Sydney golden wattle poses a particularly serious threat to coastal dunes in Northland and every effort should be made to keep it out of the nationally important Pouto dune system.

3.8.2 Pest animals

A small suite of mammalian pests is present in Kaipara ED (Northland). Of the larger introduced mammals of obvious significance to vegetation, brush-tailed possums were introduced into lower Northland in 1870 and have been present in Kaipara ED (Northland) at least since 1963, probably much longer (Cowan 1990). Canopies continue to suffer the effects of largely uncontrolled possum browsing; the crowns of many totara in Tapu Bush appear from a distance to be suffering from the effects of possum browsing. Feral pigs were present at Pouto in 1983 (McIlroy 1990) but have undoubtedly been present for very much longer. Sign of both mammals was noted on the present survey. A range of smaller mammals such as feral cats, house mice, rats, and mustelids such as stoats and ferrets, is present in the ED and likely to be having locally significant effects on flora and fauna. Stoats were observed at a number of locations during the present survey. Argentine ants are now present on the west coast at Aranga Beach and Bayly's Beach (A. Booth, DOC, pers. comm.)

and may pose a problem for nesting birds. Although many freshwater lakes have been invaded by pest fish species like gambusia, many, especially those of the Pouto dune system, are still free of them.

3.8.3 Effects of agriculture on natural areas

Unfenced forest remnants in pastoral settings have been widely degraded by domestic stock grazing, which appears to have facilitated the entry and expansion of some aggressive adventives like alligator weed. Shrublands appear less vulnerable to grazing. Although still frequented by a range of native birds, many dune lakes, particularly in the central part of the ED, are now grazed to the water's edge with no significant wetlands remaining around them. Many freshwater wetlands in pastoral settings are still being grazed by stock and drier parts are being seriously degraded by them. The prevalence in many smaller freshwater wetlands of species such as raupo, which are indicative of high fertility, may reflect the widespread use of fertilisers for agriculture on the generally poor soils of the ED. Freshwater lakes with pastoral catchments, many of which remain without any riparian protection at all, are being enriched by nutrient inflows and sediment from intensive agriculture, aggravated as elsewhere in the country by the continuing expansion of dairying. Saltmarshes have been drained in places in the past and are still grazed in places; naturally high fertility may have helped accelerate the spread of the invasive saltwater paspalum. Sand dunes and coastal faces between Glinks Gully and the northern part of the Pouto dune system are largely open to domestic stock and show widespread weed invasion.

3.8.4 Effects of residential dwelling on natural areas

Kaipara ED (Northland) is relatively sparsely populated, with only three significant population centres (Dargaville, Te Kopuru, and Ruawai), so the threat of weed invasion from residential areas, its chief source (Timmins & Williams 1991), and mammalian pests like domestic dogs to wildlife is likely to be lower than in some other parts of the country. However, the ED has been settled for longer than some other parts of the country, and is unlikely to remain immune indefinitely from the generally increasing pressure for coastal subdivision in New Zealand and its attendant risks to the integrity of natural areas.

3.8.5 Ongoing effects of former land clearance

Land clearance has led to severe habitat fragmentation throughout the Kaipara ED (Northland). The ecological effects of fragmentation have been widely studied and are reasonably well understood, and undoubtedly apply to the fragmented natural areas of the ED. They include microclimatic effects:

- altered microclimate within and around fragments (e.g., more extreme edge temperatures),
- more solar radiation, resulting in changed vegetation composition at the edges and numerous faunal effects,
- increased edge windiness, resulting in increased direct and indirect damage, leading to increased windthrow and gaps and thus altered composition,

- increased seed rain from outside, and
- less buffered hydrology.

They also include isolation effects such as species relaxation and enrichment with invasive and edge species, both of which become apparent over time (Saunders et al. 1991). Wetland drainage is evidently still in progress in the ED; several examples were encountered on the present survey.

3.8.6 Legal protection versus conservation management action

Without active conservation measures, even protected areas may lose biodiversity. The following actions need to be undertaken to protect the immediate and long-term viability of the natural areas:

- Fencing to exclude livestock from wetland, forest and shrubland remnants. This includes fencing along the coast so that livestock do not have access to dunes (for example, the coast south of Glinks Gully, including the northern portion of the outstanding Pouto dune system) and estuarine areas (e.g., the Kaipara Harbour estuaries at Pouto).
- Reducing the impact of invasive plants through targetted control programmes.
- Regular control of mammalian pests.

A lack of conservation management action, in the face of all the other pressures enumerated here, is probably the greatest threat to the future viability of the natural areas of Kaipara ED (Northland).

4. Site descriptions

Descriptions for all 113 sites are presented below, including maps, grid references, area, altitude, ecological units, landform/geology (summarised in Appendix 10), vegetation, notable species, and ecological significance. The percentage cover of ecological units has been included in the site descriptions, and individual ecological units within sites have, with some exceptions, been mapped. Vegetation types within ecological units are defined by 'abundant' species (species forming > 50% of the canopy) where present, otherwise 'common' (species which form 20–50% of the canopy) species, plus overall vegetation structure. If there are no common canopy species, vegetation types are defined by 'frequent' species (which form 10–20% of the canopy). The vegetation types are aggregated into 19 major vegetation types (from the PATN cluster analysis), which are then aggregated into higher level habitat mapping units (forest, forest-shrubland, shrubland, wetland, estuarine, dunes). Appendix 10 presents the concordance of ecological units, the 19 major vegetation types, and the six habitat mapping units, as well as area and level of ecological significance. Faunal records from the SSBI database held at Northland Conservancy, Department of Conservation, are given with site number and date of observation. Records of threatened flora and fauna have been obtained from herbaria and other databases and information systems like the SSBI mentioned in Section 2.1 and 3.6.1, or were made directly during this survey. Unless referenced, the Fauna section of each site description lists indigenous fauna observations made during this survey. The current New Zealand conservation status (e.g., Gradual Decline) which is derived from Hitchmough et al. (2007) and unpublished lists of Regionally Significant flora and fauna. See Appendices 8.5 and 8.7 for lists of flora and fauna respectively present in Kaipara ED (Northland). The Significance section specifies the ecological and conservation values of the site according to Section 2.4 (Criteria for assessment of the significance of ecological units). This includes the presence of any 'representative ecological units', ie priority ecological units representing the highest quality examples of ecological units characteristic of the diversity in the ED, or the best examples of depleted and hence underrepresented ecological units. It also includes presence of threatened and regionally significant species, land environments classified as Acutely Threatened, Chronically Threatened or At Risk (MfE 2007), and the existing degree of statutory protection.

4.1 LEVEL 1 SITES

The following 62 sites were determined as Level 1 sites (Table 6). These are listed in alphabetical order in Appendix 12, and described and mapped as follows.

TABLE 6: LIST OF LEVEL 1 SITES

SITE NAME	SURVEY NO.	GRID REF.
Western Coast A:		
Aranga Beach North Coastal Communities	O07/011	O07 627 031
Shag Lake and Wetland	O07/014	O07 646 011
Western Coast B:		
Aranga Beach South Coastal Communities	O07/016	O07 634 021
Lake Waikere, Wetland and Shrubland	O07/018	O07 675 002
Lake Taharoa, Wetland and Shrubland	O07/022	O07 695 992
Lake Kai Iwi, Wetland and Shrubland	O07/024	O07 699 981
Te Kawa Stream Forest	O07/121a	P07 761 981
Omamari Government Purpose Wildlife Management Reserve and Surrounds	P07/127	P07 718 959
Omamari Road Grassland and Wetland	P07/130	P07 715 920
Newlove Airstrip Wetland	P07/131	P07 722 929
Maitahi Wetland Scientific Reserve and Surrounds	P07/133	P07 780 925
Frith Road Northern Dairylands Forest	P07/135	P07 825 925
Mangakahia Forest Wetland	P07/140	P07 816 912
Rotu Stream Forest	P07/141	P07 825912
Opanake Road Morris Forest	P07/142	P07 737 918
Babylon Smith Wetland	P07/145	P07 737 918
NRC Opanake Road Reserve Forest	P07/148	P07 842 906
Opanake Road Davidson Forest and Shrubland	P07/150	P07 842 902
Long Gully Wetland and Shrubland	P07/153	P07 751 879, P07 757 884
Kaihu Valley West Shrubland	P07/157a	P07 827 897
Opanake Road Shrubland and Forest	P07/158	P07 855 885
Hoanga Alluvial Forest	P07/162	P07 916 910
Lower Kaihu River Forest Fragments	P07/169	P07 867853, 872 848, 873 845
Hokianga Road Railway Treeland	P07/169a	P07 875 867, 881 869
Freidrich's Lake and Wetland	P07/171	P07 792 843
Dargaville Bridge Forest	P07/173	P07 904837
Lake Rehutai and Wetland	P07/174a	P07 800 806
Aoroa Road Forest	P08/056	P08 904 796
Western Coast C:		
Glinks Gully North Grassland, Flaxland and Forest	P08/061	P08 various
Newsham Road North Forest	P08/067a	P08 963 699
Newsham Road South Forest	P08/067b	P08 965 692
Kidds Creamery Road Corner Forest	P08/068a	P08 955 712
NRC Creamery Road Reserve Forest	P08/068b	P08 957 707
Kidds Creamery Road Middle Forest	P08/068c	P08 957 710

Western Coast D:		
Glinks Gully South Grassland, Wetland and Shrubland	P08/072	P08 various
Mapau Bush	P08/094a	P08 052 608
Russell Wetland	P08/096	P08 017 539
Tangitiki Estuary, Wetland and Shrubland	P08/101	P08 074 511
Kaipara Harbour, Shrubland and Rushland	P08/200	P08 various
Clarke's Lake and Wetland	P08/208	P08 917 649
Greville's Lagoon and Wetland	P08/209	P08 847 736
Lake Kapoai and Wetland	P08/210	P08 856 726
Lake Wainui and Wetland	P08/211	P08 892 682
Waimamaku Estuary, Shrubland and Rushland	P08/213	P08 064 534
Western Coast E: Pouto Dune System	P09/001	P09 various
Kelly's Bay/Punahaere Creek Estuary, Shrubland and Forest	P09/003	P09 090502, P09 502 090
Upper Okaro Bush	P09/008	P08 085 455
Tapu Bush	P09/011	P09 071 426
Lake Rotopouua, Wetland and Forest	P09/014	P09 099 417
Lake Rototuna and Wetland	P09/205	P09 040 495
Okaro Creek/Waikere Creek Duneland, Wetland and Shrubland	Q09/051	Q09 136 448, Q09 142 426
Wetland East of Lake Rotopouua	Q09/053	Q09 105 421
Lake Humuhumu, Wetland and Forest	Q09/054	Q09 115 409
Lake Rotootuauru, Wetland and Forest	Q09/055	Q09 127 405
Tauhara Creek Estuary, Sandfield, Wetland and Shrubland	Q09/056	Q09 165 397
Lake Rotokawau and Wetland	Q09/057	Q09 135 387
Lake Kanono, Wetland and Forest	Q09/058	Q09 128 375
Lake Kahuparere, Wetland and Shrubland	Q09/060	Q09 145 361
Pretty Bush	Q09/061	Q09 353 120
Pouto Point Wildlife Reserve Sandfield, Wetland and Shrubland	Q09/063	Q09 150 354
Ongange Creek Wetland, Shrubland and Forest	Q09/150	Q09 116 476
Finlayson's Lake and Wetland	Q09/201	Q09 141 367

WEST COAST A: ARANGA BEACH NORTH COASTAL COMMUNITIES

Survey no. O07/011
Survey date 29 November 2006
Grid reference O07 627 031
Area 13.9 ha
Altitude 0–20 m asl

Ecological units

(a) Spinifex sandfield on foredune (20%)

(b) Knobby clubrush rushland on rear dune (47%)

(c) Pohutukawa forest on rear dune (15%)

(d) Undescribed shrubland (18%)

Landform/geology

Holocene unconsolidated transverse and parabolic dunes.

Vegetation

The site comprises

(a) a sparsely-vegetated foredune with spinifex dominant, and some pingao, sand sedge, knobby clubrush, tauhinu, and adventive herbs.

(b) Behind lies a more vegetated rear dune dominated by knobby clubrush and a variety of native and adventive shrubs (e.g., tauhinu, sand coprosma, boneseed, tree lupin), grasses (e.g., coastal toetoe, sand wind grass), sedges (e.g., *Carex testacea*), and herbs (e.g., *Oxalis rubens*, New Zealand spinach, adventive iceplant).

There is a very small area of pohutukawa forest

(c) at the northern end, mostly on freehold land.

(d) There are two tracts of undescribed shrubland nearby.

Significant flora

Pingao (Gradual Decline) and sand coprosma (Regionally Significant), recorded during this survey.

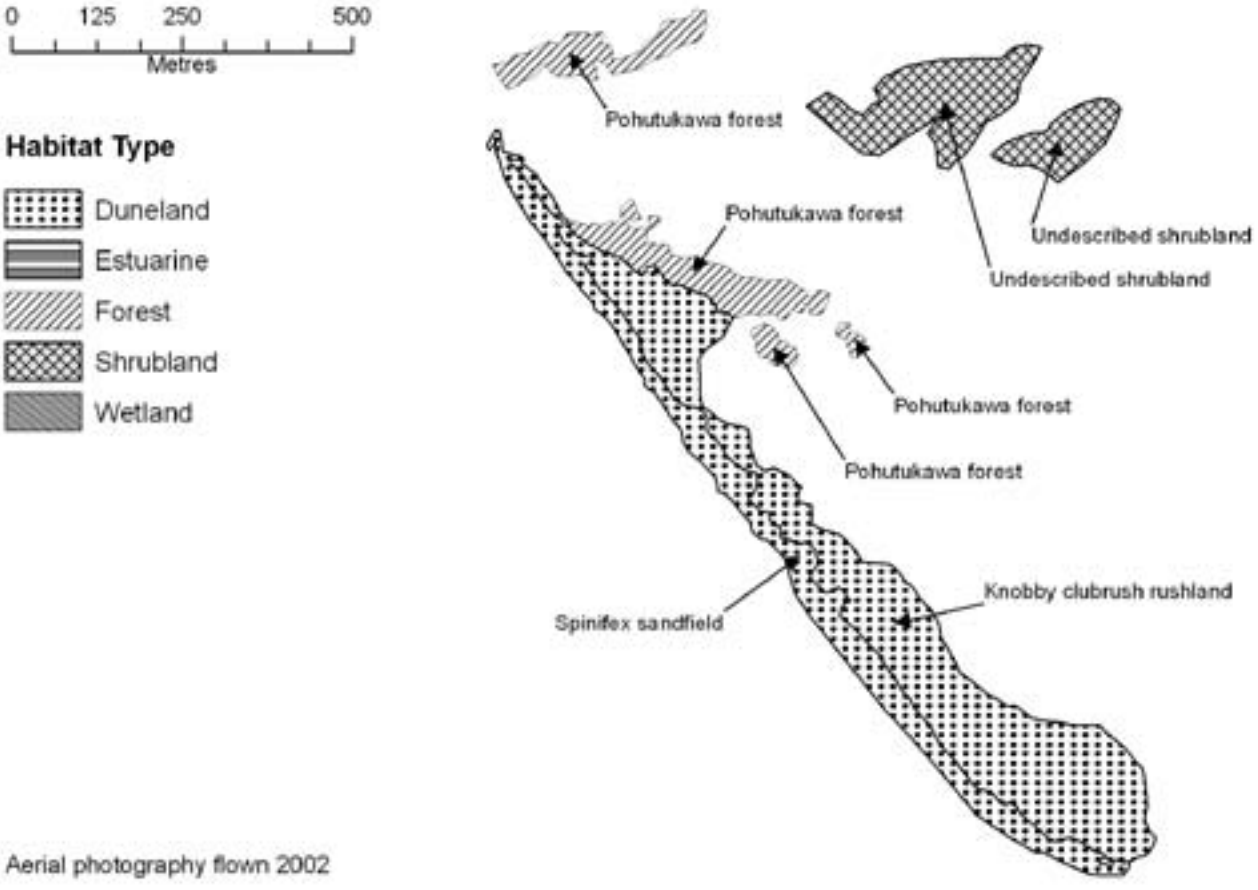
Fauna

Northern New Zealand dotterel (Nationally Vulnerable), Caspian tern (Nationally Vulnerable), white-fronted tern (Gradual Decline), variable oystercatcher (Regionally Significant), black-backed gull, pied shag, white-faced heron, Australasian pied stilt, New Zealand pipit. Shore skinks were recorded in 1972 (DOC Bioweb).

Significance

Despite the inland fence being in poor condition in places and stock access, the site supports a relatively intact sequence of coastal dune vegetation, with a representative range of native sand species, including threatened and regionally significant species, still present. The site contains

O07/011 Western Coast A: Aranga Beach North Coastal Communities



Aerial photography flown 2002

0.2 ha of Chronically Threatened land environment A7.1a and 4.6 ha of At Risk environment G1.1c. Site for two representative ecological units: (a) Spinifex sandfield on foredune, and (c) Pohutukawa forest on rear dune.

SHAG LAKE AND WETLAND

Survey no.	O07/014
Survey date	14 December 2006
Grid reference	O07 646 011
Area	17 ha
Altitude	80–100 m asl

Ecological units

(a) Eleocharis sphacelata reedland on alluvium (8%)

(b) Open water in dune lake (92%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield, ponded at landward edge of Holocene parabolic dunefield.

Vegetation

This site comprises a small dune lake.

(a) The discontinuous lacustrine fringe is dominated by *Eleocharis sphacelata*, and locally by raupo or Baumea articulata.

(b) Open water in dune lake.

Significant flora

Sand coprosma, recorded during this survey, and Glossostigma elatinoides (SSBI O07/H005) are both Regionally Significant.

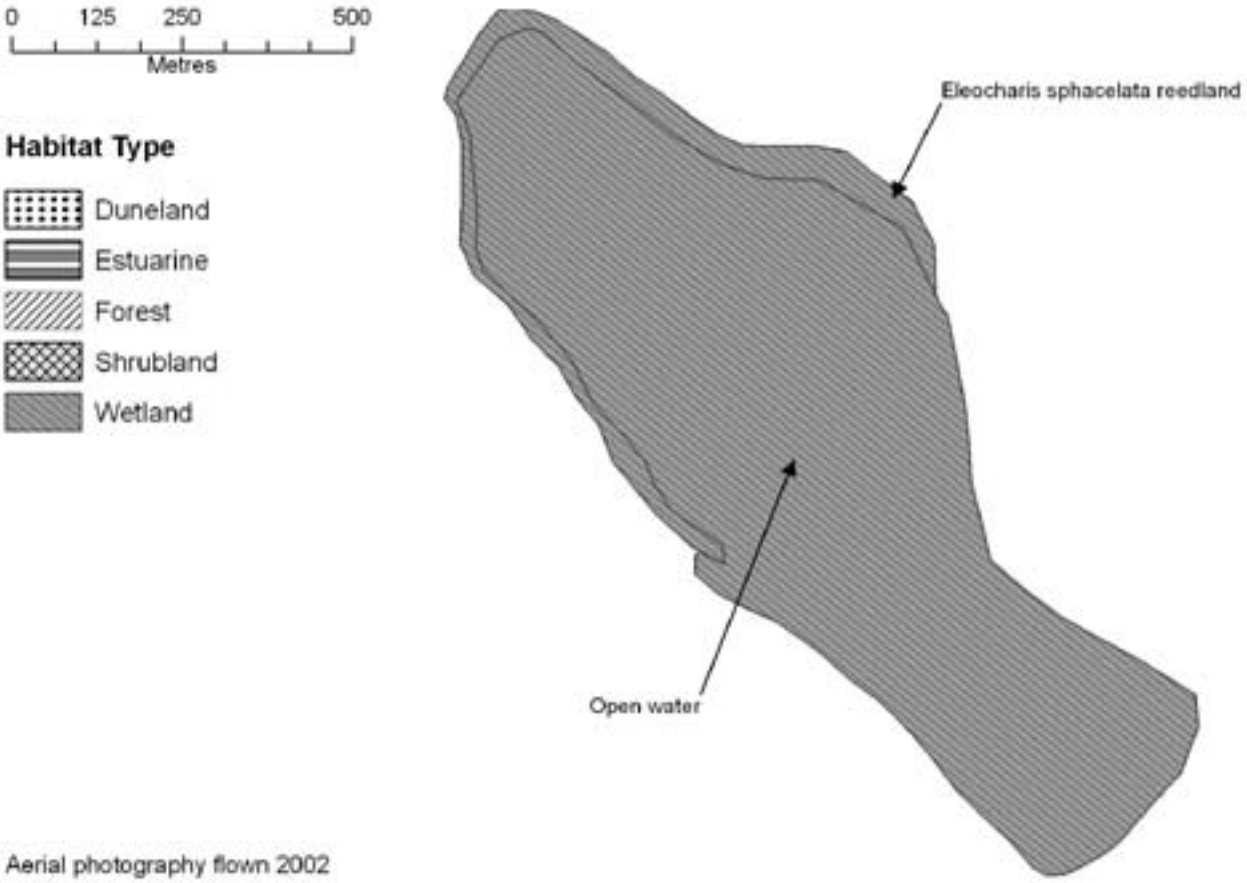
Fauna

Longfin eel (Gradual Decline), shortfin eel, common bully (Wells et al. 2007). Australasian bittern (Nationally Endangered), grey duck (Nationally Endangered) (recorded by OSNZ in 1986). New Zealand dabchick (Sparse), black shag (Sparse), little shag (Sparse), little black shag (Sparse) (OSNZ surveys 1977–1991). Australasian little grebe (Regionally Significant) (recorded by OSNZ in 1986). Australasian shoveler (Regionally Significant), pied shag, Australasian harrier, pukeko, spur-winged plover, Australasian pied stilt, black-backed gull, New Zealand kingfisher, Pacific swallow (OSNZ surveys 1977–1991). Grey warbler, silvereye, North Island fantail, New Zealand pipit, white-faced heron, paradise shelduck (SSBI O07/H005, 1978, 2004). Shore skink were recorded in 2004 (SSBI O07/H005).

Significance

Ranked Low by Wells et al. (2007). Threatened and regionally significant animal species are present. The presence of a pest fish, gambusia (Wells

O07/014 Shag Lake and Wetland



Aerial photography flown 2002

et al. 2007), and grazing to the water's edge around the entire perimeter have compromised the current value of the site. However, this lake provides habitat for several threatened and regionally significant species. The site contains 9.7 ha of At Risk land environments A6.b and A6.1c. A very small proportion of the site (0.9 ha) is already protected in Shag Lake Marginal Strip, administered by DOC.

WESTERN COAST B: ARANGA BEACH SOUTH COASTAL COMMUNITIES

Survey no.	O07/016
Survey date	29 November 2006
Grid reference	O07 634 021
Area	212.5 ha
Altitude	0–120 m asl

Ecological units

(a) Spinifex sandfield on foredunes (21%)

(b) Harakeke-mingimingi shrub-flaxland on coastal hillslopes (45%)

(c) Manuka shrubland on coastal hillslopes (33%)

(d) Pohutukawa forest on coastal hillslopes (O07 652 002) (1%)

Landform/geology

Mid-late Pleistocene (Karioitahi Group) consolidated dune sand, cliffed on seaward side, overlain by Holocene unconsolidated sand dunes.

Vegetation

The site lies immediately south of the Waihaupai Stream, and comprises limited areas of unconsolidated foredune abutting a prominent system of consolidated dunes with blowouts in places.

(a) Spinifex dominates the foredunes, with knobby clubrush and shore bindweed frequent.

(b) Harakeke is dominant over most of the consolidated sands, in a variable mosaic of native and adventive shrubs (the commonest of which is mingimingi), grasses (especially coastal toetoe), sedges (especially knobby clubrush), lianes (pohuehue), restiads (oioi), and herbs (e.g., New Zealand spinach). Pohutukawa and kanuka are locally present, and pockets of manuka shrubland occur in sheltered sites on the dune crests.

(c) Manuka shrubland contains frequent mingimingi, harakeke, coastal toetoe and kikuyu, and occasional *Leucopogon fraseri*, knobby clubrush, radiata pine, pohuehue, sand coprosma, tree lupin, and giant umbrella sedge.

(d) At the southern end there is a small gully with pohutukawa forest with occasional hangehange, rasp fern, and harakeke. Ground cover consists of New Zealand spinach and introduced grasses. The inland fence is derelict, and stock grazing has led to local patches of adventive grassland.

Significant flora

Sand coprosma (Regionally Significant), recorded during this survey.

Fauna

Northern New Zealand dotterel (Nationally Vulnerable), Caspian tern (Na-

tionally Vulnerable), white-fronted tern (Gradual Decline), variable oystercatcher (Regionally Significant), black-backed gull, pied shag, white-faced heron, Australasian pied stilt, New Zealand pipit. The moth *Notoreas* sp. 'northern' (Nationally Endangered) was recorded in 2008 (A. Booth, DOC, pers. comm.), and black katipo (Serious Decline) in 2000 (Griffiths 2000). Koura (Gradual Decline) are also present (R. Parrish, pers. comm.)

Significance

An impressive tract of relatively intact vegetation on largely consolidated sands, with native species, including threatened and regionally significant species, still dominant. Contains 2.4 ha of Chronically Threatened land environment A7.3a, and 102.2 ha of At Risk environments A6.1b, A6.1c, and G1.1c. A small proportion of the site is already protected in Ureti Conservation Area (2.6 ha) and Ureti Marginal Strip (44.9 ha), administered by DOC. Site for all four representative ecological units: (a) Spinifex sandfield on foredunes, (b) Harakeke-mingimingi shrub-flaxland on coastal hillslopes, (c) Manuka shrubland on coastal hillslopes, and (d) Pohutukawa forest on coastal hillslopes.

LAKE WAIKERE, WETLAND AND SHRUBLAND

Survey no.	O07/018
Survey date	12 December 2006
Grid reference	O07 675 002
Area	35 ha
Altitude	95–105 m asl

Ecological units

(a) Kanuka/manuka shrubland on hillslope (both lakes) (39%)

(b) Sandfield on alluvium (Lake Waikere) (1%)

(c) Raupo reedland on alluvium (smaller lake) (2%)

(d) Open water in dune lake (58%)

Landform/geology

Lakes in depressions on early Pleistocene (Awhitu Group) cemented dune sand and associated facies, ponded at landward edge of mid-late Pleistocene (Karioitahi Group) consolidated parabolic dune belt; hillslopes of (Awhitu Group) sediments bordering Lake Waikere.

Vegetation

Manuka shrubland on the eastern side of Lake Waikere has a canopy height of 2–3 m, while on the southern side the canopy reaches over 6 m. All vegetation is unfenced and there are rough vehicle tracks through the shrubland to the shore margin. The smaller lake to the northwest of Lake Waikere has a marginal fringe of raupo wetland. Shrubland similar to that at Lake Waikere is located beyond the smaller lake's wetland fringe. There are also planted kauri, rimu, and tarata to the southwest of the smaller lake amongst the shrubland. The smaller lake's vegetation is unfenced with major drains towards Lake Waikere.

(a) Kanuka/manuka shrubland consists of common manuka and kanuka, frequent mamaku, and occasional hangehange, bracken, radiata pine and prickly hakea, Spanish heath, rewarewa, downy hakea, harakeke, mingimingi, coastal karamu, *Schoenus brevifolius*, and pohutukawa.

(b) Littoral sandfield consists of frequent *Eleocharis sphacelata*, *Baumea juncea* and *Gonocarpus incanus*, and occasional harakeke and pampas.

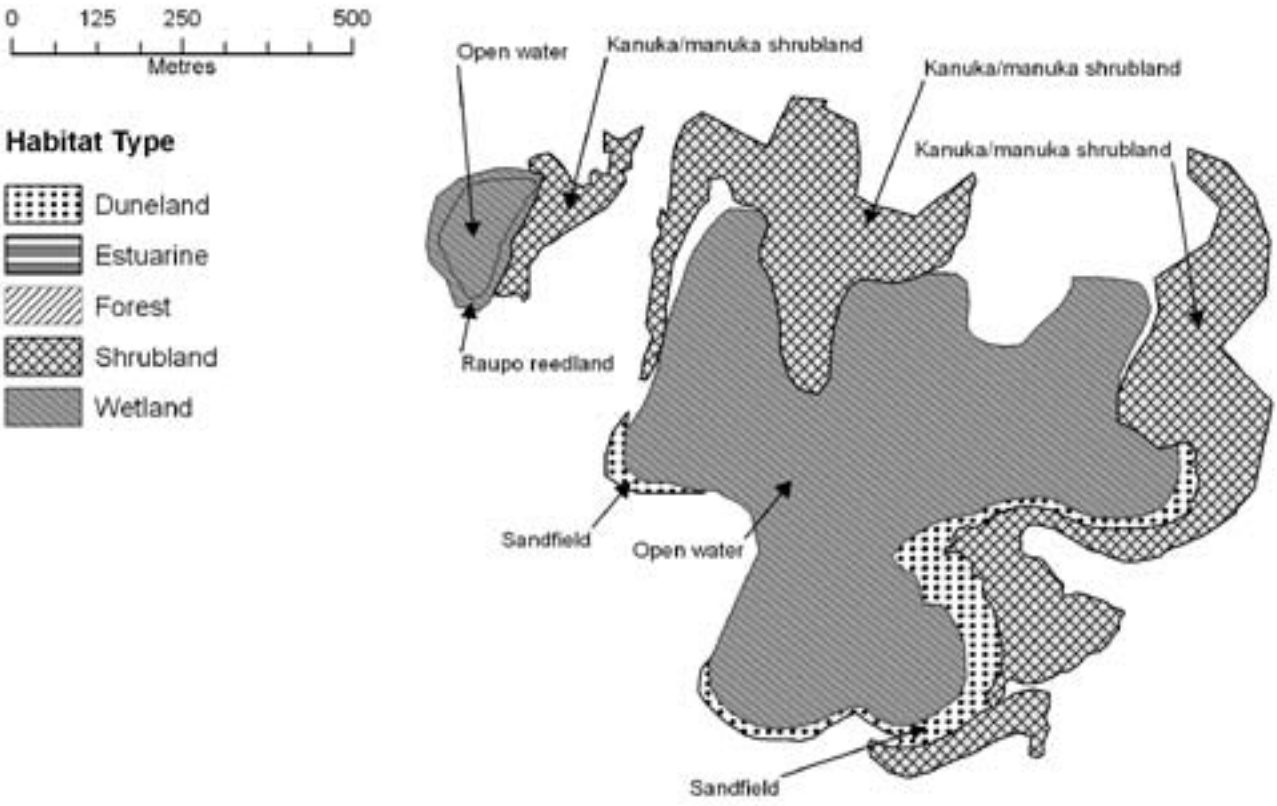
(c) Lacustrine raupo reedland consists of abundant raupo, frequent harakeke, and occasional *Eleocharis sphacelata*, *Azolla pinnata*, *Myriophyllum aquaticum*, *Isolepis* species, gorse, and water primrose.

(d) Open water of dune lake.

Significant flora

Hydatella inconspicua (Wells et al. 2007) is in Serious Decline.

O07/018 Lake Waikere, Wetland and Shrubland



Aerial photography flown 2002

Fauna

Lake Waikere: Dunelakes galaxias (Nationally Vulnerable), koura (Gradual Decline) (NIWA 2007). Longfin eel (Gradual Decline) (Wells et al. 2007). Freshwater crab (Sparse), shortfin eel, common bully (NIWA 2007). Grey duck (Nationally Endangered), red-billed gull (Gradual Decline), New Zealand dabchick (Sparse), black shag (Sparse), little shag (Sparse), grey teal (Regionally Significant), grey warbler, silvereye, North Island fantail, Australasian harrier, white-faced heron, pied shag, paradise shelduck, black-backed gull, Pacific swallow, Australasian pied stilt, Australasian shoveler (Regionally Significant) (SSBI O07/H007, 1978, 1992). Spur-winged plover, New Zealand kingfisher (OSNZ surveys 1977–1991).

Northern lake: Dunelakes galaxias (Serious Decline) (NIWA 2007), koura (Gradual Decline) (Wells et al. 2007). Grey duck (Nationally Endangered), New Zealand dabchick (Sparse), black shag (Sparse), little shag (Sparse), spotless crake (Sparse), paradise shelduck, Australasian harrier, pukeko, Pacific swallow (OSNZ surveys 1977–1991).

Significance

Lake Waikere, one of the two deepest dune lakes in New Zealand (Tanner et al. 1986), is dominated by native communities and was ranked Outstanding by Wells et al. (2007). Its value is enhanced by the presence of threatened plant and animal species. Pest fish (gambusia) are present. The dammed dune lakes at Kai Iwi (including Lake Waikere) are Nationally Important Geological Sites (Kenny & Hayward 1996). Contains 8.5 ha of Chronically Threatened land environment A5.2a and 10.3 ha of At Risk environment A6.1c. The lake is part of a 538 ha parcel of Crown land administered as Recreation Reserve by the Kaipara District Council. Site for two representative ecological units: (a) Kanuka/manuka shrubland on hillslope, and (b) Sandfield on alluvium.

LAKE TAHAROA, WETLAND AND SHRUBLAND

Survey no. O07/022
Survey date 12 December 2006
Grid reference O07 695 992
Area 197 ha
Altitude 70–90 m asl

Ecological units

(a) Oioi-*Baumea juncea* rush/sedgeland on alluvium (4%)

(b) Manuka shrubland on hillslope (1%)

(c) Kanuka shrubland on hillslope (3%)

(d) Open water in dune lake (92%)

Landform/geology

Lake and swamp deposits in depression on early Pleistocene (Awhitu Group) cemented dune sand and associated facies, ponded at landward edge of mid-late Pleistocene (Karioitahi Group) consolidated parabolic dune belt; hillslopes of (Awhitu Group) sediments bordering Lake Taharoa.

Vegetation

Lake Taharoa is largely surrounded by pine plantation, but has three ecological units dominated by native species. Lacustrine rush/sedgeland extends for 50 m on the southern margin of the lake. This margin is fenced (preventing public access) and in good condition. A small pocket of manuka shrubland is situated on the eastern margin of the lake. It is unfenced, surrounded by pasture, and has a canopy of up to 3 m high. Behind the lacustrine sedge/rushland is a thin wedge of kanuka shrubland, also unfenced and over- run with exotics such as Sydney golden wattle.

(a) Lake margin rush/sedgeland consists of common oioi and *Baumea juncea*, frequent forked sundew, pohutukawa, manuka, *Leucopogon fraseri*, and Spanish heath, and occasional arching clubmoss, *Lobelia anceps*, *Centella uniflora*, tangle fern, Sydney golden wattle and Utricularia species.

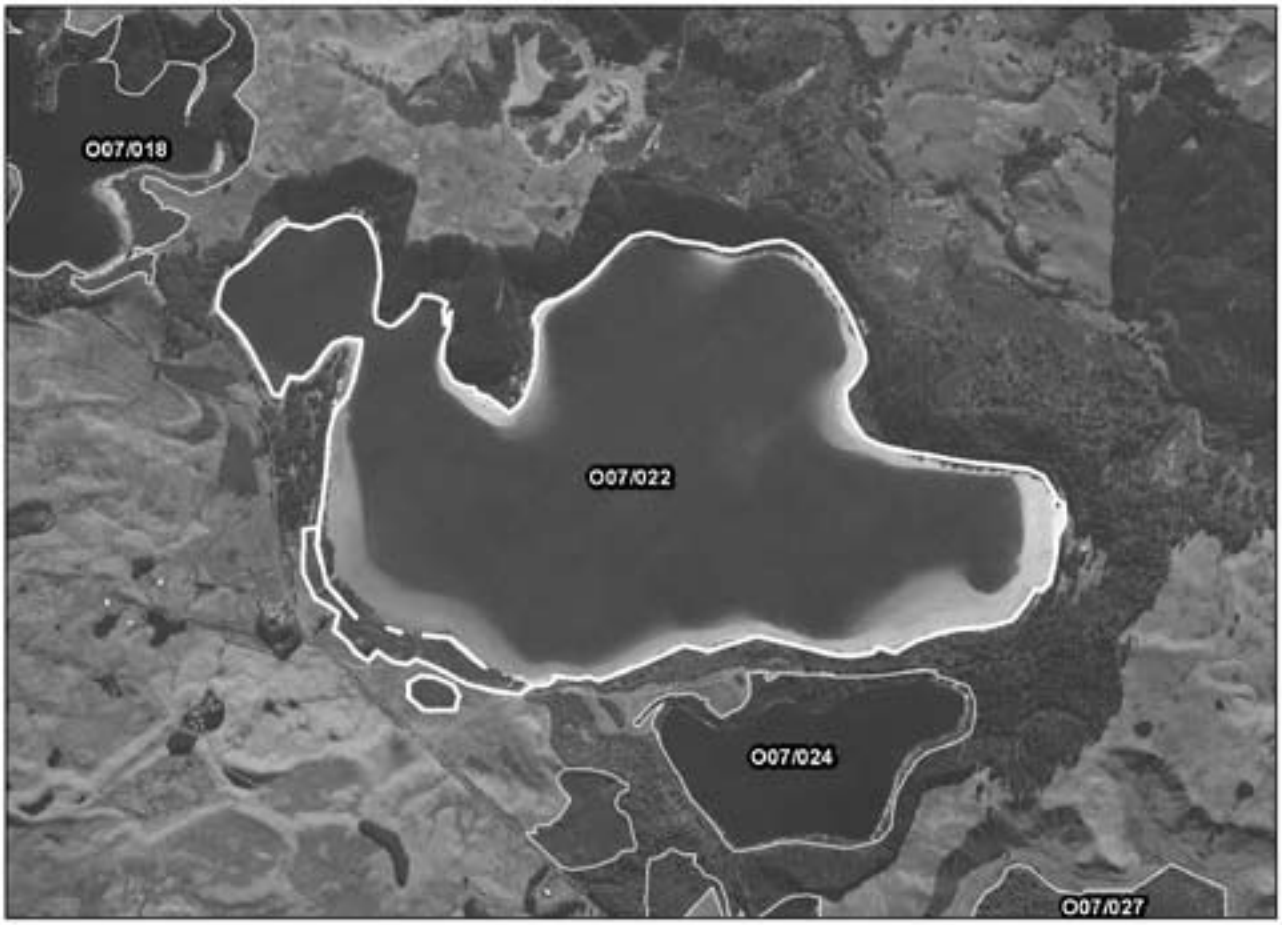
(b) Manuka shrubland consists of abundant manuka, frequent tangle fern, ring fern, bracken, and Sydney golden wattle, and occasional wheki, ti kouka, *Baumea teretifolia*, pohuehue, and *Dracophyllum lessonianum.*

(c) Kanuka shrubland consists of abundant kanuka and occasional Sydney golden wattle.

(d) Open water.

Significant flora

Hydatella inconspicua (Serious Decline) (Wells et al. 2007). *Dracophyllum sinclairii* (SSBI O07/H007), arrow grass (Wells et al. 2007), and forked sundew (recorded during this survey) are all Regionally Significant. There is a 1981 record of *Centipeda minima* ssp. *minima* (Nationally Critical) (DOC Bioweb).

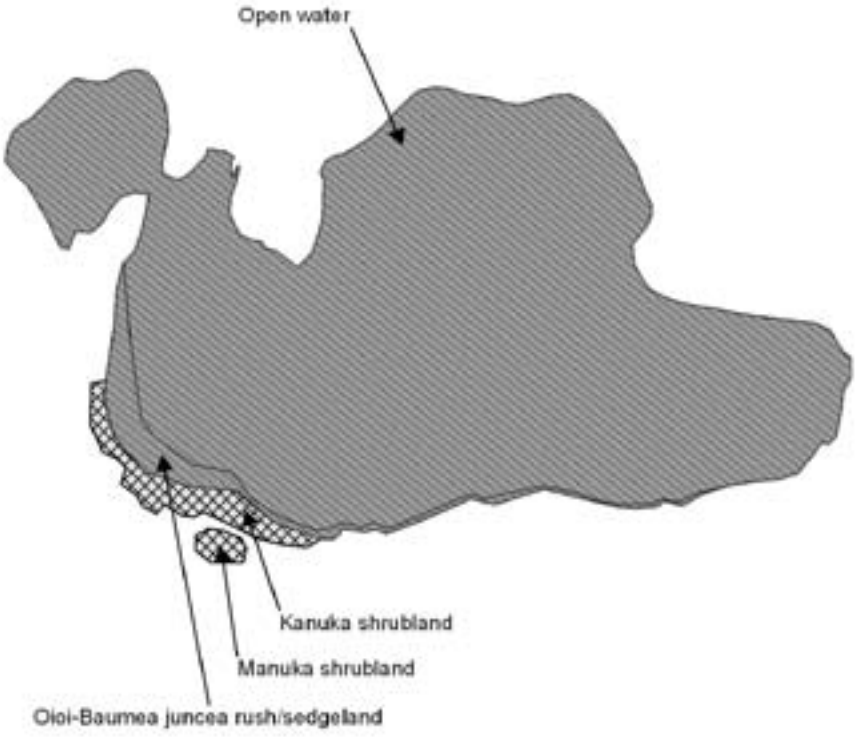


O07/022 Lake Taharoa, Wetland and Shrubland

0 250 500 1,000
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

Fauna

Dunelakes galaxias (Nationally Vulnerable), koura (Gradual Decline) (NIWA 2007). Longfin eel (Gradual Decline) (R. Parrish and K. Hawkins, DOC, pers. comm.). Freshwater crab (Sparse) (NIWA 2007). Shortfin eel, common bully (R. Parrish and K. Hawkins, DOC, pers. comm.). Australasian bittern (Nationally Endangered) (OSNZ surveys 1977–1992). Grey duck (Nationally Endangered) (SSBI O07/H007, 1978, 1992). North Island brown kiwi (Serious Decline) were recorded between Lake Kai Iwi and Lake Taharoa in 2002 (SSBI O07/H007). Red-billed gull (Gradual Decline), New Zealand dabchick (Sparse), black shag (Sparse), pied shag, little shag (Sparse) (SSBI O07/H007, 1978, 1992), little black shag (Sparse) grey teal (Regionally Significant), black-fronted dotterel (Coloniser) (OSNZ surveys 1977–1992). White-faced heron, paradise shelduck, black-backed gull, grey warbler, silvereye, North Island fantail, Australasian harrier, Pacific swallow, Australasian pied stilt, Australasian shoveler (Regionally Significant) (SSBI O07/H007, 1978, 1992). Spur-winged plover, pukeko, New Zealand kingfisher (OSNZ surveys 1977–1992).

Significance

Lake Taharoa is the deepest and second largest (after Lake Omapere in Kaikohe ED) lake in Northland, and one of the two deepest dune lakes in New Zealand (Tanner at al. 1986). Ranked Outstanding by Wells et al. (2007) because it is the best example of its type (clearwater) and has the deepest recorded submerged vegetation in the North Island. Many threatened plant and animal species are present, as well as the pest fish gambusia and rainbow trout. The dammed dune lakes at Kai Iwi (including Lake Taharoa) are Nationally Important Geological Sites (Kenny & Hayward 1996). Contains 30.8 ha of Chronically Threatened A5.2a, and 1.1 ha of At Risk A6.1b and A6.1c. The lake is part of a 538 ha parcel of Crown land administered as Recreation Reserve by the Kaipara District Council. Site. The single ecological unit, (b) Manuka shrubland on hillslope, is representative.

LAKE KAI IWI, WETLAND AND SHRUBLAND

Survey no.	O07/024
Survey date	29 November 2006
Grid reference	O07 699 981
Area	35 ha
Altitude	70–100 m asl

Ecological units

(a) Oioi-*Baumea arthrophylla-B. juncea-B. articulata-Eleocharis sphacelata* reedland on alluvium (15%)

(b) Kanuka/manuka shrubland on hillslope (12%)

(c) Open water in dune lake (73%)

Landform/geology

Lake in depression on early Pleistocene (Awhitu Group) cemented dune sand and associated facies, ponded at landward edge of mid-late Pleistocene (Karioitahi Group) consolidated parabolic dune belt; hillslopes of Awhitu Group and Karioitahi Group sediments bordering Lake Kai Iwi.

Vegetation

The site occupies the basin of Lake Kai Iwi, and comprises very small areas of

(a) lacustrine reedland dominated by oioi, *Baumea arthrophylla*, *B. juncea*, *B. articulata*, and *Eleocharis sphacelata*, and a much larger area of

(b) riparian kanuka/manuka shrubland (dominated by manuka) with a wide range of woody and herbaceous native species characteristic of the northern heathlands ('gumland'). There has been significant invasion by weedy trees (e.g., radiata pine) and shrubs (e.g., Sydney golden wattle, prickly hakea). In places, hillslopes support adventive forest dominated by radiata pine and black wattle (western side) or Sydney golden wattle (northern side).

(c) Open water.

Significant flora

Hydatella inconspicua (Serious Decline) (2001, AK 256186). *Drosera pygmaea* (Gradual Decline) (2003, AK 288711). *Myriophyllum votschii*, *Centrolepis strigosa* (CHR 319045), and ladies tresses (SSBI O07/H007), all Regionally Significant.

Fauna

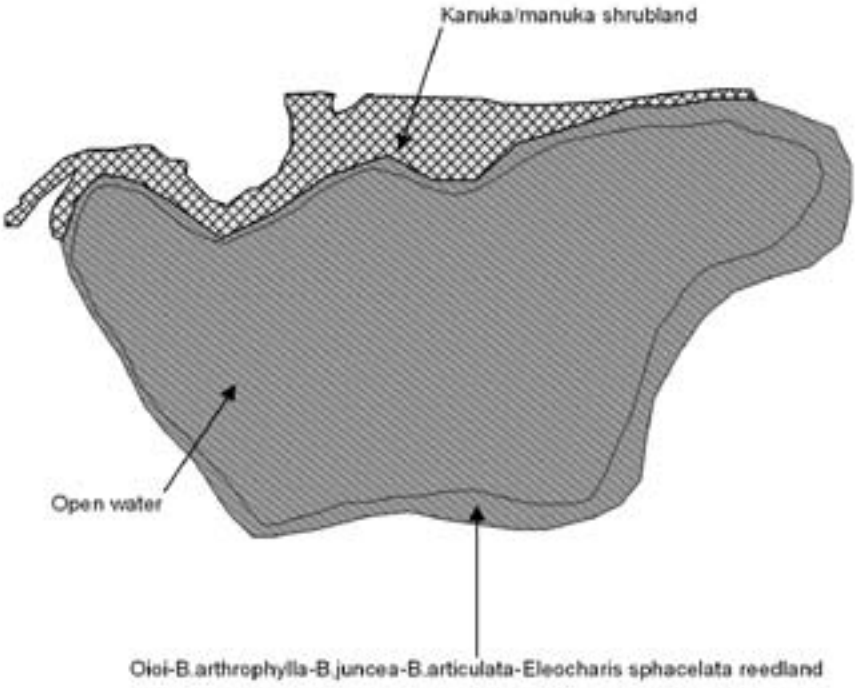
Dunelake galaxias (Serious Decline) have been recorded in the past (Rowe & Chisnall 1997). Freshwater mussel (Gradual Decline) (Wells et al. 2007). Common bully (NIWA 2007). Australasian bittern (Nationally Endangered) (OSNZ surveys 1977–1992). Grey duck (Nationally Endangered), red-billed gull (Gradual Decline) (SSBI O07/H007, 1978, 1992). Little black shag (Sparse) (OSNZ surveys 1977–1992). New Zealand dabchick (Sparse), little

O07/024 Lake Kai Iwi, Wetland and Shrubland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

shag (Sparse), black shag (Sparse), grey teal (Regionally Significant), white-faced heron, grey warbler, silvereye, North Island fantail, Australasian harrier, pied shag, paradise shelduck, black-backed gull, Pacific swallow Australasian pied stilt, Australasian shoveler (Regionally Significant) (SSBI O07/H007, 1978, 1992). Pukeko, New Zealand kingfisher (OSNZ surveys 1977–1992).

Significance

Lake Kai Iwi was ranked Outstanding by Wells et al. (2007) because it is dominated by native plants and remains free of aquatic weeds. Unfortunately, the acutely threatened dunelake galaxias has not been recorded from this lake for many years, and is threatened by the introduced pest fish species gambusia (B. David, pers. comm.). Although substantially invaded by weedy adventive trees and shrubs, much of the gumland around Lake Kai Iwi remains dominated by native species and, with weed control, is capable of restoration. The dammed dune lakes at Kai Iwi are Nationally Important Geological Sites (Kenny & Hayward 1996). Contains 6.5 ha of Chronically Threatened A5.2a, and 2.5 ha of At Risk A6.1b and A6.1c. The lake is part of a 538-ha parcel of Crown land administered as Recreation Reserve by the Kaipara District Council. Site for one representative ecological unit: (a) Oioi-*Baumea arthrophylla-B. juncea-B. articulata-Eleocharis sphacelata* reedland on alluvium.

TE KAWA STREAM FOREST

Survey no.	P07/121a
Survey date	12 December 2006
Grid reference	P07 761 981
Area	2.9 ha
Altitude	40–100 m asl

Ecological unit

(a) Totara-puriri forest on hillslope (100%)

Landform/geology

Hillslope on weathered Miocene basalt flows (Waipoua Basalt).

Vegetation

This site comprises a stand of advanced secondary mixed conifer/ broadleaved forest on a south-facing hillslope above Te Kawa Stream. Totara and puriri are common, with kahikatea and taraire frequent. A wide range of other tree species is present, including titoki, northern rata, towai, and karaka. It is contiguous with pine plantation on the western side.

Significant flora

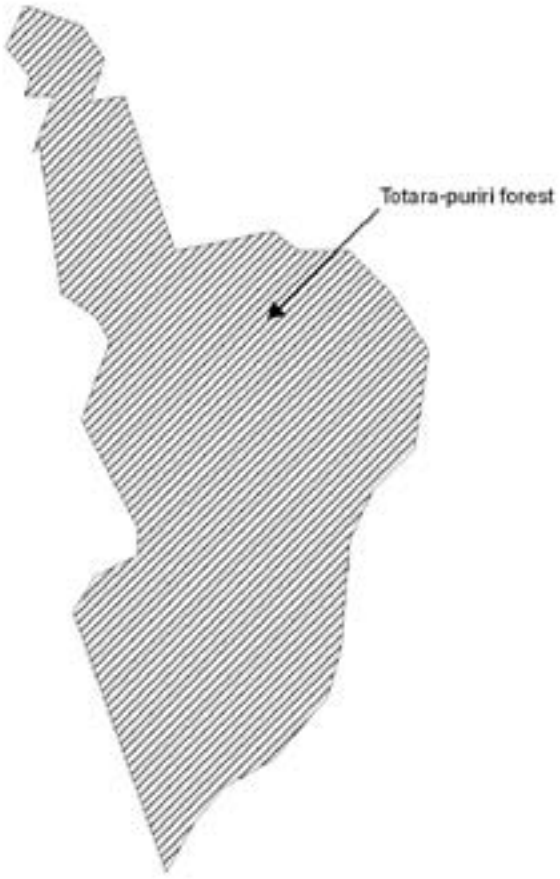
Northern rata (Regionally Significant), recorded during this survey.

P07/121A Te Kawa Stream Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

Fauna

Australasian harrier, New Zealand kingfisher.

Significance

A botanically valuable, representative, and aesthetically attractive remnant, currently grazed, with a diverse range of canopy species (including the only northern rata recorded in this survey) that would benefit greatly from fencing. Contains 0.3 ha of Chronically Threatened land environment A5.2a and 0.3 ha of At Risk environment A6.1c. The single ecological unit, (a) Totara-puriri forest on hillslope, is representative.

OMAMARI GOVERNMENT PURPOSE WILDLIFE MANAGEMENT RESERVE AND SURROUNDS

Survey no.	P07/127
Survey date	13 December 2006
Grid reference	P07 718 959
Area	177.5 ha
Altitude	20–100 m asl

Ecological units

(a) Manuka shrubland on hillslope (52%)

(b) Harakeke-pampas flaxland on alluvium

(c) *Baumea arthrophylla* sedgeland on alluvium

(d) *Eleocharis sphacelata* reedland on alluvium

(e) Raupo reedland on alluvium (all wetland types together comprise 40%)

(f) Undescribed wetlands on alluvium (8%)

Landform/geology

Hillslopes eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies, and in mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunes, with Holocene alluvial and swamp deposits on valley floor.

Vegetation

This site comprises an extensive tract of wetland in the middle reaches of an unnamed stream (and its tributaries) that enters the sea at Omamari, with extensive tracts of manuka shrubland on adjacent hillslopes of various aspects.

(a) The shrubland is dominated by manuka, with frequent akepiro and a wide range of other secondary tree and shrub species. It has been widely invaded by prickly hakea and to a lesser extent by brush wattle. North-facing slopes are much weedier than south-facing ones. Wetlands comprise a small area of

(b) harakeke-pampas swamp at the western edge, with frequent *Baumea articulata.*

The central large area comprises a mosaic of types, dominated variously over large areas by

(c) *Baumea arthrophylla* sedgeland,

(d) *Eleocharis sphacelata* reedland, or mixtures of both. Smaller areas are dominated variously by raupo, *Baumea articulata*, or *Isolepis distigmatosa*, and there are fringes of *Baumea juncea*. Manuka is very locally frequent, e.g., in the upper part of the north-east arm. There is a wide range of other herbaceous wetland species including wire rush in the middle of the wetland.

(e) The eastern areas support extensive tracts of raupo reedland with occasional patches of *Eleocharis sphacelata*.

(f) There are also three discrete undescribed wetlands to the north of the main wetland.

Significant flora

Utricularia australis (Nationally Endangered) (2000, AK 248055). Marsh fern (2000, AK 248057) and *Cyclosorus interruptus* (2000, AK 248058), both in Gradual Decline.

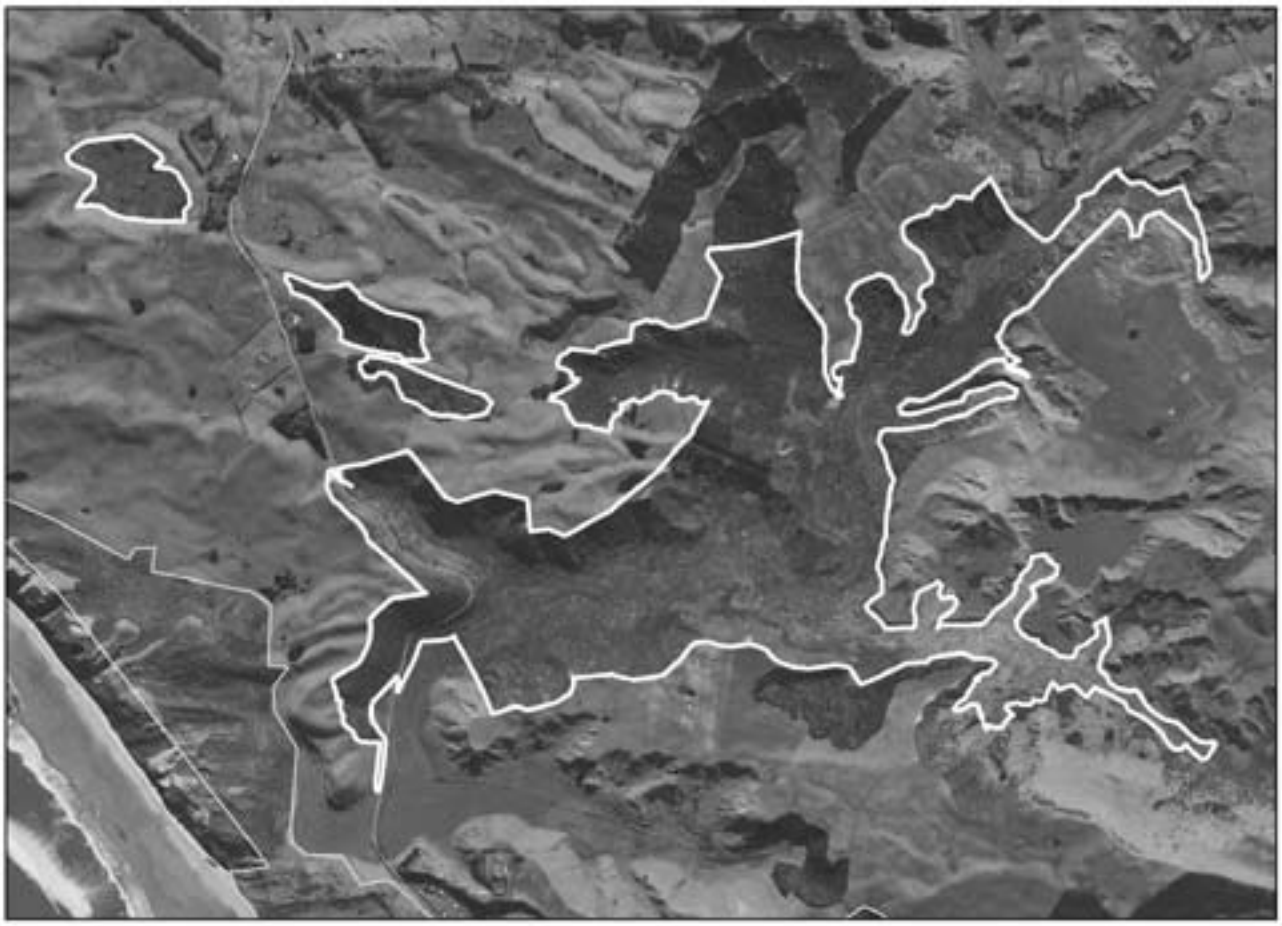
Swamp coprosma, forked sundew, and wire rush, recorded during this survey, are all Regionally Significant.

Fauna

Australasian bittern (Nationally Endangered), North Island fernbird (Sparse), little shag (Sparse), grey warbler, silvereye, North Island fantail, New Zealand kingfisher, Pacific swallow, Australasian harrier, white-faced heron, pukeko, paradise shelduck, black-backed gull, Australasian pied stilt (SSBI P07/H026, 1978, 2000).

Significance

As the largest remaining wetland in the Kaipara ED (Northland), this is an extremely important site, notable for its size, diversity, intactness, and presence of threatened and regionally significant species. Weeds are a feature of the north-facing hillslope shrubland (which has probably been burnt many times in the past) and the western edge of the wetland, but much of it is virtually weed-free. Contains 59.1 ha of Acutely Threatened land environment A5.1b, 21.1 ha of Chronically Threatened environment A5.2a, and 96.7 ha of At Risk environments. A6.1b and A6.1c. Some 41% (67.8 ha) of the site is already protected in Omamari GPWMR, administered by DOC. Site for four representative ecological units: (a) Manuka shrubland on hillslope, (b) Harakeke-pampas flaxland on alluvium, (c) *Baumea arthrophylla* sedgeland on alluvium, and (e) Raupo reedland on alluvium.



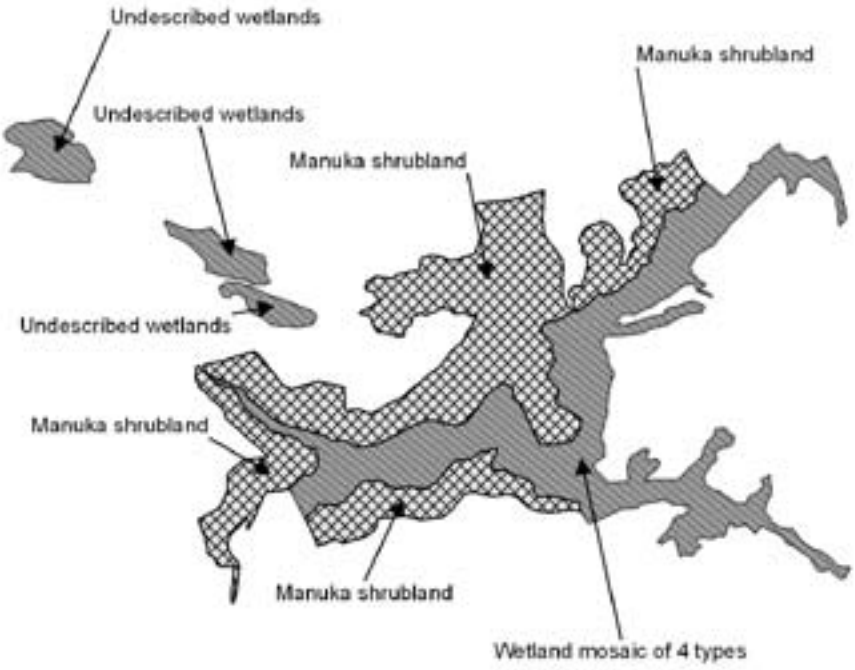
P07/127 Omamari Government Purpose Wildlife Management Reserve and Surrounds

0 250 500 1,000

Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

OMAMARI ROAD GRASSLAND AND WETLAND

Survey no. P07/130
Survey date 14 December 2006
Grid reference P07 715 920
Area 115.9 ha
Altitude 0–130 m asl

Ecological units

(a) Mingimingi-pampas shrub tussockland on rear dunes (99%)

(b) *Eleocharis sphacelata-E. acuta* reedland on alluvium (< 1%)

(c) Open water in dune lake (< 1%)

Landform/geology

Mid-late Pleistocene (Karioitahi Group) consolidated dune sand, cliffed on seaward side. Holocene unconsolidated sand dunes at mouth of Omamari Stream, and locally perched on top of Pleistocene dune units.

Vegetation

The Omamari Road rear dune faces, bounded by Omamari Road, have continuous, dense vegetation cover (no exposed ground) 2–3 m high. Largely unfenced, most of the site is too steep for stock access.

(a) Shrubland consists of common mingimingi and pampas with frequent bracken, hangehange, knobby clubrush, harakeke, coastal toetoe, and brush wattle, and occasional pohuehue, tree lupin, oioi, coastal karamu, *Baumea juncea*, mamaku, Hebe stricta, berry heath, manuka, giant umbrella sedge, tauhinu, harestail, pohutukawa, marram, sand coprosma, radiata pine, and *Pimelea urvilleana*.

(b) Vegetation consists of frequent *Eleocharis sphacelata* and *E. acuta,* occasional oioi, *Baumea juncea*, *Isolepis distigmatosa*, *Centella uniflora*, *Myriophyllum propinquum*, *Baumea arthrophylla*, swamp millet, *Ranunculus* species, lotus, and *Lobelia anceps*.

(c) A portion at the southern end, fenced and protected by local Maori, contains a small lake (P07 719 911). Aquatic vegetation consists of occasional *Potamogeton cheesemanii*.

Significant flora

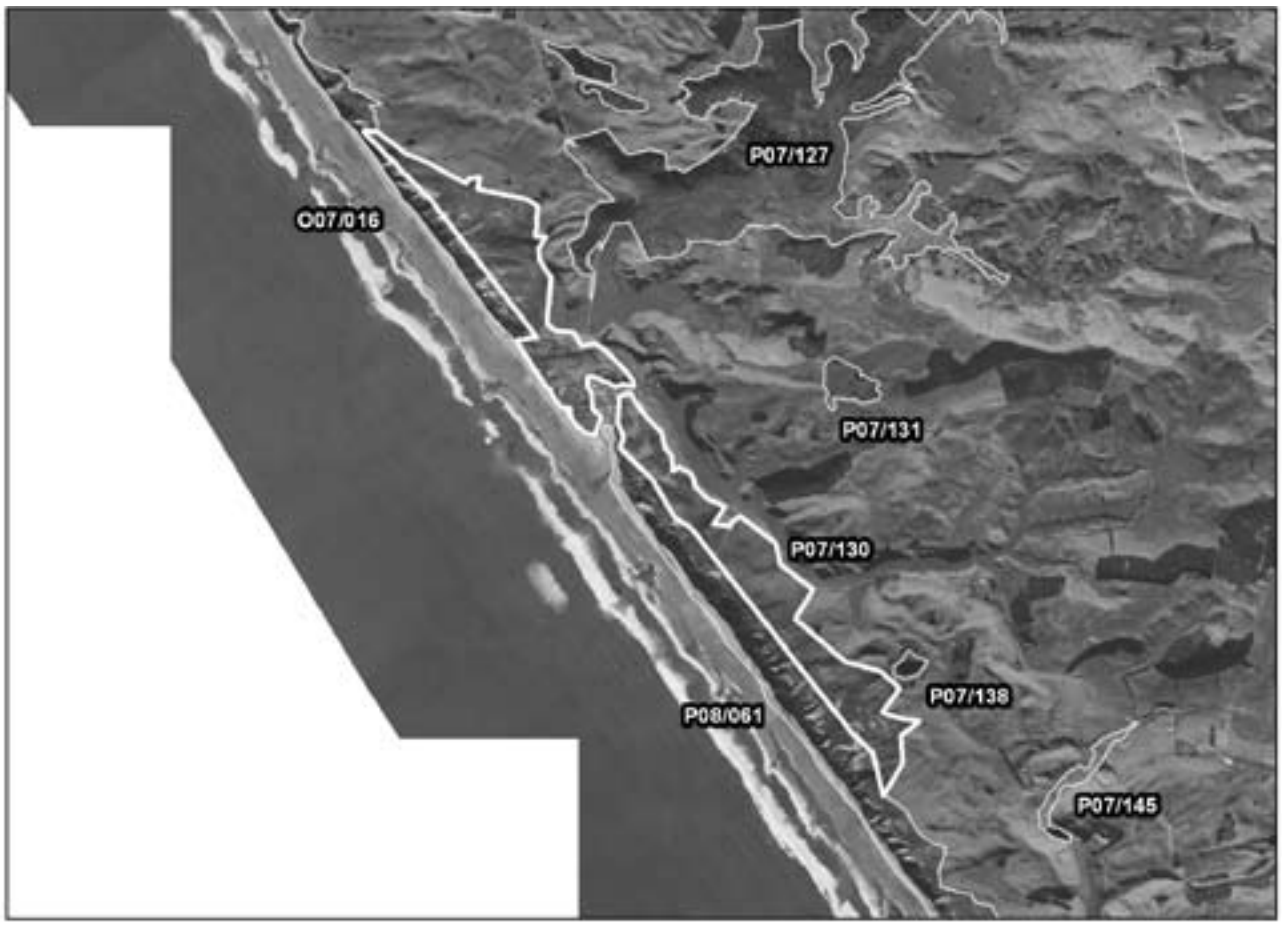
Sand coprosma (Regionally Significant), recorded in this survey.

Fauna

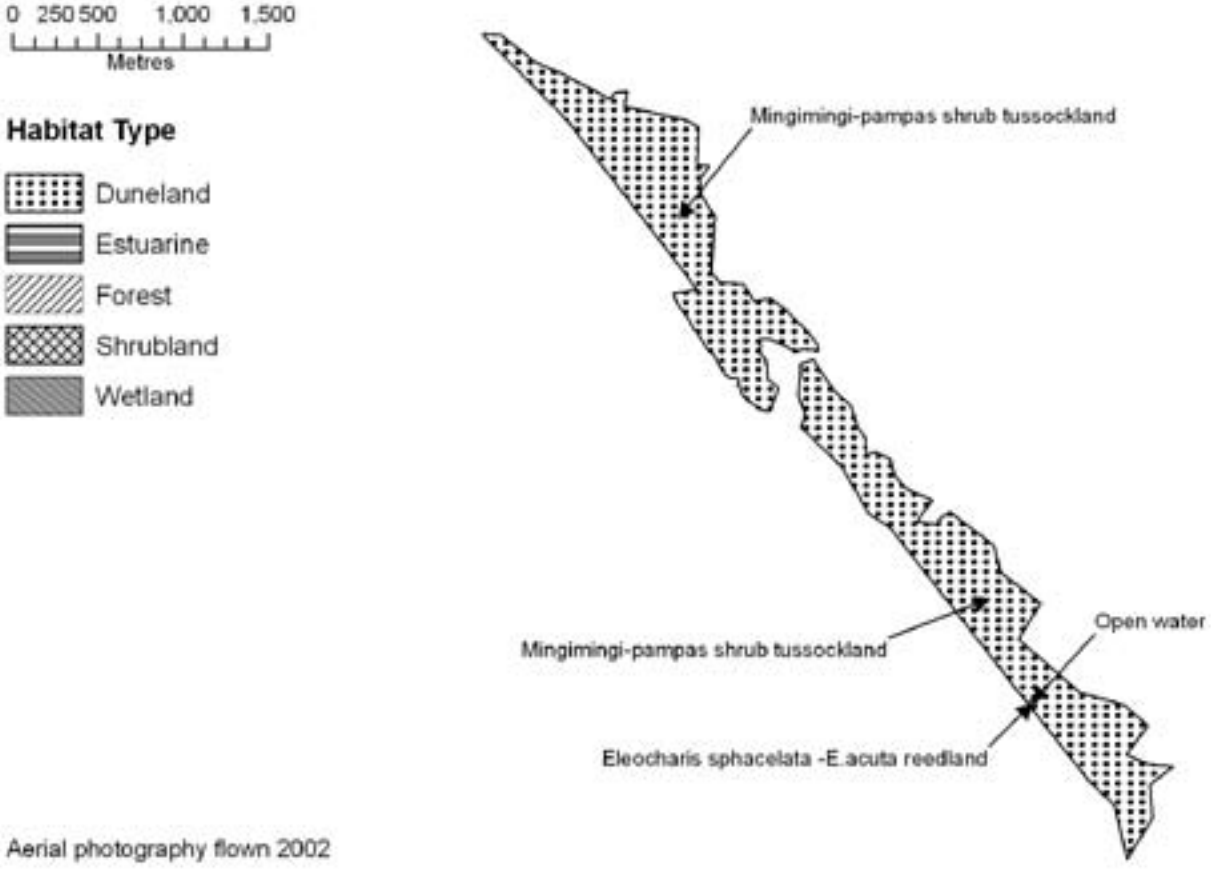
Australasian bittern (Nationally Endangered), recorded in 2008 (A. Booth, DOC, pers. comm.)

Significance

A significant representative tract of rear dune coastal vegetation. A threatened bird species has been recorded. Contains 2.4 ha of Acutely Threatened land environment A5.1b, 2.1 ha of Chronically Threatened environment A7.3a, and 111.3 ha of At Risk environment G1.1c. Site for one representative ecological unit: (b) *Eleocharis sphacelata-E. acuta* reedland on alluvium.



P07/130 Omamari Road Grassland and Wetland



Aerial photography flown 2002

NEWLOVE AIRSTRIP WETLAND

Survey no.	P07/131
Survey date	15 December 2006
rid reference	P07 722 929
Area	5.8 ha
Altitude	70–90 m asl

Ecological units

(a) Raupo reedland on alluvium

(b) *Eleocharis sphacelata* reedland on alluvium

(c) *Baumea articulata* reedland on alluvium

(d) *Eleocharis sphacelata-Bolboschoenus* sp. reedland on alluvium (all wetland types together comprise 100%)

Landform/geology

Swamp deposits ponded in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield.

Vegetation

This wetland site is fenced and has a ditch running around it on all sides. It is of good quality and is self-contained. The four types were not mapped separately.

(a) Raupo reedland consists of abundant raupo.

(b) *Eleocharis sphacelata* reedland consists of abundant *E. sphacelata*, frequent alligator weed and occasional *Potamogeton cheesemanii*, giant umbrella sedge, *Isolepis prolifer*, Mercer grass, and burr-reed.

(c) *Baumea articulata* reedland consists of abundant *Baumea articulata*.

(d) *Eleocharis sphacelata-Bolboschoenus* sp. reedland consists of abundant *Eleocharis sphacelata* and common *Bolboschoenus species*.

Significant flora

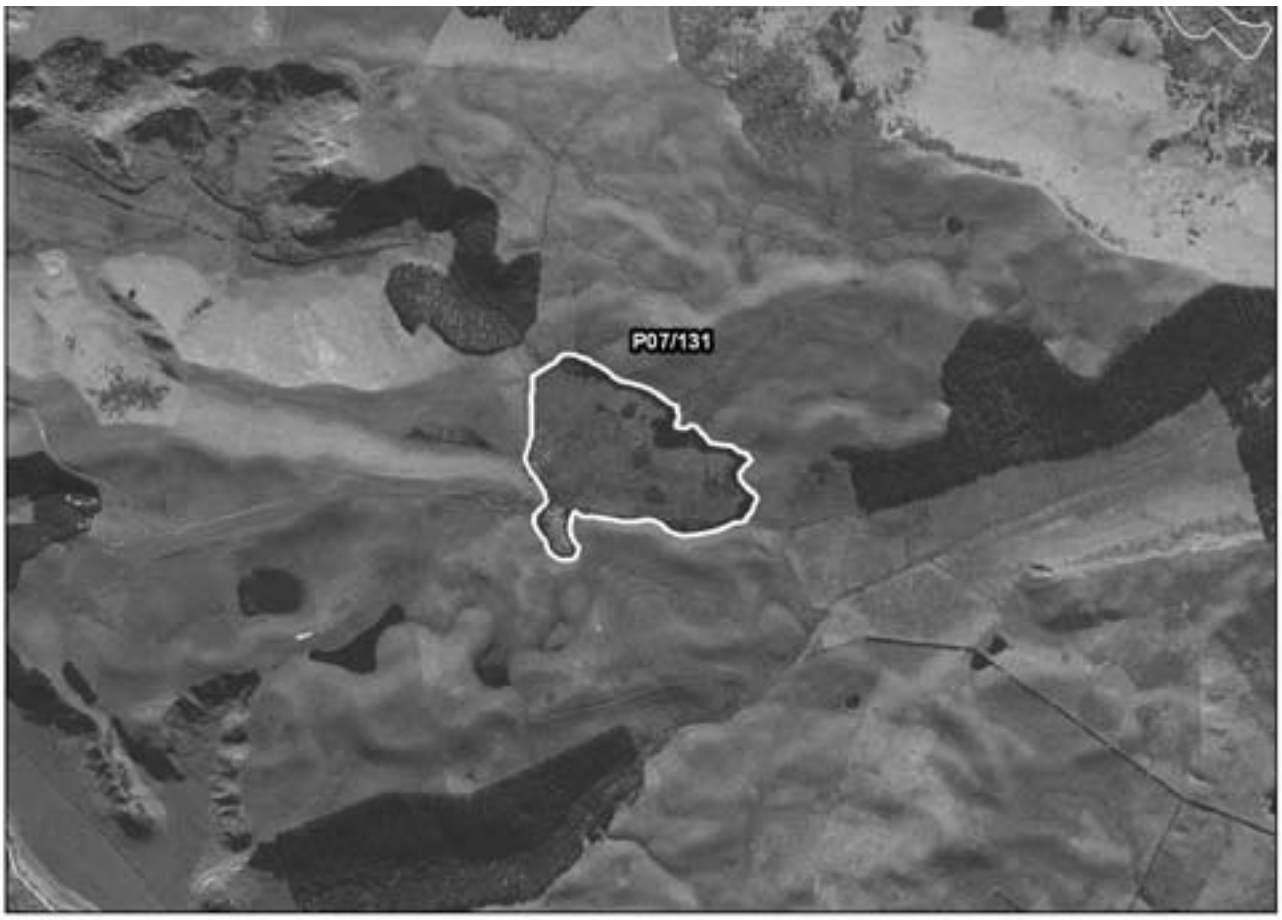
Burr-reed (Regionally Significant), recorded during this survey.

Fauna

None noted.

Significance

A small but significant fenced wetland with a regionally significant plant species. Potential habitat for threatened wetland bird species such as spotless crake (Sparse). Contains 5.7 ha of Chronically Threatened land environment A5.2a, and 0.2 ha of At Risk environment A6.1b.

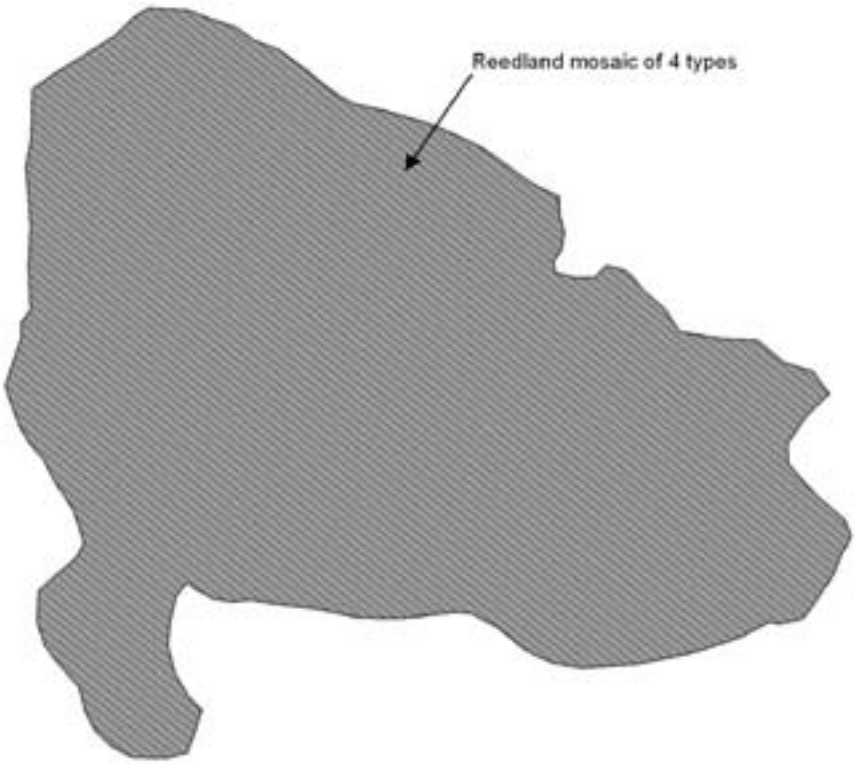


P07/131 Newlove Airstrip Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

MAITAHI WETLAND SCIENTIFIC RESERVE AND SURROUNDS

Survey no.	P07/133
Survey date	29 November 2006
Grid reference	P07 780 925
Area	323 ha
Altitude	20–90 m asl

Ecological units

(a) Manuka-prickly hakea shrubland on hillslopes and ridges (69%)

(b) Raupo reedland on alluvium (7%)

(c) Manuka-harakeke-tangle fern shrubland on alluvium (12%)

(d) *Schoenus brevifolius* sedgeland on alluvium (12%)

Landform/geology

Hillslopes eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies, and Holocene alluvial and swamp deposits on valley floor.

Vegetation

Maitahi Wetland SR and Surrounds encompasses a large part of two valley sides and a valley floor. It is surrounded by pine plantation on the northern and southern sides, farmland to the west, and a subdivision development to the east. Pines have been felled in the reserve and possum control through poisoning has taken place. Near the road edge on the southern side beehives are in use. There has been some damage in the reserve by four-wheel drive vehicles. Pampas has invaded some of the wetland.

(a) Manuka and prickly hakea are common in the canopy, mingimingi, tangle fern, kumeraho, and Spanish heath are frequent, and akepiro, hangehange, kanuka, mamaku fern, tauhinu, bog rush, and Pimelea prostrata are occasional.

The manuka-prickly hakea shrubland is a mosaic of at least four site variations

(1) On exposed rocky bluffs and ledges, an extremely low canopy of manuka, kanuka, and prickly hakea occurs with clumps of moss and lichen.

(2) On flat crests with poor drainage, tangle fern is abundant and Epacris pauciflora frequent. Wire rush is locally present.

(3) On hillslopes, the main canopy consists of tall prickly hakea, manuka, mingimingi, and akepiro.

(4) In gullies, occasional hangehange, mamaku, and manuka comprise the canopy.

(b) Raupo reedland includes patches of *Baumea arthrophylla*.

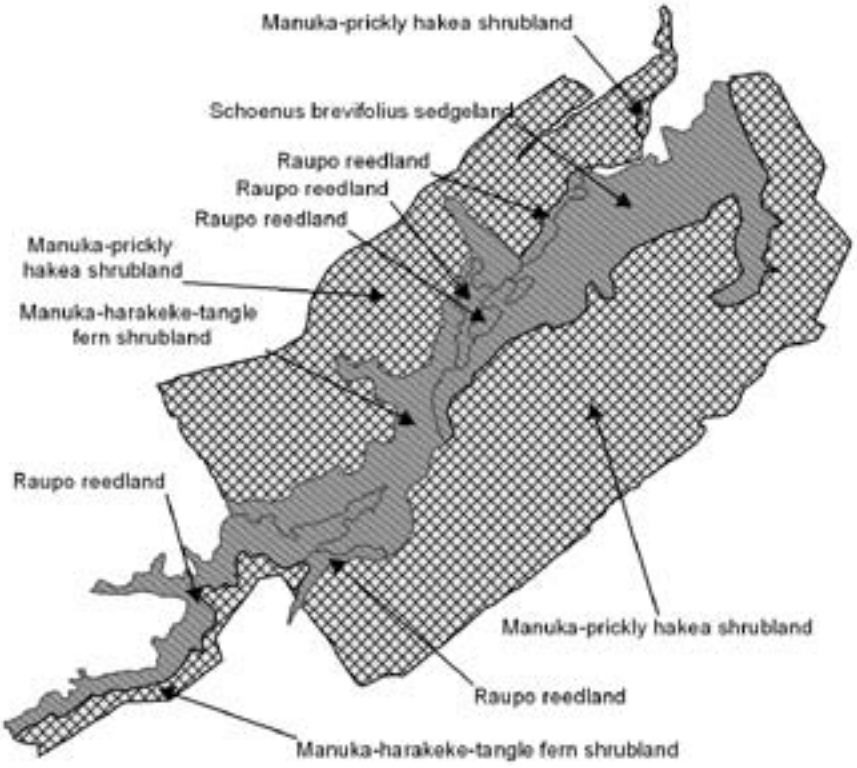
(c) The manuka shrubland comprises a transition zone between raupo reedland and the *Schoenus*-harakeke wetland. Manuka, harakeke, and

P07/133 Maitahi Wetland Scientific Reserve and Surrounds

0 250 500 1,000 1,500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

tangle fern are all common in the canopy with frequent *Dracophyllum lessonianum* and occasional *Schoenus brevifolius* also present.

(d) The canopy of the sedgeland comprises abundant *Schoenus brevifolius*, frequent *Baumea arthrophylla* and harakeke, and occasional manuka. Patches of Baumea juncea, *Baumea rubiginosa*, and *Baumea teretifolia* also occur.

Significant flora

Calochilus aff. herbaceus (Nationally Critical) (1999, AK 241957). Pomaderris phylicifolia (1999, AK 286661), *Phylloglossum drummondii* (1999, AK 286617), yellow bladderwort (1999, AK 292355), are all Nationally Endangered. *Dianella haematica* (noted during the present survey) is in Serious Decline, and *Utricularia delicatulata* (1999, AK 292388), marsh fern (2000, AK 287536) and *Schoenus carsei* (1999, AK 246919), are in Gradual Decline. Domed sun orchid (SSBI P07/H056) is Sparse. *Epacris pauciflora* (SSBI P07/H056), wire rush (2000, AK 248062), *Astelia grandis* (2006, AK 297736), burr-reed (SSBI P07/H056), ladies tresses (SSBI P07/H056), *Ranunculus urvilleanu*s (2000, AK 282128), and *Utricularia dichotoma* (SSBI P07/H056), are all Regionally Significant.

Fauna

Auckland green gecko (Gradual Decline) (SSBI P07/H056). Black mudfish (Gradual Decline), shortfin eel (NIWA 2007). Australasian bittern (Nationally Endangered), North Island fernbird (Sparse), pukeko, grey warbler (SSBI P07/H056, 1994). Pacific swallow.

Significance

This is the most significant mesotrophic-oligotrophic wetland remaining in Northland, because of its size, intactness, and the range of wetland types that it supports. It is also of very high importance because it is the largest area of 'gumland' remaining in the ED. Its large size and shape (part of a catchment) mean much of it is effectively self-buffered. It supports an impressive range of threatened and regionally significant plant species, including what appears to be the only extant population of *Schoenus carsei* (Gradual Decline) in Northland. In terms of fauna, it supports the only known viable population of black mudfish (Gradual Decline) in the ED and indeed on the west coast of Northland (M. McGlynn, DOC, pers. comm.). The introduced pest fish gambusia is present (R. Parrish, pers. comm.). Contains 103.1 ha of Acutely Threatened land environment A5.1b, 126.6 ha of Chronically Threatened environment A5.2a, and 92.8 ha of At Risk environment A6.1b. Some 72% (231 ha) of the site is already protected in Maitahi Wetland SR, administered by DOC. Site for two representative ecological units: (c) Manuka-harakeke-tangle fern shrubland on alluvium, and (d) *Schoenus brevifolius* sedgeland on alluvium.

FRITH ROAD NORTHERN DAIRYLANDS FOREST

Survey no.	P07/135
Survey date	29 November 2006
Grid reference	P07 825 925
Area	70 ha
Altitude	20–80 m asl

Ecological units

(a) Kahikatea-ti kouka-*Coprosma propinqua*-harakeke shrub wetland on alluvium (13%)

(b) Kanuka forest on hillslope (4%)

(c) Kahikatea forest on alluvium (32%)

(d) Undescribed shrubland/forest on hillslope (52%)

Landform/geology

Hillslopes on undifferentiated Mangakahia Complex sediments, and overlying early Pleistocene (Awhitu Group) cemented dune sands and associated facies, with adjoining Holocene alluvial and swamp deposits on the flood plain of the Kaihu River.

Vegetation

This site is bordered to the north by the Kaihu River and to the south by Frith and Opanake Roads. Neither forest nor wetland are fenced, resulting in pugging by cattle in wetter areas.

(a) The shrub wetland canopy consists of harakeke, ti kouka, kahikatea, and *Coprosma propinqua*, with frequent *Baumea arthrophylla* and occasional *Carex virgata* and small-leaved mahoe.

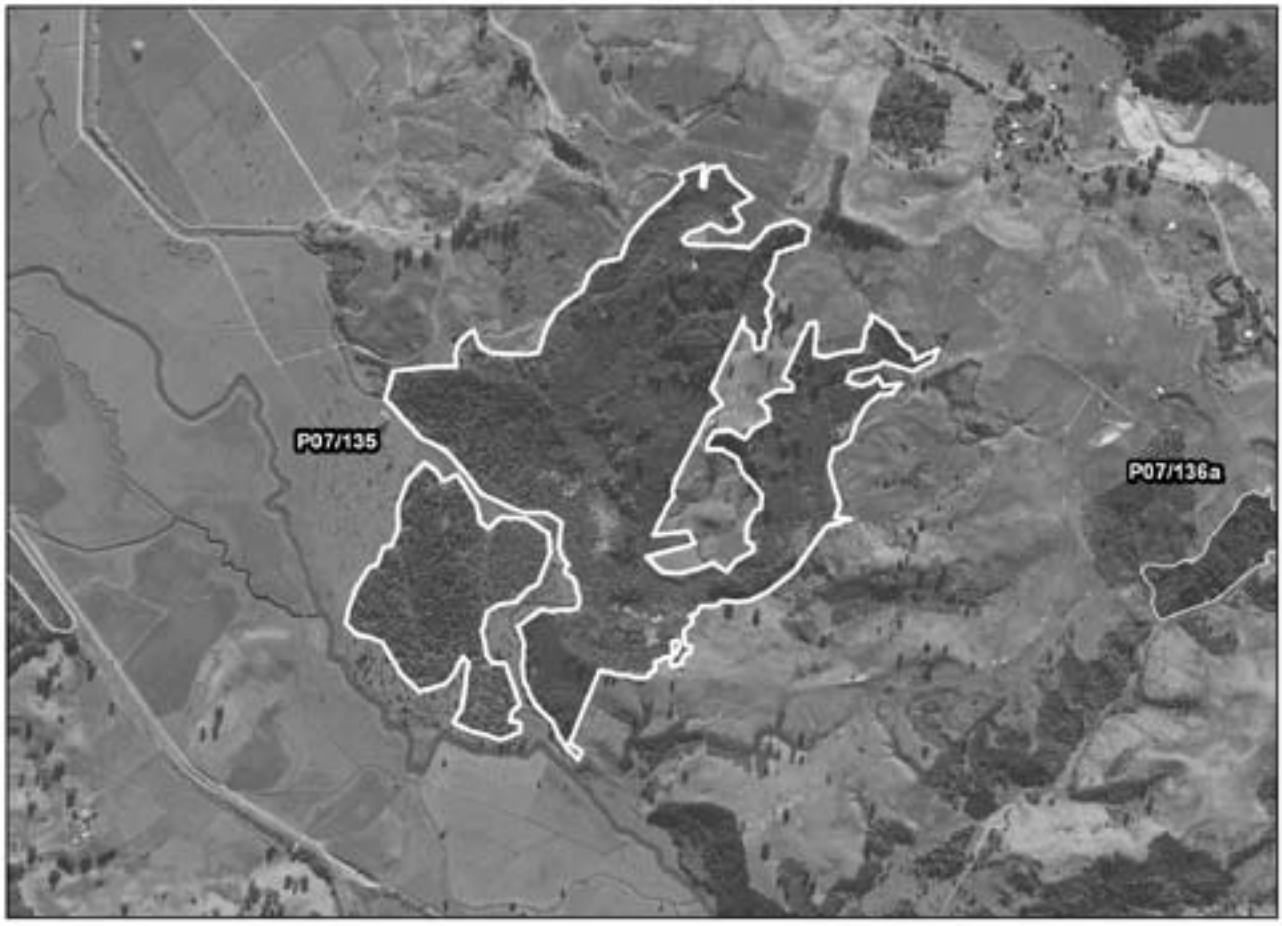
(b) The hillslope forest comprises abundant kanuka, frequent totara, kowhai, and emergent radiata pine, and occasional mapau, houhere, kaikomako, rewarewa, and towai.

(c) Most of the alluvial forest is dominated by kahikatea. Ti kouka and kowhai occur occasionally. The understorey contains harakeke, small-leaved mahoe, round-leaved coprosma, *Coprosma rigid*a, *C. rhamnoide*s, *C. parviflora*, swamp coprosma, pigeonwood, small-leaved milk tree, nikau, and supplejack. Ground cover consists of alligator weed with herb patches containing *Viola lyallii*, water buttercup, *Hydrocotyle* spp and *Centella uniflora*.

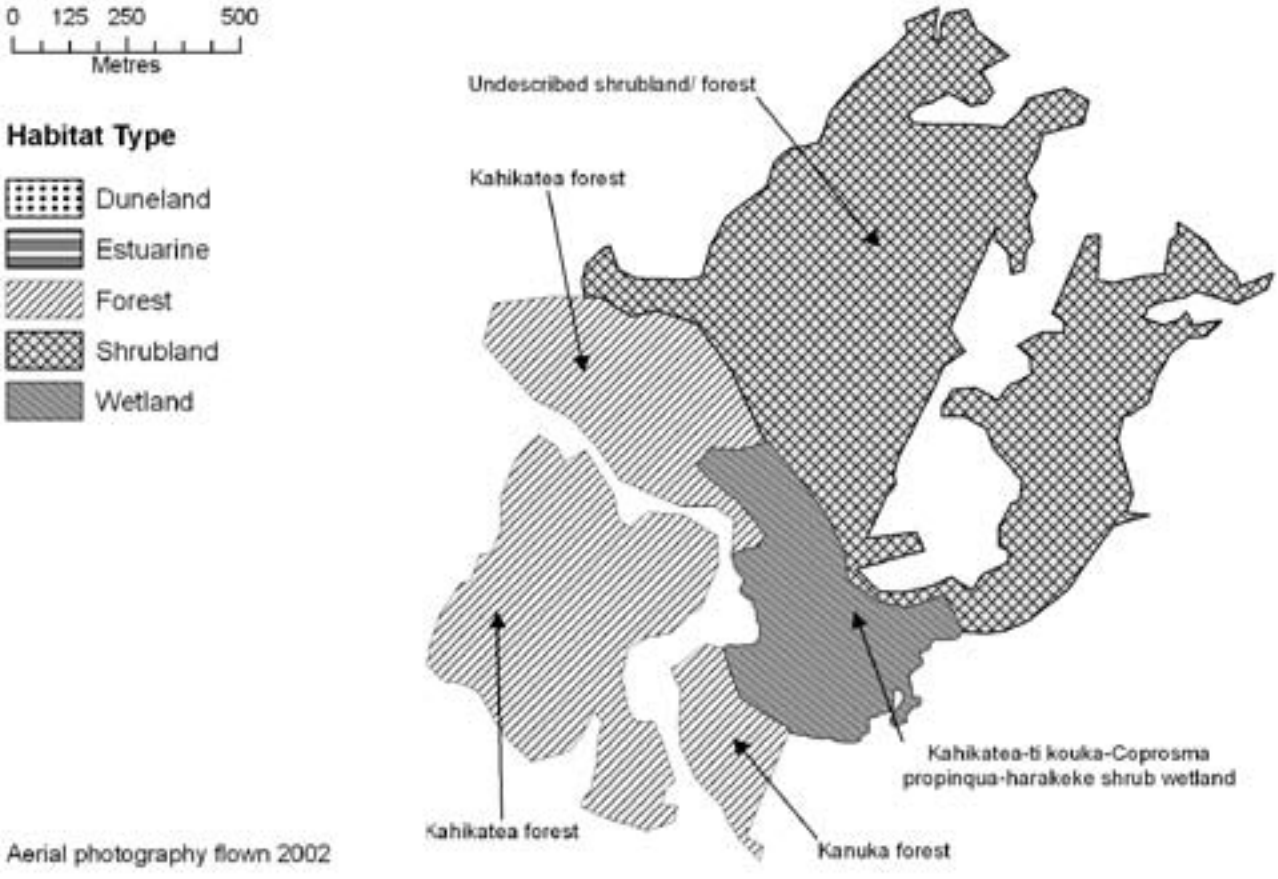
(d) There is an area of undescribed shrubland to the north.

