

SIGNIFICANT INDIGENOUS VEGETATION AND HABITATS OF KAIPARA DISTRICT, NORTHLAND – VOLUME 1



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R4899f – Volume 1

SIGNIFICANT INDIGENOUS VEGETATION AND HABITATS OF KAIPARA DISTRICT, NORTHLAND – VOLUME 1

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CONTENTS

1.	EXECUTIVE SUMMARY	1
2.	INTRODUCTION	2
3.	METHODS	3
3.1	Review of significance criteria	3
3.2	Collation of existing information to update site information	3
3.3	Site assessments	4
3.4	GIS assessment and site mapping	4
3.5	Oblique aerial imagery	8
4.	ECOLOGICAL CONTEXT – AN OVERVIEW	8
4.1	Overview	8
4.2	Land cover	8
4.3	Threatened land environments	9
4.4	Ecological districts of Kaipara District	10
5.	INFORMATION ON EACH ECOLOGICAL DISTRICT	11
5.1	Overview	11
5.2	Kaipara Ecological District	11
5.2.1	Overview	11
5.2.2	Vegetation	12
5.3	Otamatea Ecological District	15
5.3.1	Overview	15
5.3.2	Vegetation	16
5.4	Rodney Ecological District (Northland)	19
5.4.1	Overview	19
5.4.2	Vegetation	20
5.5	Tangihua Ecological District	22
5.5.1	Overview	22
5.5.2	Vegetation	22
5.6	Tokatoka Ecological District	25
5.6.1	Overview	25
5.6.2	Vegetation	26
5.7	Tutamoe Ecological District	27
5.7.1	Overview	27
5.7.2	Vegetation	29
5.8	Waipū Ecological District	31
5.8.1	Overview	31
5.8.2	Vegetation	32
5.9	Whāngārei Ecological District	34
5.9.1	Overview	34
5.9.2	Vegetation	35
6.	KEY FINDINGS	37
6.1	Extent and number of sites	37
6.2	Likely significant sites	49

ACKNOWLEDGMENTS	51
REFERENCES	51
APPENDIX	
1. Northland significance criteria from the RPS with associated guidelines and limited examples	55

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1. EXECUTIVE SUMMARY

Kaipara District (Northland) covers approximately 310,871 hectares, approximately 9.4% of which are legally protected. The district contains significant areas of indigenous forest, shrubland, wetlands, dune lakes and dunelands, which have significant ecological values. These habitats support a range of unique range of plants and animals, including many species classified as ‘Threatened’ and ‘At Risk’. The District also contains the Kaipara Harbour, which is the largest harbour in New Zealand and the Southern Hemisphere and provides a nationally and internationally important habitat for migratory and non-migratory bird species.

Indigenous habitats in Kaipara District has suffered extensive loss and modification, due mainly to land clearance for agricultural activities, with only about n16% of its former indigenous over remaining. While large, protected areas of indigenous forest, dunelands and saline wetlands have retained their ecological integrity and viability, cumulative loss has continued to occur on private land, resulting in a patchwork of small forest and wetland remnants that are increasingly vulnerable to the adverse effects of stock, pests, and climate change. The current regulatory framework has largely been ineffective to prevent the ongoing loss and degradation of indigenous ecosystems in Kaipara District and indeed throughout the Northland Region.

District Councils are required under Section (6c) of the Resource Management Act 1991(RMA) to identify and provide for “the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna” on land under their administration. In terms of the Regional Policy Statement for Northland 2016, the local authorities are required to identify Significant Natural Areas (SNAs) in their District Plans following the criteria set out in the RPS. The study completed by Wildland Consultants Ltd (Wildlands) has assessed the non-statutory Protected Natural Areas Project and has applied the RPS criteria in the new mapping process to give effect to the requirements of the RPS. The report also draws on natural areas identified and described in additional reports prepared by Wildland, including structure plans, wetland rankings, forestry surveys, and desktop surveys of heathlands. The review updates ecological information for these sites, maps these sites onto 2017 aerial photographs, reports any change in area of any of these sites, and identifies and maps any new, or potentially new, SNAs. Site information sheets have been provided for all existing and new sites, and include a summary of key information. This report comprises a stand-alone document containing all known information on SNAs in the Kaipara District to negate the need to search previous SNA reviews and information sources.

A total of 570 SNAs within Kaipara District, covering an area of c.58,361 hectares have been identified and described. Thirty-eight SNAs share boundaries with Whangarei District, three with Far North District, and one SNA includes areas from all three districts. Thirty-one SNAs were removed from the Kaipara District after inspection revealed that they were either too reduced or too degraded to be classified as significant. Twenty-seven of these were in the Otamatea Ecological District, three were in the Kaipara Ecological District, and one was in the Rodney Ecological District.