Significant flora

Coprosma parviflora, *C. rigida*, swamp coprosma, round-leaved coprosma, kaikomako, and *Viola lyalli*i, all Regionally Significant, recorded during this survey.



P07/135 Frith Road Northern Dairylands Forest



Aerial photography flown 2002

Fauna

Australasian harrier, New Zealand kingfisher, grey warbler, tui, shining cuckoo.

Significance

A large and diverse site, containing far and away the largest and best example of kahikatea forest in the ED. Contains 31.1 ha of Chronically Threatened A5.2a and 39.9 ha of At Risk land environment G3.1b. Site for two representative ecological units: (a) Kahikatea-ti kouka-*Coprosma propinqua*-harakeke shrub wetland on alluvium, and (c) Kahikatea forest on alluvium.

MANGAKAHIA FOREST WETLAND

Survey no.	P07/140
Survey date	28 November 2006
Grid reference	P07 816 912
Area	6.6 ha
Altitude	20 m asl

Ecological unit

(a) Manuka-*Baumea rubiginosa-B.tenax* shrub sedgeland on alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

The site comprises

(a) manuka-*Baumea rubiginosa-B. tenax* shrub sedgeland on poorly-drained alluvium in the lower reaches of an un-named tributary of the Kaihu River. Manuka is abundant and *Baumea rubiginosa* and *B. tenax* are common. A range of other native wetland species, such as swamp coprosma and swamp millet, is present.

Significant flora

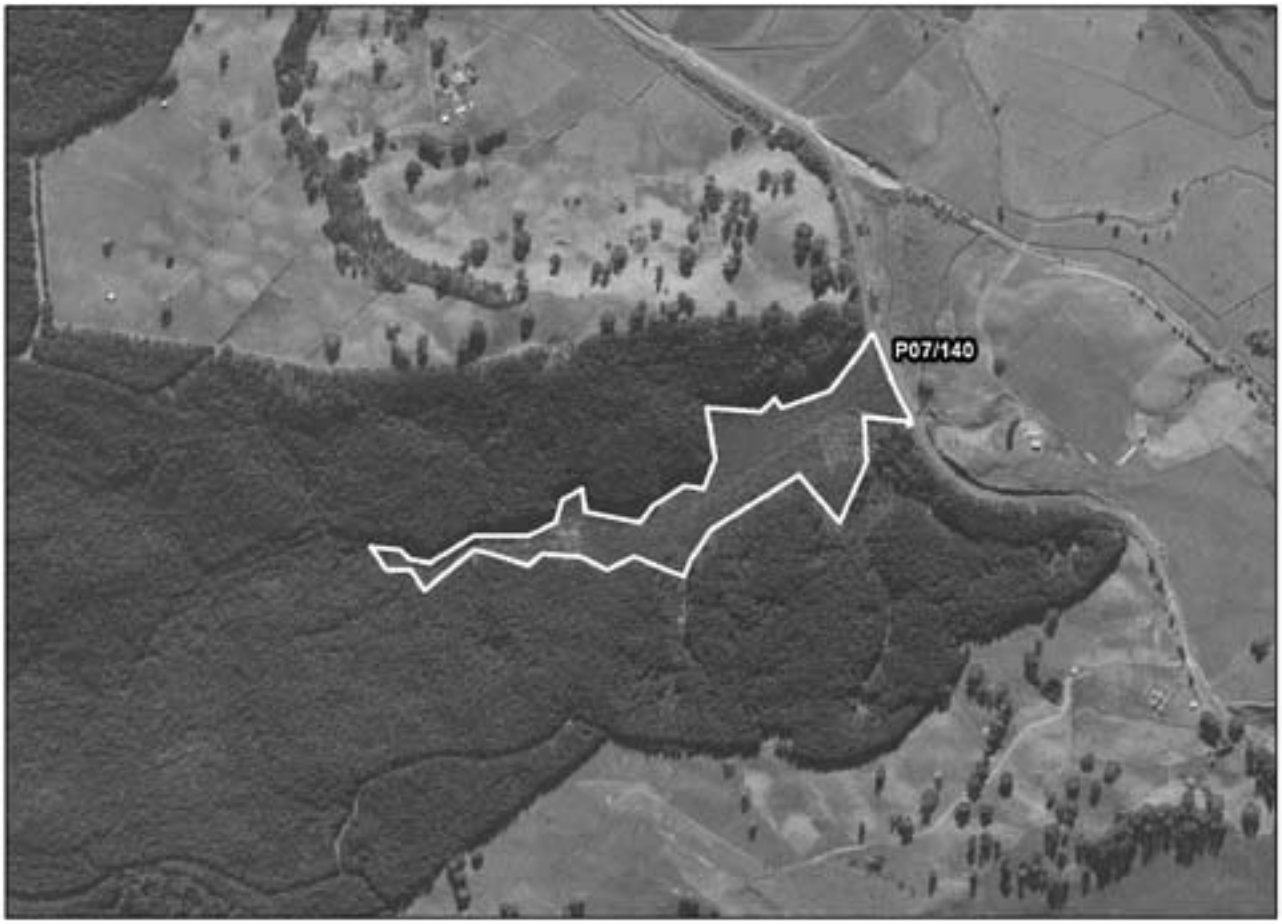
Swamp coprosma (Regionally Significant), recorded during this survey.

Fauna

Grey warbler.

Significance

An excellent intact representative wetland, still relatively weed-free because of buffering by exotic plantation on three sides. Contains 0.6 ha of Acutely Threatened land environment A5.1b and 0.8 ha of Chronically Threatened environment A5.2a. The s-ngle site, (a) Manuka-*Baumea rubiginosa-B. tenax* shrub sedgeland on alluvium, is representative.

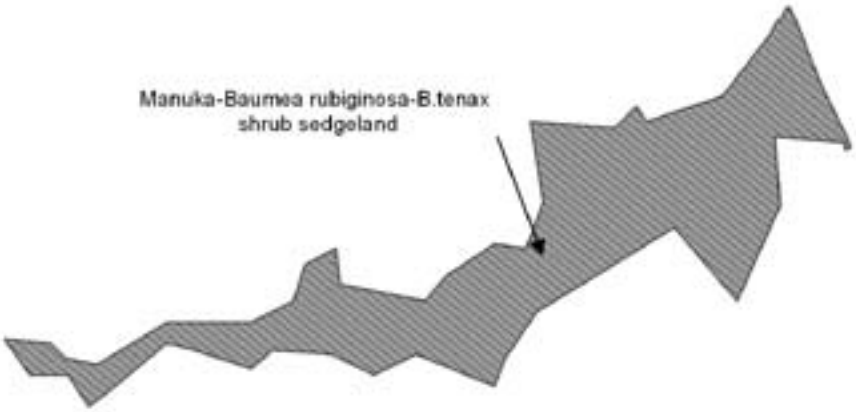


P07/140 Mangakahia Forest Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

ROTU STREAM FOREST

Survey no.	P07/141
Survey date	29 November 2006
Grid reference	P07 825912
Area	10.1 ha
Altitude	20 m asl

Ecological unit

(a) Kahikatea-houhere-kowhai-ti kouka forest on alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Kaihu River.

Vegetation

This remnant of secondary forest between Rotu Stream and the Kaihu River lies in a highly modified landscape and has three deep drains around its edges. The natural flooding regime is restricted by channelisation of the river. The remnant is fenced but a cattle race runs along its border and it shows evidence of cattle pugging and trampling throughout. The canopy is formed by common kahikatea, kowhai, ti kouka, and houhere, frequent mahoe, small-leaved milk tree, kaikomako, and nikau and occasional tree privet and harakeke. Pampas is scattered around the margins. The understorey comprises small-leaved mahoe, *Coprosma rigida*, round-leaved coprosma, *C. propinqua*, small-leaved milk tree, and poataniwha. Ground cover is dominated by tradescantia and alligator weed, with pockets of native herbs and creeping plants, e.g., *Viola lyallii*, *Hydrocotyle spp*, *Centella uniflora*, and *Doodia mollis*.

Significant flora

Doodia mollis (Sparse), recorded during this survey. *Coprosma rigida*, round-leaved coprosma, kaikomako, and *Viola lyallii* (all Regionally Significant), recorded during this survey.

Fauna

New Zealand pigeon (Gradual Decline), New Zealand kingfisher, silvereye, grey warbler, North Island fantail, shining cuckoo.

Significance

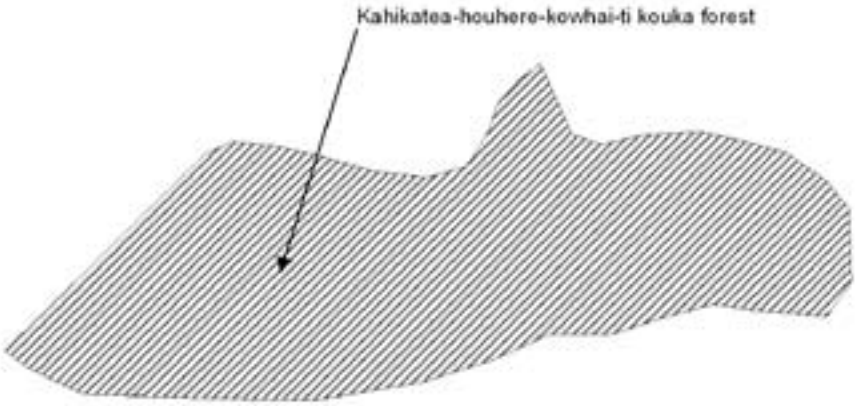
Alluvuial forest is relatively rare in this Ecological District and throughout Northland. Contains 10.3 ha of At Risk land environment G3.1b. The single ecological unit, (a) Kahikatea-houhere-kowhai-ti kouka forest on alluvium, is representative.

P07/141 Rotu Stream Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

OPANAKE ROAD MORRIS FOREST

Survey no.	P07/142
Survey date	30 November 2006
Grid reference	P07 834 912-Alluvial forest
	P07 836 904-Hillslope forest
Area	10.3 ha
Altitude	20 m asl

Ecological units

(a) Kahikatea forest on alluvium (67%)

(b) Kauri-taraire-tawa forest on hillslope (33%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Kaihu River.

Vegetation

This remnant lies between Opanake Road and the Kaihu River. The forest is unfenced and shows evidence of cattle browsing, trampling, and pugging. Ti kouka and harakeke border the river.

(a) Alluvial forest forms a fringe around the drier conifer-broadleaved forest. Most of it is dominated exclusively by kahikatea. Ti kouka, totara, pukatea, and kowhai occur occasionally. The subcanopy consists of pigeonwood, houhere, pukatea, and mahoe, the understorey of swamp coprosma, karamu, *Coprosma propinqua*, *C. rhamnoides*, *C. areolata*, *C. rigida*, *C. parviflora*, small-leaved mahoe, small-leaved milk tree, kaikomako, and hangehange. The ground layer is infested with tradescantia but contains occasional swamp kiokio and lady fern.

(b) The kauri-taraire-tawa forest developed from kanuka forest with some relictual kanuka surviving. The canopy is formed by kauri, tawa, and taraire, with frequent matai, totara, kanuka, and tanekaha, and occasional titoki, rimu, puriri, and kahikatea. Subcanopy and shrub tiers are largely absent except for occasional nikau. Tradescantia has invaded the remnant and covers almost all the ground with occasional water fern and bracken in canopy gaps.

Significant flora

Kaikomako, *Coprosma parviflora*, *C. rigida*, swamp coprosma (all Regionally Significant), recorded during this survey.

Fauna

New Zealand kingfisher, grey warbler, shining cuckoo, North Island fantail.

Significance

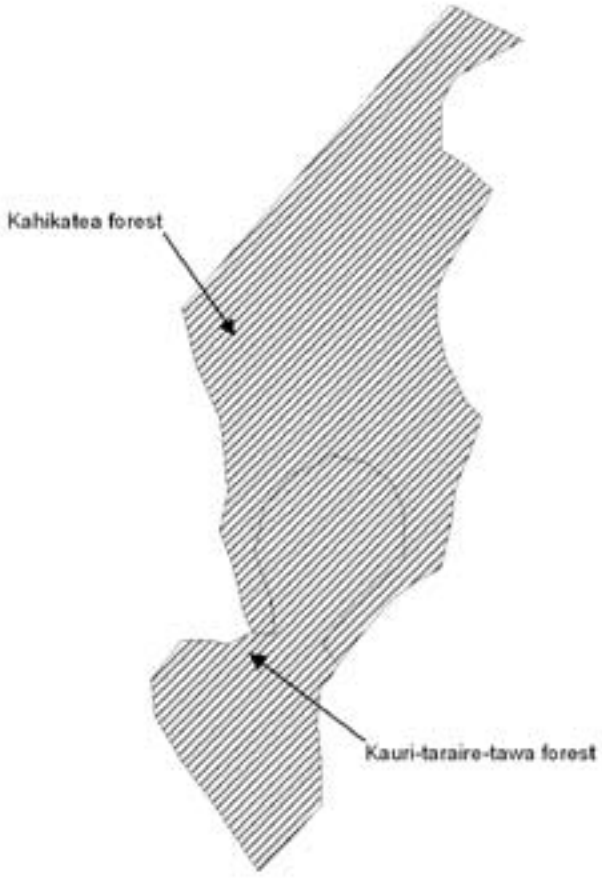
A representative alluvuial forest remnant, a habitat type that is relatively rare in this ED and throughout Northland. Contains 1.3 ha of Acutely Threatened land environment A5.1b and 7.8 ha of At Risk environment

P07/142 Opanake Road Morris Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

G3.1b. A very small proportion of this site (0.05 ha) is already protected under QEII National Trust covenant. Site for one representative ecological unit: (b) Kauri-taraire-tawa forest on hillslope.

BABYLON SMITH WETLAND

Survey no.	P07/145
Survey date	14 December 2006
Grid reference	P07 737 918
Area	5.5 ha
Altitude	20–60 m asl

Ecological units

(a) Raupo reedland on alluvium (89%)

(b) Open water (11%)

Landform/geology

Holocene alluvial and swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies, and mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunes.

Vegetation

This wetland system has been dammed at the western end, creating a lake. The site is unfenced but surrounded by extremely steep hillslopes that prevent stock access. The wetland is of moderate to good quality, and surrounding hillslopes have been recently planted with native trees such as rimu and pohutukawa.

(a) Wetland vegetation consists of abundant raupo, frequent *Isolepis distigmatosa*, rushes, and lotus, and occasional pampas, white clover, Yorkshire fog, water purslane, *Hydrocotyle pterocarpa*, burr-reed, swamp millet, *Eleocharis acuta*, duckweed, *Potamogeton ochreatus*, giant umbrella sedge, harakeke, and ti kouka.

(b) Open water.

Significant flora

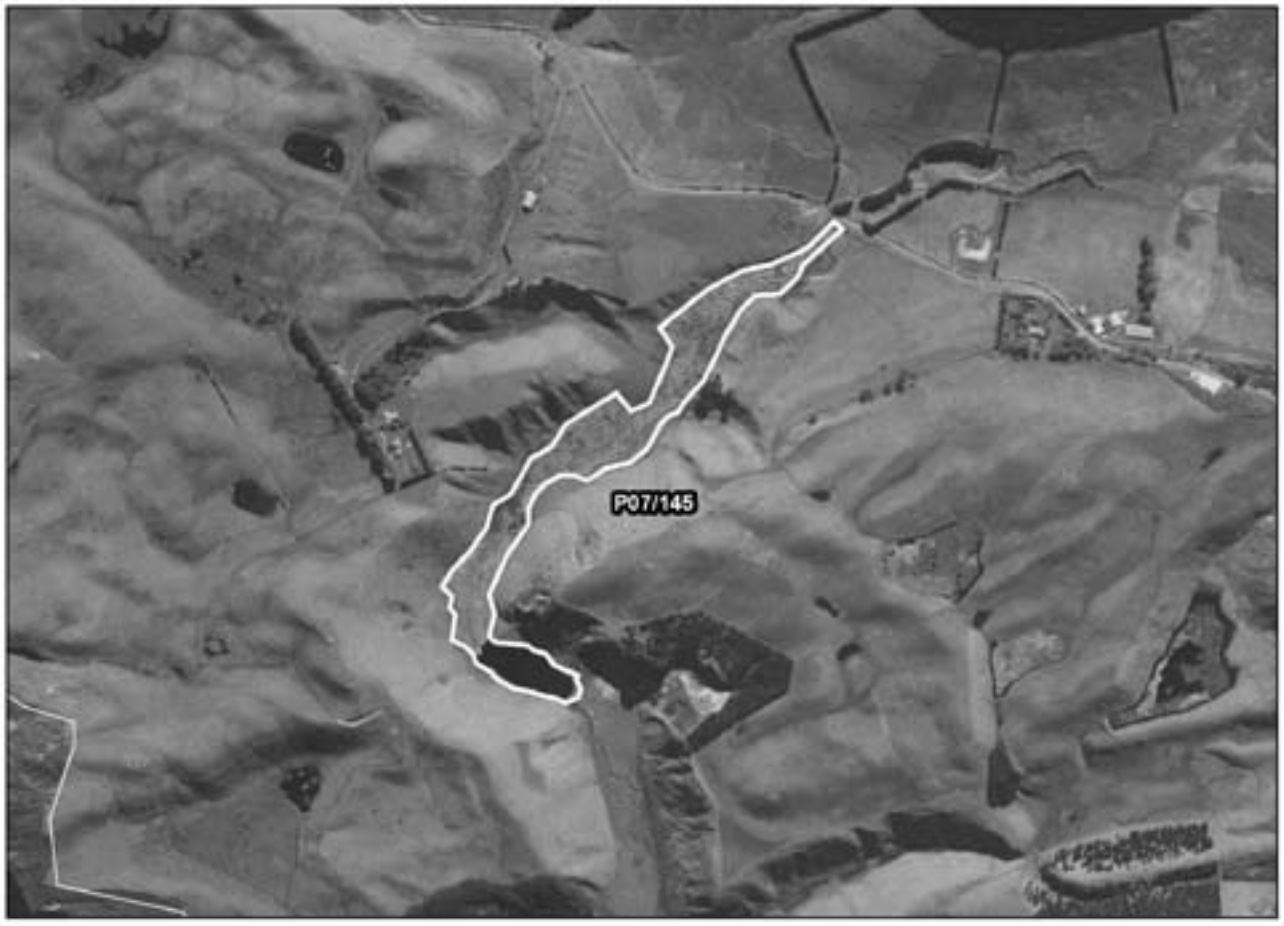
Burr-reed (Regionally Significant), recorded during this survey.

Fauna

Australasian bittern (Nationally Endangered), spotless crake (Sparse), North Island fantail, Pacific swallow, Australasian harrier, pukeko, Australasian pied stilt (SSBI P07/H029, 1978). Paradise shelduck.

Significance

Wetlands are a threatened habitat type in Northland. This site has effective topographic protection from grazing, and its reasonable size enhances its ecological value. Historical records of threatened species. Contains 3.2 ha of Acutely Threatened land environment A5.1b and 2.3 ha of Chronically Threatened environment A7.3a.

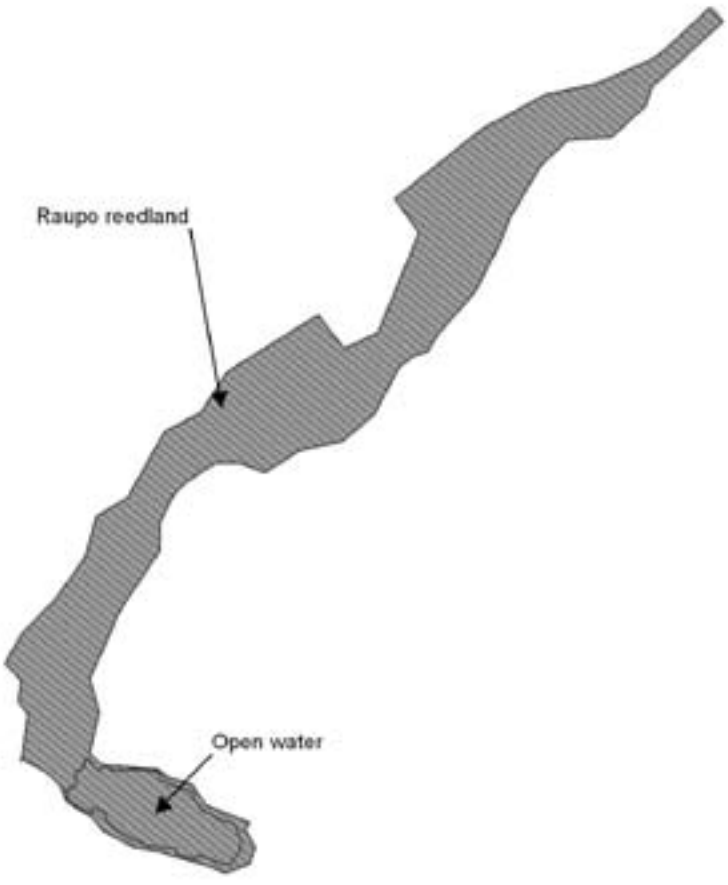


P07/145 Babylon Smith Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

NRC OPANAKE ROAD RESERVE FOREST

Survey no.	P07/148
Survey date	30 November 2006
Grid reference	P07 842 906
Area	2 ha
Altitude	20 m asl

Ecological unit

(a) Matai forest on hillslope (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Kaihu River.

Vegetation

Comprising young secondary forest, this reserve is situated south of Opanake Road and north of the Kaihu River.

(a) Matai is common throughout the canopy with frequent rimu, white maire, tanekaha, totara, kanuka, and mamangi, and occasional kauri and kowhai. The subcanopy comprises mamangi, tawa, white maire, nikau, ponga, and willow-leaved maire, the understorey nikau and matai. The ground layer consists of pockets of tradescantia, tree seedlings and mixtures of ferns such as *Blechnum fraseri*. A variety of lianes, including supplejack, mangemange, and New Zealand jasmine, is present.

Significant flora

Willow-leaved maire (Gradual Decline), recorded during this survey.

Fauna

Grey warbler.

Significance

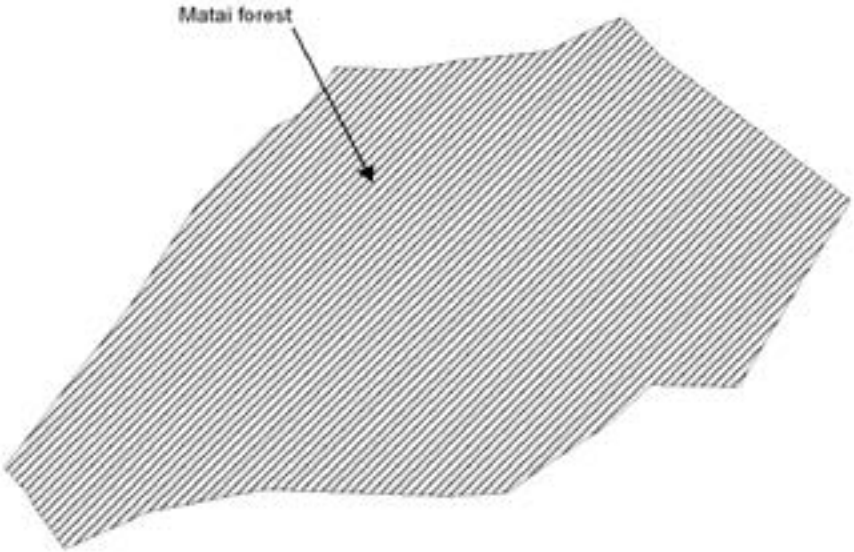
An excellent site, fenced and in very good condition, supporting threatened and regionally significant plant species. The only such stand of a very rare forest type in the ED, Northland, and New Zealand (NZPCN 2008). Contains 2 ha of At Risk land environment G3.1b. Nearly half the site (0.9 ha) is already protected under QEII National Trust covenant. The single ecological unit, (a) Matai forest on hillslope, is representative.

P07/148 NRC Opanake Road Reserve Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

OPANAKE ROAD DAVIDSON FOREST AND SHRUBLAND

Survey no. P07/150
Survey date 1 December 2006
Grid reference P07 842 902
Area 5 ha
Altitude 20 m asl

Ecological units

(a) Manuka shrubland on hillslope (11%)

(b) Totara-titoki forest on hillslope (75%)

(c) Kahikatea forest on alluvium (7%)

(d) Rushland on alluvium (7%)

Landform/geology

Hillslopes on undifferentiated Mangakahia Complex sediments, and overlying early Pleistocene (Awhitu Group) cemented dune sands and associated facies

Vegetation

This indigenous forest and wetland is beside the Opanake Road Morris forest (P07/142). Bordered by Opanake Road and the Kaihu River, the site is partially fenced.

(a) The shrubland canopy comprises abundant manuka and occasional totara, radiata pine, *Coprosma parviflora*, kanuka, and *C. X cunninghamii*.

(b) Below the shrubland is totara-titoki forest. The canopy is formed by common totara and titoki, frequent rewarewa, tanekaha and manuka, and occasional kowhai, nikau, kahikatea, kanuka, taraire, puriri, matai, ti kouka and mapau.

(c) The canopy of the kahikatea forest comprises abundant kahikatea, frequent ti kouka, nikau, pukatea, and swamp maire, and occasional harakeke, and putaputaweta.

(d) The grazed backswamp has abundant rushes, uncommon alligator weed, umbrella sedge, water pepper, lotus, creeping buttercup, creeping bent, water celery, *Polygonum strigosum*, and cleavers.

Significant flora

Coprosma parviflora (Regionally Significant), recorded during this survey.

Fauna

Grey warbler, North Island fantail, tui, New Zealand kingfisher, pukeko (SSBI P07/H036, 1978).

Significance

An excellent site with a range of contiguous plant communities on several landforms, albeit in a relatively small area. Contains 1.6 ha of Acutely

P07/150 Opanake Road Davidson Forest and Shrubland

Aerial photography flown 2002

Threatened land environments A5.1b and A5.1c, and 2.9 ha of Chronically Threatened environments A6.1b and G3.1b. Site for three representative ecological units: (a) Manuka shrubland on hillslope, (b) Totara-titoki forest on hillslope, and (c) Kahikatea forest on alluvium.

LONG GULLY WETLAND AND SHRUBLAND

Survey no.	P07/153
Survey date	15 December 2006
Grid reference	P07 751 879 (west), P07 757 884 (east)
Area	38 ha
Altitude	20–70 m asl

Ecological units

(a) *Baumea arthrophylla-B. juncea sedgeland* on alluvium

(b) Raupo reedland on alluvium

(c) *Baumea articulata* reedland on alluvium

(d) *Eleocharis sphacelata* reedland on alluvium

(e) *Bolboschoenus fluviatilis* reedland on alluvium (all wetland units together comprise 60%)

(f) Manuka shrubland on hillslopes (40%)

Landform/geology

Holocene alluvial and swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies, and mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunes.

Vegetation

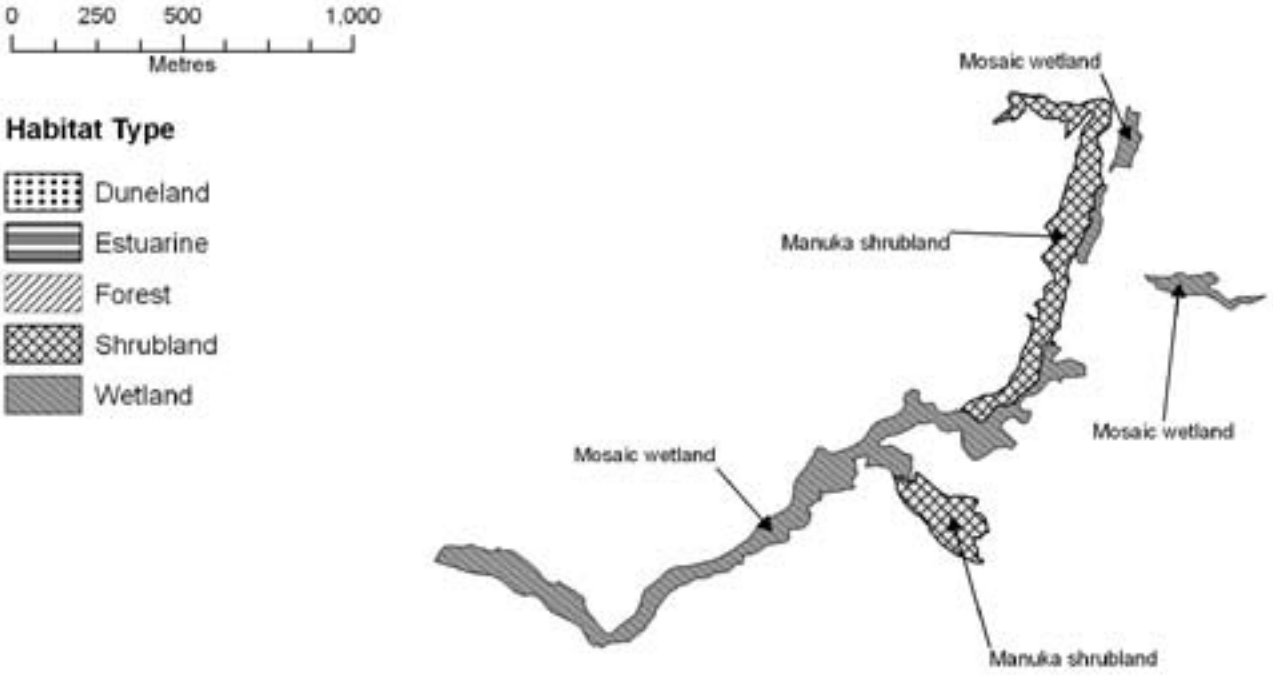
This long valley floor contains a fine mosaic of wetland units, with other units on adjacent lower hillslopes. The valley is surrounded by pasture and radiata pine woodlots. Despite being open to cattle grazing for short periods twice a year at most, the western and central portions of the wetland are in relatively good condition. The eastern end is heavily grazed and divided by Babylon Coast Road. It is in poor condition and heavily infested by weeds.

(a) *Baumea* sedgeland consists of abundant *B. arthrophylla* and *B. juncea*, and occasional swamp kiokio, lotus, swamp millet, Yorkshire fog, pale rush, *Isolepis distigmatosa*, *Centella uniflora*, *Pertusaria celata*, and *Lobelia anceps*.

(b) Raupo reedland consists of abundant raupo, frequent *Eleocharis sphacelata*, and occasional harakeke, oioi, *Carex virgata*, *Baumea arthrophylla*, *B. juncea*, giant umbrella sedge, bracken, harakeke, pampas, manuka, mamaku, Mexican devil, hangehange, tangle fern, karamu, and knobby clubrush.

(c) *Baumea articulata* reedland consists of abundant *B. articulata* with occasional pampas, raupo, swamp millet, *B. juncea*, harakeke, Yorkshire fog, Spanish heath, lotus, and swamp kiokio.

P07/153 Long Gully Wetland and Shrubland



Aerial photography flown 2002

(d) *Eleocharis sphacelata* reedland consists of abundant *E. sphacelata*, frequent *Baumea juncea*, and occasional harakeke, *Carex virgata*, gorse, and bracken.

(e) *Bolboschoenus* reedland consists of abundant *B. fluviatilis*, frequent harakeke, raupo and lotus, and occasional tall fescue, Yorkshire fog, and karamu.

(f) Manuka shrubland on hillslopes consists of abundant manuka, common gorse, frequent brush wattle, and occasional radiata pine, akepiro, berry heath, Spanish heath, mingimingi and karamu.

Significant flora

None noted.

Fauna

Australasian harrier, pukeko.

Significance

The western and central portions of this substantial wetland site contain an impressive array of wetland communities in relatively good condition, well buffered in places by radiata pine woodlots. The value of the eastern end is reduced by stock intrusion and weed invasion. Contains 14.7 ha of Acutely Threatened land environment A5.1b and 22.4 ha of Chronically Threatened environment A5.2a. Site for two representative ecological units: (a) *Baumea arthrophylla-B. juncea* sedgeland on alluvium, and (b) Raupo reedland on alluvium.

KAIHU VALLEY WEST SHRUBLAND

Survey no.	P07/157a
Survey date	28 November 2006
Grid reference	P07 827 897
Area	1.5 ha
Altitude	20 m asl

Ecological unit

(a) Manuka shrubland on alluvium (100%)

Landform/geology

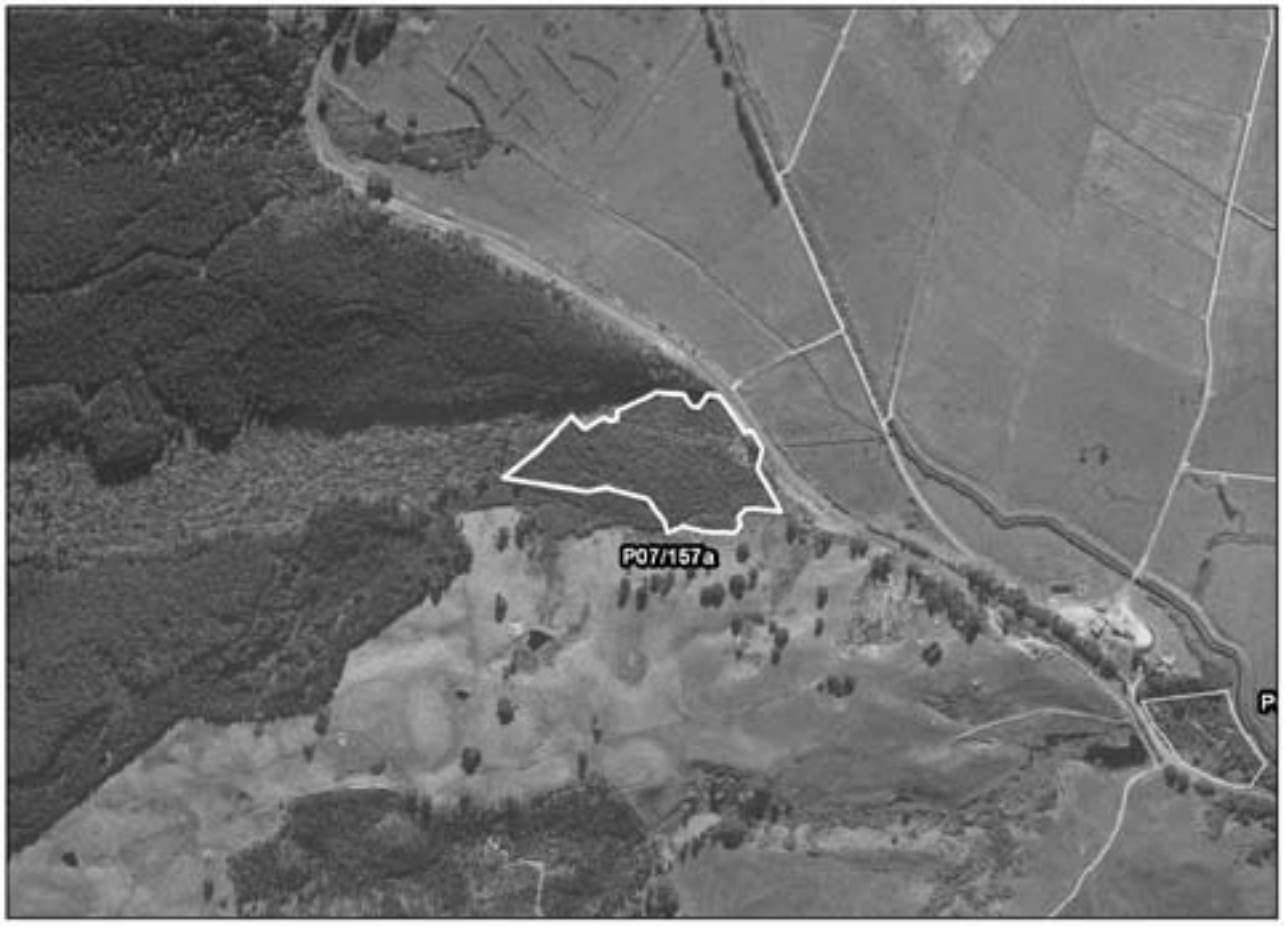
Holocene alluvial and swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This site occupies poorly drained alluvium in the lower reaches of an unnamed tributary of the Kaihu River. Apart from manuka, other prominent species are harakeke, *Coprosma parviflora*, and pampas.

Significant flora

Coprosma parviflora (Regionally Significant), recorded during this survey.

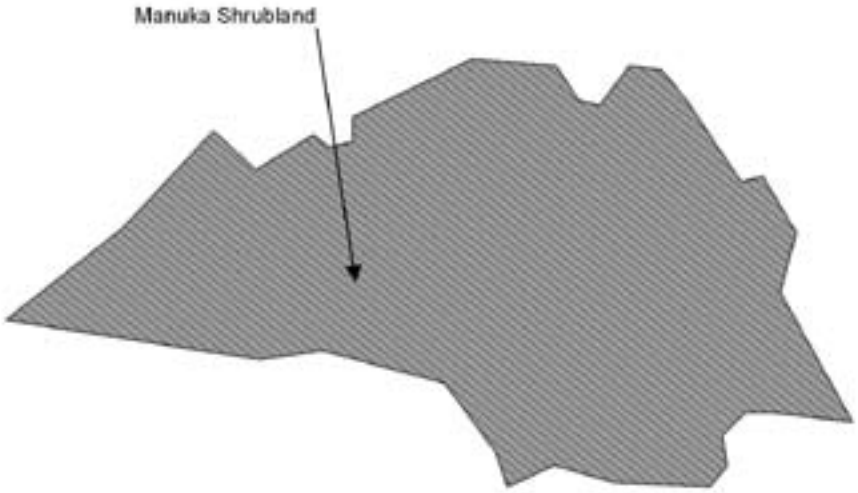


P07/157A Kaihu Valley West Shrubland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

Fauna

Australasian harrier, shining cuckoo, grey warbler, North Island fantail (SSBI P07/H057, 1994)

Significance

A relatively intact wetland, buffered on the western and northern sides by plantation forests. Manuka shrubland on alluvium is a relatively rare ecological unit in this ED. Contains 4.3 ha ha of Acutely Threatened land environment A5.1b and 0.4 ha of Chronically Threatened environment A5.2a. The single ecological unit, (a) Manuka shrubland on alluvium, is representative.

OPANAKE ROAD SHRUBLAND AND FOREST

Survey no.	P07/158
Survey date	28 November 2006
Grid reference	P07 855 885
Area	9.3 ha
Altitude	20–40 m asl

Ecological units

(a) Manuka shrubland on hillslope (50%)

(b) Totara forest on hillslope (10%)

(c) Kahikatea forest on alluvium (2%)

(d) Radiata pine treeland on hillslope (38%)

Landform/geology

Hillslopes on undifferentiated Mangakahia Complex sediments, and overlying early Pleistocene (Awhitu Group) cemented dune sands and associated facies

Vegetation

Bordered by Opanake Road on the northern side, these unfenced remnants curve around the hillside towards the Kaihu River.

(a) The canopy of the shrubland is formed by abundant manuka, frequent tangle fern and bracken, and occasional hangehange.

(b) Totara forest canopy contains abundant totara and occasional mahoe.

(c) Kahikatea forest contains occasional matai and kowhai in the canopy.

(d) Radiata pine treeland lies between Opanake Road and the manuka shrubland. Its canopy contains frequent mapau and hangehange and occasional karamu, pigeonwood, and gorse.

Significant flora

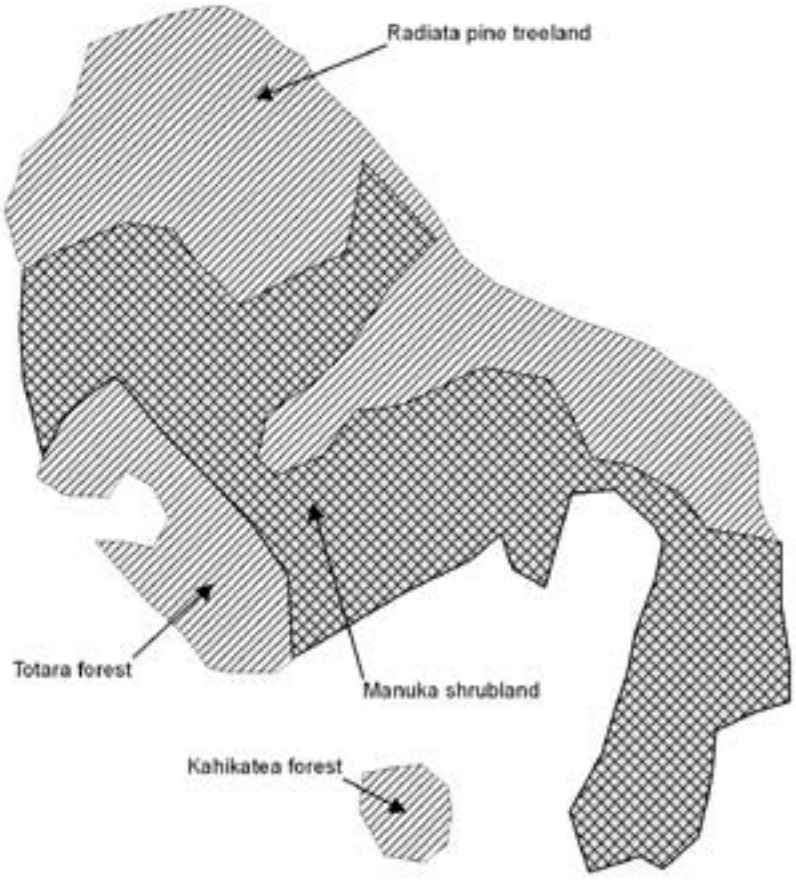
None recorded.

P07/158 Opanake Road Shrubland and Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

Fauna

New Zealand kingfisher.

Significance

The value of this reasonably large site is enhanced by the presence of several different contiguous lowland plant communities. Contains 3.9 ha of Acutely Threatened land environment A5.1b and 5.4 ha of At Risk environment A6.1b. Site for two representative ecological units: (a) Manuka shrubland on hillslope, and (b) Totara forest on hillslope.

HOANGA ALLUVIAL FOREST FRAGMENT

Survey no.	P07/162
Survey date	12 December 2006
Grid reference	P07 916 910
Area	5.3 ha
Altitude	10–15 m asl

Ecological unit

(a) Kahikatea forest on alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Northern Wairoa River.

Vegetation

This site comprises a stand of secondary kahikatea forest in which fencing several decades ago has allowed impressive recovery of understorey and ground layers. Subcanopy species include pukatea, titoki, nikau, ti kouka, and mahoe. The understorey is dominated by *Coprosma areolata*. A road bisects the fragment; the eastern portion has been fenced for longer than the western one, and has denser and better developed lower tiers. There has been some invasion by tree privet along the margins.

Significant flora

None noted.

Fauna

None noted.

Significance

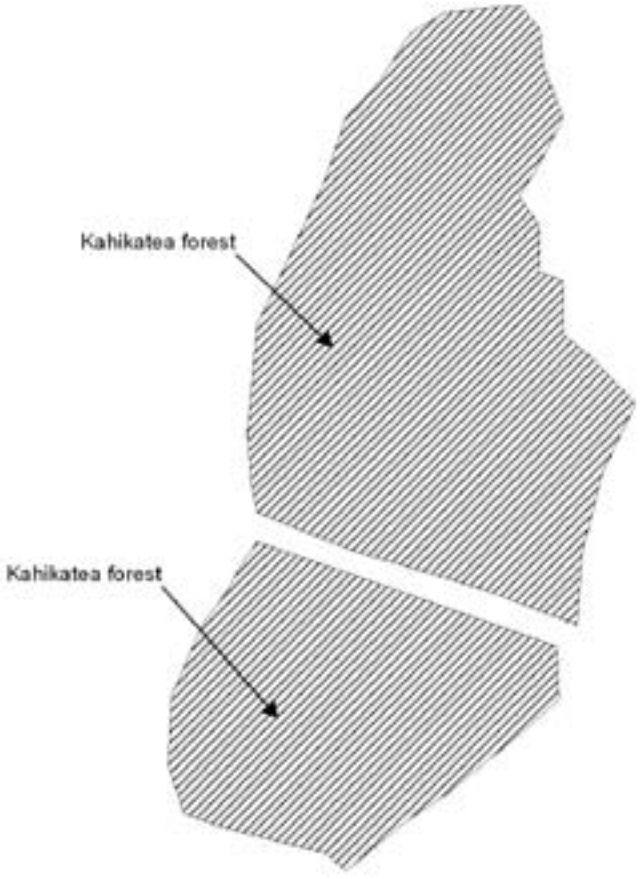
A valuable remnant, one of the best of its kind in the ED, and one of very few in the intensively farmed part of the ED east of the Northern Wairoa River. Contains 5.3 ha of Acutely Threatened land environment A5.1b. The single ecological unit, (a) Kahikatea forest on alluvium, is representative.

P07/162 Hoanga Alluvial Forest Fragment

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

LOWER KAIHU RIVER FOREST FRAGMENTS

Survey no.	P07/169
Survey date	1 December 2006
Grid reference	P07 867853 (a), 872 848 (b), 873 845 (c)
Area	5 ha
Altitude	15 m asl

Ecological unit

(a) Kahikatea forest on alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Kaihu River.

Vegetation

The site comprises three patches of secondary kahikatea forest with occasional ti kouka. Patch (a) is currently grazed and has little or no lower tiers. Patches (b) and (c) have recently been fenced and have very sparse subcanopy and understorey tiers with a small range of characteristic large (pukatea), small tree (e.g., small-leaved milk tree, kowhai), and shrub (e.g., small-leaved mahoe, *Coprosma rigida*) species. A variety of woody (e.g., Chinese privet) and herbaceous (e.g., alligator weed) weeds are present. Manchurian rice grass fringes (b) and (c) in places.

Significant flora

Coprosma rigida (Regionally Significant), recorded during this survey.

Fauna

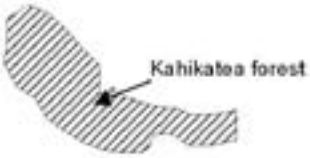
Australasian harrier.

Significance

Alluvial forest is a rare habitat type in the ED and throughout Northland. Despite their small size and fragmented nature, with some weed control, fenced patches (b) and (c) have good potential for restoration; patch (a) would also benefit from fencing. Contains 5.8 ha of Acutely Threatened land environment A5.1b.

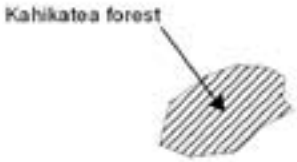
P07/169 Lower Kaihu River Forest Fragments

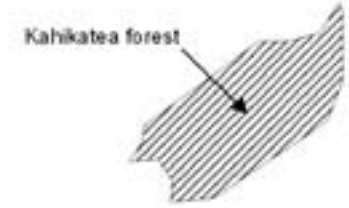
0 125 250 500
Metres



Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland





Aerial photography flown 2002

HOKIANGA ROAD RAILWAY TREELAND

Survey no.	P07/169a
Survey date	28 November 2006
Grid reference	P07 875 867 (a), 881 869 (b)
Area	9 ha
Altitude	20 m asl

Ecological units

(a) Ti kouka-Coprosma propinqua-C. parviflora-pampas treeland on alluvium (78%)

(b) Ti kouka forest on alluvium (22%)

Landform/geology

Holocene swamp and alluvial deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

The site comprises several tracts of freshwater wetland on poorly drained alluvium, bisected by the Dargaville Branch Railway. The wetland area has been fragmented by subsequent drainage.

(a) The larger surviving tract, on both sides of the railway line at the western end south of the line, supports ti kouka treeland with frequent *Coprosma propinqua*, *C. parviflora*, and pampas over a range of native (e.g., raupo) and adventive herbs.

(b) The smaller tract, at the eastern end north of the line, supports denser ti kouka forest over pampas with occasional kahikatea. Stock has access to both areas.

Significant flora

Coprosma parviflora (Regionally Significant), recorded during this survey.

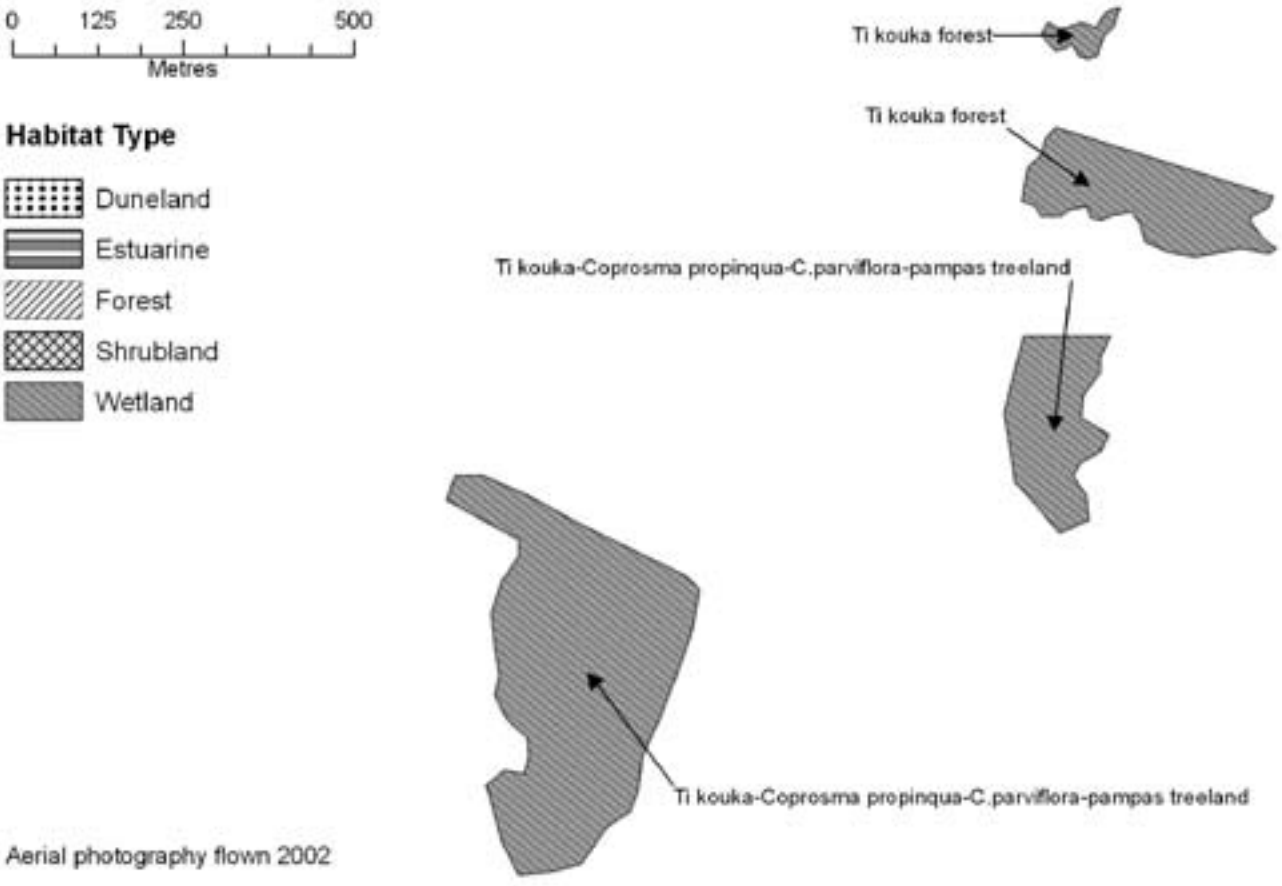
Fauna

Australasian bittern (Nationally Endangered), North Island fernbird (Sparse), black shag (Sparse), Australasian harrier, grey warbler, silvereye, North Island fantail, Pacific swallow.

Significance

Although there has been substantial weed invasion, the western tract evidently still has a high water table and supports two rare ecological units and some native wetland plant and bird species, including threatened species. Contains 8.5 ha of Acutely Threatened land environment A5.1b and 0.9 ha of At Risk environment A6.1b.

P07/169A Hokianga Road Railway Treeland



Aerial photography flown 2002

FREIDRICH'S LAKE AND WETLAND

Survey no.	P07/171
Survey date	15 December 2006
Grid reference	P07 792 843
Area	7 ha
Altitude	85–95 m asl

Ecological units

(a) *Baumea articulata* reedland on alluvium

(b) *Eleocharis sphacelata* reedland on alluvium

(c) Open water in dune lake (all units together comprise 100%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield.

Vegetation

This site comprises wetland communities, not mapped separately, dominated either by

(a) *Baumea articulat*a or

(b) *Eleocharis sphacelata,* around a small lake. The margins are weedy with alligator weed abundant at the western end.

(c) A small dune lake, fenced in part (Wells et al. 2007).

Significant flora

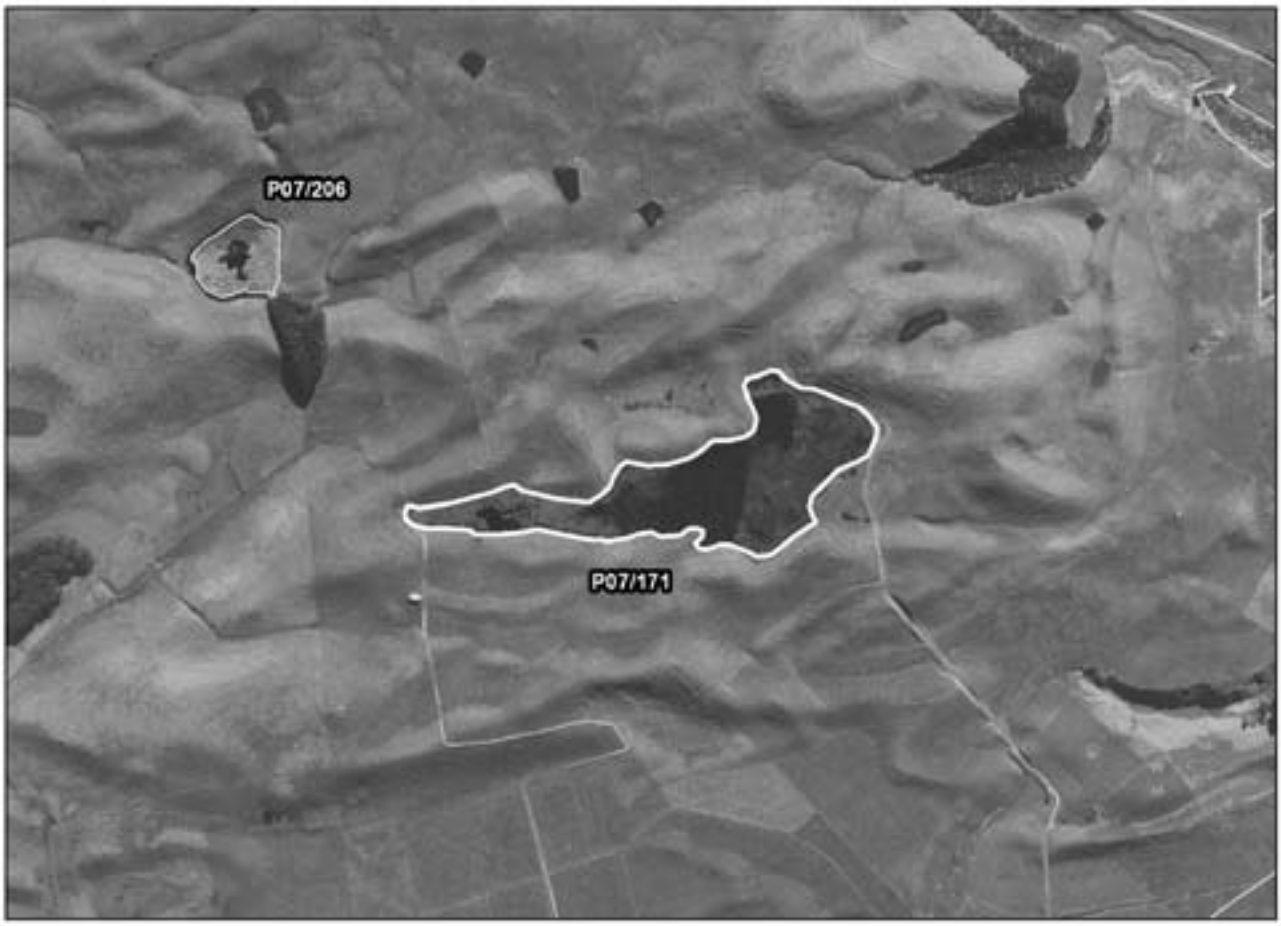
Utricularia australis (Nationally Endangered) was recorded in 2005 (Wells et al. 2007).

Fauna

Australasian bittern (Nationally Endangered) (SSBI P07/H033). Grey duck (Nationally Endangered), New Zealand dabchick (Sparse), black shag (Sparse), little shag (Sparse), little black shag (Sparse), grey teal (Regionally Significant) (OSNZ surveys 1979–1991). Pacific swallow, pukeko, paradise shelduck, Australasian pied stilt, (SSBI P07/H033). White-faced heron, Australasian shoveler (Regionally Significant), Australasian harrier (OSNZ surveys 1979–1991).

Significance

Although ranked Low by Wells et al. (2007), the site has notable birdlife, including threatened and regionally significant species. The invasive adventive weed *Utricularia gibba* was recorded in 2005. Although its presence was described as minimal, it has the potential to increase in future and eliminate the nationally threatened *U. australis* (Wells et al. 2007). Contains 4.8 ha of Chronically Threatened land environment A7.3a.

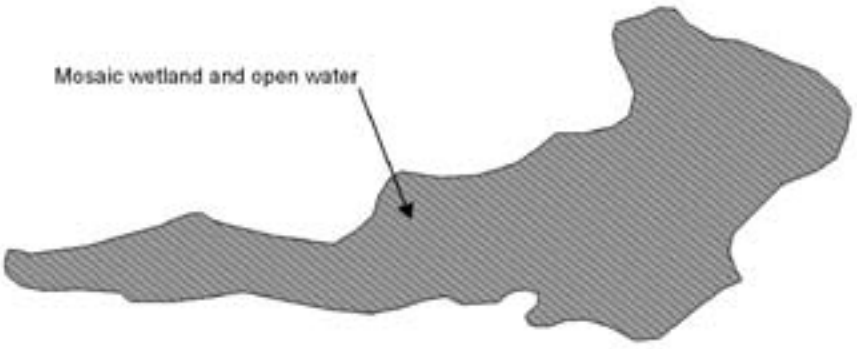


P07/171 Freidrich's Lake and Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

DARGAVILLE BRIDGE FOREST

Survey no.	P07/173
Survey date	1 December 2006
Grid reference	P07 904837
Area	1.8 ha
Altitude	10 m asl

Ecological unit

(a) Kahikatea forest on an alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Northern Wairoa River.

Vegetation

On the eastern side of the Northern Wairoa bridge at Dargaville is a small isolated pocket of secondary indigenous forest. The canopy is formed of abundant medium-sized kahikatea with occasional ti kouka, kohekohe, puriri, titoki, and nikau. Drainage of the area has led to a subcanopy dominated by karaka. There is a sparse understorey of small-leaved mahoe. Half the forest had been fenced off for 11 years at time of survey; the other half remains unfenced and has pasture grasses as the ground cover.

Significant flora

None noted.

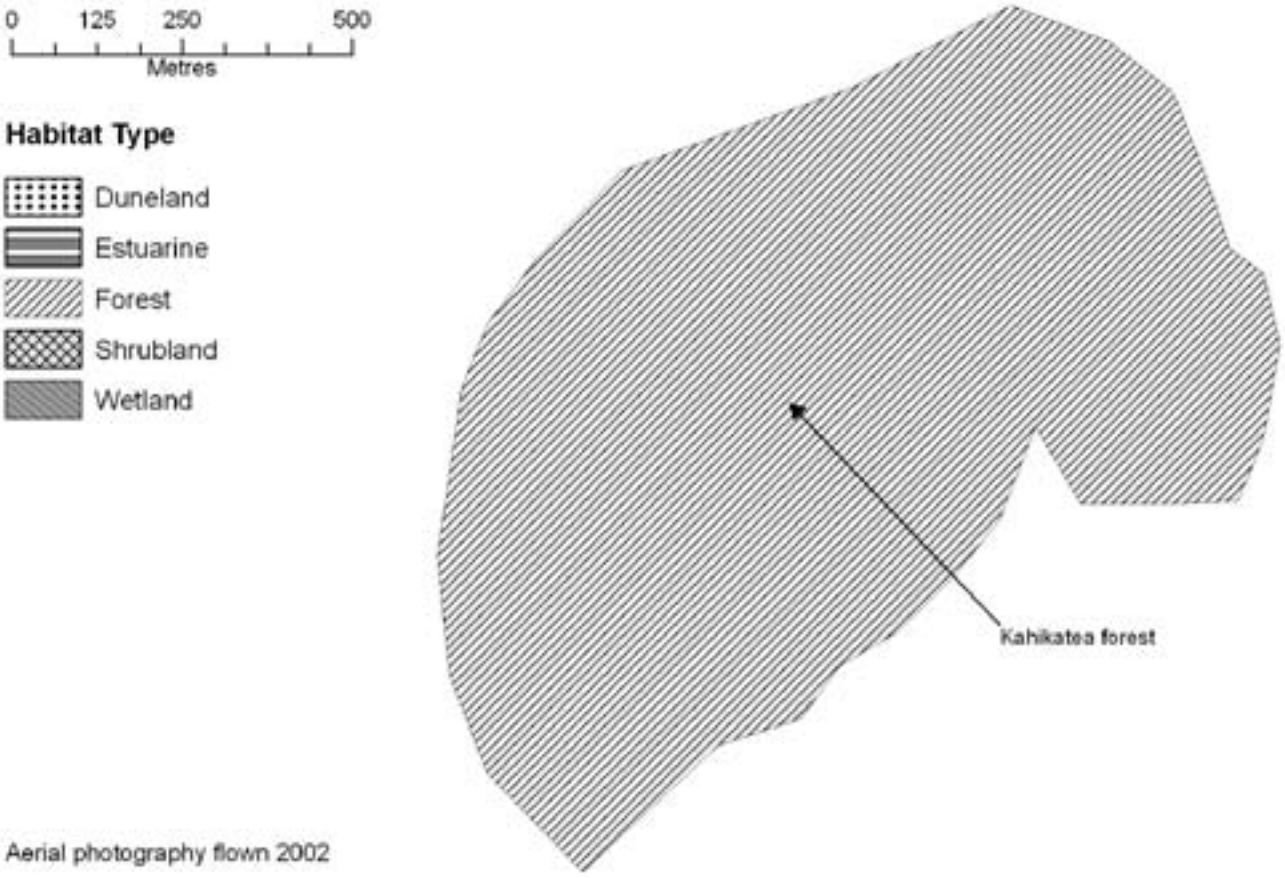
Fauna

Shining cuckoo.

Significance

Alluvial forest is a threatened habitat type in Northland, and this small remnant is the best example in the Turiwiri district. Contains 1.8 ha of Acutely Threatened land environment A5.1b. This site possibly meets the criteria for Level 1 but further information may result in reclassification at Level 2.

P07/173 Dargaville Bridge Forest



Aerial photography flown 2002

LAKE REHUTAI AND WETLAND

Survey no.	P07/174a
Survey date	15 December 2006
Grid reference	P07 800 806
Area	5.2 ha
Altitude	60–70 m asl

Ecological units

(a) *Eleocharis sphacelata* reedland on alluvium (75%)

(b) Open water in dune lake (25%)

Landform/geology

Lake and swamp deposits in depression on early Pleistocene (Awhitu Group) cemented dune sand, ponded at landward edge of mid-late Pleistocene (Karioitahi Group) consolidated parabolic dune belt.

Vegetation

This site comprises

(a) a natural wetland, dominated variously by *Eleocharis sphacelata*, raupo, and *Baumea articulata*, around

(b) a small dune lake.

Significant flora

None noted.

Fauna

Australasian bittern (Nationally Endangered), grey duck (Nationally Endangered), New Zealand dabchick (Sparse), black shag (Sparse), little black shag (Sparse), little shag (Sparse), spotless crake (Sparse), Australasian little grebe (Regionally Significant), grey teal (Regionally Significant), pied shag, white-faced heron, paradise shelduck, Australasian shoveler (Regionally Significant), Australasian harrier, pukeko, black-backed gull, New Zealand kingfisher, Pacific swallow (OSNZ surveys 1977–1994). Grey warbler (SSBI P07/H034, 1977, 1979).

Significance

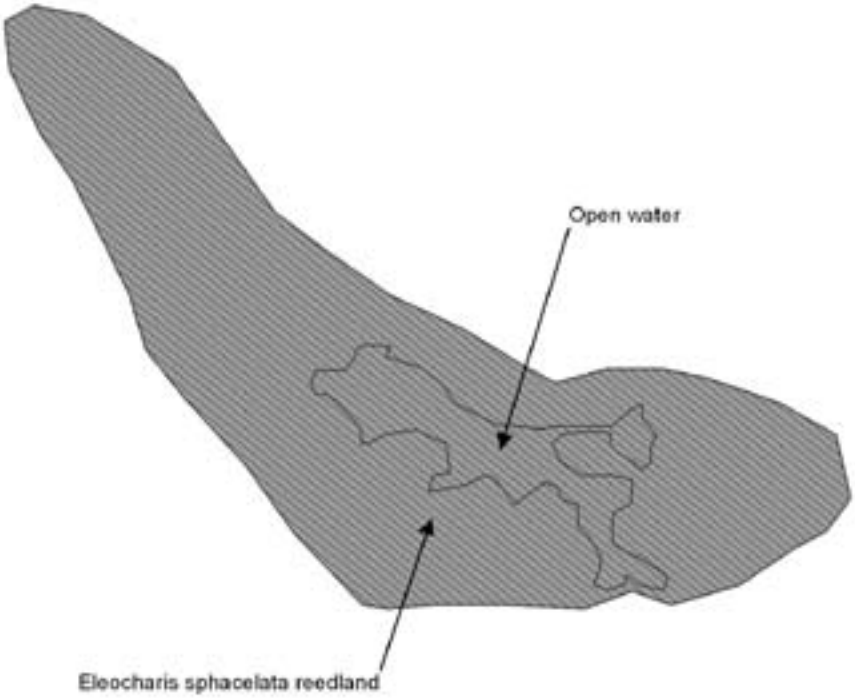
This is an excellent site, completely fenced from stock, relatively weed-free, and supporting threatened and regionally significant wetland bird species. Known colloquially as 'Bird Lake', it has been used for bird photography in the past. Contains 3.1 ha of Acutely Threatened land environment A5.1b and 1.8 ha of At Risk environment G1.1c. The site is largely protected within Rehutai Conservation Area (3.5 ha), administered by DOC. Site for one representative ecological unit: (a) *Eleocharis sphacelata* reedland on alluvium.

P07/174A Lake Rehutai and Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

AOROA ROAD FOREST

Survey no.	P08/056
Survey date	30 November 2006
Grid reference	P08 904 796
Area	2.2 ha
Altitude	10 m asl

Ecological unit

(a) Kahikatea forest on alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Northern Wairoa River.

Vegetation

This secondary forest remnant is situated beside the Northern Wairoa River. Nearby are a couple of small fenced kahikatea forest patches.

(a) Kahikatea dominates the canopy with frequent puriri, and occasional nikau, taraire, pukatea, and ti kouka. Other species include karaka, pukatea, and nikau. The understorey consists of nikau, hangehange, and karo. Ground cover consists of toikiwi, mamangi, nikau, small-leaved milk tree, pigeonwood, small-leaved mahoe, kohekohe, *Asplenium oblongifolium*, *Lastreopsis microsora*, *Blechnum filiforme*, and kiekie.

Significant flora

None noted.

Fauna

None noted.

Significance

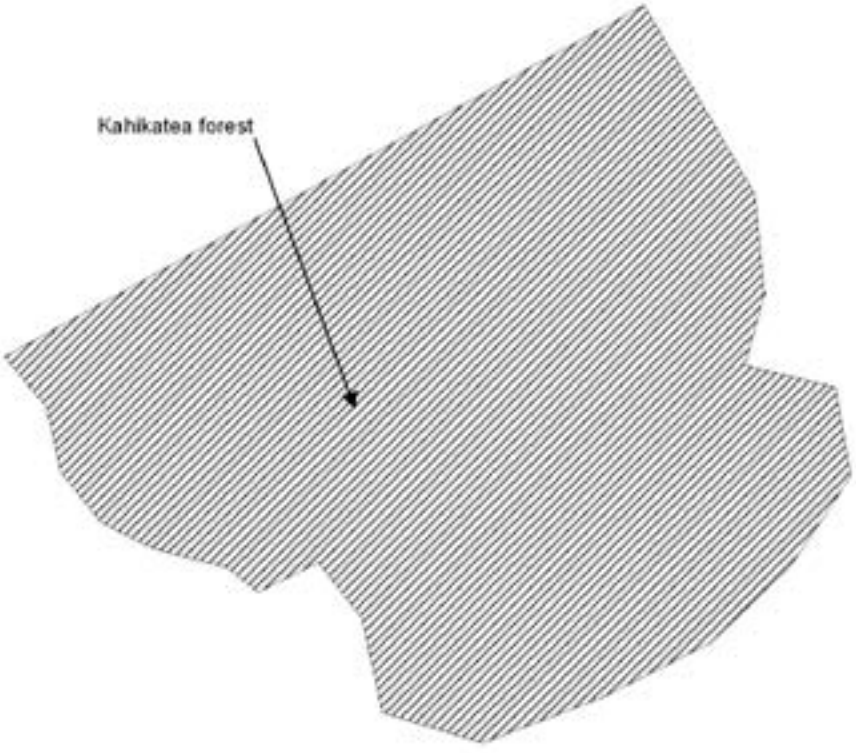
Alluvial forest is an uncommon habitat type in this ED and Northland, and most of this site (1.4 ha) is a fenced QEII National Trust covenant. Edges are weedy but the interior is in excellent condition. Contains 2.2 ha of Acutely Threatened land environment A5.1b. This site evidently meets the criteria for Level 1, but further information may result in re-classification at Level 2.

P08/056 Aoroa Road Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

WESTERN COAST C: GLINKS GULLY NORTH GRASSLAND, FLAXLAND AND FOREST

Survey no.	P08/061
Survey dates	28 November, 15 December, 18 December 2006
Grid reference	P08 various, including 872 692
Area	833 ha
Altitude	0–110 m asl

Ecological units

(a) Spinifex sandfield on foredunes (17%)

(b) Marram grassland on rear dunes (2%)

(c) Coastal toetoe-harakeke tussock flaxland on coastal faces (68%)

(d) Pohutukawa-coastal toetoe forest on rear dunes (P08 869 697) (1%)

(e) Pohuehue vineland on rear of coastal faces (12%)

Landform/geology

Coastal cliffs and canyons eroded in early Pleistocene (Awhitu Group) cemented dune sands and associated facies, and overlying mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunes, capped by Holocene dunes; on seaward side coastal cliffs locally bounded by Holocene unconsolidated transverse dunes.

Vegetation

This extensive site comprises the long stretch of coastline between Aranga Beach South (O07/016) and Glinks Gully, and forms the northern part of what is known locally as Ripiro Beach. Most of the coastal vegetation north of Glinks Gully is in good condition with little farming encroachment and hence less weed invasion than coastal vegetation south of Glinks Gully.

(a) Foredune vegetation consists of common spinifex, frequent knobby clubrush and adventive iceplant and occasional pingao, tree lupin, and sand wind grass.

(b) Rear duneland vegetation consists of common marram, frequent mingimingi and pohuehue and occasional knobby clubrush, harakeke, adventive iceplant, sand coprosma, hangehange, spinifex, and kikuyu.

(c) Cliff face vegetation consists of common harakeke and coastal toetoe, frequent pohuehue and mingimingi and occasional sand coprosma, hangehange, knobby clubrush, oioi, tree lupin, tauhinu, and bracken. Karo, kawakawa, and kikuyu are locally present. The mapped area includes some patches of (e).

(d) Occasional tiny pockets of pohutukawa forest consist of common pohutukawa and coastal toetoe.

(e) Pohuehue vineland occurs in places on the back faces of the coastal cliffs. Other species such as knobby clubrush, kikuyu, tauhinu, tree lupin, coastal toetoe, pampas, sand wind grass, and quaking grass occur occasionally.

Significant flora

Pingao (Gradual Decline) and sand coprosma (Regionally Significant), recorded during this survey.

Fauna

Wrybill (Nationally Vulnerable) (OSNZ CSN 1978), Caspian tern (Nationally Vulnerable), red-billed gull (Gradual Decline), white-fronted tern (Gradual Decline), variable oystercatcher (Regionally Significant), Antarctic prion, fairy prion (R. Parrish, pers. comm.). Mottled petrel (OSNZ CSN 1942), white-capped mollymawk (OSNZ CSN 1959), blue petrel (OSNZ CSN 1953), Antarctic petrel (OSNZ CSN 1979), Cape pigeon (OSNZ CSN 1986), sooty tern (OSNZ CSN 1996), spine-tailed swift (Taylor 1996), New Zealand pipit (OSNZ CSN 1999, 2000). Black-backed gull, Australasian pied stilt (R. Parrish, pers. comm.). Australasian gannet (Robertson et al. 2007). Pacific swallow, silvereye. Notoreas sp. 'northern' (Nationally Endangered) and black katipo (Serious Decline), both recorded in 2008 (A. Booth, DOC, pers. comm.). Green turtle (Regionally Significant) recorded live in 1978 (DOC Bioweb). Leatherback turtle (Migrant) recorded dead in 1989 (DOC Bioweb). Banded sea snake (Vagrant) recorded live in 1989 (DOC Bioweb), and yellow-bellied sea snake (Vagrant) live and dead between 1989 and 1996 (DOC Bioweb). New Zealand fur seals (Regionally Significant) regularly haul out at this site (R. Parrish, pers. comm.).

Significance

Coastal habitats such as this have been greatly reduced from their former extent in Northland and in much of New Zealand. Most of the vegetation of this extensive site is in relatively good condition and appears to be free from stock trespass. All pohutukawa between Aranga Beach and Glinks Gully have reputedly been planted (B. Searle, pers. comm.) and the stands certainly give that impression. In places (e.g., at Bayly's Beach P07 775 831), there are layers of buried forest with excellent kauri macrofossils. Bayly's Beach is a Nationally Important Geological Site for lignites and dune sands (Kenny & Hayward 1996). Contains 248.3 ha of At Risk land environment G1.1c. Some 4% of the site is already protected in Mahuta Gap Marginal Strip (3.8 ha), Rehutai Marginal Strip (28.3 ha), and Rehutai Conservation Area (3.9 ha), administered by DOC. Site for two representative ecological units: (a) Spinifex sandfield on foredunes, and (c) Coastal toetoe-harakeke tussock flaxland on coastal faces.

NEWSHAM ROAD NORTH FOREST

Survey no.	P08/067a
Survey date	30 November 2006
Grid reference	P08 963 699
Area	1.4 ha
Altitude	15 m asl

Ecological unit

(a) Kahikatea forest on alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Northern Wairoa River.

Vegetation

This small remnant of secondary forest is near a QEII covenant and a council reserve and has recently been fenced. The canopy consists of abundant kahikatea with nikau and ti kouka common and occasional karaka, pukatea, puriri and titoki.

Significant flora

None noted.

Fauna

Australasian harrier.

Significance

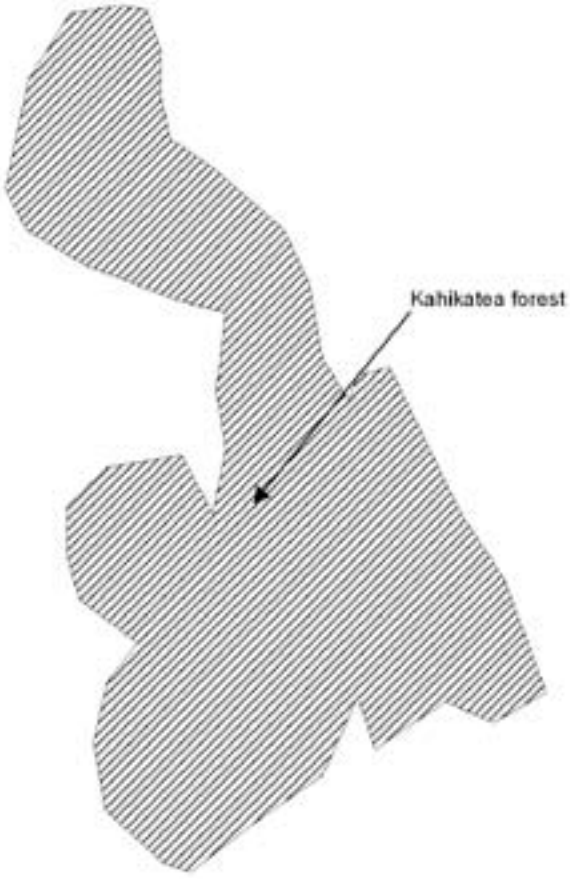
Alluvial forest is rare in this ED and throughout Northland. Although there are substantially larger examples of the same vegetation type on the same landform nearby, this is a fenced reserve with no weed problems and its value is enhanced by proximity to other larger fragments. Contains 1.4 ha of Acutely Threatened land environment A5.1b.

P08/067A Newsham Road North Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

NEWSHAM ROAD SOUTH FOREST

Survey no.	P08/067b
Survey date	30 November 2006
Grid reference	P08 965 692
Area	1.6 ha
Altitude	15 m asl

Ecological units

(a) Kahikatea forest on alluvium (64%)

(b) Puriri forest on alluvium (36%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Northern Wairoa River.

Vegetation

This forest is near the Kidd's QEII covenant and the NRC Creamery Road Reserve. Eastern and western ends of the forest are fenced, leaving only a small intervening part unfenced. Both fenced areas are less than 1 ha and comprise young secondary forest.

(a) Kahikatea dominates the canopy with frequent ti kouka.

(b) Puriri is abundant in the canopy with kahikatea, nikau, and ti kouka common and occasional karaka and pukatea.

Significant flora

None noted.

Fauna

Australasian harrier.

Significance

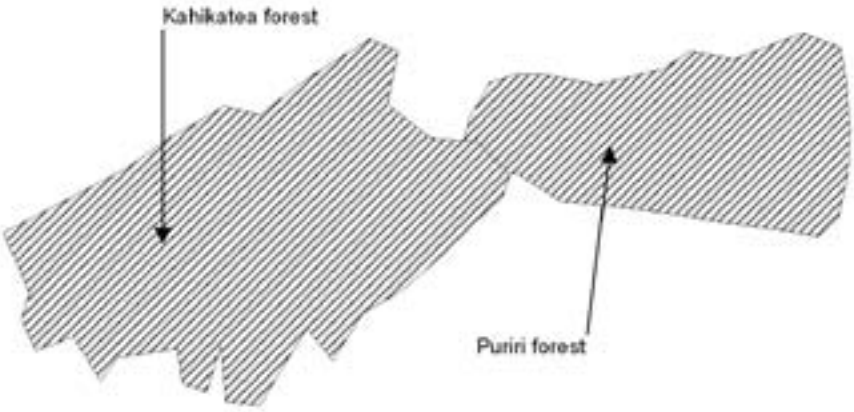
Alluvial forest is an uncommon forest type throughout Northland and the value of the site is enhanced by the presence within it of two different forest associations and its proximity to other fenced fragments. Contains 2.8 ha of Acutely Threatened land land environment A5.1b. Nearly one-third (0.5 ha) of the site is already protected under QEII National Trust covenant.

P08/067B Newsham Road South Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

KIDDS CREAMERY ROAD CORNER FOREST

Survey no.	P08/068a
Survey date	30 November 2006
Grid reference	P08 955 712
Area	0.9 ha
Altitude	15 m asl

Ecological unit

(a) Kahikatea forest on alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Northern Wairoa River.

Vegetation

This fragment has a closed canopy, well developed subcanopy and understorey with prolific tree seedlings, and a ground layer mainly of leaf litter.

(a) The canopy is dominated by kahikatea. Kauri, matai, taraire, puriri, and ti kouka occur occasionally. The subcanopy is dominated by nikau and karaka, with frequent puriri and pigeonwood, and some mahoe and mamangi, while the understorey consists of abundant toikiwi, and common kiekie and small-leaved shrubs such as small-leaved milk tree, small-leaved mahoe, and *Coprosma areolata*.

Significant flora

None recorded.

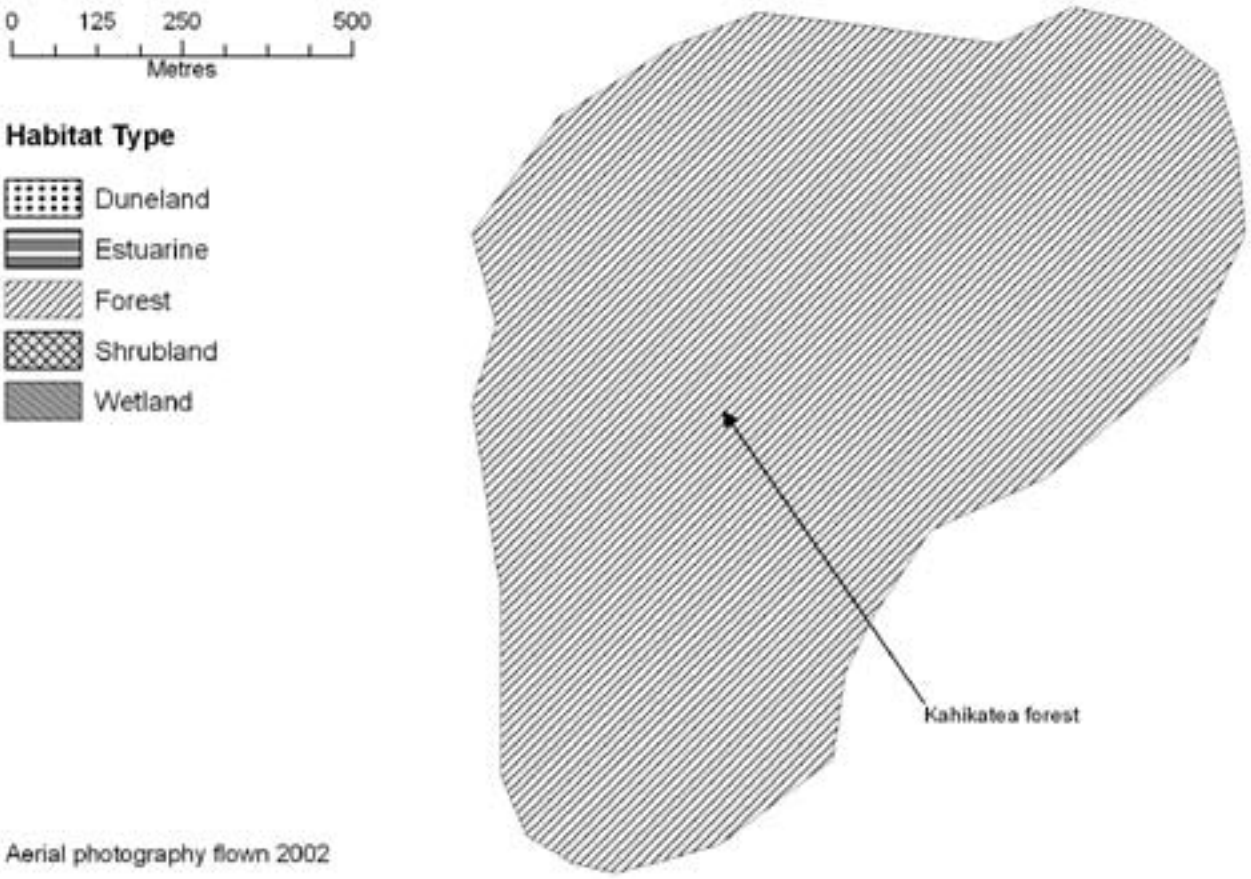
Fauna

New Zealand pigeon (Gradual Decline), white-faced heron, shining cuckoo, New Zealand kingfisher, grey warbler, North Island fantail, silvereye (SSBI P08/H028, 1992, 1993).

Significance

This QEII National Trust covenant is in very good condition and relatively weed-free. Proximity to the other fenced fragments at Tatarariki enhances its value. This is a Nationally Important site for Kaipara Soils (Kenny & Hayward 1996). Contains 2.8 ha of Acutely Threatened land environment A5.1b.

P08/068A Kidds Creamery Road Corner Forest



Aerial photography flown 2002

NRC CREAMERY ROAD RESERVE FOREST

Survey no.	P08/068b
Survey date	30 November 2006
Grid reference	P08 957 707
Area	5.9 ha
Altitude	15 m asl

Ecological units

(a) Kahikatea-ti kouka forest on alluvium (30%)

(b) Kahikatea-kowhai-ti kouka forest on alluvium (32%)

(c) Puriri-kohekohe-karaka forest on hillslope (24%)

(d) Kahikatea forest on hillslope (14%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Northern Wairoa River.

Vegetation

This reserve is in two parts, with the smaller northern end cut off from the rest by a cattle race. Both have recently been fenced.

(a) The small part contains kahikatea-ti kouka forest with many epiphytes and climbers such as *Metrosideros perforata*. In open areas, pasture grasses occur. Some restoration planting has been undertaken, though some inappropriate species, e.g., rimu, have been planted.

(b) The canopy consists of common kahikatea, ti kouka, and kowhai with frequent *Coprosma areolata*. The understorey contains toikiwi, small-leaved milk tree, coastal karamu, *Coprosma rigida*, *C. areolata*, harakeke, pigeonwood, mapau, mahoe, and small-leaved mahoe.

(c) On the northern side of the large part of the reserve, the canopy is formed by common puriri, karaka, and kohekohe and occasional rewarewa. The understorey contains nikau and mamangi.

(d) The understorey of the kahikatea forest contains frequent nikau while the ground layer is dominated by the native grass *Oplismenus imbecillis*.

Significant flora

Doodia mollis (Sparse) (1998 AK 235015). *Coprosma rigida* (Regionally Significant), recorded during this survey.

Fauna

None noted.

Significance

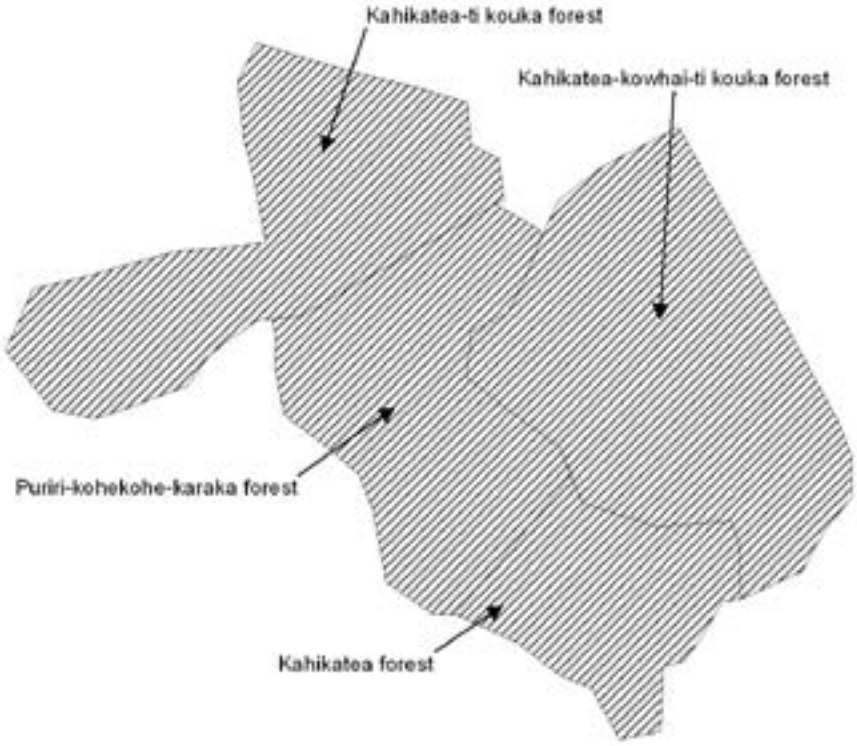
The largest of the forest fragments at Tatarariki. Alluvial forest is a rare vegetation type in this ED and Northland, and its value is enhanced by the presence within it of several different forest associations on different landforms, threatened and regionally significant plant species, and its

P08/068B NRC Creamery Road Reserve Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

proximity to other fenced fragments. Contains 6.1 ha of Acutely Threatened land environment A5.1b. Most of the site (3.7 ha) is already protected by QEII National Trust covenant. Site for three representative ecological units: (a) Kahikatea-ti kouka forest on alluvium, (b) Kahikatea-kowhai-ti kouka forest on alluvium, and (c) Puriri-kohekohe-karaka forest on hillslope.

KIDDS CREAMERY ROAD MIDDLE FOREST

Survey no. P08/068c
Survey date 30 November 2006
Grid reference P08 957 710
Area 0.9 ha
Altitude 15 m asl

Ecological unit

(a) Kahikatea forest on alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Northern Wairoa River.

Vegetation

This QEII covenant comprises young secondary kahikatea forest. It has only recently been fenced but is starting to show signs of recovery, such as an increasing abundance of nikau.

(a) Kahikatea is abundant in the forest canopy with occasional pukatea, taraire, and karaka. The subcanopy contains frequent nikau and occasional mamangi; ti kouka is frequent around the margins. The understorey contains frequent toikiwi and tree privet. In parts of the forest, areas of kahikatea treeland occur with pasture beneath.

Significant flora

None noted.

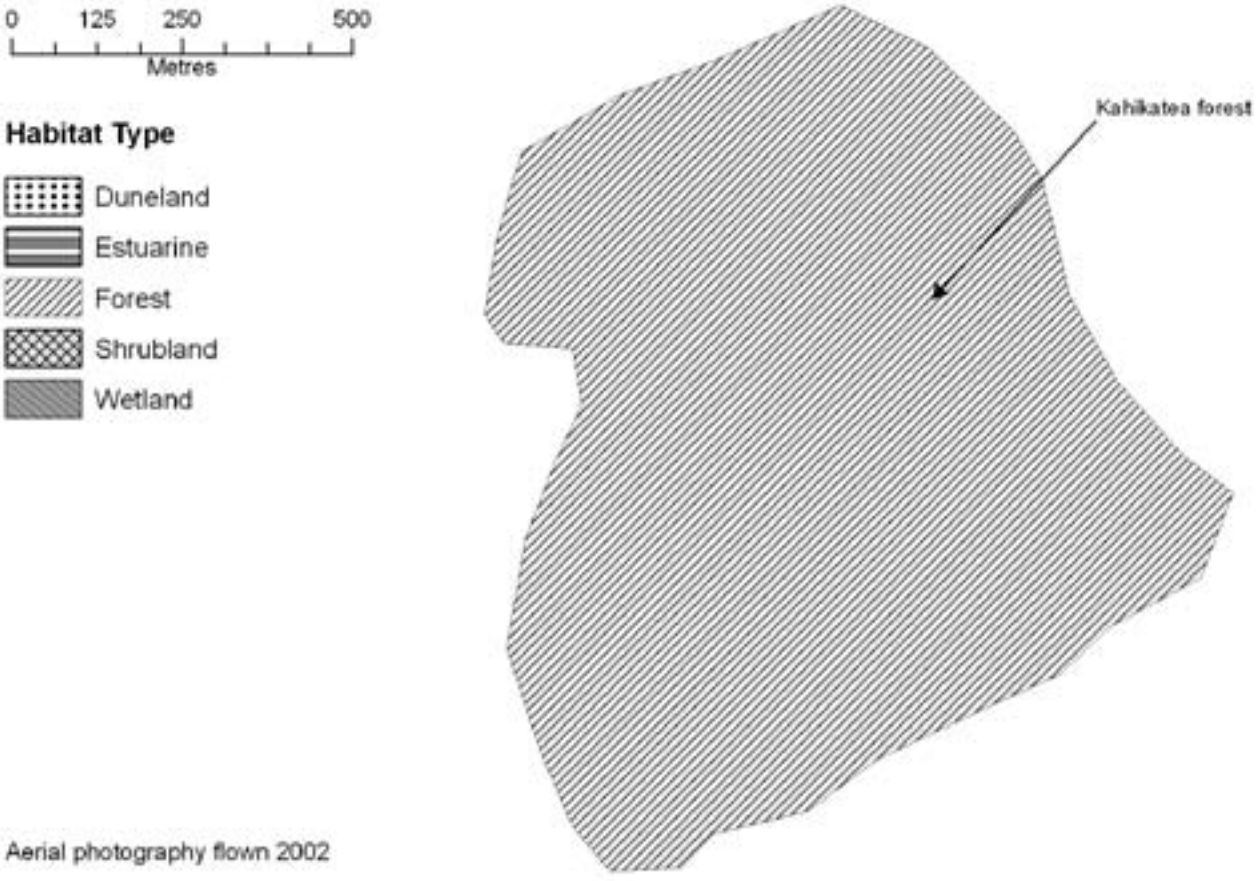
Fauna

New Zealand pigeon (Gradual Decline), white-faced heron, shining cuckoo, New Zealand kingfisher, grey warbler, North Island fantail, silvereye (SSBI P08/H028, 1992, 1993).

Significance

Alluvial forest is an uncommon habitat type in Northland, and the presence of a substantially larger example of the same vegetation type on the same property enhances the value of this small site. This site is a Nationally Important site for Kaipara Soils (Kenny & Hayward 1996). Contains 0.9 ha of Acutely Threatened land environment A5.1b. A small proportion of the site (0.2 ha) is already protected under QEII National Trust covenant.

P08/068C Kidds Creamery Road Middle Forest



Aerial photography flown 2002

WESTERN COAST D: GLINKS GULLY SOUTH GRASSLAND, WETLAND AND SHRUBLAND

Survey no.	P08/072
Survey date	18 December 2006
Grid reference	P08 various, including PO8 992 506
Area	1000 ha
Altitude	0–140 m asl

Ecological units

(a) Sandfield on unconsolidated foredunes (20%)

(b) Pohuehue vineland on semi-consolidated rear dunes (52%)

(c) Raupo reedland in dune slacks (6%)

(d) Manuka shrubland and shrub grassland on coastal faces (22%)

Landform/geology

Coastal cliffs and canyons eroded in mid-late Pleistocene (Karioitahi Group) consolidated dune sand, with overlying unconsolidated Holocene parabolic dunes; on seaward side coastal cliffs bounded by Holocene unconsolidated transverse and parabolic dunes, and associated interdune wetlands, and beach sand.

Vegetation

This extensive site comprises the long stretch of coastline between Glinks Gully and the Pouto dune system, and forms the southern part of what is known locally as Ripiro Beach. There is a narrow, fragmentary band of unconsolidated dunes on the seaward side, a broad band of semi-consolidated dunes behind them, and occasional freshwater wetlands where streams reach the coast and in the south. The site appears to be largely accessible to grazing by stock from farms behind and has been widely degraded by weed invasion.

(a) Unconsolidated dunes support frequent spinifex and occasional tauhinu.

(b) Pohuehue vineland covers an extensive band of semi-consolidated rear dunes. Knobby clubrush is common; adventive iceplant and kikuyu are frequent, while tauhinu, tree lupin, coastal toetoe, pampas, sand wind grass, and quaking grass occur occasionally. Where pohuehue is locally absent, knobby clubrush and tauhinu are dominant.

(c) Freshwater wetlands are dominated by raupo, with frequent giant umbrella sedge, *Baumea articulata*, swamp millet, native willow weed, harakeke, kuta, Eleocharis sphacelata, and pampas, and occasional oioi, ti kouka, *Centella uniflora*, *Eleocharis acut*a, *Carex maorica*, and water primrose.

(d) In places on coastal cliff faces occur patches of abundant manuka with common open pockets of pasture, frequent pampas, pohuehue and harakeke, and occasional giant umbrella sedge, and knobby clubrush.

Significant flora

None noted.

Fauna

Australasian bittern (Nationally Endangered) (SSBI P08/H029, 1993). Wrybill (Nationally Vulnerable) (Robertson et al. 2007). Caspian tern (Nationally Vulnerable) (this survey). Northern little blue penguin (Gradual Decline), red-billed gull (Gradual Decline), white-fronted tern (Gradual Decline) (SSBI P08/H029, 1993). New Zealand dabchick (Sparse), black shag (Sparse), little black shag (Sparse) (this survey). Variable oystercatcher (Regionally Significant), Australasian pied stilt, black-backed gull, New Zealand kingfisher, paradise shelduck (SSBI P08/H029, 1993). Australasian gannet (Robertson et al. 2007). New Zealand pipit, Australasian harrier. Notoreas sp. 'northern' (Nationally Endangered), recorded in 2000 (B. Patrick, pers. comm.), black katipo (Serious Decline) (A. Booth, DOC, pers. comm.). New Zealand fur seals (Regionally Significant) regularly haul out at this site (R. Parrish, pers. comm.).

Significance

Although widely degraded by grazing and weed invasion, this huge site with its diverse array of contiguous plant communities represents part of the only semi-consolidated dune system in the ED still predominantly under native vegetation (the other is the contiguous northern portion of the Pouto dune system P09/001). It supports a range of threatened and regionally significant species. Contains 758.4 ha of At Risk G1.1c. About one-quarter of the site is already protected in Wainui Lake Conservation Area (15.1 ha), Tikinui Conservation Area (104.2 ha), Pouto North Marginal Strip (16.5 ha), and Pouto North Conservation Area (118.1 ha), administered by DOC. Site for two representative ecological units: (a) Sandfield on unconsolidated foredunes, and (b) Pohuehue vineland on semi-consolidated rear dunes.

MAPAU BUSH

Survey no.	P08/094a
Survey date	1 December 2006
Grid reference	P08 052 608
Area	6.3 ha
Altitude	10–15 m asl

Ecological unit

(a) Kahikatea forest on alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Northern Wairoa River.

Vegetation

An isolated, fully fenced pocket of kahikatea forest on the eastern side of the Northern Wairoa River. Some older kahikatea trees are present in the canopy.

(a) Kahikatea is the dominant canopy species with occasional totara, mahoe, karaka, and ti kouka. A well-developed subcanopy contains abundant kohekohe with frequent nikau, karaka, ti kouka, and karo. *Muehlenbeckia australis* covers short trees on the forest edge. Some pampas and Chinese privet occur around the edges.

Significant flora

None noted.

Fauna

None noted.

Significance

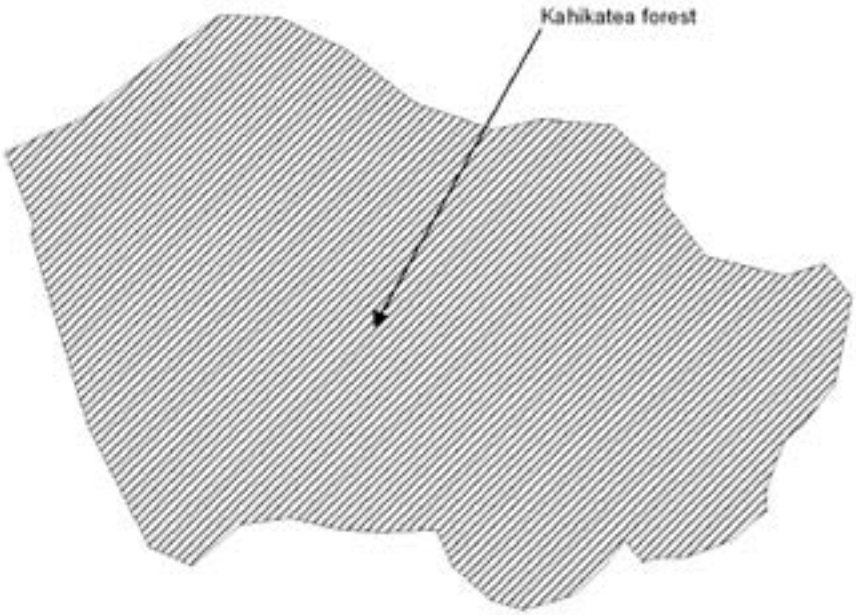
Although isolated, this fragment is as large as any of its kind in the ED and one of the few remaining stands of kahikatea forest on the Ruawai Plains. Contains 6.3 ha of Acutely Threatened land environment A5.1b. The single ecological unit, (a) Kahikatea forest on alluvium, is representative.

P08/094a Mapau Bush

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

RUSSELL WETLAND

Survey no.	P08/096
Survey date	17 December 2006
Grid reference	P08 017 539
Area	8 ha
Altitude	55–60 m asl

Ecological unit

(a) Manuka-pampas shrub grassland on peat (100%)

Landform/geology

Gully head eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies, with Holocene swamp and alluvial deposits on valley floor.

Vegetation

This site comprises a side valley wetland that has been deeply drained but still has a significant peat layer (over 2 m deep) remaining. Manuka was recently sprayed in one section of the wetland. The site would be easy to restore by blocking drains and fencing to prevent stock grazing. Current botanical value is low but has the potential for restoration (also possible fernbird habitat). The owner is a keen conservationist and may be interested in protection.

(a) Wetland vegetation consists of abundant sweet vernal, frequent pampas and manuka, and occasional ti kouka, tarweed, soft rush, *Isolepis distigmatosa*, tangle fern, *Juncus planifolius*, *Microtis unifolia*, *Lobelia anceps*, raupo, Yorkshire fog, forked sundew, *Thelymitra* species and sphagnum.

Significant flora

Forked sundew (Regionally Significant), recorded during this survey.

Fauna

None noted.

Significance

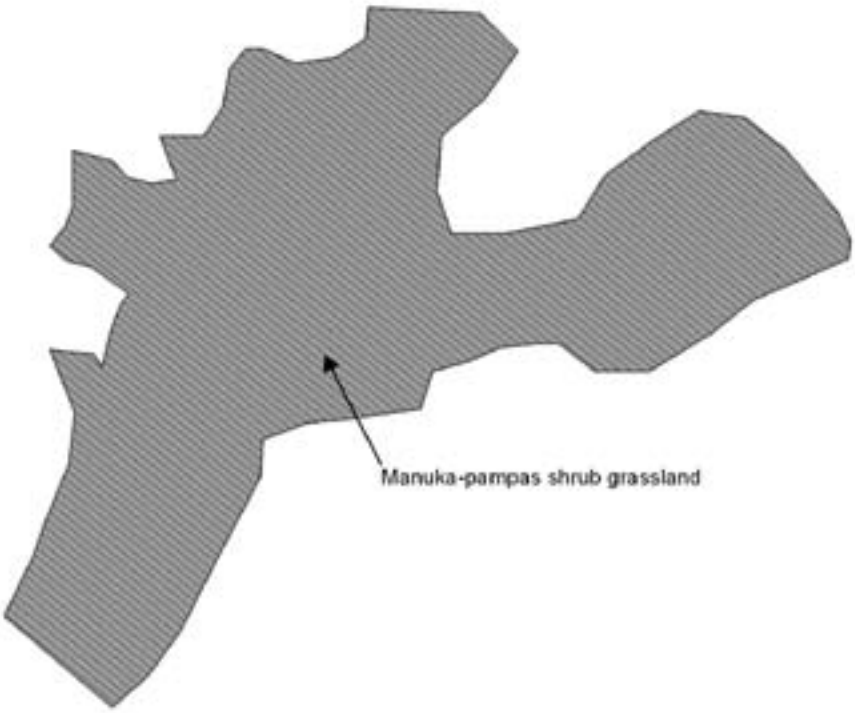
Lowland peat wetlands are a threatened habitat type in Northland and elsewhere in New Zealand, and this is the only example encountered in the ED. Although this substantial site been drained and extensively invaded by weeds, it has potential for restoration. Potential habitat for the threatened North Island fernbird. Contains 7.2 ha of Acutely Threatened land environment A5.1b and 1 ha of At Risk environment A6.1b.

P08/096 Russell Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

TANGITIKI ESTUARY, WETLAND AND SHRUBLAND

Survey no.	P08/101
Survey date	17 December 2006
Grid reference	P08 074 511
Area	166 ha
Altitude	0–40 m asl

Ecological units

(a) Mangrove shrubland on estuarine alluvium (53%)

(b) Manuka shrubland on alluvium (11%)

(c) Oioi rushland on estuarine alluvium (4%)

(d) Open water in estuary (32%)

Landform/geology

Holocene estuarine and swamp deposits, and intertidal flats.

Vegetation

Tangitiki Estuary contains a complete sequence from mangrove saltmarsh to oioi sedgeland to a freshwater wetland dominated by manuka with occasional pockets of raupo. The site is fenced.

(a) Mangrove shrubland consists of abundant mangrove (up to 2 m tall) and open mudflat, with occasional sea rush, sea primrose, shore tussock, glasswort, remuremu, *Isolepis cernua* and saltmarsh ribbonwood.

(b) Manuka wetland consists of abundant manuka (up to 3 m tall), frequent *Baumea rubiginosa*, pampas and raupo and occasional harakeke.

(c) Oioi rushland consists of abundant oioi.

(d) Open water in estuary.

Significant flora

None noted.

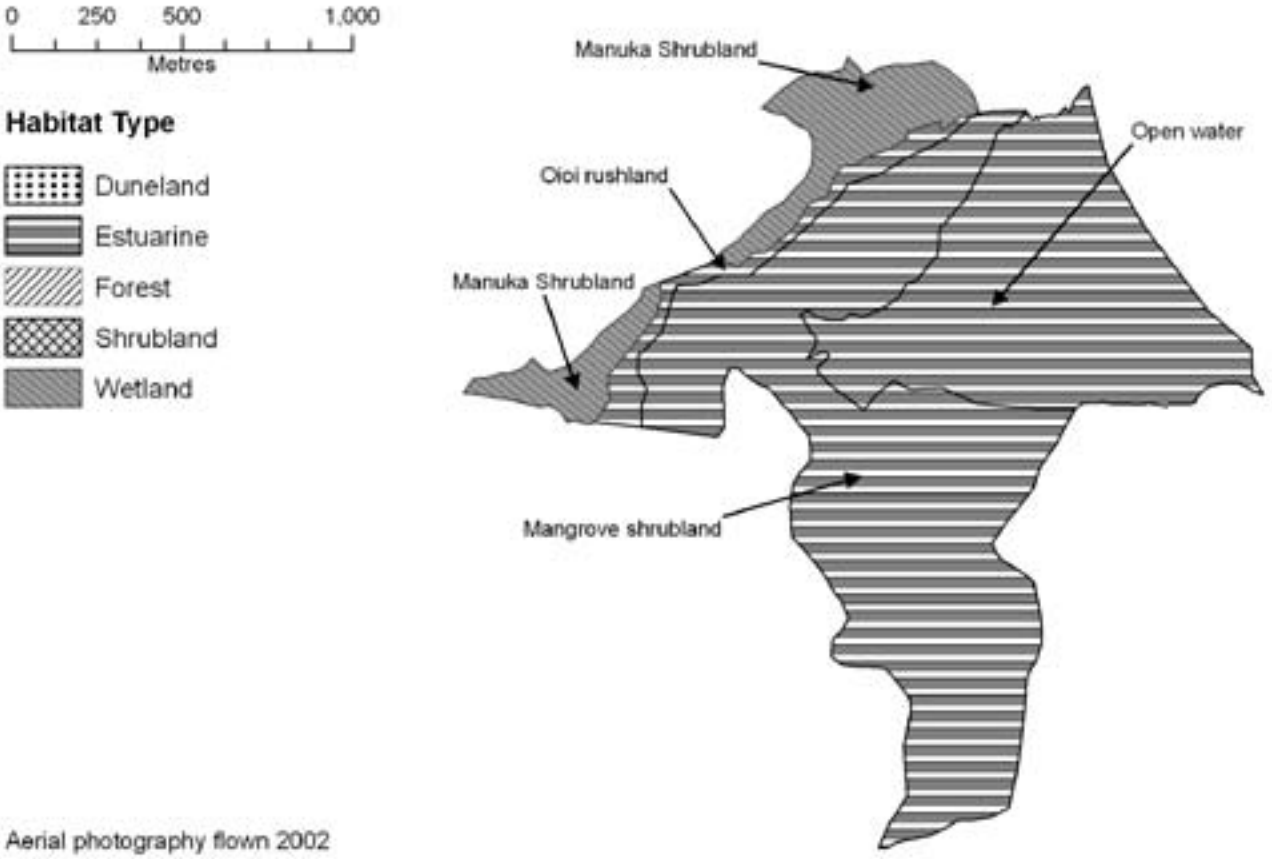
Fauna

Black mudfish (Gradual Decline) (DOC survey 2001). Australasian bittern (Nationally Endangered), red-billed gull (Gradual Decline), North Island fernbird (Sparse), banded rail (Sparse), little shag (Sparse), grey warbler, silvereye, North Island fantail, New Zealand kingfisher, Australasian harrier, white-faced heron, black-backed gull, Australasian pied stilt, bar-tailed godwit (SSBI P08/H020, 1989). Pied shag (OSNZ CSN 1961).

Significance

Despite former partial drainage of the upper reaches, this large site is still in moderately good condition. One of only two records of black mudfish in the ED. Contains 25.1 ha of Acutely Threatened land environ-

P08/101 Tangitiki Estuary, Wetland and Shrubland



Aerial photography flown 2002

ment A5.1b and 6 ha of At Risk environment A6.1b. Nearly one-third of the site is already protected in Tangitiki Bay Marginal Strip No 1 (2.8 ha), Tangitiki Bay Marginal Strip No 2 (0.05 ha), and Tangitiki Conservation Area (47.3 ha), administered by DOC. Site for two representative ecological units: (a) Mangrove shrubland on estuarine alluvium, and (b) Manuka shrubland on alluvium

KAIPARA HARBOUR, SHRUBLAND AND RUSHLAND

Survey no.	P08/200
Survey dates	30 November 2006, 17 December 2006
Grid references	P08 082 594 (Montgomery Reserve), P08 985 636 (Tikinui), P08 030 578 (Otara Point), P08 063 552 (Clarks Bay)
Area	11 480 ha
Altitude	0–20 m asl

Ecological units

(a) Mangrove shrubland on estuarine alluvium (4%)

(b) Oioi rushland on estuarine alluvium (1%)

(c) Open water (95%)

Landform/geology

Holocene estuarine deposits, muddy and sandy intertidal sediments, and harbour channels.

Vegetation

The site comprises several extensive tracts of

(a) mangrove shrubland up to 5 m high in places. The largest by far is Montgomery Reserve, south of the Ruawai Plains on the true left of the Northern Wairoa River. Smaller tracts occur on the true right of the Northern Wairoa River at Tikinui and Otara Point. A variety of native and adventive saltmarsh plants including oioi, sea primrose, and saltwater paspalum, and locally alligator weed, are present in the ground layer.

(b) Saltmarshes mostly dominated by oioi occur locally on the inland side. A range of characteristic saltmarsh species, including saltmarsh ribbonwood, sea rush and sea primrose, is present.

(c) Open water.

Significant flora

None noted.

Fauna

Tikinui: White heron (Nationally Critical) (OSNZ CSN 1973). Australasian bittern (Nationally Endangered: OSNZ CSN 1986). Yellow-bellied sea snake (Vagrant) recorded live in 1991 (DOC Bioweb).

Otara Point: White-fronted tern (Gradual Decline), North Island fernbird (Sparse) (this survey). Australasian harrier, white-faced heron, Australasian pied stilt (SSBI Q08/H047*6, 1989). New Zealand kingfisher, grey warbler, black-backed gull.

Clarks Bay: Caspian tern (Nationally Vulnerable), red-billed gull (Gradual Decline), New Zealand kingfisher, Australasian harrier, white-faced heron, black-backed gull, Australasian pied stilt, South Island pied oystercatcher (SSBI Q08/H047*8, 1989).

General: Banded dotterel (Gradual Decline), banded rail (Sparse), bar-tailed godwit, lesser knot, Pacific golden plover, and cattle egret have recently been recorded at this site (Robertson et al. 2007).

Significance

This site comprises part of the largest harbour in New Zealand and the Southern Hemisphere, a site of national and international importance for birdlife, especially migratory birds that arrive each year to feed and roost. It also contains far and away the largest tracts of mangrove shrubland in the ED. Contains 66.8 ha of Acutely Threatened land environment A5.1b, 3.6 ha of Chronically Threatened environments A5.2a and A6.1d, and 87 ha of At Risk environments A4.1a and A6.1b. Some 170 ha of the site is already protected: Ruawai Conservation Area (7 ha), Wairoa River Marginal Strip No 6 (< 0.1 ha), Wairoa River Marginal Strip No 7 (10.1 ha), Wairoa River Marginal Strip No 8 (12.9 ha), Wairoa River Marginal Strip No 9 (2.6 ha), Wairoa River Marginal Strip No 10 (0.4 ha), Koremoa Marginal Strip (0.1 ha), Tangitiki Bay Marginal Strip No 1 (0.05 ha), Tauhara Creek Marginal Strip (0.7 ha), Kohatutahi Marginal Strip (2.6 ha), Matanginui Conservation Area (3.6 ha), and Whakatu Conservation Area (130.3 ha), all administered by DOC. Site for two representative ecological units: (a) Mangrove shrubland on estuarine alluvium, and (b) Oioi rushland on estuarine alluvium.

CLARKE'S LAKE AND WETLAND

Survey no.	P08/208
Survey date	Not visited during this survey. Information from SSBI P08/H016.
Grid reference	P08 917 649
Area	2.4 ha
Altitude	100 m asl

Ecological units

(a) Open water in dune lake

(b) *Eleocharis sphacelata* reedland on alluvium (both wetland units together comprise 100%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield, ponded at landward edge of Holocene parabolic dunefield.

Vegetation

This old dune lake comprises:

(a) Open water in dune lake

(b) *Eleocharis sphacelata* reedland with occasional ti kouka on alluvium.

Significant flora

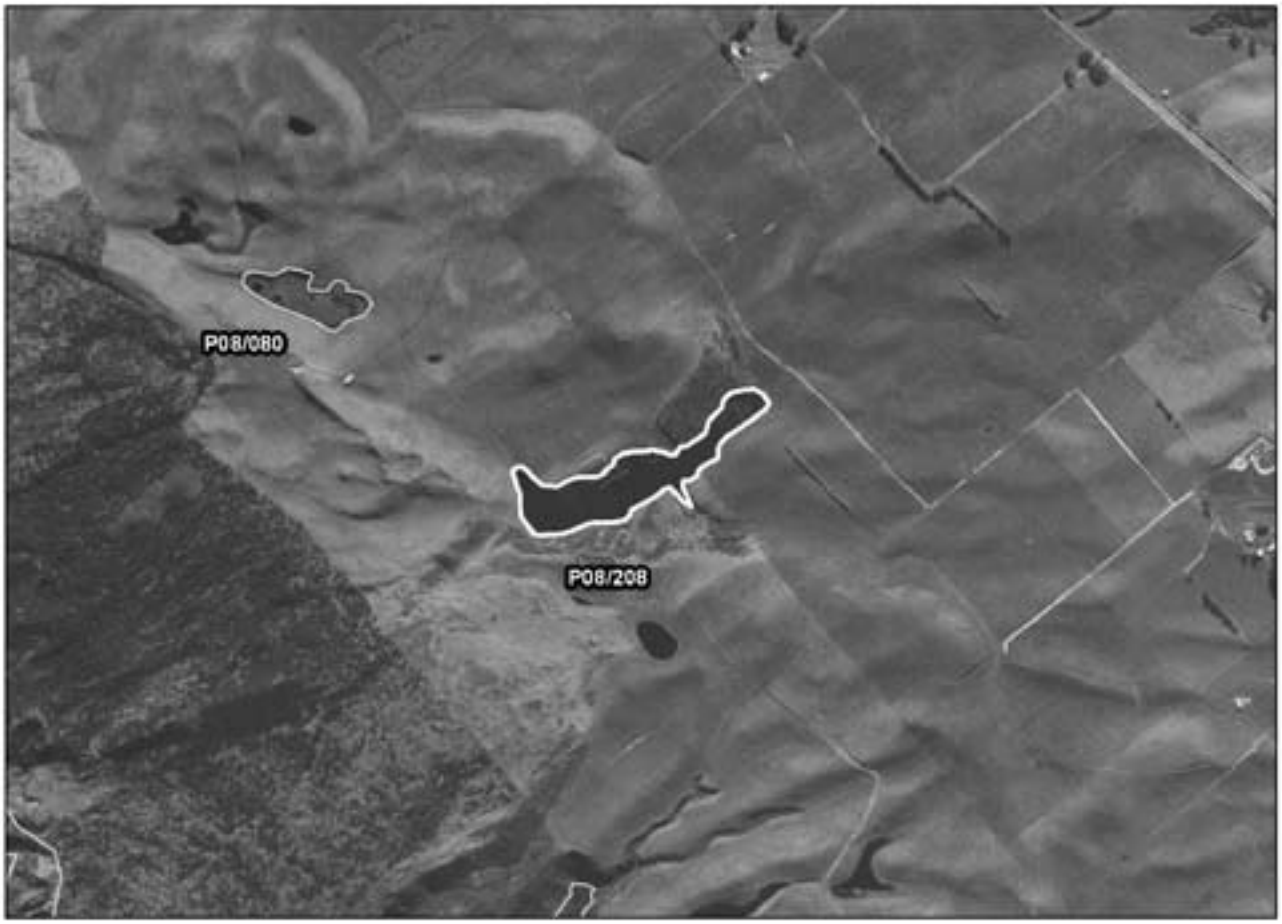
None noted.

Fauna

Australasian bittern (Nationally Endangered), grey duck (Nationally Endangered), black shag (Sparse), little shag (Sparse), New Zealand dabchick (Sparse), Australasian little grebe (Regionally Significant), paradise shelduck, Australasian harrier, pukeko, Australasian shoveler (Regionally Significant), New Zealand kingfisher, Pacific swallow (SSBI P08/H016, 1989).

Significance

Although completely grazed by domestic stock, this site was described in 1989 (SSBI P08/H016) as having good potential for restoration by riparian planting, and threatened and regionally significant birds have been recorded in a past survey. A small proportion of it (0.1 ha) is already protected in Lucich Road Marginal Strip, administered by DOC.

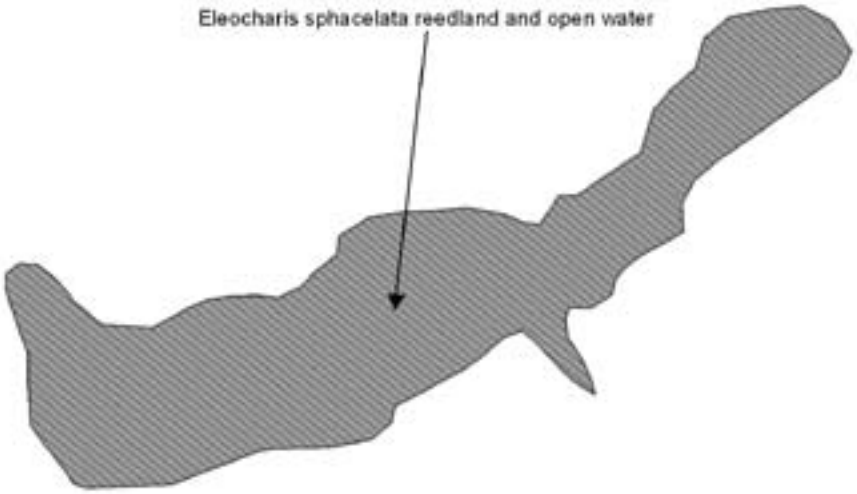


P08/208 Clarke's Lake and Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

GREVILLE'S LAGOON AND WETLAND

Survey no.	P08/209
Survey date	Not visited during this survey. Information from Wells et al. (2007).
Grid reference	P08 847 736
Area	2.5 ha
Altitude	40 m asl

Ecological units

(a) Raupo reedland on alluvium (22%)

(b) Open water in dune lake (78%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield, ponded at landward edge of Holocene parabolic dunefield.

Vegetation

(a) A lacustrine fringe of raupo reedland with occasional kuta completely encircles the lake. Alligator weed forms a floating mat amongst the raupo at the western end.

(b) Open water in dune lake.

Significant flora

None noted.

Fauna

Australasian bittern (Nationally Endangered), grey duck (Nationally Endangered), New Zealand dabchick (Sparse) (SSBI P08/H006, 1989). Black shag (Sparse), little black shag (Sparse), little shag (Sparse) (OSNZ surveys 1977–1994). Australasian harrier, black-backed gull, Australasian shoveler (Regionally Significant), New Zealand kingfisher, Pacific swallow (SSBI P08/H006, 1989). Pied shag, white-faced heron, paradise shelduck, pukeko, New Zealand kingfisher (OSNZ surveys 1977–1994).

Significance

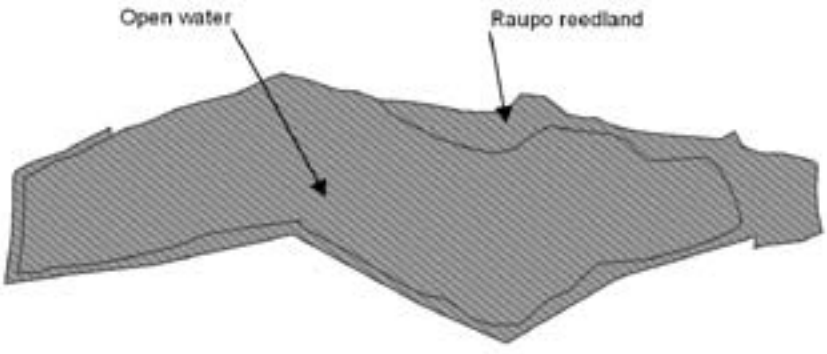
Ranked Moderate by Wells et al. (2007) because it is fully fenced and its submerged vegetation is native. The emergent zone, however, is affected by the pest plant, alligator weed. Restoration planting has been undertaken on the seaward side. Threatened species have been recorded in past surveys. Contains 1.1 ha of At Risk land environment G1.1c.

P08/209 Greville's Lagoon and Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

LAKE KAPOAI AND WETLAND

Survey no.	P08/210
Survey date	Not visited during this survey. Information from Wells et al. (2007).
Grid reference	P08 856 726
Area	3.6 ha
Altitude	40 m asl

Ecological units

(a) Kuta-*Eleocharis sphacelata* reedland on alluvium

(b) Open water in dune lake (both units together comprise 100%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield, ponded at landward edge of Holocene parabolic dunefield.

Vegetation

(a) A lacustrine fringe of kuta and *Eleocharis sphacelata* is re-establishing.

(b) Open water in dune lake.

Significant flora

Fimbristylis velata (Sparse), *Centipeda aotearoana*, *Callitriche petrei* ssp. *petrei*, *Alternanthera* aff. *sessilis*, all Regionally Significant (Wells et al. 2007).

Fauna

Shortfin eel, common bully (NIWA 2007). Grey duck (Nationally Endangered) (OSNZ surveys 1977–1994). New Zealand dabchick (Sparse) (SSBI P08/H07, 1989). Black shag (Sparse), little black shag (Sparse), little shag (Sparse), New Zealand scaup (Regionally Significant), pied shag, white-faced heron, paradise shelduck, Australasian harrier, pukeko, New Zealand kingfisher, Pacific swallow (OSNZ surveys 1977–1994). Black shag were also recorded in 2005 and grey duck in 2007 (Wells et al. 2007).

Significance

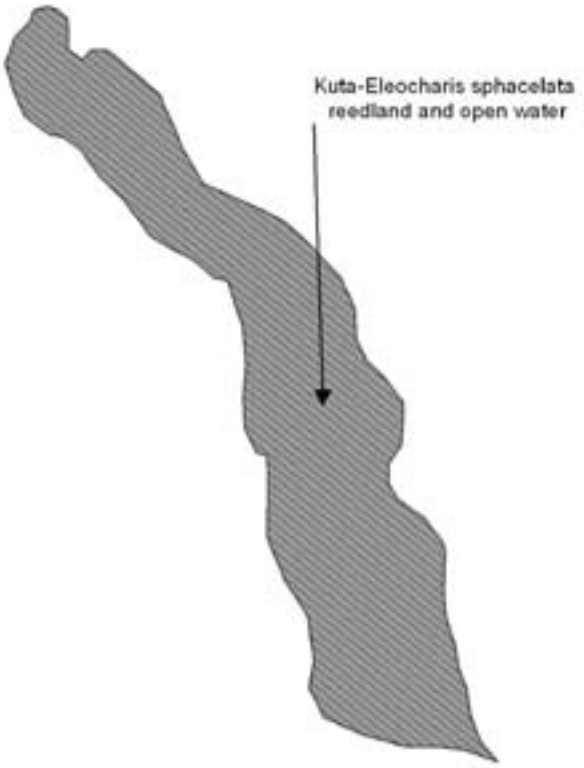
Ranked Low-Moderate by Wells et al. (2007) because of the absence of submerged and sparse marginal vegetation. Threatened and regionally significant species are present, as well as pest fish species (rudd: Wells et al. 2007). Re-establishment of lacustrine vegetation is occurring after recent almost complete riparian fencing. Contains 2.4 ha of At Risk land environment G1.1c.

P08/210 Lake Kapoai and Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

LAKE WAINUI AND WETLAND

Survey no.	P08/211
Survey date	Not visited during this survey. Information from Wells et al. (2007).
Grid reference	P08 892 682
Area	4.8 ha
Altitude	95 m asl

Ecological units

(a) Kuta reedland on alluvium

(b) Open water in dune lake (both units together comprise 100%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield, ponded at the landward edge of Holocene parabolic dunefield.

Vegetation

There is

(a) a narrow lacustrine fringe on about three-quarters of the shoreline dominated by kuta, with some *Baumea articulata*, *Eleocharis sphacelata*, and *E. acuta*.

(b) Open water.

Significant flora

Fimbristylis velata (Sparse) was recorded in 2007 in lakeside turf (Wells at al. 2007).

Fauna

Grey duck (Nationally Endangered) (SSBI P08/H015, 1989). Australasian bittern (Nationally Endangered), New Zealand dabchick (Sparse) (Wells et al. 2007). Little shag (Sparse) (SSBI P08/H015, 1989). Little black shag (Sparse), Australasian little grebe (Regionally Significant) (OSNZ surveys 1977–1994). New Zealand scaup (Regionally Significant), paradise shelduck (Wells et al. 2007). Grey warbler, silvereye, Pacific swallow, pied shag, black-backed gull (SSBI P08/H015, 1989). White-faced heron, Australasian harrier, pukeko, New Zealand kingfisher (OSNZ surveys 1977–1994).

Significance

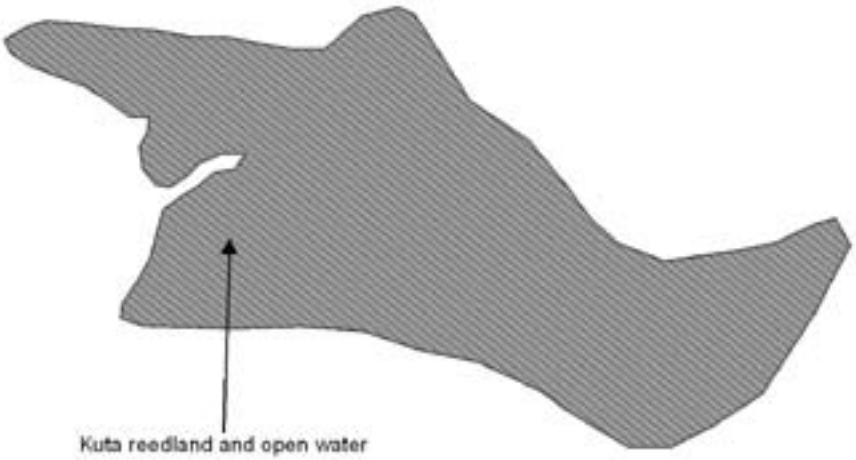
Ranked Moderate-High by Wells et al. (2007), this site supports threatened and regionally significant species. Degraded by domestic stock grazing, and an aggressive weed, water primrose, has recently been reported (Wells et al. 2007). Contains 1.6 ha of At Risk G1.1c. The site is already protected as Wainui Lake Conservation Area (15.1 ha), administered by DOC.

P08/211 Lake Wainui and Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

WAIMAMAKU ESTUARY, SHRUBLAND AND RUSHLAND

Survey no.	P08/213
Survey date	Not visited during this survey. Information from Wells et al. (2007).
Grid reference	P08 064 534
Area	102 ha
Altitude	0–30 m asl

Ecological units

(a) Mangrove shrubland on estuarine alluvium (67%)

(b) Sea rush rushland on estuarine alluvium (8%)

(c) Manuka shrubland on alluvium (25%)

Landform/geology

Holocene alluvial, swamp and estuarine deposits in valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies. Also Holocene estuarine and beach sand deposits.

Vegetation

This site supports estuarine vegetation typical of the Pouto Peninsula:

(a) Mangrove shrubland with some glasswort grading in places into

(b) Sea rush rushland with some oioi, which in turn grades into

(c) Manuka shrubland containing frequent *Baumea juncea* and *B. rubiginosa*, and occasional *B. articulata* and raupo; a variant degraded by weed (pampas) invasion occurs further inland.

Significant flora

None noted.

Fauna

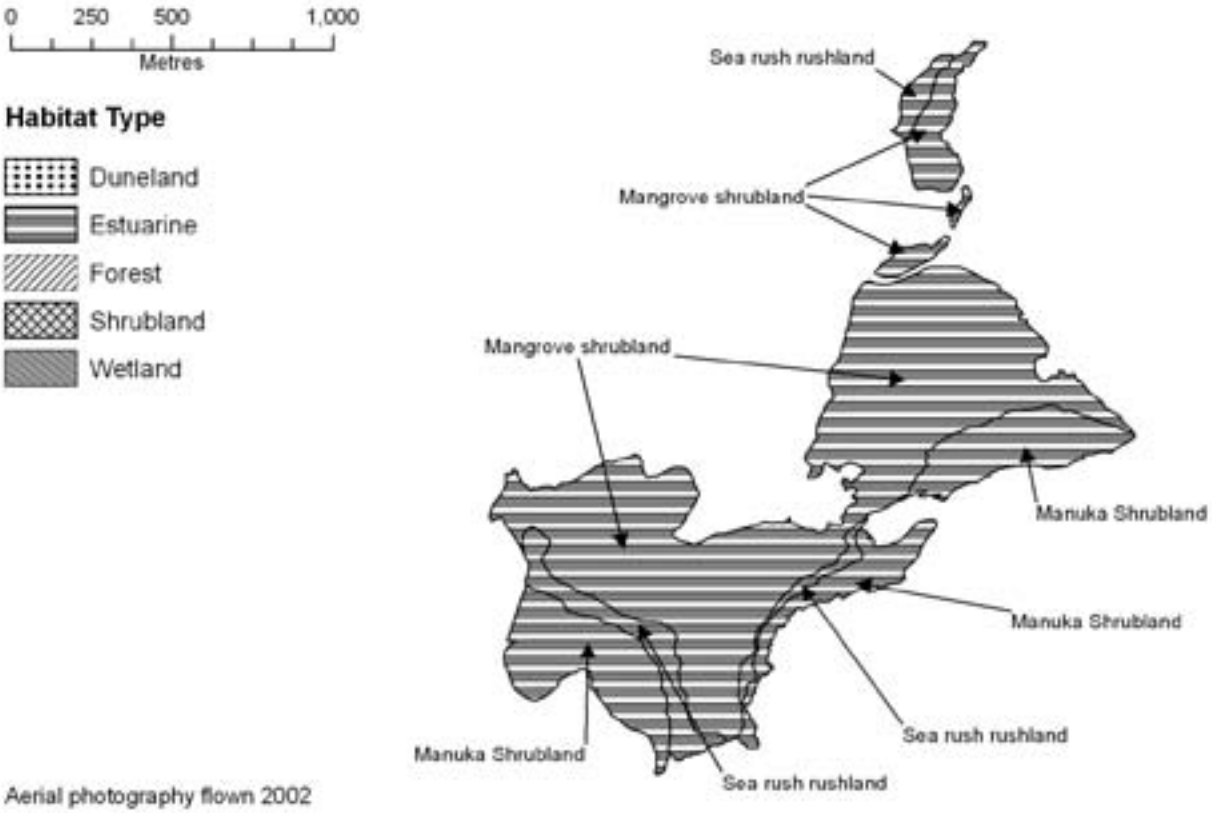
Caspian tern (Nationally Vulnerable), red-billed gull (Gradual Decline), black shag (Sparse), spotless crake (Sparse), banded rail (Sparse), North Island fernbird (Sparse) grey warbler, silvereye, North Island fantail, New Zealand kingfisher, Pacific swallow, white-faced heron, pukeko, pied shag (rookery present in 1989), little shag, paradise shelduck, black-backed gull, Australasian pied stilt, South Island pied oystercatcher, bar-tailed godwit (SSBI Q08/H047*9, 1989).

Significance

This substantial site which supports threatened species is mostly Crown land administered by Landcorp. The northernmost of the Kaipara Harbour estuaries in the ED, it comprises the lower reaches of Mosquito Gully Wetland (P08/099), from which it has now been separated by drainage and land development. It has been degraded by stock grazing and weed invasion. Contains 24.7 ha of Acutely Threatened land environments A5.1b and 7.5 ha of At Risk environment A6.1b. A very small proportion

of it is already protected in Tomb Point Marginal Strip (4.2 ha), Tomb Point Conservation Area (2.4 ha), and Tangitiki Bay Marginal Strip No 1 (1 ha), administered by DOC.

P08/213 Waimamaku Estuary, Shrubland and Rushland



Aerial photography flown 2002

WESTERN COAST E: POUTO DUNE SYSTEM

Survey no.	P09/001
Survey dates	27–29 January 2007
Grid references	P09 various
Area	5798 ha
Altitude	5–150 m asl

Ecological units

Summary:

(a) Sandfield on foredunes (41%)

(b) Kanuka shrub duneland, including

(c) Oioi rushland in dune slacks, on rear dunes (both units together comprise 31%)

(d) Kanuka shrubland on rear dunes (13%)

(e) Mixed freshwater wetland (including raupo reedland) on alluvium (8%)

(f) Pohuehue vineland on rear dunes (1%)

(g) Kanuka forest on inland hillslope (3%)

(h) Open water in dune lakes (3%)

By site visit:

Northern end vineland (P09 985 516)

(a) Pohuehue vineland on rear dunes

Roundhill wetlands (P09 019 461)

(a) Raupo reedland on alluvium

Lake Oteone wetland and shrubland (P09 027 450)

(a) Raupo reedland on alluvium

(b) *Baumea*-raupo sedge-reedland on alluvium

(c) Kanuka shrubland on hillslope

Lake Karaka North shrubland and forest (P09 034 441)

(a) Kanuka forest on hillslope

(b) Kanuka shrubland on rear dunes

Lake Karaka wetland and shrubland (P09 043 422)

(a) *Baumea articulata-Carex sect*a-raupo reedland in dune slack

(b) Manuka-*Baumea* juncea shrub-sedgeland (P09 039 420) in dune slack

(c) Raupo reedland on alluvium

(d) Oioi rushland in dune slack

(e) Kanuka shrubland in dune slack

Lakes and wetland between Lakes Karaka and Mokeno (P09 046 417)

(a) *Baumea juncea* sedgeland in dune slack

(b) Raupo reedland on alluvium

Lake Mokeno wetland and shrubland (P09 051 390, P09 049 407)

(a) Raupo reedland on alluvium

(b) Kanuka shrubland on hillslope (extension of P09/016)

(c) Pampas grassland on dunes

Lake Whakaneke wetland and shrubland (P09 058 366)

(a) Kanuka forest/shrubland on hillslope

(b) Raupo reedland on alluvium

Southwest Pouto shrubland (P09 050 367)

(a) Kanuka-*Baumea* shrub sedgeland in dune slack

Lake Matthews (Stick Lake) wetland (P09 074 346)

(a) Raupo reedland on alluvium

Lighthouse Road duneland and shrubland (Q09 087 354)

(a) Tree lupin shrubland on dunes

(b) Kanuka shrubland/forest on dunes

Pouto Lighthouse Bush (Q09 106 345)

(a) Kanuka shrubland/forest on dunes and coastal faces.

Landform/geology

Holocene beach sands, transverse and parabolic sand dunes, and inter-dune wetlands; coastal cliffs eroded in mid-late Pleistocene (Karioitahi Group) consolidated dune sand at Kaipara North Head.

Vegetation

This vast dune system stretches from the small un-named lakes in the north to Pouto Lighthouse at North Kaipara Head in the south. It is bordered by plantation and pasture in the east and by the Tasman Sea in the west. Between the semi-consolidated rear dunes to the west and the largely afforested older consolidated dunes to the east lies a string of substantial lakes and associated wetlands, the largest of which is Lake Mokeno. In places, vegetation types are contiguous with remnants on the older, more consolidated dunes to the east.

There are seven major plant communities.

(a) Sandfield. Frontal dune vegetation consists of occasional pingao, spinifex, coastal toetoe, tauhinu, and sand sedge. Rear dune vegetation consists of occasional coastal toetoe, pampas, kanuka, tree lupin, spinifex, marram, knobby clubrush, sand coprosma, and tauhinu. Frontal dune vegetation is scattered throughout dunes, whereas vegetation on rear dunes is concentrated in sheltered pockets.

(b) Kanuka shrub duneland comprises extensive areas of open shrubland

on rear dunes, dominated by kanuka. The characteristic species of rear dunes are also present in varying amounts.

(c) Oioi rushland in dune slacks of the semi-consolidated rear dunes consists of abundant to common oioi, frequent manuka and pampas, frequent to occasional *Baumea juncea*, and occasional manuka, tauhinu, knobby clubrush, coastal toetoe, *Eleocharis sphacelata*, arching clubmoss, *B. rubiginosa*, raupo, swamp millet, *E. acuta*, and tree lupin. It was not possible to map oioi rushland separately and is mapped together with the more extensive (b) shrub duneland.

(d) Kanuka shrubland on semi-consolidated rear dunes consists of abundant to common kanuka, common to frequent *Baumea juncea* and pampas, frequent to occasional oioi, manuka, and pohuehue, and occasional thick-leaved coprosma, *Lepidosperma laterale*, hangehange, mingimingi, prickly heath, *Coprosma rhamnoides*, mapau, tree lupin, sand coprosma, korokio, coastal toetoe, and mapau. On damper sites, kanuka is replaced by manuka, with common to occasional *B. juncea* and pampas and occasional oioi, hangehange, mamaku, ponga, and wheki.

(e) Mixed freshwater wetlands, including some seasonally inundated ones, on alluvium. *Lacustrine* fringes are dominated by raupo, with *Baumea articulata*, kuta, and *Eleocharis acuta* common to frequent. The composition of wetlands varies considerably but widespread dominants are raupo, *B. juncea, B. articulata*, *B. rubiginosa*, and kuta. A wide range of native (oioi, *E. sphacelata*, *Carex secta*, pale rush, ti kouka, manuka, *Isolepis prolifer*, *C. geminata*, giant umbrella sedge, native willow weed, *C. virgata*, *E. acuta*, harakeke, marsh fern, *Hypolepis distans*, swamp kiokio, *Carex maorica*, swamp millet, water fern, bracken, ti kouka, *B. arthrophylla*, karamu, mapau, *Thelymitra pulchella*, *Isolepis cernua*, and *Myriophyllum propinquum*) and adventive (pampas, purple umbrella sedge, oval sedge, *Juncus sonderianus*, Mercer grass, Mexican devil, *Polygonum strigosum*, and water purslane) species are present occasionally.

(f) Pohuehue vineland on rear dunes. Common species are knobby clubrush; while tauhinu, tree lupin, coastal toetoe, pampas, sand wind grass, and quaking grass occur occasionally.

(g) Kanuka forest on hillslopes on the inland side consists of abundant kanuka, frequent to occasional *Baumea juncea*, and occasional thick-leaved coprosma, *Lepidosperma laterale*, hangehange, common broom, knobby clubrush, korokio, mingimingi, prickly heath, *Coprosma rhamnoides*, *C. parviflora*, mapau, manuka, fivefinger, harakeke, pampas, karamu, kohuhu, ti kouka, mahoe, pale rush, bracken, and oioi.

(h) Lake Oteone (3 ha of open water)

Lake Karaka (11 ha of open water)

Lake Mokeno (148 ha of open water)

Lake Whakaneke (21 ha of open water)

Lake Matthews (Stick Lake) (40 ha of open water)

Significant flora

Sebaea ovata (Nationally Critical) has recently been translocated to the dunes (Forester & Townsend 2004) but did not survive; the site appears too unstable. The Pouto dune system is the Northland stronghold of marsh fern (Gradual Decline) (including AK 252344) and sand spikesedge (Gradual Decline) (including 2003, AK 284635). Pingao, recorded during this survey, also in Gradual Decline. *Gunnera dentata* (Cameron et al. 2001), G. prorepens (2000, AK 248035), *Myriophyllum votschii* (including AK 252641), *Glossostigma elatinoides* (Lake Mokeno: Wells et al. 2007). Ladies' tresses (2001, AK 252671), *Psilotum nudum* (1996, AK 228957), rohutu (1987, AK 180267), *Hebe diosmifolia* (1987, AK 180253), thick-leaved coprosma, and sand coprosma, both recorded during this survey, are all Regionally Significant.

Fauna

Northern dunes P09 015 467: Northern New Zealand dotterel (Nationally Vulnerable), Caspian tern (Nationally Vulnerable), banded dotterel (Gradual Decline), variable oystercatcher (Regionally Significant), South Island pied oystercatcher, pied shag, black-backed gull.

Roundhill P09 019 461: Australasian bittern (Nationally Endangered), grey duck (Nationally Endangered) (SSBI P09/H001*4, 1977). Wrybill (Nationally Vulnerable: OSNZ CSN 1978). Northern New Zealand dotterel (Nationally Vulnerable) (this survey). New Zealand dabchick (Sparse), black shag (Sparse), little black shag (Sparse) (SSBI P09/H001*4, 1977), North Island fernbird (Sparse) (this survey). Australasian little grebe (Regionally Significant) (OSNZ CSN 1989). New Zealand scaup (Regionally Significant), pied shag, white-faced heron, Australasian harrier, Australasian shoveler (Regionally Significant), Pacific swallow (SSBI P09/H001*4, 1977). Australasian pied stilt (OSNZ survey 1995). Hawksbill sea turtle (Regionally Significant) recorded in 1972 and shore skink in 1991 (DOC Bioweb).

Lake Oteone P09 027 450: New Zealand dabchick (Sparse), black shag (Sparse), North Island fernbird (Sparse), pied shag, New Zealand kingfisher.

North of Lake Karaka P09 034 441: North Island fernbird (Sparse), Australasian harrier, New Zealand kingfisher, North Island fantail. Shore skink found dead in 1985 (DOC Bioweb).

Lake Karaka P09 143 422: Giant kokopu (Gradual Decline), longfin eel (Gradual Decline), shortfin eel, common bully (NIWA 2007). Grey duck (Nationally Endangered), New Zealand dabchick (Sparse), little shag (Sparse), little black shag (Sparse) (SSBI P09/H001*2, 1977). North Island fernbird (Sparse), black shag (Sparse) grey teal (Regionally Significant), New Zealand scaup (Regionally Significant), pied shag, white-faced heron, paradise shelduck, Australasian shoveler (Regionally Significant), Australasian harrier, pukeko, black-backed gull, (OSNZ surveys 1973–1995). Pacific swallow (SSBI P09/H001*2, 1977). This is the only record in Northland of giant kokopu.

Between Lakes Karaka and Mokeno P09 046 417: Australasian bittern (Nationally Endangered), grey duck (Nationally Endangered), New Zealand

dabchick (Sparse), black shag (Sparse), little shag (Sparse), little black shag (Sparse), North Island fernbird (Sparse), spotless crake (Sparse), New Zealand scaup (Regionally Significant), grey teal (Regionally Significant), paradise shelduck, Australasian shoveler (Regionally Significant), pied shag, Australasian harrier, pukeko, spur-winged plover, Pacific swallow, New Zealand kingfisher (OSNZ surveys 1979–1994).

Lake Mokeno P09 051 390, P09 049 407: Freshwater mussel (Gradual Decline) (Wells et al. 2007). Shortfin eel, common bully, inanga (NIWA 2007). Australasian bittern (Nationally Endangered), grey duck (Nationally Endangered) (SSBI P09/H003*3, 1977). Caspian tern (Nationally Vulnerable), white-fronted tern (Gradual Decline) (OSNZ surveys 1973–1994). New Zealand dabchick (Sparse), black shag (Sparse), little shag (Sparse) (SSBI P09/H003*3, 1977). Spotless crake (Sparse) (OSNZ CSN 2000). North Island fernbird (Sparse), little black shag (Sparse) (OSNZ surveys 1973–1994). New Zealand scaup (Regionally Significant), grey teal (Regionally Significant), pied shag, white-faced heron, paradise shelduck, Australasian shoveler (Regionally Significant), Australasian harrier, pukeko, black-backed gull, Pacific swallow (SSBI P09/H003*3, 1977). New Zealand kingfisher, silvereye, Australasian pied stilt, (OSNZ surveys 1973–1994).

Lake Whakaneke P09 058 366: Australasian bittern (Nationally Endangered) (OSNZ CSN 2000). Grey duck (Nationally Endangered), New Zealand dabchick (Sparse), black shag (Sparse), little shag (Sparse), little black shag (Sparse), spotless crake (Sparse), New Zealand scaup (Regionally Significant), pied shag, white-faced heron, paradise shelduck, Australasian shoveler (Regionally Significant), Australasian harrier, pukeko, Australasian pied stilt, Pacific swallow, New Zealand kingfisher (P09/H001*3, 1977) (OSNZ surveys 1981–1994).

Lake Matthews (Stick Lake) P09 074 346: Australasian bittern (Nationally Endangered), grey duck (Nationally Endangered), Caspian tern (Nationally Vulnerable), North Island fernbird (Sparse), New Zealand dabchick (Sparse), black shag (Sparse), little shag (Sparse), little black shag (Sparse), grey teal (Regionally Significant), New Zealand scaup (Regionally Significant), pied shag, white-faced heron, paradise shelduck, Australasian shoveler (Regionally Significant), Australasian harrier, pukeko, Australasian pied stilt, spur-winged plover, black-backed gull, Pacific swallow (OSNZ surveys 1973–1995). Pukeko, Australian bell frog. A feral pig wallow was also noted.

General: Brown teal (Nationally Endangered) were recorded on the Pouto dune system in 1977/1978 and there is one record of marsh crake (Sparse) by Cromarty & Scott (1996). Northern little blue penguin (Gradual Decline), Australasian gannet, Arctic skua, and fluttering shearwater have been recorded recently from the adjacent coastal waters, and black-billed gull (Serious Decline), New Zealand pigeon (Gradual Decline), banded rail (Sparse), tui, and shining cuckoo within the site (Robertson et al. 2007). Black katipo (Serious Decline) have also recently been recorded within the site (A. Booth, DOC, pers. comm.), and Notoreas sp. "Northern" in coastal herbfield in 2000 (B. Patrick, pers. comm.). New Zealand fur seals (Regionally Significant) regularly haul out at this site.

Significance

The Pouto dune system is a very large site of extremely high national and international importance, representing the best remaining example of a large, relatively unmodified sand dune system in the Kaipara ED (Northland). In the wider context, it is the best example in New Zealand of the particular suite of ecosystems that it contains (Cromarty & Scott 1996). It supports an impressive range of threatened plant and animal species, including a nationally and regionally important populations of northern New Zealand dotterel and significant populations of grey duck (R. Parrish, pers. comm.) It is also a geological site of National Importance (Kenny & Hayward 1996). Most of the lakes are currently free of pest fish species and invasive aquatic weeds, a reflection of their relative isolation and effective buffering by wetlands. Karaka was ranked High, Lake Mokeno Outstanding, and Lake Whakaneke High by Wells et al. (2007). However, royal fern has recently established at Lake Mokeno (currently being controlled by DOC), and alligator weed is now locally present (see Q09/054) near Lake Humuhumu (see Q09/054) (Wells et al. 2007).

Although the dune system as a whole is in good condition (the widespread invasion of rear dunes by pampas excepted), two significant threats exist. From Lake Oteone north, domestic stock has access in places from the east, and plant communities on the inland side locally show signs of light to moderate grazing. Open sandfield at the southern end is regularly accessed from Pouto by four-wheel motorcycles. Contains 5265.1 ha of At Risk land environment G1.1c. Just over two-thirds of the site is already protected in Pouto Conservation Area (2985.3 ha), Pouto North Conservation Area (943.7 ha), Pouto North Marginal Strip (18.8 ha), Pukekura Historic Area (1.4 ha), and Kaipara North Head Lighthouse Historic Reserve (7.8 ha), all administered by DOC. All ecological units are representative.

KELLY'S BAY/PUNAHAERE CREEK ESTUARY, SHRUBLAND AND FOREST

Survey no.	P09/003
Survey date	23 January 2007
Grid reference	P09 502 090
Area	500 ha
Altitude	0–90 m asl

Ecological units

(a) Kanuka forest on hillslope and ridge crest (52%)

(b) Oioi-*Baumea juncea* rushland on estuarine alluvium (16%)

(c) Mangrove shrubland on estuarine alluvium (11%)

(d) Manuka shrubland on colluvium (4%)

(e) Manuka shrubland on alluvium (8%)

(f) Open water (9%)

Landform/geology

Hillslopes eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies, with Holocene intertidal, estuarine, alluvial and swamp deposits in valleys.

Vegetation

This site comprises

(a) substantial tracts of secondary kanuka forest occupy hillslopes on the northern, western, and southern sides of Kelly's Bay and the northern and western sides of Punahaere Creek estuary. The only presence of towai on the peninsula was noted on seaward faces at the southern end of Kelly's Bay. There has been some woody weed invasion (pines, prickly hakea, pampas) on the fringes of kanuka forest tracts, but much of it is remarkably intact.

(b) Small areas of oioi-Baumea juncea rush sedgeland occur at Kelly's Bay and in Punahaere Creek estuary.

(c) There is a substantial tract of mangrove shrubland in Punahaere Creek estuary, now partly bisected by Kelly's Bay Road.

(d) Narrow fringing strips of manuka shrubland occur on footslopes at Punahaere Creek estuary.

(e) The upper reaches and heads of valleys at Punahaere Creek estuary are occupied by fingers of freshwater manuka shrub wetlands of very variable composition, reflecting wetness and degree of salinity.

(f) Open water.

Significant flora

Marsh fern (Gradual Decline) was recorded (SSBI Q08/H047*4) in 1985.

Fauna

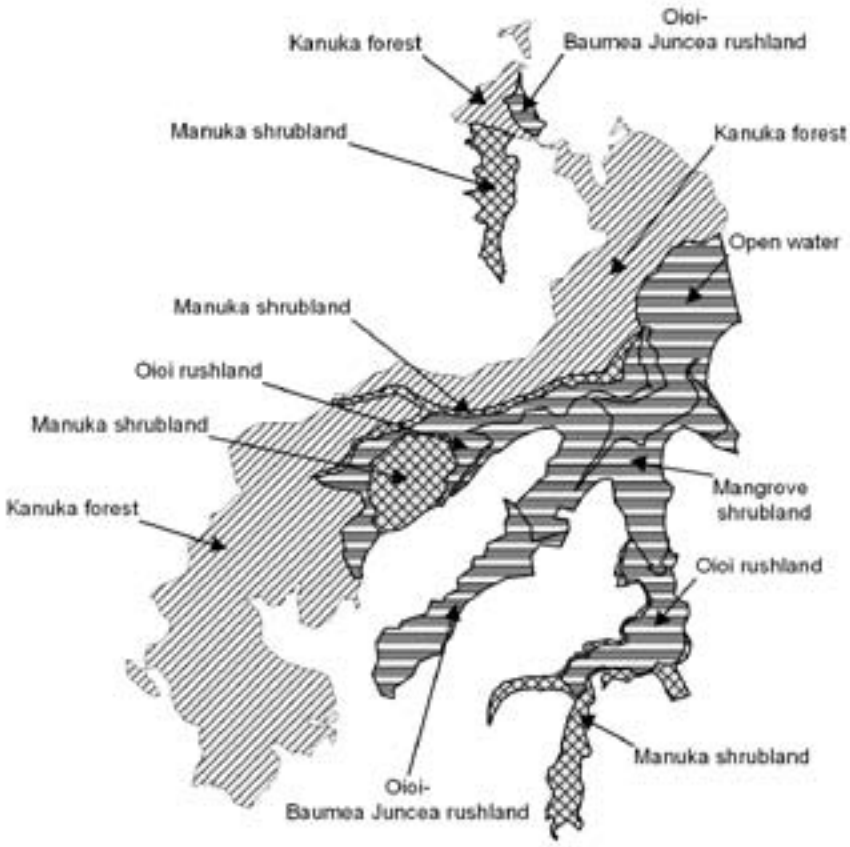
Kelly's Bay: Australasian bittern (Nationally Endangered), northern

P09/003 Kelly's Bay/Punahaere Creek Estuary, Shrubland and Forest

0 250 500 1,000 1,500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

New Zealand dotterel (Nationally Vulnerable), Caspian tern (Nationally Vulnerable), banded dotterel (Gradual Decline), white-fronted tern (Gradual Decline), red-billed gull (Gradual Decline), North Island fernbird (Sparse) (SSBI Q08/H047*5 1977, 1989). Variable oystercatcher (Regionally Significant). Australasian harrier, Australasian pied stilt, South Island pied oystercatcher, black-backed gull, bar-tailed godwit, lesser knot, New Zealand kingfisher, silvereye, grey warbler (SSBI Q08/H047*5 1977, 1989). Pacific swallow, shining cuckoo, tui, North Island fantail.

Punahaere Creek: Australasian bittern (Nationally Endangered), Caspian tern (Nationally Vulnerable), red-billed gull (Gradual Decline), North Island fernbird (Sparse), banded rail (Sparse). Grey warbler, silvereye, North Island fantail, Australasian harrier, New Zealand kingfisher, Pacific swallow, New Zealand pipit, white-faced heron, pukeko, pied shag, black-backed gull, Australasian pied stilt, South Island pied oystercatcher, bar-tailed godwit (SSBIs P09/H005, Q08/H047*4, 1985). Auckland green gecko (Gradual Decline) (recorded by NZWS in 1980).

Significance

This large and important site supports threatened and regionally significant species and some intact sequences of plant communities, including substantial tracts of secondary kanuka forest embracing a range of saline and freshwater wetland communities in the intervening estuary and valleys. Despite some weed invasion of the kanuka forest, some of it is remarkably intact and supports the only occurrence of towai on the peninsula encountered in this survey. There has been attempted drainage in the past of the southernmost valley of Punahaere Creek estuary. Kelly's Bay is an important roosting site for migratory waders. Contains 64.3 ha of Acutely Threatened land environment A5.1b, 1.9 ha of Chronically Threatened environment A7.3a, and 296.1 ha of At Risk environment A6.1b. Nearly half the site is already protected in Punahaere Creek Conservation Area (229.9 ha), Punahaere Creek Government Purpose Wildlife Management Refuge (12.2 ha), and Tangitiki Bay Marginal Strip No 2 (0.4 ha), administered by DOC. Site for four representative ecological units: (a) Kanuka forest on hillslope and ridge crest, (b) Oioi-*Baumea juncea* rushland on estuarine alluvium, (c) Mangrove shrubland on alluvium, and (e) Manuka shrubland on alluvium.

UPPER OKARO BUSH

Survey no.	P09/008
Survey date	23 January 2007
Grid reference	P08 085 455
Area	34 ha
Altitude	40–130 m asl

Ecological units

(a) Kauri-puriri-taraire forest on hillslope and alluvium (34%)

(b) Kanuka forest on hillslope (66%)

Landform/geology

Hillslopes at landward edge of mid-late Pleistocene (Karioitahi Group) parabolic dunefield.

Vegetation

The kauri forest/broadleaved forest at this remarkable site provides an all-too rare glimpse of the pre-human forests of the Pouto Peninsula. The forest occupies both sides of a small north-south valley and comprises

(a) a stand of ricker and submature kauri on the upper eastern slopes with taraire and puriri dominating the canopy on the lower slopes. A wide range of common lowland forest species is present, including some typical kauri associates like kauri grass. It is buffered to the west and south by

(b) secondary kanuka forest of indifferent quality.

A pine stand on the eastern boundary has been felled recently.

Significant flora

Coprosma parviflora (Regionally Significant), recorded during this survey.

Fauna

New Zealand pigeon (Gradual Decline), North Island fantail, shining cuckoo, grey warbler (R.J. Pierce, EcoOceania Ltd, pers. comm.). New Zealand kingfisher, tui, Australasian harrier.

Significance

Despite an imminent weed problem with woolly nightshade, the site is of outstanding importance as evidently the only one with kauri surviving on the southern Pouto Peninsula. It shows the range of species that more fertile sands have supported in the past, and represents a vital seed source for recolonisation of the extensive secondary stands of the ED by later successional species like taraire. The forest interior is in excellent condition. Contains 2.9 ha of Acutely Threatened land environment A5.1a, 1.6 ha of Chronically Threatened environment A7.3a, and 29.4 ha of At Risk environment A6.1b. Site for one representative ecological unit: (a) Kauri-puriri-taraire forest on hillslope and alluvium.

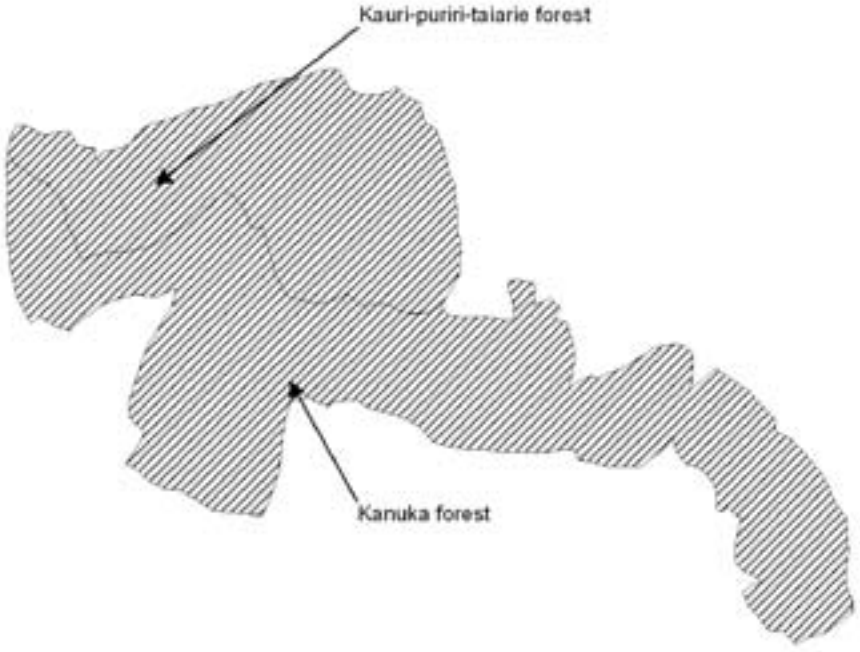
P09/008 Upper Okaro Bush

0 125 250 500

Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

TAPU BUSH

Survey no.	P09/011
Survey date	24 January 2007
Grid reference	P09 071 426
Area	210 ha
Altitude	80–170 m asl

Ecological units

(a) Kanuka forest on rear dunes

(b) Totara-narrow-leaved maire-rewarewa forest on rear dunes

(c) Karaka-puriri-totara forest on rear dunes (all forest units together comprise 93%)

(d) Sandfield on rear dunes (7%)

Landform/geology

Holocene unconsolidated transverse sand dunes.

Vegetation

This large tract of forest on rear dunes has been described in detail by Reid (1977). It comprises a core of old-growth mixed conifer-broadleaved forest, mostly surrounded by a more extensive tract of secondary kanuka forest, and is buffered on all sides by exotic conifer plantation. They are not mapped separately.

(a) The subcanopy of the secondary kanuka forest consists of rewarewa and mapau, and there is a dense and varied understorey.

(b) The canopy of the old-growth forest is dominated on dune crests and midslopes by totara, narrow-leaved maire, and rewarewa. Kohekohe locally reaches the canopy on midslopes.

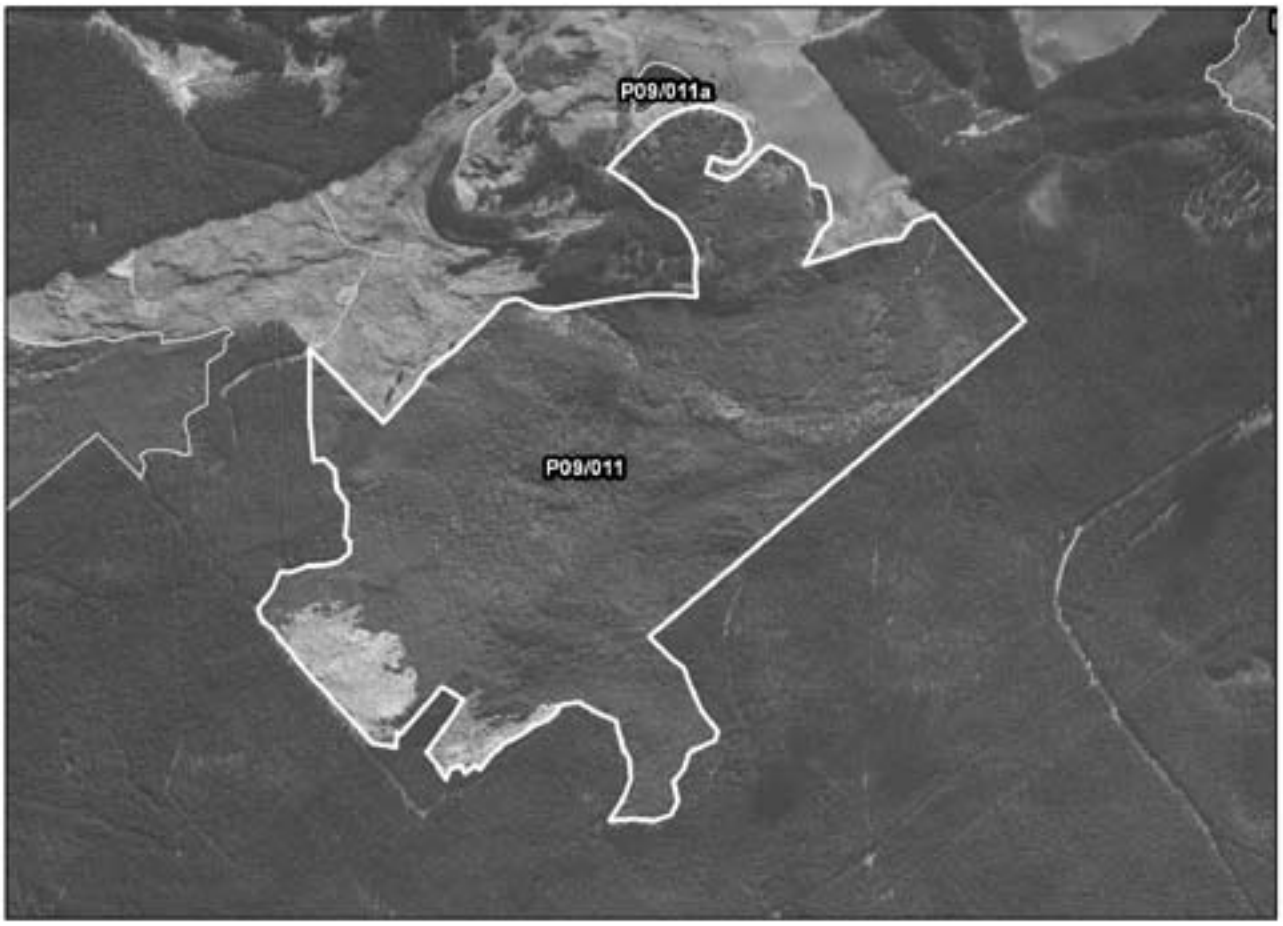
(c) In hollows, karaka, puriri, and totara are the canopy dominants.

Well-developed diverse subcanopies and understories are present throughout the old-growth units, including totara, rewarewa, narrow-leaved maire, kohekohe, lancewood, fierce lancewood, mahoe, small-leaved mahoe, tawa, titoki, puriri, karaka, mangeao, mapau, kohuhu, pate, kawakawa, rangiora, and *Coprosma* species.

(d) There are two areas of open dunes at the southwest edge with frequent coastal toetoe and pampas and occasional tauhinu and sand coprosma.

Significant flora

Hebe diosmifolia (1991, AK 205265), *Corokia cotoneaster* (1991, AK 205262), *Asplenium hookerianum* (1991, AK 205258), *Olearia albida* (Wright & Young 1991), and sand coprosma, recorded in this survey, are Regionally Significant. Historic records (Reid 1977) of fierce lancewood (Sparse), weeping matipo, true maidenhair, and northern rata, all Regionally Significant, none of which has been recorded in subsequent surveys.

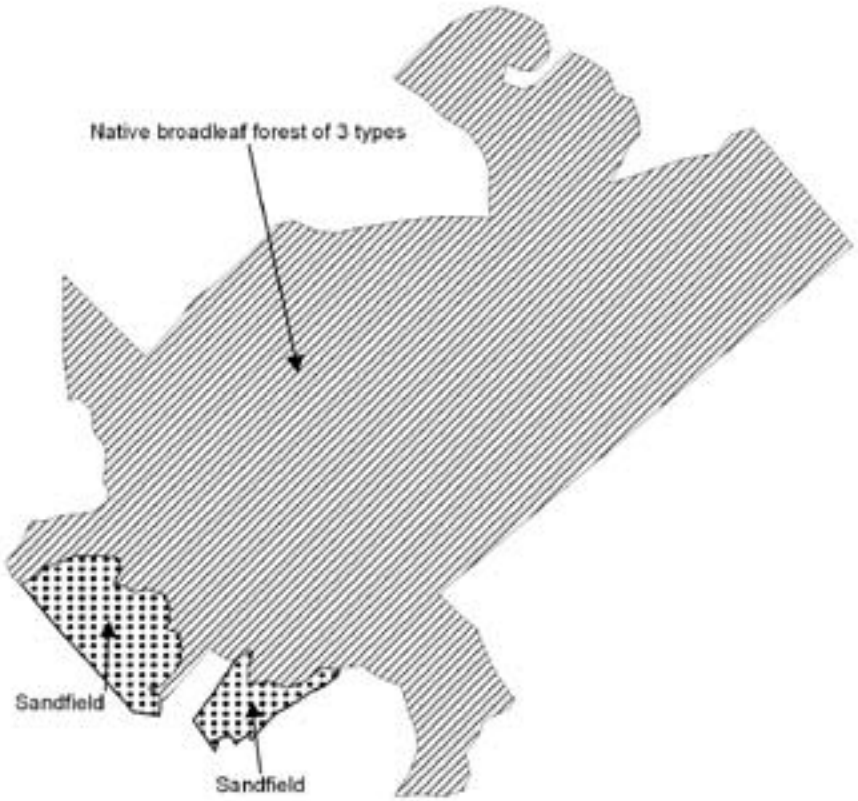


P09/011 Tapu Bush

0 250 500 1,000
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

Fauna

North Island brown kiwi (Serious Decline), New Zealand kingfisher, morepork, grey warbler, North Island fantail, silvereye (SSBI P09/H007, 1989, 1992). Australasian harrier. A snail survey was conducted in 1998; only common species were found (SSBI P09/H007).

Significance

Tapu Bush is the largest and most significant old-growth forest remnant surviving on the Pouto Peninsula and one of the few examples of this forest type left in New Zealand. This site is of very high ecological significance and is justifiably well-known to the botanical community. Wright and Young (1991) commented on several unusual features, including the local dominance of very large, mature trees of narrow-leaved maire (a feature shared with Pretty Bush), the prevalence of normally epiphytic tank lilies (kahakaha, kowharawhara) on the forest floor, and the prevalence of filmy ferns on sandy soil. Ring counts of canopy trees suggest an age of at least 300 years for the old-growth forest. Comprehensive species lists were compiled by the Auckland Botanical Society on their visits (Wright & Young, 1991; Cameron et al. 2001). The moss flora has been documented by Beever (1991) and lichens by Hayward and Hayward (1991). Contains 1.1 ha of Chronically Threatened land environment A7.3a and 208.1 ha of At Risk environment G1.1c. Site for three representative ecological units: (a) Kanuka forest on rear dunes, and (b) Totara-narrow-leaved maire-rewarewa forest on rear dunes, and (c) Karaka-puriri-totara forest on rear dunes.

LAKE ROTOPOUUA, WETLAND AND FOREST

Survey no.	P09/014
Survey date	25 January 2007
Grid reference	P09 099 417
Area	49.5 ha
Altitude	55–100 m asl

Ecological units

(a) Kanuka forest on hillslopes (44%)

(b) Raupo reedland on alluvium (3%)

(c) Manuka-*Baumea arthrophylla*-raupo-*Carex secta* shrub reed-sedgeland on alluvium (44%)

(d) Open water in dune lake (9%)

Landform/geology

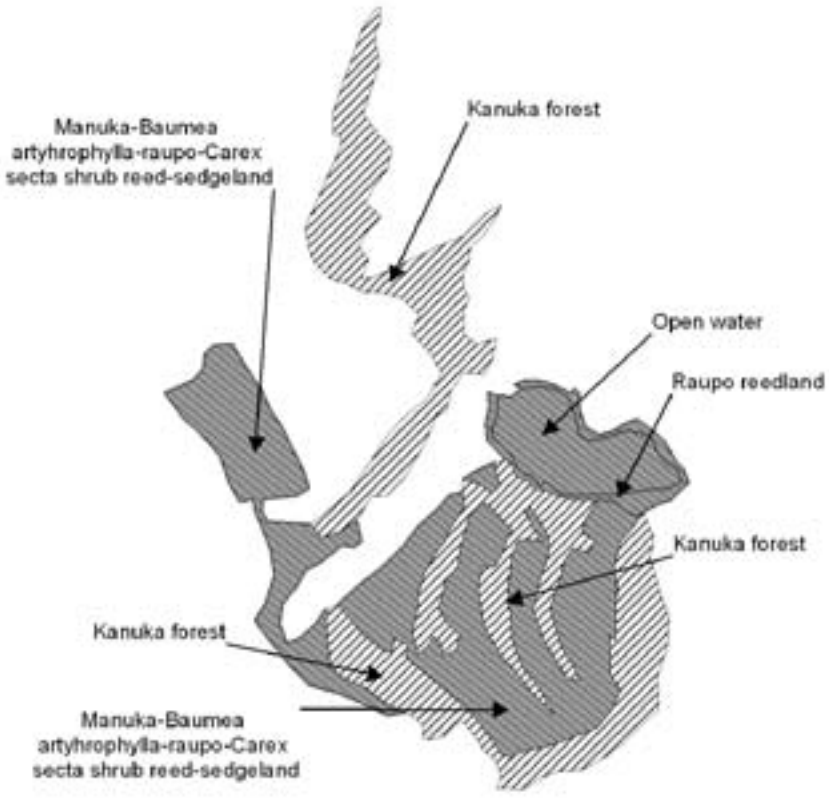
Holocene transverse dunes, and lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield, ponded at landward edge of Holocene dunefield.

P09/014 Lake Rotopouua, Wetland and Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

Vegetation

This site comprises a substantial wetland on the west of and contiguous with Lake Rotopouua, smaller discontinuous lacustrine fringes around the lake itself, and a finger of riparian forest along a feeder stream.

(a) Kanuka forest is fenced and has occasional puriri, rewarewa, karaka, mahoe, and ti kouka.

(b) Lacustrine fringes are dominated by raupo, with frequent kuta and *Carex secta*.

(c) The main wetland is dominated variously by manuka, *Baumea arthrophylla*, raupo, and *C. secta*. Marsh fern is locally common.

(d) Open water of Lake Rotopouua.

Significant flora

Marsh fern (Gradual Decline), burr-reed and *Corokia cotoneaster* (both Regionally Significant), all recorded during this survey.

Fauna

Dwarf inanga (Serious Decline), common bully (NIWA 2007). Australasian bittern (Nationally Endangered) (R. Parrish, pers. comm.). Grey duck (Nationally Endangered), black shag (Sparse), little shag (Sparse), spotless crake (Sparse) (OSNZ surveys 1977–1994). North Island fernbird (Sparse), New Zealand dabchick (Sparse) (SSBI Q09/H003, 1989). New Zealand scaup (Regionally Significant) (OSNZ surveys 1977–1994). Australasian little grebe (Regionally Significant) (OSNZ CSN 2001). Grey teal (Regionally Significant) (R. Parrish, pers. comm.). Australasian harrier, white-faced heron, New Zealand kingfisher, Pacific swallow (OSNZ surveys 1977–1994). Grey warbler, silvereye, North Island fantail, pukeko, (SSBI Q09/H003, 1989). Paradise shelduck, morepork (R. Parrish, pers. comm.). Tui.

Significance

An important site, in very good condition, supporting a range of threatened and regionally significant species and apparently largely weed-free. The wetland is well buffered by plantation forestry on its western and northern sides. Contains 4.5 ha of Chronically Threatened A7.3a and 40.1 ha of At Risk G1.1c. Over half the site is already protected Rotopouua Creek Conservation Area (28.4 ha), administered by DOC. Site for three representative ecological units: (a) Kanuka forest on hillslopes, (b) Raupo reedland on alluvium, and (c) Manuka-*Baumea arthrophylla*-raupo-*Carex secta* shrub reed-sedgeland on alluvium.

LAKE ROTOTUNA AND WETLAND

Survey no.	P09/205
Survey date	Not visited during this survey. Information from Wells et al. (2007).
Grid reference	P09 040 495
Area	8.7 ha
Altitude	120 m asl

Ecological units

(a) Raupo-*Eleocharis sphacelata-E. acuta*-kuta reedland on alluvium.

(b) *Glossostigma elatinoides-Lilaeopsis novae-zealandiae* herbfield on alluvium (both units together comprise (17%)

(c) Open water in dune lake (83%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield, ponded at landward edge of Holocene parabolic dunefield.

Vegetation

There is

(a) a lacustrine fringe of Raupo-*Eleocharis sphacelata-E. acuta*-kuta reedland around about half the lake. The invasive adventive sweet grass is locally present.

(b) Littoral herbfield comprises *Glossostigma elatinoides* and *Lilaeopsis novae-zealandiae*.

(c) Open water in dune lake.

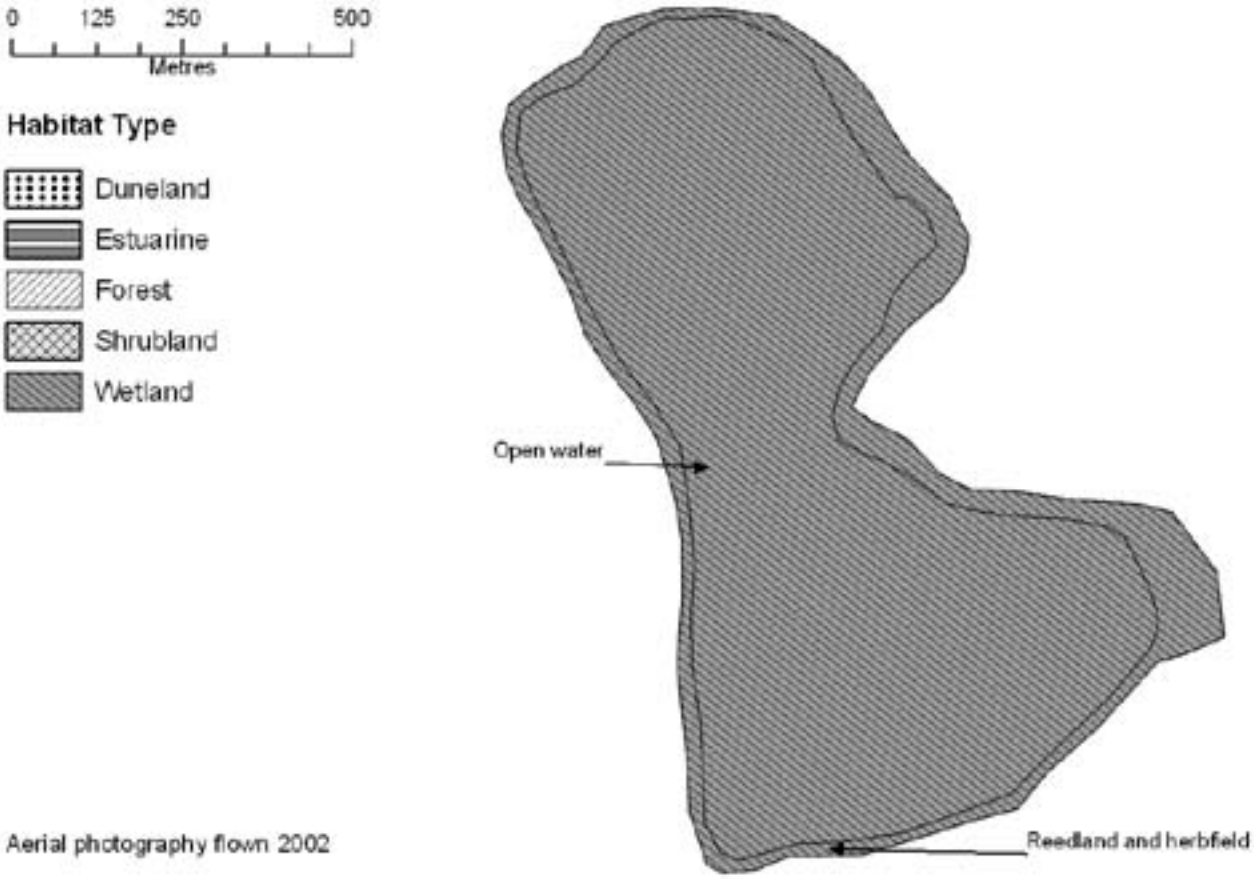
Significant flora

Glossostigma elatinoides (Regionally Significant) (Wells et al. 2007). Historical record of *Dicksonia fibrosa* (P. Anderson, pers. comm.). *Stuckeria pectinata* (Sparse) was recorded by NIWA in 2005 but was not seen in a subsequent survey in 2007 (Wells et al. 2007).

Fauna

Dwarf inanga (Serious Decline), common bully (NIWA 2007). Australasian bittern (Nationally Endangered), brown teal (Nationally Endangered), grey duck (Nationally Endangered) (OSNZ surveys 1972–1994). Reef heron (Nationally Vulnerable) (SSBI P09/H002), 1977, 1989). Caspian tern (Nationally Vulnerable) (OSNZ surveys 1972–1994). New Zealand dabchick (Sparse), black shag (Sparse), little black shag (Sparse), little shag (Sparse), New Zealand scaup (Regionally Significant) (SSBI P09/H002), 1977, 1989). Grey teal (Regionally Significant) (OSNZ surveys 1972–1994). Paradise shelduck, Australasian harrier, pukeko, Australasian pied stilt, spur-winged plover (SSBI P09/H002), 1977, 1989). Pied shag, white-faced heron, Australasian shoveler (Regionally Significant), Australasian harrier, black-backed gull, New Zealand kingfisher, Pacific swallow (OSNZ surveys 1972–1994).

P09/205 Lake Rototuna and Wetland



Aerial photography flown 2002

Significance

Ranked High by Wells et al. (2007) because of the presence of threatened species and retired margins. Despite recent fencing and riparian restoration planting, pest fish (gambusia: Wells et al. 2007; rudd: NIWA 2007) and plant (sweet grass, found for the first time in 2007) species compromise its value somewhat. Contains 1.3 ha of Chronically Threatened land environment A7.3a. A small proportion of the site is already protected in Rototuna Lake Conservation Area (0.4 ha), administered by DOC.

OKARO CREEK/WAIKERE CREEK DUNELAND, WETLAND AND SHRUBLAND

Survey no.	Q09/051
Survey date	24–25 January 2007
Grid reference	Q09 136 448, Q09 142 426
Area	555 ha
Altitude	0–85 m asl

Ecological units

(a) Kanuka shrubland/forest on hillslope (37%)

(b) Kanuka shrubland on colluvium (3%)

(c) Manuka shrubland on alluvium (8%)

(d) Raupo reedland on alluvium (4%)

(e) Mixed wetland on alluvium (3%)

(f) Oioi-sea rush rushland on estuarine alluvium (<1%)

(g) Mangrove shrubland on estuarine alluvium (16%)

(h) Kanuka shrubland and forest on sand dunes (3%)

(i) Spinifex sandfield on dunes (<1%)

(j) Open water in estuary (25%)

Landform/geology

Hillslopes eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies, with Holocene intertidal, estuarine, alluvial and swamp deposits in valleys.

Vegetation

This large site comprises a range of plant communities in and around the extensive Okaro Estuary and the much smaller Waikere Estuary to the south.

(a) Secondary kanuka shrubland/forest with occasional radiata pine on hillslopes grades into

(b) kanuka shrubland on footslopes, which in turn grades into

(c) manuka shrubland with *Baumea juncea* (nearer the sea) or *B. rubiginosa* (further inland) ground layers on alluvium,

(d) raupo reedland with frequent to occasional *Baumea articulata* and

occasional pampas, manuka, harakeke, and swamp millet on alluvium and

(e) mixed wetlands of variable composition with common *Baumea teretifolia* and frequent manuka, raupo, and oioi. Towards the inlet, this grades into mosaics of

(f) oioi and sea rush rush-reedland. Shore tussock and *Baumea juncea* occur frequently with occasional sharp rush, knobby clubrush, saltmarsh ribbonwood, manuka, and pampas. This grades into

(g) mangrove shrubland with occasional sea primrose, glasswort, and *Baumea juncea*. There are small areas of

(h) kanuka forest and shrubland with occasional to frequent radiata pine on sand dunes; knobby clubrush, kanuka, and pampas are also frequent in the canopy with occasional black wattle, harakeke, buffalo grass, marram, spinifex, sea primrose, gorse, mingimingi, shore bindweed, shore tussock, manuka, paspalum, and sand wind grass.

(i) Very small areas of foredune are dominated by spinifex.

(j) Open water in estuary.

Significant flora

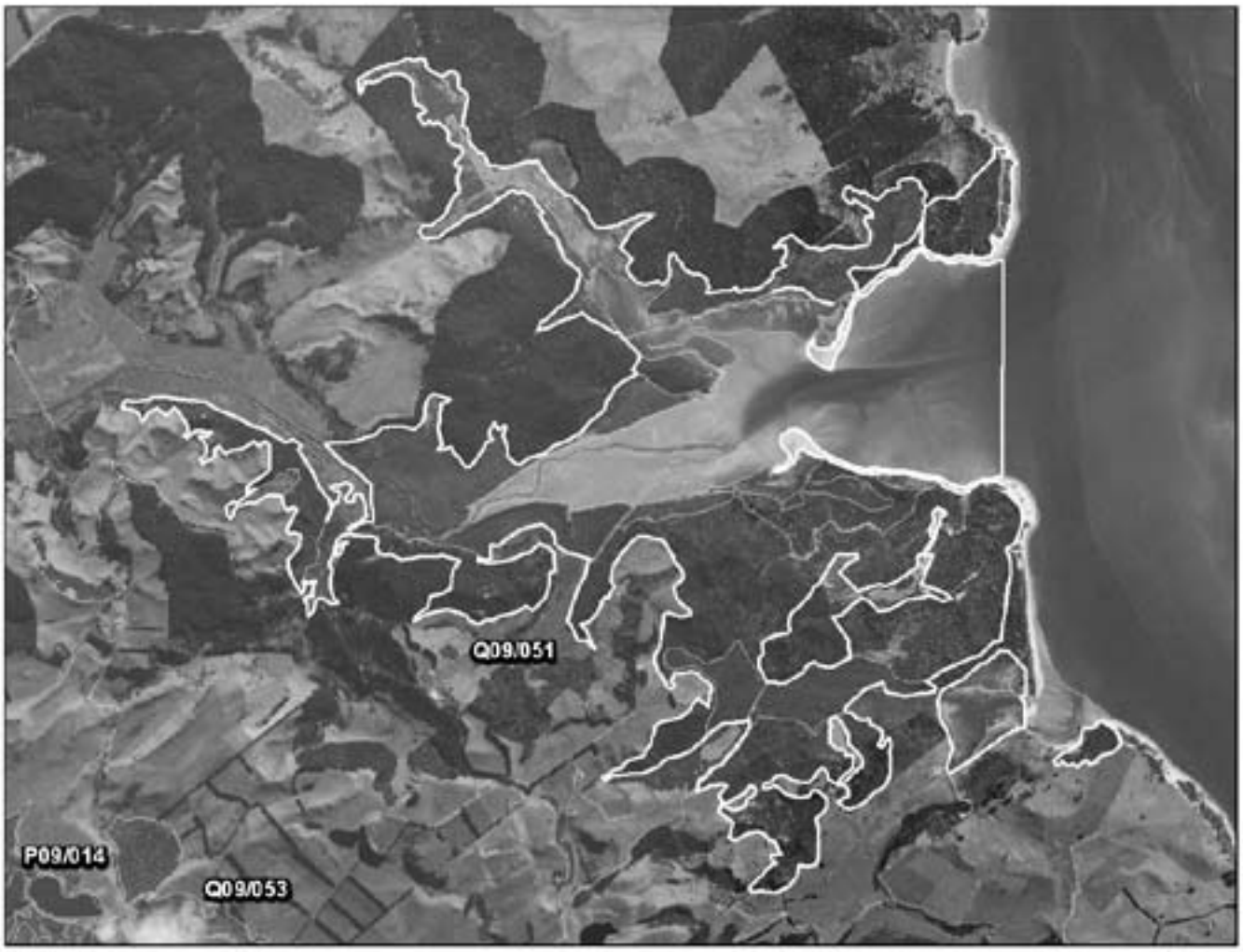
Pimelea tomentosa (Serious Decline), recorded from kanuka shrubland on colluvium during this survey, and pingao (Gradual Decline) (SSBI Q08/H047*1).

Fauna

Banded kokopu (Regionally Significant) (DOC survey 2001). Australasian bittern (Nationally Endangered) (R.J. Pierce, EcoOceania Ltd, pers. comm.). Grey duck (Nationally Endangered), northern New Zealand dotterel (Nationally Vulnerable) (SSBI Q08/H047*1, 1977, 1989; SSBI Q08/H047*3, 1977). Caspian tern (Nationally Vulnerable), this survey. Northern little blue penguin (Gradual Decline) nest on the coast south of Waikere Estuary (L. Forrest, pers. comm.). Little shag (Sparse), banded rail (Sparse), spotless crake (Sparse), North Island fernbird (Sparse), variable oystercatcher (Regionally Significant), pied shag, white-faced heron, black-backed gull, Australasian harrier, pukeko, South Island pied oystercatcher, Australasian pied stilt, spur-winged plover, bar-tailed godwit, New Zealand kingfisher, Pacific swallow, North Island fantail, grey warbler, silvereye (SSBI Q08/H047*1, 1977, 1989; SSBI Q08/H047*3, 1977). North Island fernbird were common in saltmarsh and shrubland-reedland at Okaro Creek in 2007, and banded rail in mangroves and adjacent saltmarsh at Okaro Creek in 2007 (R.J. Pierce, EcoOceania Ltd, pers. comm.).

Significance

Okaro Creek is the largest of the Kaipara Harbour estuaries in the ED, and contains excellent sequences of plant communities, largely buffered by exotic conifer plantation. Kanuka forest on hillslopes and sand dunes on the southern side of the estuary has been degraded by woody weed (mostly black wattle and radiata pine) invasion. In common with some other Kaipara estuaries, the upper reaches of Waikere Creek have been

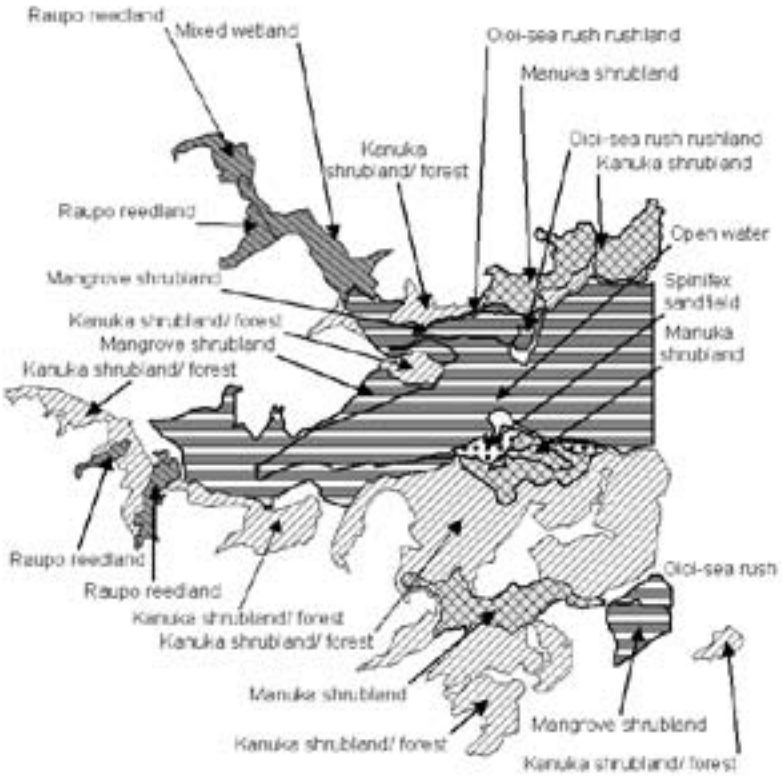


Q09/051 Okaro Creek/Waikere Creek Duneland, Wetland and Shrubland

0 250 500 1,000 1,500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

drained. Okaro Creek estuary is one of the most important roosting site for migratory waders in the Northland portion of the ED, 2000 bar-tailed godwits having been recorded in 2000 (R. Parrish, pers. comm.). Northern New Zealand dotterel were recorded breeding here in 1989 (R. Parrish, pers. comm.) and may still do so. Contains 47.6 ha of Acutely Threatened environment A5.1b, 7.2 ha of Chronically Threatened land environment A7.3a, and 97.3 ha of At Risk environments A4.1a and A6.1c. Site for four representative ecological units: (a) Kanuka forest/shrubland on hillslope, (c) Manuka shrubland on alluvium, (d) Raupo reedland on alluvium, (f) Oioi-sea rush rushland on estuarine alluvium, and (g) Mangrove shrubland on estuarine alluvium.

WETLAND EAST OF LAKE ROTOPOUUA

Survey no.	Q09/053
Survey date	25 January 2007
Grid reference	Q09 105 421
Area	20 ha
Altitude	60 m asl

Ecological units

(a) Manuka-*Baumea articulata* shrub reedland on alluvium (50%)

(b) Raupo reedland on alluvium (50%)

Landform/geology

Holocene swamp deposits in depressions on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield, ponded at landward edge of Holocene transverse dunefield.

Vegetation

This site comprises a substantial wetland east of Lake Rotopouua and isolated in pasture matrix. Although unfenced, deep drains around it appear to exclude domestic stock.

(a) The main wetland, comprising a variable mosaic of shrub and herbaceous wetland species, is dominated by manuka with common *Baumea articulata*, wire rush, tangle fern, and *Eleocharis sphacelata*.

(b) Raupo reedland at the southern end is locally dominated by *Baumea articulata* or *Eleocharis sphacelata*.

Significant flora

Wire rush (Regionally Significant), recorded during this survey.

Fauna

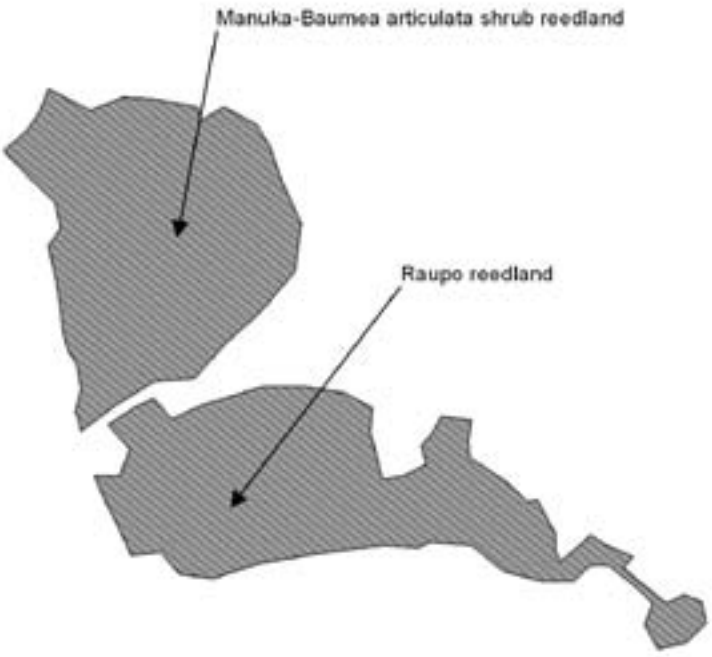
North Island fernbird (Sparse), New Zealand kingfisher, Australasian harrier.

Q09/053 Wetland East of Lake Rotopouua

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

Significance

Despite its isolation in a pastoral matrix, this is a regionally important wetland with the only population of wire rush (Regionally Significant) seen on the Pouto Peninsula. It also supports a threatened species, North Island fernbird. Unlike almost all other wetlands in the ED, it gives every indication of an oligotrophic (nutrient-poor) status. Contains 0.2 ha of Chronically Threatened land environment A7.3a and 19.3 ha of At Risk environment G1.1c. Site for one representative ecological unit: (a) Manuka-*Baumea articulata* shrub reedland on alluvium.

LAKE HUMUHUMU, WETLAND AND FOREST

Survey no.	Q09/054
Survey date	25 January 2007
Grid reference	Q09 115 409
Area	268 ha
Altitude	50–85 m asl

Ecological units

(a) Kanuka forest/shrubland on hillslope (47%)

(b) Raupo reedland on alluvium (2%)

(c) Manuka-raupo shrub reedland on alluvium (3%)

(d) Kanuka forest on hillslope (1%)

(e) Kohekohe-karaka-mahoe forest on hillslope (1%)

(f) Open water in dune lake (46%)

Landform/geology

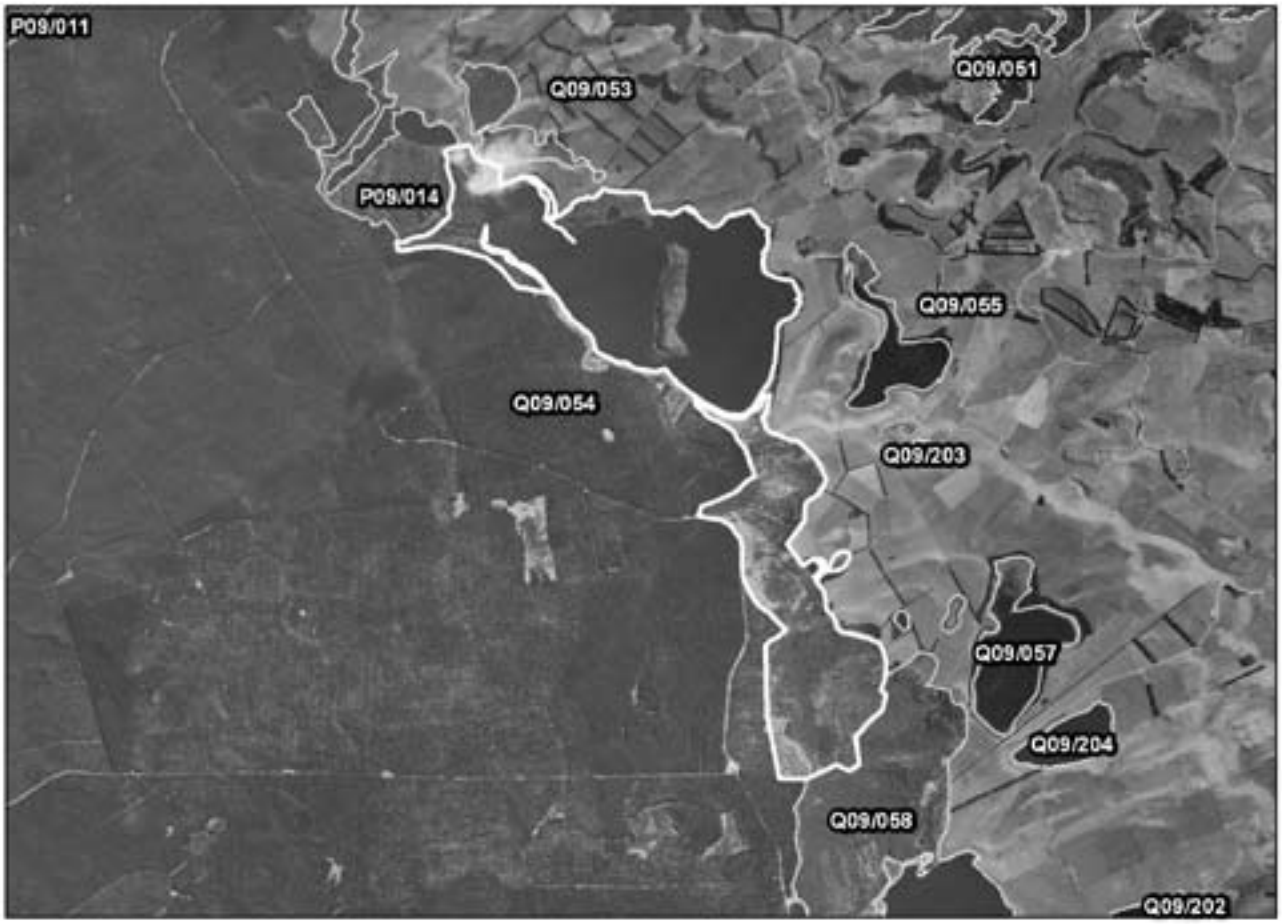
Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield, ponded at landward edge of Holocene transverse dunefield. The island in Lake Humuhumu is formed of consolidated (Kariotahi Group) dune sand. This site also includes Holocene transverse dunes to the northwest and south of Lake Humuhumu.

Vegetation

This site comprises Lake Humuhumu, a substantial island within it, and adjacent hillslopes at the northern end of the lake. It is only partially fenced and bordered by pasture on the north and east and plantation forest on the west.

(a) Kanuka forest/shrubland on hillslopes at the northern and southern ends appears to be free of grazing and has a well-developed understorey of secondary species such as mahoe, mapau, mingimingi, prickly heath, karaka, and lancewood.

(b) There is a discontinuous fringe of raupo reedland around the shoreline, dominated by raupo and *Eleocharis sphacelata*. A wide range of other species is present, including *Glossostigma elatinoides* (Wells et al. 2007).



Q09/054 Lake Humuhumu, Wetland and Forest

0 250 500 1,000
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland

Aerial photography flown 2002

(c) On the eastern side, there are substantial pockets of shrub wetland dominated by manuka, raupo, *Baumea articulata*, *B. arthrophylla*, and *B. juncea*. A wide range of other species is present, including substantial populations of nationally threatened (marsh fern) and regionally significant (forked sundew, burr-reed, and arrow grass) species.

(d) Kanuka forest on the substantial un-named island (12 ha) comprises secondary kanuka forest on the western side.

(e) Secondary broadleaved forest dominated by kohekohe, with karaka and mahoe common, occurs on the eastern side of the island. An absence of domestic stock has led to lush understorey and ground layers in places.

Significant flora

Hydatella inconspicua (Wells et al. 2007) and *Pimelea tomentosa* (DOC Bioweb), both in Serious Decline. Willow-leaved maire (SSBI Q09/H004) and marsh fern (both in Gradual Decline), recorded during this survey. *Blechnum fluviatile* (2001, AK 252702), forked sundew, burr-reed, arrow grass (all recorded during this survey), *Glossostigma elatinoides* and *Myriophyllum votschii* (Wells et al. 2007), are all Regionally Significant. Historical record of sand pimelea (Serious Decline) in 1920 (AK 101198 and AK 101199).

Fauna

Dwarf inanga (Serious Decline), koura (Gradual Decline) (NIWA 2007), freshwater mussel (Gradual Decline) (Wells et al. 2007). Common bully, freshwater jellyfish (NIWA 2007). Australasian bittern (Nationally Endangered), grey duck (Nationally Endangered), Caspian tern (Nationally Vulnerable), red-billed gull (Gradual Decline), New Zealand dabchick (Sparse), black shag (Sparse), little shag (Sparse), little black shag (Sparse), spotless crake (Sparse) (SSBI Q09/H004, 1981, 1990, 1999). North Island fernbird (Sparse), Australasian little grebe (Regionally Significant) (OSNZ surveys 1973–1994). New Zealand scaup (Regionally Significant), pied shag, white-faced heron, paradise shelduck, Australasian shoveler (Regionally Significant), Australasian harrier, pukeko, Australasian pied stilt, spur-winged plover, black-backed gull, Pacific swallow, grey warbler, North Island fantail, silvereye (SSBI Q09/H004, 1981, 1990, 1999). New Zealand kingfisher (OSNZ surveys 1973–1994).

Significance

Ranked Outstanding by Wells et al. (2007), Lake Humuhumu is the largest and deepest (16 m; Cromarty & Scott 1996) of the dune lakes on the eastern side of the Pouto Peninsula and supports many threatened and regionally significant species. An important site, because of its size and the range of habitats it supports, the lake is free of pest fish and invasive weeds, although alligator weed is present nearby (Wells et al. 2007). There has been limited weed incursion (pampas and brush wattle) on the island. With its potential to be kept free of possums and one of the largest kohekohe populations in the ED, the forest on the island

is particularly important. If fully fenced to exclude domestic stock, the conservation value of the lake itself would be considerably enhanced. A pied shag colony was present on the island in 1990, and the lake supports the largest population of New Zealand scaup in Northland (R. Parrish, pers. comm.). Contains 6.8 ha of Chronically Threatened land environment A7.3a and 125 ha of At Risk environment G1.1c. Nearly 40% of the site is already protected in Lake Humuhumu Marginal Strip (2.7 ha), Rotopouua Creek Conservation Area (9.6 ha), and Kanono Conservation Area (93.4 ha), administered by DOC. Site for three representative ecological units: (a) Kanuka forest/shrubland on hillslope, (c) Manuka-raupo shrub reedland on alluvium, and (e) Kohekohe-karaka-mahoe forest on hillslope.

LAKE ROTOOTUAURU, WETLAND AND FOREST

Survey no. Q09/055
Survey date 24 January 2007
Grid reference Q09 127 405
Area 21 ha
Altitude 40 m asl

Ecological units

(a) *Glossostigma elatinoides* herbfield on alluvium;

(b) Raupo reedland on alluvium (these two units together comprise 6%)

(c) Raupo reedland with manuka on alluvium (4%)

(d) Kanuka forest on alluvium (6%)

(e) Open water in dune lake (84%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield.

Vegetation

This small lake, also known as Swan Lake, supports

(a) littoral herbfield dominated by *Glossostigma elatinoides*

(b) lacustrine fringes dominated by raupo with frequent kuta, *Eleocharis sphacelata*, and *Baumea articulata*

(c) a small, contiguous tract of raupo reedland with frequent manuka

(d) a small tract of kanuka forest, and

(e) open water.

Significant flora

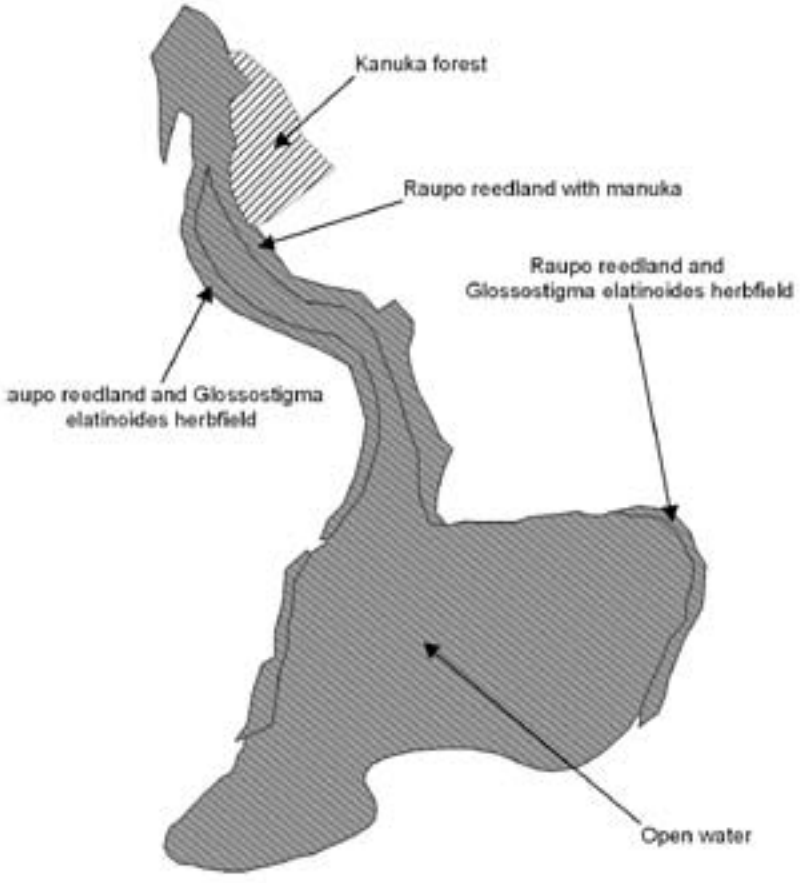
Hydatella inconspicua (Serious Decline), *Gratiola sexdentata*, *Glossostigma elatinoides*, *Centipeda aotearoana* and *Myriophyllum votschii* (all Regionally Significant) (Wells et al. 2007). Historical record of *Myriophyllum robustum* (Gradual Decline) (1950, DOC Bioweb).

Q09/055 Lake Rotootuauru, Wetland and Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

Fauna

Dwarf inanga (Serious Decline), longfin eel (Gradual Decline) (NIWA 2007). Freshwater mussel (Gradual Decline) (Wells et al. 2007). Australasian bittern (Nationally Endangered) (OSNZ surveys 1973–1995). Grey duck (Nationally Endangered), New Zealand dabchick (Sparse), black shag (Sparse) (SSBI Q09/H005, 1989, 1990). Little shag (Sparse), little black shag (Sparse), grey teal (Regionally Significant) (OSNZ surveys 1973–1995). New Zealand scaup (Regionally Significant), white-faced heron, paradise shelduck, Australasian harrier, pukeko, spur-winged plover, New Zealand kingfisher, Pacific swallow, North Island fantail (SSBI Q09/H005, 1989, 1990). Australasian shoveler (Regionally Significant), Australasian pied stilt, black-backed gull (OSNZ surveys 1973–1995).

Significance

Ranked Moderate by Wells et al. (2007). A degraded site whose quality has been compromised by domestic stock access, heavy aquatic weed (lakeweed, hornwort) invasion, and the local presence of alligator weed (Wells et al. 2007). Nevertheless, threatened plant and animal species are present, and it retains the potential for restoration by fencing and riparian planting. Lake Rotootuauru is currently the only lake in the ED with hornwort (A. Macdonald, pers. comm.), a highly invasive weed species whose presence here is of serious concern, given the proximity of the lake to the very important Lake Humuhumu. Contains 7.2 ha of Chronically Threatened land environment A7.3a. A very small proportion (1.8 ha) is already protected in Lake Rotootuauru Marginal Strip, administered by DOC.

TAUHARA CREEK ESTUARY, SANDFIELD, WETLAND AND SHRUBLAND

Survey no. Q09/056
Survey date 30 November 2006
Grid reference Q09 165 397
Area 35 ha
Altitude 0–40 m asl

Ecological units

(a) Sandfield with spinifex grassland on foredune (3%)

(b) Kanuka shrubland and treeland on rear dune (23%)

(c) Manuka-mapau shrubland on islet summit (1%)

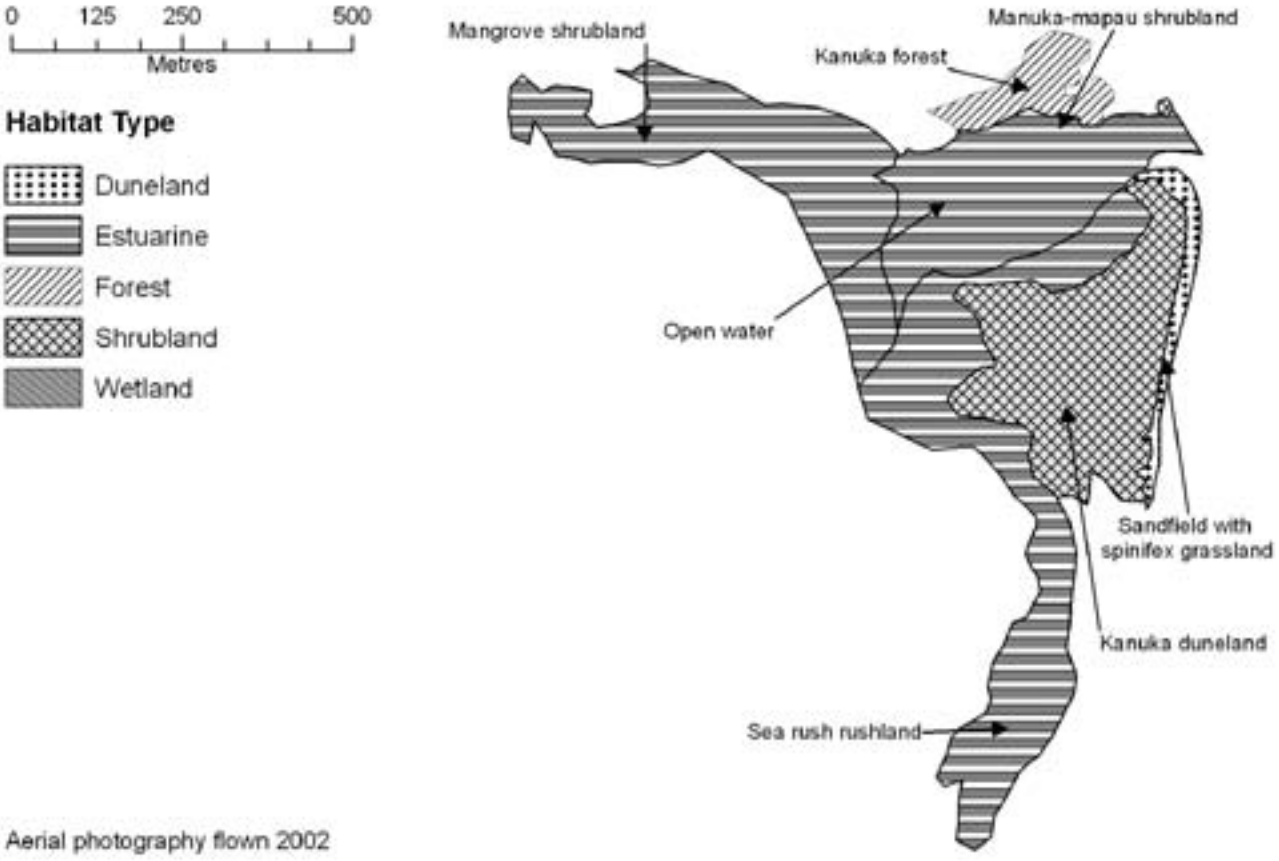
(d) Kanuka forest on hillslope (5%)

(e) Sea rush rushland on estuarine alluvium (26%)

(f) Mangrove shrubland on estuarine alluvium (23%)

(g) Open water in estuary (19%)

Q09/056 Tauhara Creek Sandfield, Wetland and Shrubland



Aerial photography flown 2002

Landform/geology

Holocene estuarine and beach sand deposits, and coastal cliff eroded in mid-late Pleistocene (Karioitahi Group) consolidated dune sand.

Vegetation

(a) Foredune vegetation is relatively intact, although marram is present.

(b) The rear dune is grazed and has been heavily invaded by adventives, including weeds like pampas and brush wattle. Also degraded by weed invasion is

(c) Rocky islet which supports reputedly one of only a couple of populations of rengarenga in the ED (L. Forrest, pers. comm.).

(d) Kanuka forest on the adjacent northern hillslope. The most intact vegetation occurs on the

(e) Saltmarsh vegetation dominated by sea rush is quite extensive and largely intact, as is

(f) Mangrove shrubland.

(g) Open water in estuary.

Significant flora

Olearia solandri (Regionally Significant) (2001, AK 252693)

Fauna

Reef heron (Nationally Vulnerable) (this survey). Caspian tern (Nationally Vulnerable), red-billed gull (Gradual Decline), black shag (Sparse), banded rail (Sparse), North Island fernbird (Sparse), Australasian pied stilt, black-backed gull, white-faced heron, Australasian harrier, New Zealand kingfisher, Pacific swallow, grey warbler, North Island fantail, silvereye (SSBI Q08/H047*2, 1977, 1989). Pied shag, Australasian gannet.

Significance

Known locally as Sheehan's Creek, this diverse but rather fragmented site has been marred by stock access to most of it and by weed invasion. Although Tauhara Creek provides some roosting sites for waders (R. Parrish, pers. comm.) and supports a number of ecosystems with a good range of native, including threatened and regionally significant, species, most other Kaipara Harbour estuaries in the ED contain larger and less modified examples of similar vegetation types. Contains 0.7 ha of Chronically Threatened land environment A7.3a and 18.3 ha of At Risk environments A4.1a and A6.1b. A very small proportion of the site (0.4 ha) is already protected in Tauhara Creek Marginal Strip, administered by DOC.

LAKE ROTOKAWAU AND WETLAND

Survey no.	Q09/057
Survey date	25 January 2007
Grid reference	Q09 135 387
Area	36 ha
Altitude	35–60 m asl

Ecological units

(a) Kuta-*Eleocharis sphacelata* reedland on alluvium

(b) *Baumea articulata-Eleocharis sphacelata* reedland on alluvium (both wetland units together comprise 32%)

(c) Open water in dune lake (68%)

Landform/geology

Lakes and Holocene swamp deposits in depressions on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield.

Vegetation

This site comprises one substantial lake and two small lakes west of it.

(a) There is a discontinuous fringe of kuta and *Eleocharis sphacelata* around the edge of Lake Rotokawau.

(b) Two small lakes support lacustrine reedland dominated by either *Baumea articulata* or *Eleocharis sphacelata*, with raupo and sweet grass also present

(c) Open water in dune lake.

Significant flora

Hydatella conspicua (Serious Decline), apparently the largest population in Northland (Wells et al. 2007). *Myriophyllum votschii* (Regionally Significant) (Wells et al. 2007).

Fauna

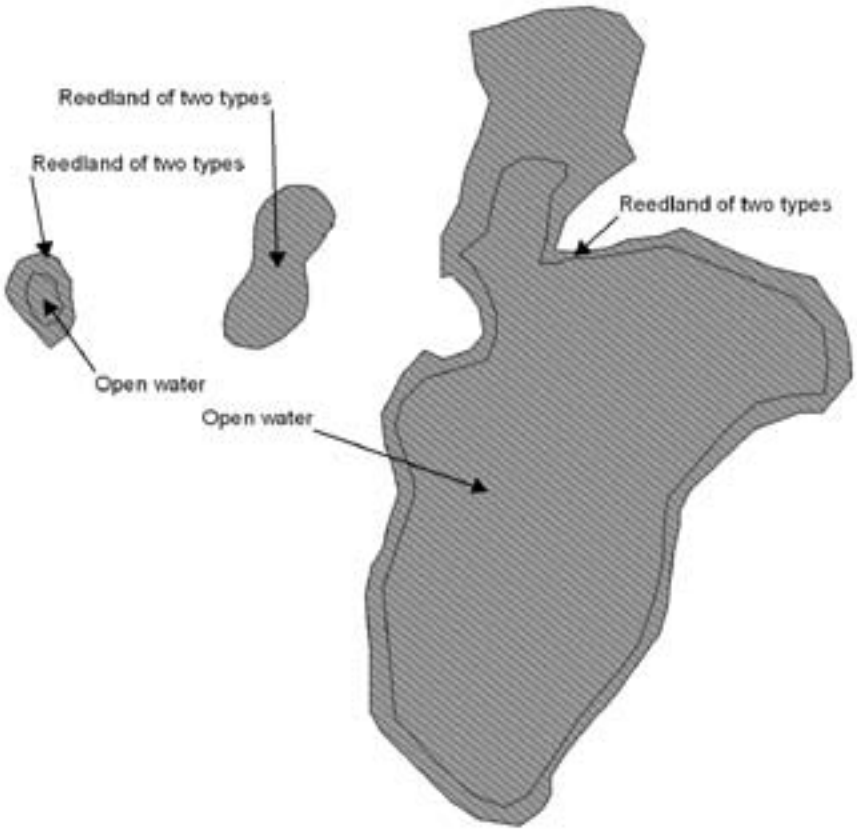
Dwarf inanga (Serious Decline), freshwater mussel (Gradual Decline) (Wells et al. 2007). Shortfin eel (Gradual Decline), common bully (NIWA 2007). Australasian bittern (Nationally Endangered), grey duck (Nationally Endangered), red-billed gull (Gradual Decline) (SSBI Q09/H009, 1977, 1981, 1989). White-fronted tern (Gradual Decline) (OSNZ surveys 1973–1995). New Zealand dabchick (Sparse), little shag (Sparse) (SSBI Q09/H009, 1977, 1981, 1989). Black shag (Sparse), little black shag (Sparse), New Zealand scaup (Regionally Significant) (SSBI Q09/H009, 1977, 1981, 1989). Grey teal (Regionally Significant) (OSNZ surveys 1973–1995). Pied shag, white-faced heron, paradise shelduck, Australasian shoveler (Regionally Significant), Australasian pied stilt, spur-winged plover (SSBI Q09/H009, 1977, 1981, 1989). Australasian harrier, Pacific swallow, pukeko, black-backed gull, common tern (Migrant), white-winged black tern (Migrant) (OSNZ surveys 1973–1995). New Zealand kingfisher (SSBI Q09/H008, 1994).

Q09/057 Lake Rotokawau and Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

Significance

Ranked High by Wells et al. (2007). Although largely buffered by plantation forestry, this is a degraded site, grazed to the water's edge over a substantial portion of its shoreline and heavily invaded by lakeweed and to a minor extent, Canadian pondweed and *Utricularia gibba* (Wells et al. 2007). However, it supports threatened and regionally significant species, including what may be the largest population of *Hydatella inconspicua* in Northland (Wells et al. 2007). Rare migrants (common tern and white-winged black tern) were recorded by OSNZ in 1990. Contains 9.1 ha of Chronically Threatened land environment A7.3a.

LAKE KANONO, WETLAND AND FOREST

Survey no.	Q09/058
Survey date	26 January 2007
Grid reference	Q09 128 375
Area	198 ha
Altitude	50–90 m asl

Ecological units

(a) Raupo reedland on alluvium (2%)

(b) Kanuka forest on hillslope (61%)

(c) Open water in dune lake (37%)

Landform/geology

Holocene transverse dunes, and lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield, ponded at landward edge of Holocene dunefield.

Vegetation

One of the larger of the eastern Pouto dune lakes, Lake Kanono is bordered by plantation forestry on the west, kanuka forest to the north and south, and pastoral land on the east. It supports

(a) discontinuous lacustrine fringes of raupo reedland with frequent manuka, kuta, and *Eleocharis sphacelata*, and occasional ti kouka.

(b) Kanuka forest on adjacent hillslopes has occasional ti kouka, mapau, and karaka in the canopy.

Significant flora

Glossostigma elatinoides (Regionally Significant) (Wells et al. 2007). *Alternanthera aff. sessilis* (Regionally Significant) (2007, AK 299836).

Fauna

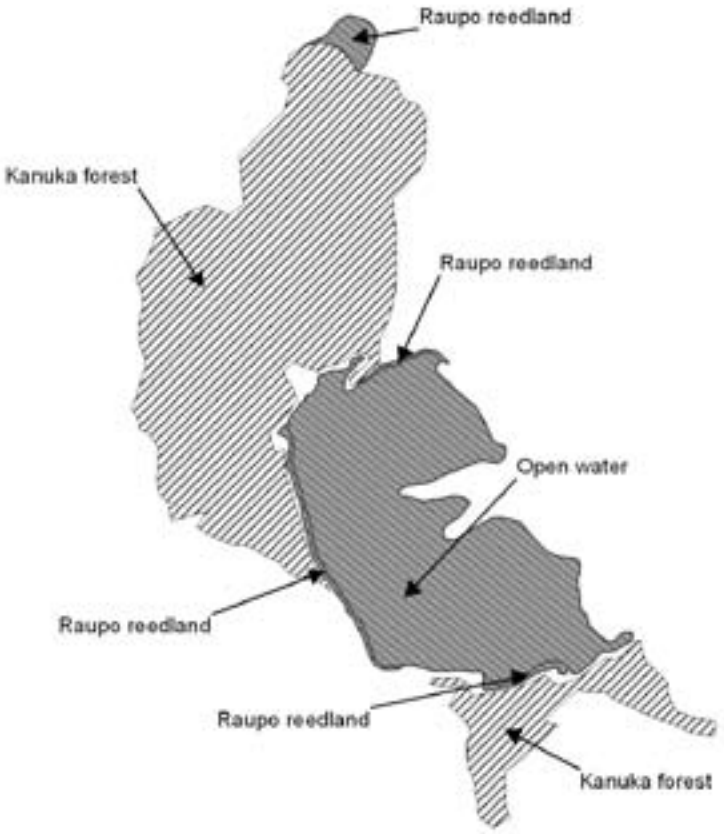
Dwarf inanga (Serious Decline), koura (Gradual Decline), common bully (NIWA 2007). Australasian bittern (Nationally Endangered), grey duck (Nationally Endangered), Caspian tern (Nationally Vulnerable), red-billed gull (Gradual Decline), (SSBI Q09/H011, 1977, 1991, 1989). White-

Q09/058 Lake Kanono, Wetland and Forest

0 250 500 1,000
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

fronted tern (Gradual Decline) little black shag (Sparse), (OSNZ surveys 1972–1995). New Zealand dabchick (Sparse), black shag (Sparse), little shag (Sparse), spotless crake (Sparse), New Zealand scaup (Regionally Significant) (SSBI Q09/H011, 1977, 1991, 1989). Australasian little grebe (Regionally Significant), grey teal (Regionally Significant) (OSNZ surveys 1972–1995). White-faced heron, paradise shelduck, Australasian shoveler (Regionally Significant), Australasian pied stilt, black-backed gull, Pacific swallow (SSBI Q09/H011, 1977, 1991, 1989). Pied shag, Australasian harrier, spur-winged plover, pukeko (OSNZ surveys 1972–1995).

Significance

Ranked Outstanding by Wells et al. (2007), this site supports threatened and regionally significant species, including a substantial population of New Zealand scaup (R. Parrish, pers. comm.). Although degraded by stock access on the eastern side, the conservation value of this substantial site would be considerably enhanced if the eastern shoreline were fenced and domestic stock excluded. Pest fish species and invasive aquatic weeds are currently absent (Wells et al. 2007). Contains 5.9 ha of Chronically Threatened land environment A7.3a and 117.4 ha of At Risk environment G1.1c. Some 60% of the site is already protected in Kanono Conservation Area (111.7 ha), Lake Kanono Marginal Strip (6.2 ha), and Lake Kahuparere Marginal Strip (0.1 ha), administered by DOC. Site for two representative ecological units: (a) Raupo reedland on alluvium, and (b) Kanuka forest on hillslope.

LAKE KAHUPARERE, WETLAND AND SHRUBLAND

Survey no.	Q09/060
Survey date	25 January 2007
Grid reference	Q09 145 361
Area	54 ha
Altitude	55–90 m asl

Ecological units

(a) Kanuka shrubland on hillslope (75%)

(b) Raupo reedland on alluvium (11%)

(c) Raupo-kuta reedland on alluvium (2%)

(d) Open water in dune lake (12%)

Landform/geology

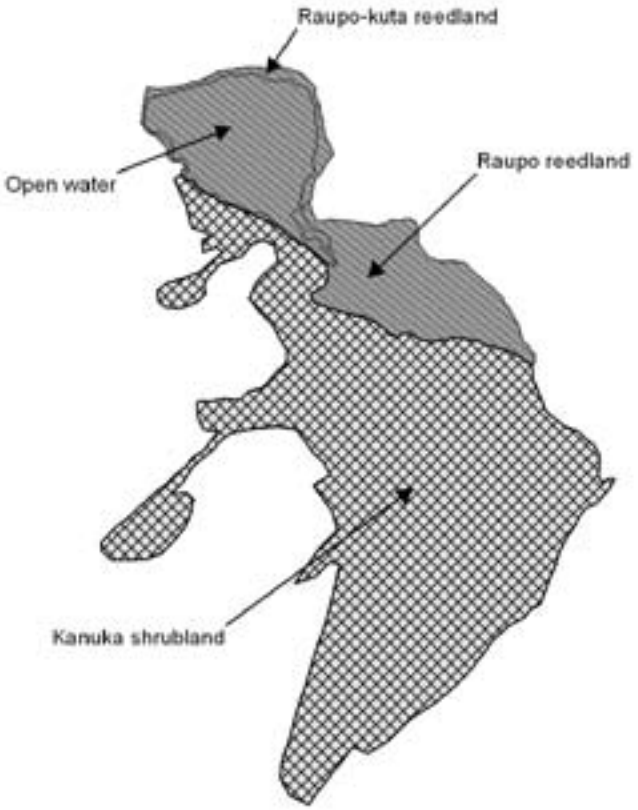
Holocene transverse dunes, and lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield, ponded at landward edge of Holocene dunefield.

Q09/060 Lake Kahuparere, Wetland and Shrubland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

Vegetation

Kanuka surrounding the lake is contiguous with the cliff face kanuka shrubland of Q09/063. Bordered by forestry to the west and pasture to the east, this lake is unfenced and grazed to the wetland margin.

(a) Dominated by kanuka, species such as radiata pine, ti kouka, mahoe, and hangehange occur occasionally in the canopy.

(b) The raupo wetland is at the southern end of the lake with abundant raupo, frequent *Baumea arthrophylla*, *Eleocharis sphacelata* and *Eleocharis acuta* and occasional native willow weed, knobby clubrush, *Carex virgata*, kuta, *Juncus edgarae*, and *Potamogeton cheesemanii*.

(c) The lake margin has raupo and kuta as common canopy species with *Eleocharis sphacelata*, manuka, native willow weed, pampas, pale rush, purple umbrella sedge, and *Bolboschoenus fluviatilis* occasionally present.

Significant flora

Pimelea tomentosa (Serious Decline) (SSBI P09/H015), fierce lancewood (Sparse) (1999, AK 300268). *Glossostigma elatinoides* (Champion et al. 2002) and *Corokia cotoneaster*, both Regionally Significant (1991, AK 205024). There is a 1928 record (WELT SP44985) of *Myriophyllum robustum* (Gradual Decline).

Fauna

Dwarf inanga (Serious Decline), koura (Gradual Decline) (Wells et al. 2007). Freshwater mussel (Gradual Decline) (Wells et al. 2007). Common bully (NIWA 2007). Australasian bittern (Nationally Endangered), grey duck (Nationally Endangered), Caspian tern (Nationally Vulnerable), New Zealand dabchick (Sparse), little shag (Sparse), spotless crake (Sparse) (SSBI Q09/H015, 1977, 1981, 1989, 1999). Black shag (Sparse) (R. Parrish, pers. comm.). New Zealand scaup (Regionally Significant), grey teal (Regionally Significant), white-faced heron, paradise shelduck, Australasian shoveler (Regionally Significant), Australasian harrier, pukeko, Australasian pied stilt, New Zealand kingfisher, Pacific swallow, New Zealand pipit, silvereye (SSBI Q09/H015, 1977, 1981, 1989, 1999). Eastern little tern (Wells et al. 2007). Spur-winged plover, grey warbler, North Island fantail (R. Parrish, pers. comm.).

Significance

Ranked High by Wells et al. (2007). Degraded by stock access on the eastern side, its conservation value would be considerably enhanced if the eastern shoreline were fenced and domestic stock excluded. A number of threatened plant and animal species are present. The adventive weed *Utricularia gibba* was noted for the first time in 2007 (Wells et al. 2007). Contains 2 ha of Chronically Threatened land environments A7.3a and 43.2 ha of At Risk environment G1.1c. Most of the site is already protected in Kahuparere Conservation Area (22.7 ha), Kanono Conservation Area (15.9 ha), and Lake Kahuparere Conservation Area (0.7 ha), administered by DOC.

PRETTY BUSH

Survey no.	Q09/061
Survey date	28 January 2007
Grid reference	Q09 120 353
Area	63 ha
Altitude	80–120 m

Ecological units

(a) Kanuka forest on rear dune

(b) Narrow-leaved maire forest on rear dune (forest units together comprise 82%)

(c) Kanuka forest on hillslope (18%)

Landform/geology

Mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunes overlain by unconsolidated Holocene transverse sand dunes.

Vegetation

Pretty Bush comprises a fine mosaic, mapped as one unit, of

(a) secondary kanuka forest with occasional totara, rewarewa, and fivefinger, interspersed with smaller areas of

(b) narrow-leaved maire forest with frequent totara, rewarewa, titoki, and puriri, and occasional other canopy tree species. Subcanopy and understorey species include rohutu, mahoe, and kohekohe, kawakawa, *Olearia albida*, common broom, *Hebe diosmifolia*, fierce lancewood, hangehange, mapau, coastal karamu, thick-leaved coprosma, *Coprosma rhamnoides*, kohuhu, mingimingi, and korokio. There is a rich ground layer dominated by ferns and megaherbs (Cameron et al. 2001).

(c) Secondary kanuka forest on hillslope.

Significant flora

Fierce lancewood (Sparse) (1990, AK 203129). *Corokia cotoneaster* (1987, AK 180236), rohutu (1990, AK 203113), *Hebe diosmifolia* (1991, AK 205275), *Olearia albida* (Cameron et al. 2001), and thick-leaved coprosma, recorded during this survey, all Regionally Significant.

Fauna

Australasian harrier, spur-winged plover, Pacific swallow, grey warbler, North Island fantail (SSBI Q09/H016, 1998).

Significance

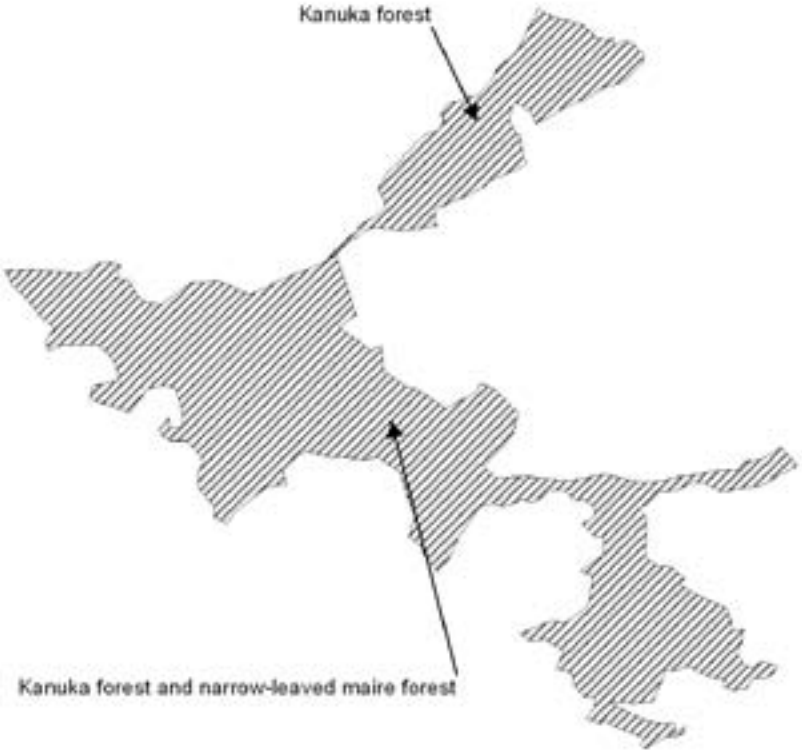
Along with Tapu Bush, Pretty Bush is one of a handful of surviving areas containing old-growth forest on the Pouto Peninsula whose significance is well recognised regionally and nationally (Cameron et al. 2001). The local dominance in the canopy of narrow-leaved maire is a rare and unusual phenomenon, and apparently unique to Pretty Bush. The moss flora has

Q09/061 Pretty Bush

0 250 500 1,000
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

been documented by Beever (1991). While a natural phenomenon, sand encroaching from the west is threatening to bury the forest. Control measures have been suggested recently (Ogle 1997) but apparently not implemented. Contains 62 ha of At Risk land environment G1.1c. Most of the site is already protected in Pouto Conservation Area (52.2 ha) and Pukekura Historic Area (< 0.1 ha), administered by DOC. Site for two representative ecological units: (a) Kanuka forest on rear dune and (b) Narrow-leaved maire forest on rear dune.

POUTO POINT WILDLIFE RESERVE SANDFIELD, WETLAND AND SHRUBLAND

Survey no. Q09/063
Survey date 25 January 2007
Grid reference Q09 150 354
Area 91 ha
Altitude 0–90 m asl

Ecological units

(a) Paspalum grassland on foredune (8%)

(b) Raupo reedland in dune slack (1%)

(c) Kanuka shrubland on rear dune (28%)

(d) Kanuka shrubland on cliff face (63%)

Landform/geology

Coastal cliffs eroded in mid-late Pleistocene (Karioitahi Group) consolidated dune sand, overlain by unconsolidated Holocene sand dunes.

Vegetation

(a) Paspalum is common on foredunes, spinifex frequent and pingao, tree lupin, tauhinu, *Juncus pauciflorus*, sand sedge, knobby clubrush, *Gnaphalium luteoalbum*, and Formosan lily present occasionally. Sand sedge and knobby clubrush are only present in dune hollows within the dunes.

(b) A small area of wetland at the edge of the rear dune is dominated by raupo. Occasional pampas, ti kouka and harakeke are also present.

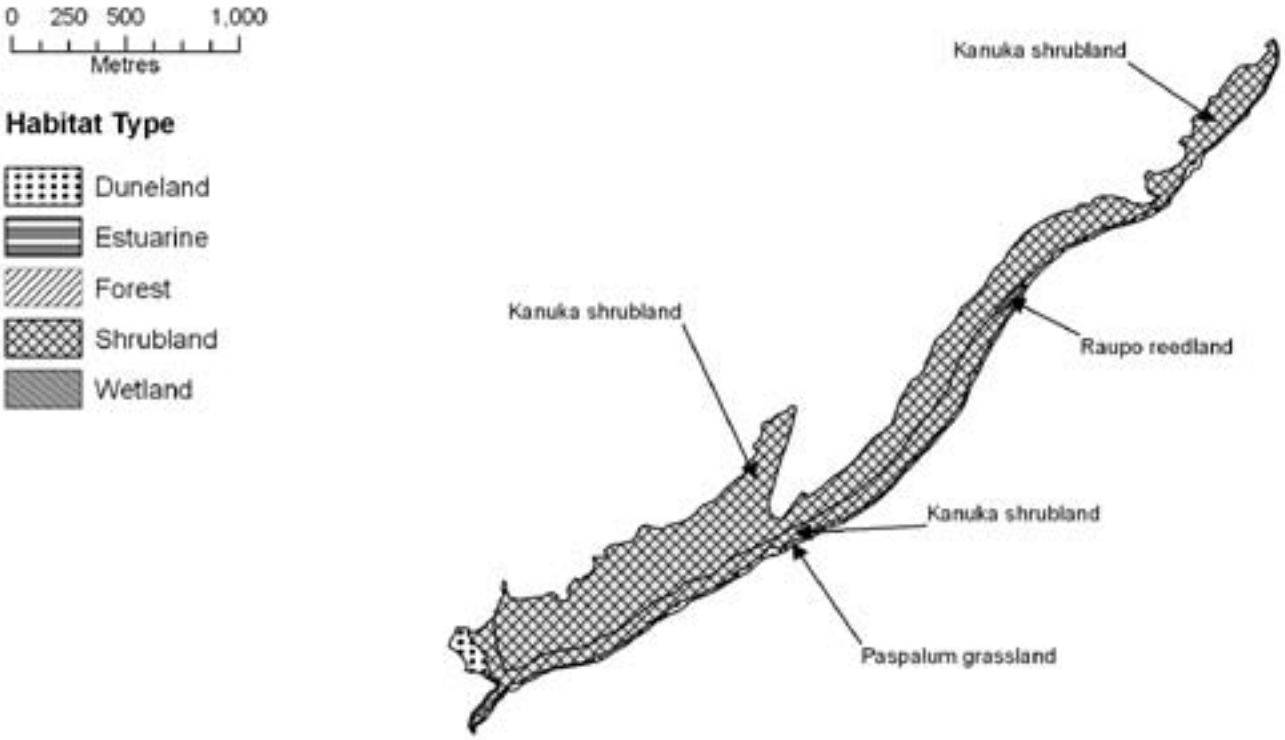
(c) The rear dune is dominated by kanuka. Mahoe, karaka and hangehange are dominant in small gullies within the rear dunes which are away from vehicle and horse tracks.

(d) The cliff face comprises of kanuka with the same occasional species as on the rear dune, as well as radiata pine, Hebe stricta, and *Coprosma areolata*.

Significant flora

Pimelea tomentosa (Serious Decline) (DOC Bioweb). Pingao (Gradual Decline), recorded during this survey. Fierce lancewood (Sparse) (2001,

Q09/063 Pouto Point Wildlife Reserve Sandfield, Wetland and Shrubland



Aerial photography flown 2002

AK 252746). True maidenhair (2000, AK 252590) and *Lagenifera stipitata* (2001, AK 252734) are both Regionally Significant.

Fauna

White heron (Nationally Critical) (OSNZ CSN 2002). Caspian tern (Nationally Vulnerable) (SSBI Q09/H017, 1992). Northern New Zealand dotterel (Nationally Vulnerable), white-fronted tern (Gradual Decline) (this survey). Variable oystercatcher (Regionally Significant) (OSNZ CSN 2001). Common tern (Migrant) (OSNZ CSN 1990). Paradise shelduck, Australasian pied stilt, black-backed gull, morepork, New Zealand kingfisher, grey warbler, North Island fantail, silvereye (SSBI Q09/H017, 1992). Bar-tailed godwit (OSNZ CSN 1998, 1999, 2001, 2002). South Island pied oystercatcher (OSNZ CSN 1999). Australasian harrier. Loggerhead sea turtle (Vagrant) recorded dead in 1985 (DOC Bioweb). Turtle carcass found during this survey.

Significance

A sizeable tract of natural vegetation in good condition. It has supported one of the few mainland colonies of grey-faced petrel (Regionally Significant), with breeding reported as recently as 1980 (P. Anderson, pers. comm.). Pouto Point is used frequently by locals and visitors. Vehicles use the beach front and four-wheel motorcycle and horse tracks are evident within the fore and rear dunes. This is a Nationally Important site for unspecified soil types (aeolian sand, alluvium, and peat). Contains 4.1 ha of Chronically Threatened land environment A7.3a and 88.2 ha of At Risk environment G1.1c. About half of the site is already protected in Kahuparere Conservation Area (45.2 ha) and Pouto Conservation Area (<0.1 ha), administered by DOC. Site for two representative ecological units: (b) Raupo reedland in dune slack, and (c) Kanuka shrubland on rear dune.

ONGANGE CREEK WETLAND, SHRUBLAND AND FOREST

Survey no.	Q09/150
Survey date	17 December 2007
Grid reference	Q09 116 476
Area	126 ha
Altitude	0–70 m asl

Ecological units

(a) Kanuka forest on hillslope (32%)

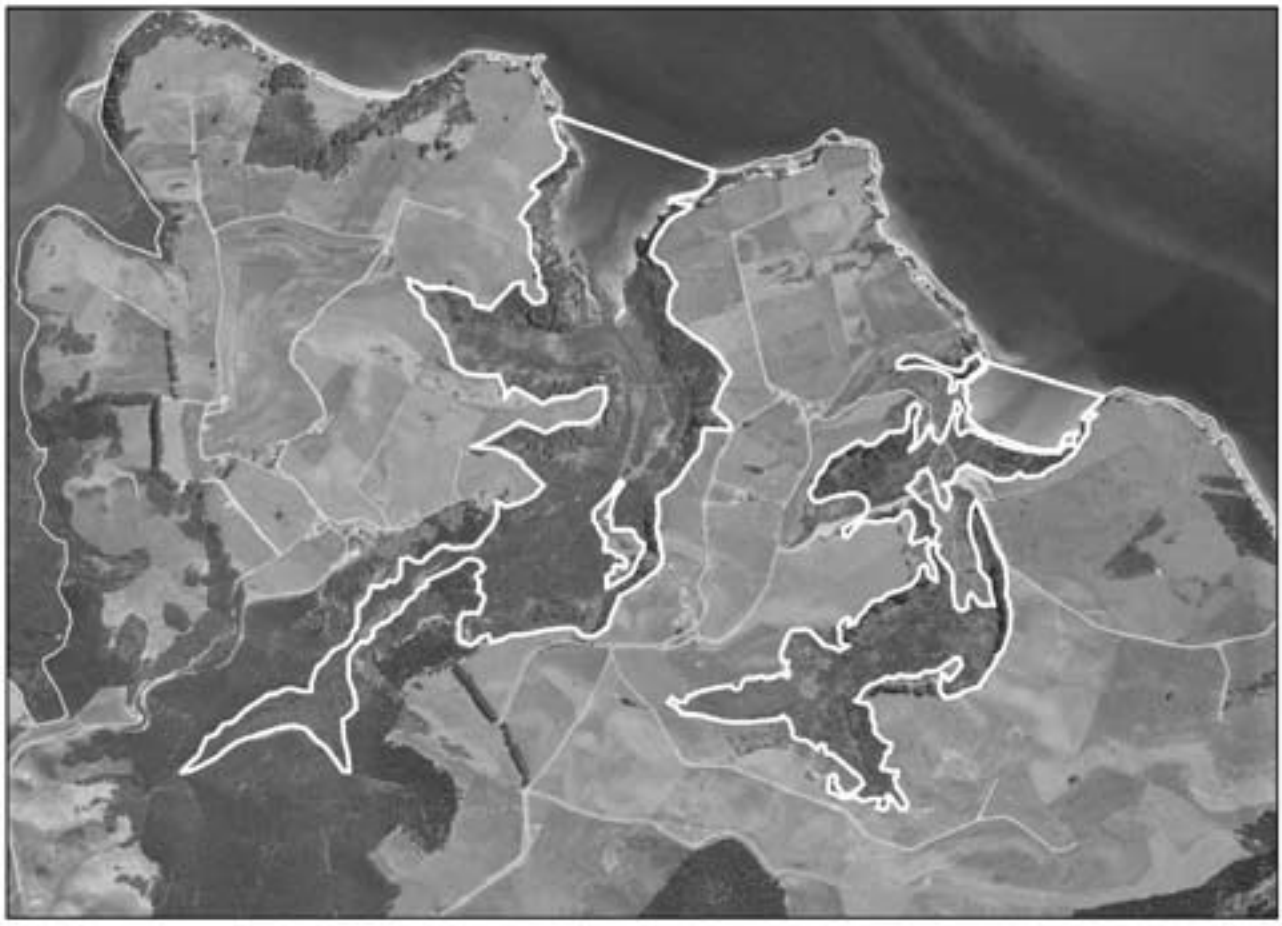
(b) Manuka shrubland on alluvium (40%)

(c) Raupo reedland on alluvium (5%)

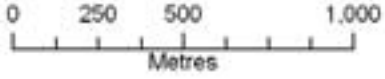
(d) Mangrove shrubland on estuarine alluvium (5%)

(e) Oioi rushland on estuarine alluvium (3%)

(f) Open water of estuary (15%)

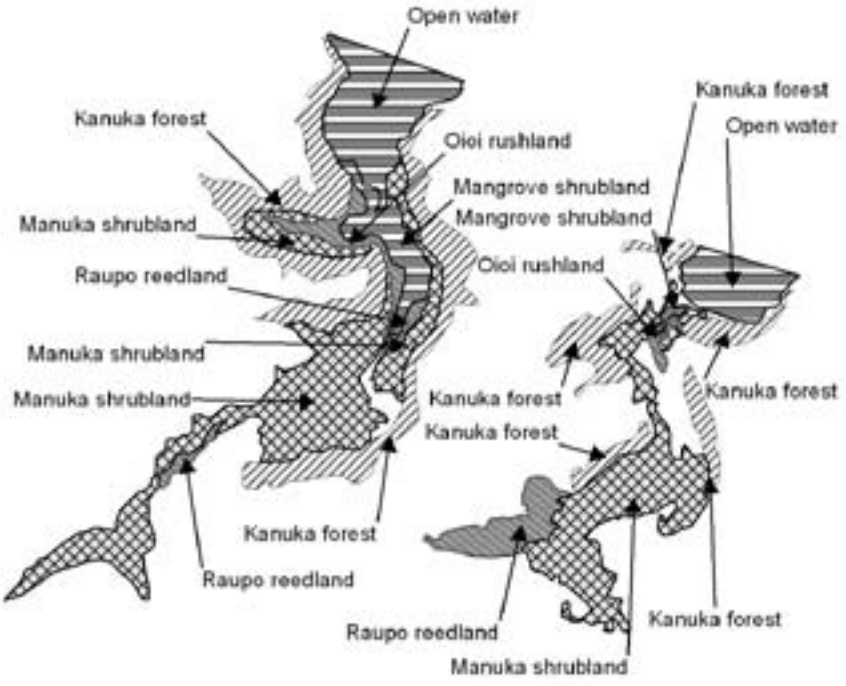


Q09/150 Ongange Creek Wetland, Shrubland and Forest



Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

Landform/geology

Hillslopes eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies, with Holocene intertidal, estuarine, alluvial and swamp deposits in valleys.

Vegetation

This large site comprises forest on hillslopes surrounding a small estuary.

(a) Kanuka forest contains some mamaku and a limited array of other early successional trees and shrubs. Radiata and maritime pine, gorse, prickly hakea, and pampas are locally present.

(b) Manuka shrubland occupies the upper valley floor and a mosaic of

(c) raupo reedland,

(d) mangrove shrubland, and

(e) oioi rushland with some *Baumea juncea* in the lower, saline portion of it.

Much of the smaller estuary on the southern side of the southern headland has been converted to pasture; surrounding hillslopes support weedier variants of kanuka forest.

(f) Open water of estuary.

Significant flora

None noted.

Fauna

North Island fernbird (Sparse).

Significance

The whole site has been farmed in the past, with old fencelines attesting to past clearance of the hillslopes and ditches to drainage of the wetland. Floristic diversity of the mesophytic vegetation is correspondingly low, and there is significant weed presence in all of it. Nevertheless, the whole site is now effectively free of grazing, all communities are predominantly native, there is a good sequence of plant communities from the coast inland, and a threatened species, North Island fernbird, is present. Contains 39.3 ha of Acutely Threatened land environment A5.1b and 64.5 ha of Chronically Threatened environment A6.1b.

FINLAYSON'S LAKE AND WETLAND

Survey no.	Q09/201
Survey date	Not visited during this survey. Information from Wells et al. (2007).
Grid reference	Q09 141 367
Area	3.5 ha
Altitude	55 m asl

Ecological units

(a) Undescribed vegetation on lacustrine fringe (22%)

(b) Open water in dune lake (78%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield.

Vegetation

(a) Undescribed vegetation fringe.

(b) Open water in dune lake.

Significant flora

Centipeda aotearoana (Regionally Significant) (2007, AK 299835)

Fauna

Australasian bittern (Nationally Endangered), grey duck (Nationally Endangered) (SSBI Q09/H014, 1981, 1989). Red-billed gull (Gradual Decline) (OSNZ surveys 1978–1994). New Zealand dabchick (Sparse), little black shag (Sparse), little shag (Sparse) (SSBI Q09/H014, 1981, 1989). Black shag (Sparse), grey teal (Regionally Significant), New Zealand scaup (Regionally Significant) (OSNZ surveys 1978–1994). White-faced heron, Australasian shoveler (Regionally Significant), Australasian pied stilt, black-backed gull, New Zealand kingfisher, Pacific swallow, North Island fantail (SSBI Q09/H014, 1981, 1989). Pied shag, paradise shelduck, pukeko, spur-winged plover (OSNZ surveys 1978–1994).

Significance

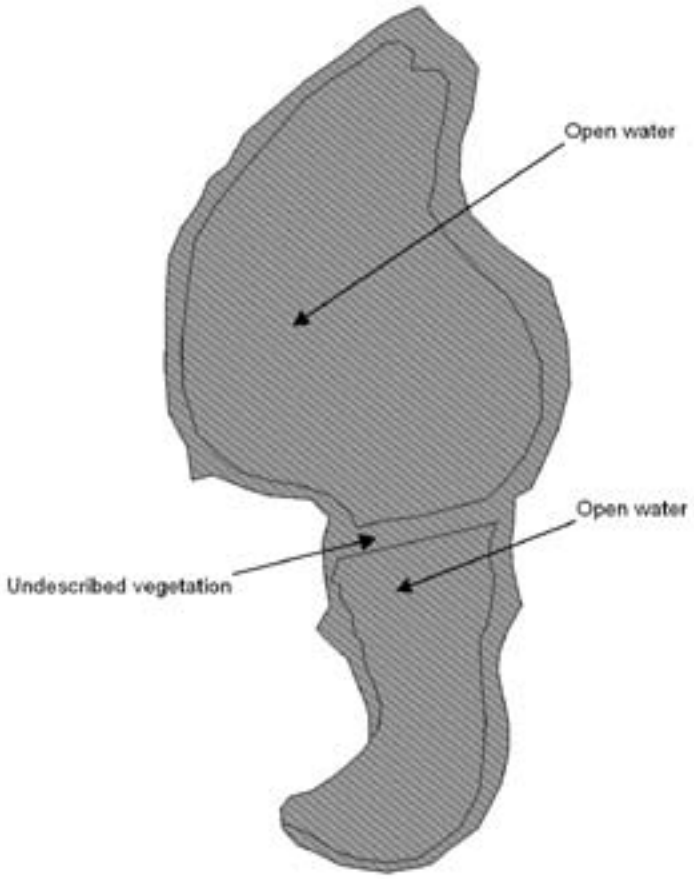
The lake is connected to the much larger Lake Kanono (Q09/058), from which it receives water. Although the lake was unfenced in 1989 (SSBI Q09/H014), threatened and regionally significant species have been recorded and it forms part of the eastern Pouto chain of lakes. Contains 1.8 ha of Chronically Threatened land environment A7.3a and 0.1 ha of At Risk environment G1.1c.

Q09/201 Finlayson's Lake and Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

4.2 Level 2 sites

The following 52 sites were assessed as Level 2 sites (Table 7). These are listed in alphabetical order in Section 9, and described and mapped as follows.

TABLE 7: LIST OF LEVEL 2 SITES

SITE NAME	SURVEY NO.	GRID REF.
Waihaupai Stream Shrubland and Forest	O07/012	P07 655 027
Ngakiriparauri Stream Shrubland and Wetland	O07/015	O07 676 015
Bruce Clear's Wetland	O07/017	O07 659 999
North Kai Iwi Stream Wetland and Forest	O07/025	O07 680 972
Lower Kai Iwi Stream Wetland, Shrubland and Forest	O07/026	O07 685 966
Kai Iwi Lakes South Shrubland	O07/027	O07 696 974, 699 972 698 979
Airstrip Road Wetland 1	P07/120a	P07 730 982
Airstrip Road Wetland 2	P07/120b	P07 725 978
Upper Te Kawa Stream Shrubland	P07/121	P07 743 981
Rehutai Road Wetland	P07/124a	P07 807 821
Omamari Station North Shrubland and Wetland	P07/125	P07 939 958
Omamari Station Wetland and Shrubland	P07/132	P07 760 5926
Arnesen Farm Shrubland	P07/134	P07 805 923
Opanake Road Forest Fragments	P07/136a	P07 839 923, 834 922
Peter Kelly's Lake and Wetland	P07/138	P07 726 911
Woodcock's Forest	P07/141a	P07 828 908
Opanake Road Swamp Forest	P07/149	P07 841 905
Babylon Coast Roadside Shrubland	P07/154	P07 796 879
Woodcock's Wetland	P07/157	P07 834 894
Basin Road Shrubland 1	P07/160	P07 775 867
Basin Road Shrubland 2	P07/161	P07 775 867
Hokianga Road Forest	P07/164	P07 867 868
Hoanga Road Forest	P07/165	P07 929 893
Scotty's Camp Road Shrubland	P07/167	P07 813 851
Bayly's Coast Road Wetland and Shrubland	P07/171a	P07 812 843
Bayly's Basin Road Wetland 1	P07/171b	P07 801 846
Bayly's Coast Road Wetland	P07/172	P07 825 838
Mangatara Flat Shrubland	P07/177	P07 844 820
Turiwiri Forest Remnants	P07/182	P07 899 824
Dargaville Domain Forest	P07/185	P07 884 834
Bayly's Basin Road Wetland 2	P07/206	P07 785 847
Sills Road Forest Remnants	P08/060	P08 964 757
Upper Aratapu Creek Shrubland	P08/062	P08 729 524
Reed's Farm Forest	P08/063	P08 950 730
Glinks Gully Wetland and Grassland	P08/073	P08 889 690
Lucich Wetland	P08/080	P08 914 652
Kernot Farm Shrubland	P08/081	P08 967 611

Pinaki Road South Wetland and Shrubland	P08/087	P08 985 597
Burgess Road South Shrubland	P08/088	P08 000 602
Barfoot's Shrubland	P08/092	P08 009 567
Barfoot's Gully Shrubland	P08/095	P08 018 556
Harrison Wetland	P08/096a	P07 655 027
Mosquito Gully Wetland	P08/099	P08 035 522
Black Lake	P08/207	P08 916 643
Lake Parawanui and Wetland	P08/212	P08 873 706
Lower Lake Rototuna Wetland	P09/002	P09 049 489
Phoebe's Lake and Wetland	P09/011a	P09 074 438
Pukemiro Wetland and Forest	P09/020	P09 095 442
The Spectacles Lakes and Wetland	Q09/202	Q09 142 373, 146 373
Swan Egg Pond and Wetland	Q09/203	Q09 129 400
Lake Waingata	Q09/204	Q09 138 383

WAIHAUPAI STREAM SHRUBLAND AND FOREST

Survey no.	O07/012
Survey date	28 November 2006
Grid reference	P07 655 027
Area	59 ha
Altitude	20–85 m asl

Ecological units

(a) Manuka shrubland on alluvium (61%)

(b) Mingimingi-gorse shrubland on hillslope (39%)

Landform/geology

Holocene alluvial and swamp deposits, and hillslopes eroded in deeply weathered Miocene basalt flows, and early Pleistocene (Awhitu Group) cemented dune sands and associated facies.

Vegetation

The site comprises

(a) a large tract of manuka shrubland on alluvium in the poorly drained lower reaches of the Waihaupai Stream. Manuka dominates over adventive grassland, and the site has been drained and is currently grazed. On neighbouring hillslopes there are several tracts of

(b) mingimingi-gorse shrubland with frequent kanuka and totara, also grazed.

Significant flora

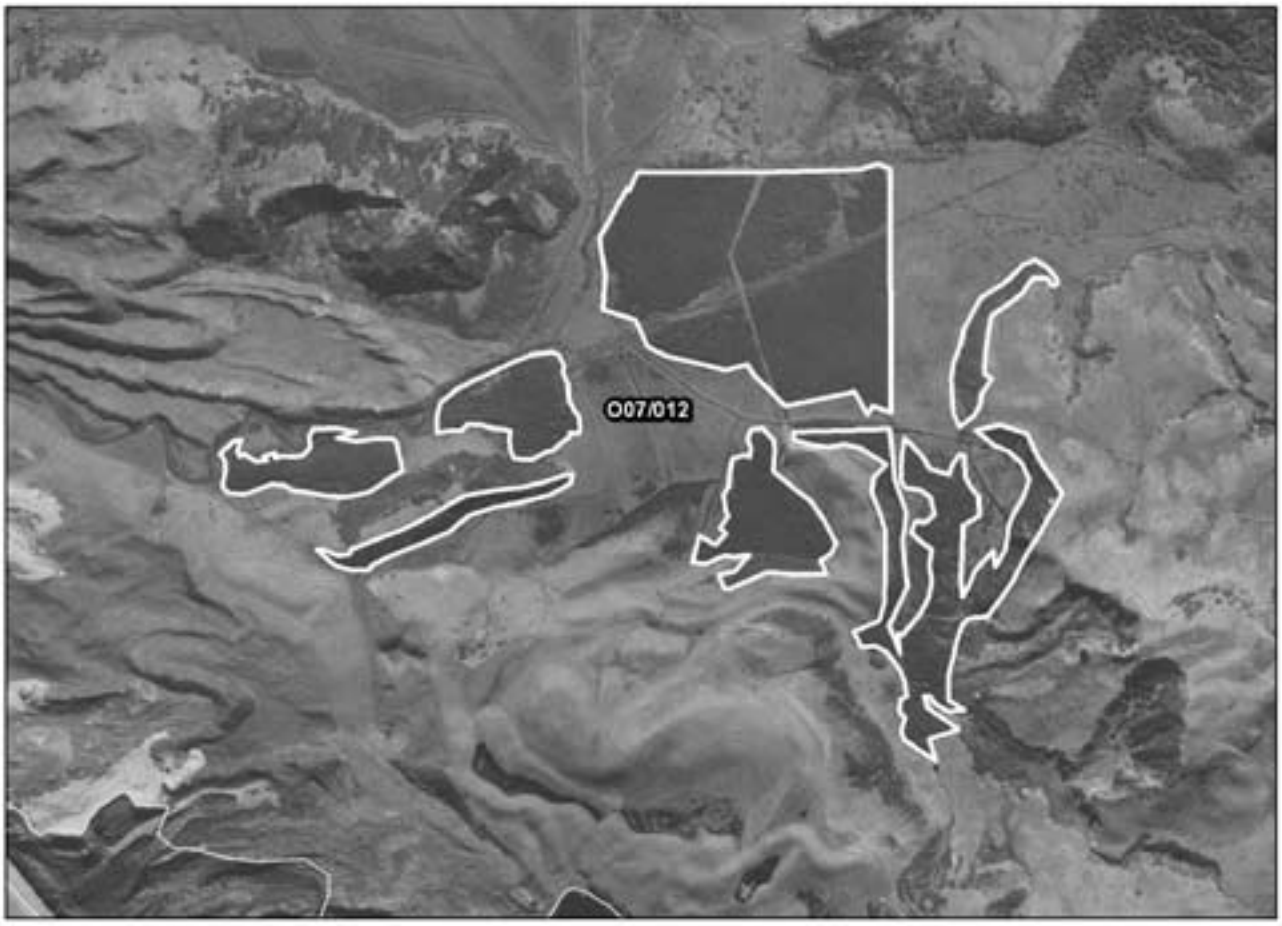
None noted.

Fauna

Banded kokopu (Regionally Significant), grey duck (Nationally Endangered), North Island fernbird (Sparse), grey warbler, silvereye, North Island fantail, New Zealand kingfisher, Pacific swallow, Australasian harrier, pukeko, paradise shelduck, Australasian pied stilt (SSBI O07/H004, 1978).

Significance

The site has suffered major degradation from drainage, grazing, and weed invasion (gorse, pampas) and as the threatened species records are historical (1978), this site remains at Level 2. Contains 46.4 ha of Acutely Threatened land environment A5.1b, 7 ha of Chronically Threatened environments A7.1a and A7.3a, and 25.2 ha of At Risk environments A6.1b and A6.1c. A very small proportion of it (0.8 ha) is already protected in Waihaupai Stream Marginal Strip, administered by DOC.

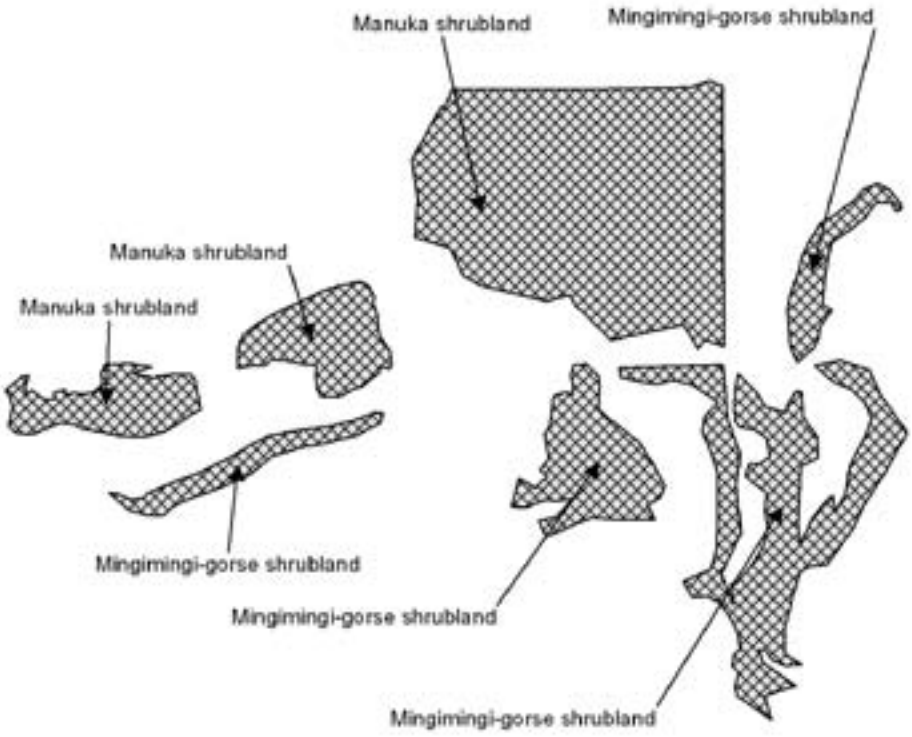


O07/012 Waihaupai Stream Shrubland and Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

NGAKIRIPARAURI STREAM SHRUBLAND AND WETLAND

Survey no.	O07/015
Survey date	14 December 2006
Grid reference	O07 676 015
Area	18 ha
Altitude	20–120 m asl

Ecological units

(a) Kanuka/manuka shrubland on hillslope (52%)

(b) Manuka shrubland on alluvium (19%)

(c) Raupo reedland on alluvium (29%)

Landform/geology

Hillslopes eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies, and Holocene alluvial and swamp deposits on valley floor.

Vegetation

The Ngakiriparauri Stream unit is entirely secondary. It is unfenced and in poor condition due to grazing by goats and sheep.

(a) Kanuka/manuka shrubland consists of abundant kanuka and manuka, frequent mamaku, and occasional wheki, radiata pine, pohutukawa, kohekohe, totara and gorse.

(b) Manuka shrubland on alluvium consists of abundant manuka, frequent raupo and occasional ti kouka, hangehange, kahikatea and pukatea.

(c) Raupo reedland consists of abundant raupo, frequent *Baumea arthrophylla*, and occasional Baumea juncea and harakeke.

Significant flora

None noted.

Fauna

New Zealand kingfisher, grey warbler.

Significance

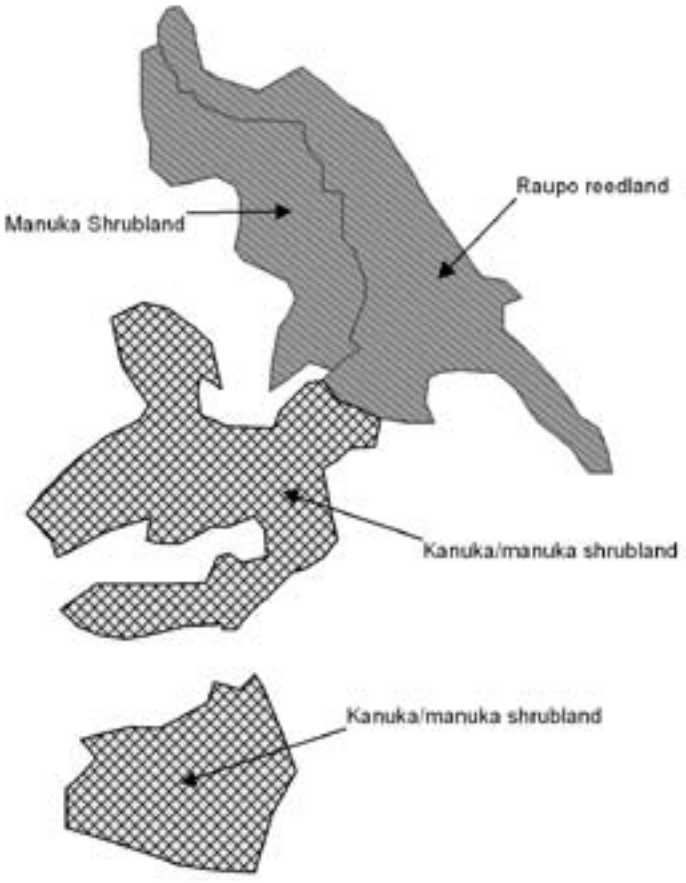
Widespread woody weed invasion of the kanuka/manuka shrubland and lack of fencing have substantially reduced the value of this site. Contains 2.2 ha of Acutely Threatened land environment A5.1b, 4.3 ha of Chronically Threatened environment A5.2a, and 10.9 ha of At Risk environments A6.1b and A6.1c.

O07/015 Ngakiriparauri Stream Shrubland and Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

BRUCE CLEAR'S WETLAND

Survey no.	O07/017
Survey date	14 December 2006
Grid reference	O07 659 999
Area	2 ha
Altitude	60–85 m asl

Ecological unit

(a) *Eleocharis sphacelata* reedland on alluvium (100%)

Landform/geology

Holocene swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield.

Vegetation

This is a previously drained wetland which has refilled; the owner reports numerous failed attempts at draining it. It is unfenced and completely surrounded by pasture; stock has access to the margin and major pugging is visible throughout. Over 10 pohutukawa logs lie at the western end; these have been recently cut. Introduced pasture grasses have invaded from surrounding paddocks. The unit is of poor quality due to the previous drainage attempts and its unfenced state.

(a) Reedland consists of abundant *Eleocharis sphacelata*, frequent rush species, and occasional raupo, water purslane, *Myriophyllum* species, *Leptinella nana*, *Utricularia* species. *Azolla pinnata*, *Isolepis prolifer*, *Centella uniflora*, *Myriophyllum propinquum*, pale rush, pohuehue, pohutukawa, duckweed, *Callitriche stagnalis*, lotus, wheki, and *E. acuta*.

Significant flora

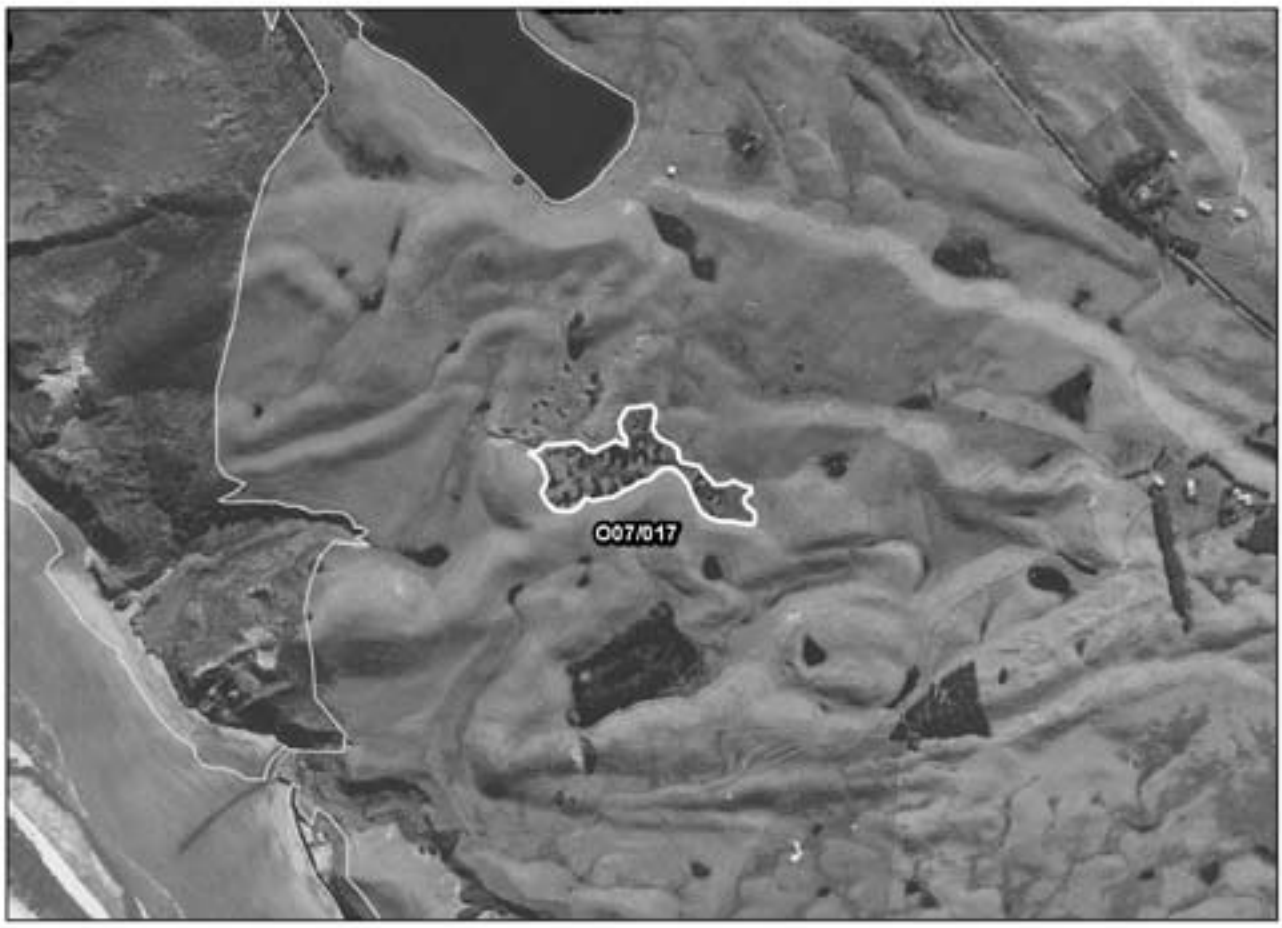
None noted.

Fauna

None noted.

Significance

Although wetlands are a threatened habitat type throughout Northland, grazing to the water's edge and substantial weed invasion have reduced the value of this site. Contains 2.3 ha of At Risk environments A6.1b and A6.1c.

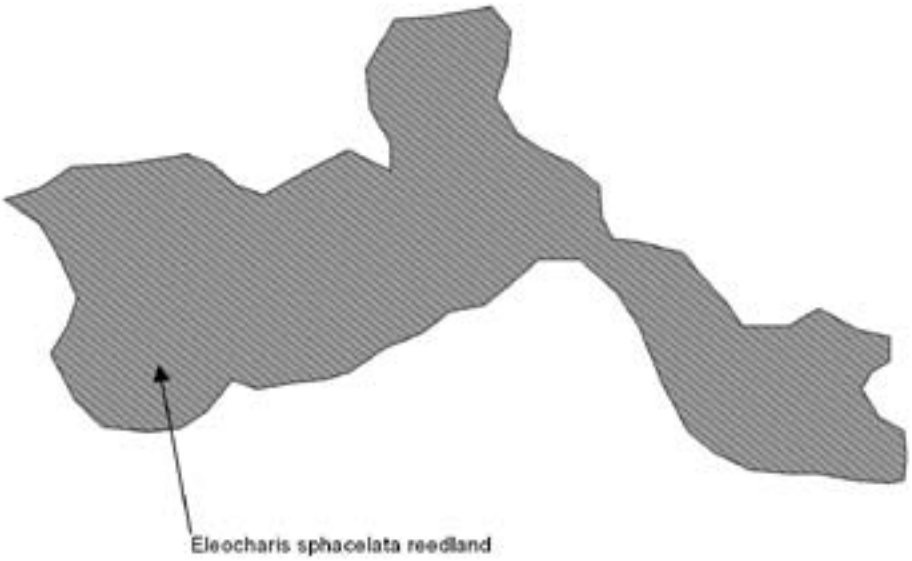


O07/017 Bruce Clear's Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

NORTH KAI IWI STREAM WETLAND AND FOREST

Survey no. O07/025
Survey date 12 December 2006
Grid reference O07 680 972
Area 5 ha
Altitude 0–40 m asl

Ecological units

(a) Pohutukawa forest on hillslope (30%)

(b) Raupo reedland on alluvium (8%)

(c) Hangehange-oioi shrub-rushland on coastal faces (60%)

(d) Undescribed wetlands (2%)

Landform/geology

Holocene swamp deposits in depressions on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield.

Vegetation

This gully is smaller than lower Kai Iwi Stream gully (O07/026) but has similar plant communities. The pohutukawa forest at the mouth is fenced at the seaward end only and is in good condition. Further inland, there is scattered pohutukawa amongst pasture and shrubland which is unfenced and in poor condition. Raupo wetland at the mouth of the gully is highly modified by grazing stock. The coastal cliff faces at mouth of the gully are in good condition with dense vegetation.

(a) Pohutukawa forest consists of abundant pohutukawa. Ground cover consists of some New Zealand spinach.

(b) Raupo reedland consists of abundant raupo.

(c) Coastal cliff vegetation consists of common oioi, hangehange, frequent pohutukawa, harakeke, mingimingi, coastal toetoe, and sand coprosma, and occasional tauhinu, *Asplenium oblongifolium*, tree lupin, adventive iceplant, hairy birdsfoot trefoil, and native iceplant.

(d) Two undescribed wetlands are included in this site.

Significant flora

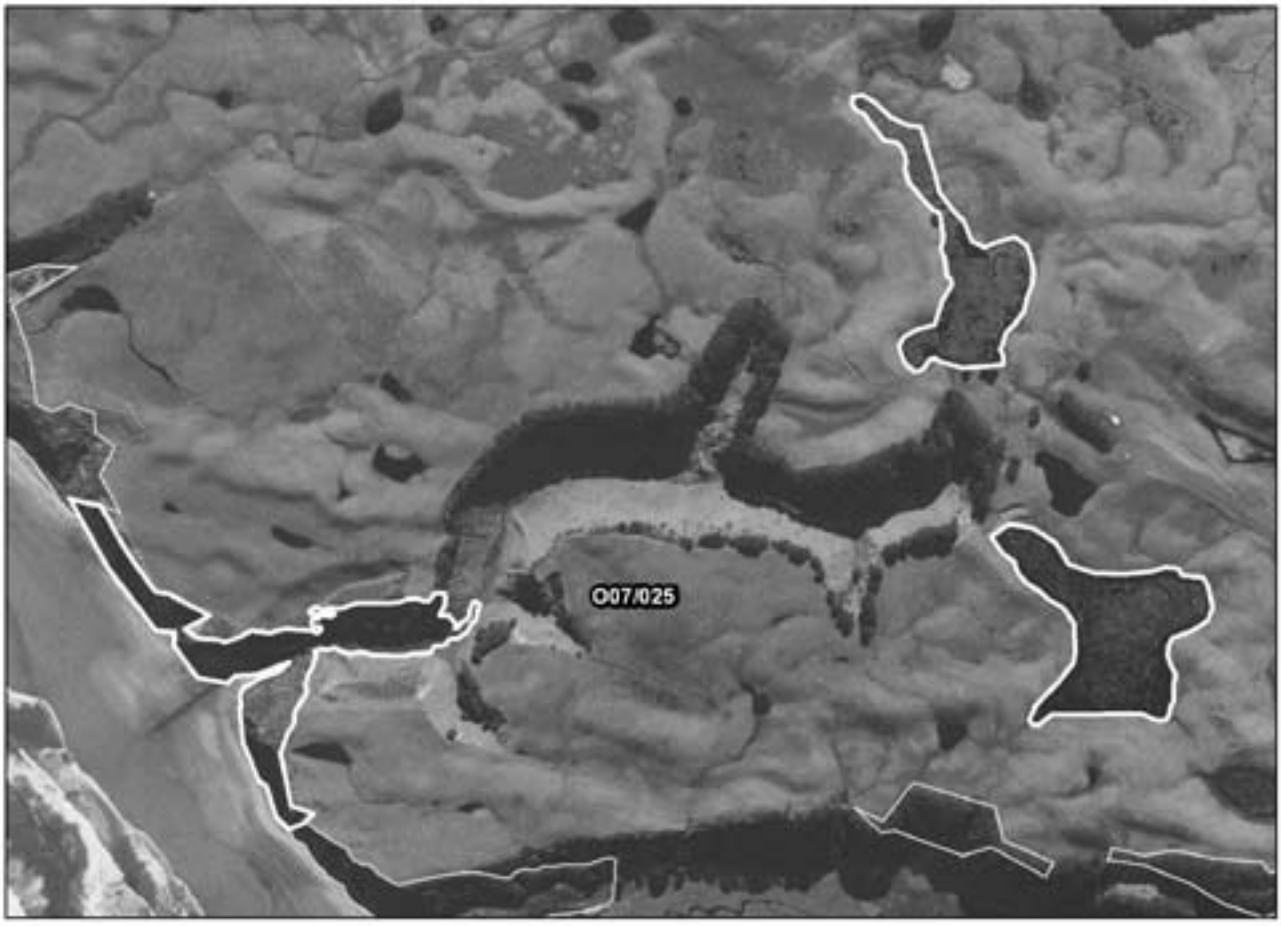
Sand coprosma (Regionally Significant), recorded during this survey.

Fauna

Pacific swallow, grey warbler, Australasian harrier, North Island fantail.

Significance

The highly modified nature of the wetland and the poor condition of it reduce the value of this site. Contains 2.9 ha of At Risk land environments A6.1b and G1.1c. A very small proportion of the site is already protected in Ureti Marginal Strip (0.1 ha), administered by DOC.

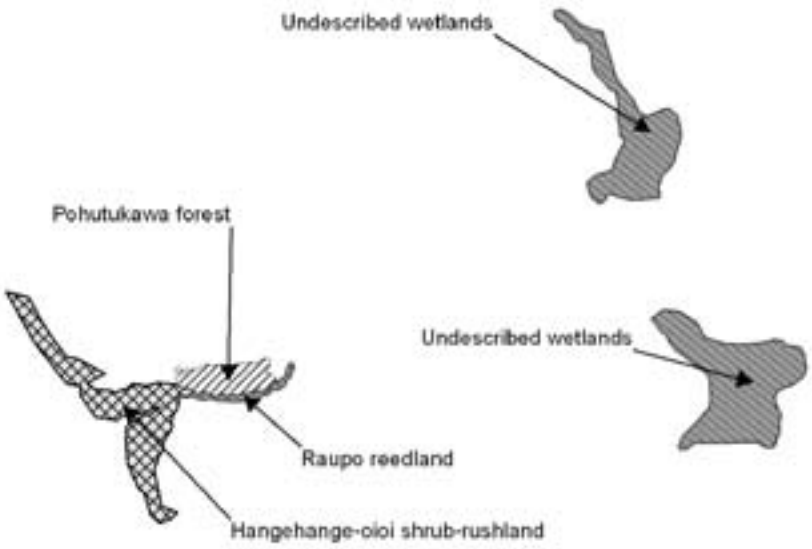


O07/025 North Kai Iwi Stream Wetland and Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

LOWER KAI IWI STREAM WETLAND, GRASSLAND, SHRUBLAND AND FOREST

Survey no.	O07/026
Survey date	12 December 2006
Grid reference	O07 685 966
Area	12 ha
Altitude	0–85 m asl

Ecological units

(a) Manuka shrub wetland on alluvium (O07 696 965) (6%)

(b) Manuka shrubland on hillslope (O07 691 965 and O07 685 966) (23%)

(c) Pohutukawa forest on hillslope (O07 678 966) (11%)

(d) Tussockland on dunes (O07 679 966) (8%)

(e) Sandfield community (O07 679 965) (3%)

(f) Hangehange-oioi shrub rushland on coastal faces (O07 679 964 and O07 676 966) (49%)

Landform/geology

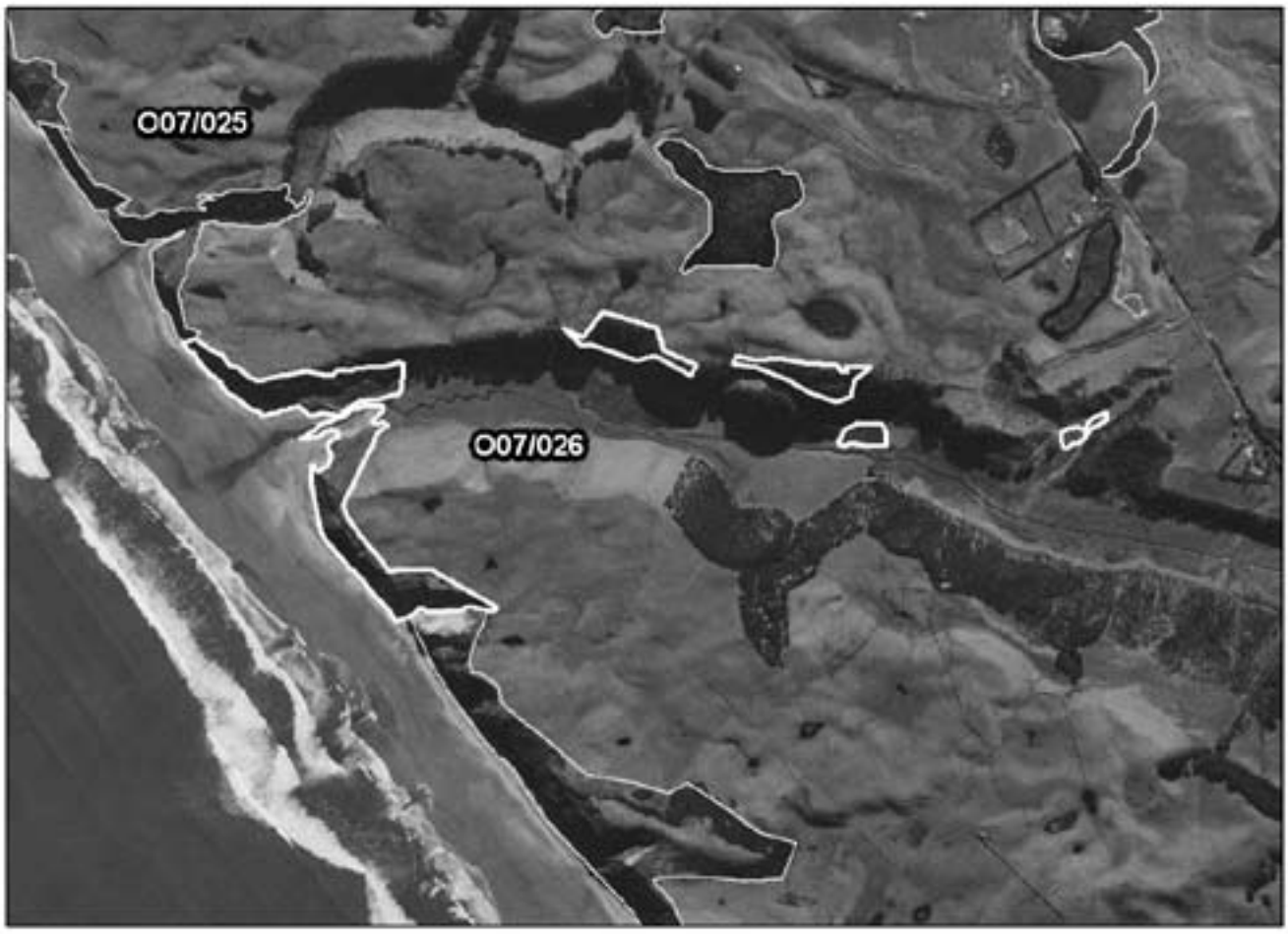
Coastal cliffs and hillslopes in valley cut in mid-late Pleistocene (Karioitahi Group) consolidated dune sand. Holocene dunes at mouth of the Kai Iwi Stream.

Vegetation

Lower Kai Iwi Stream gully has scattered pockets of native vegetation. Of these, the two wetland pockets at the eastern end are tiny unfenced fragments fringed with weeds but in reasonable condition. Both wetlands are pugged and grazed by cattle. Along the ridge and south-facing slope north of the gully are two pockets of manuka shrubland, both unfenced but in reasonable condition, with pine trees invading in places. The canopy of the manuka shrubland is 2–4 m tall. The pohutukawa forest pocket at the southern mouth of the gully, is fenced with a canopy 10–12 m high and has a fringe of bracken on the edge. Pohutukawa trees are also scattered east of the fenced forest. The gully mouth also encompasses a river mouth dune area which grades into coastal toetoe shrubland on the north, located below the pohutukawa forest. To the south of the river flat is a sandflat community. Coastal cliff face communities to the north and south of the gully mouth are in excellent condition with dense vegetation cover; pohutukawa trees are scattered across northern coastal face.

(a) The manuka shrub wetland consists of abundant manuka with occasional raupo, wheki, ponga, *Baumea rubiginosa*, swamp kiokio, mingimingi, tangle fern, *Baumea teretifolia*, bracken and mistflower.

(b) Manuka shrubland consists of abundant manuka, frequent Spanish heath and occasional mamaku, ponga, pampas, hangehange, harakeke, *Lepidosperma laterale*, bracken, and coastal karamu. Ground cover consists of rasp fern, ragwort, pasture grasses, *Nertera setulosa*,

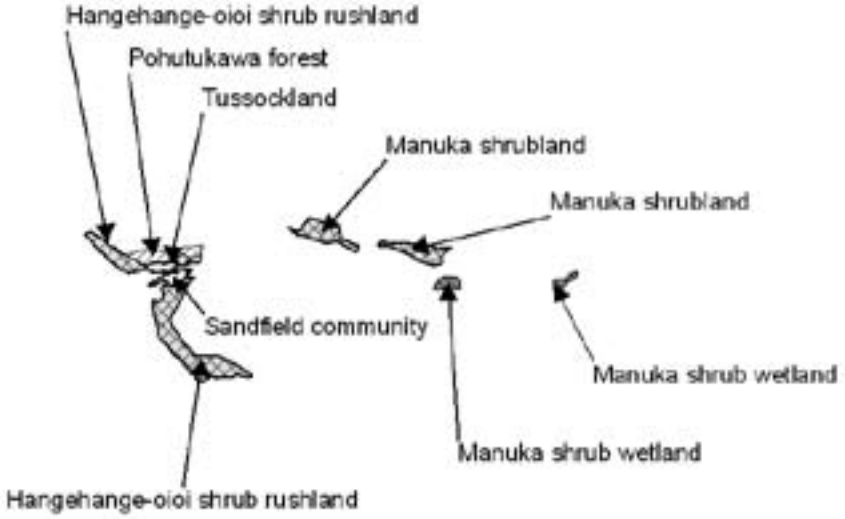


O07/026 Lower Kai Iwi Stream Wetland, Grassland, Shrubland and Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

blackberry, *Adiantum hispidulum*, *Microlaena stipoides*, and pohuehue.

(c) Pohutukawa forest consists of abundant pohutukawa, frequent karaka, and occasional boxthorn. The understorey consists of coastal toetoe, harakeke, rasp fern, hangehange, kowharawhara, *Asplenium oblongifolium* and bracken. Ground cover consists of New Zealand spinach.

(d) Tussockland on dunes consists of common coastal toetoe, pingao, and spinifex, frequent harestail, oioi, knobby clubrush, mingimingi, and harakeke, and occasional bracken, pohuehue, shore bindweed, and tree lupin.

(e) Sandfield consists of common *Lilium* species, shore bindweed, lotus, knobby clubrush, sand wind grass, water purslane and sand sedge, with frequent oioi.

(f) The coastal cliff community consists of common oioi and hangehange, frequent pohutukawa, harakeke, mingimingi, coastal toetoe and sand coprosma, and occasional tauhinu, *Asplenium oblongifolium*, tree lupin, adventive iceplant, hairy birdsfoot trefoil, Yorkshire fog, remuremu, and native iceplant.

Significant flora

Pingao (Gradual Decline) and sand coprosma (Regionally Significant), both recorded during this survey.

Fauna

Pacific swallow, grey warbler, Australasian harrier, North Island fantail.

Significance

The very fragmented nature of the vegetation and weed invasion and stock intrusion in much of it reduce the value of this diverse and potentially valuable site. Contains 2.4 ha of Acutely Threatened land environments A5.1b, and 5.8 ha of At Risk environments A6.1b, A6.1c, and G1.1c.

KAI IWI LAKES SOUTH SHRUBLAND

Survey no.	O07/027
Survey date	12 December 2006
Grid reference	(a) O07 696 974, 699 972, (b) 698 979
Area	52 ha
Altitude	55–120 m asl

Ecological units

(a) Kanuka/manuka shrubland on hillslope (60%)

(b) Undescribed shrubland (40%)

Landform/geology

Hillslopes eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies, and in mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunes, with Holocene alluvial and swamp deposits in depressions.

Vegetation

This site supports

(a) several patches of kanuka/manuka shrubland, the smaller ones not fenced and in poor condition, the larger ones fenced and in reasonable condition. There has been local maritime pine and Sydney golden wattle invasion. Kanuka or manuka are variously dominant. The understorey of kanuka-dominant areas consists of hangehange, mingimingi, and tangle fern.

(b) There is an undescribed patch of shrubland to the east.

Significant flora

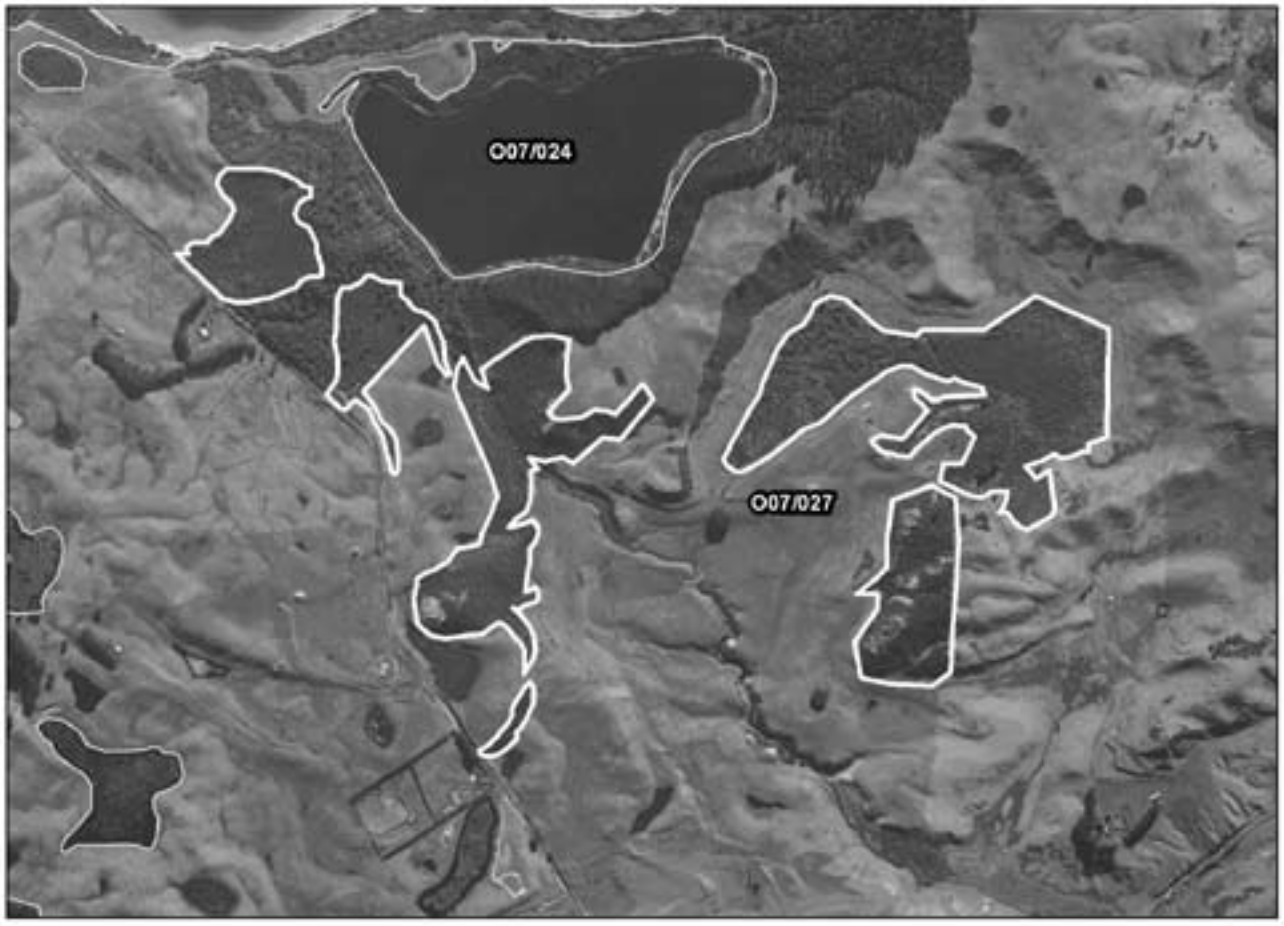
None noted.

Fauna

None noted.

Significance

The fragmented nature of the site and the degree of woody weed invasion reduce its value. Contains 36 ha of Chronically Threatened land environment A5.2a, and 15.5 ha of At Risk environments A6.1b and A6.1c.

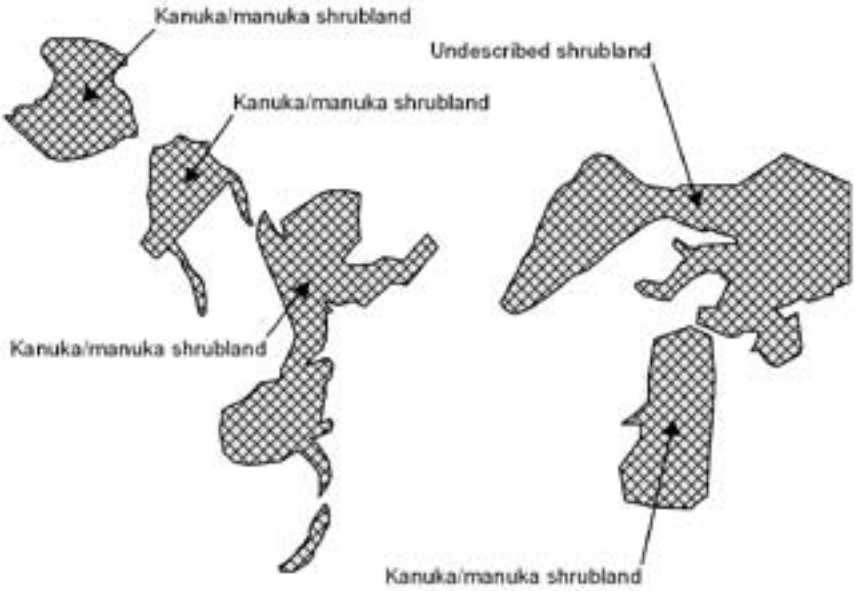


O07/027 Kai Iwi Lakes South Shrubland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

AIRSTRIP ROAD WETLAND 1

Survey no.	P07/120a
Survey date	12 December 2006
Grid reference	P07 730 982
Area	2.2 ha
Altitude	115–130 m asl

Ecological units

(a) Raupo reedland on alluvium

(b) *Eleocharis acuta* sedgeland on alluvium (both units together 100%)

Landform/geology

Holocene swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This site comprises

(a) Raupo reedland with occasional manuka, harakeke, bracken, and mamaku, and

(b) *Eleocharis acuta* sedgeland with swamp millet common, frequent lotus and occasional raupo and *Baumea* species. They are not mapped separately.

Significant flora

None noted.

Fauna

New Zealand kingfisher, paradise shelduck.

Significance

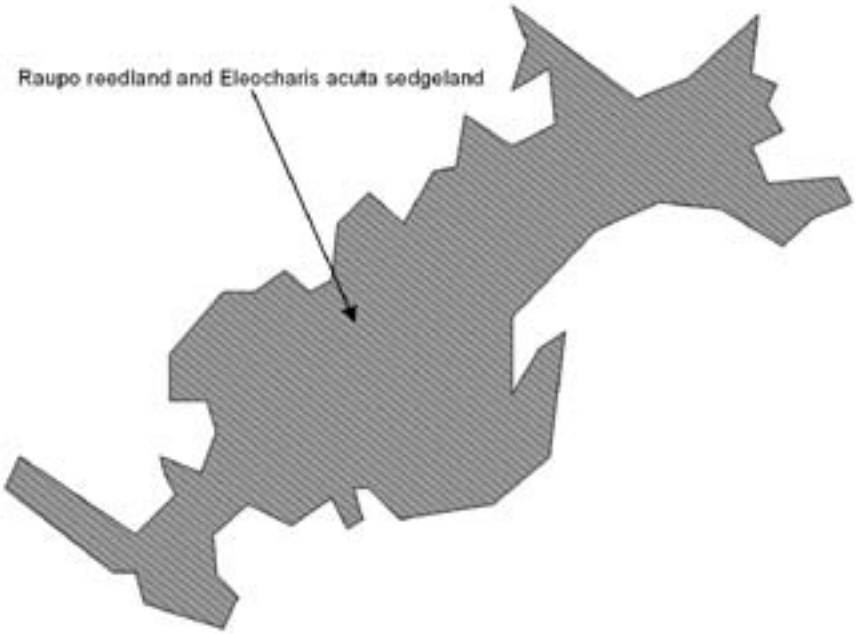
Although wetlands are a threatened habitat type throughout Northland, the site has been seriously degraded by grazing and trampling. Contains 2.1 ha of At Risk land environment A6.1c.

P07/120A Airstrip Road Wetland 1

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

AIRSTRIP ROAD WETLAND 2

Survey no.	P07/120b
Survey date	12 December 2006
Grid reference	P07 725 978
Area	2.3 ha
Altitude	50–70 m asl

Ecological units

(a) Raupo reedland on alluvium (56%)

(b) *Isolepis distigmatosa* sedgeland on alluvium (44%)

Landform/geology

Holocene swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This site comprises

(a) raupo reedland with occasional manuka and

(b) a small area of *Isolepis distigmatosa* sedgeland with common swamp millet and *I. reticularis* in a valley bottom. Lotus is common throughout.

Significant flora

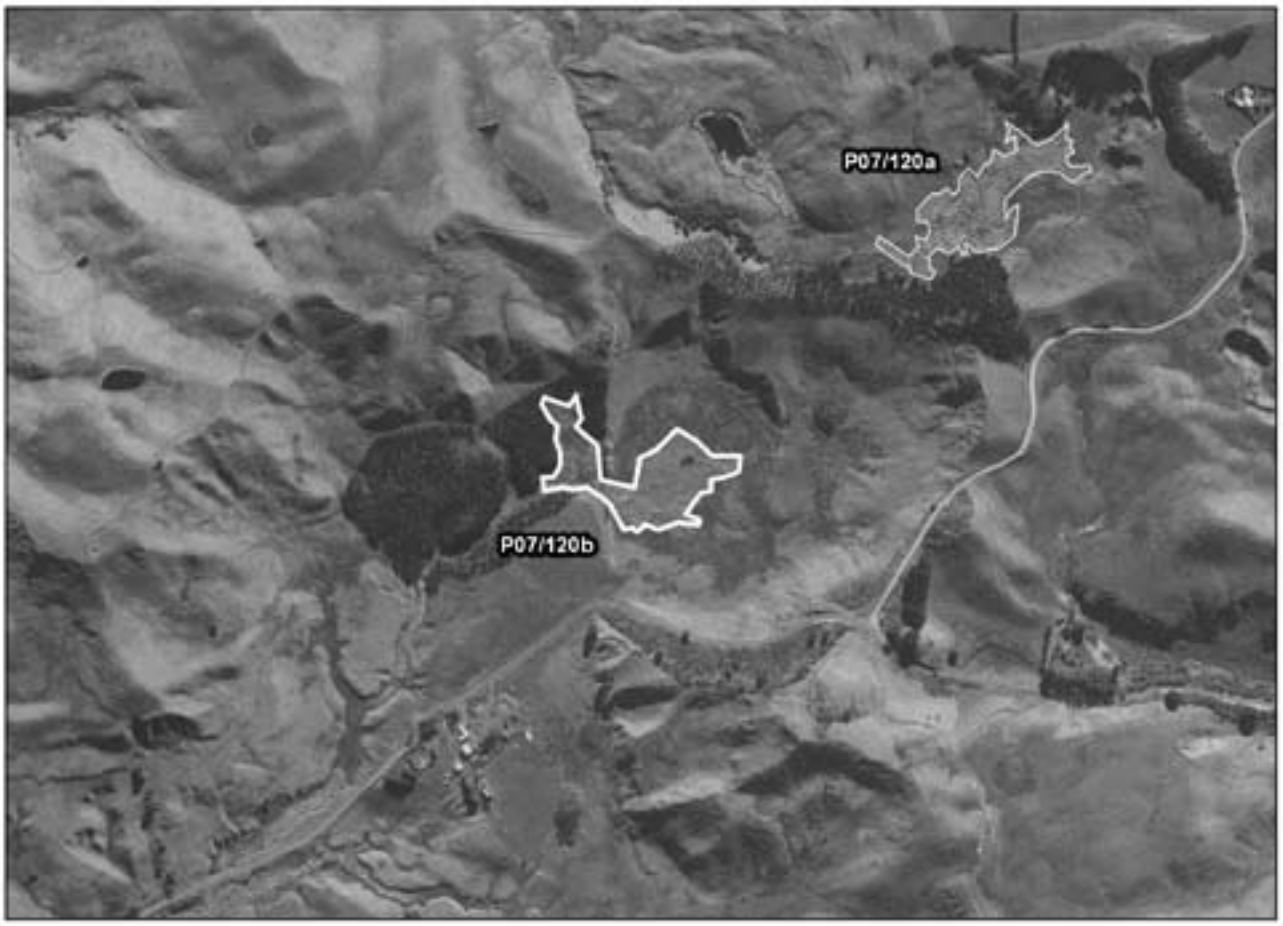
None noted.

Fauna

New Zealand kingfisher, paradise shelduck.

Significance

Although wetlands are a threatened habitat type in Northland, the site has been seriously degraded by grazing and trampling and the (drier) sedgeland in particular has been heavily invaded by adventives. Nevertheless, restoration by fencing should be considered. Contains 1 ha of At Risk land environment A5.2a.

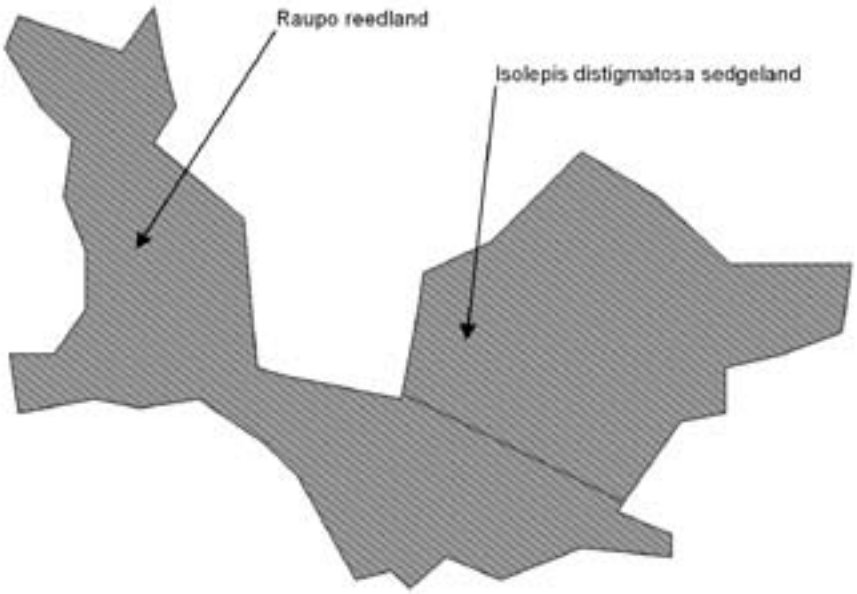


P07/120B Airstrip Road Wetland 2

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

UPPER TE KAWA STREAM SHRUBLAND

Survey no.	P07/121
Survey date	12 December 2006
Grid reference	P07 743 981
Area	1.3 ha
Altitude	110–140 m asl

Ecological unit

(a) Kanuka/manuka shrubland on hillslope (100%)

Landform/geology

Holocene swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This site comprises a narrow band of kanuka shrubland/forest on south-facing hillslopes above the Te Kawa Stream. Trees appear healthy and the canopy is dense. The site is unfenced.

(a) Shrubland consists of abundant kanuka and manuka with occasional totara, rewarewa, mingimingi, and mamaku.

Significant flora

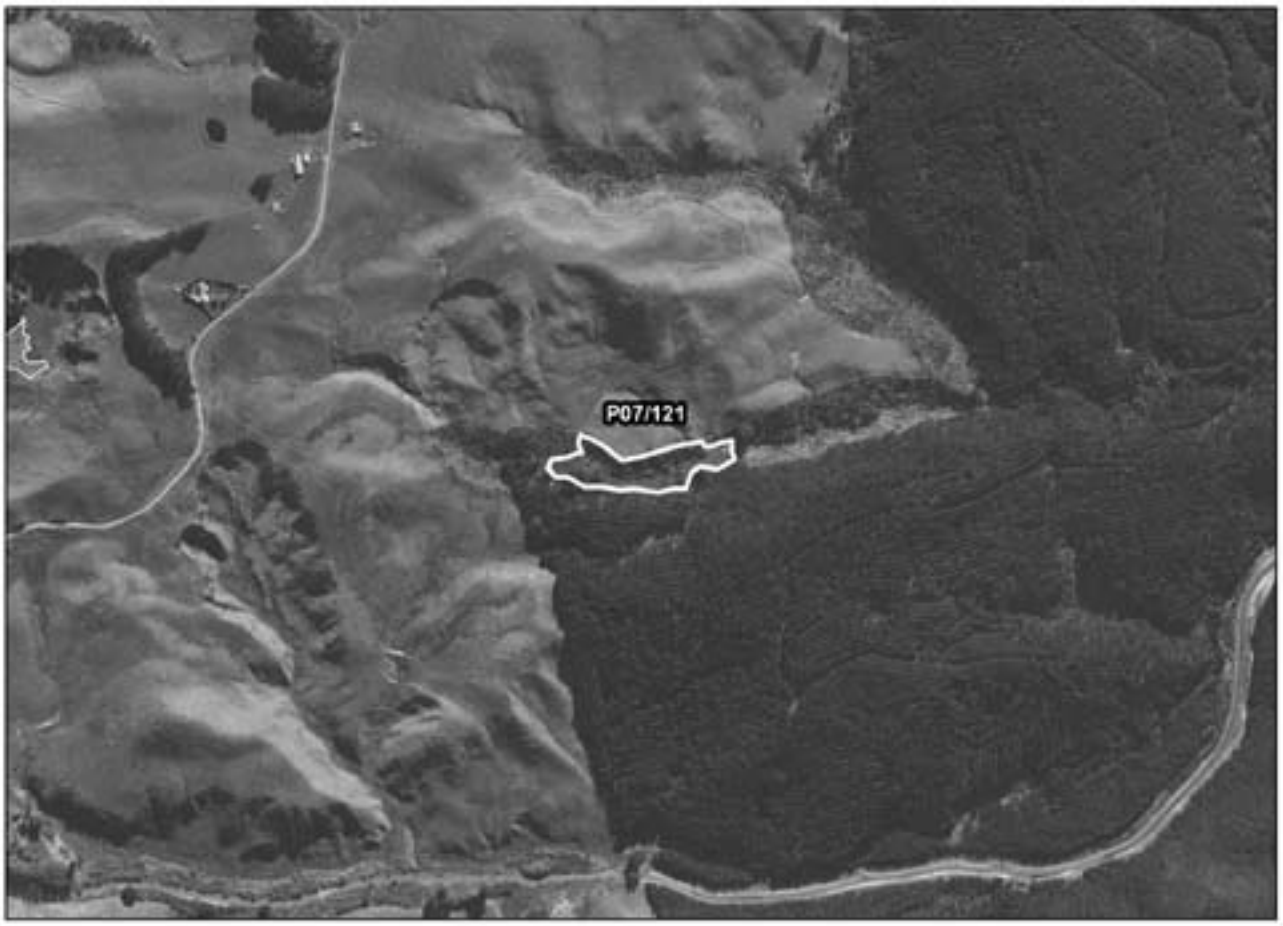
None noted.

Fauna

None noted.

Significance

Although this site provides riparian protection for Te Kawa Stream, it has been degraded to some extent by weed invasion (brush wattle) and appears to be grazed. Contains 1.4 ha of Chronically Threatened land environment A5.2a.

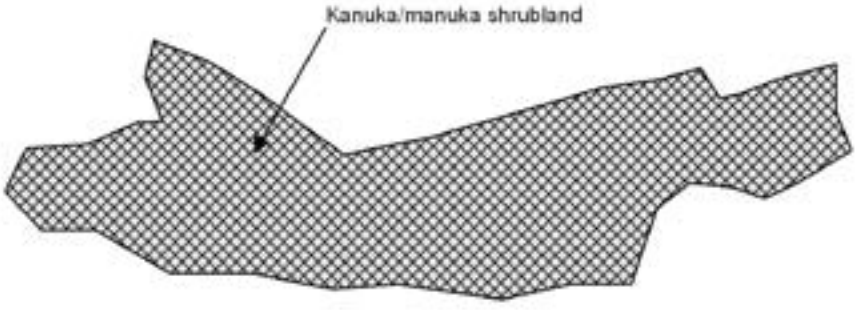


P07/121 Upper Te Kawa Stream Shrubland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

REHUTAI ROAD LAKE AND WETLAND

Survey no.	P07/124a
Survey date	15 December 2006
Grid reference	P07 807 821
Area	2 ha
Altitude	95–110 m asl

Ecological units

(a) *Baumea articulata* reedland on alluvium

(b) *Eleocharis sphacelata* reedland on alluvium (both units comprise 50%)

(c) Open water (50%)

Landform/geology

Holocene swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield.

Vegetation

This site comprises wetland communities dominated either by

(a) *Baumea articulata* or

(b) *Eleocharis sphacelata* (not mapped separately) around

(c) an artificial lake.

Significant flora

None noted.

Fauna

Paradise shelduck.

Significance

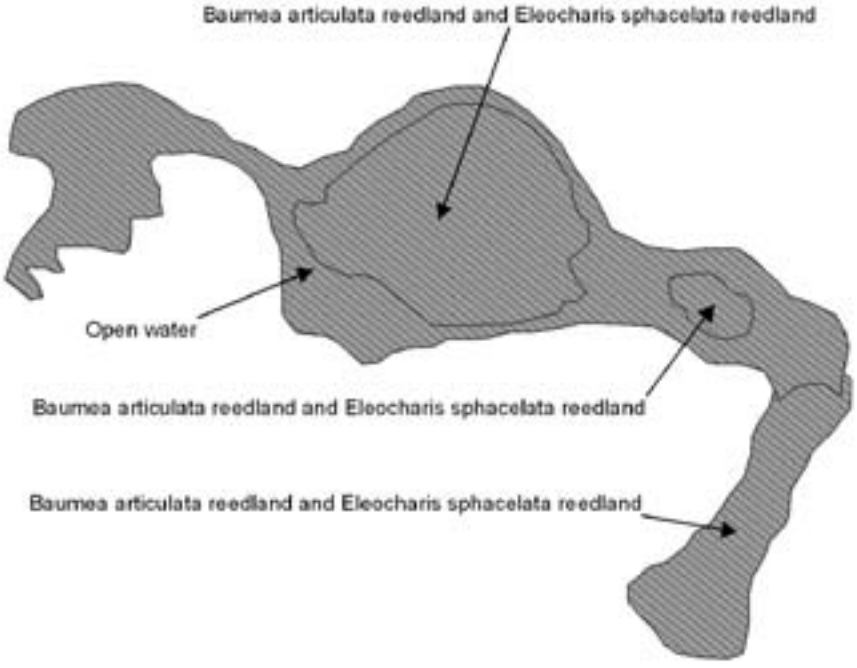
Although wetlands are a threatened habitat type throughout Northland, the site is grazed and heavily invaded by weeds around the margins. Contains 2 ha of Chronically Threatened land environment A 7.3a.

P07/124A Rehutai Road Lake and Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

OMAMARI STATION NORTH SHRUBLAND AND WETLAND

Survey no.	P07/125
Survey date	12 December 2006
Grid reference	P07 939 958
Area	23 ha
Altitude	20–120 m asl

Ecological units

(a) Kanuka/manuka treeland on hillslope (86%)

(b) Raupo reedland on alluvium (14%)

Landform/geology

Hillslopes eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This modified site comprises two contiguous vegetation types.

(a) Raupo reedland in finger valleys contains some harakeke.

(b) Several patches of adjacent treeland on steep hillslopes support kanuka/manuka treeland with rewarewa and mapau, substantially invaded by pampas and brush wattle.

Significant flora

None noted.

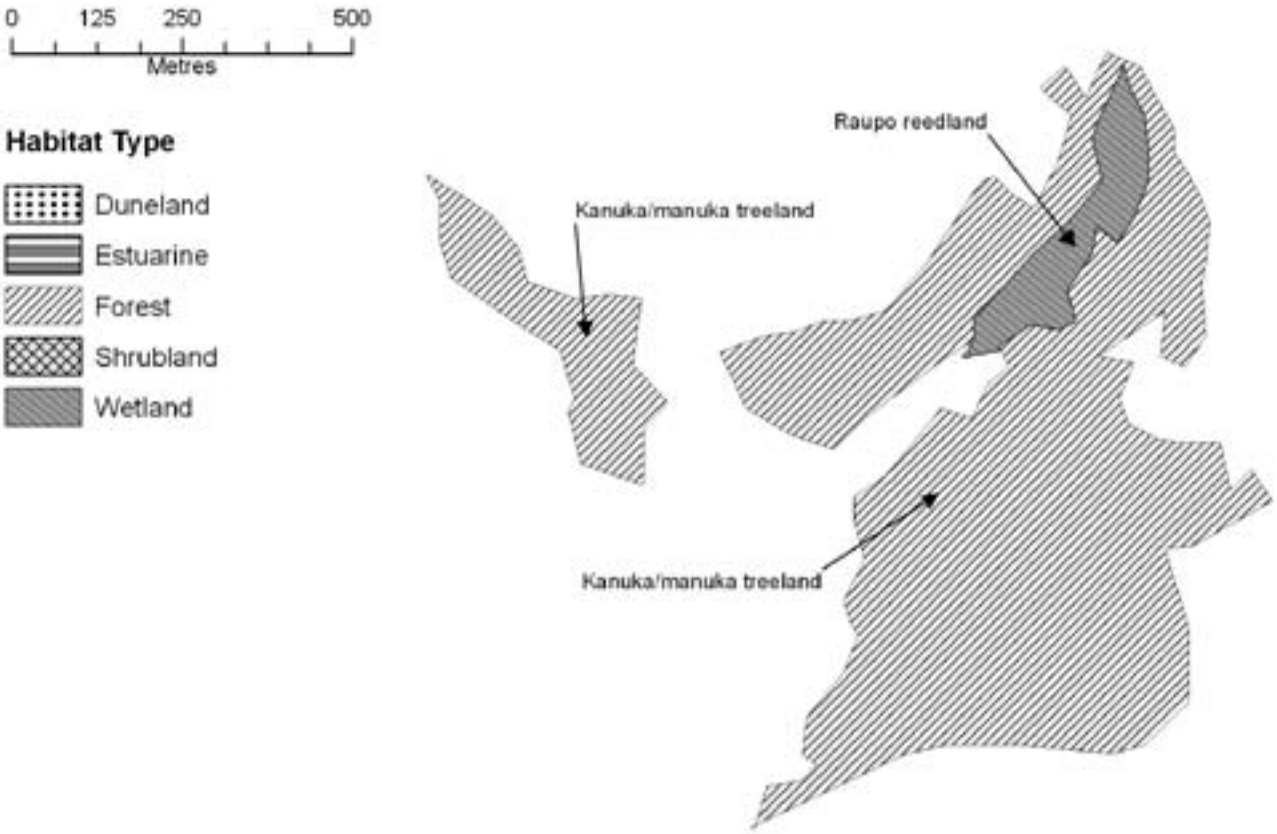
Fauna

None noted.

Significance

A modified site, degraded by grazing and weed invasion. Contains 0.8 ha of Acutely Threatened land environment A5.1b and 20.3 ha of At Risk environments A6.1b and A6.1c.

P07/125 Omamari Station North Shrubland and Wetland



Aerial photography flown 2002

OMAMARI STATION WETLAND AND SHRUBLAND

Survey no.	P07/132
Survey date	12 December 2006
Grid reference	P07 760 5926
Area	15 ha
Altitude	20–40 m asl

Ecological units

(a) Raupo reedland on alluvium (74%)

(b) Manuka shrubland on colluvium (15%)

(c) Kanuka/manuka shrubland on hillslope (11%)

Landform/geology

Holocene alluvial and swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This modified site comprises three contiguous vegetation types, fragmented by several roads.

(a) Raupo reedland contains some manuka and ti kouka.

(b) Manuka shrubland contains mamaku, harakeke, and *Dracophyllum lessonianum*.

(c) Kanuka/manuka shrubland has some rewarewa and dally pine.

Significant flora

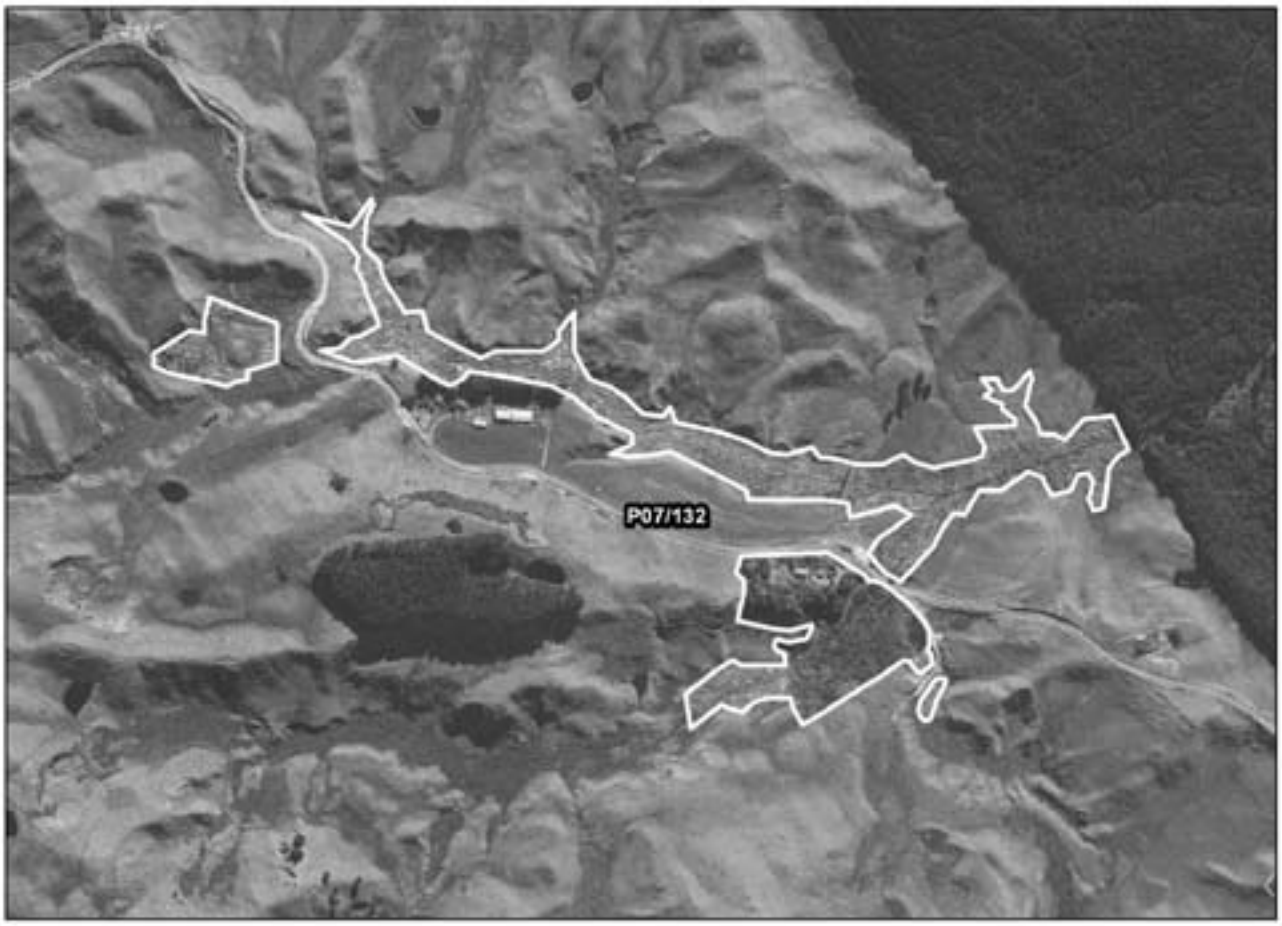
None noted.

Fauna

None noted.

Significance

Although wetlands are a threatened habitat type in Northland, this site is degraded by fragmentation, grazing, and weed invasion. Contains 5.3 ha of Acutely Threatened land environment A5.1b, 4.6 ha of Chronically Threatened environment A5.2a, and 5.6 ha of At Risk environment A6.1b.

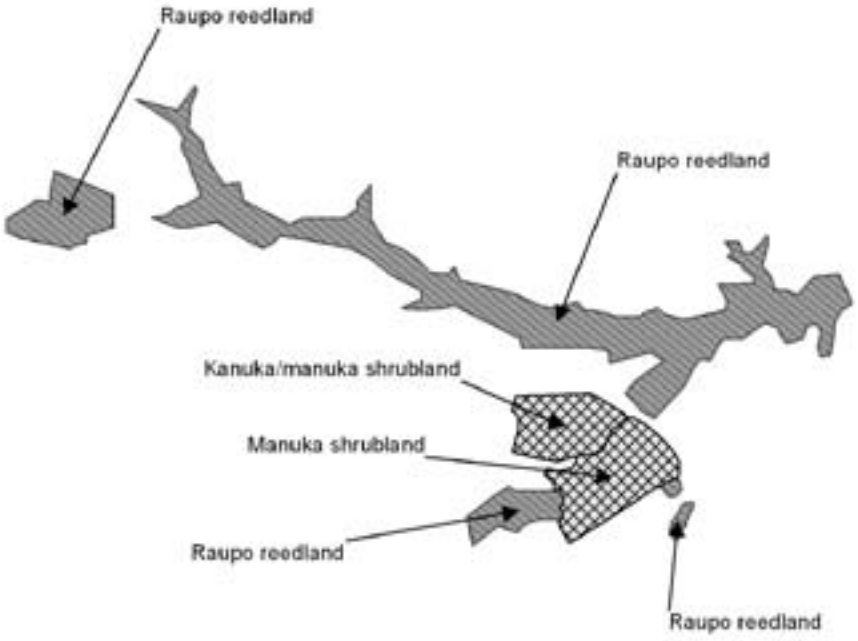


P07/132 Omamari Station Wetland and Shrubland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

ARNESEN FARM SHRUBLAND

Survey no.	P07/134
Survey date	1 December 2006
Grid reference	P07 805 923
Area	11 ha
Altitude	20 m asl

Ecological units

(a) Ti kouka treeland on alluvium (15%)

(b) Manuka shrubland on alluvium (85%)

Landform/geology

Holocene alluvial and swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This site occupies poorly drained alluvium in the lower reaches of an un-named tributary of the Kaihu River. Beside SH12 there is

(a) a stand of ti kouka treeland; other prominent species are harakeke, manuka, and pampas. Most of the site supports

(b) manuka-harakeke-ti kouka shrubland in a mosaic of adventive grassland. The site has been drained by deep ditches which are periodically maintained. A number of widespread wetland species (e.g., raupo, *Coprosma propinqua*, *Baumea arthrophylla*), were recorded.

Significant flora

None noted.

Fauna

None noted.

Significance

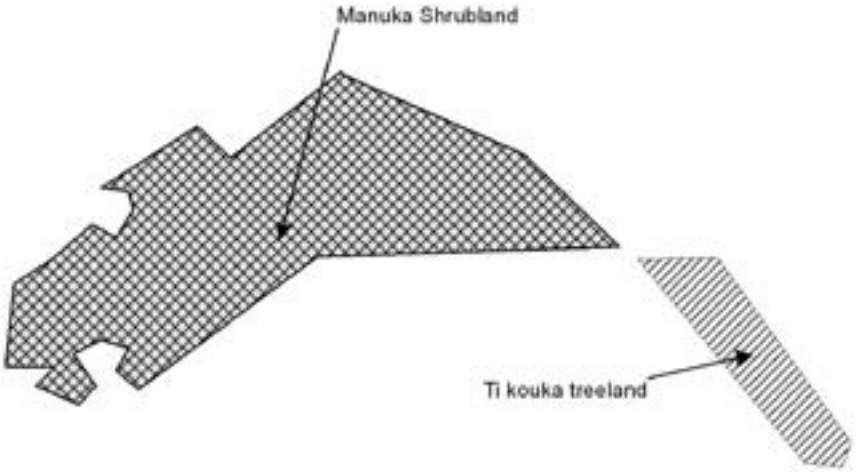
Although alluvial habitats are a threatened habitat throughout Northland, this site has seriously degraded by drainage and grazing, which has led to major encroachment by adventive plants, including some serious weeds (blackberry, pampas). Contains 0.8 ha of Acutely Threatened land environment A5.1c and 10.8 ha of At Risk environment G3.1b.

P07/134 Arnesen Farm Shrubland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

OPANAKE ROAD FOREST FRAGMENTS

Survey no.	P07/136a
Survey date	28 November 2006
Grid reference	P07 839923 (a), 834922 (b)
Area	7 ha
Altitude	20–70 m asl

Ecological units

(a) Totara-kahikatea-kanuka forest on hillslope

(b) Kanuka forest on hillslope (both units together comprise 100%)

Landform/geology

Hillslopes on undifferentiated Mangakahia Complex sediments, and overlying early Pleistocene (Awhitu Group) cemented dune sands and associated facies.

Vegetation

The site comprises two patches of secondary forest in the upper catchment of an un-named tributary of the Kaihu River. Patch (a), nearer Opanake Road, has more conifers emergent through the kanuka canopy than the more distant patch (b). Both are grazed, and there has been some weed invasion (gorse, radiata pine). The units are not mapped separately.

Significant flora

None noted.

Fauna

New Zealand kingfisher.

Significance

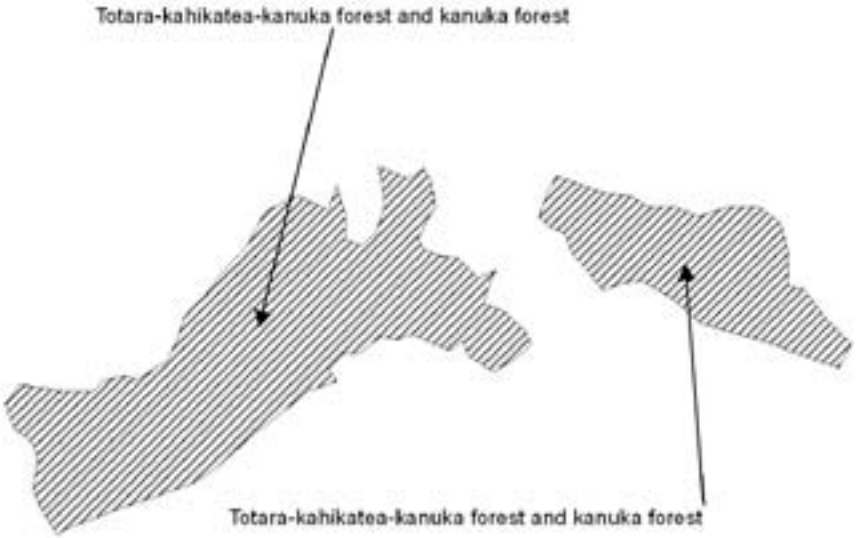
Weed invasion, fragmentation, and grazing have reduced the value of this site. Contains 6.8 ha of Chronically Threatened land environment A5.2a.

P07/136A Opanake Road Forest Fragments

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

PETER KELLY'S LAKE AND WETLAND

Survey no.	P07/138
Survey date	14 December 2006
Grid reference	P07 726 911
Area	2 ha
Altitude	80–100 m asl

Ecological units

(a) Raupo-*Eleocharis sphacelata* reedland on alluvium (51%)

(b) Open water (49%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield.

Vegetation

This farm pond and wetland unit is unfenced and grazed with cattle pugging throughout. It is of poor quality and surrounded by pasture.

(a) Wetland vegetation consists of abundant raupo, common *Eleocharis sphacelata* and occasional *Baumea articulata* and giant umbrella sedge, beside

(b) an artificial pond.

Significant flora

None noted.

Fauna

New Zealand scaup (Regionally Significant), paradise shelduck.

Significance

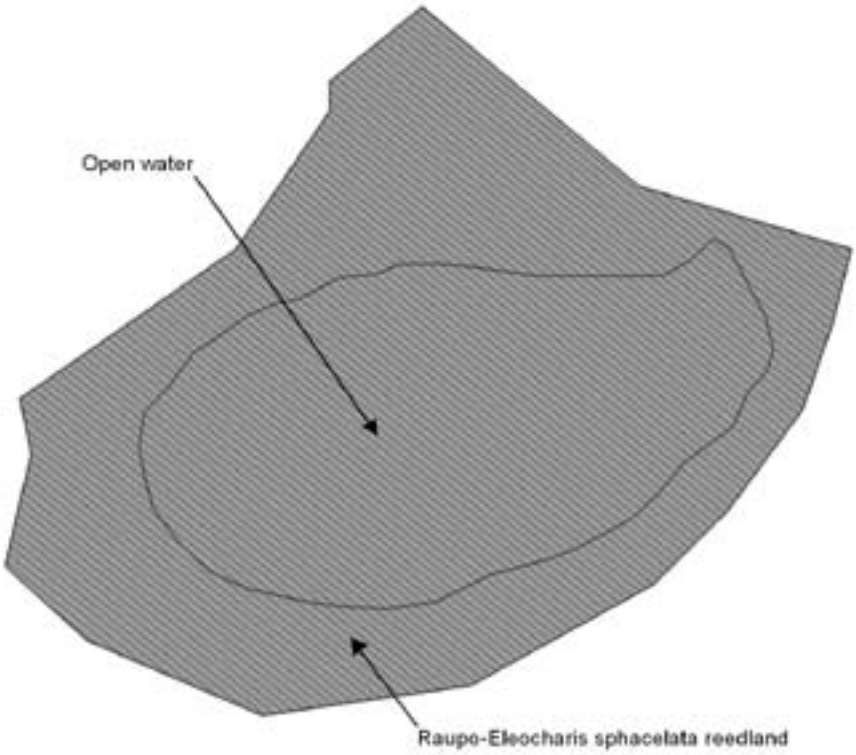
Wetlands are a threatened habitat type in Northland, and this site supports a regionally significant species. However, stock intrusion has reduced its value. Contains 0.9 ha of Chronically Threatened land environment A7.3a and 0.8 ha of At Risk environment G1.1c. A very small proportion of the site (0.1 ha) is already protected in Babylon Marginal Strip, administered by DOC.

P07/138 Peter Kelly's Lake and Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

WOODCOCK'S FOREST

Survey no.	P07/141a
Survey date	29 November 2006
Grid reference	P07 828 908
Area	0.6 ha
Altitude	20 m asl

Ecological unit

(a) Kahikatea forest on alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Kaihu River.

Vegetation

This is a small patch of indigenous forest in the middle of pasture on the southern side of Rotu Stream. It is lightly grazed with evidence of pugging. The understorey tier is virtually absent and ground cover consists of tradescantia and pasture plants.

Significant flora

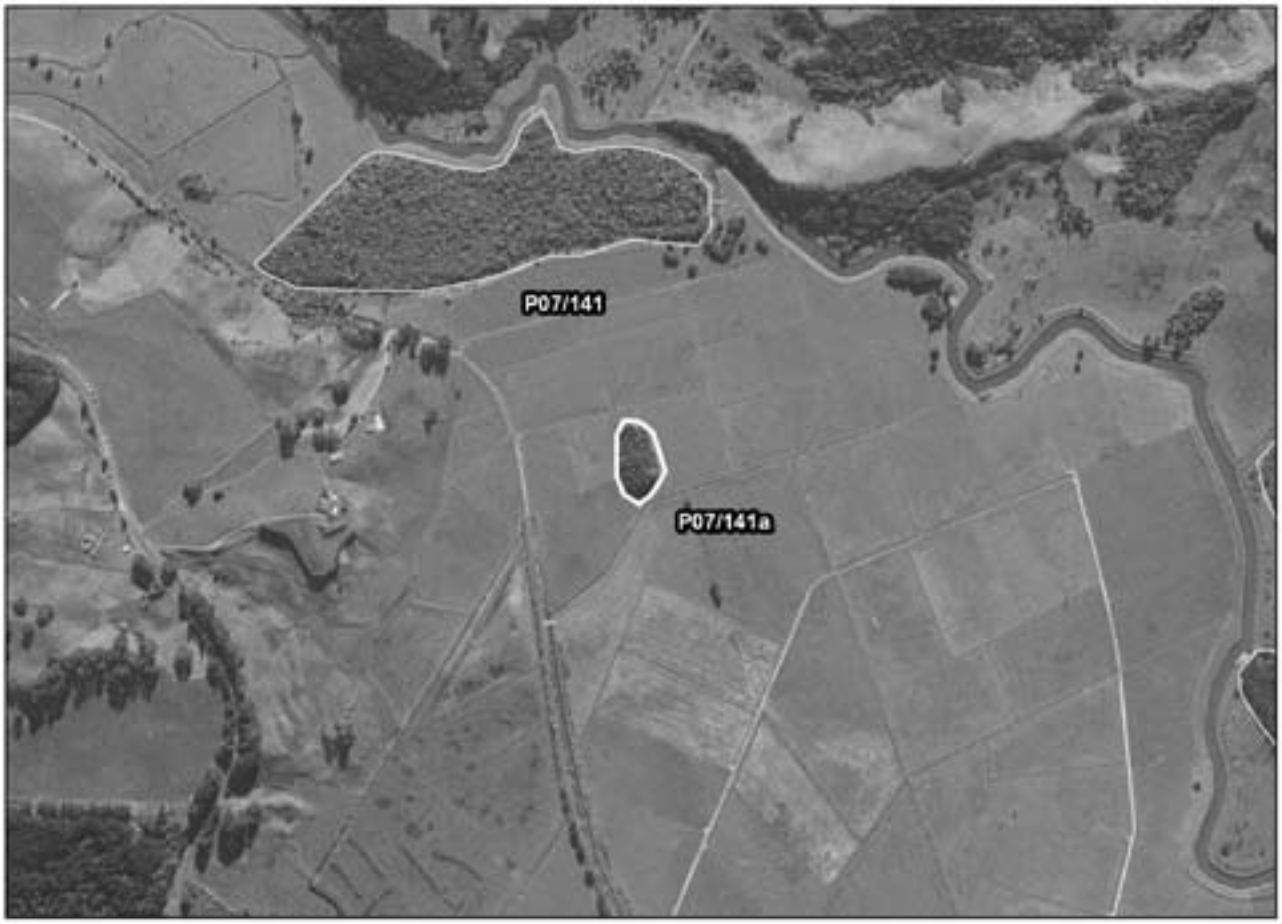
None noted.

Fauna

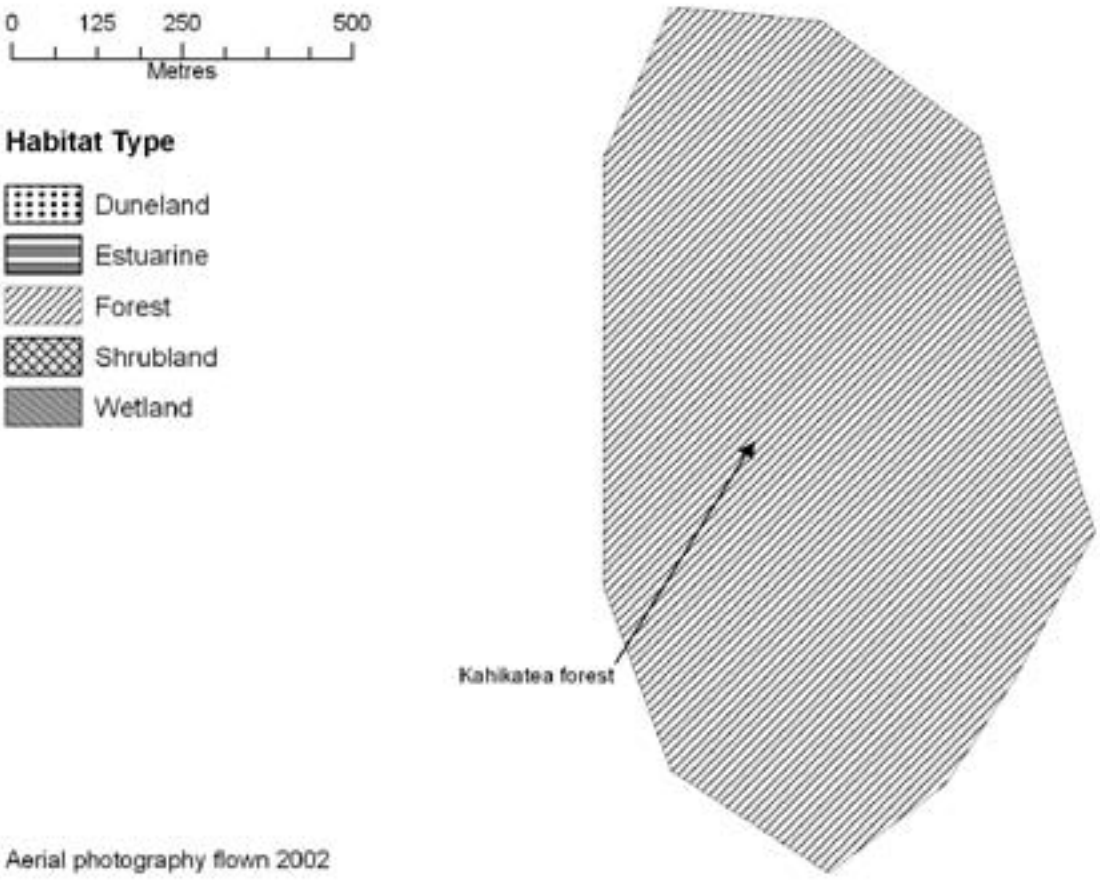
Grey warbler.

Significance

Alluvial forest is a threatened habitat type in Northland. However, small size, grazing, and weed invasion reduce the value of this site. Contains 0.6 ha of Acutely Threatened land environment A5.1b.



P07/141A Woodcock's Forest



Aerial photography flown 2002

OPANAKE ROAD SWAMP FOREST

Survey no.	P07/149
Survey date	30 November 2006
Grid reference	P07 841 905
Area	4 ha
Altitude	20 m asl

Ecological unit

(a) Kahikatea swamp forest on alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Kaihu River.

Vegetation

This swamp forest lies between Opanake Road and the Kaihu River, close to other remnants (NRC Reserve and Davidson forest and shrubland). Although the area is fully fenced, fencing is in poor condition. Despite a small drain on the west, water tables remain relatively high.

(a) The swamp forest has two common canopy dominants, kahikatea and sweet grass. Kahikatea is dominant on the eastern side of the swamp and sweet grass on the west. Ti kouka and harakeke are frequent in the canopy, and *Carex virgata*, *Baumea arthrophylla*, raupo, alligator weed, soft rush, creeping buttercup, and water pepper occasional. *Carex secta*, Japanese honeysuckle, and *Coprosma propinqua* occur in the understorey. *Collospermum hastatum* occurs on some kahikatea.

Significant flora

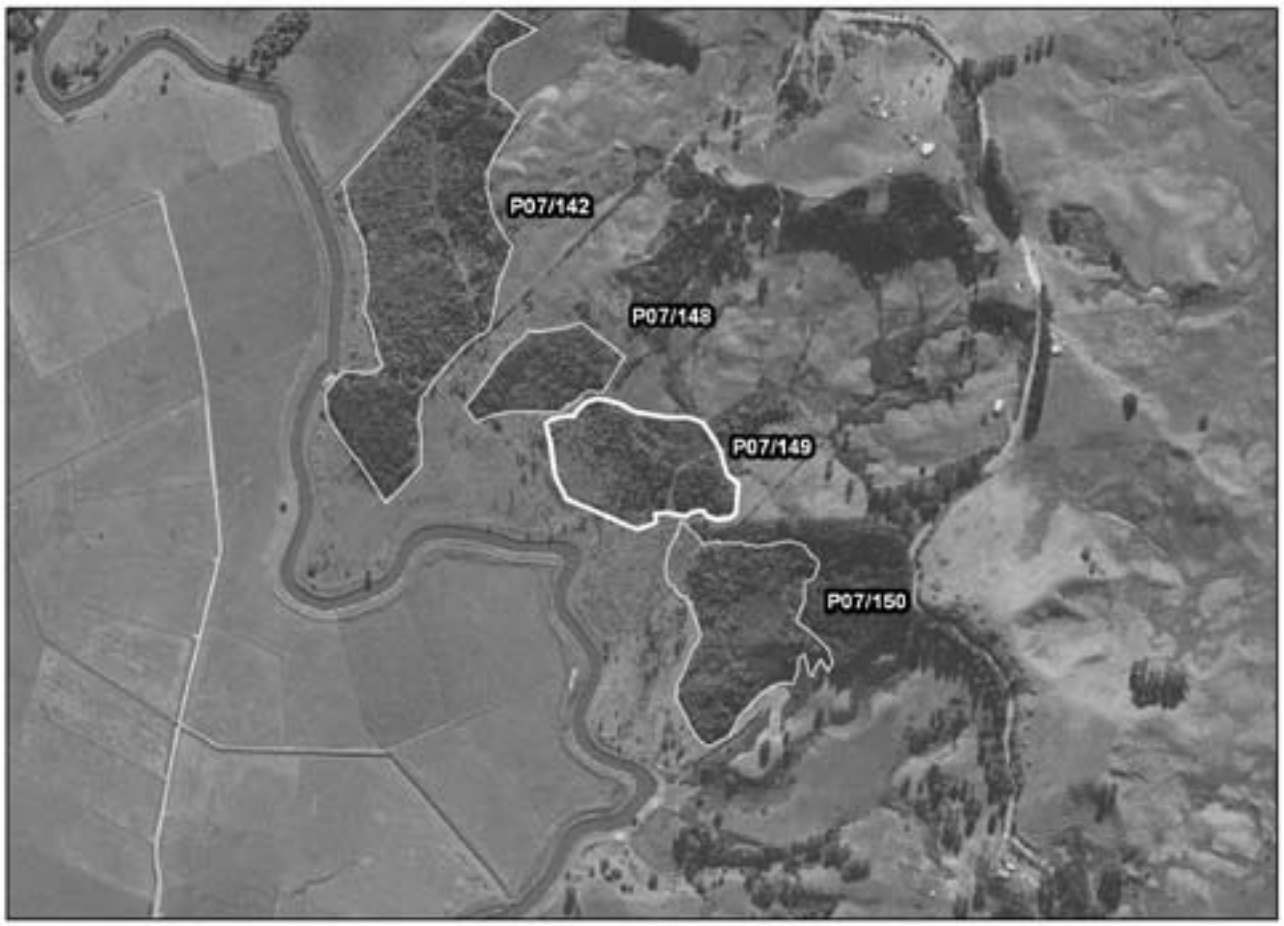
None noted.

Fauna,

Common forest birds (SSBI P07/H036, 1978), including Australasian harrier and North Island fantail.

Significance

Although swamp forest is a threatened habitat type in Northland, this site has been seriously degraded by weed invasion. Contains 3.8 ha of At Risk land environment G3.1b.

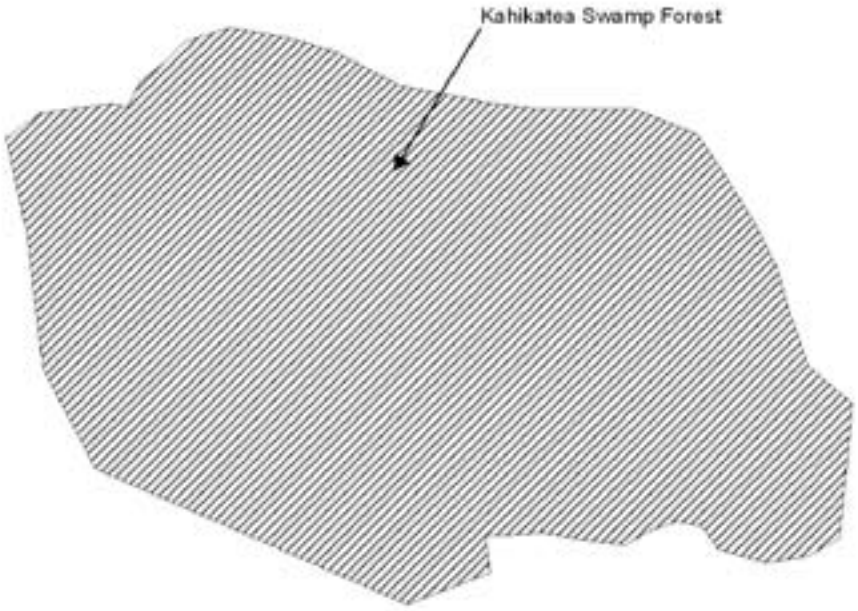


P07/149 Opanake Road Swamp Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

BABYLON COAST ROADSIDE SHRUBLAND

Survey no. P07/154
Survey date 14 December 2006
Grid reference P07 796 879
Area 3 ha
Altitude 100–130 m asl

Ecological unit

(a) Manuka shrubland on hillslope (100%)

Landform/geology

Hillslope on consolidated (Karioitahi Group) parabolic dunefield.

Vegetation

This site comprises a fenced area of manuka shrubland on an east-facing hillslope, bisected by Babylon Coast Road. It has been extensively invaded by maritime pine, radiata pine, and Spanish heath.

Significant flora

None noted.

Fauna

None noted.

Significance

The small isolated site has been degraded by weed invasion and is of relatively low value. Contains 1.6 ha of Acutely Threatened land environment A5.2a and 1 ha of At Risk environments A6.1b and A6.1c.

WOODCOCK'S WETLAND

Survey no. P07/157
Survey date 29 November 2006
Grid reference P07 834 894
Area 1.5 ha
Altitude 20 m asl

Ecological unit

(a) Manuka shrubland on alluvium (100%)

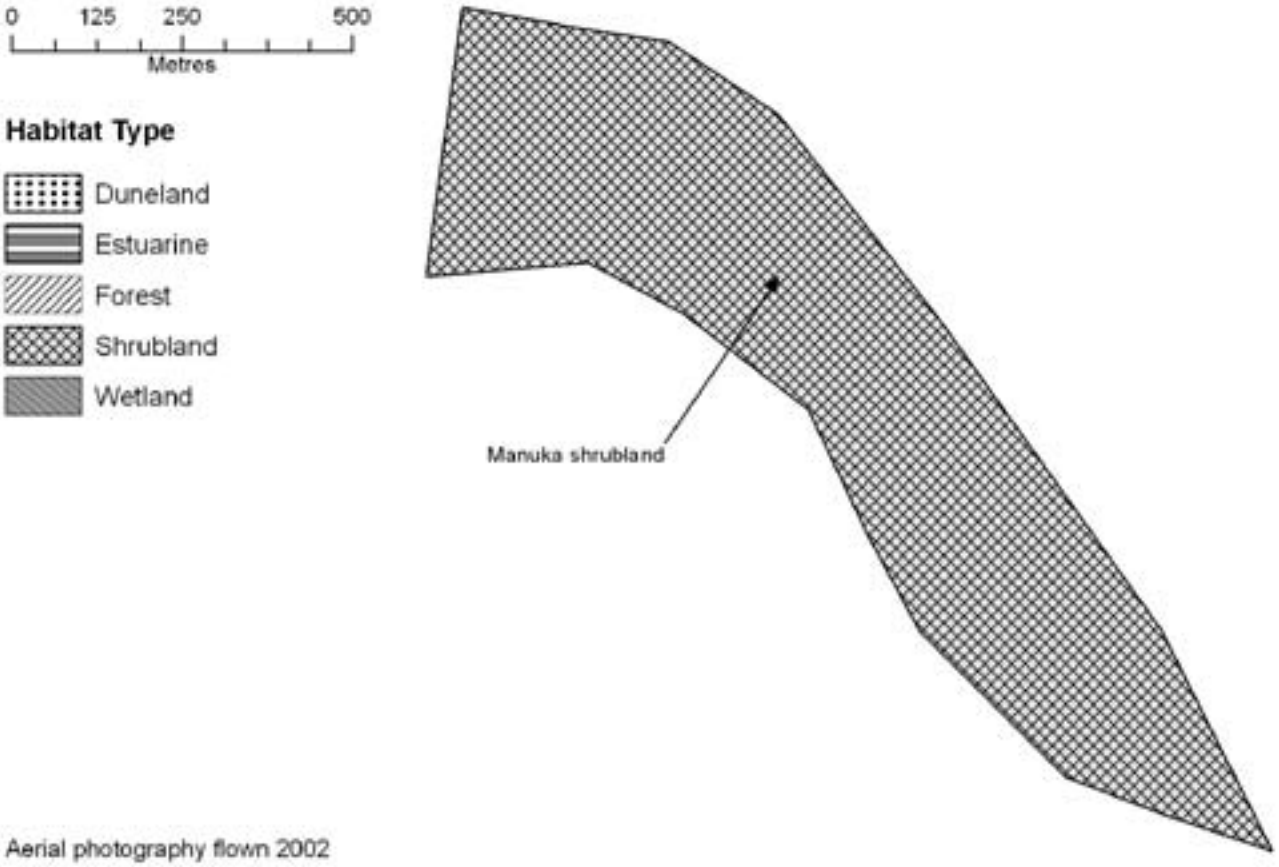
Landform/geology

Holocene alluvial and swamp deposits on the Kaihu River flood plain.

Vegetation

This small wetland on the southern side of Kaihu River is bordered on the west by SH12. The margins have been extensively invaded by weeds (pampas, tree privet, and *Acacia* species). The canopy is formed by

P07/154 Babylon Coast Roadside Shrubland



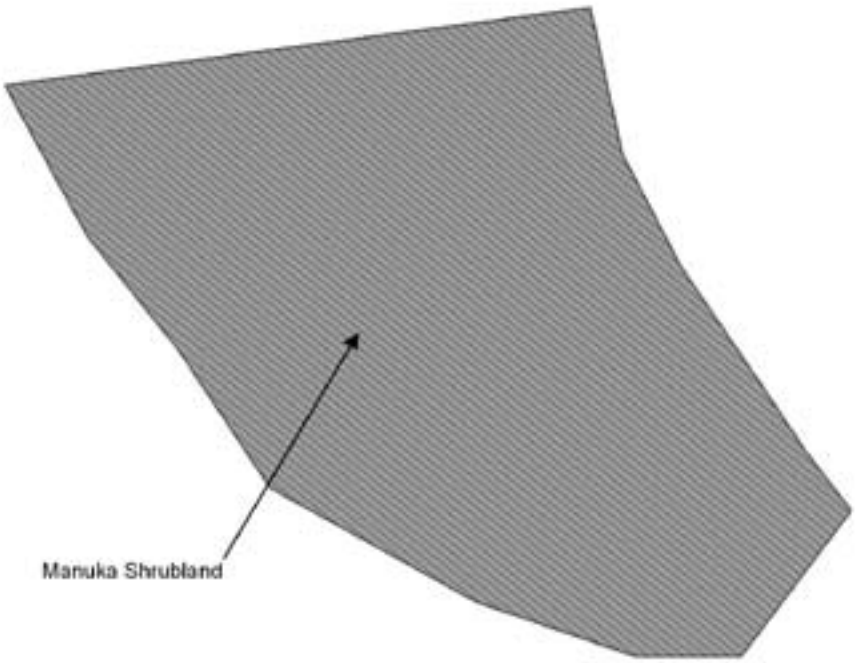
Aerial photography flown 2002

P07/157 Woodcock's Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

abundant manuka, common harakeke, frequent ti kouka, and occasional *Baumea rubiginosa*, *Coprosma rigida*, *C. propinqua*, swamp coprosma, and raupo. *Baumea rubiginosa* and raupo occur in wetter areas. There are some totara trees on the eastern margin.

Significant flora

Coprosma rigida and swamp coprosma (both Regionally Significant), recorded during this survey.

Fauna

None noted.

Significance

Wetlands are a threatened habitat type in Northland. Although this site supports two regionally significant species, small size and extensive weed invasion reduce its value. Contains 1.5 ha of Chronically Threatened land environment A5.2a.

BASIN ROAD SHRUBLAND 1

Survey no.	P07/160
Survey date	14 December 2006
Grid reference	P07 775 867
Area	10 ha
Altitude	30–105 m asl

Ecological unit

(a) Manuka shrubland on hillslope (100%)

Landform/geology

Steep hillslopes in gullies eroded into mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunes.

Vegetation

This site comprises several tracts of manuka shrubland on steep hillslopes of several aspects, with frequent akepiro and mingimingi. They have been extensively invaded by radiata pine and occasional other weed species.

Significant flora

None noted.

Fauna

None noted.

Significance

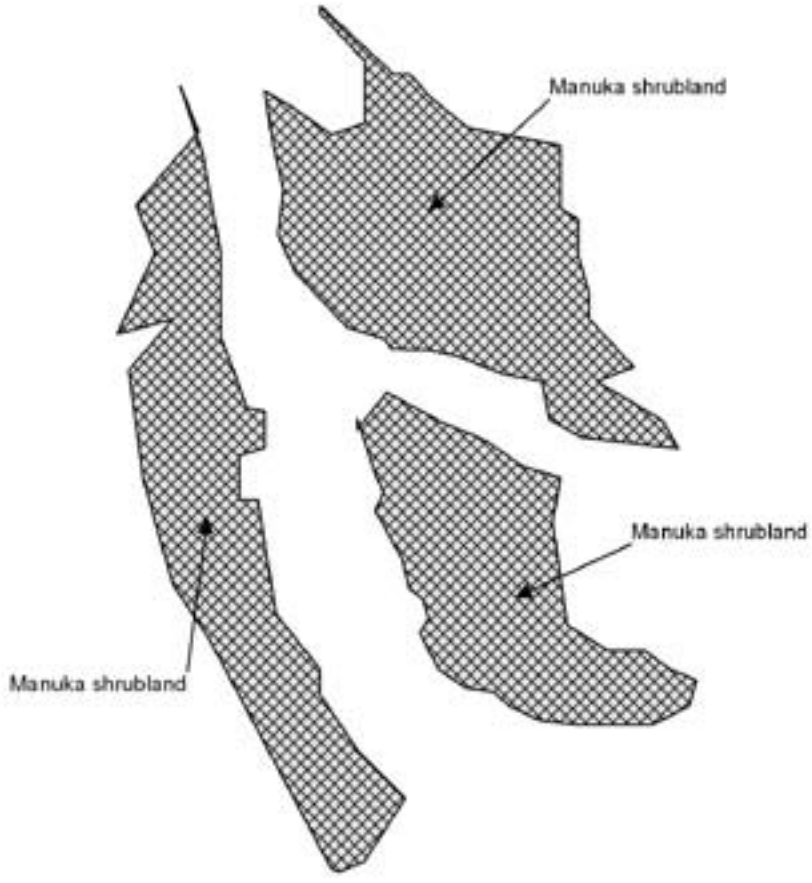
The site has been degraded by weed invasion and is of relatively low value. Contains 10.2 ha of Chronically Threatened land environments A5.2a and A7.3a.

P07/160 Basin Road Shrubland 1

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

BASIN ROAD SHRUBLAND 2

Survey no.	P07/161
Survey date	29 November 2006
Grid reference	P07 775 867
Area	12 ha
Altitude	95–105 m asl

Ecological unit

(a) Manuka shrubland in basin (100%)

Landform/geology

Lake and swamp deposits in depression on early Pleistocene (Awhitu Group) cemented dune sand, ponded behind landward edge of mid-late Pleistocene (Karioitahi Group) consolidated parabolic dune belt.

Vegetation

This site comprises two small blocks of shrubland, surrounded by pasture and unfenced, so is in poor condition. Although the general area has been drained, the site itself is still somewhat poorly drained. The canopy consists of abundant manuka, frequent emergent radiata pine, occasional mamaku, and gorse. The understorey comprises water fern.

Significant flora

None noted.

Fauna

Australasian harrier.

Significance

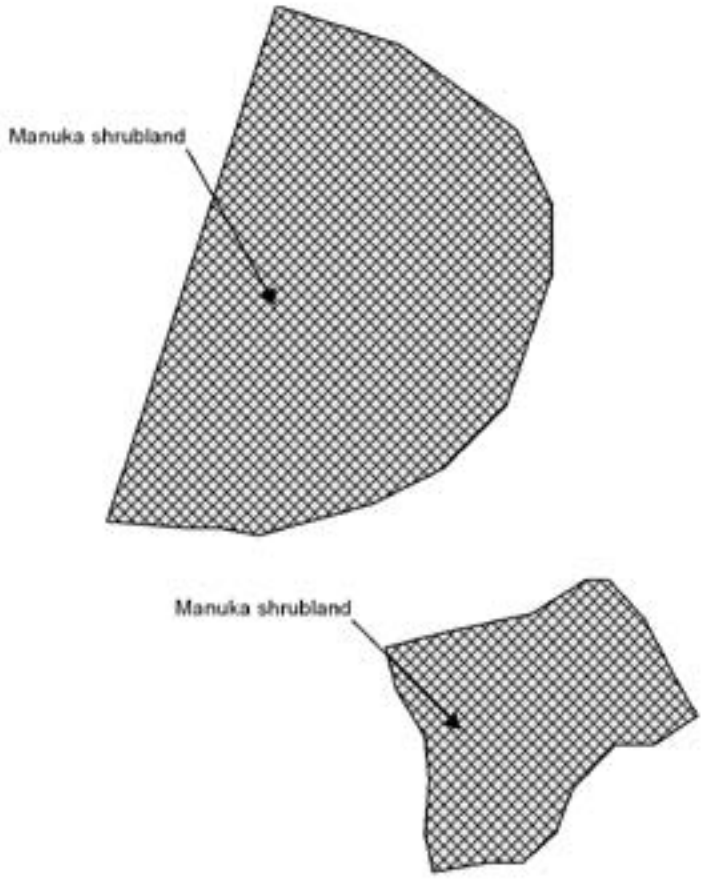
This fragmented site is in poor condition owing to grazing and weed invasion. Contains 10.2 ha of Chronically Threatened land environment A5.2a, and 0.1 ha of At Risk environment A6.1b.

P07/161 Basin Road Shrubland 2

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

HOKIANGA ROAD FOREST

Survey no.	P07/164
Survey date	28 November 2006
Grid reference	P07 867 868
Area	0.9 ha
Altitude	20 m asl

Ecological units

(a) Kahikatea forest on alluvium (70%)

(b) Ti kouka treeland on alluvium (30%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Kaihu River.

Vegetation

This remnant on the northern side of Kaihu River is in a pastoral area and unfenced. Grazing of the forest and treeland has eliminated lower tiers and led to a ground layer dominated by pasture grasses.

(a) The mixed forest consists of common kahikatea, frequent karaka, nikau and pukatea, and occasional ti kouka and totara.

(b) The treeland on margins of the forest has abundant ti kouka and frequent nikau.

Significant flora

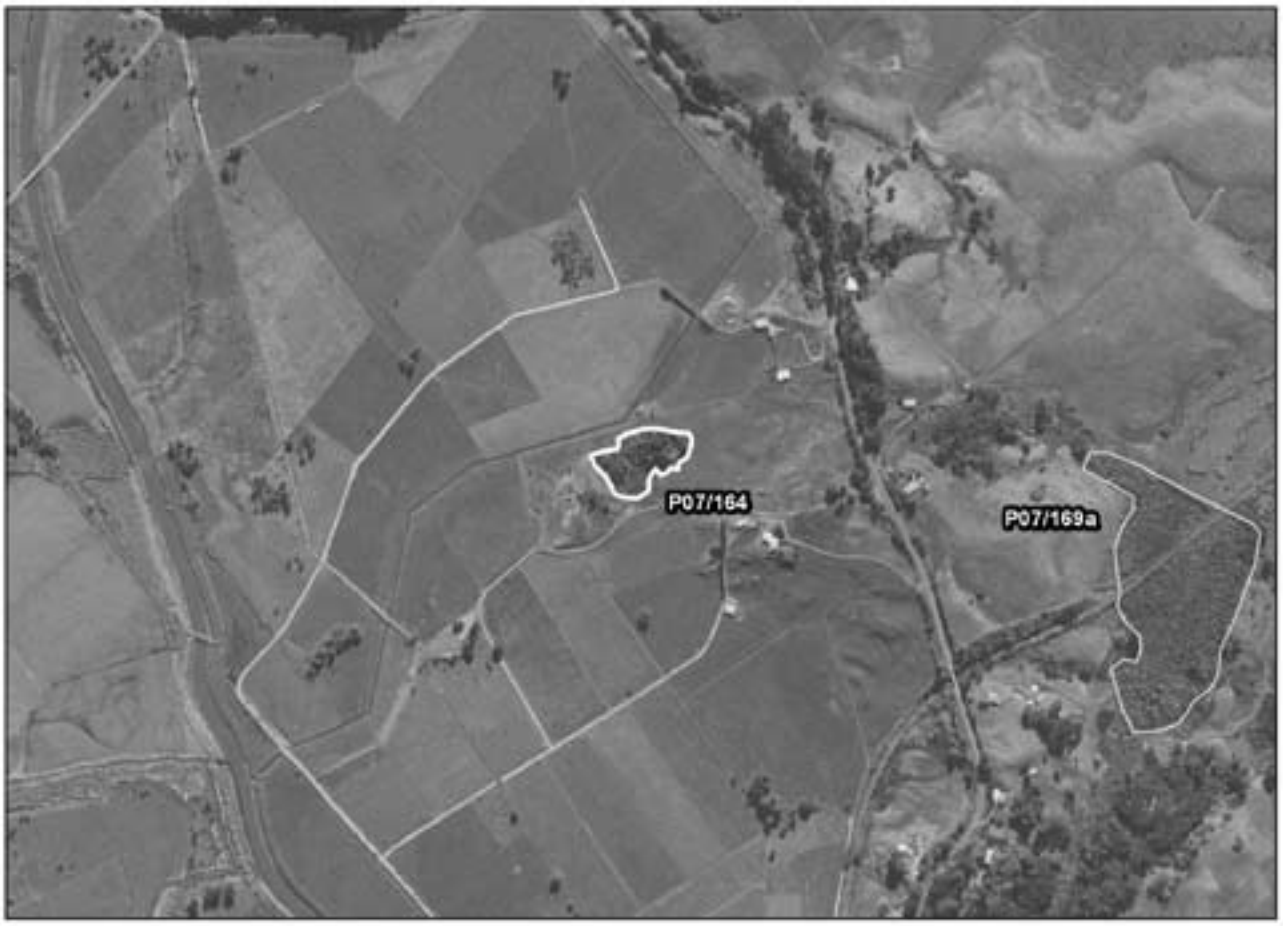
None noted.

Fauna

None noted.

Significance

Alluvial forest is a threatened habitat type in Northland. However, this small site is an unfenced, isolated fragment in a pastoral setting. Contains 0.9 ha of At Risk land environment A6.1b.

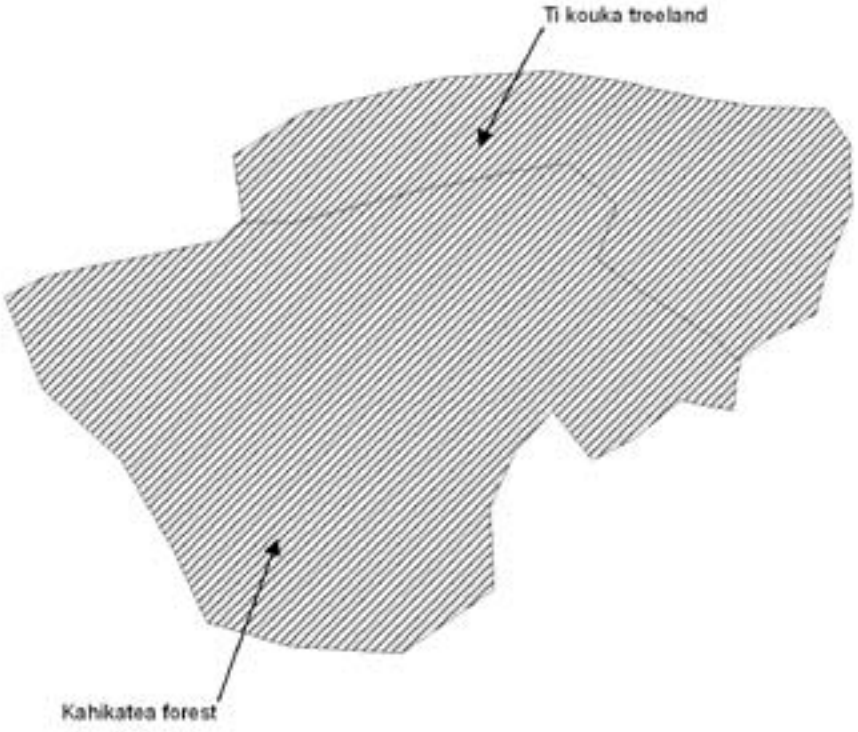


P07/164 Hokianga Road Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

HOANGA ROAD FOREST

Survey no.	P07/165
Survey date	12 December 2006
Grid reference	P07 929 893
Area	8 ha
Altitude	20–40 m asl

Ecological unit

(a) Totara forest on hillslope (100%)

Landform/geology

Hillslopes on undifferentiated Mangakahia Complex sediments, and overlying early Pleistocene (Awhitu Group) cemented dune sands and associated facies.

Vegetation

This site comprises a stand of secondary totara forest with kanuka and manuka and occasional kauri and puriri.

Significant flora

None noted.

Fauna

None noted.

Significance

The site is being degraded by firewood harvesting, grazing, and weed invasion (black wattle).

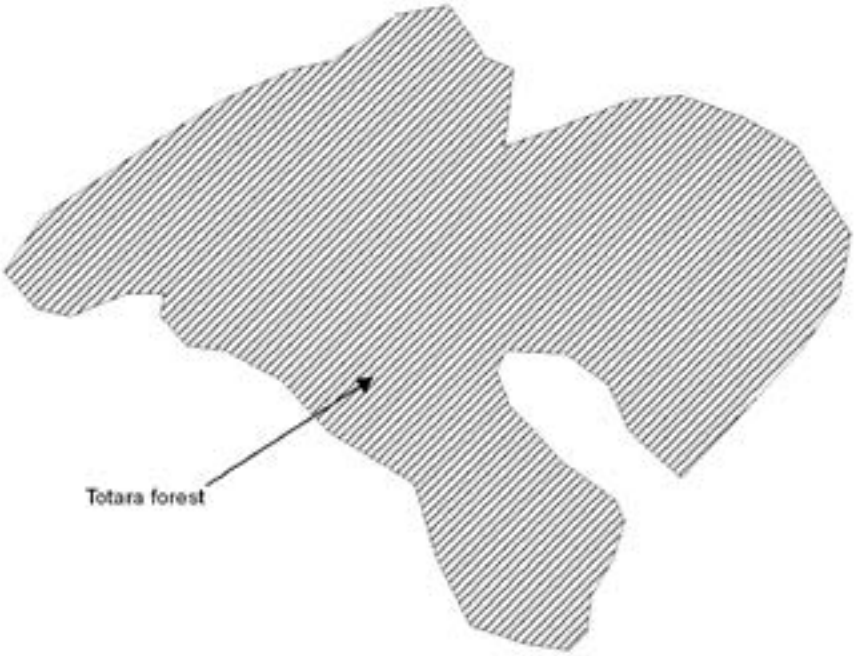
Contains 2.2 ha of Acutely Threatened land environments A5.1b and A5.1c and 5.9 ha of At Risk environments A6.1b and A6.1c.

P07/165 Hoanga Road Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

SCOTTY'S CAMP ROAD SHRUBLAND

Survey no.	P07/167
Survey date	14 December 2006
Grid reference	P07 813 851
Area	26 ha
Altitude	20–30 m asl

Ecological units

(a) Manuka shrubland on alluvium (83%)

(b) Manuka shrubland on hillslope (17%)

Landform/geology

Holocene alluvial and swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This site comprises

(a) manuka shrubland with frequent harakeke and bracken, widely invaded by pampas and gorse.

(b) An adjacent south-facing hillslope supports a smaller area of manuka shrubland, widely invaded by maritime pine and Spanish heath.

Significant flora

None noted.

Fauna

None noted.

Significance

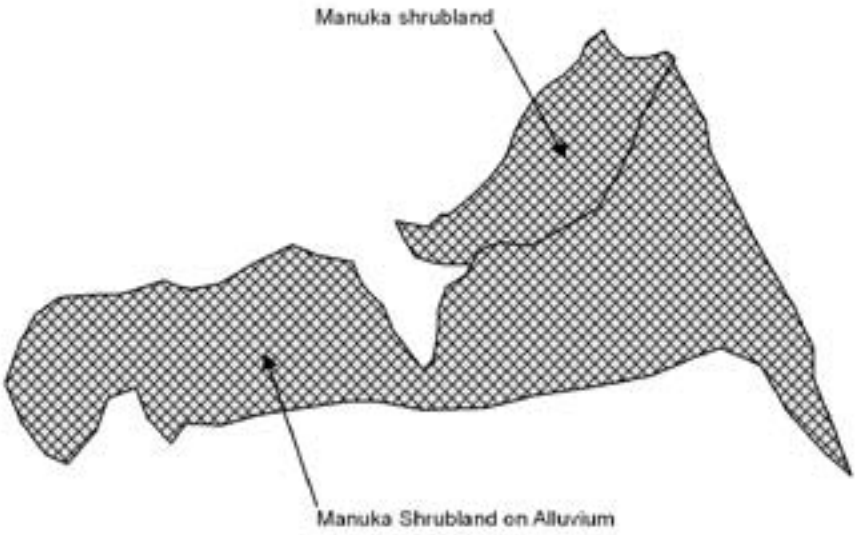
The western and eastern ends of the wetland have been drained and converted to pasture. The remaining wetland has been partly drained and grazed, allowing extensive weed invasion. Contains 21.9 of Acutely Threatened land environment A5.1b, 2.1 ha of Chronically Threatened environment A5.2a, and 1.3 ha of At Risk environment A6.1b.

P07/167 Scotty's Camp Road Shrubland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

BAYLY'S COAST ROAD WETLAND AND SHRUBLAND

Survey no. P07/171a
Survey date 14 December 2006
Grid reference P07 812 843
Area 12 ha
Altitude 20–30 m asl

Ecological units

(a) Raupo reedland on alluvium (55%)

(b) Manuka shrubland on hillslope (45%)

Landform/geology

Holocene swamp and alluvial deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This site comprises an area of

(a) raupo reedland with occasional manuka, ti kouka, mamaku, and harakeke.

(b) Adjacent hillslopes support contiguous manuka shrubland with frequent ti kouka, mamaku, and bracken, lightly invaded by maritime pine, large-leaved privet, Chinese privet, and pampas. The southern end of the gully system supports exotic forest. The site is accessible to stock.

Significant flora

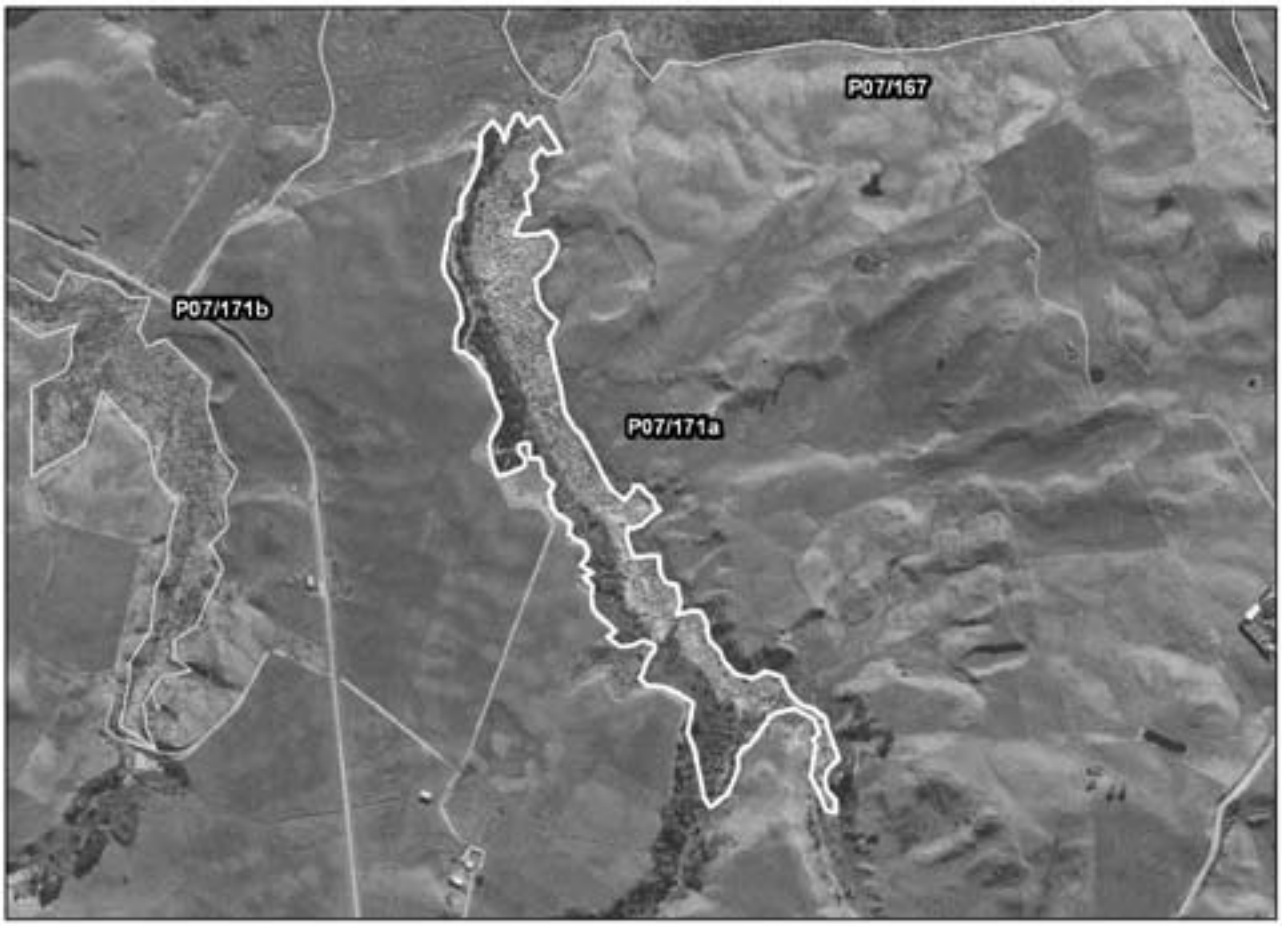
None noted.

Fauna

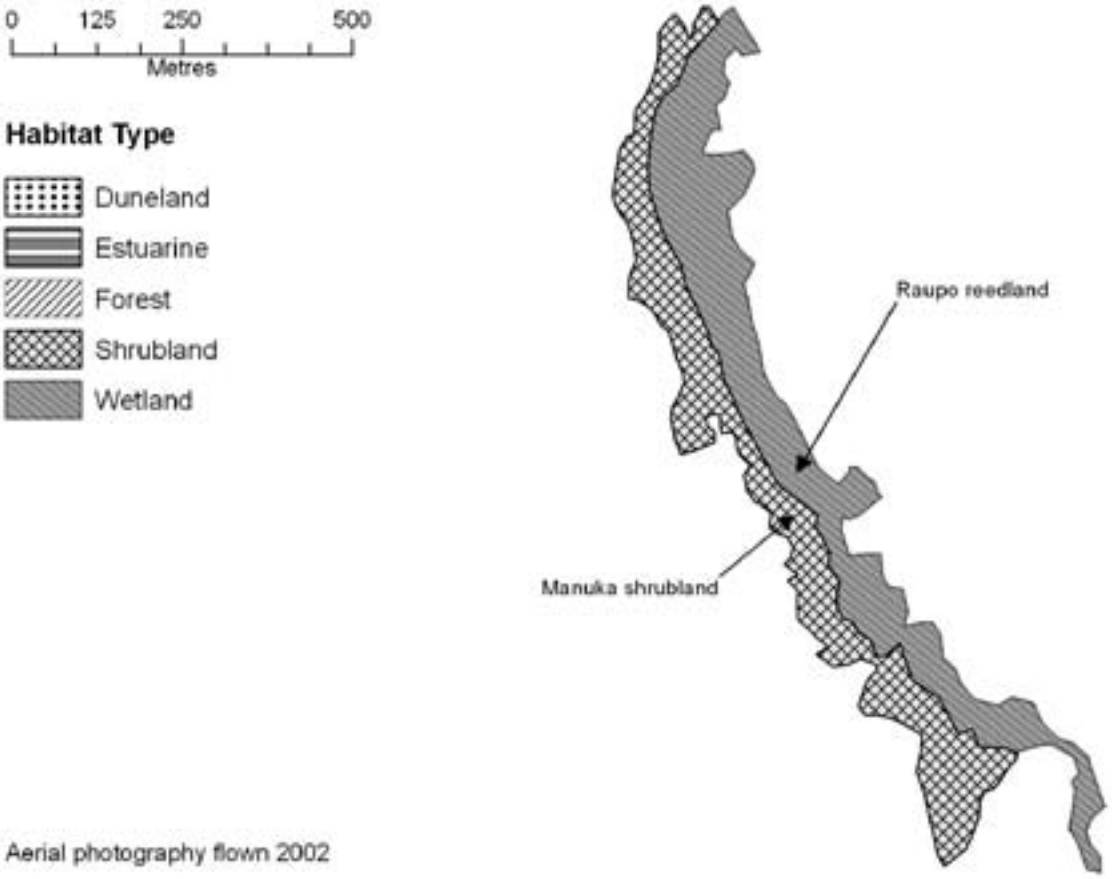
None noted.

Significance

Although wetlands are a threatened habitat type in Northland, this site has been degraded by weed invasion and is of relatively low value. Contains 2.1 ha of Acutely Threatened land environment A5.1b, 6.8 ha of Chronically Threatened environment A5.2a, and 2.6 ha of At Risk environment A6.1b.



P07/171A Bayly's Coast Road Wetland and Shrubland



Aerial photography flown 2002

BAYLY'S BASIN ROAD WETLAND 1

Survey no.	P07/171b
Survey date	14 December 2006
Grid reference	P07 801 846
Area	8 ha
Altitude	20–40 m asl

Ecological unit

(a) Raupo reedland on alluvium (100%)

Landform/geology

Holocene swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This site comprises raupo reedland with frequent harakeke in several arms of a small stream on the western side of Bayly's Basin Road. It has been extensively invaded by pampas.

Significant flora

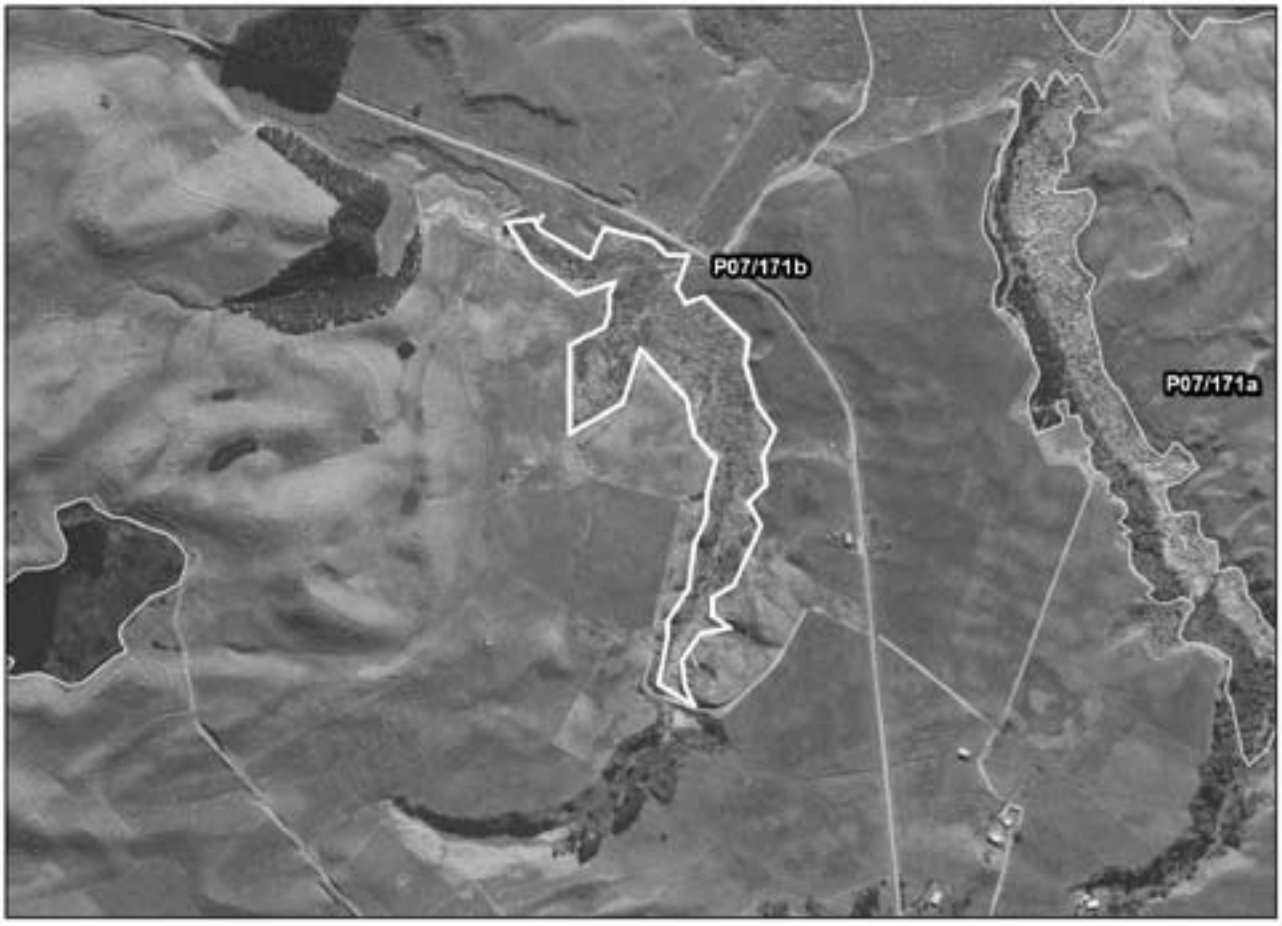
None noted.

Fauna

North Island fernbird (Sparse), spotless crake (Sparse), grey warbler, silvereye, North Island fantail, New Zealand kingfisher, Pacific swallow, Australasian pied stilt (SSBI P07/H032, 1978).

Significance

Wetlands are a threatened habitat type in Northland. However, this site is has been degraded by marginal grazing and weed invasion. There are historical records of threatened bird species. Contains 1.3 ha of Acutely Threatened land environment A5.1b and 6.7 ha of Chronically Threatened environment A7.3a.

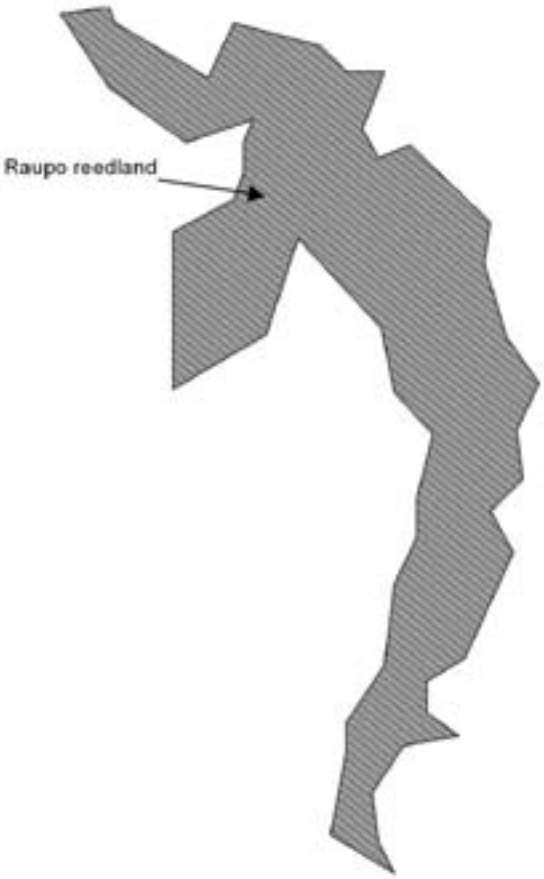


P07/171b Bayly's Basin Road Wetland 1

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

BAYLY'S COAST ROAD WETLAND

Survey no.	P07/172
Survey date	14 December 2006
Grid reference	P07 825 838
Area	4 ha
Altitude	20–25 m asl

Ecological unit

(a) Raupo reedland on alluvium (100%)

Landform/geology

Holocene swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This site comprises raupo reedland with occasional manuka, ti kouka, and harakeke. The site is accessible to stock.

Significant flora

None noted.

Fauna

None noted.

Significance

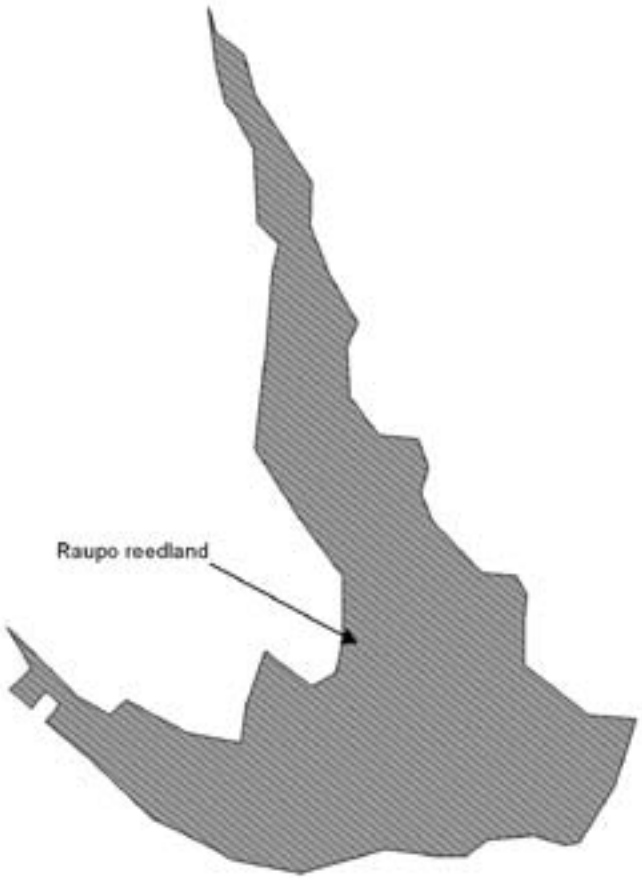
Wetlands are a threatened habitat type in Northland and although significant in size, grazing and pugging by domestic stock reduced the value of this site. Contains 2.1 ha of Acutely Threatened land environment A5.1b, 0.3 ha of Chronically Threatened environment A5.2a, and 0.8 ha of At Risk environment A6.1b.

P07/172 Bayly's Coast Road Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

TURIWIRI FOREST FRAGMENTS

Survey no.	P07/182
Survey date	29 November 2006
Grid reference	P07 899 824
Area	3 ha
Altitude	5 m asl

Ecological unit

(a) Kahikatea forest on alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Northern Wairoa River.

Vegetation

This site comprises two small patches of secondary kahikatea forest, degraded by grazing. Ti kouka is also frequent in the canopy. The southern stand has kahikatea treeland in neighbouring pasture.

Significant flora

None noted.

Fauna

North Island kaka (Nationally Endangered) have been recorded as temporary residents (SSBI P07/H067, 2003). Cattle egrets were present in the ED in 1975 (OSNZ CSN 1976).

Significance

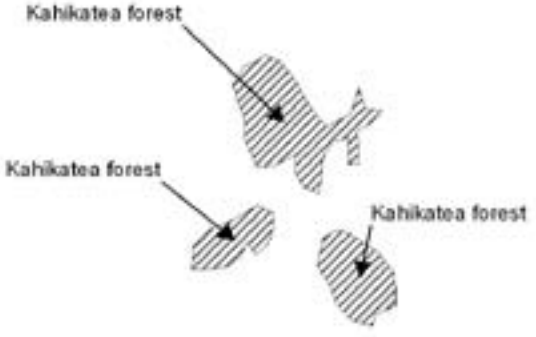
Although alluvial forest is a rare habitat type in this ED and throughout Northland, fragmentation and grazing reduce the value of this site. Contains 2.9 ha of Acutely Threatened land environment A5.1b.

P07/182 Turiwiri Forest Fragments

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

MANGATARA FLAT SHRUBLAND

Survey no.	P07/177
Survey date	15 December 2006
Grid reference	P07 844 820
Area	3 ha
Altitude	20 m asl

Ecological unit

(a) Manuka shrubland on alluvium (100%)

Landform/geology

Holocene swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This site comprises manuka shrubland on alluvium. It has been extensively invaded by pampas.

Significant flora

None noted.

Fauna

None noted.

Significance

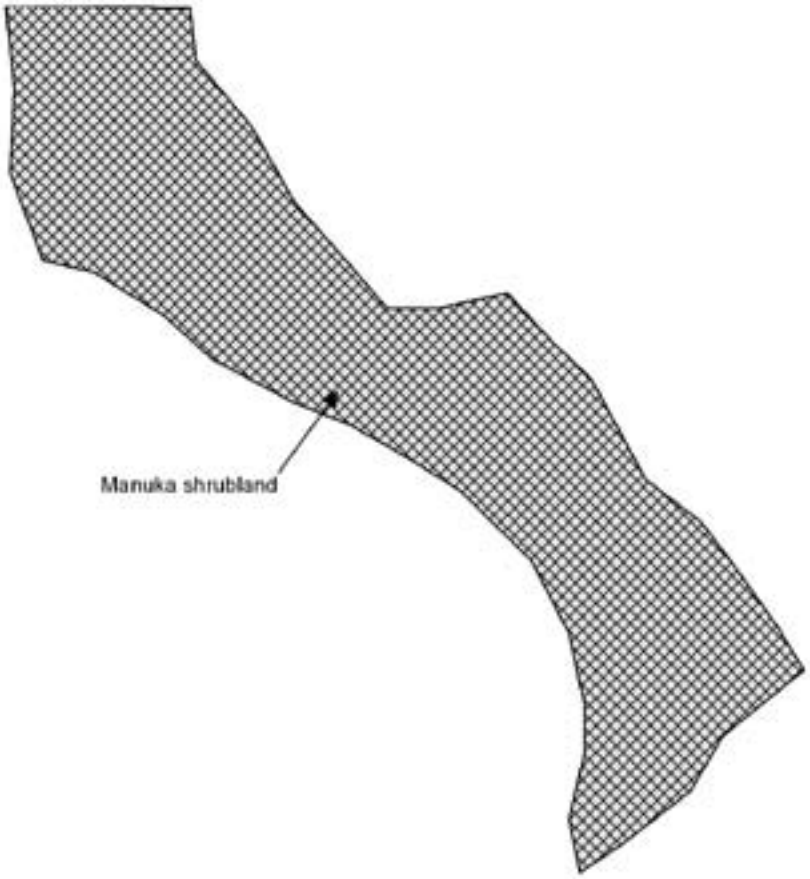
Although alluvial forest and shrubland are a rare habitat type in Northland, this small site has been seriously degraded by grazing, partial drainage, and weed invasion. Contains 2.9 ha of Acutely Threatened land environment A5.1b.

P07/177 Mangatara Flat Shrubland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

DARGAVILLE DOMAIN FOREST

Survey no.	P07/185
Survey date	30 November 2006
Grid reference	P07 884 834
Area	2.2 ha
Altitude	15 m asl

Ecological unit

(a) Kahikatea forest on an alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Northern Wairoa and Kaihu Rivers.

Vegetation

Dargaville Domain is a small urban remnant of secondary indigenous forest in Mangawhare on the southern side of the Kaihu River. The canopy comprises abundant kahikatea, common kanuka and mahoe, and frequent karaka and karo, while the subcanopy comprises scattered mamangi, Chinese privet, and karo. The understorey comprises scattered hangehange, small-leaved mahoe, and shining karamu. There are many weeds and garden escapes such as Chinese privet, Japanese honeysuckle, wild ginger, montbretia, and climbing asparagus.

Significant flora

None noted.

Fauna

None noted.

Significance

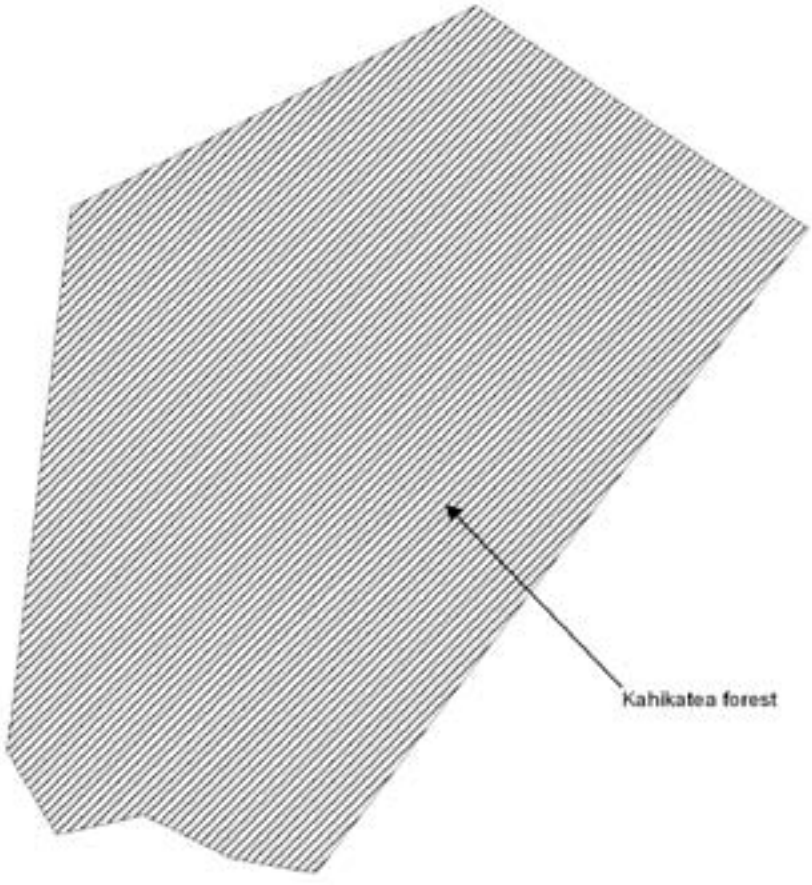
Although alluvial forest is a rare habitat type in this ED and throughout Northland, this is a small, isolated urban forest remnant that has been significantly degraded by weed invasion. Contains 2.2 ha of Acutely Threatened land environment A5.1b.

P07/185 Dargaville Domain Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

BAYLY'S BASIN ROAD WETLAND 2

Survey no.	P07/206
Survey date	Not visited during this survey. Information from SSBI P07/H033.
Grid reference	P07 785 847
Area	1.2 ha
Altitude	m asl

Ecological units

(a) Raupo reedland on alluvium (83%)

(b) Open water (17%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield.

Vegetation

The vegetation consists of two types.

(a) Raupo reedland on alluvium

(b) Open water

Significant flora

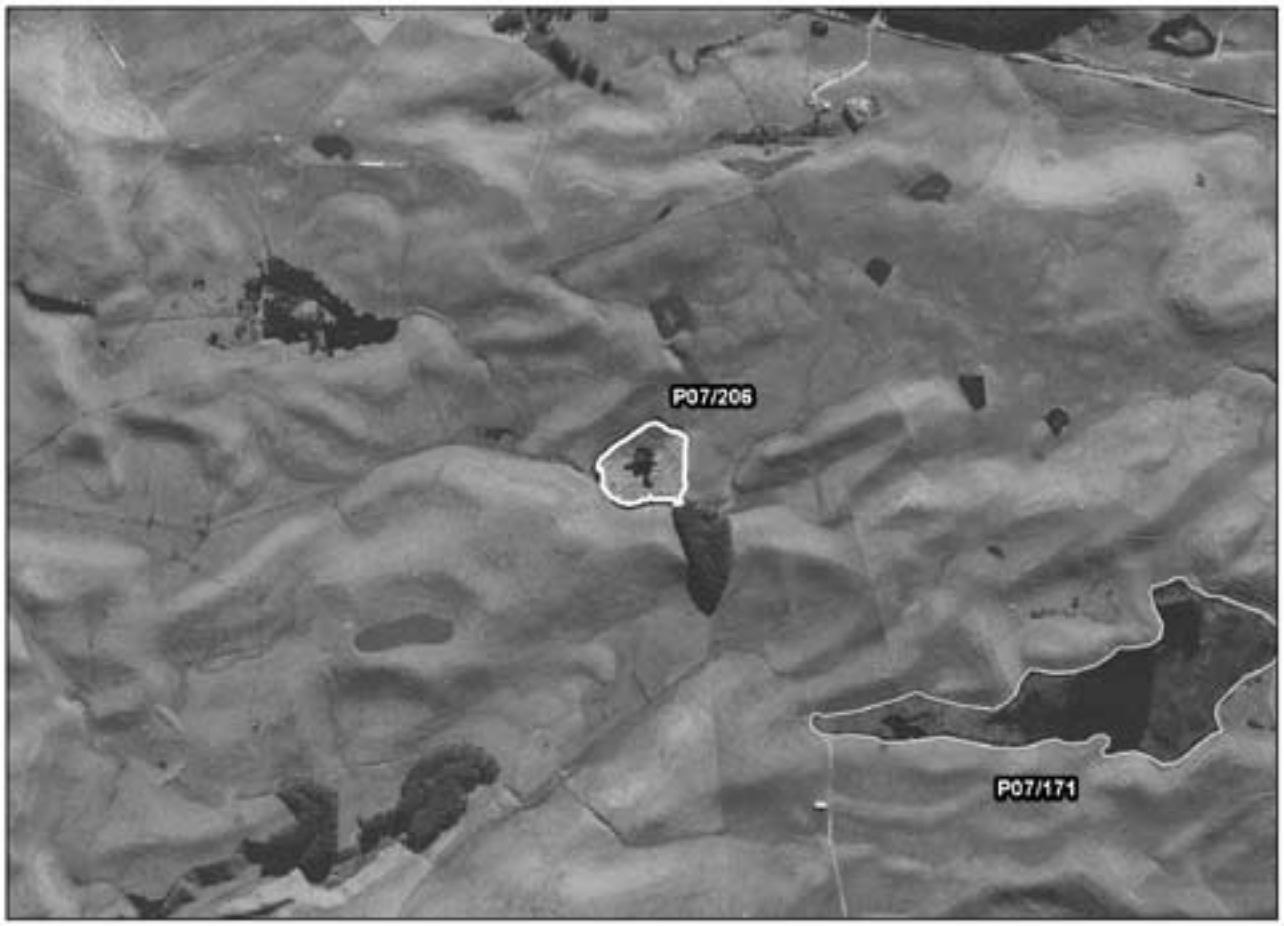
None noted.

Fauna

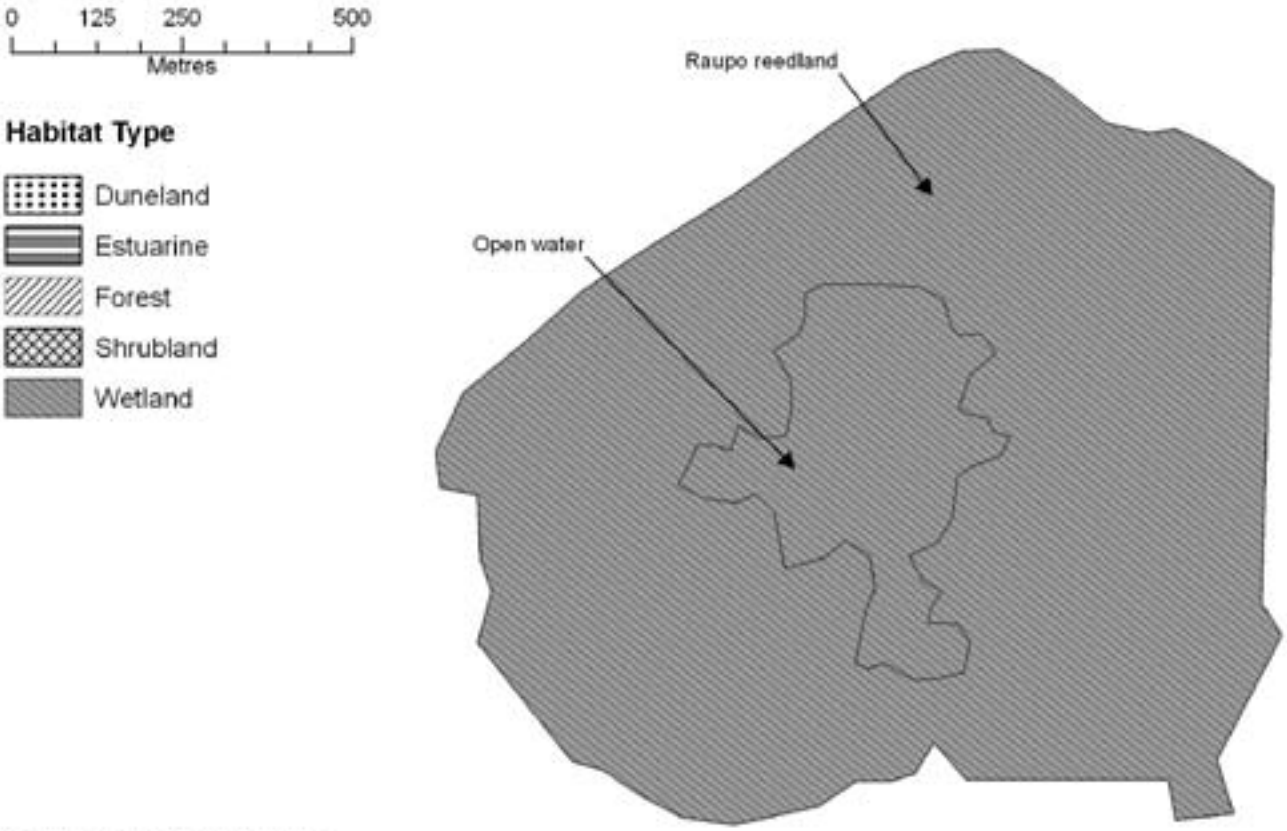
Australasian bittern (Nationally Endangered) (SSBI P07/H033, 1978). Grey duck (Nationally Endangered), black shag (Sparse) (OSNZ surveys 1979–1982). Pacific swallow, Australasian pied stilt, pukeko, paradise shelduck (SSBI P07/H033, 1978). Australasian harrier (OSNZ surveys 1979–1982).

Significance

Although threatened species have been recorded from this wetland in the past, follow-up survey is required and it remains at Level 2 in the interim. Contains 0.9 ha of Chronically Threatened land environment A7.3a.



P07/206 Bayly's Basin Road Wetland 2



Aerial photography flown 2002

SILLS ROAD FOREST FRAGMENTS

Survey no.	P08/060
Survey date	28 November 2006
Grid reference	P08 964 757
Area	8 ha
Altitude	20 m asl

Ecological units

(a) Kahikatea forest on alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Northern Wairoa River.

Vegetation

There are four separate patches of secondary kahikatea-dominant forest on alluvium below Sills Road. The two northern patches are less than 1 ha, the southern patch is around 2 ha, and the middle patch is around 5 ha. All patches comprise young secondary forest and are unfenced. The middle patch has frequent ti kouka, while the southern patch has occasional karaka and nikau.

Significant flora

None noted.

Fauna

None noted.

Significance

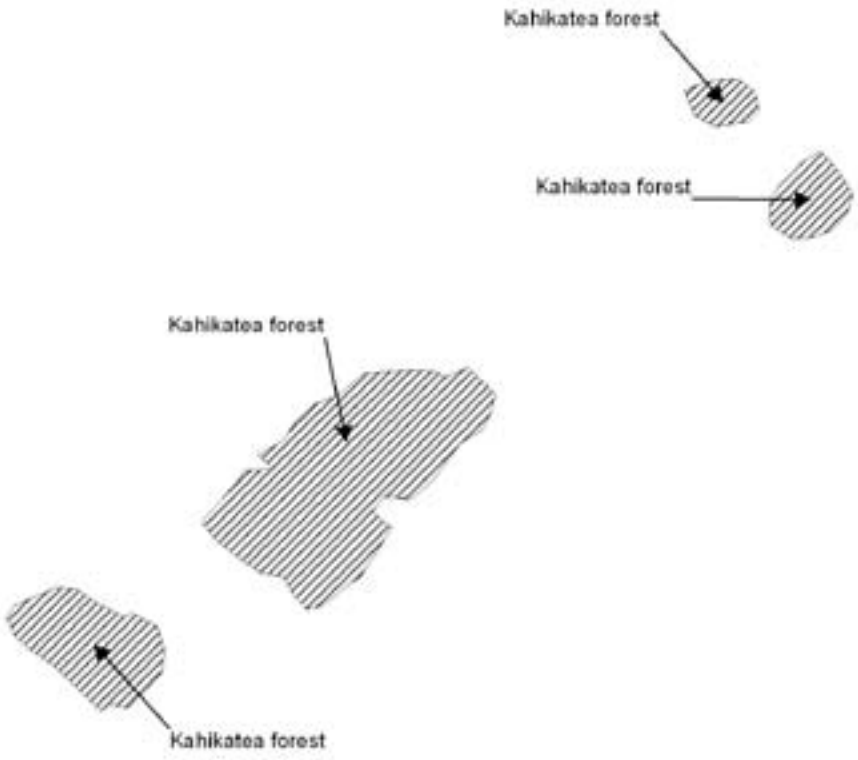
Although their combined area is significant and alluvial forest is rare in Northland, a high level of fragmentation and grazing reduce the conservation value of this site. Contains 7.6 ha of Acutely Threatened land environment A5.1b.

P08/060 Sills Road Forest Fragments

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

UPPER ARATAPU CREEK SHRUBLAND

Survey no.	P08/062
Survey date	Not surveyed
Grid reference	P08 729 524
Area	44 ha
Altitude	90–100 m asl

Ecological units

(a) Undescribed shrubland on hillslopes (100%)

Landform/geology

Hillslopes and gullies eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies, and in mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunes, with Holocene alluvial and swamp deposits on valley floor.

Vegetation

The site comprises an extensive tract of

(a) undescribed shrubland, probably dominated by manuka.

Significant flora

None noted.

Fauna

None noted.

Significance

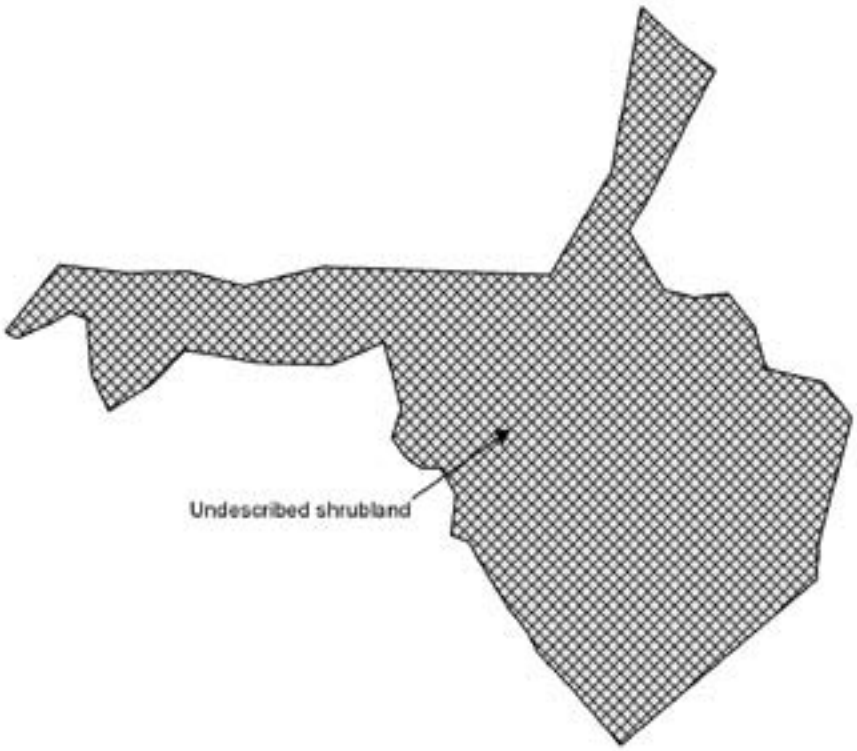
This site was not surveyed and until further information is available, remains at Level 2. Contains 2 ha of Acutely Threatened land environment A5.1b, 7.5 ha of Chronically Threatened environment A7.3a, and 33.9 ha of At Risk environment A6.1b.

P08/062 Upper Aratapu Creek Shrubland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

REED'S FARM FOREST

Survey no.	P08/063
Survey date	18 December 2006
Grid reference	P08 950 730
Area	2 ha
Altitude	15 m asl

Ecological unit

(a) Kahikatea forest on alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits on the flood plain of the Northern Wairoa River.

Vegetation

(a) Forest consists of abundant kahikatea.

Significant flora

None noted.

Fauna

None noted.

Significance

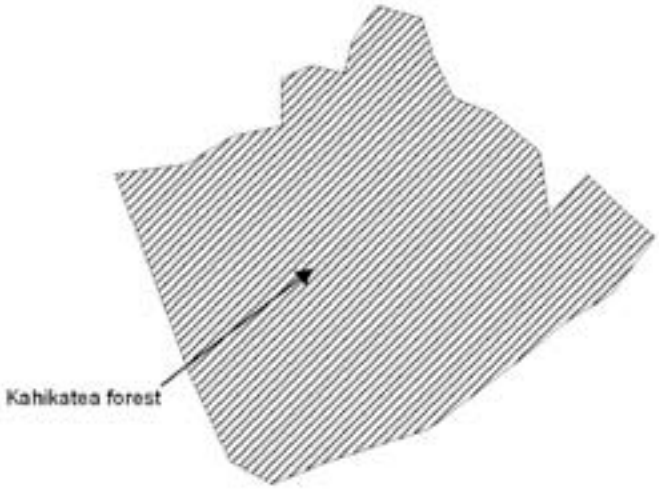
This forest unit is unfenced, with cattle having free access and although alluvial forest is a rare habitat type in Northland, there are substantially larger examples of the same vegetation type on the same landform in better condition in the ED. The current owner did not express an interest in protecting the area. Contains 2 ha of Acutely Threatened land environment A5.1b.

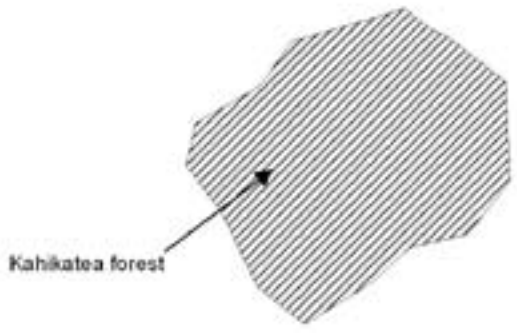
P08/063 Reed's Farm Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland





Aerial photography flown 2002

GLINKS GULLY WETLAND AND GRASSLAND

Survey no. P08/073
Survey date 16 December 2006
Grid reference P08 889 690
Area 7 ha
Altitude 45–80 m asl

Ecological units

(a) *Eleocharis sphacelata* reedland on alluvium (12%)

(b) Raupo reedland on alluvium (11%)

(c) Mamaku fernland on hillslope (77%)

Landform/geology

Holocene swamp deposits within gully eroded in mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunes, ponded at landward edge of Holocene unconsolidated parabolic dunefield.

Vegetation

This gully system is bordered by the road on the northern side. It is weed-infested and of poor quality, and used as a dumping ground.

(a) Lacustrine vegetation consists of abundant *Eleocharis sphacelata* and occasional *Azolla sp*.

(b) Freshwater wetland consists of abundant raupo with occasional pampas, manuka, and harakeke.

(c) Hillslope shrubland consists of abundant mamaku, frequent radiata pine, brush wattle, and pampas, and occasional nikau, manuka, Spanish heath, bracken, and mangeao.

Significant flora

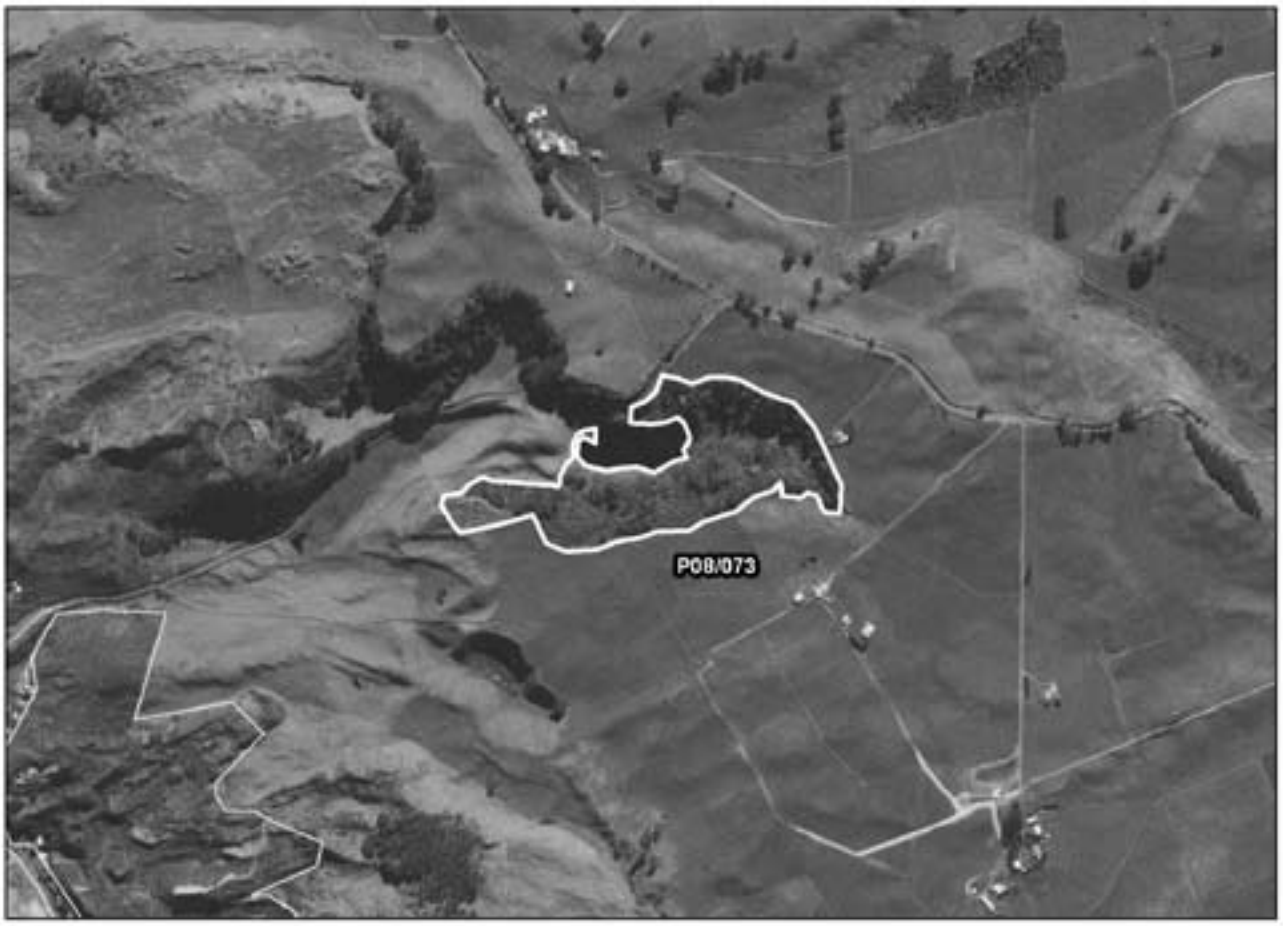
None noted.

Fauna

Australasian bittern (Nationally Endangered) reported in 1980 (SSBI P08/H014, 1989). Grey duck (Nationally Endangered), paradise shelduck, spur-winged plover, Pacific swallow (OSNZ surveys 1977–1992).

Significance

Although wetlands are a threatened habitat type throughout Northland, this is a poor-quality site that has been degraded by weed invasion and rubbish dumping and the threatened species records are not current. Contains 0.1 ha of Chronically Threatened land environment A7.3a and 7.3 ha of At Risk environment G1.1c.

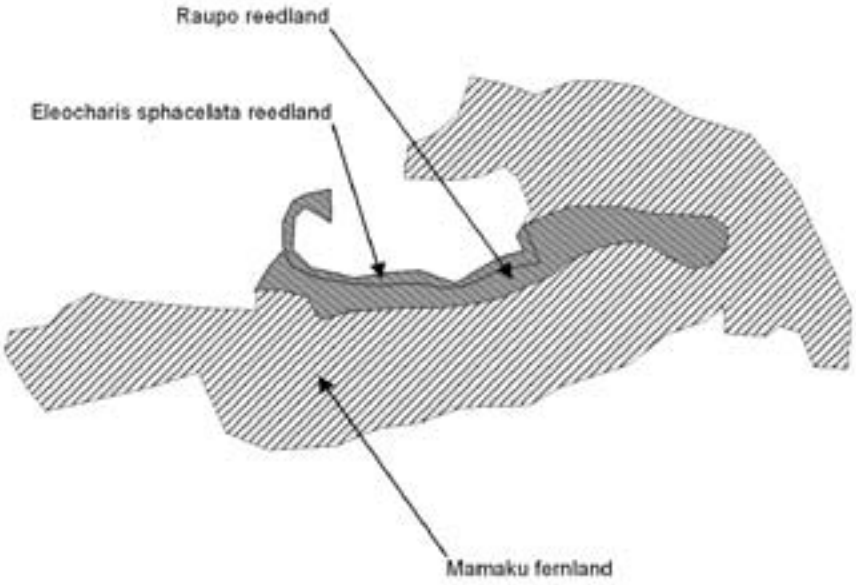


P08/073 Glinks Gully Wetland and Grassland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

LUCICH WETLAND

Survey no.	P08/080
Survey date	16 December 2006
Grid reference	P08 914 652
Area	1 ha
Altitude	100 m asl

Ecological unit

(a) *Eleocharis sphacelata* reedland on alluvium

(b) Open water of farm pond (both units together comprise 100%)

Landform/geology

Holocene swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunes, ponded at landward edge of Holocene unconsolidated parabolic dunefield.

Vegetation

This site comprises a lacustrine fringe of abundant *Eleocharis sphacelata* with frequent *Baumea articulata* and occasional raupo around a farm pond.

Significant flora

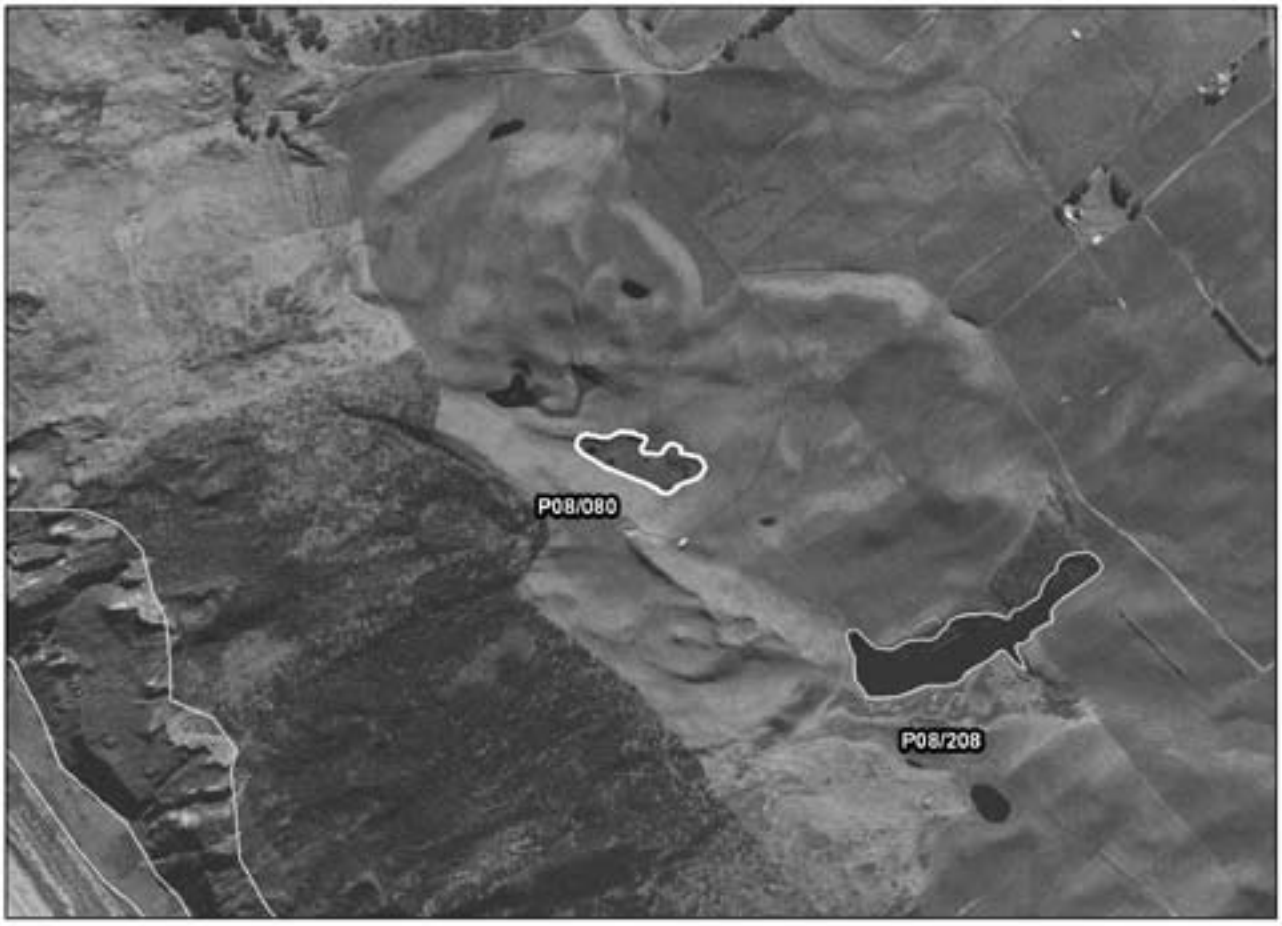
None noted.

Fauna

Pacific swallow. An unusual tern present at the time of the visit was tentatively identified by MCS as a Gull-billed tern (*Sterna nilotica*), which would be the first record for the ED.

Significance

An artificial wetland, grazed to its margins by domestic stock. Contains 1 ha of Acutely Threatened land environment A5.1b.

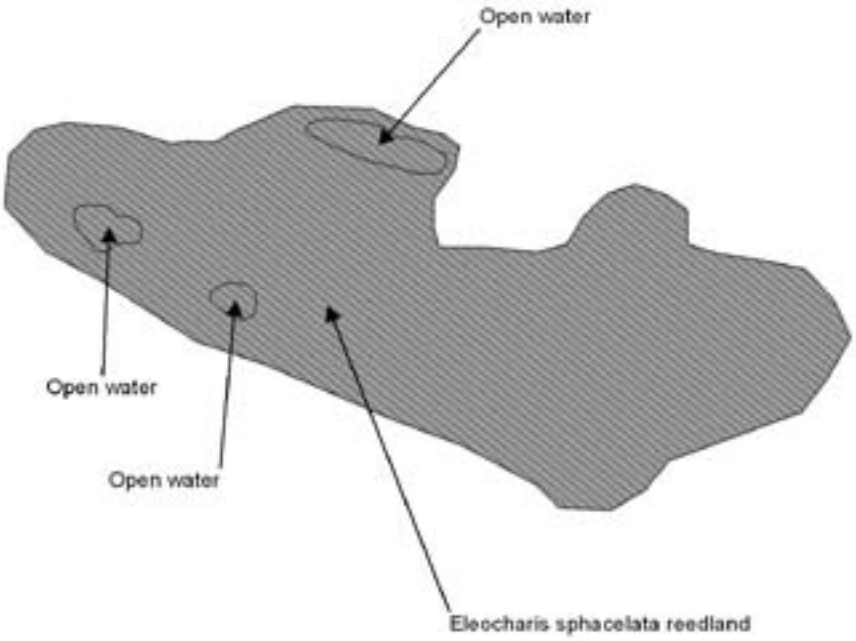


P08/080 Lucich Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

KERNOT FARM SHRUBLAND

Survey no.	P08/081
Survey date	16 December 2006
Grid reference	P08 967 611
Area	1 ha
Altitude	20–80 m asl

Ecological units

(a) Manuka shrubland on alluvium (1%)

(b) Undescribed shrubland on hillslopes and alluvium (99%)

Landform/geology

Hillslopes eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies, and Holocene alluvial and swamp deposits on valley floors.

Vegetation

This peat freshwater wetland unit is around 0.5 ha in size. Although surrounding pasture has been completely drained, the farm race on the eastern side holds the water in this unit. Arrow grass is located in pasture east of this unit. An area of wetland and forest east of the site was not visited.

(a) Wetland vegetation consists of abundant manuka, frequent sweet vernal and pampas, and occasional mamaku, ti kouka, water fern, giant umbrella sedge, raupo, radiata pine, bracken, ring fern, *Baumea rubiginosa*, rush species, *Carex virgata,* and *Isolepis distigmatosa.*

(b) A much larger tract of undescribed shrubland occupying a gully system to the east was not surveyed.

Significant flora

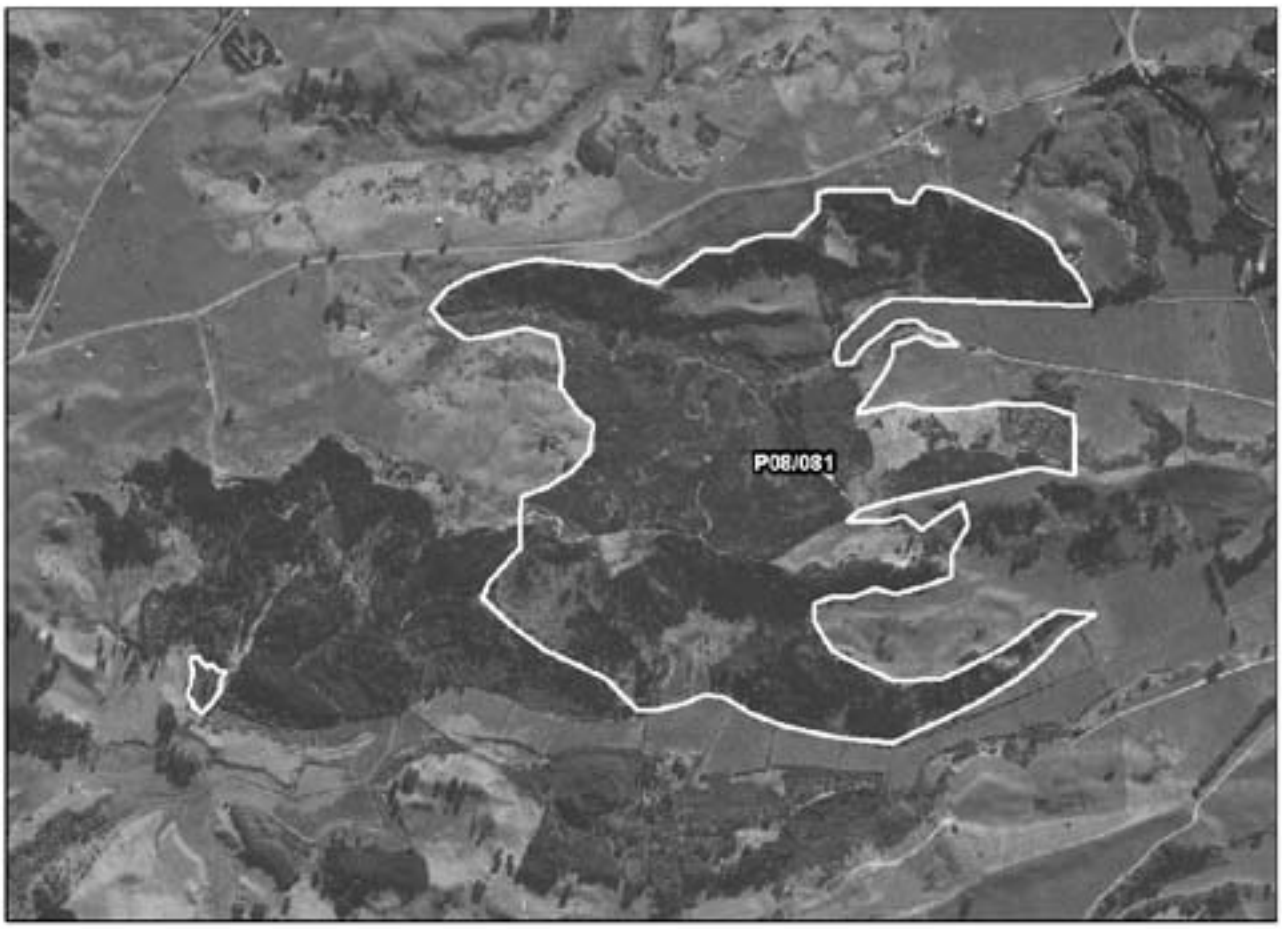
Arrow grass (Regionally Significant), recorded during this survey.

Fauna

Australasian bittern (Nationally Endangered), grey warbler, tui (SSBI P08/H049, 2006).

Significance

Peat wetlands in any sort of condition approaching natural are now very rare in this ED. However, this wetland is in poor condition due to extensive weed invasion. Although threatened species are present, the poor quality of the site precludes it being ranked at Level 1. Contains 0.3 ha of Acutely Threatened land environment A5.1b and 9.3 ha of At Risk environment A6.1b.

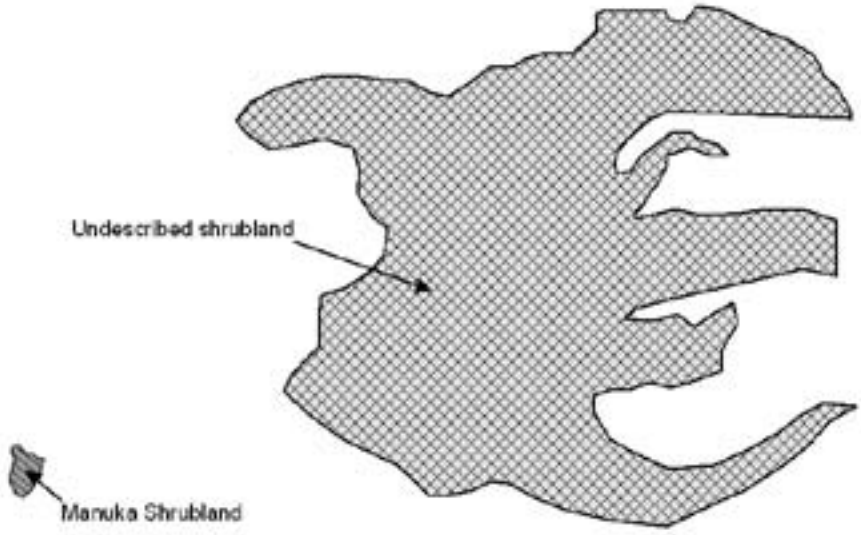


P08/081 Kernot Farm Shrubland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

PINAKI ROAD SOUTH WETLAND AND SHRUBLAND

Survey no.	P08/087
Survey date	30 November 2006
Grid reference	P08 985 597
Area	13 ha
Altitude	20–40 m asl

Ecological units

(a) Kanuka/manuka shrubland on hillslope (45%)

(b) Raupo reedland on alluvium (45%)

(c) Manuka shrubland on alluvium (10%)

Landform/geology

Hillslopes eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies, with Holocene alluvial and swamp deposits on valley floor.

Vegetation

The site comprises a sizeable wetland in the headwaters of the Owairangi Stream, with nearly contiguous kanuka/manuka shrubland on adjacent hillslopes.

(a) Kanuka dominates the shrubland areas, which are grazed and have been substantially invaded by weeds (e.g., Hakea species, berry heath, pampas). The wetland, also grazed, supports

(b) areas of raupo reedland and

(c) manuka shrubland with a variety of other native wetland species (e.g., *Baumea articulata*, *Isolepis prolifer*) present.

Significant flora

None noted.

Fauna

Black shag (Sparse), Australasian harrier, mallard, paradise shelduck.

Significance

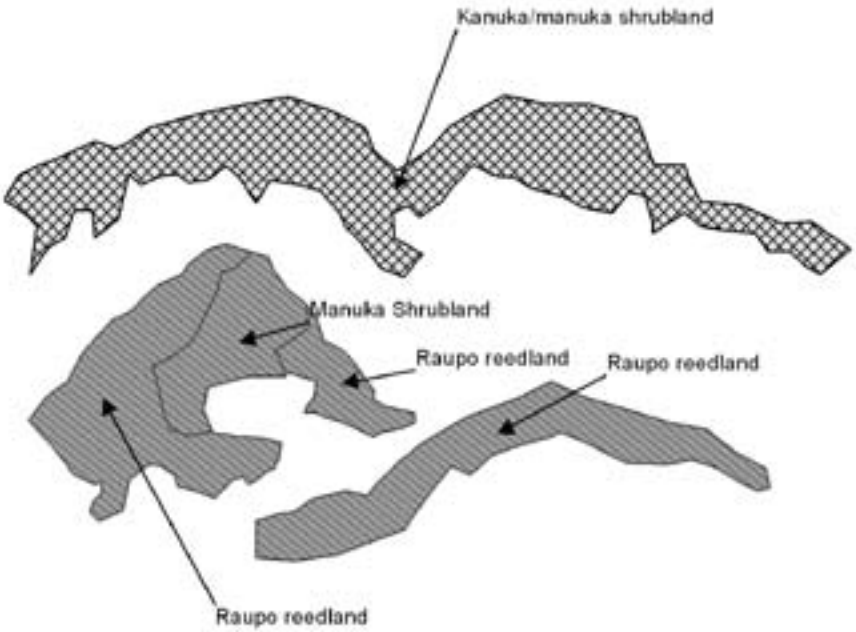
Wetlands are a threatened habitat type in Northland, and a threatened species is present. However, the site is unfenced and there is substantial weed invasion,. If managed and fenced, this site could be elevated to Level 1. Contains 4.4 ha of Acutely Threatened land environment A5.1b and 8.8 ha of At Risk environment A6.1b.

P08/087 Pinaki Road South Wetland and Shrubland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

BURGESS ROAD SOUTH SHRUBLAND

Survey no.	P08/088
Survey date	30 November 2006
Grid reference	P08 000 602
Area	9 ha
Altitude	20–40 m asl

Ecological unit

(a) Kanuka/manuka shrubland on hillslope (100%)

Landform/geology

Hillslopes eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

The site comprises a patch of secondary shrubland in the catchment of the Owairangi Stream. The upper slopes support the larger area dominated by kanuka, the lower slopes a smaller area of manuka. A small range of other native trees and shrubs are present, along with some radiata pines. The site is grazed and the canopy is collapsing in places.

Significant flora

None noted.

Fauna

None noted.

Significance

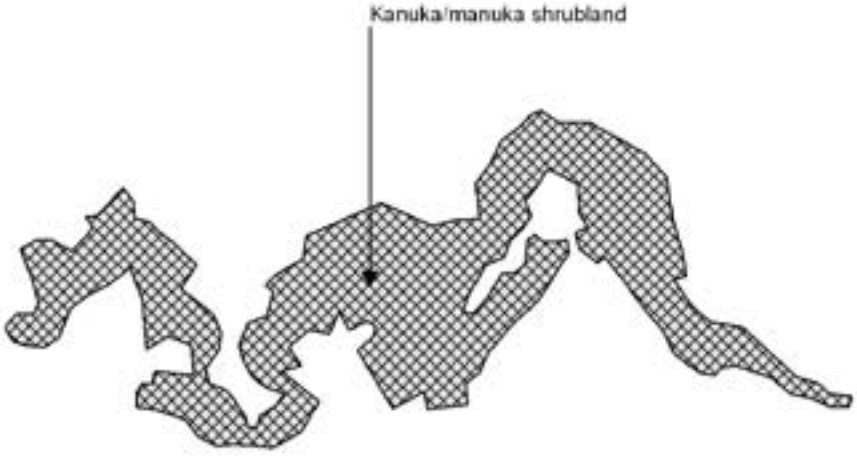
Weed invasion and grazing have diminished the value of this site, and the canopy is collapsing in places. Contains 0.3 ha of Acutely Threatened land environment A5.1b and 9.3 ha of At Risk environment A6.1b.

P08/088 Burgess Road South Shrubland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

BARFOOT'S SHRUBLAND

Survey no.	P08/092
Survey date	17 December 2006
Grid reference	P08 009 567
Area	9 ha
Altitude	20–25 m asl

Ecological units

(a) Manuka-pampas shrub grassland on alluvium (77%)

(b) Kanuka/manuka shrubland on hillslope (23%)

Landform/geology

Holocene swamp and alluvial deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This site consists of a wetland with adjoining shrubland. Neither of these units appears to be fenced.

(a) Freshwater wetland consists of abundant manuka, common pampas, and occasional mamaku.

(b) Kanuka/manuka shrubland on hillslopes has frequent mamaku and occasional radiata pine and ti kouka.

Significant flora

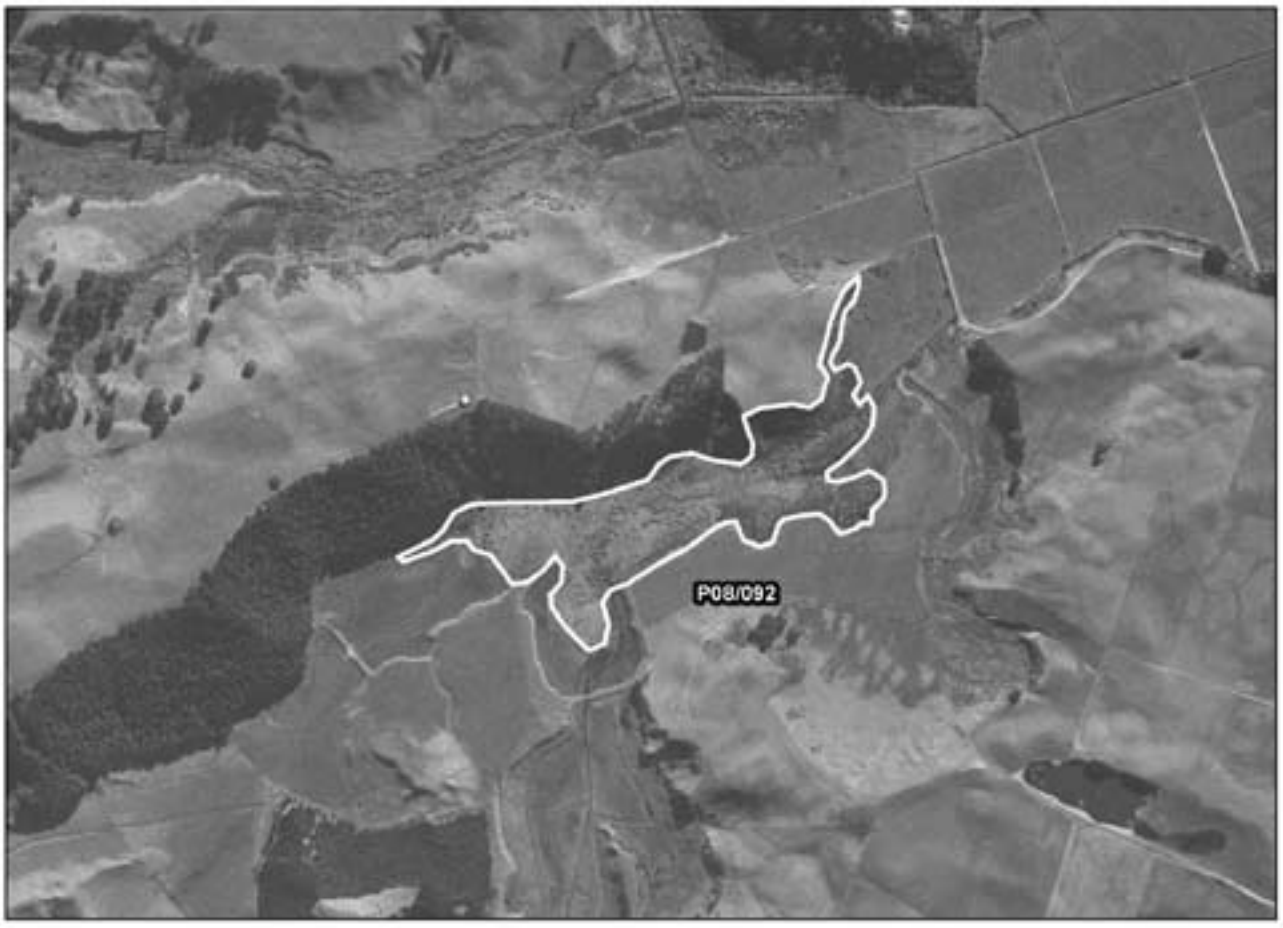
None noted.

Fauna

None noted.

Significance

The site has been seriously degraded by pampas invasion and locally by rubbish dumping. Contains 8.4 ha of Acutely Threatened land environment A5.1b, 0.1 ha of Chronically Threatened land environment A7.3a, and 0.8 ha of At Risk environment A6.1b.

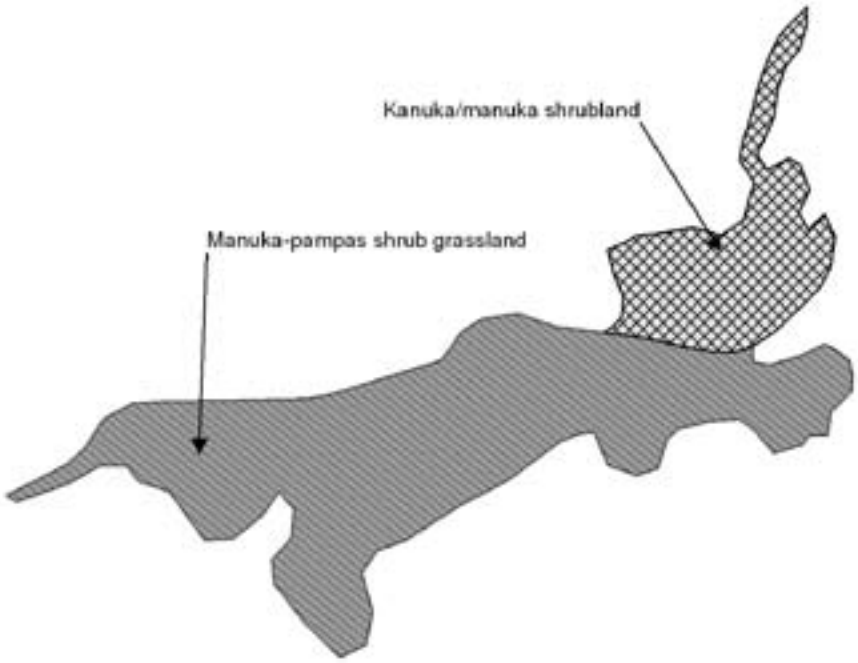


P08/092 Barfoot's Shrubland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

BARFOOT'S GULLY SHRUBLAND

Survey no.	P08/095
Survey date	17 December 2006
Grid reference	P08 018 556
Area	13 ha
Altitude	20–65 m asl

Ecological units

(a) Manuka-pampas shrub grassland on alluvium (78%)

(b) Manuka shrubland on hillslope (22%)

Landform/geology

Holocene swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This gully is completely fringed by plantation forest on surrounding ridges, making it inaccessible to stock at present.

(a) Manuka freshwater wetland consists of abundant manuka, common pampas and frequent pasture grasses, and occasional mamaku, ti kouka, and raupo.

(b) Hillslope manuka shrubland consists of abundant manuka, frequent prickly hakea and mingimingi, and occasional downy hakea, kanuka, ring fern, hangehange, mapau, *Coprosma rhamnoides*, and prickly heath.

Significant flora

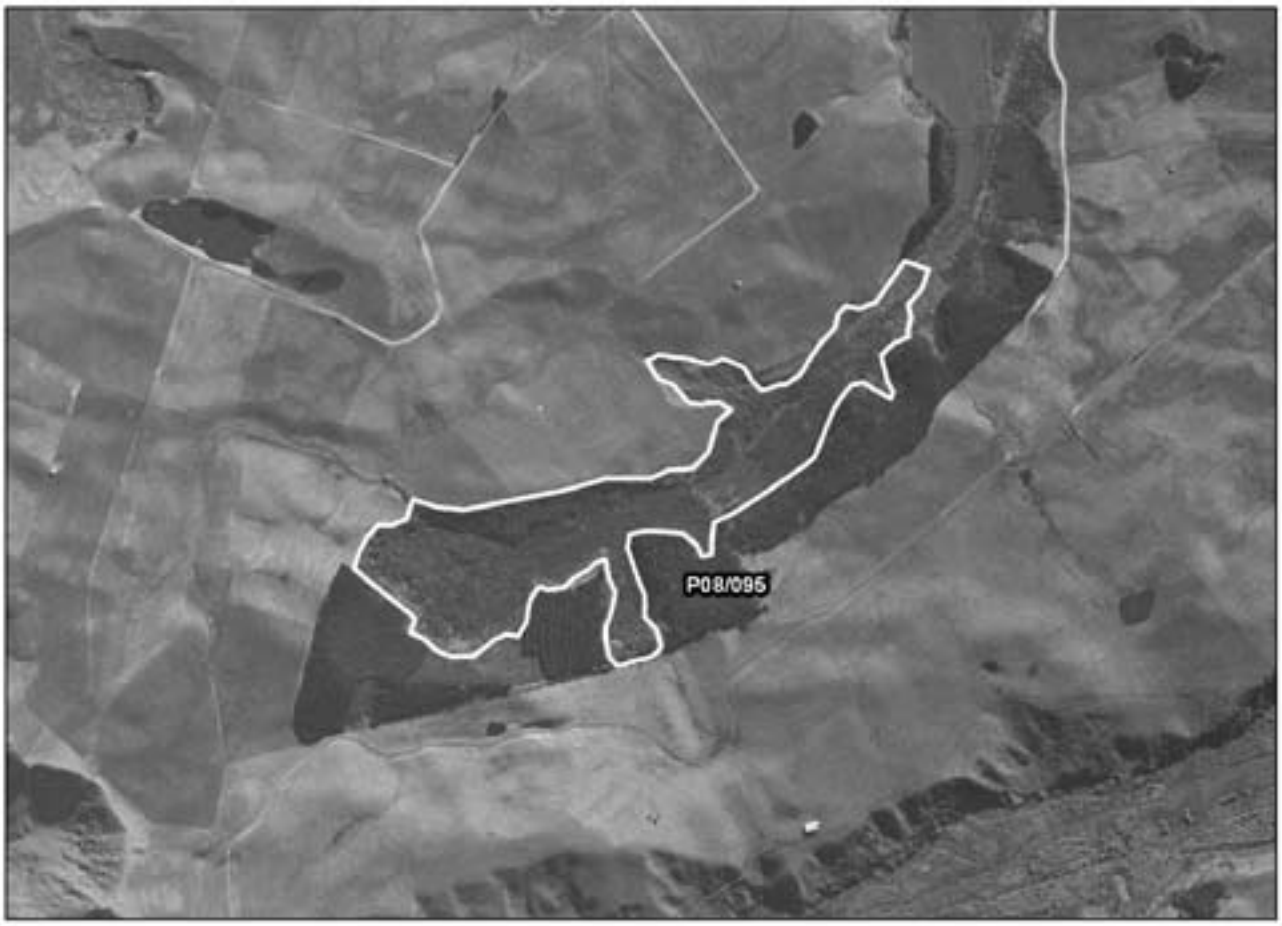
None noted.

Fauna

None noted.

Significance

Both vegetation types of this relatively large site have been extensively invaded by weeds, limiting its integrity and value. Contains 5.5 ha of Acutely Threatened land environment A5.1b.

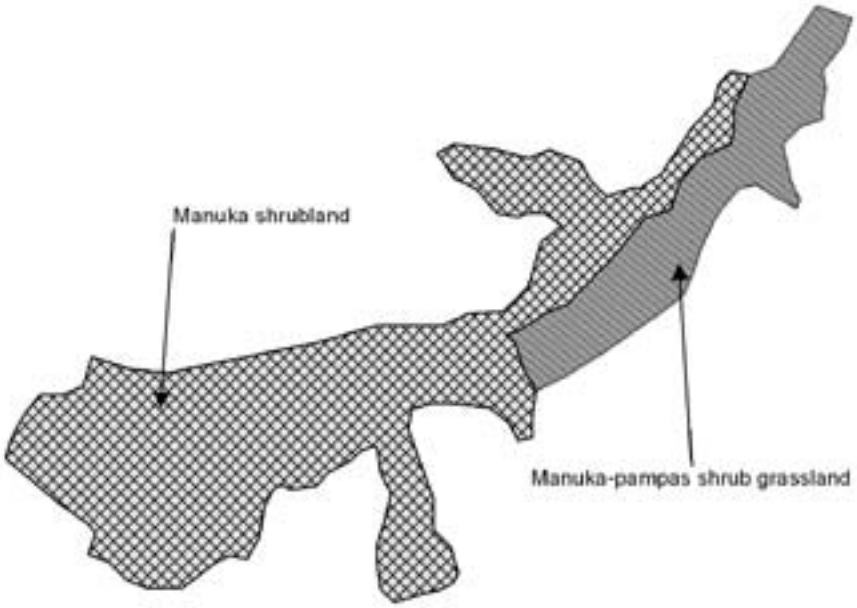


P08/095 Barfoot's Gully Shrubland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

HARRISON WETLAND

Survey no.	P08/096a
Survey date	17 December 2006
Grid reference	P08 042 544
Area	14 ha
Altitude	20 m asl

Ecological unit

(a) Pampas tussockland on alluvium (100%)

Landform/geology

Holocene alluvial and swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This long linear wetland adjoining Pouto Road was scoured out during a severe flooding event. The wetland is severely infested with pampas but still has pockets dominated by manuka, raupo, and ti kouka.

(a) Wetland consists of abundant pampas, frequent raupo and manuka and occasional mamaku, harakeke, and bracken.

Significant flora

None noted.

Fauna

None noted.

Significance

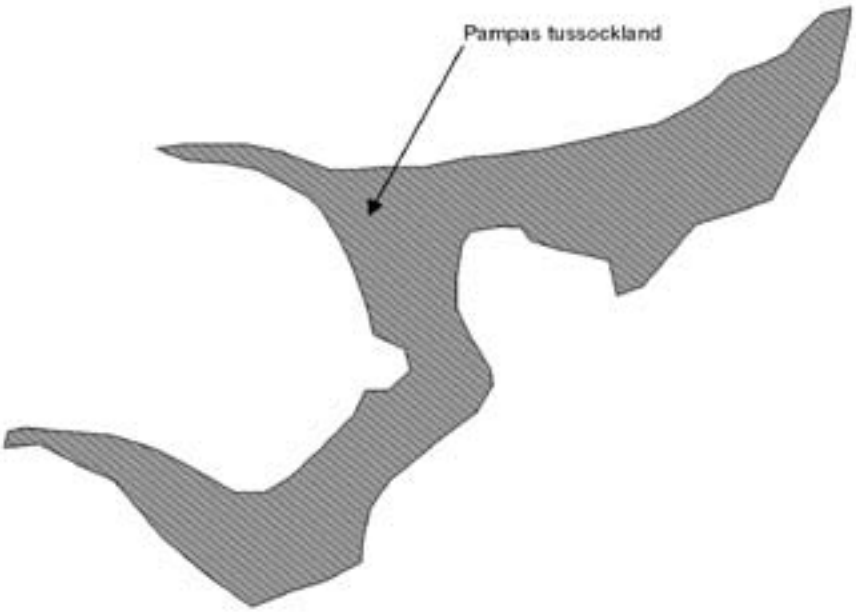
Although wetlands are a threatened habitat type throughout Northland, this site is now dominated by weeds (pampas) which seriously reduces its value. Contains 11.9 ha of Acutely Threatened land environment A5.1b and 2.2 ha of At Risk environment A6.1b.

P08/096A Harrison Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

MOSQUITO GULLY WETLAND

Survey no.	P08/099
Survey date	17 December 2006
Grid reference	P08 035 522
Area	18 ha
Altitude	20–60 m asl

Ecological unit

(a) Manuka-pampas shrub tussockland on alluvium (100%)

Landform/geology

Holocene swamp deposits within valley eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies.

Vegetation

This site, comprising a valley in the middle reaches of Waimamaku Creek, is surrounded by pine plantation on the northern, western, and southern sides, and Pouto Road on the east. Its original connection with the estuary has been severed by land development. No stock has access to the site.

(a) Wetland consists of common pampas and manuka, frequent raupo and *Baumea articulata*, and occasional bracken, mamaku, ti kouka, *Hebe stricta*, karamu, mistflower, *Baumea rubiginosa*, harakeke, *Calystegia sepium*, wheki and *Coprosma* ×*cunninghamii*.

Significant flora

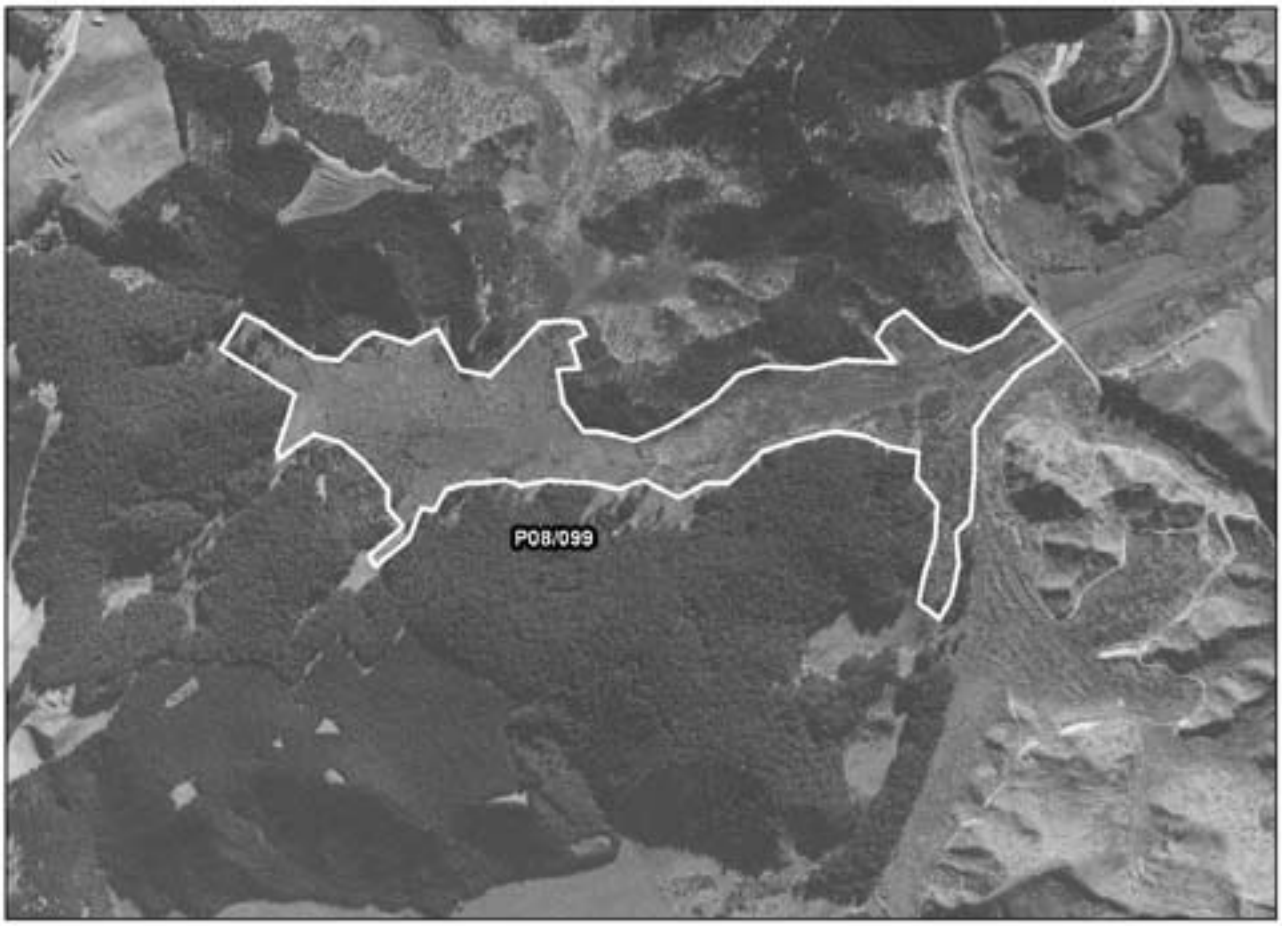
Marsh fern (Gradual Decline) (1996, SSBI P08/H021).

Fauna

North Island fernbird (Sparse), spotless crake (Sparse), Australasian harrier, New Zealand kingfisher, Pacific swallow, North Island fantail (SSBI P08/H021, 1977, 1989).

Significance

Although wetlands are a threatened habitat type throughout Northland and threatened bird species have been recorded in the recent past and a threatened plant in 1996, this site has been widely invaded by pampas. This site was once contiguous with Waimamaku Estuary, but the sequence of native plant communities from shoreline inland no longer exists. Contains 14.7 ha of Acutely Threatened land environment A5.1b and 3 ha of At Risk environment A6.1b.

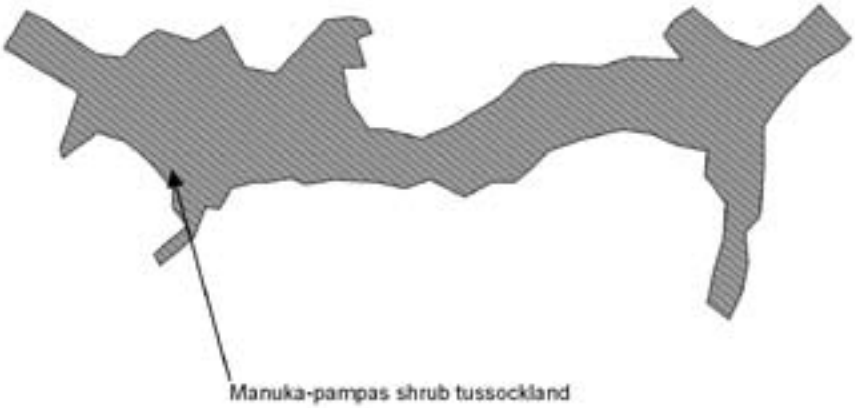


P08/099 Mosquito Gully Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

BLACK LAKE AND SHRUBLAND

Survey no.	P08/207
Survey date	Not visited during this survey.
Grid reference	P08 916 643
Area	0.9 ha
Altitude	65 m asl

Ecological units

(a) Undescribed shrubland (37%)

(b) Open water in dune lake (63%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield, ponded at landward edge of Holocene parabolic dunefield.

Vegetation

(a) Undescribed shrubland is likely to be dominated by manuka.

(b) Open water in dune lake.

Significant flora

None noted.

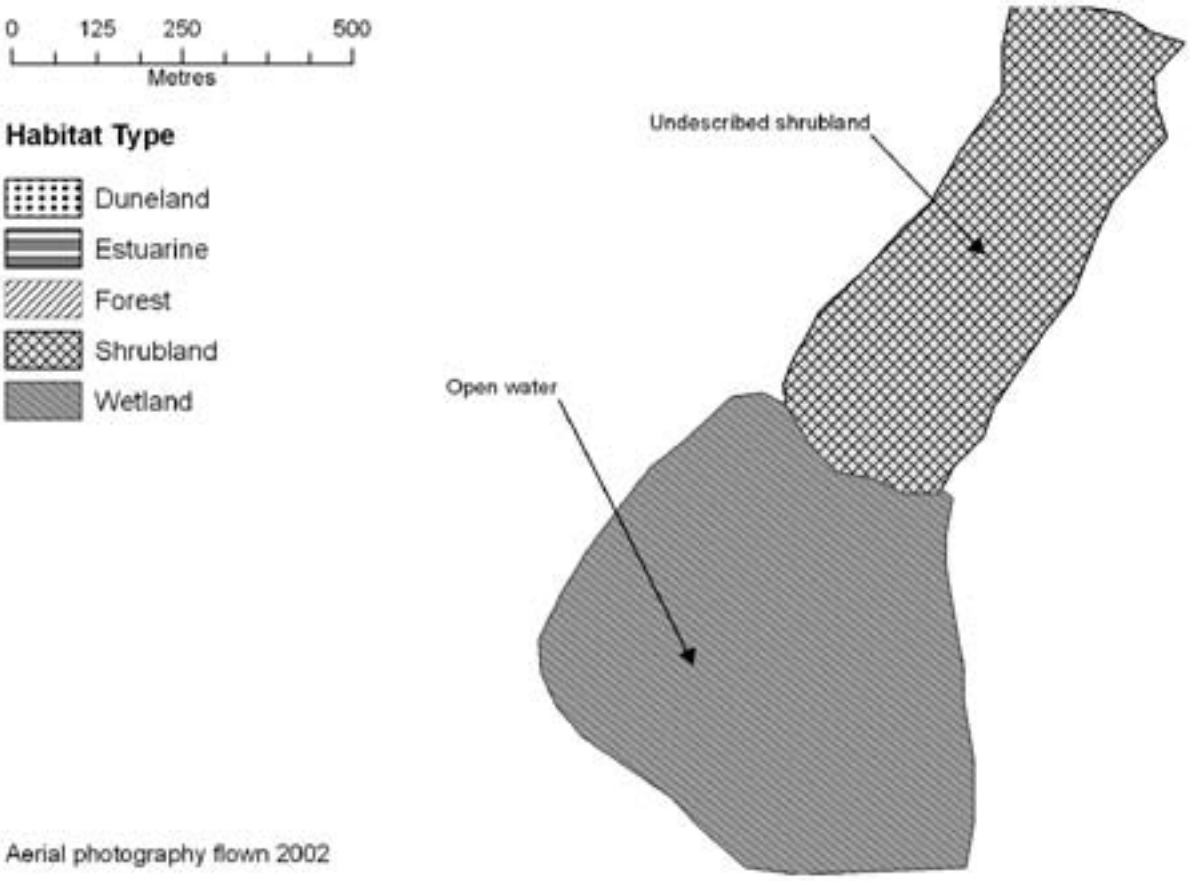
Fauna

None noted.

Significance

This site was not visited during this survey and so until further survey, it remains at Level 2. The site is already wholly protected in Black Lake CA, administered by DOC. Contains 0.8 ha of At Risk land environment G1.1c.

P08/207 Black Lake and Shrubland



Aerial photography flown 2002

LAKE PARAWANUI AND WETLAND

Survey no.	P08/212
Survey date	Not visited during this survey. Information from Wells et al. (2007).
Grid reference	P08 873 706
Area	7.7 ha
Altitude	65 m asl

Ecological units

(a) *Eleocharis sphacelata*-raupo-*Baumea articulata* reedland on alluvium

(b) Open water in dune lake (both units together comprise 100%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield, ponded at landward edge of Holocene parabolic dunefield.

Vegetation

(a) *Eleocharis sphacelat*a-raupo-*Baumea articulata* reedland on alluvium.

(b) Open water in dune lake (both units together comprise 100%).

Significant flora

Fimbristylis velata (Sparse) (Wells et al. 2007).

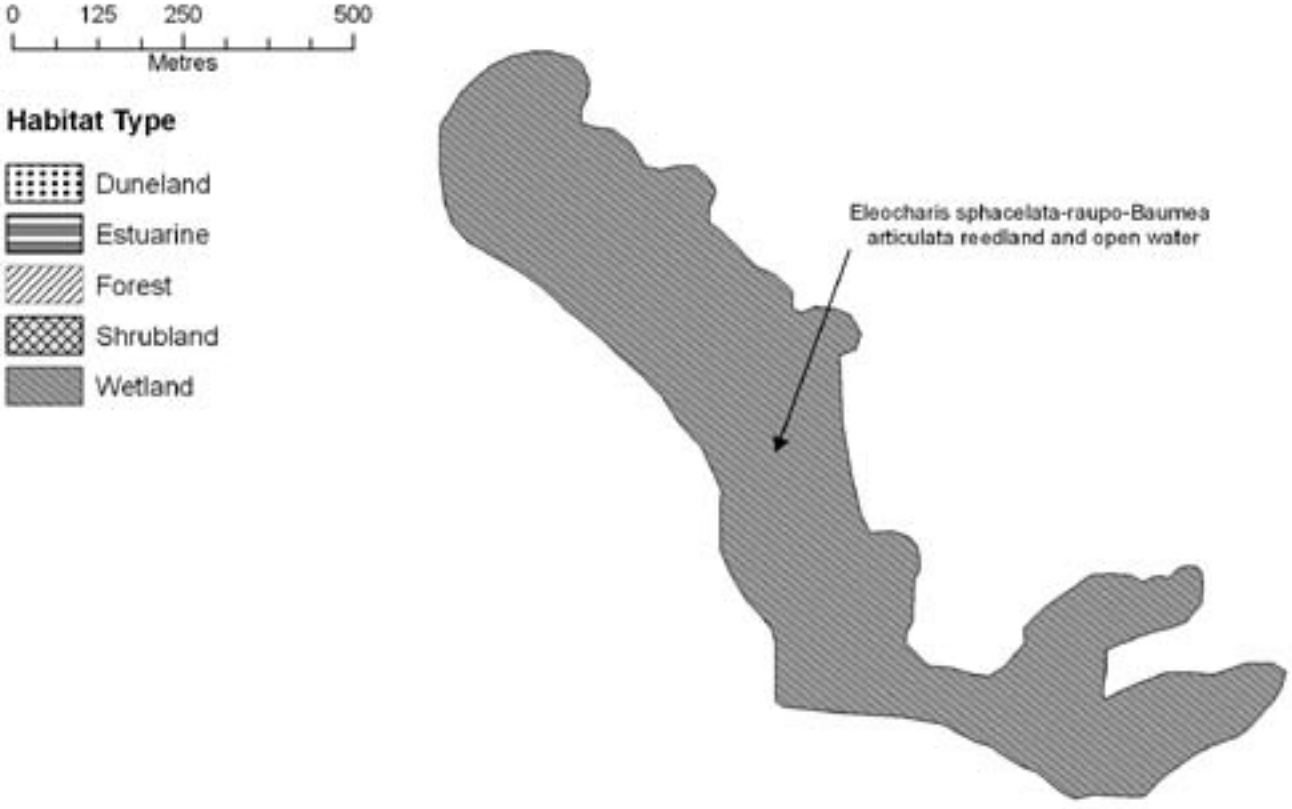
Fauna

Freshwater mussel (Gradual Decline) (Wells et al. 2007). Shortfin eel, common bully (NIWA 2007). Grey duck (Nationally Endangered) (SSBI P08/H008, 1989). Australasian bittern (Nationally Endangered), little black shag (Sparse) (OSNZ surveys 1977–1994). Black shag (Sparse), little shag (Sparse), New Zealand dabchick (Sparse) (SSBI P08/H008, 1989). Australasian little grebe (Regionally Significant), New Zealand scaup (Regionally Significant) (SSBI P08/H008, 1989). Pied shag, paradise shelduck, black-backed gull, Pacific swallow, grey warbler, Australasian shoveler (Regionally Significant) (SSBI P08/H008, 1989). White-faced heron, Australasian harrier, New Zealand kingfisher, Pacific swallow (OSNZ surveys 1977–1994).

Significance

Lake Parawanui lies in a steep-sided catchment, with shrubland on the western (seaward) side. Domestic stock has access to it, and it appears that pest fish species (rudd, koi carp, and orfe) were deliberately introduced into it (Wells et al. 2007). Although seriously degraded and ranked Low by Wells et al. (2007), a variety of threatened species has been recorded. However, the large numbers of waterbirds (including rare species) were reported before the collapse of the submerged vegetation (Wells et al. 2007) and therefore remains at Level 2. Contains 3.7 ha of At Risk land environment G1.1c.

P08/212 Lake Parawanui and Wetland



Aerial photography flown 2002

LOWER LAKE ROTOTUNA WETLAND

Survey no.	P09/002
Survey date	18 December 2006
Grid reference	P09 049 489
Area	9 ha
Altitude	100–115 m asl

Ecological unit

(a) *Baumea articulata*-pampas reed tussockland in old lake bed (100%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield.

Vegetation

This wetland has formed in an old lake bed (lower Lake Rototuna). Manuka is relatively uncommon in comparison with other wetland sites in the ED. Pine plantations surround the site on the western and southern margins with pasture on the northern and eastern margins. It is fenced from domestic stock.

(a) Vegetation consists of common *Baumea articulata* and pampas, frequent ti kouka, raupo and harakeke and occasional kanuka, bracken and manuka.

Significant flora

None noted.

Fauna

Black shag (Sparse), New Zealand dabchick (Sparse), North Island fernbird (Sparse), New Zealand scaup (Regionally Significant), Australasian harrier, pukeko, New Zealand kingfisher, Pacific swallow, silvereye (SSBI P09/H003, 1977, 1989).

Significance

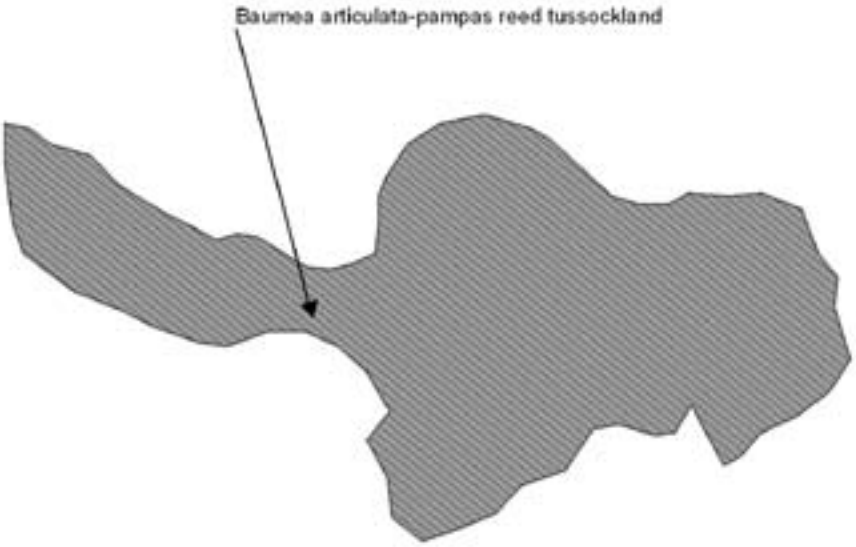
The wetland was formed in 1980 after a drainage barrier was washed out (SSBI P09/H003). The site has been heavily invaded by weeds (especially pampas), but has supported threatened and regionally significant bird species in the past. Contains 4.3 ha of At Risk A6.1b and G1.1c. It is already wholly protected (9.6 ha) in Rototuna Lake CA, administered by DOC.

P09/002 Lower Lake Rototuna Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

PHOEBE'S LAKE AND WETLAND

Survey no.	P09/011a
Survey date	24 January 2007
Grid reference	P09 074 438
Area	1.8 ha
Altitude	135–140 m asl

Ecological units

(a) Raupo reedland on alluvium

(b) *Eleocharis sphacelata* reedland on alluvium (both wetland units together comprise 35%)

(c) Open water in dune lake (65%)

Landform/geology

Lake in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield, ponded at landward edge of Holocene parabolic dunefield.

Vegetation

This small lake supports very narrow fringing reedland communities, not mapped separately, dominated either by

(a) raupo or

(b) *Eleocharis sphacelata*

(c) Open water in dune lake

Significant flora

None noted.

Fauna

Grey duck (Nationally Endangered), black shag (Sparse), little shag (Sparse) (OSNZ surveys 1973–1995). New Zealand dabchick (Sparse), Pacific swallow (SSBI P09/H008, 1989). Australasian harrier, pied shag, paradise shelduck, pukeko (OSNZ surveys 1973–1995).

Significance

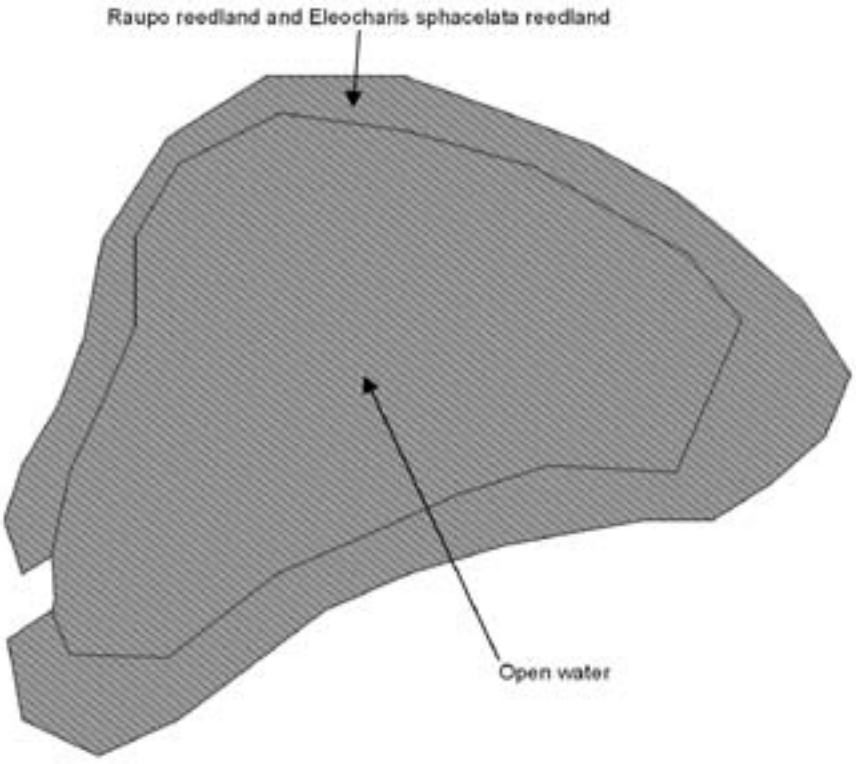
Ranked Low by Wells et al. (2007). Although dune lakes are a threatened habitat type throughout New Zealand, this site is being degraded by grazing and weed invasion (Manchurian wild rice has established around some of the fringe and oxygen weed is also present; Wells et al., 2007), and currently has little ecological significance. Threatened species have been recorded in past surveys. Contains 1 ha of At Risk land environment G1.1c.

P09/011A Phoebe's Lake and Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

PUKEMIRO WETLAND AND FOREST

Survey no.	P09/020
Survey date	18 December 2006
Grid reference	P09 095 442
Area	39 ha
Altitude	20–80 m asl

Ecological units

(a) Kanuka forest on hillslope (89%)

(b) Manuka-raupo shrub reedland on alluvium (11%)

Landform/geology

Hillslopes eroded in early Pleistocene (Awhitu Group) cemented dune sand and associated facies, and in mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunes, with Holocene alluvial and swamp deposits on valley floor.

Vegetation

The Pukemiro swamp and forest unit lies east of Tapu Bush. The kanuka forest understorey consists of pasture as the unit is unfenced. Surrounding the main site are various pockets of similar kanuka forest and wetlands, all of which are unfenced and less than 1 ha in size.

(a) Kanuka forest canopy consists solely of kanuka.

(b) Wetland vegetation consists of abundant manuka, frequent raupo and occasional harakeke, ti kouka, and pampas.

Significant flora

None noted.

Fauna

North Island fernbird (Sparse), spotless crake (Sparse), grey warbler, North Island fantail, (SSBI P09/H009, 1989).

Significance

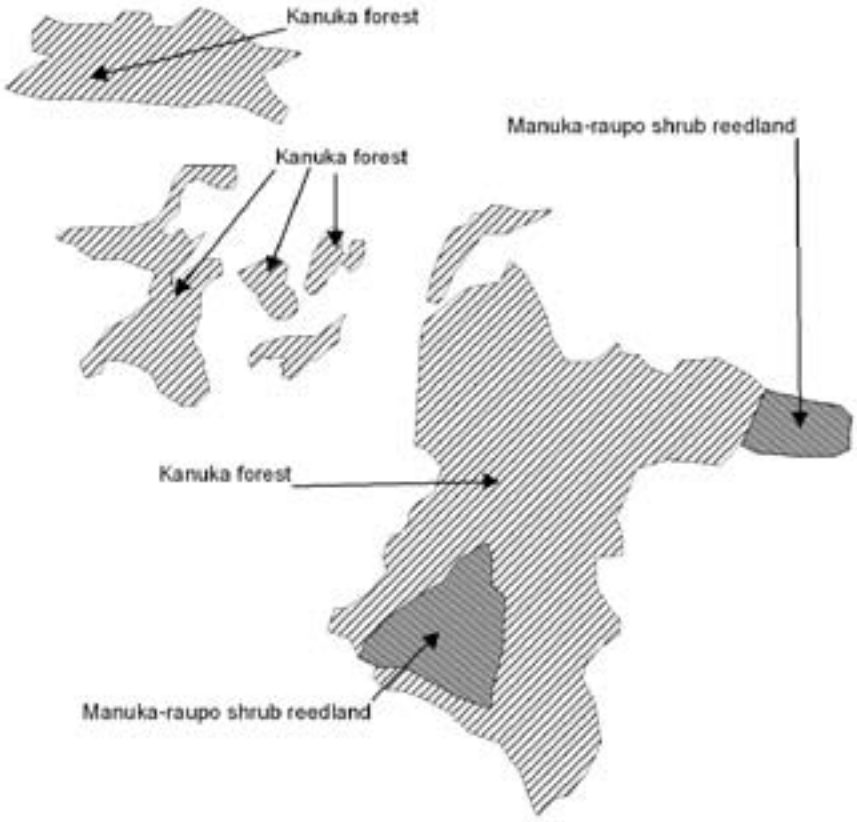
Although partly buffered by plantation, there are better examples of similar vegetation in the ED. Threatened bird species have been recorded in the past. Contains 13.4 ha of Acutely Threatened land environment A7.3a and 25.4 ha of At Risk A5.1b.

P09/020 Pukemiro Wetland and Forest

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

THE SPECTACLES LAKES AND WETLAND

Survey no.	Q09/202
Survey date	Not visited during this survey. Information from Wells et al. (2007).
Grid reference	Q09 142 373, 146 373
Area	4.9 ha
Altitude	55–60 m asl

Ecological units

(a) Raupo-reedland on alluvium (53%)

(b) Open water in dune lake (47%)

Landform/geology

Lakes and swamp deposits in depressions on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield.

Vegetation

This site comprises a pair of small lakes.

(a) Both lakes have a fringe of lacustrine reedland, one dominated by raupo, the other by *Baumea articulata*.

(b) Open water.

Significant flora

None noted.

Fauna

Australasian bittern (Nationally Endangered), grey duck (Nationally Endangered) (SSBI Q09/H013, 1981, 1989). Red-billed gull (Gradual Decline) (OSNZ surveys 1973–1995). New Zealand dabchick (Sparse), little black shag (Sparse), little shag (Sparse) (SSBI Q09/H013, 1981, 1989). Black shag (Sparse), grey teal (Regionally Significant), New Zealand scaup (Regionally Significant) (OSNZ surveys 1973–1995). Australasian harrier, pukeko, black-backed gull, Pacific swallow (SSBI Q09/H013, 1981, 1989). Pied shag, white-faced heron, paradise shelduck, Australasian shoveler (Regionally Significant), pukeko, spur-winged plover, Australasian pied stilt, New Zealand kingfisher, Pacific swallow (OSNZ surveys 1973–1995).

Significance

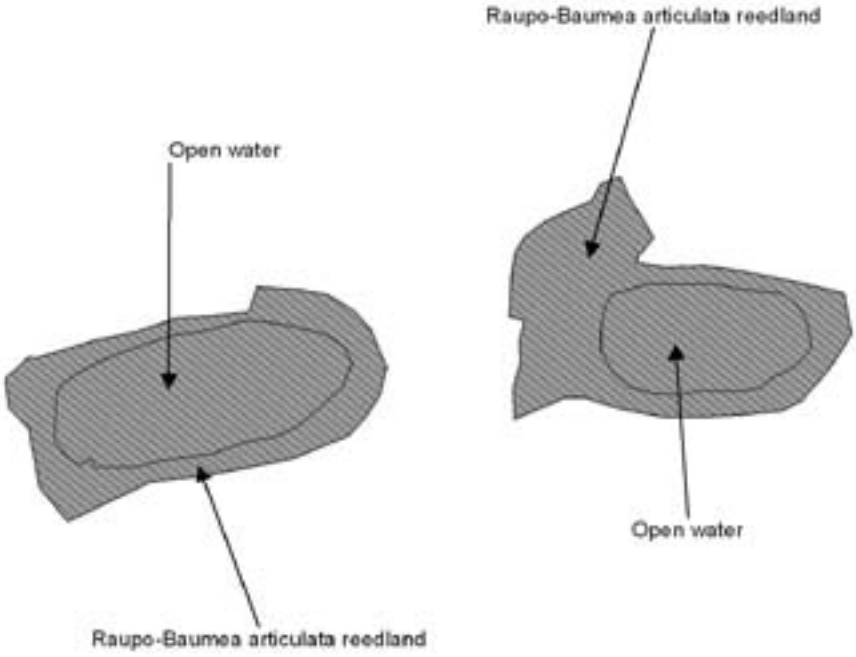
At least one of the lakes was fenced in 1989 (SSBI Q09/H013). Threatened and regionally significant species have been recorded and this site is part of the eastern Pouto chain of lakes; until further survey, however, it remains at Level 2. Contains 4.3 ha of Chronically Threatened land environment A7.3a. A small proportion of it (0.9 ha) is already protected in Pouto Lakes Marginal Strip, administered by DOC.

Q09/202 The Spectacles Lakes and Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

SWAN EGG POND AND WETLAND

Survey no.	Q09/203
Survey date	Not visited during this survey. Information from Wells et al. (2007).
Grid reference	Q09 129 400
Area	2 ha
Altitude	55 m asl

Ecological units

(a) Raupo reedland on alluvium (70%)

(b) Open water in dune lake (30%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield.

Vegetation

This small lake comprises

(a) Raupo reedland on alluvium

(b) Open water.

Significant flora

None noted.

Fauna

Dwarf inanga (Serious Decline), shortfin eel, common bully (NIWA 2007). Australasian bittern (Nationally Endangered), grey duck (Nationally Endangered), New Zealand dabchick (Sparse), black shag (Sparse), little shag (Sparse), grey teal (Regionally Significant) (OSNZ surveys 1977–1994). Australasian harrier, pukeko, Pacific swallow, grey warbler, North Island fantail (SSBI Q09/H006, 1981, 1984). White-faced heron, paradise shelduck, Australasian shoveler (Regionally Significant), Australasian harrier, pukeko, spur-winged plover, Australasian pied stilt, Pacific swallow (OSNZ surveys 1977–1994).

Significance

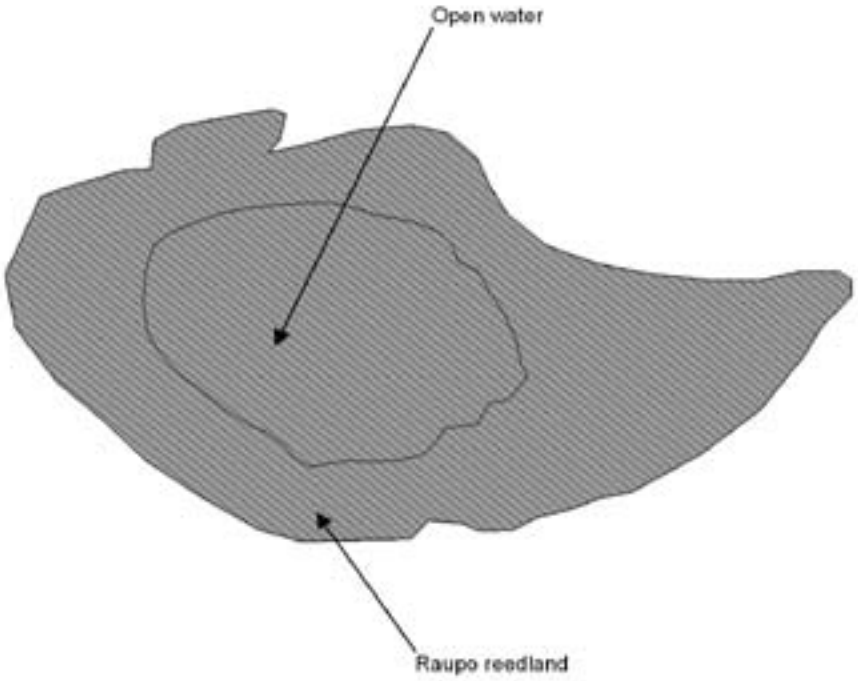
In 1989, this site was grazed to the water's edge, diminishing its value. Nevertheless, dune lakes are a threatened habitat type in Northland and this lake, which has supported threatened and regionally significant species in the past, is part of the eastern Pouto chain of dune lakes. Until updated by further survey, this site remains at Level 2. Contains 1.9 ha of Chronically Threatened land environment A7.3a.

Q09/203 Swan Egg Pond and Wetland

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

LAKE WAINGATA

Survey no.	Q09/204
Survey date	26 January 2007
Grid reference	Q09 138 383
Area	13 ha
Altitude	60 m asl

Ecological units

(a) Herbfield on alluvium (15%)

(b) Open water in dune lake (85%)

Landform/geology

Lake and swamp deposits in depression on mid-late Pleistocene (Karioitahi Group) consolidated parabolic dunefield.

Vegetation

This small lake supports

(a) Herbfield on alluvium comprising *Lilaeopsis novae-zelandiae*, *Elatine gratioloides*, and *Glossostigma elatinoides*.

(b) Open water in dune lake.

Significant flora

Hydatella inconspicua (Serious Decline) was formerly present (Wells et al. (2007). *Elatine gratioloides* and *Glossostigma elatinoides*, recorded during this survey, are Regionally Significant.

Fauna

Dwarf inanga (Serious Decline), common bully (NIWA 2007). Grey duck (Nationally Endangered), red-billed gull (Gradual Decline), New Zealand dabchick (Sparse), little black shag (Sparse), little shag (Sparse), New Zealand scaup (Regionally Significant) (SSBI Q09/H010, 1977, 1981, 1984), grey teal (Regionally Significant) (OSNZ surveys 1973–1995), black shag (Sparse) (R. Parrish, pers. comm.), white-faced heron, pukeko, spur-winged plover, Australasian shoveler (Regionally Significant), New Zealand kingfisher, Pacific swallow (SSBI Q09/H010, 1977, 1981, 1984). Pied shag, Australasian harrier, Australasian pied stilt (OSNZ surveys 1973–1995). Paradise shelduck (R. Parrish, pers. comm.).

Significance

Ranked Low by Wells et al. (2007). The introduction of grass carp in 1995 to eradicate the pest plant oxygen weed has also eliminated the formerly extensive lacustrine fringe of *Eleocharis sphacelata* reedland and almost all submerged native vegetation as well, including the nationally threatened *Hydatella inconspicua*. Domestic stock grazing to the water's edge has also reduced the quality of the site. Nevertheless, threatened animal and plant species have been recorded, and Wells et al. (2007) suggest that the nationally threatened fish, dunelakes galaxias, may still

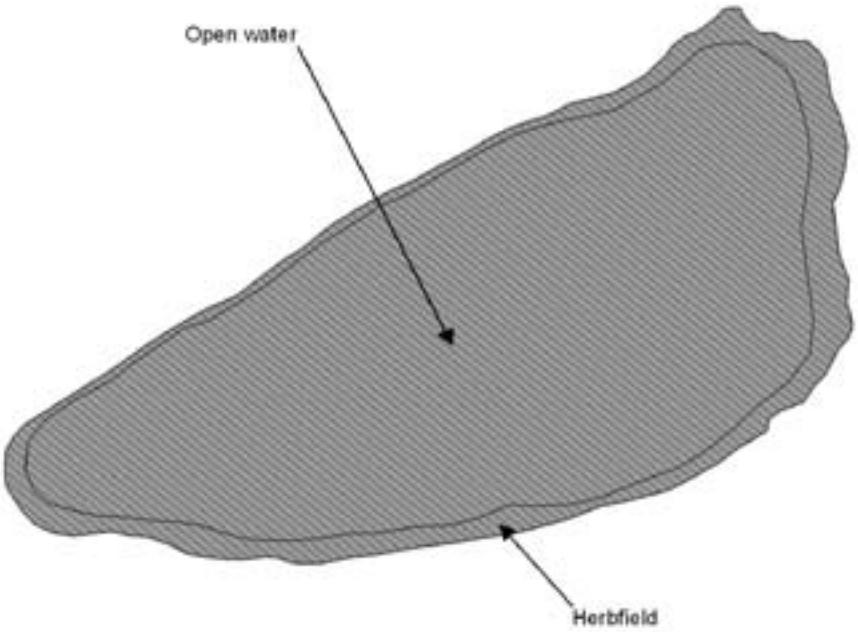
be common. Further survey is recommended to assess the impact of recent modifications. Until then, the site remains at Level 2. Contains 4.1 ha of Chronically Threatened land environment A7.3a.

Q09/204 Lake Waingata

0 125 250 500
Metres

Habitat Type

- Duneland
- Estuarine
- Forest
- Shrubland
- Wetland



Aerial photography flown 2002

5. Summary and conclusions

5.1 ANALYSIS OF EXISTING PROTECTED AREAS

5.1.1 Overview

The Protected Natural Areas network in Kaipara ED (Northland) is summarised in Table 8.

Kaipara ED (Northland) covers a land area of 87 700 ha. Natural areas in Kaipara ED (Northland) cover a total of 23 591 ha, of which 11 144 ha fall within the estuarine habitats of the Kaipara Harbour. Therefore, natural areas on land amount to a total of 12 447 ha or 14% of the total land extent of 87 700 ha. Approximately 54% (6721 ha) of the natural areas of Kaipara ED (Northland), excluding estuarine waters, are formally protected (Table 8), about 8% of the total extent of the ED.

TABLE 8: PROTECTED NATURAL AREAS NETWORK IN KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY) (AREAS IN HA)

Notes: The extent (ha) and type of protection status within each site is identified. CA = Conservation Area; SR = Scientific Reserve; WMR = Wildlife Management Reserve; HR = Historic Reserve; GP = Government Purpose; MS = Marginal Strip; QEII = Queen Elizabeth II National Trust Covenant.

PROTECTED AREA	SURVEY NO.	STATUS						TOTAL AREA PROTECTED	TOTAL SITE AREA
		CA	SR	WMR	HA	MS	QEII		
Waihaupai Stream MS	O07/012					2.9		2.9	87
Shag Lake MS	O07/014					1.3		1.3	17
Ureti CA (Camping Area)	O07/016	10.1						10.1	212.5
Ureti MS	O07/016, 025					90.6		90.6	217.5
Lake Waikere	O07/018							538[1]	
Lake Taharoa	O07/022							538[1]	
Lake Kai Iwi	O07/024							538[1]	
Omamari GPWMR	P07/127			67.8				67.8	127.7
Maitahi Wetland SR	P07/133		237.1					237.1	323
Babylon MS	P07/138					1.2		1.2	2
Rehutai CA	P07/174a	8.5						8.5	5.2
Morris QEII Covenant	P07/142, 148						3.2	3.2	12.3
Harding QEII Covenant	P08/056						1.4	1.4	2.2
Rehutai MS	P08/061					31.7		31.7	833
Lendrum QEII Covenant	P08/067b						0.5	0.5	1.6

PROTECTED AREA	SURVEY NO.	STATUS						TOTAL AREA PROTECTED	TOTAL SITE AREA
		CA	SR	WMR	HA	MS	QEII		
Kidd QEII Covenant	P08/068b						1.6	1.6	3.7
Tikinui CA	P08/072	104.2						104.2	1000
Tangitiki CA	P08/101	158.4						158.4	166
Tangitiki Bay MS No 1	P08/101, P08/200, P08/213					12.2		12.2	11748
Tangitiki Bay MS No 2	P08/101, P09/003					6.8		6.8	666
Wairoa River MS No 7	P08/200					10.1		10.1	11480
Wairoa River MS No 8	P08/200					12.9		12.9	11480
Wairoa River MS No 9	P08/200					2.6		2.6	11480
Wairoa River MS No 10	P08/200					0.5		0.5	11480
Whakatu CA	P08/200	130.2						130.2	11480
Lucich Road MS	P08/200					0.1		0.1	11480
Matanginui CA	P08/200	3.1						3.1	11480
Kohatutahi MS	P08/200					2.6		2.6	11480
Koremoa MS	P08/200					0.1		0.1	11480
Wairoa River MS No 8	P08/200					32.7		32.7	11480
Ruawai CA	P08/200	7.0						7.0	11480
Black Lake CA	P08/207	0.9						0.9	0.9
Wainui Lake CA	P08/211	14.9						14.9	4.8
Tomb Point CA	P08/213	2.4						2.4	104
Tomb Point MS	P08/213					4.2		4.2	104
Kaipara North Head Lighthouse HR	P09/001				8.1			8.1	5798
Pouto CA	P09/001	3304.4						3304.4	5798
Pouto Lakes MS	P09/001					0.9		0.9	5798
Pouto North CA	P09/001	1398.9						1398.9	5798
Pouto North MS	P09/001					30.4		30.4	5798
Pukekura HA	P09/001, Q09/061				1.5			1.5	5861
Rototuna Lake CA	P09/002, 205	22.6						22.6	17.7
Punahaere Creek CA	P09/003			13				13	500
Punahaere GPWMR	P09/003			10.9				10.9	500
Rotopouua Creek CA	P09/014	40.3						40.3	49.5
Kanono CA	Q09/054, 060	239.5						239.5	322
Lake Humuhumu MS	Q09/054					6.4		6.4	268

PROTECTED AREA	SURVEY NO.	STATUS						TOTAL AREA PROTECTED	TOTAL SITE AREA
		CA	SR	WMR	HA	MS	QEII		
Tauhara Creek MS	Q09/056					5.0		5.0	35
Tauhara MS	Q09/056					18.1		18.1	35
Lake Kahuparere MS	Q09/058, 060					0.8		0.8	252
Lake Kanono MS	Q09/058					10.7		10.7	198
Kahuparere CA	Q09/060, 063	98.7						98.7	145
Total		5544.1	237.1	67.8	13.6	292.4	28	6721	

[1]**Total area of reserved land at the three lakes. Individual areas not available.**

5.1.2 Ecological units protected

A summary of the protected vegetation types within protected areas is presented in Table 9. Proportions of different vegetation types represented in the protected natural areas network (Fig. 1) generally mirror those over the entire study area (Fig. 2).

Figure 1. Proportions of the main vegetation types represented in existing protected natural areas in Kaipara ED (Northland), excluding fresh and estuarine waters.

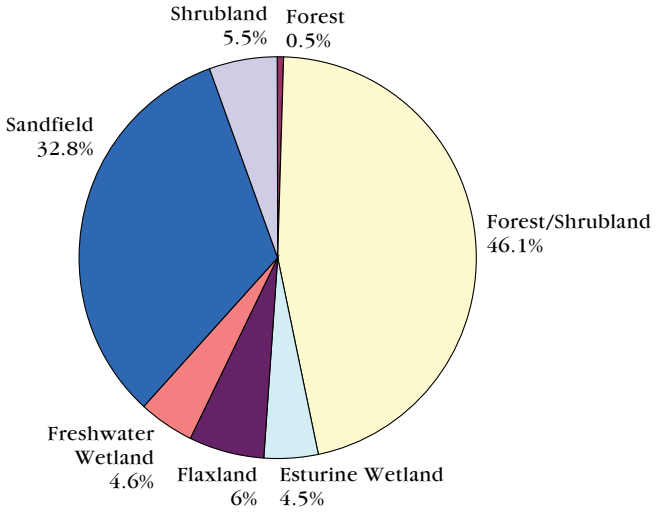


Figure 2: Proportions of the main vegetation types in all surveyed natural areas in Kaipara ED (Northland), excluding fresh and estuarine open waters of all sites.

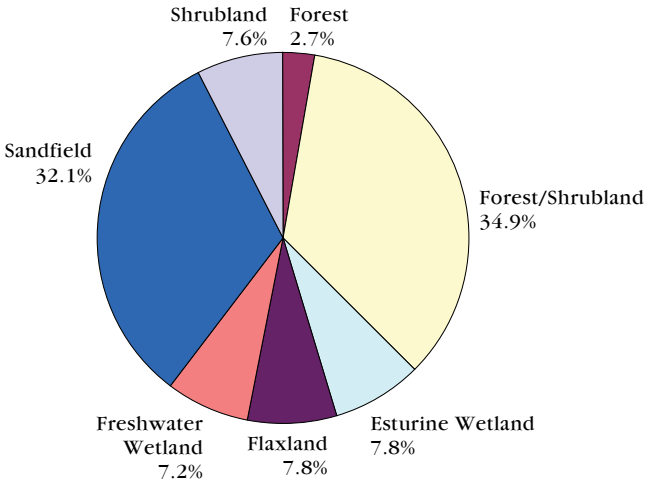


TABLE 9: VEGETATION TYPES WITHIN EXISTING PROTECTED AREAS IN KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

PROTECTED AREA	SURVEY NO.	VEGETATION TYPES WITHIN PROTECTED LAND STATUS
Shag Lake MS	O07/014	Open water
Babylon MS	P07/138	Raupo reedland, Open water
Black Lake CA	P08/207	Undescribed shrubland, Open water
Kahuparere CA	Q09/60, 063	Kanuka forest/shrubland, Raupo reedland
Kaipara North Head Lighthouse HR	P09/001	Kanuka forest/shrubland, Sandfield
Kanono CA	Q09/054, 058, 060	Raupo reedland, Kanuka forest/ shrubland, Open water
Kohatutahi MS	P08/200	Oioi rushland, Mangrove shrubland
Koremoa MS	P08/200	Open water
Lake Humuhumu MS	Q09/054	Kanuka forest/shrubland
Lake Kahuparere MS	Q09/058, 060	Raupo reedland, Kanuka forest/ shrubland, Open water
Lake Kanono MS	Q09/058	Raupo reedland, Kanuka forest/ shrubland, Open water
Lake Rotootuauru MS	Q09/055	Raupo reedland, Open water
Lucich Road MS	P08/200	Open water
Mahuta Gap MS	P08/061	Spinifex sandfield, Flaxland
Maitahi Wetland SR	P07/133	Manuka shrubland, Raupo reedland, Flaxland
Matanginui CA	P08/200	Oioi rushland, Mangrove shrubland
Omamari GPWMR	P07/127	Manuka shrubland, *Baumea* sedgeland, Raupo reedland
Pouto CA	P09/001	Kanuka forest/shrubland/forest, Kanuka/manuka shrubland, Manuka shrubland, Raupo reedland, Raupo-*Baumea* reedland, *Baumea* sedgeland, Sandfield
Pouto Lakes MS	P09/001	Raupo-Baumea reedland, Open water
Pouto North CA	P09/001	Kanuka forest/shrubland, Kanuka/ manuka shrubland, Manuka shrubland, Raupo reedland, Raupo-*Baumea* reedland, *Baumea* sedgeland, Spinifex sandfield, Sandfield
Pouto North MS	P09/001	Kanuka forest/shrubland, Kanuka/ manuka shrubland, Manuka shrubland, Raupo reedland, Sandfield
Pukekura HA	P09/001, Q09/061	Sandfield, Kanuka forest
Punahaere Creek CA	P09/003	Kanuka forest/shrubland, Manuka shrubland Mangrove shrubland, Oioi rushland
Punahaere GPWM Reserve	P09/003	Kanuka forest/shrubland, Manuka shrubland Mangrove shrubland, Oioi rushland
Rehutai CA	P07/174a	*Eleocharis* reedland, Spinifex sandfield, Open water

PROTECTED AREA	SURVEY NO.	VEGETATION TYPES WITHIN PROTECTED LAND STATUS
Rehutai MS	P07/174a	Flaxland, Spinifex sandfield
Rotopouua Creek CA	P09/014	Kanuka forest/shrubland, Raupo reedland, Baumea sedgeland
Rototuna Lake CA	P09/002, P09/025	Raupo reedland, Pampas grassland, Open water
Ruawai CA	P08/200	Open water
Tangitiki Bay MS No 1	P08/101, P08/200, P08/213	Mangrove shrubland, Open water
Tangitiki Bay MS No 2	P08/101, P09/003	Kanuka forest/shrubland, Mangrove shrubland, Oioi rushland
Tangitiki CA	P08/101	Mangrove shrubland
Tauhara Creek MS	Q09/056	Oioi rushland, Open water
Tauhara MS	Q09/056	Kanuka forest/shrubland
Tikinui CA	P08/072	Manuka shrubland, Raupo reedland, Spinifex sandfield,
Tomb Point CA	P08/213	Mangrove shrubland
Tomb Point MS	P08/213	Manuka shrubland, Mangrove shrubland, Oioi rushland
Ureti CA (Camping Area)	O07/016	Manuka shrubland, Flaxland, Spinifex sandfield
Ureti MS	O07/016, 025	Pohutukawa forest, Manuka shrubland, Raupo reedland, Flaxland, Spinifex sandfield
Waihaupai Stream MS	O07/012	Manuka shrubland
Wainui Lake CA	P08/072	Manuka shrubland, Spinifex sandfield, Sandfield
Wairoa River MS No 7	P08/200	Mangrove shrubland, Oioi rushland, Open water
Wairoa River MS No 8	P08/200	Mangrove shrubland, Oioi rushland, Open water
Wairoa River MS No 9	P08/200	Mangrove shrubland, Open water
Wairoa River MS No 10	P08/200	Mangrove shrubland, Oioi rushland
Whakatu CA	P08/200	Mangrove shrubland, Oioi rushland
Harding QEII covenant	P08/056	Kahikatea forest
Kidd QEII covenant	P08/068c, 068e	Kahikatea forest
Kidd QEII covenant	P08/068b	Kahikatea forest, Puriri forest
Morris QEII covenant	P07/142, 148	Ti kouka-kahikatea forest, Totara forest
Lendrum QEII covenant	P08/067b	Kahikatea forest, Puriri forest

Forest

Only some 7% (34 ha) of the very small area of forest proper remaining in the Kaipara ED (Northland) is formally protected.

Of the five forest types:

- Pohutukawa forest is already protected at 1 site.
- Totara forest is already protected at 1 site.
- Kahikatea forest is already protected at 5 sites.
- Ti kouka-kahikatea forest is already protected at 1 site.
- Puriri forest is already protected at 2 sites.

Forest/shrubland

With nearly 60% (3098 ha) of the remaining area formally protected, kanuka forest/shrubland is already well protected in the existing reserve system.

- Kanuka forest/shrubland is already protected at 9 sites.

Shrubland

Nearly one-third of shrubland (370 ha) is already protected within the existing reserve network. However, Kanuka/manuka shrubland is only protected at one site.

Of the two shrubland types:

- Kanuka/manuka shrubland is already protected at one site.
- Manuka shrubland is already protected at 8 sites.

Flaxland

Only some 5% (403 ha) of flaxland is currently protected; this characteristic vegetation type of the ED is under-represented in the existing reserve system.

- Flaxland is already protected at 5 sites.

Freshwater wetland

Some 28% (309 ha) of the remaining area of freshwater wetland is already protected. One type, *Baumea articulata* reedland, is not currently protected at any site.

Of the five freshwater wetland types:

- Raupo reedland is already protected at 12 sites.
- Raupo-*Baumea articulata* reedland already protected at 3 sites.
- *Baumea arthrophylla* sedgeland is already protected at 3 sites.
- *Eleocharis sphacelata* reedland is already protected at 1 site.
- *Baumea articulata* reedland is not currently protected at any site.

Estuarine wetland

Just over one quarter of the area of estuarine wetland (302 ha) is already protected, with both rushland and shrubland well represented.

Of the two estuarine wetland types:

- Mangrove shrubland is already protected at 5 sites.
- Oioi rushland is already protected at 5 sites.

Sandfield

Sandfield is relatively well protected in Kaipara ED (Northland), with nearly half (2204 ha) of the area already protected.

Of the two sandfield types

- Spinifex sandfield is already protected at 5 sites.
- Sandfield is already protected at 3 sites.

5.2 Priority natural areas for protection in Kaipara Ecological District (Northland Conservancy)

Outlined below are the unprotected natural areas identified in this report that best supplement the existing protected areas network to make it more fully representative of the ecological diversity and character of the Kaipara ED (Northland). Since immediate protection of all sites identified as Level 1 sites is not feasible, priorities for protection have been identified (Table 10) that would provide the greatest immediate benefits for indigenous biodiversity. These priority areas have one or some of the following characteristics:

- They contain vegetation types/ecological units under-represented in the existing reserves network
- They contain substantial area of forest or flaxland (both under-represented in the current reserves network)
- They contain representative sequences of ecological units.

Excluding estuarine waters, these priority areas cover some 3960 ha, or 4% of the area of Kaipara ED (Northland). However, as several sites are already partly protected, the area recommended for protection is somewhat less.

A summary of Level 1 and Level 2 site evaluations according to their PNAP ecological criteria is presented in Table 11.

TABLE 10: LEVEL 1 SITES IN KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY) WITH PRIORITY FOR PROTECTION

LEVEL 1 SITES (PARTLY OR FULLY UNPROTECTED) *=ALREADY PARTLY PROTECTED	1. ECOLOGICAL UNIT UNDER-REPRESENTED IN THE EXISTING RESERVE NETWORK	2. SUBSTANTIAL AREA OF FOREST OR FLAXLAND	3. REPRESENTATIVE SEQUENCE OF ECOLOGICAL UNITS
Western Coast A: Aranga Beach North Coastal Communities O07/011	✓	✓	✓
* Western Coast B: Aranga Beach South Coastal Communities O07/016	✓	✓	✓
Te Kawa Stream Forest P07/121a	✓	✓	
Frith Road Northern Dairylands Forest P07/135		✓	✓
Rotu Stream Forest P07/141	✓	✓	
*Opanake Road Morris Forest P07/142	✓	✓	
Opanake Road Davidson Forest and Shrubland P07/150	✓	✓	✓
Kaihu Valley West Shrubland P07/157a	✓		
Opanake Road Shrubland and Forest P07/158	✓	✓	✓
Aoroa Road Forest P08/056		✓	
*Western Coast C: Glinks Gully north Grassland, Flaxland and Forest P08/061	✓	✓	✓
*Newsham Road South Forest P08/067b	✓	✓	
Western Coast D: Glinks Gully South Grassland, Wetland and Shrubland P08/072	✓		✓
Mapau Bush P08/094a		✓	
*Kaipara Harbour, Shrubland and Wetland P08/200			✓
*Kelly's Bay/Punahaere Creek Estuary, Shrubland and Forest P09/003	✓		✓
Upper Okaro Bush P09/008	✓	✓	
Tapu Bush P09/011		✓	✓
Okaro Creek/Waikere Creek Duneland, Wetland and Forest Q09/051			✓
Wetland East of Lake Rotopouua Q09/053	✓		
*Lake Humuhumu, Wetland and Forest Q09/054		✓	✓

TABLE 11: SUMMARY OF SITE EVALUATIONS IN KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

Note: e.u.= ecological unit.

LEVEL 1 SITES (62) SITE NAME SURVEY NO.	REPRESENT-ATIVENESS	RARITY/ SPECIAL FEATURES	DIVERSITY & PATTERN	NATURALNESS	BUFFER/LINKAGE/ CORRIDOR	SIZE & SHAPE
Western Coast A: Aranga Beach North Coastal Communities O07/011	Site for 3 rep. e.u.s	2 threatened bird species, 1 threatened plant species.	4 e.u.s	Despite some stock access, in relatively good condition. Minor woody weed invasion.	Bordered by pasture on the inland side.	13.9 ha; long and narrow
Shag Lake and Wetland O07/014		6 threatened bird species, 1 threatened fish species.	e.u.s	Grazed to the water's edge.	Surrounded by pasture	17 ha; one single block
Western Coast B: Aranga Beach South Coastal Communities O07/016	Site for 4 rep. e.u.s	3 threatened bird species.	4 e.u.s	Despite some stock access, some is still in relatively good condition. Minor woody weed invasion.	Bordered by pasture on the inland side.	212.5 ha; long and narrow
Lake Waikere Wetland and Shrubland O07/018	Site for 2 rep. e.u.s	5 threatened bird species, 3 threatened fish and crustacean species, 2 threatened plant species.	4 e.u.s	Substantial woody weed invasion of shrubland.	Surrounded by pasture, but connected by a narrow tongue of shrubland to nearby Lake Taharoa.	35 ha
Lake Taharoa, Wetland and Shrubland O07/022	Site for 1 rep. e.u.	8 threatened bird species, 4 threatened fish and crustacean species, 2 threatened plant species	4 e.u.s.	Substantial woody weed invasion of shrubland.	Surrounded by exotic plantation, but connected by narrow strips of predominantly native vegetation with adjacent sites.	197 ha
Lake Kai Iwi Wetland and Shrubland O07/024	Site for 1 rep. e.u.	8 threatened bird species, 1 threatened crustacean species, 2 threatened plant species.	2 e.u.s	Substantial woody weed invasion of shrubland.	Largely surrounded by predominantly native vegetation, and connected with	52 ha
Te Kawa Stream Forest P07/121a	Site for 1 rep. e.u.		2 e.u.s	Grazed but free of woody weeds.	Largely surrounded by pasture, but with pine plantation on the western side.	2.9 ha; one single block.
Omamari Wildlife Reserve Wetland and Shrubland P07/127	Site for 4 rep. e.u.s	3 threatened bird species, 3 threatened plant species.	6 e.u.s	Not grazed. Locally significant woody weed invasion .of hillslope shrubland.	Although surrounded by pasture, the site is fenced. Much of the wetland is well buffered by hillslope shrubland.	177.5 ha; one single block
Omamari Road Grassland and Wetland P07/130	Site for 1 rep. e.u.	1 threatened invertebrate species.	3 e.u.s	Locally significant woody weed invasion.	Bordered by pasture and Babylon Coast Rd on the eastern side, and only partly fenced.	115.9 ha; long and narrow

LEVEL 1 SITES (62) SITE NAME SURVEY NO.	REPRESENT-ATIVENESS	RARITY/ SPECIAL FEATURES	DIVERSITY & PATTERN	NATURALNESS	BUFFER/LINKAGE/ CORRIDOR	SIZE & SHAPE
Newlove Airstrip Wetland P07/131			4 e.u.s	Substantial invasion by alligator weed.	Surrounded by pasture but effectively fenced by the surrounding ditch.	5.8 ha
Maitahi Wetland Scientific Reserve and Surrounds P07/133	Site for 2 rep. e.u.s	2 threatened bird species, 1 threatened fish species, 1 threatened reptile species, 8 threatened plant species.	4 e.u.s	Not grazed.	Part of a catchment, effectively internally buffered by its large size.	323 ha; part of a catchment
Frith Road Northern Dairylands Forest P07/135	Site for 2 rep. e.u.s		3 e.u.s	Currently unfenced and grazed.		70 ha; one single block
Mangakahia Forest Wetland P07/140	Site for 1 rep. e.u.		1 e.u.	In excellent condition.	Buffered by pine plantation on three sides.	7 ha; long and narrow
Rotu Stream Forest P07/141	Site for 1 rep. e.u.		1 e.u.	Grazed. Extensively invaded by tradescantia and alligator weed.	Largely bordered by waterways.	10.1 ha.
Opanake Road Morris Forest P07/142	Site for 1 rep. e.u.		2 e.u.s	Grazed. Extensively invaded by tradescantia.	Bordered by the Kaihu River in the west and pasture in the east.	10.3 ha
Babylon Smith Wetland P07/145		2 threatened bird species.	1 e.u.	Some weed invasion.	Effectively protected from grazing by topography.	5.5 ha
NRC Opanake Road Reserve Forest P07/148	Site for 1 rep. e.u.	1 threatened plant species.	1 e.u.	Fully fenced.	Largely buffered by other forest patches.	2 ha
Opanake Road Davidson Forest and Shrubland P07/150	Site for 4 rep. e.u.s		4 e.u.s	Largely intact.	Bordered by the Kaihu River and Opanake Rd.	5 ha
Long Gully Wetland and Shrubland P07/153	Site for 2 rep. e.u.s		6 e.u.s	Relatively little weed invasion except at the eastern end.	Surrounded by pasture and pine woodlots.	38 ha; long and narrow
Kaihu Valley West Shrubland P07/157a	Site for 1 rep. e.u.		4 e.u.s	Some pampas invasion.	Partly buffered by pine plantation.	1.5 ha
Opanake Road Shrubland and Forest P07/158	Site for 2 rep. e.u.s		4 e.u.s	Not fenced.	Largely buffered by Opanake Rd and the Kaihu River.	9.3 ha
Hoanga Alluvial Forest P07/162	Site for 1 rep. e.u.		1 e.u.	Not grazed. Apart from some margins, relatively weed-free.	Surrounded by pasture.	5.3 ha; one single block

LEVEL 1 SITES (62) SITE NAME SURVEY NO.	REPRESENT-ATIVENESS	RARITY/ SPECIAL FEATURES	DIVERSITY & PATTERN	NATURALNESS	BUFFER/LINKAGE/ CORRIDOR	SIZE & SHAPE
Lower Kaihu River Forest Fragments P07/169			1 e.u.	Partly fenced. Substantially weed-infested.	Surrounded by pasture.	5 ha; in three patches
Hokianga Road Railway Treeland P07/169a		3 threatened bird species.	2 e.u.s	Grazed and substantially weed-invaded.	Surrounded by pasture.	9 ha
Freidrich's Lake and Wetland P07/171		6 threatened bird species, 1 threatened plant species.	2 e.u.s	Significant weed invasion at the margins.	Surrounded by pasture.	7 ha
Dargaville Bridge Forest P07/173			1 e.u.	A portion is fenced.	Surrounded by pasture.	1.8 ha; small and compact
Lake Rehutai and Wetland P07/174a	Site for 1 rep. e.u.	7 threatened bird species.	2 e.u.s	Not grazed and relatively weed-free.	Largely surrounded by pasture.	5.2 ha; one single block
Aoroa Road Forest P08/056			1 e.u.	Not grazed and relatively weed-free.	In a pastoral setting.	2.2 ha.
Western Coast C: Glinks Gully North Grassland, Flaxland and Forest P08/061	Site for 2 rep. e.u.s	1 threatened bird species, 1 threatened invertebrate species, 1 threatened plant species.	4 e.u.s	Largely ungrazed and only limited weed invasion.	Mostly bordered by pasture on the inland side.	833 ha in one linear patch.
Newsham Road North Forest P08/067a			1 e.u.	Not grazed.	Surrounded by pasture.	1.4 ha; in one block
Newsham Road South Forest P08/067b			2 e.u.s	Mostly fenced.	Surrounded by pasture.	1.6 ha
Kidds Creamery Road Corner Forest P08/068a	Site for 1 rep. e.u.		1 e.u.	Not grazed and relatively weed-free.	Surrounded by pasture.	0.9 ha; one single block
NRC Creamery Road Reserve P08/068b	Site for 3 rep. e.u.s		4 e.u.s	Not grazed and relatively weed-free.	Surrounded by pasture.	5.9 ha
Kidds Creamery Road Middle Forest P08/068c			1 e.u.	Not grazed but with significant woody weed invasion.	Surrounded by pasture.	0.9 ha; one single block
Western Coast D: Glinks Gully South Grassland, Wetland and Shrubland P08/072	Site for 2 rep. e.u.s	8 threatened bird species.	4 e.u.s	Although accessible to stock in places and widely invaded by weeds, plant communities are still predominantly native.	Bordered by pasture on the inland side.	1000 ha; long and narrow
Mapau Bush P08/094a			1 e.u.	Some weed invasion around the margins.	Surrounded by pasture.	6.3 ha.

LEVEL 1 SITES (62) SITE NAME SURVEY NO.	REPRESENT-ATIVENESS	RARITY/ SPECIAL FEATURES	DIVERSITY & PATTERN	NATURALNESS	BUFFER/LINKAGE/ CORRIDOR	SIZE & SHAPE
Russell Wetland P08/096			1 e.u.	Grazed and substantially weed-infested.	Surrounded by pasture.	1 ha
Tangitiki Estuary, Wetland and Shrubland P08/101	Site for 2 rep. e.u.s	5 threatened bird species, 1 threatened fish species.	3 e.u.s	Some weed invasion.	Surrounded by pasture.	4.8 ha
Kaipara Harbour, Shrubland and Rushland P08/200	Site for 2 rep. e.u.s	8 threatened bird species.	3 e.u.s	Mostly ungrazed and only limited weed invasion.	Bordered by pasture on the landward side.	11480 ha. One huge block.
Clarke's Lake and Wetland P08/208		6 threatened bird species	2 e.u.s	Apparently still grazed.	Surrounded by pasture.	8 ha
Greville's Lagoon and Wetland P08/209		5 threatened bird species	2 e.u.s	Recently fenced and restoration planted. Alligator weed present.	Buffered by riparian reserve.	2.5 ha
Lake Kapoai and Wetland P08/210		5 threatened bird species, 1 threatened plant species.	2 e.u.s	Almost completely fenced. Pest fish species present.	Surrounded by plantation.	18 ha; long and narrow
Lake Wainui and Wetland P08/211		5 threatened bird species, 1 threatened plant species.	2 e.u.s	Grazed and with some weed invasion.	Surrounded by pasture.	6.3 ha; one single block
Waimamaku Estuary, Shrubland and Rushland P08/213		5 threatened bird species.	3 e.u.s	Significantly invaded by weeds in places.	Surrounded by pasture.	9 ha; fragmented
Western Coast E: Pouto Dune System P09/001	Site for 5 rep. e.u.s	18 threatened bird species, 2 threatened fish and mollusc species, 4 threatened plant species.	14 e.u.s	Rear dunes widely invaded by pampas. Some herbaceous weeds in the wetlands. Otherwise largely intact.	Bordered mostly by plantation and pasture in places on the inland side. Much is effectively internally buffered by its large size.	5798 ha; one single block
Kelly's Bay/ Punahaere Creek Estuary, Shrubland and Forest P09/003	Site for 4 rep. e.u.s	8 threatened bird species, 1 threatened lizard species, 1 threatened plant species.	5 e.u.s	Some woody weed invasion around the margins.	Bordered variously by pasture and plantation. Part of a catchment, effectively internally buffered by its large size.	500 ha; several blocks
Upper Okaro Bush P09/008	Site for 1 rep. e.u.	1 threatened bird species	2 e.u.	Fragmented and weedy at the margins, but the core is remarkably intact.	Surrounded by pasture.	34 ha; part of a catchment
Tapu Bush P09/011	Site for 3 rep. e.u.s	1 threatened bird species.	2 e.u.s	Except for the sandfield, largely weed-free beyond the margins.	Bordered variously by pasture and plantation.	210 ha

LEVEL 1 SITES (62) SITE NAME SURVEY NO.	REPRESENT-ATIVENESS	RARITY/ SPECIAL FEATURES	DIVERSITY & PATTERN	NATURALNESS	BUFFER/LINKAGE/ CORRIDOR	SIZE & SHAPE
Lake Rotopouua, Wetland and Forest P09/014	Site for 3 rep. e.u.s	6 threatened bird species, 1 threatened fish species, 1 threatened plant species.	4 e.u.s	Largely intact.	Bordered by exotic plantation on three sides, pasture on the fourth.	49.5 ha; one single block
Lake Rototuna and Wetland P09/205		9 threatened bird species, 1 threatened fish species	3 e.u.s	Recently fenced and restoration planted. Pest fish and weeds (sweet grass) are present.	Buffered by riparian reserve.	8.7 ha
Okaro Creek/ Waikere Creek Duneland, Wetland and Shrubland Q09/051	Site for 5 rep. e.u.s	9 threatened bird species, 2 threatened plant species.	9 e.u.s	Extensive woody weed invasion of the kanuka hillslopes; otherwise largely intact.	Bordered by exotic plantation and pasture.	555 ha; one dispersed block
Wetland East of Lake Rotopouua Q09/053	Site for 1 rep. e.u.	1 threatened bird species.	2 e.u.s	Effectively free from grazing because of ring drain.	Surrounded by pasture.	20 ha; one single block
Lake Humuhumu, Wetland and Forest Q09/054	Site for 3 rep. e.u.s	9 threatened bird species, 1 threatened fish species, 3 threatened plant species.	6 e.u.s	Some woody weed invasion on the island. Grazed to the water's edge in places on the eastern side.	Bordered by exotic plantation and pasture	268 ha; one single block
Lake Rotootuauru, Wetland and Forest Q09/055		2 threatened fish species, 3 threatened bird species.	3 e.u.s	Grazed to the water's edge.	Surrounded by pasture.	21 ha; one single block.
Tauhara Creek Sandfield, Wetland and Shrubland Q09/056		5 threatened bird species.	7 e.u.s	Widely degraded by stock access and weed invasion.	Surrounded by pasture.	35 ha in several blocks.
Lake Rotokawau and Wetland Q09/057		7 threatened bird species, 1 threatened plant species.	3 e.us	Grazed to the water's edge for much of the shoreline.	Surrounded by pasture and plantation..	36 ha
Lake Kanono, Wetland and Forest Q09/058	Site for 3 rep. e.u.s	1 threatened fish species, 9 threatened bird species.	3 e.u.s	Grazed to the water's edge on the eastern side.	Bordered by exotic plantation and pasture.	198 ha; one single block
Lake Kahuparere Wetland and Shrubland Q09/060		1 threatened fish species, 6 threatened bird species.	3 e.u.s	Grazed to the water's edge on the eastern side.	Bordered by exotic plantation and pasture	54 ha; one single block
Pretty Bush Q09/061	Site for 2 rep. e.u.s	1 threatened plant species.	3 e.u.s	Largely weed-free beyond the margins	Bordered by open sand dunes and exotic plantation.	63 ha; one single block
Pouto Point Wildlife Reserve Sandfield, Wetland and Shrubland Q09/063	Site for 3 rep. e.u.s	4 threatened bird species, 3 threatened plant species.	4 e.u.s	Some weed invasion.	Bordered by exotic plantation and pasture on the landward side.	91 ha; long and narrow

LEVEL 2 SITES (51) SITE NAME SURVEY NO.	REPRESENT-ATIVENESS	RARITY/ SPECIAL FEATURES	DIVERSITY & PATTERN	NATURALNESS	BUFFER/LINKAGE/ CORRIDOR	SIZE & SHAPE
Ongange Creek Wetland, Shrubland and Forest Q09/201		1 threatened bird species.	5 e.u.s	Some woody weed invasion of hillslope kanuka, and pampas of wetland.	Mostly bordered by pasture with some exotic plantation.	126 ha
Finlayson's Lake and Wetland Q09/150		7 threatened bird species	2 e.u.s	Apparently grazed to the water's edge.	Surrounded by pasture. Connected to Lake Kanono (Q09/058).	3.5 ha
Total Level 1 Sites						22797 ha
Waihaupai Stream Shrubland and Forest O07/012		1 threatened fish species, 2 threatened bird species.	3 e.u.s	Grazed throughout and widely invaded by weeds.	Surrounded by pasture.	87 ha; in several blocks
Ngakiriparauri Stream Shrubland and Wetland O07/015			3 e.u.s	Grazed, with significant woody weed invasion.	Surrounded by pasture.	18 ha
Bruce Clear's Wetland O07/017			1 e.u.	Grazed, with significant weed invasion.	Surrounded by pasture.	2 ha; one single block
North Kai Iwi Stream Wetland And Forest O07/025			3 e.u.s	Largely grazed.	Surrounded by pasture.	5 ha
Lower Kai Iwi Stream Wetland, Shrubland and Forest O07/026		1 threatened plant species.	6 e.u.s	Largely grazed, with significant weed invasion in places.	Surrounded by pasture.	12 ha; ;long, narrow, and fragmented
Kai Iwi Lakes South Shrubland O07/027			1 e.u.	Mostly ungrazed but significant woody weed invasion.	Surrounded by pasture.	52 ha; in several blocks
Airstrip Road Wetland 1 P07/120a			2 e.u.s	Grazed and significantly invaded by weeds.	Surrounded by pasture.	2.2 ha
Airstrip Road Wetland 2 P07/120b			2 e.u.s	Grazed and significantly invaded by weeds.	Surrounded by pasture.	2.3 ha
Upper Te Kawa Stream Shrubland P07/121			1 e.u.	Grazed.	Bordered by plantation on southern side and pasture on northern side.	1.3 ha; long and narrow
Rehutai Road Wetland P07/124a			2 e.u.s	Grazed and significantly invaded by weeds.	Surrounded by pasture.	1.3 ha
Omamari Station North Shrubland and Wetland P07/125			2 e.u.s	At least partly grazed and substantially invaded by weeds in places.	Surrounded by pasture.	23 ha; fragmented

LEVEL 2 SITES (51) SITE NAME SURVEY NO.	REPRESENT-ATIVENESS	RARITY/ SPECIAL FEATURES	DIVERSITY & PATTERN	NATURALNESS	BUFFER/LINKAGE/ CORRIDOR	SIZE & SHAPE
Omamari Station Wetland and Shrublan P07/132			3 e.u.s	At least partly grazed and substantially invaded by weeds in places.	Surrounded by pasture.	15 ha
Arnesen Farm Shrubland P07/134			2 e.u.s	Partly drained, grazed, and substantially weed-infested.	Bordered by pine plant Surrounded by plantation and pasture.	11 ha; one single block
Opanake Road Forest Fragments P07/136a			2 e.u.s	Grazed and invaded by weeds in places.	Surrounded by pasture.	7 ha
Peter Kelly's Lake and Wetland P07/138			1 e.u.	Grazed.	Surrounded by pasture.	2 ha
Woodcock's Forest P07/141a			1 e.u.	Grazed and weed-infested.	Surrounded by pasture.	0.6 ha
Opanake Road Swamp Forest P07/149			1 e.u.	Apparently not grazed. Some weed invasion.	Partly surrounded by pasture.	4 ha
Babylon Coast Roadside Shrubland P07/154			1 e.u.	Substantial woody weed invasion.	Surrounded by pasture.	3 ha
Woodcock's Wetland P07/157			1 e.u.	Substantial weed invasion at the margins.	Bordered by SH12 and pasture.	1.5 ha
Basin Road Shrubland 1 P07/160			1 e.u.	Substantial weed invasion.	Surrounded by pasture.	10 ha
Basin Road Shrubland 2 P07/161			1 e.u.	Grazed and with substantial weed invasion.	Surrounded by pasture.	12 ha
Hokianga Road Forest P07/164			2 e.u.s	Grazed.	Surrounded by pasture.	0.9 ha; one single block
Hoanga Road Forest 2 P07/165			1 e.u.	Grazed and fragmented, with substantial weed invasion.	Surrounded by pasture.	8 ha; one single block
Scotty's Camp Road Shrubland P07/167			2 e.u.s	Partly drained and substantially weed-infested.	Surrounded by pasture.	26 ha
Bayly's Coast Road Wetland and Shrubland P07/171 a			2 e.u.s	Grazed and significantly weed-invaded.	Surrounded by pasture.	12 ha
Bayly's Basin Road Wetland 1 P07/171b		2 threatened bird species.	1 e.u.	Grazed and significantly weed-invaded.	Surrounded by pasture.	8 ha
Bayly's Coast Road Wetland P07/172			1 e.u.	Grazed.	Surrounded by pasture.	4 ha

LEVEL 2 SITES (51) SITE NAME SURVEY NO.	REPRESENT-ATIVENESS	RARITY/ SPECIAL FEATURES	DIVERSITY & PATTERN	NATURALNESS	BUFFER/LINKAGE/ CORRIDOR	SIZE & SHAPE
Mangatara Flat Shrubland P07/177			1 e.u.	Grazed, partly drained, and weed-infested.	Surrounded by pasture.	3 ha.
Turiwiri Forest Remnants P07/182		1 threatened bird species recorded as a visitor.	e.u.s	Grazed.	Surrounded by pasture.	3 ha; in two patches
Dargaville Domain Forest P07/185			1 e.u.	Substantially invaded by weeds.	In an urban area.	2.2 ha
Bayly's Basin Road Wetland 2 P07/206		3 threatened bird species.	2 e.u.s	Grazed.	Surrounded by pasture.	1.2 ha
Sills Road Forest Remnants P08/060			1 e.u.	Grazed.	Surrounded by pasture.	8 ha in four patches
Upper Aratapu Creek Shrubland P08/062			1 e.u.		Surrounded by pasture.	44 ha; one dispersed block.
Reed's Farm Forest P08/063			1 e.u.	Grazed.	Surrounded by pasture.	2 ha
Glinks Gully Wetland and Grassland P08/073		2 threatened bird species.	3 e.u.s	Invaded by weeds and used as a rubbish dump.	Surrounded by pasture.	7 ha; long and narrow
Lucich Wetland P08/080			2 e.u.s	Grazed to the water's edge.	Surrounded by pasture.	1 ha.
Kernot's Shrubland P08/081		1 threatened bird species.	1 e.u.	Substantially invaded by weeds.	Surrounded by pasture.	1 ha.
Pinaki Road South Wetland and Shrubland P08/087		1 threatened bird species.	3 e.u.s	Grazed. Shrublands significantly invaded by woody weeds.	Surrounded by pasture.	13 ha.
Burgess Road South Shrubland P08/088		1 threatened bird species.	1 e.u.	Grazed and invaded by woody weeds.	Surrounded by pasture.	9 ha.
Barfoot's Shrubland P08/092			2 e.u.s	Grazed, weed-infested, and degraded locally by rubbish dumping.	Surrounded by pasture.	9 ha.
Barfoot's Gully Shrubland P08/095			2 e.u.s	Substantially invaded by weeds.	Surrounded by plantation.	13 ha.
Harrison Wetland P08/096a			1 e.u.	Major weed (pampas) invasion.	Surrounded by pasture.	14 ha
Mosquito Gully Wetland P08/099		2 threatened bird species, 1 threatened plant species.	1 e.u.	Significantly invaded by weeds.	Surrounded by pasture.	13 ha
Black Lake and Shrubland P08/207			2 e.u.s		Surrounded by plantation.	13 ha

LEVEL 2 SITES (51) SITE NAME SURVEY NO.	REPRESENT-ATIVENESS	RARITY/ SPECIAL FEATURES	DIVERSITY & PATTERN	NATURALNESS	BUFFER/LINKAGE/ CORRIDOR	SIZE & SHAPE
Lake Parawanui and Wetland P08/212		6 threatened bird species	2 e.u.s	Apparently grazed. Pest fish species present.	Surrounded by pasture and plantation.	102 ha
Lower Lake Rototuna Wetland P09/002		3 threatened bird species	1 e.u.	Substantially invaded by weeds.	Surrounded by pasture and plantation.	9 ha
Phoebe's Lake and Wetland P09/011a		5 threatened bird species.	2 e.u.s	Grazed to the water's edge.	Surrounded by pasture.	1.8 ha
Pukemiro Wetland And Forest P09/020		2 threatened bird species.	4 e.u.s	Grazed and with some weed invasion.	Surrounded by pasture and plantation.	39 ha
The Spectacles Lakes and Wetland Q09/202		6 threatened bird species	2 e.u.s	At least one of the lakes is fenced.	Surrounded by pasture.	4.9 ha
Swan Egg Pond and Wetland Q09/203		5 threatened bird species	5 e.u.s	Grazed to the water's edge.	Surrounded by pasture.	3 ha.
Lake Waingata Q09/204		4 threatened bird species, 1 threatened fish species	2 e.u.s	Grazed to the water's edge. Pest fish species present.	Surrounded by pasture.	13 ha.
Total Level 2 Sites						660.2 ha

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Appendix 1

FIELD SURVEY FORM

DEPARTMENT OF CONSERVATION

PROTECTED NATURAL AREA 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)	Occasional (0-5)
Comments:					

Appendix 2

LETTER TO RATEPAYERS

1 November 2006

Dear Landowner

I would like to advise you that Landcare Research New Zealand and The University of Waikato under contract with the Department of Conservation will soon be undertaking an updated survey of natural features such as forest, wetlands, gumlands and dunelands within the Pouto, Dargaville and Kai Iwi Lakes area of the Kaipara District. The natural features have been identified from recent aerial photography and are viewed from roadsides or (with the permission of landowners) from other viewpoints, recording information on their vegetation type and general condition. This survey is a continuation of work first undertaken by the Department in 1994.

In some cases, if these areas are not visible from the road, you may be contacted for permission to enter your land to enable a quick survey of the natural feature to gain information on the vegetation type and key plant species present.

Why are we doing this survey? Northland's natural features make a significant contribution to the character and quality of the region. Many of these areas are habitat for some of our increasingly rare plants and animals. The Department of Conservation and Kaipara District Council have existing information on many of the natural features in the District. However some of this information is now out of date, and therefore may no longer be accurate. This survey enables us to update our information and is an important reference point for assessing habitat changes over time and to assist landowners with management of their natural features.

The information gathered in this survey will be made available to anyone interested in natural features such as landowners, iwi, environmental groups, local bodies, and professionals.

The Kaipara District Council will be provided with the results of the survey upon completion.

With an increasing awareness in the value of natural features many residents and future residents to the District will have updated information describing the native plants and animals in the District. Information collected during this survey may be used to support cases made by private landowners to increase protection of forest or wetland on their land. These cases can be made to the Governments Biodiversity Condition and Advice Fund and the Northland Regional Council's Environment Fund. The Funds were set up to support landowners for the management and protection of natural areas, the information provided in this survey is an important tool in achieving these aims.

If you have any questions about the survey, please contact the Department of Conservation, (attention Wendy Holland or Peter Anderson) at Northland Conservancy Office in Whangarei, telephone (09) 430 2470; fax 09 430 2479 or email wholland@doc.govt.nz. or panderson@doc.govt.nz .

Thank you for your assistance

Chris Jenkins,

Conservator Northland

Department of Conservation

DOC to note natural features

By Annette Lambly

The Department of Conservation is currently undertaking a survey of all-important natural habitat features within the Kaipara area.

DOC has contracted Landcare Research NZ and the University of Waikato to identify these important habitats and record them into an update database.

DOC co-ordinator Wendy Holland said the survey would include forests, wetlands, gumlands and dunelands.

The alluvial forest remnants along the Kaihu River, the dune lakes on the Pouto Peninsula and the Maitahi wetlands off State Highway 12 north west of Dargaville are examples of habitats which have been identified as significant, but there are perhaps other areas which have not been recorded she said.

The aim of the survey is to provide an updated database of baseline information for local bodies, environmental groups, iwi and landowners to work and plan from.

Ms Holland said landowners had been sent letters prior to the survey commencing in December asking for help in identifying any of these natural features.

Survey teams are now working in the Pouto, Dargaville and the Kai Iwi Lakes. A full project report is expected at the end of the year said Ms Holland.

The public is encouraged to contact the Department of Conservation on 094302470 if they have, or would like, further information.

Appendix 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 and Davis (1992), 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.

Classification structure and categories

This section describes each of the categories (shown in Figure 3)

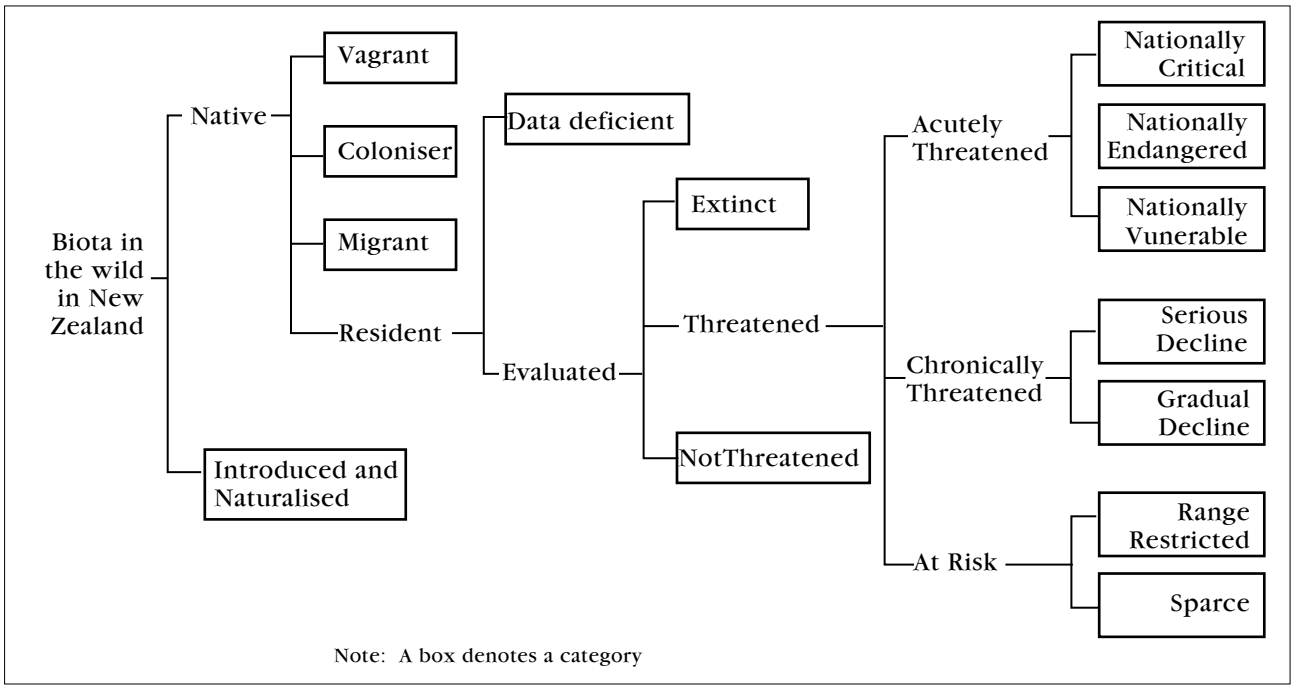

Figure 3. Structure of the New Zealand Threat Classification System

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. 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 longfin 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 urveys in known or expected habitats at appropriate times (di-

urnal, 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 lUCN Red List criteria, numerical limits and time-frames 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 subpopulations, 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.

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 km2).
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 km2).

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 km2).

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 km2).

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 km2).

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 km2).

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 km2).

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.

Appendix 4

CATEGORIES OF IMPORTANCE FOR GEOLOGICAL AND SOIL SITES

Ranking criteria for important geological sites and landforms in the Northland Region follow Kenny & Hayward (1996) and Arand et al. (1993).

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.

The importance given to each site was assessed by those informants of Kenny and Hayward (1996) and Arand et al. (1993) who were familiar with the site.

Appendix 5

CHECKLIST OF PLANT SPECIES IN KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

This species list was compiled by the authors during a reconnaissance survey in the summer of 2006/2007. Other records, including those from Department of Conservation Sites of Specific Biological Interest (SSBI) database, Auckland Museum Herbarium (AK), and Allan Herbarium, Landcare Research (CHR) are referenced.

5.1 Indigenous Species

GYMNOSPERMS

Agathis australis	kauri
Dacrycarpus dacrydioides	kahikatea, white pine
Dacrydium cupressinum	rimu
Phyllocladus trichomanoides	tanekaha
Podocarpus totara	totara
Prumnopitys taxifolia	matai, black pine
Prumnopitys ferruginea	miro

MONOCOT. TREES AND SHRUBS

Cordyline australis	ti kouka, cabbage tree
Cordyline banksii	ti ngahere, forest cabbage tree

Cordyline australis X C. pumilio	(Cameron et al. 2001)
Phormium tenax	harakeke, flax
Rhopalostylis sapida	nikau

DICOT. TREES AND SHRUBS

Ackama rosifolia	makamaka
Alectryon excelsus ssp. excelsus	titoki
Avicennia marina ssp. australasica	mangrove, manawa
Beilschmiedia tarairi	taraire
Beilschmiedia tawa	tawa
Brachyglottis repanda	rangiora
Carmichaelia australis	common broom
Carpodetus serratus	putaputaweta, marbleleaf
Coprosma acerosa	sand coprosma
Coprosma arborea	mamangi, tree coprosma
Coprosma areolata	
Coprosma crassiflolia	thick-leaved coprosma
Coprosma grandifolia	kanono
Coprosma lucida	shining karamu/kakaramu
Coprosma macrocarpa ssp. *minor*	coastal karamu
Coprosma macrocarpa × *C. robusta*	(J. Reid & P. Simpson)
Coprosma parviflora	
Coprosma propinqua ssp. *propinqua*	
Coprosma propinqua ssp. *propinqua* × *C. robusta*	
Coprosma propinqua ssp. *propinqu*a × *C. macrocarpa*	AK 217494
Coprosma repens	taupata
Coprosma repens × *C. robusta*	
Coprosma repens × *C. rhamnoides*	AK 277974
Coprosma rhamnoides	
Coprosma rigida	
Coprosma robusta	karamu
Coprosma rotundifolia	round-leaved coprosma
Coprosma spathulata	
Coprosma tenuicaulis	swamp coprosma
Coriaria arborea var. *arborea*	tutu
Corokia cotoneaster	korokio, AK 205024, AK 205262, AK 180236
Corynocarpus laevigatus	karaka
Dodonaea viscosa	akeake
Dracophyllum sinclairii	SSBIO07/H007
Dracophyllum lessonianum	
Dysoxylum spectabile	kohekohe
Elaeocarpus dentatus	hinau, (Wright &Young 1991)
Entelea aborescens	whau
Gaultheria antipoda	snowberry

Geniostoma rupestre var. *ligustrifolium*	hangehange
Griselinia lucida	puka, shining broadleaf
Hebe diosmifolia	AK 205275, AK 205276, AK 180253, AK 205265
Hebe stricta var. *stricta*	koromiko
Hedycarya arborea	pigeonwood, porokaiwhiri
Hoheria populnea	houhere, northern lacebark
Knightia excelsa	rewarewa
Korthalsella salicornioides	AK 232713
Kunzea ericoides var. ericoides	kanuka
Kunzea ericoides var. linearis	sand kanuka, AK 288776
Laurelia novae-zelandiae	pukatea
Leptecophylla juniperina ssp. *juniperina*	prickly heath
Leptospermum scoparium	manuka
Leucopogon fasciculatus	mingimingi
Leucopogon fraseri	patotara
Litsea calicaris	mangeao
Lophomyrtus bullata	
Lophomyrtus bullata × *L. obcordata*	AK 252585
Lophomyrtus obcordata	rohutu, AK 180267, AK 203113
Macropiper excelsum ssp. *excelsum* f. *excelsum*	kawakawa
Melicope simplex	poataniwha
Melicope ternata	wharangi (Reid 1977)
Melicytus macrophyllus	large-leaved mahoe
Melicytus micranthus	small-leaved mahoe
Melicytus ramiflorus ssp. *ramiflorus*	mahoe
Metrosideros excelsa	pohutukawa
Metrosideros robusta	northern rata
Mida salicifolia	willow-leaved maire
Myrsine australis	mapau, mapou
Myrsine divaricata	weeping mapou (Reid 1977)
Nestegis lanceolata	white maire, AK 252377
Nestegis montana	orooro, narrow-leaved maire
*Olearia albid*a	AK 180238
Olearia furfuracea	akepiro
Olearia rani	heketara, (Reid 1977)
Olearia solandri	AK 252693
Ozothamnus leptophyllus	tauhinu
Pennantia corymbosa	kaikomako
Pimelea arenaria	sand pimelea, AK 101199, AK 101198
Pimelea prostrata	
Pimelea tomentosa	
Pimelea urvilleana	
Pittosporum cornifolium	perching kohuhu
Pittosporum crassifolium	karo

Pittosporun eugenioides	tarata, lemonwood
Pittosporum tenuifolium	kohuhu
Plagianthus divaricatus	saltmarsh ribbonwood, makaka
Plagianthus regius	lowland ribbonwood, manatu
Pomaderris kumeraho	kumarahou
Pomaderris edgerleyi	
Pomaderris ericifolia	
Pomaderris phylicifolia	AK 286611
Pseudopanax arboreus	fivefinger, whauwhaupaku
Pseudopanax crassifolius	lancewood, horoeka
Pseudopanax crassifolius × *P. lessonii*	
Pseudopanax ferox	fierce lancewood, AK 205022, AK 205021, AK 300268, AK 252746, AK 203129
Pseudopanax ferox × *P.* lessonii	AK 205023
Pseudopanax lessonii	coastal fivefinger, houpara, AK 203114
Rhabdothamnus solandri	turepo
Schefflera digitata	pate
Sophora microphylla s.l.	kowhai
Streblus heterophyllus	small-leaved milk tree, turepo
Syzygium maire	swamp maire, maire-tawake
Vitex lucens	puriri
Weinmannia silvicola	towai
MONOCOT. LIANES	
Freycinetia banksii	kiekie
Ripogonum scandens	supplejack, kareao
DICOT. LIANES	
Calystegia sepium	pink bindweed, pohue
Calystegia soldanella	shore bindweed, panahi
Calystegia tuguriorum	AK 222425, AK 120119
Cassytha paniculata	AK 225853
Clematis cunninghamii	AK 4150
Clematis paniculata	puawananga
Metrosideros diffusa	
Metrosideros fulgens	
Metrosideros perforata	aka
Muehlenbeckia australis	pohuehue
Muehlenbeckia complexa	pohuehue
Passiflora tetrandra	*kohia*
Parsonsia heterophylla	NZ jasmine
Rubus cissoides	bush lawyer, tataramoa
Tetragonia implexicoma	NZ spinach

LYCOPODS AND PSILOPSIDS

Huperzia varia	AK 205253
Lycopodiella cernua	arching clubmoss
Lycopodium deuterodensum	
Lycopodium lateralis	AK 35472
Lycopodium varium	
Phylloglossum drummondii	AK 286617
Tmesipteris lanceolata	(Cameron et al. 2001)

MOSSES[1]

Achrophyllum dentatum	AK 201987
Brach*ythecium rutab*ulum	AK 201988
Bryum billardierei var. *platyloma*	AK 201989
Bryum sauteri	AK 201990
Calyptrochaeta brownii	AK 201991
Camptochete arbuscula	AK 201992
Camptochaete pulvinata	AK 201993
Camptochaete deflexa	AK 201994
Campylopus introflexus	AK 201995
Campylopus pyriformis	AK 201996
Cy*athophorum bulbosum*	AK 201997
Cyrtopus setosus	AK 201998
*Dicranoloma billardiere*i	AK 201999
Dicranoloma fasciatum	*AK 202000*
Dicranoloma menziesii	AK 202001
Disticophyllum crispulum	AK 202002
Eurhynchium praelongum	AK 202028
Fissidens curvatus	AK 202004
Fissidens tenellus	AK 202005
Haplohymenium pseudo-triste	AK 202006
Hypnodendrum colensoi	AK 202008
Hypnum chrysogaster	AK 202009
Hypnum cupressiforme	AK 202010
Hypopterygium rotulatum	AK 202011
Lembophyllum divulsum	AK 202012
Leptodontium interruptum	AK 202013
Leptostomum macrocarpum	AK 202014
Leucobryum candidum	AK 202015
Lopidium concinnum	AK 202016
Macromitrium gracile	AK 202017
Macromitrium ligulaefolium	AK 202018
Macromitrium ligulare	AK 202019
Macromitrium prorepens	AK 202020
Macromitrium retusum	AK 202021
Orthorrhyncium elegans	AK 202022

1 All moss records are from Beever (1991).

Papillaria crocea	AK 202023
Pseudotaxiphyllum falcifolium	AK 202007
Ptychomion aciculare	AK 202024
Racopilum convolutaceum	AK 202025
Rhyncostegium muriculatum	AK 202003
Rhyncostegium tenuifolium	AK 202026
Rhaphidorrhynchium amoenum	AK 202027
Sphagnum cristatum	
Tetraphidopsis pusilla	AK 202029
Thuidium furfurosum	AK 202030
Thuidium sparsum	AK 201985
Tortella knightii	AK 202031
Trachyloma diversinerve	AK 202032
Trachyloma planifolium	AK 202033
Weymouthia cochlearifolia	AK 202034
Weymouthia mollis	AK 2022035
Wijkia extenuata	AK 2022036
Zygodon intermedius	AK 202037

FERNS

Adantium aethiopicum	true maidenhair, AK 252590
Adiantum cunninghamii	common maidenhair
Adiantum formosum	AK 135734
Adiantum hispidulum	rosy maidenhair
Adiantum viridescens	
Anarthropteris lanceolata	
Arthropteris tenella	
Asplenium bulbiferum	hen and chickens fern
Asplenium flaccidum	hanging spleenwort
Asplenium gracillimum	
Asplenium hookerianum	AK 205258
Asplenium oblongifolium	shining spleenwort huruhuru whenua
Asplenium obtusatum ssp.*northblandicum*	shore spleenwort
Asplenium polyodon	sickle spleenwort, petako
Blechnum chambersii	rereti
Blechnum discolor	crown fern AK 25272, AK 252726
Blechnum filiforme	thread fern, panako
Blechnum fluviatile	kiwakiwa, AK 252702
Blechnum fraseri	
Blechnum minus	swamp kiokio
Blechnum novae-zelandiae	kiokio
Cyathea dealbata	ponga, silver fern
Cyathea medullaris	mamaku, black tree fern
Cyclosorus interruptus	AK 248058
Deparia petersenii ssp. *congrua*	
Dicksonia squarrosa	wheki

Diplazium australe	lady fern
Doodia australis	rasp fern, pukupuku
Doodia mollis	AK 235015
Gleichenia dicarpa	tangle fern
Gleichenia microphylla	carrier tangle, waewaekaka
Grammitis ciliata	AK 205263
Histiopteris incisa	water fern, matata
Hymenophyllum demissum	filmy fern, ririrangi (Wright & Young 1991)
Hymenophyllum dilatatum	AK 205259
Hymenophyllum flexuosum	AK 205271
Hymenophyllum revolutum	AK 205264
Hymenophyllum sanguinolentum	AK 205252
Hymenophyllum scabrum	AK 205250
Hypolepis ambigua	AK 25237, AK 252351, AK 252376
Hypolepis distans	
Lastreopsis glabella	
Lastreopsis hispida	
Lastreopsis microsora ssp. *pentangularis*	AK 235016
Leptopteris hymenophylloides	AK 115901
Lindsaea linearis	AK 292349
Lygodium articulatum	mangemange
Microsorum pustulatum	hound's tongue fern, kowaowao
Microsorum scandens	mokimoki, fragrant fern
Paesia scaberula	ring fern, hard fern, matata
Pellaea rotundifolia	AK 155152, AK 206067
Polystichum neozelandicum ssp. *neozelandicum*	AK 203112, AK 205257
Pneumatopteris pennigera	gully fern
Psilotum nudum	AK 22895, AK 228957
Pteridium esculentum	bracken, rarahu
Pteris comans	coastal brake AK 252732
Pteris macilenta (of NZ authors)	
Pteris tremula	shaking brake, turawera
Pyrrosia eleagnifolia	leather-leaf fern
Schizaea fistulosa	comb fern, AK 163524
Sticherus flabellatus var. *flabellatus*	
Thelypteris confluens	marsh fern, AK 252344, AK 220594, AK 202660, AK 248057, AK 287536
Trichomanes reniforme	AK 205251

ORCHIDS

Acianthus sinclairii	(Wright & Young 1991)
Calochilus aff. herbaceus	AK 241957
Corybas trilobus agg.	(Wright & Young 1991)
Drymoanthus adversus	

Earina aestivalis	AK 203130, AK 203125, AK 252450
Earina autumnalis	(Wright & Young 1991)
Earina mucronata	peka-a-waka
Gastrodia aff. sesamoides	AK 3677
Icthyostomum pygmaeum	(Wright &Young 1991)
Microtis unifolia	onion orchid, maikaika
Pterostylis alobula	(Wright & Young 1991)
Spiranthes novae-zelandiae	ladies tresses, AK 252671
Thelymitra cyanea	
Thelymitra longifolia	
Thelymitra pauciflora	(Colenso 1888)
Thelymitra pulchella	
Thelymitra tholiformis	(SSBI P07/H056)
Winika cunninghamii	(Wright & Young 1991)

GRASSES

Austrostipa stipoides	shore tussock
Cortaderia fulvida	toetoe
Cortaderia splendens	coastal toetoe
Dichelachne crinita	
Elymus multiflorus	AK 11173, AK 278676, AK 198002, AK 232709
Isachne globosa	swamp millet
Lachnagrostis filiformis	*AK 216376*
Lachnagrostis billardierei	sand wind grass
Microlaena polynoda	AK 252691, AK 252691
Microlaena stipoides	patiti, meadow rice grass
Oplismenus hirtellus ssp. i*mbecillis*	
Poa anceps var. *anceps*	drooping poa
Poa pusilla var. *pusilla*	AK 289603, AK 158406, AK 158406
Rytidosperma biannulare	
*Rytidosperma gracil*e	danthonia, (Wright & Young 1991)
*Rytidosperma unared*e	AK 252582
Rytidosperma viride	
Spinifex sericeus	spinifex
Trisetum arduanum	AK 11153, AK 233099
Zoysia pauciflora	

SEDGES

Baumea arthrophylla	
Baumea articulata	
Baumea juncea	
Baumea rubiginosa	
Baumea tenax	
Baumea teretifolia	
Bolboschoenus caldwellii	AK 252378, AK 36466
*Bolboschoenus fluviatili*s	marsh clubrush

Carex dissita	
Carex fascicularis	AK 35492, AK 294608, AK 252705
Carex lambertiana	AK 252710
Carex lessoniana	AE Wright, unpubl. data
Carex maorica	
Carex ochrosaccus	AK 235020
Carex pumila	sand sedge
Carex secta	purei
Carex spinirostris	AK 252708
Carex subdola	AK 35474
Carex aff. *testacea* ('raotest')	
Carex virgata	purei
Cyperus ustulatus	giant umbrella sedge, upokotangata
Desmoschoenus spiralis	pingao, golden sand sedge
Eleocharis acuta	
Eleocharis gracilis	
Eleocharis neozelandica	sand spike-sedge, AK 284635, AK 252643
Eleocharis sphacelata	
Ficinia nodosa	knobby clubrush
Fimbristylis velata	AK 254137
Gahnia lacera	tarangarara
Gahnia setifolia	mapere
Gahnia xanthocarpa	toikiwi
Isolepis cernua	
Isolepis distigmatosa	
Isolepis prolifer	
Isolepis reticularis	
Lepidosperma australe	AK 202653
Lepidosperma laterale	sword sedge
Morelotia affinis	
Schoenoplectus tabernaemontanii	lake sedge, kuta
Schoenus brevifolius	
Schoenus carsei	AK 246919
Schoenus maschalinus	
Schoenus pauciflorus	
Schoenus tendo	wiwi
Tetraria capillaris	
Uncinia banksii	hook sedge
Uncinia distans	(Cameron et al. 2001)
Uncinia laxiflora	AK 205277, AK 252719, AK 252733
Uncinia uncinata	hook sedge
Uncinia zotovii	hook sedge, (Wright & Young 1991)

RUSHES AND ALLIED PLANTS

Juncus australis	(Cameron et al. 2001)
Juncus edgarae	

Juncus kraussi ssp. *australiensis*	sea rush
Juncus pauciflorus	
Juncus planifolius	
Juncus pallidus	pale rush
Juncus sarophorus	

MONOCOT. HERBS (other than orchids, grasses, sedges and rushes)

Apodasmia similis	oioi, jointed rush
Arthropodium cirratum	rengarenga
Astelia banksii	coastal astelia, kowharawhara
Astelia cf. *grandis*	AK 297736
Astelia solandri	(Cameron et al. 2001)
Astelia trinervia	kauri grass
Collospermum hastatum	perching lily, kahakaha
Cordyline pumilio	ti rauriki
Dianella haematica	
Dianella nigra	inkberry, turutu
Empodisma minus	wire rush
Hydatella inconspicua	AK 256186, AK 297462, AK 299041, AK 207127, AK 253948
Lemna minor	duckweed
Lepilaina bilocularis	(Cameron et al. 2001)
Libertia ixioides	AK 292945
Phormium tenax	harakeke, flax
Potamogeton cheesemanii	pondweed, (Tanner et al. 1986)
Potmogeton ochreatus	AK 216450, AK 218869, AK 1240
Potamogeton pectinatus	AK 234413, AK 234703
Ruppia polycarpa	AK 252681, AK 252681
Sparganium subglobosum	burr-reed, AK 252720
Stuckenia pectinata	(Wells et al. 2007)
Triglochin striata	arrow grass
Typha orientalis	raupo, bullrush

COMPOSITE HERBS

Centipeda minima ssp. minima	sneezeweed (DOC Bioweb)
Centipeda aotearoana	AK 299835
Cotula coronopifolia	bachelor's buttons
Euchiton sphaericus	(Cameron et al. 2001)
Lagenifera pumila	AK 198003
Lagenifera stipitata	AK 252734
Pseudognaphalium luteoalbum agg.	Jersey cudweed
Senecio glomeratus	AK 120217, AK 252673
Senecio hispidulus	
Senecio lautus var. *lautus*	shore groundsel
Senecio minimus	
Senecio scaberulus	AK 233091
Sigesbeckia australis	AK 120217, AK 48862

DICOT. HERBS (OTHER THAN COMPOSITES)

Alternanthera aff. *sessilis*	AK 299836
Apium 'white denticles'	(Cameron et al. 2001)
Apium prostratum	NZ celery
Callitriche muelleri	*starwort*
Callitriche petriei ssp. *petriei*	(Wells et al. 2007)
Centella uniflora	
Centrolepis strigosa	CHR 319045, CHR 214231, AK 216436
Dichondra repens	Mercury Bay weed
Disphyma australe	native iceplant, horokaka
Drosera auriculata	common sundew
Drosera binata	forked sundew
Drosera peltata	AK 120008, AK 288722
Drosera pygmaea	AK 288711
Elatine gratioloides	(Cameron et al. 2001)
Epilobium billardiereanum ssp. *billardiereanum*	AK 223770, AK 294727, AK 252737
Epilobium chionanthum	AK 292348
Epilobium rotundifolium	AK 252727
Galium divaricatum	AK 217531
Geranium solanderi	(Cameron et al. 2001)
Glossostigma elatinoides	AK 252701
Glossostigma submersum	(Wells et al. 2007)
Gonocarpus aggregatus	AK 223975, AK 5930
Gonocarpus incanus	
Gratiola sexdentata	AK 11610
Gunnera dentata	AK 248040, AK 257556, AK 252354, AK 252353
Gunnera prorepens	AK 248035
Haloragis erecta ssp. *erecta*	toatoa
Hydrocotyle dissecta	
Hydrocotyle pterocarpa	
Lagenifera stipitata	AK 252734
Leptostigma setulosum	
Lilaeopsis novae-zelandiae	
Lilaeopsis ruthiana	AK 253608
Limosella lineata	(Cameron et al. 2001)
Lobelia anceps	punakuru
Mentha cunninghamii	AK 7591, AK 108220
Myriophyllum pedunculatum	(Cameron et al. 2001)
Myriophyllum propinquum	
Myriophyllum robustum	WELT SP44985
Myriophyllum triphyllum	AK 289585, AK 229605, AK 216300
Myriophyllum votschii	AK 252641
Nertera dichondrifolia	
Nertera setulosa	AK 252651
Nertera scapanioides	AK 252391, AK 248061, AK 292354, AK 293926

Oxalis exilis	(Cameron et al. 2001)
Oxalis rubens	
Peperomia urvilleana	AK 252361
Persicaria decipiens	native willow weed
Ranunculus amphitrichus	water buttercup
Ranunculus urvilleanus	AK 282128, AK 210673, AK 224122
Samolus repens	sea primrose
Sarcocornia quinqueflora	glasswort
Selliera radicans	remuremu
Solanum americanum	
Stellaria paviflora	(Wright & Young 1991)
Viola lyalli	native violet
Utricularia australis	yellow bladderwort, AK 248055, AK 292387
Utricularia delicatula	AK 292388
Utricularia dichotoma	AK 241956
Wahlenbergia littoralis ssp. *vernicosa*	

5.2 Exotic Species

GYMNOSPERMS

Cupressus macrocarpa	macrocarpa
Pinus pinaster	maritime pine
Pinus radiata	radiata pine

DICOT. TREES AND SHRUBS

Acacia paradoxa	kangaroo wattle
Acacia longifolia	Sydney golden wattle
Acacia mearnsii	black wattle
Acacia melanoxylon	Tasmanian blackwood
Acacia verticillata	prickly moses, AK 120019
Banksia integriifolia	coastal banksia
Berberis glaucocarpa	barberry
Betula pendula	silver birch
Chrysanthemoides monilifera	boneseed
Clerodendrum trichotomum	AK 217175
Cotoneaster glaucophyllus	cotoneaster
Crataegus monogyna	hawthorn
Elaeagnus × *reflexa*	elaeagnus
Erica baccans	berry heath
Erica caffra	hedge heath, AK 120009
Erica lusitanica	Spanish heath
Eriobotrya japonica	loquat
Erythrina × *sykesii*	coral tree
Hakea gibbosa	downy hakea

Hakea salicifolia	willow-leaved hakea
Hakea sericea	prickly hakea, needlebush
Ligustrum lucidum	tree privet
Ligustrum sinense	Chinese privet
Lupinus arboreus	tree lupin
Lycium ferocissimum	boxthorn
Paraserianthes lophantha	brush wattle
Pyracantha angustifolia	firethorn, AK 239586
Olea europaea ssp. *europaea*	olive, CHR 214141, AK 215883
Prunus persica	peach
Psoralea pinnata	dally pine, cut-leaf psoralea
Rosa cv.	rose
Rubus sp. (*R. fruticosus* agg.)	blackberry
Salix cinerea	grey willow
Salix fragilis	crack willow
Senna septemtrionalis	buttercup bush, CHR 276338
Solanum mauritianum	woolly nightshade
Tibouchina urvilleana	AK 215530
Ulex europaeus	gorse

MONOCOT TREES

Phoenix canariensis	phoenix palm, AK 153623

FERNS

Azolla pinnata	ferny azolla
Osmunda regalis	royal fern

MONOCOT. LIANES

Asparagus asparagoides	smilax, CHR 81437
Asparagus scandens	climbing asparagus

DICOT. LIANES

Calystegia silvatica	great bindweed, CHR 214249
Cassytha pubescens	dodder laurel, AK 256213
Clematis maximowicziana	(Webb et al. 1989)
Dipogon lignosus	mile-a-minute, CHR 473710
Jasminum polyanthum	Jasmine
Lonicera japonica	Japanese honeysuckle
Passiflora caerulea	blue passionfruit
Passiflora tripartita var. *mollissima*	banana passionfruit
Rubus ostryifolius	AK 252696
Rubus rosifolius	AK 282117
Senecio mikanioides	German ivy
Vinca major	periwinkle, AK 119922
Vitis vinifera	grape
Wisteria sinensis	wisteria

LYCOPODS AND PSILOPSIDS

Sellaginella kraussiana	selaginella

GRASSES

Agrostis capillaris	browntop
Agrostis stolonifera	creeping bent, AK 143703, AK 252695
Aira caryophyllea	silvery hair grass
Alopecurus pratensis	meadow foxtail
Ammophila arenaria	marram
Anthoxanthum odoratum	sweet vernal
Arundo donax	giant reed grass
Avena barbata	slender oat
Axonopus fissifolius	narrow-leaved carpet grass
Briza maxima	large quaking grass
Briza minor	shivery grass
Bromus arenarius	ripgut brome, sand brome
Bromus willdenowii	praire grass
Cortaderia jubata	purple pamapas
Cortaderia selloana	pampas
Cynodon dactylon	Bermuda grass
Cynosurus echinatus	rough dogstail, AK 216750
Dactylis glomerata	cocksfoot
Echinocloa crus-galli	barnyard grass, AK 119869
Glyceria declinata	small sweet grass
Glyceria maxima	reed sweet grass
Holcus lanatus	Yorkshire fog
Lagurus ovatus	harestail
Lolium perenne	perennial ryegrass
Panicum dichotomiflorum	smooth witchgrass, AK 278751
Parapholis strigosa	strigose sicklegrass, AK 252694
Paspalum dilatatum	paspalum
Paspalum distichum	Mercer grass
Paspalum urvillei	Vasey grass
Paspalum vaginatum	saltwater paspalum
Pennisetum clandestinum	kikuyu
Pennisetum macrourum	African feather grass, AK 227138, AK 252712, AK 205952
Phalaris aquatica	AK 143702, AK 227138
Phleum pratense	timothy
Poa annua	annual meadow grass
Poa trivialis	rough-stalked meadow grass, AK 218010
Polypogon fugax	
Polypogon monspeliensis	beard grass, AK 276721, AK 35459, AK 99168
Rytidosperma penicillatum	danthonia
Rytidosperma racemosum	(Cameron et al. 2001)

Schedonorus phoenix	tall fescue
Setaria gracilis	knotroot bristlegrass, AK 276722
Setaria palmifolia	plam grass, AK 222555
Setaria pumila	yellow bristlegrass, AK 277088
Spartina alterniflora	spartina
Sporobolus africanus	ratstail
Stenotaphrum secundatum	buffalo grass
Vulpia myuros ssp. *myuros*	hair grass
Zizania latifolia	Manchurian wild rice

SEDGES

Carex divulsa	grey sedge
Carex longii	
Carex ovalis	oval sedge
Cyperus brevifolius	globe sedge
Cyperus congestus	*purple umbrella sedge*
Cyperus eragrostis	umbrella sedge
Cyperus polystachyos	
Isolepis marginata	little club sedge, AK 216744
Isolepis sepulcralis	AK 252715
Rhynchospora globularis	globebeak sedge, AK 251997
Schoenoplectus californicus	American bullrush, AK 246002, AK 92826, AK 250304, AK 232860,AK 224056, AK 224055

RUSHES

Juncus acutus	sharp rush
Juncus articulatus	jointed rush
Juncus bufonius	toad rush
Juncus bulbosus	bulbous rush
Juncus capitatus	dwarf rush, AK 151481, AK 298035, AK 266382
Juncus dichotomus	forked rush, AK 252731, AK 252584
Juncus effusus	soft rush
Juncus fockei	(Ogle in Wright & Young 1991)
Juncus microcephalus	AK 35479, AK 35507
Juncus sonderianus	AK 251998, AK 298851
Juncus tenuis	track rush

MONOCOT. HERBS (other than orchids, grasses, sedges and rushes)

Agapanthus praecox	agapanthus
Aristea ecklonii	aristea (Cameron et al. 2001)
Arum italicum	Italian arum, AK 232792
Canna indica	canna lily
Ceraiophyllum demersum	hornwort
Crocosmia × *crocosmiiflora*	montbretia
Dracunculus vulgare	stink lily (Cameron et al. 2001)

Egeria densa	lakeweed (Wells et al. 2007)
Elodea canadensis	Canadian pondweed (Tanner et al. 1986)
Hedychium gardnerianum	kahili ginger; wild ginger
Ixia polystachya	variable ixia, AK 35497
Kniphofia uvaria	red hot poker
Lagarosiphon major	oxygen weed (Wells et al. 2007)
Lilium formosanum	Formosan lily
Otellia ovalifolia	swamp lily (Tanner et al. 1986)
Spirodela punctata	purple-backed duckweed (Tanner et al. 1986)
Tradescantia fluminensis	tradescantia
Watsonia meria susbsp. bulbifera	watsonia, AK 35463
Zantedeschia aethiopica	arum lily

COMPOSITE HERBS

Achillea millefolium	yarrow
Ageratina adenophora	Mexican devil
Ageratina riparia	mistflower
Arctotheca calendula	calendula AK 220800
Arctotis stoechadifolia	AK 271117
Aster subulatus	sea aster
Bidens frondosa	beggar's ticks
Carduus acanthoides	plumeless thistle, AK 219403
Carduus nutans	nodding thistle, CHR 212026
Carthamus lanatus	saffron thistle, AK 217798
Cirsium arvense	Californian thistle
Cirsium vulgare	Scotch thistle
Conyza albida	fleabane
Conyza bonariensis	wavy-leaved fleabane, AK 235017
Conyza parva	smooth fleabane, AK 203223
Crepis capillaris	hawksbeard
Gamochaeta simplicicaulis	(Cameron et al. 2001)
Hypochoeris glabra	*smooth* catsear, AK 252, AK 252350, AK 252728
Hypochoeris radicata	catsear
Leontodon taraxacoides	hawkbit
Senecio bipinnatisecus	Australian fireweed
Senecio diaschides	AK 218148
Senecio jacobaea	ragwort
Senecio sylvaticus	wood groundsel
Sonchus asper	prickly sowthistle
Sonchus oleraceus	sowthistle, puha
Taraxacum officinale	dandelion
Tolpis barbata	European milkwort, AK 205948
Vellereophyton dealbatum	white cudweed, AK 252356

DICOT. HERBS (other than composites)

Alisma plantago-aquatica	water speedwell
Alternanthera philoxeroides	alligator weed
Anagallis arvensis	scarlet pimpernel
Apium nodiflorum	water celery
Aptenia cordifolia	rock rose, AK 119956
Atriplex prostrata	sea orache
Blackstonia perfoliata	yellow-wort
Callitriche stagnalis	starwort
Cardamine flexuosa	wavy bittercress, AK 218226
Carpobrotus edulis	adventive iceplant
Centaurium erythraea	centaury
Cerastium glomeratum	annual mouse-ear chickweed
Chenopodium ambrosioides	Mexican tea, AK 235014, AK 119914
Chenopodium murale	nettle-leaved fathen, AK 297716
Ciclospermum leptophyllum	slender celery, AK 215974
Coronopus didymus	twincress, AK 262953
Crassula multicava	fairy crassula, AK 271800
Daucus carota	wild carrot
Epilobium tetragonum	AK 219372, AK 219373, AK 252672
Euphorbia peplus	milkweed
Foeniculum vulgare	fennel
Galium aparine	cleavers
Galium palustre	marsh bedstraw, AK 217523
Geranium molle	dovesfoot cranesbill
Hypericum androsaemum	tutsan
Kennedia rubicunda	dusky coral pea, AK 223804, AK 233991
Limonium sinuatum	blue statice, AK 201384
Linum bienne	pale flax
Lotus pedunculatus	lotus
Lotus suaveolens	hairy birdsfoot trefoil
Ludwigia palustris	water purslane
Ludwigia peploides ssp. *montevidensis*	water primrose
Lythrum hyssopifolia	purple loosestrife
Lythrum junceum	rose loosestrife, AK 141414
Melilotus indicus	King Island melilot
Mentha pulegium	pennyroyal
Modiola caroliniana	creeping mallow
Myosotis discolor	grassland forget-me-not, AK 276723
Myosotis laxa var. *caespitosa*	forget-me-not
Nasturtium officinale	watercress
Oenanthe pimpinelloides	parsley dropwort
Ornithopus pinnatus	yellow seradella
Ornithopus sativus	serradella, AK 252448
Orobanche minor	broomrape
Oxalis pes-caprae	Bermuda buttercup, AK 120001

Parentucellia viscosa	tarweed
Petroselinum crispum	parsley, AK 151620
Phytolacca octandra	inkweed
Plantago australis	swamp plantain
Plantago coronopus	buck's horn plantain
Plantago lanceolata	narrow-leaved plantain
Plantago major	broad-leaved plantain
Polycarpon tetraphyllum	allseed
Polygonum hydropiper	water pepper
Polygonum lapathifolium	pale willow weed, AK 299823
Polygonum punctatum	American willow weed
Polygonum strigosum	spotted knotcord
Prunella vulgaris	selfheal
Ranunculus repens	creeping buttercup
Ranunculus sardous	hairy buttercup
Ranunculus sceleratus	celery-leaved buttercup, AK 119870, AK2 76724, AK 179261, AK 299170
Rumex acetosella	sheep's sorrel
Rumex conglomeratus	clustered dock
Rumex frutescens	Argentine dock, AK 218266, AK 252670
Rumex obtusifolius	broad leaved dock
Sagina subulata	*Irish moss*, AK 252371
Sida rhombifolia	paddy lucerne, AK 235200, AK 251296
Silene gallica	catchfly
Sison amomum	stone parsley, AK 153652
*Solanum nigru*m	black nightshade
Soliva anthemifolia	AK 90894
Soliva sessilis	Onehunga weed, AK 140756
Spergularia rubra	sand spurrey, AK 35457
Trifolium repens	white clover
Trifolium resupinatum	reversed clover, AK 219455
Tropaeolum majus	garden nasturtium
Utricularia gibba	(Wells et al. 2007)
Verbena bonariensis	purpletop
Verbena littoralis	blue vervain, AK 119957
Verbena officinalis	common vervain
Verbena rigida	creeping vervain, AK 211034
Veronica arvensis	field speedwell
Veronica plebeia	Australian speedwell (Cameron et al. 2001)
Vicia sativa	vetch
Vinca major	periwinkle

Appendix 6

COMMON PLANT NAMES USED IN TEXT

6.1 Native species

akepiro	*Olearia furfuracea*
arching clubmoss	*Lycopodiella cernua*
arrow grass	*Triglochin striata*
bog rush	*Schoenus pauciflorus*
bracken	*Pteridium esculentum*
burr-reed	*Sparganium subglobosum*
coastal karamu	*Coprosma macrocarpa* ssp. *minor*
coastal toetoe	*Cortaderia splendens*
common broom	*Carmichaelia australis*
domed sun orchid	*Thelymitra tholiformis*
duckweed	*Lemna minor*
fierce lancewood	*Pseudopanax ferox*
fivefinger	*Pseudopanax arboreu*
forked sundew	*Drosera binata*
giant umbrella sedge	*Cyperus ustulatus*
glasswort	*Sarcocornia quinqueflora*
gully tree fern	*Cyathea cunninghamii*
hangehange	*Geniostoma rupestre* var. *ligustrifolium*
harakeke	*Phormium tenax*
houhere	*Hoberia populnea*
kahakaha	*Collospermum hastatum*
kahikatea	*Dacrycarpus dacrydioides*
kaikomako	*Pennantia corymbosa*
kanuka	*Kunzea ericoides*
karaka	*Corynocarpus laevigatus*
karamu	*Coprosma robusta*
karo	*Pittosporum crassifolium*
kauri	*Agathis australis*
kauri grass	*Astelia trinervia*
kawakawa	*Macropiper excelsum* ssp. ex*celsum* f. *excelsum*
kiekie	*Freycinetia banksii*
knobby clubrush	*Ficinia nodosa*
kohekohe	*Dysoxylum spectabile*
kohuhu	*Pittosporum tenuifolium*
korokio	*Corokia cotoneaster*
kowhai	*Sophora microphylla* s.l.

kowharawhara	*Astelia banksii*
kumara	*Ipomoea batatas*
kumeraho	*Pomaderris kumeraho*
kuta	*Schoenoplectus tabernaemontani*
lady fern	*Diplazium australe*
ladies' tresses	*Spiranthes novae-zelandiae*
lancewood	*Pseudopanax crassifolius*
mahoe	*Melicytus ramiflorus* ssp. *ramiflorus*
mamaku	*Cyathea medullaris*
mamangi	*Coprosma arborea*
manatu	*Plagianthus regius*
mangeao	*Litsea calicaris*
mangemange	*Lygodium articulatum*
mangrove	*Avicennia marina ssp. australasica*
manuka	*Leptospermum scoparium*
mapau	*Myrsine australis*
marsh fern	*Thelypteris confluens*
matai	*Prumnopitys taxifolia*
mingimingi	*Leucopogon fasciculatus*
miro	*Stachypitys ferruginea*
narrow-leaved maire	*Nestegis montana*
native iceplant	*Disphyma australe*
native willow weed	*Persicaria decipiens*
nikau	*Rhopalostylis sapida*
northern rata	*Metrosideros robusta*
New Zealand jasmine	*Parsonsia heterophylla*
New Zealand spinach	*Tetragonia implexicoma*
oioi	*Apodasmia similis*
pale rush	*Juncus pallidus*
pate	*Schefflera digitata*
pigeonwood	*Hedycarya arborea*
pingao	*Desmoschoenus spiralis*
poataniwha	*Melicope simplex*
pohuehue	*Muehlenbeckia complexa*
pohutukawa	*Metrosideros excelsa*
ponga	*Cyathea dealbata*
prickly heath	*Leptecophylla juniperina ssp. juniperina*
pukatea	*Laurelia novae-zelandiae*
puriri	*Vitex lucens*
putaputaweta	*Carpodetus serratus*
rangiora	*Brachyglottis repanda*

rasp fern	*Doodia australis*
raupo	*Typha orientalis*
remuremu	*Selliera radicans*
rengarenga	*Arthropodium cirratum*
rewarewa	*Knightia excelsa*
ring fern	*Paesia scaberula*
rimu	*Dacrydium cupressinum*
rohutu	*Lophomyrtus obcordata*
round-leaved coprosma	*Coprosma rotundifolia*
saltmarsh ribbonwood	*Plagianthus divaricatus*
sand coprosma	*Coprosma acerosa*
sand wind grass	*Lachnagrostis billardierei*
sand sedge	*Carex pumila*
sand spike-sedge	*Eleocharis neozelandica*
sea primrose	*Samolus repens*
sea rush	*Juncus kraussii* ssp. *australiensis*
shining karamu	*Coprosma lucida*
shore bindweed	*Calystegia soldanella*
shore tussock	*Austrostipa stipoides*
spinifex	*Spinifex sericeus*
small-leaved mahoe	*Melicytus micranthus*
small-leaved milk tree	*Streblus heterophyllus*
sneezeweed	*Centipeda minima* ssp. *minima*
sphagnum	*Sphagnum cristatum*
supplejack	*Ripogonum scandens*
swamp coprosma	*Coprosma tenuicaulis*
swamp kiokio	*Blechnum minus*
swamp maire	*Syzygium maire*
swamp millet	*Isachne globosa*
tanekaha	*Phyllocladus trichomanoides*
tangle fern	*Gleichenia dicarpa*
taraire	*Beilschmiedia tarairi*
tarata	*Pittosporum eugenioides*
tauhinu	*Ozothamnus leptophyllus*
tawa	*Beilschmiedia tawa*
tawapou	*Pouteria costata*
thick-leaved coprosma	*Coprosma crassifolia*
ti kouka	*Cordyline australis*
titoki	*Alectryon excelsus* ssp. *excelsus*
toetoe	*Cortaderia fulvida*
toikiwi	*Gahnia xanthocarpa*
totara	*Podocarpus totara*
towai	*Weinmannia silvicola*
true maidenhair	*Adantium aethiopicum*
water buttercup	*Ranunculus amphitrichus*
water fern	*Histiopteris incisa*
weeping mapou	*Myrsine divaricata*

wharangi	*Melicope ternata*
whau	*Entelea aborescens*
wheki	*Dicksonia squarrosa*
white maire	*Nestegis lanceolata*
willow-leaved maire	*Mida salicifolia*
wire rush	*Empodisma minus*
yellow bladderwort	*Utricularia australis*

6.2 Adventive species

alligator weed	*Alternanthera philoxeroides*
adventive iceplant	*Carpobrotus edulis*
berry heath	*Erica baccans*
black wattle	*Acacia mearnsii*
blackberry	*Rubus sp.* (*R. fruticosus* agg.)
boneseed	*Chrysanthemoides monilifera*
boxthorn	*Lycium ferocissimum*
brush wattle	*Paraserianthes lophantha*
buffalo grass	*Stenotaphrum secundatum*
Canadian pondweed	*Elodea canadensis*
catsear	*Hypochoeris radicata*
Chinese privet	*Ligustrum sinense*
cleavers	*Galium aparine*
climbing asparagus	*Asparagus scandens*
creeping bent	*Agrostis stolonifera*
creeping buttercup	*Ranunculus repens*
dally pine	*Psoralea pinnata*
downy hakea	*Hakea gibbosa*
Formosan lily	*Lilium formosanum*
gorse	*Ulex europaeus*
hairy birdsfoot trefoil	*Lotus suaveolens*
harestail	*Lagurus ovatus*
hornwort	*Ceratophyllum demersum*
Japanese honeysuckle	*Lonicera japonica*
kikuyu	*Pennisetum clandestinum*
lakeweed	*Egeria densa*
lotus	*Lotus pedunculatus*
Manchurian wild rice	*Zizania latifolia*
maritime pine	*Pinus pinaster*
marram	*Ammophila arenaria*
Mercer grass	*Paspalum distichum*
Mexican devil	*Ageratina adenophora*
mistflower	*Ageratina riparia*
montbretia	*Crocosmia X crocosmiiflora*
prickly hakea	*Hakea sericea*
oval sedge	*Carex ovalis*
oxygen weed	*Lagarosiphon major*
pampas	*Cortaderia selloana*

paspalum	*Paspalum dilatatum*
purple umbrella sedge	*Cyperus congestus*
quaking grass	*Briza minor*
radiata pine	*Pinus radiata*
ragwort	*Senecio jacobaea*
royal fern	*Osmunda regalis*
saltwater paspalum	*Paspalum vaginatum*
sharp rush	*Juncus acutus*
soft rush	*Juncus effusus*
Spanish heath	*Erica lusitanica*
sweet grass	*Glyceria* spp.
sweet vernal	*Anthoxanthum odoratum*
Sydney golden wattle	*Acacia longifolia*
tall fescue	*Schedonorus phoenix*
tarweed	*Parentucellia viscosa*
tradescantia	*Tradescantia fluminensis*
tree lupin	*Lupinus arboreus*
tree privet	*Ligustrum lucidum*
umbrella sedge	*Cyperus eragrostis*
water celery	*Apium nodiflorum*
water pepper	*Polygonum hydropiper*
water primrose	*Ludwigia peploides*
water purslane	*Ludwigia palustris*
white clover	*Trifolium repens*
wild ginger	*Hedychium gardnerianum*
willow-leaved hakea	*Hakea salicifolia*
woolly nightshade	*Solanum mauritianum*
Yorkshire fog	*Holcus lanatus*

Appendix 7

CHECKLIST OF FAUNA IN KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

Checklist compiled by the authors. Additional records from Ornithological Society of New Zealand (OSNZ), Crockett (comp.) (1992–2004), Wells et al. (2007), and R. Parrish (pers. comm.).

7.1 Mammals - native

Arctocephalus forsteri	New Zealand fur seal; kekeno

7.2 Mammals - introduced (feral)

Erinaceus europaeus	European hedgehog
Felis catus	cat

Lepus europaeus	brown hare
Mus musculus	house mouse
Mustela erminea	stoat
Mustela furo	ferret
Mustela nivalis	weasel
Oryctolagus cuniculus	European rabbit
Rattus norvegicus	Norway rat
Rattus rattus	ship rat
Sus scrofa	pig
Trichosurus vulpecula	brushtail possum

7.3 Birds - native

Anarhynchus frontalis	wrybill; ngutuparore
Anas aucklandica chlorotis	brown teal; pateke (historical)
Anas gracilis	grey teal; tete
Anas rhynchotis	Australasian shoveler; kuruwhengi
Anas superciliosa superciliosa	grey duck; parera
Anthus novaeseelandiae novaeseelandiae	New Zealand pipit; pihoihoi
Apteryx mantelli	North Island brown kiwi
Ardea novaehollandiae	white-faced heron
Arenaria interpres	turnstone
Aythya novaezealandiae	New Zealand scaup; papango
Botaurus poiciloptilus	Australasian bittern; matuku
Bowdleria punctata vealeae	North Island fernbird; matata
Bubulcus ibis	cattle egret
Calidris canutus	lesser knot; huahou
Charadrius bicinctus bicinctus	banded dotterel; tuturiwhatu
Charadrius melanops	black-fronted dotterel
Charadrius obscurus aquilonius	northern New Zealand dotterel; tuturiwhatu pukunui
Childonias leucopterus	white-winged black tern
Chrysococcyx lucidus lucidus	shining cuckoo; pipiwharauroa
Circus approximans	Australasian harrier; kahu
Daption capense	Cape pigeon/titore
Diomedea cauta cauta	white-capped mollymawk
Egretta alba modesta	white heron; kotuku
Egretta garzetta	little egret
Egretta sacra sacra	reef heron; matuku-moana
Eudyptula minor iredalei	northern little blue penguin; korora
Fulica atra australis	Australasian coot
Gallirallus australis australis	North Island weka (historical)
Gallirallus philippensis assimilis	banded rail; moho-pereru
Gerygone igata	grey warbler; riroriro
Haematopus ostralegus	South Island pied oystercatcher; torea
Haematopus unicolor	variable oystercatcher; torea; toreapango
Halobaena caerulea	blue petrel

Hemiphaga novaeseelandiae	New Zealand pigeon; kukupa
Himantopus himantopus leucocephalus	Australasian pied stilt; poaka
Himantopus novaezelandiae	black stilt; kaki
Hirundo tahitica neoxena	Pacific swallow, welcome swallow
Hirundapus caudacutus	spine-tailed swift
Larus bulleri	black-billed gull
Larus dominicanus dominicanus	(southern) black-backed gull, Dominican gull, karoro
Larus novaehollandiae scopulinus	red-billed gull; tarapunga
Limosa lapponica	bar-tailed godwit
Morus serrator	Australasian gannet; takapu
Nestor meridionalis septentrionalis	North Island kaka
Ninox novaeseelandiae	morepork; ruru
Numenius phaeopus	whimbrel
Pachyptila desolata	Antarctic prion
Pachyptila tartar	fairy prion
Phalacrocorax carbo novaehollandiae	black shag; kawau
Phalacrocorax melanoleucos	little shag; kawaupaka
Phalacrocorax sulcirostris	little black shag
Phalacrocorax varius varius	pied shag; karuhiruhi
Platalea regia	Royal spoonbill; kotuku-ngutupapa
Plegadis falcinellus	glossy ibis
Pluvialis fulva	Pacific golden plover
Porphyrio porphyrio melanotus	pukeko
Porzana pusilla affinis	marsh crake; koitareke
Porzana tabuensis plumbea	spotless crake; puweto
Prosthemadera novaeseelandiae novaeseelandiae	tui
Pterodroma inexpectata	mottled petrel
Pterodroma macoptera gouldi	grey-faced petrel, North Island muttonbird, oi
Rhipidura fuliginosa placabilis	North Island fantail; piwakawaka
Stercorarius parasiticus	Arctic skua
Sterna albifrons sinensis	eastern little tern
Sterna caspia	Caspian tern; taranui
Sterna fuscata	sooty tern
Sterna hirundo	common tern
Sterna nereis davisae	New Zealand fairy tern
Sterna striata striata	white-fronted tern; tara
Tachybaptus novaehollandiae	Australasian little grebe
Tadorna variegata	paradise shelduck; putangitangi
Thalassoica antarctica	Antarctic petrel
Todiramphus sanctus	New Zealand kingfisher; kotare
Vanellus miles	spur-winged plover
Zosterops lateralis	silvereye; tauhou

7.4 Birds - introduced

Acridotheres tristis	myna

Alauda arvensis	skylark
Anas platyrhynchos	mallard
Branta canadensis	Canada goose
Callipepla californica	Californian quail
Carduelis carduelis	goldfinch
Carduelis chloris	greenfinch
Carduelis flammea	redpoll
Coturnix ypsilophorus	brown quail
Cygnus atratus	black swan
Emberiza citrinella	yellowhammer
Fringilla coelebs	chaffinch
Gymnorhina tibicen	Australian magpie
Passer domesticus	house sparrow
Pavo cristatus	peafowl
Phasianus colchicus	pheasant
Platycercus eximius	eastern rosella
Prunella modularis	dunnock; hedge sparrow
Sturnus vulgaris	starling
Synoicus ypsilophorus	brown quail
Turdus merula	blackbird
Turdus philomelos	song thrush

7.5 Reptiles - native

Caretta caretta	loggerhead sea turtle
Chelonia mydas	green turtle
Cyclodina aenea	copper skink
Dermochelys coriacea	leatherback turtle
Eretmochelys imbricata	hawksbill sea turtle
Laticauda colubrina	banded sea snake
Naultinus elegans elegans	Auckland green gecko
Oligosoma smithi	shore skink
Pelamis platurus	yellow-bellied sea snake

7.6 Reptiles - introduced

Litorea aurea	golden bell frog
Litorea ewingii	brown tree frog
Litoria raniformis	southern bell frog
Trachemys scripta elegans	common slider

7.7 Fish - native

Aldrichetta forsterii	yellow-eyed mullet
Anguilla dieffenbachii	longfin eel
Anguilla australis	shortfin eel
Galaxias argenteus	giant kokopu
Galaxias fasciatus	banded kokopu
Galaxias gracilis	dwarf inanga
Galaxias maculatus	inanga

Galaxias sp.	dunelakes galaxias
Gobiomorphus basalis	Cran's bully
Gobiomorphus cotidianus	*common bully*
Gobiomorphus gobioides	giant bully
Gobiomorphus huttoni	redfin bully
Mugil cephalus	grey mullet
Neochanna diversus	black mudfish
Retropinna retropinna	common smelt

7.8 Introduced

Cyprinus carpio	koi carp
Gambusia affinis	gambusia
Leuciscus idus	orfe
Ptenopharyngodon idella	grass carp
Scardinius erythrophthalmus	rudd

7.9 Freshwater invertebrates - native

Amarinus lacustris	freshwater crab
Hydriella menziesii	freshwater mussel
Parenephrops planifrons	koura; freshwater crayfish

7.10 Freshwater invertebrates - introduced

Craspedacusta sowerbyi	freshwater jellyfish

Appendix 8

COMMON FAUNA NAMES USED IN TEXT

8.1 Native species

ARTHROPODS

black katipo	*Latrodectus atritus*

REPTILES

Auckland green gecko	*Naultinus elegans elegans*
banded sea snake	*Laticauda colubrina*
green turtle	*Chelonia mydas*
hawksbill sea turtle	*Eretmochelys imbricata*
leatherback turtle	*Dermochelys coriacea*
loggerhead sea turtle	*Caretta caretta*
copper skink	*Cyclodina aenea*
shore skink	*Oligosoma smithii*
yellow-bellied sea snake	*Pelamis platurus*

MAMMALS

New Zealand fur seal	*Arctocephalus forsteri*
long-tailed bat	*Chaninolobus tuberculata*
lesser short-tailed bat	*Mystacina tuberculata*

BIRDS

Antarctic petrel	*Thalassoica antarctica*
Antarctic prion	*Pachyptila desolata*
Arctic skua	*Stercorarius parasiticus*
Australasian bittern	*Botaurus poiciloptilus*
Australasian gannet	*Morus serrator*
Australasian harrier	*Circus approximans*
Australasian little grebe	*Tachybaptus novaehollandiae*
Australasian pied stilt	*Himantopus himantopus leucocephalus*
Australasian shoveler	*Anas rhynchotis*
banded dotterel	*Charadrius bicinctus bicinctus*
banded rail	*Gallirallus philippensis assimilis*
black shag	*Phalacrocorax carbo novaehollandiae*
black stilt	*Himantopus novaezelandiae*
black-backed gull	*Larus dominicanus dominicanus*
black-billed gull	*Larus bulleri*
black-fronted dotterel	*Charadrius melanops*
blue petrel	*Halobaena caerulea*
brown teal	*Anas aucklandica chlorotis*

cape pigeon	*Daption capense*
cattle egret	*Bubulcus ibis*
Caspian tern	*Sterna caspia*
common tern	*Sterna hirundo*
shag	*Phalacrocorax spp.*
bar-tailed godwit	*Limosa lapponica*
North Island fantail	*Rhipidura fuliginosa placabilis*
fluttering shearwater	*Puffinus gavia*
glossy ibis	*Plegadis falcinellus*
grey duck	*Anas superciliosa superciliosa*
grey-faced petrel	*Pterodroma macroptera gouldi*
grey teal	*Anas gracilis*
grey warbler	*Gerygone igata*
kuaka	*Limosa lapponica*
kuruwhengi	*Anas rhynchotis*
lesser knot	*Calidris canutus*
little black shag	*Phalacrocorax sulcirostris*
little egret	*Egretta garzetta*
marsh crake	*Porzana pusilla affinis*
morepork	*Ninox novaezelandiae*
New Zealand dabchick	*Poliocephalus rufopectus*
New Zealand fairy tern	*Sterna nereis davisae*
New Zealand kingfisher	*Halcyon sancta vagans*
New Zealand pigeon	*Hemiphaga novaeseelandiae novaezealandiae*
New Zealand pipit	*Anthus novaezealandiae novaezealandiae*
New Zealand scaup	*Aythya novaezealandiae*
North Island brown kiwi	*Apteryx mantelli*
North Island fernbird	*Bowdleria punctata vealeae*
North Island kaka	*Nestor meridionalis septentrionalis*
northern little blue penguin	*Eudyptula minor iredalei*
northern New Zealand dotterel	*Charadrius obscurus aquilonius*
Pacific swallow	*Hirundo tahitica neoxena*
paradise shelduck	*Tadorna variegata*
pied shag	*Phalacrocorax varius varius*
pukeko	*Porphyrio porphyrio melanotus*
red-billed gull	*Larus novaehollandiae scopulinus*
reef heron	*Egretta sacra sacra*
Royal spoonbill	*Platalea regia*
shag	*Phalacrocorax spp.*
shining cuckoo	*Chrysococcyx lucidus lucidus*
silvereye	*Zosterops lateralis*
sooty shearwater	*Puffinus griseus*
sooty tern	*Sterna fuscata*
South Island pied oystercatcher	*Haematopus ostralegus*
spine-tailed swift	*Hirundapus caudacutus*

spotless crake	*Porzona tabuensis plumbea*
spur-winged plover	*Vanellus miles*
tui	*Prosthemadera novaeseelandiae*
turnstone	*Arenaria interpres*
variable oystercatcher	*Himatopus unicolor*
white-capped mollymawk	*Diomedea cauta cauta*
white heron	*Egretta alba modesta*
white-faced heron	*Ardea novaehollandiae*
white-fronted tern	*Sterna striata striata*
white-winged black tern	*Chlidonias leucopterus*
wrybill	*Anarhynchus frontalis*
little shag	*Phalacrocorax melanoleucos brevirostris*

FISH AND MOLLUSCS

banded kokopu	*Galaxias fasciatus*
black mudfish	*Neochanna diversus*
common bully	*Gobiomophus cotidianus*
dwarf inanga	*Galaxias gracilis*
dunelakes galaxias	*Galaxias sp.*
freshwater mussel	*Hydriella menziesii*
giant kokopu	*Galaxias argenteus*
inanga	*Galaxias maculates*
longfin eel	*Anguilla dieffenbachia*
shortfin eel	*Anguilla australis*

8.2 Introduced species

MAMMALS

brush-tailed possum	*Trichosurus vulpecula*
cat	*Felis catus*
dog	*Canis familiaris*
ferret	*Mustela furo*
house mouse	*Mus musculus*
pig	*Sus scrofa*
rat	*Rattus spp.*
stoat	*Mustela ermine*

FISH

grass carp	*Ptenopharyngodon idella*
koi carp	*Cyprinus carpio*
gambusia	*Gambusia affinis*
orfe	*Leuciscus idus*
rainbow trout	*Oncorhynchus mykiss*
rudd	*Scardinius erythrophthalmus*

INSECTS

Argentine ant	*Linepithema humile*

Appendix 9

VEGETATION TYPES RECORDED IN KAIPARA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY) IN RELATION TO GEOLOGY

Key: bold PNA numbers = representative ecological units; part = part of site is within geological unit

GEOL. GROUP:	A	B	C	D	E	F	G	H
NORTHERN LOWLANDS								
A4								
FOREST/SHRUBLAND								
Kanuka	**Q09/051 (part)**		Q09/056 (part)					
SHRUBLAND								
Manuka	**Q09/051 (part)**							
ESTUARINE WETLAND								
Mangrove shrubland	P08/200 (part), Q09/056 (part)							
Oioi rushland	P08/200 (part), Q09/056 (part)							
SANDFIELD								
Sandfield	Q09/051 (part), Q09/056 (part)							
A5								
FOREST								
Totara						O7/012 (part), **P07/121a (part)**	P07/136a (part), P07/150 (part), P07/158 (part)	P07/136a (part), P07/150 (part), P07/158 (part), P07/165 (part)
Kahikatea	P07/141a, **P07/142 (part),** P07/158 (part), P07/162, P07/169, P07/173, P07/182, P07/185, P08/056, P08/060, P08/063, P08/067a, P08/067b, **P08/068a, P08/068b**, P08/068c, P08/094a							

GEOL. GROUP:	A	B	C	D	E	F	G	H
Ti kouka-kahikatea	P07/135 (part), P07/164 (part), P07/169a (part), **P08/068b**							
Puriri	**P08/068b**							
FOREST/SHRUBLAND								
Kanuka			O07/027 (part), P09/020 (part)	P09/008 (part)		O07/022 (part)	O07/027 (part), P07/135 (part), **P09/003 (part),** P09/020 (part), **Q09/051 (part),** Q09/150 (part)	P07/135 (part)
SHRUBLAND								
Kanuka/manuka						O07/024 (part)	O07/015 (part), O07/018 (part), P07/121 (part), P07/136a (part), P08/088 (part), **Q09/051 (part)**	P07/136a (part)
Manuka	O07/012 (part) O07/015 (part), **P07/133 (part),** P07/ Contains 59.1 ha of Acutely Threatened environment A5.1b, 21.1 ha of Chronically Threatened A5.2a, and 96.7 ha of At Risk environment A6.1b and A6.1c. (part), P07/140, P07/157, P07/157a, P07/167 (part), P07/177, P08/081, P08/087 (part), P08/095 (part), P08/101 (part), P08/213 (part), P09/003 (part), P09/020 (part), Q09/150 (part)		O07/026 (part), **P07/127 (part),** P07/153 (part), P07/154 (part), P07/160 (part)		P07/161	O07/022 (part)	O07/012 (part), P07/125 (part), P07/127 (part), P07/132 (part), P07/133 (part), P07/150 (part), P07/153 (part), P07/158 (part), P07/167 (part), P07/171a (part), P08/095 (part)	P07/150 (part), P07/158 (part)

GEOL. GROUP:	A	B	C	D	E	F	G	H
FLAXLAND								
Flaxland	P07/127 (part), P07/133 (part)		P08/061 (part)				P08/061 (part)	
FRESHWATER WETLAND								
Raupo reedland	O07/015 (part), P07/120b (part), P07/127 (part), P07/132 (part), P07/133 (part), P07/145 (part), P07/153 (part), P07/171a (part), P07/171b (part), P07/172 (part), Q09/051 (part), Q09/150 (part)			P07/131 (part)	O07/018 (part), P07/125 (part)			
Raupo-*Baumea* reedland	P08/087 (part), Q09/051 (part)							
Baumea sedgeland	P07/127 (part), P07/153 (part)				O07/024 (part)			
Eleocharis reedland				P07/131 (part)	P07/174a (part)			
Baumea reedland				P07/131 (part)				
ESTUARINE WETLAND								
Mangrove shrubland	**P08/101 (part),** P08/200 (part), P08/213 (part), **P09/003 (part),** Q09/150 (part)							
Oioi rushland	**P08/101 (part),** P08/200 (part), P08/213 (part), **P09/003 (part),** Q09/150 (part)							
SANDFIELD								
Spinifex sandfield	O07/026 (part)	**P08/061 (part)**	O07/026 (part)		O07/022 (part)			
Sandfield					O07/018 (part)			
A6								
FOREST								
Pohutukawa		**O07/016 (part)**	**O07/016 (part)** O07/026 (part)	O07/025 (part)				
Totara						O7/012 (part), **P07/121a (part)**	P07/165 (part)	P07/165 (part)

GEOL. GROUP:	A	B	C	D	E	F	G	H
Ti kouka-kahikatea	P07/164 (part)							
Puriri				**P09/008 (part)**				
FOREST/SHRUBLAND								
Kanuka	Q09/051 (part)		O07/027 (part), P09/020 (part), Q09/056 (part)	P09/008 (part)		O07/027 (part), **P09/003 (part),** P09/020 (part), Q09/051 (part), Q09/150 (part)		
SHRUBLAND								
Kanuka/manuka							O07/015 (part), O07/018 (part), P07/121 (part), P08/088 (part)	
Manuka	O07/012 (part), O07/015 (part), **P07/133 (part)**, P07/167 (part), P08/087 (part), P08/095 (part), P08/101 (part), P08/213 (part), P09/003 part), Q09/051 (part), Q09/150 (part)		O07/026 (part), **P07/127 (part),** P07/154 (part)				O07/012 (part), P07/125 (part), **P07/127 (part),** P07/132 (part), **P07/133 (part),** P07/158 (part), P07/171a (part), P08/087 (part), P08/095 (part)	P07/158 (part)
FLAXLAND								
Flaxland	P07/127 (part)							
FRESHWATER WETLAND								
Raupo reedland	O07/015 (part), P07/120a (part), P07/120b (part), P07/127 (part), P07/132 (part), P07/133 (part), P07/171a (part), P07/172 (part), Q09/051 (part), Q09/150 (part)			O07/025 (part), P07/131 (part)	O07/018 (part), P07/125 (part)			
Raupo-*Baumea* reedland	P07/127 (part), P08/087 (part), Q09/051 (part)							

GEOL. GROUP:	A	B	C	D	E	F	G	H
Baumea sedgeland					O07/024 (part)			
Eleocharis reedland				O07/014 (part), O07/017, P07/131 (part)				
ESTUARINE WETLAND								
Mangrove shrubland	**P08/101 (part),** P08/200 (part), P08/213 (part), **P09/003 (part),** Q09/056 (part), Q09/150 (part)							
Oioi rushland	**P08/101 (part),** P08/200 (part), P08/213 (part), **P09/003 (part), Q09/051 (part),** Q09/056 (part) Q09/150 (part)							
SANDFIELD								
Spinifex sandfield		O07/016 (part)						
Sandfield	Q09/056 (part)							
A7								
FOREST								
Totara						O07/012 (part)		
Puriri		P09/011 (part)	**Q09/054 (part)**	**P09/008 (part),**				
FOREST/SHRUBLAND								
Kanuka		**P09/011 (part), Q09/058 (part),** Q09/063 (part)	P09/020 (part), Q09/055 (part), Q09/063 (part)	P09/008 (part), **P09/014 (part), Q09/054 (part)**			P09/020 (part), **Q09/051 (part)**	
SHRUBLAND								
Kanuka/manuka							Q09/051 (part)	
Manuka	O07/012 (part), P09/020 (part)		**P07/127 (part),** P07/153 (part), P07/160 (part)	Q09/053 (part)		O07/012 (part),	**P07/127 (part),** P07/153 (part)	
FLAXLAND								
Flaxland	P07/127 (part)	O07/016 (part)	O07/016 (part) P08/061 (part)				P08/061 (part)	

GEOL. GROUP:	A	B	C	D	E	F	G	H
FRESHWATER WETLAND								
Raupo reedland	P07/127 (part), P07/145 (part), P07/171b (part), P09/014 (part), Q09/051 (part)			P07/138 (part), P09/011a (part), Q09/053 (part) Q09/055 (part), Q09/058 (part), Q09/060 (part), Q09/203				
Raupo-*Baumea* reedland				Q09/060 (part), Q09/202				
Baumea sedgeland	P07/127 (part)			Q09/054 (part)				
Eleocharis reedland	P07/080			P08/ 208,P09/ 011a (part), Q09/054 (part), Q09/057				
ESTUARINE WETLAND								
Mangrove shrubland	Q09/056 (part)							
NORTHERN HILL COUNTRY								
D1								
FOREST								
Totara						O07/012 (part), **P07/121a (part)**		
SHRUBLAND								
Manuka	O07/012 (part)		P07/160 (part)			O07/012 (part)	**P07/127 (part)**	
FLAXLAND								
Flaxland	P07/127 (part)	O07/016 (part)	O07/016 (part)					
FRESHWATER WETLAND								
Raupo reedland	P07/127 (part), P07/145 (part)							
Baumea sedgeland	P07/127 (part)							
Eleocharis reedland	P07/124a (part)							
Baumea reedland	P07/124a (part)							
NORTHERN RECENT SOILS								
G1								

GEOL. GROUP:	A	B	C	D	E	F	G	H
FOREST								
Pohutukawa		O07/016 (part), O07/011 (part)	O07/016 (part), O07/026 (part), P08/061 (part)	O07/025 (part)				
Puriri		**P09/011 (part), Q09/061 (part)**	**Q09/054 (part), Q09/061 (part)**					**P07/142 (part)**
FOREST/SHRUBLAND								
Kanuka		**P09/001 (part), P09/011 (part), Q09/058 (part),** Q09/060 (part), **Q09/061 (part)** Q09/063 (part)	P09/020 (part), **Q09/054 (part), Q09/061 (part),** Q09/063 (part),	**P09/014 (part), Q09/054 (part)**			P09/020 (part)	
SHRUBLAND								
Kanuka/manuka		P09/001 (part)						
Manuka		O07/016 (part), P09/001 (part)	O07/016 (part) O07/026 (part)	Q09/053 (part)				
FLAXLAND								
Flaxland		O07/016 (part), P08/072 (part)	O07/016 (part) P08/061 (part), P08/072 (part)				P08/061 (part)	
FRESHWATER WETLAND								
Raupo reedland	P08/073 (part), P09/014 (part)	P08/072 (part), P09/001 (part), Q09/063 (part)		O07/025 (part), P07/138 (part), P08/ 209,P09/ 011a (part), Q09/053 (part), Q09/058 (part), Q09/060 (part)				
Raupo-*Baumea* reedland		P09/001 (part)		P08/212, Q09/060 (part)				
Baumea sedgeland	P09/014 (part)			Q09/054 (part)				

GEOL. GROUP:	A	B	C	D	E	F	G	H
Eleocharis reedland	PO7/130, P08/073 (part)			P08/210, P09/011a (part), P09/205, Q09/054 (part)	P07/174a (part)			
SANDFIELD								
Spinifex sandfield	O07/026 (part)	**P08/061 (part), P09/001 (part)**	O07/026 (part)	O07/025 (part)				
Sandfield		**O07/011 (part),** P08/072 (part), **P09/001 (part)**						
ESTUARINE WETLAND								
Oioi rushland		**P09/001 (part)**						
G3								
FOREST								
Totara							P07/150 (part)	**P07/148,** P07/150 (part)
Kahikatea	P07/135 (part), **P07/142 (part),** P07/149, P07/150 (part)							
Ti kouka-kahikatea	P07/135 (part), P07/141, P07/169a (part)							
FOREST/SHRUBLAND								
Kanuka							P07/135 (part)	P07/135 (part)
SHRUBLAND								
Manuka	P07/134 (part)						P07/150 (part)	P07/150 (part)
ESTUARINE WETLAND								
Oioi rushland	P07/150 (part)							

A: Holocene alluvial and/or swamp and/or estuarine deposits.

B: Holocene unconsolidated sand dunes.

C: Mid-late Pleistocene consolidated dune sands (Kariotahi Group).

D: Lake and swamp deposits in mid-late Pleistocene (Kariotahi Group) consolidated dune sands.

E: Lake and swamp deposits on early Pleistocene (Awhitu Group) cemented dune sands.

F: Miocene (Waipoua Basalt) basalt.

G: Early Pleistocene (Awhitu Group) cemented dune sands.

H: Undifferentiated Mangakahia Complex.

Appendix 10

CONCORDANCE OF ECOLOGICAL UNIT (VEGETATION COMPOSITION AND STRUCTURE, AND LANDFORM), MAJOR VEGETATION TYPE, HABITAT MAPPING UNITS, AREA AND LEVEL OF SIGNIFICANCE WITHIN EACH SITE

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Airstrip Road Wetland 1	P07120a	Raupo reedland and *Eleocharis acuta* sedgeland	Alluvium	Baumea sedgeland	Wetland	2.1	2
Airstrip Road Wetland 2	P07120b	Raupo reedland	Alluvium	Raupo reedland	Wetland	1.3	2
Airstrip Road Wetland 2	P07120b	*Isolepis distigmatosa* sedgeland	Alluvium	Baumea sedgeland	Wetland	1.0	2
Aoroa Road Forest	P08056	Kahikatea forest	Alluvium	Kahikatea forest	Forest	2.2	1
Arnesen Farm Shrubland	P07134	Manuka shrubland	Alluvium	Manuka shrubland	Shrubland	9.7	2
Arnesen Farm Shrubland	P07134	Ti kouka treeland	Alluvium	*	Forest	1.7	2
Babylon Coast Roadside Shrubland	P07154	Manuka shrubland	Hillslope	Manuka shrubland	Shrubland	2.7	2
Babylon Smith Wetland	P07145	Raupo reedland	Alluvium	Mixed raupo reedland	Wetland	4.9	1
Babylon Smith Wetland	P07145	Open water	Lake	*	Wetland	0.6	1
Barfoot's Gully Shrubland	P08095	Manuka-pampas shrub grassland	Alluvium	Manuka shrubland	Shrubland	2.9	2
Barfoot's Gully Shrubland	P08095	Manuka shrubland	Hillslope	Manuka shrubland	Shrubland	10.2	2
Barfoot's Shrubland	P08092	Manuka-pampas shrub grassland	Alluvium	Manuka shrubland	Shrubland	7.1	2
Barfoot's Shrubland	P08092	Kanuka/manuka shrubland	Hillslope	Kanuka/manuka shrubland	Shrubland	2.1	2
Basin Road Shrubland 1	P07160	Manuka shrubland	Hillslope	Manuka shrubland	Shrubland	10.0	2
Basin Road Shrubland 2	P07161	Manuka shrubland	Basin	Manuka shrubland	Shrubland	11.8	2
Bayly's Basin Road Wetland 1	P07171b	Raupo reedland	Alluvium	Raupo reedland	Wetland	8.0	2
Bayly's Basin Road Wetland 2	P07206	Raupo reedland	Alluvium	Raupo reedland	Wetland	1.0	2
Bayly's Basin Road Wetland 2	P07206	Open water	Lake	*	Wetland	0.2	2
Bayly's Coast Road Wetland	P07172	Raupo reedland	Alluvium	Raupo reedland	Wetland	4.0	2

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Bayly's Coast Road Wetland and Shrubland	P07171a	Raupo reedland	Alluvium	Raupo reedland	Wetland	6.4	2
Bayly's Coast Road Wetland and Shrubland	P07171a	Manuka shrubland	Hillslope	Manuka shrubland	Shrubland	5.3	2
Black Lake and Shrubland	P08207	Undescribed shrubland	Undescribed	*	Shrubland	0.4	2
Black Lake and Shrubland	P08207	Open water	Dune lake	*	Wetland	0.6	2
Bruce Clear's Wetland	O07017	*Eleocharis sphacelata* reedland	Alluvium	Eleocharis reedland	Wetland	2.2	2
Burgess Road South Shrubland	P08088	Kanuka/manuka shrubland	Hillslope	Kanuka/manuka shrubland	Shrubland	9.4	2
Clarke's Lake and Wetland	P08208	*Eleocharis sphacelata* reedland and Open water	Lake	Eleocharis reedland	Wetland	2.4	1
Dargaville Bridge Forest	P07173	Kahikatea forest	Alluvium	Kahikatea forest	Forest	1.8	1
Dargaville Domain Forest	P07185	Kahikatea forest	Alluvium	Ti kouka-kahikatea forest	Forest	2.2	2
Finlayson's Lake and Wetland	Q09201	Undescribed vegetation	Lacustrine fringe	*	Wetland	0.8	1
Finlayson's Lake and Wetland	Q09201	Open water	Dune lake	*	Wetland	2.7	1
Freidrich's Lake	P07171	Mosaic wetland and Open water	Alluvium	Eleocharis reedland	Wetland	7.2	1
Frith Road Northern Dairylands Forest	P07135	Kanuka forest	Hillslope	Kanuka forest/ shrubland	Forest	2.9	1
Frith Road Northern Dairylands Forest	P07135	Kahikatea forest	Alluvium	Kahikatea forest	Forest	22.5	1
Frith Road Northern Dairylands Forest	P07135	Undescribed shrubland/ forest	Hillslope	*	Forest Shrubland	36.6	1
Frith Road Northern Dairylands Forest	P07135	Kahikatea-ti kouka-*Coprosma propinqua*-harakeke shrub wetland	Alluvium	Ti kouka-kahikatea forest	Wetland	8.8	1
Glinks Gully Wetland and Grassland	P08073	*Eleocharis sphacelata* reedland	Alluvium	Eleocharis reedland	Wetland	0.2	2
Glinks Gully Wetland and Grassland	P08073	Raupo reedland	Alluvium	Raupo reedland	Wetland	0.8	2
Glinks Gully Wetland and Grassland	P08073	Mamaku treefernland	Hillslope	Pampas grassland	Forest	6.1	2
Greville's Lagoon and Wetland	P08209	Open water	Dune lake	*	Wetland	2.0	1

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Greville's Lagoon and Wetland	P08209	Raupo reedland	Alluvium	Raupo reedland	Wetland	0.6	1
Harrison Wetland	P08096a	Pampas-raupo tussock-reedland	Alluvium	Pampas grassland	Wetland	14.3	2
Hoanga Alluvial Forest Fragment	P07162	Kahikatea forest	Alluvium	Kahikatea forest	Forest	5.3	1
Hoanga Road Forest	P07165	Totara forest	Hillslope	Totara forest	Forest	7.7	2
Hokianga Road Forest	P07164	Ti kouka treeland	Alluvium	Ti kouka-kahikatea forest	Forest	0.3	2
Hokianga Road Forest	P07164	Kahikatea forest	Alluvium	Ti kouka-kahikatea forest	Forest	0.6	2
Hokianga Road Railway Treeland	P07169a	Ti kouka-*Coprosma propinqua*-*C.parviflora*-pampas treeland	Alluvium	Pampas grassland	Forest	7.3	1
Hokianga Road Railway Treeland	P07169a	Ti kouka forest	Alluvium	Ti kouka-kahikatea forest	Forest	2.0	1
Kai Iwi Lakes South Shrubland	O07027	Kanuka/manuka shrubland	Hillslope	Kanuka/manuka shrubland	Shrubland	30.8	2
Kai Iwi Lakes South Shrubland	O07027	Undescribed shrubland	Undescribed	*	Shrubland	21.2	2
Kaipara Harbour, Shrubland and Rushland	P08200	Mangrove shrubland	Estuarine alluvium	Mangrove shrubland	Estuarine	497.1	1
Kaipara Harbour, Shrubland and Rushland	P08200	Oioi rushland	Estuarine alluvium	Oioi rushland	Estuarine	103.2	1
Kaipara Harbour, Shrubland and Rushland	P08200	Open water	Estuary	*	Estuarine	20000	1
Kelly's Bay/ Punahaere Creek Estuary, Shrubland and Forest	P09003	Mangrove shrubland	Estuarine alluvium	Mangrove shrubland	Estuarine	53.2	1
Kelly's Bay/ Punahaere Creek Estuary, Shrubland and Forest	P09003	Kanuka forest	Hillslope & ridge crest	Kanuka forest/ shrubland	Forest	257.8	1
Kelly's Bay/ Punahaere Creek Estuary, Shrubland and Forest	P09003	Manuka shrubland	Alluvium	Pampas grassland	Shrubland	45.2	1
Kelly's Bay/ Punahaere Creek Estuary, Shrubland and Forest	P09003	Oioi rushland	Estuarine alluvium	Oioi rushland	Estuarine	78.7	1

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Kelly's Bay/ Punahaere Creek Estuary, Shrubland and Forest	P09003	Manuka shrubland	Colluvium	Manuka shrubland	Shrubland	19.2	1
Kelly's Bay/ Punahaere Creek Estuary, Shrubland and Forest	P09003	Open water	Estuary	*	Estuarine	44.9	1
Kernot Farm Shrubland	P08081	Manuka shrubland	Alluvium	Manuka shrubland	Shrubland	0.6	2
Kernot Farm Shrubland	P08081	Undescribed shrubland	Hillslopes & alluvium	*	Wetland	99.3	2
Kidds Creamery Road Corner Forest	P08068a	Kahikatea forest	Alluvium	Kahikatea forest	Forest	2.9	1
Kidds Creamery Road Middle Forest	P08068c	Kahikatea forest	Alluvium	Kahikatea forest	Forest	0.9	1
Lake Humuhumu, Wetland and Forest	Q09054	Kanuka forest	Hillslope	Kanuka forest/ shrubland	Forest	3.0	1
Lake Humuhumu, Wetland and Forest	Q09054	Kohekohe-karaka-mahoe forest	Hillslope	Puriri forest	Forest	3.5	1
Lake Humuhumu, Wetland and Forest	Q09054	Kanuka forest/shrubland	Hillslope	Kanuka forest/ shrubland	Forest	124.7	1
Lake Humuhumu, Wetland and Forest	Q09054	Open water	Dune lake	*	Wetland	123.5	1
Lake Humuhumu, Wetland and Forest	Q09054	Raupo reedland	Alluvium	Raupo reedland	Wetland	6.0	1
Lake Humuhumu, Wetland and Forest	Q09054	*Baumea articulata*-pampas reed tussockland	Alluvium	Baumea reedland	Wetland	7.6	1
Lake Kahuparere, Wetland and Shrubland	Q09060	Raupo-kuta reedland	Alluvium	Mixed raupo reedland	Wetland	1.4	1
Lake Kahuparere, Wetland and Shrubland	Q09060	Raupo reedland	Alluvium	Raupo reedland	Wetland	6.1	1
Lake Kahuparere, Wetland and Shrubland	Q09060	Kanuka shrubland	Hillslope	Kanuka forest/ shrubland	Shrubland	40.4	1

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Lake Kahuparere, Wetland and Shrubland	Q09060	Open water	Dune lake	*	Wetland	6.6	1
Lake Kai Iwi, Wetland and Shrubland	O07024	Oioi-*B.arthrophylla-B.juncea-B.articulata-Eleocharis sphacelata* reedland	Alluvium	Oioi rushland	Wetland	5.1	1
Lake Kai Iwi, Wetland and Shrubland	O07024	Kanuka/manuka shrubland	Hillslopes	Kanuka forest/ shrubland	Shrubland	4.3	1
Lake Kai Iwi, Wetland and Shrubland	O07024	Open water	Dune lake	*	Wetland	25.7	1
Lake Kanono, Wetland and Forest	Q09058	Kanuka forest	Hillslope	Kanuka forest/ shrubland	Forest	120.2	1
Lake Kanono, Wetland and Forest	Q09058	Raupo reedland	Alluvium	Mixed raupo reedland	Wetland	4.8	1
Lake Kanono, Wetland and Forest	Q09058	Open water	Dune lake	*	Wetland	72.9	1
Lake Kapoai and Wetland	P08210	Kuta-*Eleocharis sphacelata* reedland and Open water	Dune lake	*Eleocharis* reedland	Wetland	3.6	1
Lake Parawanui and Wetland	P08212	*Eleocharis sphacelat*a-raupo-*Baumea articulata* reedland and Open water	Alluvium / Dune lake	*Baumea* reedland	Wetland	7.7	2
Lake Rehutai and Wetland	P07174a	*Eleocharis sphacelata* reedland	Alluvium	*Eleocharis* reedland	Wetland	4.6	1
Lake Rehutai and Wetland	P07174a	Open water	Dune lake	*	Wetland	0.6	1
Lake Rotokawau and Wetland	Q09057	Reedland of two types	Alluvium	*Eleocharis* reedland	Wetland	11.3	1
Lake Rotokawau and Wetland	Q09057	Open water	Dune lake	*	Wetland	24.4	1
Lake Rotootuauru, Wetland and Forest	Q09055	Raupo reedland with manuka	Alluvium	Raupo reedland	Wetland	3.3	1
Lake Rotootuauru, Wetland and Forest	Q09055	Kanuka forest	Alluvium	Kanuka forest/ shrubland	Forest	1.3	1
Lake Rotootuauru, Wetland and Forest	Q09055	Raupo reedland and *Glossostigma elatinoides* herbfield	Alluvium	Raupo reedland	Wetland	0.8	1
Lake Rotootuauru, Wetland and Forest	Q09055	Open water	Lake	*	Wetland	15.5	1
Lake Rotopouua Wetland and Forest	P09014	Raupo reedland	Alluvium	Raupo reedland	Wetland	1.5	1

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Lake Rotopouua Wetland and Forest	P09014	Manuka-*Baumea arthrophylla*-raupo-*Carex secta* shrub reed-sedgeland	Alluvium	*Baumea* sedgeland	Wetland	21.8	1
Lake Rotopouua Wetland and Forest	P09014	Open water	Dune lake	*	Wetland	4.4	1
Lake Rotopouua Wetland and Forest	P09014	Kanuka forest	Hillslopes	Kanuka forest/ shrubland	Forest	21.9	1
Lake Rototuna & Wetland	P09205	Reedland and Herbfield	Alluvium	Raupo reedland	Wetland	1.5	1
Lake Rototuna & Wetland	P09205	Open water	Dune lake	*	Wetland	7.3	1
Lake Taharoa Wetland and Shrubland	O07022	Manuka shrubland	Hillslope	Manuka shrubland	Shrubland	1.2	1
Lake Taharoa Wetland and Shrubland	O07022	Kanuka shrubland	Hillslope	Kanuka forest/ shrubland	Shrubland	5.8	1
Lake Taharoa Wetland and Shrubland	O07022	Oioi-*Baumea juncea* rush/ sedgeland	Alluvium	Spinifex sandfielld	Wetland	8.0	1
Lake Taharoa Wetland and Shrubland	O07022	Open water	Dune lake	*	Wetland	198.2	1
Lake Waikere Wetland and Shrubland	O07018	Raupo reedland	Alluvium	Raupo reedland	Wetland	0.8	1
Lake Waikere Wetland and Shrubland	O07018	Sandfield	Alluvium	Sandfield	Dunes	3.4	1
Lake Waikere Wetland and Shrubland	O07018	Open water	Dune lake	*	Wetland	28.1	1
Lake Waikere Wetland and Shrubland	O07018	Kanuka/manuka shrubland	Hillslope	Kanuka/manuka shrubland	Shrubland	18.6	1
Lake Waingata	Q09204	Herbfield	Alluvium	*	Wetland	2.0	2
Lake Waingata	Q09204	Open water	Dune lake	*	Wetland	11.3	2
Lake Wainui and Wetland	P08211	Kuta reedland and Open water	Alluvium / Dune lake	Baumea reedland	Wetland	3.1	1
Long Gully Wetland and Shrubland	P07153	Mosaic wetland	Alluvium	*Baumea* sedgeland	Wetland	22.6	1
Long Gully Wetland and Shrubland	P07153	Manuka shrubland	Hillslopes	Manuka shrubland	Shrubland	14.9	1
Lower Kaihu River Forest Fragments	P07169	Kahikatea forest	Alluvium	Kahikatea forest	Forest	5.5	1
Lower Lake Rototuna Wetland	P09002	*Baumea articulata*-pampas reed tussockland	Lake bed	Pampas grassland	Wetland	9.6	2
Lucich Wetland	P08080	*Eleocharis sphacelata* reedland	Alluvium	*Eleocharis* reedland	Wetland	0.9	2

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Lower Kai Iwi Stream Wetland, Grassland, Shrubland and Forest	O07026	Tussockland	Dunes	Spinifex sandfield	Dunes	0.8	2
Lower Kai Iwi Stream Wetland, Grassland, Shrubland and Forest	O07026	Manuka shrub wetland	Alluvium	*Baumea* sedgeland	Shrubland	0.7	2
Lower Kai Iwi Stream Wetland, Grassland, Shrubland and Forest	O07026	Manuka shrubland	Hillslope	Manuka shrubland	Shrubland	2.7	2
Lower Kai Iwi Stream Wetland, Grassland, Shrubland and Forest	O07026	Sandfield community	Foredune	Spinifex sandfield	Dunes	0.6	2
Lower Kai Iwi Stream Wetland, Grassland, Shrubland and Forest	O07026	Hangehange-oioi shrub rushland	Coastal faces	Flaxland	Shrubland	5.7	2
Lower Kai Iwi Stream Wetland, Grassland, Shrubland and Forest	O07026	Pohutukawa forest	Hillslope	Pohutukawa forest	Forest	1.3	2
Maitahi Wetland Scientific Reserve and Surrounds	P07133	Manuka-prickly hakea shrubland	Hillslopes & ridges	Manuka shrubland	Shrubland	222.4	1
Maitahi Wetland Scientific Reserve and Surrounds	P07133	Raupo reedland	Alluvium	Raupo reedland	Wetland	22.5	1
Maitahi Wetland Scientific Reserve and Surrounds	P07133	*Schoenus brevifolius* sedgeland	Alluvium	Flaxland	Wetland	40.0	1
Maitahi Wetland Scientific Reserve and Surrounds	P07133	Manuka-harakeke-tangle fern shrubland	Alluvium	Manuka shrubland	Shrubland	38.3	1
Mangakahia Forest Shrubland	P07140	Manuka-*Baumea rubiginosa-B.tenax* shrub sedgeland	Alluvium	*Baumea* reedland	Shrubland	6.6	1
Mangatara Flat Shrubland	P07177	Manuka shrubland	Alluvium	Manuka shrubland	Shrubland	3.0	2
Mapau Bush	P08094a	Kahikatea forest	Alluvium	Kahikatea forest	Forest	6.4	1
Mosquito Gully Wetland	P08099	Manuka-pampas shrub tussockland	Alluvium	Pampas grassland	Wetland	18.1	2
Newlove Airstrip Wetland	P07131	Reedland mosaic of 4 types	Alluvium	*Baumea* reedland	Wetland	6.2	1
Newsham Road North Forest	P08067a	Kahikatea forest	Alluvium	Kahikatea forest	Forest	1.4	1

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Newsham Road South Forest	P08067b	Kahikatea forest	Alluvium	Kahikatea forest	Forest	1.6	1
Newsham Road South Forest	P08067b	Puriri forest	Alluvium	Puriri forest	Forest	0.9	1
Ngakiriparauri Stream Shrubland and Wetland	O07015	Raupo reedland	Alluvium	Raupo reedland	Wetland	5.2	2
Ngakiriparauri Stream Shrubland and Wetland	O07015	Manuka shrubland	Alluvium	Manuka shrubland	Shrubland	3.3	2
Ngakiriparauri Stream Shrubland and Wetland	O07015	Kanuka/manuka shrubland	Hillslope	Kanuka/manuka shrubland	Shrubland	9.2	2
North Kai Iwi Stream Wetland and Forest	O07025	Hangehange-oioi shrub-rushland	Coastal faces	Flaxland	Shrubland	3.5	2
North Kai Iwi Stream Wetland and Forest	O07025	Undescribed wetlands	Alluvium	*	Wetland	7.8	2
North Kai Iwi Stream Wetland and Forest	O07025	Pohutukawa forest	Hillslope	Pohutukawa forest	Forest	1.1	2
North Kai Iwi Stream Wetland and Forest	O07025	Raupo reedland	Alluvium	Raupo reedland	Wetland	0.3	2
NRC Creamery Road Reserve Forest	P08068b	Kahikatea forest	Hillslope	Kahikatea forest	Forest	0.8	1
NRC Creamery Road Reserve Forest	P08068b	Puriri-kohekohe-karaka forest	Hillslope	Puriri forest	Forest	1.4	1
NRC Creamery Road Reserve Forest	P08068b	Kahikatea-ti kouka forest	Alluvium	Ti kouka-kahikatea forest	Forest	1.6	1
NRC Creamery Road Reserve Forest	P08068b	Kahikatea-kowhai-ti kouka forest	Alluvium	Ti kouka-kahikatea forest	Forest	2.1	1
NRC Opanake Road Reserve Forest	P07148	Matai forest	Hillslope	Totara forest	Forest	1.978	1
Okaro Creek/ Waikere Creek Duneland, Wetland and Shrubland	Q09051	Kanuka shrubland	Colluvium	Kanuka forest/ shrubland	Shrubland	14.0	1
Okaro Creek/ Waikere Creek Duneland, Wetland and Shrubland	Q09051	Oioi-sea rush rushland	Estuarine alluvium	Oioi rushland	Estuarine	7.9	1
Okaro Creek/ Waikere Creek Duneland, Wetland and Shrubland	Q09051	Mixed wetland	Alluvium	Baumea sedgeland	Wetland	16.7	1

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Okaro Creek/ Waikere Creek Duneland, Wetland and Shrubland	Q09051	Raupo reedland	Alluvium	Raupo reedland	Wetland	20.5	1
Okaro Creek/ Waikere Creek Duneland, Wetland and Shrubland	Q09051	Mangrove shrubland	Estuarine alluvium	Mangrove shrubland	Estuarine	88.6	1
Okaro Creek/ Waikere Creek Duneland, Wetland and Shrubland	Q09051	Spinifex sandfield	Dunes	Sandfield	Dunes	6.2	1
Okaro Creek/ Waikere Creek Duneland, Wetland and Shrubland	Q09051	Manuka shrubland	Alluvium	Manuka shrubland	Shrubland	43.6	1
Okaro Creek/ Waikere Creek Duneland, Wetland and Shrubland	Q09051	Kanuka shrubland/forest	Hillslope	Kanuka forest/ shrubland	Forest Shrubland	203.5	1
Okaro Creek/ Waikere Creek Duneland, Wetland and Shrubland	Q09051	Kanuka shrubland and forest	Sand dunes	Kanuka forest/ shrubland	Shrubland	14.3	1
Okaro Creek/ Waikere Creek Duneland, Wetland and Shrubland	Q09051	Open water	Estuary	*	Estuarine	139.7	1
Okaro Creek/ Waikere Creek Duneland, Wetland and Shrubland	Q09051	Open water	Estuary	*	Estuarine	0.4	1
Omamari Government Purpose Wildlife Management Reserve and Surrounds	P07127	Manuka shrubland	Hillslope	Manuka shrubland	Shrubland	92.1	1
Omamari Government Purpose Wildlife Management Reserve and Surrounds	P07127	Wetland mosaic of 4 types	Alluvium	*Baumea* sedgeland	Wetland	72.1	1
Omamari Government Purpose Wildlife Management Reserve and Surrounds	P07127	Undescribed wetlands	Alluvium	*	Wetland	13.4	1

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Omamari Road Grassland and Wetland	P07130	Mingimingi-pampas shrub tussockland	Rear dunes	Pampas grassland	Dunes	122.1	1
Omamari Road Grassland and Wetland	P07130	*Eleocharis sphacelata -E.acuta* reedland	Alluvium	*Eleocharis* reedland	Wetland	0.1	1
Omamari Road Grassland and Wetland	P07130	Open water	Dune lake	*	Wetland	0.02	1
Omamari Station North Shrubland and Wetland	P07125	Kanuka/manuka treeland	Hillslope	Kanuka/manuka shrubland	Forest	19.6	2
Omamari Station North Shrubland and Wetland	P07125	Raupo reedland	Alluvium	Raupo reedland	Wetland	1.4	2
Omamari Station Wetland and Shrubland	P07132	Raupo reedland	Alluvium	Raupo reedland	Wetland	11.5	2
Omamari Station Wetland and Shrubland	P07132	Kanuka/manuka shrubland	Hillslope	Kanuka/manuka shrubland	Shrubland	1.7	2
Omamari Station Wetland and Shrubland	P07132	Manuka shrubland	Colluvium	Manuka shrubland	Shrubland	2.4	2
Ongange Creek Wetland, Shrubland and Forest	Q09150	Kanuka forest	Hillslope	Kanuka forest/ shrubland	Forest	38.8	1
Ongange Creek Wetland, Shrubland and Forest	Q09150	Raupo reedland	Alluvium	Raupo reedland	Wetland	7.0	1
Ongange Creek Wetland, Shrubland and Forest	Q09150	Manuka shrubland	Alluvium	Manuka shrubland	Shrubland	50.6	1
Ongange Creek Wetland, Shrubland and Forest	Q09150	Oioi rushland	Estuarine alluvium	Oioi rushland	Wetland	3.9	1
Ongange Creek Wetland, Shrubland and Forest	Q09150	Mangrove shrubland	Estuarine alluvium	Mangrove shrubland	Estuarine	6.0	1
Ongange Creek Wetland, Shrubland and Forest	Q09150	Open water	Estuary	*	Estuarine	19.5	1
Opanake Road Davidson Forest and Shrubland	P07150	Kahikatea forest	Alluvium	Kahikatea forest	Forest	0.3	1
Opanake Road Davidson Forest and Shrubland	P07150	Rushland	Alluvium	Oioi rushland	Wetland	0.3	1

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Opanake Road Davidson Forest and Shrubland	P07150	Manuka shrubland	Hillslope	Manuka shrubland	Shrubland	0.5	1
Opanake Road Davidson Forest and Shrubland	P07150	Totara-titoki forest	Hillslope	Totara forest	Forest	3.571	1
Opanake Road Forest Fragments	P07136a	Totara-kahikatea-kanuka forest and kanuka forest	Hillslope	Totara forest	Forest	6.9	2
Opanake Road Morris Forest	P07142	Kahikatea forest	Alluvium	Kahikatea forest	Forest	6.9	1
Opanake Road Morris Forest	P07142	Kauri-taraire-tawa forest	Hillslope	Totara forest	Forest	3.4	1
Opanake Road Shrubland and Forest	P07158	Totara forest	Hillslope	Totara forest	Forest	0.9	1
Opanake Road Shrubland and Forest	P07158	Kahikatea forest	Alluvium	Kahikatea forest	Forest	0.2	1
Opanake Road Shrubland and Forest	P07158	Manuka shrubland	Hillslope	Manuka shrubland	Shrubland	4.7	1
Opanake Road Shrubland and Forest	P07158	Radiata pine treeland	Hillslope	*	Forest	3.5	1
Opanake Road Swamp Forest	P07149	Kahikatea swamp forest	Alluvium	Kahikatea forest	Forest	3.8	2
Peter Kelly's Lake and Wetland	P07138	Raupo-*Eleocharis sphacelata* reedland	Alluvium	Raupo reedland	Wetland	1.1	2
Peter Kelly's Lake and Wetland	P07138	Open water	Lake	*	Wetland	0.9	2
Phoebe's Lake and Wetland	P09011a	Raupo reedland and *Eleocharis sphacelata* reedland	Alluvium	*Eleocharis* reedland	Wetland	0.6	2
Phoebe's Lake and Wetland	P09011a	Open water	Dune lake	*	Wetland	1.2	2
Pinaki Road South Wetland and Shrubland	P08087	Manuka shrubland	Alluvium	Manuka shrubland	Shrubland	1.4	2
Pinaki Road South Wetland and Shrubland	P08087	Raupo reedland	Alluvium	*Baumea* sedgeland	Wetland	6.1	2
Pinaki Road South Wetland and Shrubland	P08087	Kanuka/manuka shrubland	Hillslope	Kanuka/manuka shrubland	Shrubland	5.9	2
Pouto Point Wildlife Reserve Sandfield, Wetland and Shrubland	Q09063	Raupo reedland	Dune slack	Raupo reedland	Wetland	0.3	1
Pouto Point Wildlife Reserve Sandfield, Wetland and Shrubland	Q09063	Kanuka shrubland	Rear dune	Kanuka forest/ shrubland	Shrubland	25.7	1

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Pouto Point Wildlife Reserve Sandfield, Wetland and Shrubland	Q09063	Kanuka shrubland	Cliff face	Kanuka forest/ shrubland	Shrubland	57.6	1
Pouto Point Wildlife Reserve Sandfield, Wetland and Shrubland	Q09063	Paspalum grassland	Foredune	Sandfield	Dunes	7.6	1
Pretty Bush	Q09061	Kanuka forest and Narrow-leaved maire forest	Rear dune	Puriri forest	Forest	62.6	1
Pretty Bush	Q09061	Kanuka forest	Hillslope	Kanuka forest/ shrubland	Forest	13.7	1
Pukemiro Wetland and Forest	P09020	Manuka-raupo shrub reedland	Alluvium	Manuka shrubland	Wetland	4.7	2
Pukemiro Wetland and Forest	P09020	Kanuka forest	Hillslope	Kanuka forest/ shrubland	Forest	34.5	2
Reed's Farm Forest	P08063	Kahikatea forest	Alluvium	Kahikatea forest	Forest	2.0	2
Rehutai Road Lake and Wetland	P07124a	Open water	Lake	*	Wetland	1.0	2
Rehutai Road Lake and Wetland	P07124a	*Baumea articulata* reedland and *Eleocharis sphacelata* reedland	Alluvium	*Baumea* reedland	Wetland	1.1	2
Rotu Stream Forest	P07141	Kahikatea-houhere-kowhai-ti kouka forest	Alluvium	Alluvium	Forest	10.1	1
Kaihu Valley West Shrubland	P07157a	Manuka shrubland	Alluvium	Manuka shrubland	Shrubland	4.7	1
Russell Wetland	P08096	Manuka-pampas shrub grassland	Peat	Pampas grassland	Shrubland	8.1	1
Scotty's Camp Road Shrubland	P07167	Manuka shrubland	Alluvium	Manuka shrubland	Shrubland	21.3	2
Scotty's Camp Road Shrubland	P07167	Manuka shrubland	Hillslope	Manuka shrubland	Shrubland	4.4	2
Shag Lake and Wetland	O07014	*Eleocharis sphacelata* reedland	Alluvium	*Eleocharis* reedland	Wetland	1.5	1
Shag Lake and Wetland	O07014	Open water	Dune lake	*	Wetland	15.8	1
Sills Road Forest Fragments	P08060	Kahikatea forest	Alluvium	Kahikatea forest	Forest	7.6	2
Swan Egg Pond and Wetland	Q09203	Raupo reedland	Alluvium	Raupo reedland	Wetland	1.4	2
Swan Egg Pond and Wetland	Q09203	Open water	Dune lake	*	Wetland	0.7	2
Tangitiki Estuary, Wetland and Shrubland	P08101	Oioi rushland	Estuarine alluvium	Oioi rushland	Estuarine	5.9	1
Tangitiki Estuary, Wetland and Shrubland	P08101	Manuka shrubland	Alluvium	Manuka shrubland	Shrubland	18.4	1

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Tangitiki Estuary, Wetland and Shrubland	P08101	Mangrove shrubland	Estuarine alluvium	Mangrove shrubland	Estuarine	88.0	1
Tangitiki Estuary, Wetland and Shrubland	P08101	Open water	Estuary	*	Estuarine	53.8	1
Tapu Bush	P09011	Sandfield	Rear dunes	Sandfield	Dunes	13.7	1
Tapu Bush	P09011	Native conifer-broadleaved forest of 3 types	Rear dunes	Puriri forest	Forest	195.9	1
Tauhara Creek Estuary, Sandfield, Wetland and Shrubland	Q09056	Sea rush rushland	Estuarine alluvium	Oioi rushland	Estuarine	9.4	1
Tauhara Creek Estuary, Sandfield, Wetland and Shrubland	Q09056	Mangrove shrubland	Estuarine alluvium	Mangrove shrubland	Estuarine	8.0	1
Tauhara Creek Estuary, Sandfield, Wetland and Shrubland	Q09056	Sandfield with spinifex grassland	Foredune	Spinifex sandfield	Dunes	1.0	1
Tauhara Creek Estuary, Sandfield, Wetland and Shrubland	Q09056	Manuka-mapau shrubland	Islet summit	Kanuka-manuka shrubland	Shrubland	0.04	1
Tauhara Creek Estuary, Sandfield, Wetland and Shrubland	Q09056	Kanuka forest	Hillslope	Kanuka forest/ shrubland	Forest	1.8	1
Tauhara Creek Estuary, Sandfield, Wetland and Shrubland	Q09056	Kanuka shrubland and treeland	Rear dune	Kanuka forest/ shrubland	Forest Shrubland	8.4	1
Tauhara Creek Estuary, Sandfield, Wetland and Shrubland	Q09056	Open water	Estuary	*	Estuarine	6.9	1
Te Kawa Stream Forest	P07121a	Totara-puriri forest	Hillslope	Totara forest	Forest	2.9	1
The Spectacles Lakes and Wetland	Q09202	Open water	Dune lake	*	Wetland	2.3	2
The Spectacles Lakes and Wetland	Q09202	Raupo-Baumea articulata reedland	Alluvium	Raupo reedland	Wetland	2.6	2
Turiwiri Forest Fragments	P07182	Kahikatea forest	Alluvium	Kahikatea forest	Forest	2.9	2

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Upper Aratapu Creek Shrubland	P08062	Undescribed shrubland	Hillslopes	*	Shrubland	43.7	2
Upper Okaro Bush	P09008	Kauri/puriri-taraire forest	Hillslope & alluvium	Puriri forest	Forest	11.8	1
Upper Okaro Bush	P09008	Kanuka forest	Hillslope	Kanuka forest/ shrubland	Forest	22.6	1
Upper Te Kawa Stream Shrubland	P07121	Kanuka/manuka shrubland	Hillslope	Kanuka forest/ shrubland	Shrubland	1.3	2
Waihaupai Stream Shrubland and Forest	O07012	Manuka shrubland	Alluvium	Manuka shrubland	Shrubland	36.1	2
Waihaupai Stream Shrubland and Forest	O07012	Mingimingi-gorse shrubland	Hillslope	Manuka shrubland	Shrubland	22.3	2
Waimamaku Estuary, Shrubland & Rushland	P08213	Sea rush rushland	Estuarine alluvium	Oioi rushland	Estuarine	8.4	1
Waimamaku Estuary, Shrubland & Rushland	P08213	Manuka shrubland	Alluvium	Manuka shrubland	Estuarine	24.5	1
Waimamaku Estuary, Shrubland & Rushland	P08213	Mangrove shrubland	Estuarine alluvium	Mangrove shrubland	Estuarine	68.7	1
Western Coast A: Aranga Beach North Coastal Communities	O07011	Undescribed shrubland	Undescribed	*	Shrubland	2.5	1
Western Coast A: Aranga Beach North Coastal Communities	O07011	Pohutukawa forest	Rear dune	Pohutukawa forest	Forest	2.1	1
Western Coast A: Aranga Beach North Coastal Communities	O07011	Knobby clubrush rushland	Rear dune	*	Dunes	6.5	1
Western Coast A: Aranga Beach North Coastal Communities	O07011	Spinifex sandfield	Foredune	Sandfield	Dunes	2.8	1
Western Coast B: Aranga Beach South Coastal Communities	O07016	Harakeke-mingimingi shrub-flaxland	Coastal hillslopes	Flaxland	Shrubland	97.4	1
Western Coast B: Aranga Beach South Coastal Communities	O07016	Manuka shrubland	Coastal hillslopes	Manuka shrubland	Shrubland	70.7	1
Western Coast B: Aranga Beach South Coastal Communities	O07016	Spinifex sandfield	Foredunes	Sandfield	Dunes	11.4	1

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Western Coast B: Aranga Beach South Coastal Communities	O07016	Pohutukawa forest	Coastal hillslopes	Pohutukawa forest	Forest	0.9	1
Western Coast C: Glinks Gully North Grassland, Flaxland and Forest	P08061	Pohutukawa-coastal toetoe forest	Rear dunes	Pohutukawa forest	Forest	1.2	1
Western Coast C: Glinks Gully North Grassland, Flaxland and Forest	P08061	Coastal toetoe-harakeke-tussock flaxland	Coastal faces	Flaxland	Dunes	566.5	1
Western Coast C: Glinks Gully North Grassland, Flaxland and Forest	P08061	Marram grassland	Rear dunes	Spinifex sandfield	Dunes	27.1	1
Western Coast C: Glinks Gully North Grassland, Flaxland and Forest	P08061	Spinifex sandfield	Foredunes	Spinifex sandfield	Dunes	139.3	1
Western Coast C: Glinks Gully North Grassland, Flaxland and Forest	P08061	Pohuehue vineland	Rear of coastal faces		Dunes	99.3	1
Western Coast D: Glinks Gully South Grassland, Wetland and Shrubland	P08072	Manuka shrubland and shrub grassland	Coastal faces	Flaxland	Shrubland	222.1	1
Western Coast D: Glinks Gully South Grassland, Wetland and Shrubland	P08072	Pohuehue vineland	Rear dunes	Flaxland	Dunes	519.2	1
Western Coast D: Glinks Gully South Grassland, Wetland and Shrubland	P08072	Sandfield	Foredunes	Sandfield	Dunes	234.0	1
Western Coast D: Glinks Gully South Grassland, Wetland and Shrubland	P08072	Raupo reedland	Dune slacks	Raupo reedland	Wetland	60.5	1

SITE NAME	SITE NO.	VEGETATION COMPOSITION AND STRUCTURE	LANDFORM	MAJOR VEGETATION TYPE	HABITAT	AREA (HA)	LEVEL
Western Coast E: Pouto Dune System	P09001	Kanuka forest	Inland hillslope	Kanuka forest/ shrubland	Forest	183.6	1
Western Coast E: Pouto Dune System	P09001	Kanuka shrub duneland including oioi rushland in dune slacks	Dune	Kanuka/manuka shrubland	Dunes	1982.4	1
Western Coast E: Pouto Dune System	P09001	Pohuehue vineland	Rear dunes	Flaxland	Dunes	47.8	1
Western Coast E: Pouto Dune System	P09001	Mixed freshwater wetland	Alluvium	Baumea sedgeland	Wetland	262.6	1
Western Coast E: Pouto Dune System	P09001	Kanuka shrubland	Rear dunes	Kanuka/manuka shrubland	Shrubland	733.9	1
Western Coast E: Pouto Dune System	P09001	Sandfield	Frontal dunes	Sandfield	Dunes	2380.8	1
Western Coast E: Pouto Dune System	P09001	Open water	Dune lakes	*	Wetland	198.6	1
Wetland East of Lake Rotopouua	Q09053	Raupo reedland	Alluvium	Raupo reedland	Wetland	9.9	1
Wetland East of Lake Rotopouua	Q09053	Manuka-*Baumea articulata* shrub reedland	Alluvium	Manuka shrubland	Wetland	9.7	1
Woodcock's Forest	P07141a	Kahikatea forest	Alluvium	Kahikatea forest	Forest	0.6	2
Woodcock's Wetland	P07157	Manuka shrubland	Alluvium	Manuka shrubland	Shrubland	1.5	2

Appendix 11

GLOSSARY OF TERMS

(after Lux & Beadel 2006)

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.

Buffer

A zone surrounding a natural area which reduces the effects of external influences on the natural area. For example, shrubland or exotic plantations surrounding an indigenous remnant provide physical protection to it by reducing changes in wind and light, reducing the chance of weed infestation and providing a corridor for the movement of wildlife into and out of it, so that it is less isolated. Vegetation is often considered a buffer to waterways – riparian vegetation and wetlands protect both water quality and habitat from influences arising on the surrounding land.

Community

An association of populations of plants and animals that 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 that have diverse but closely related characteristics; 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 interrelated 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 to New Zealand; not indigenous.

Forest

Woody vegetation in which the cover of trees and shrubs in the canopy is > 80% and in which tree cover exceeds that of shrubs. Trees are woody plants > 10 cm diameter at breast height (dbh) and shrubs are woody plants < 10 cm dbh. Tree ferns > 10 cm dbh are treated as trees (Atkinson 1985).

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 New Zealand. This includes species that occur naturally in New Zealand and other places (e.g., migratory bar-tailed godwits, which return to New Zealand from Siberia every summer). Species that only occur in New Zealand are 'endemic'.

Landform

A part of the land's surface with distinctive naturally formed physical characteristics, e.g., hillslope, gully, ridge top, etc.

Linkages/Corridors

An area of habitat that links two or more other habitat areas. Depending on the habitat type, this linkage or corridor can comprise indigenous vegetation (e.g., forest, shrubland), exotic vegetation (e.g., pine forest), aquatic habitat (e.g., a farm pond) or any other feature that assists the movement of indigenous species between habitat patches. Where a linkage exists between habitats, the opportunities for genetic exchange within a species are greater, which enhances the viability of that population. For many species, in particular mobile fauna such as birds, a corridor does not have to be continuous to be usable. Small remnants can act as stepping stones between two larger habitats.

Locally uncommon

Considered rare within the study area; in this case within Kaipara ED (Northland).

Natural area

A tract of land that 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 conservation status of a species (see Appendix 3) or habitat type in any one of the following ways: formerly common but now rare; 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 that are regarded as rare in themselves.

Reedland

Reedlands comprise 20–100% cover of reeds, which are tall erect herbs emergent from shallow water, having branched leaves or stems that are either hollow or have very spongy pith, e.g., raupo, *Baumea articulata* and kuta (Johnson & Gerbeaux 2004, adapted from Atkinson 1985).

Regionally significant

Assessed by DOC to be either rare or threatened within the Northland Region.

Representativeness

The extent to which an area represents or exemplifies the components of the natural diversity of a larger reference area (in this case, the reference area is the part of Kaipara ED that lies within Northland Conservancy). This implies consideration of the full range of natural ecosystems and landscapes that were originally found in the reference area and how well they are represented in today's environment. The reference period for 'original' land cover used for this study was the immediate pre-human era (late Holocene).

The identification and evaluation of the key representative natural areas in all Ecological Districts is the principal objective of the PNA Programme (Myers et al. 1987).

Riparian protection

Riparian vegetation performs important protective functions to streams such as shading, sediment control, primary production, and provision of habitat linkages/corridors. Without riparian protection water temperature can rise, depleting the available oxygen and leading to the death of aquatic life. Leaf litter and woody debris enter the nutrient cycle of the stream providing food for the first consumer in the food web, e.g., mayflies, caddisflies, and stonefly. Riparian vegetation acts as a filter for non-point source water discharges.

Rushland

Rushlands comprise 20–100% cover of rushes, which are Juncus spp. that have stiff, erect stems or similarly non-flattened leaves (Johnson & Gerbeaux 2004, adapted from Atkinson 1985).

Secondary vegetation

Indigenous vegetation established after destruction or disturbance of the previous vegetation and which is essentially different from the original vegetation.

Shrubland

Vegetation in which the cover of shrubs and trees in the canopy is > 50% and in which shrub cover exceeds that of trees. Trees are woody plants > 10 cm diameter at breast height (dbh) and shrubs are woody plants < 10 cm dbh. Tree ferns > 10 cm dbh are treated as trees. This definition includes both 'shrubland' and 'scrub' of Atkinson (1985).

Site

An area of habitat or habitats identified during the field survey phase of the PNAP. Some small habitats occurring in close geographical proximity, with similar characteristics and functions, have been grouped and addressed as one site, e.g., small forest remnants and farm ponds within the same catchment.

Succession

Succession is the dynamic process whereby one plant community changes into another, involving the immigration and local extinction of species, coupled with changes in the relative abundance of different plants (Crawley 1997). Change may be due to natural or human-induced factors, or both. Primary succession refers to the colonisation of a bare surface by vegetation (e.g., the greening of new volcano after it erupts out of the sea). Secondary succession refers to the process of colonisation and change after original vegetation has been destroyed, e.g., by fire, human-induced land clearance, etc.

Successional

Describes a plant community in the process of succession.

Survey no.

A sequential number given to each site (e.g., P09/001). The first letter and two figures refer to the NZMS 260 topographical map sheet that covers the site.

Treeland

Vegetation in which the cover of trees in the canopy is 20–80%, with tree cover exceeding that of any other growth form, and in which the trees form a discontinous upper canopy above either a lower canopy of predominantly non-woody vegetation or bare ground (Atkinson 1985). Treeland is mainly induced by grazing.

Vegetation type

The most detailed vegetation descriptive name, defined by the composition of dominant canopy species, in order of abundance (e.g., taraire-puriri-kahikatea) and the structure of the vegetation, e.g., forest, treeland, shrubland, reedland, etc.

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., ponds, lakes, swamps, bogs, ephemeral wetlands, saltmarshes, mangroves, etc.

Appendix 12

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