Following the Stage 1 assessment of all SNAs, 97 sites were shortlisted as being ‘Likely Significant’, i.e. the sites have the potential to meet one or more significance criteria but required further information. Where possible, ‘Likely’ SNAs were further

investigated using oblique aerial photography (Biospatial aerial imagery 2017) in February-March 2020. Twenty-eight sites were confirmed as significant based on the observable vegetation types. Twenty-two 'Likely' sites were combined with existing SNAs or new SNAs rather than creating unique sites. The status of 28 potential SNAs could not be confirmed using oblique aerial photography, and these sites remain to be ground-truthed. The remaining sites were removed after being deemed not to be significant.

2. INTRODUCTION

District Councils are required under Section (6c) of the Resource Management Act 1991(RMA) to identify and provide for “the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna” on land under their administration. The Kaipara District Council (KDC) is reviewing its operative District Plan. In undertaking the review, KDC and other Territorial Authorities in the region Whangarei District Council (WDC) and Far North District Council (FNDC) must give effect to the Northland Regional Policy Statement in their District Plans when identifying issues related to controlling the effects of land use and subdivision. In regards to this project, this relates specifically to the maintenance and protection of significant biodiversity. Section 31 of the RMA determines the following function of a territorial authority:

(1) Every territorial authority shall have the following functions for the purpose of giving effect to this Act in its district:

(a) the establishment, implementation, and review of objectives, policies, and methods to achieve integrated management of the effects of the use, development, or protection of land and associated natural and physical resources of the district:

(b) the control of any actual or potential effects of the use, development, or protection of land, including for the purpose of—

(iii) the maintenance of indigenous biological diversity:

(2) The methods used to carry out any functions under subsection (1) may include the control of subdivision

The Operative Kaipara District Plan in Policy 6. 6.1 determines that:

By progressively improving the level and accuracy of information on Significant Ecological Areas, so that it can be effectively used for information, education, non-regulatory and regulatory methods and monitoring.

The Council will work with other agencies and landowners to identify those areas in the District of significance which warrant monitoring, investigation and protection. The Council will also work with other agencies to monitor the status of identified areas and in particular the success of policies adopted through the District Plan.

To achieve this, the councils seek to identify and map areas of significant indigenous vegetation and significant habitats of indigenous fauna (Significant Natural Areas - SNAs) within their districts. Due to biodiversity management being a cross boundary

issue, the District Councils of the Northland Region have agreed to work collectively to address aspects of the RPS requirements. Once mapped, the councils are required to develop appropriate controls on activities within those areas to ensure their protection.

- This report provides a review of Significant Natural Areas (SNAs) in the Kaipara District that have been mapped and described in reports prepared for the Protected Natural Areas Programme (PNAP) from 1990 to 2012. (<https://www.doc.govt.nz/search-results/?query=pnap>). It also draws on natural areas identified and described in additional reports prepared by Wildland Consultants Ltd, including structure plans, wetland rankings, and desktop surveys of heathlands. The review updates ecological information for these sites, updates mapping of these sites onto 2017 aerial photographs, reporting on any reduction in area of any of these sites, and also includes identification and mapping of any new, or potentially new sites, and provision of site information sheets with summaries of key information for all existing and new sites.
- The current report is intended to comprise a stand-alone report which will contain all known information on SNAs in the Kaipara District to negate the need to search previous SNA reviews and information sources.

3. METHODS

3.1 Review of significance criteria

Significance criteria in the Northland RPS, along with relevant sections of the RPS were reviewed relating to the assessment of ecologically significant sites, primarily relevant policies within regional policy statements and district plans. Guidelines for the application of significance criteria in identifying SNAs in other parts of the country were also reviewed. Wildland Consultants subsequently prepared a report that contained significance criteria and guidelines for the application of significance criteria for the Northland Region (Wildland Consultants 2019). A table that lists the significance criteria and associated guidelines and examples is provided in Appendix 1.

3.2 Collation of existing information to update site information

Readily available literature on the indigenous biodiversity of the Kaipara District was searched for, reviewed, and used to update site information and to ensure that information required for the significance assessments was utilised. This information gathering included internet searches, review of relevant Wildland Consultants Limited reports, and review of relevant Regional and District Council publications. The information sources are cited in the 'References' section and include:

- The Northland Regional Policy Statement.
- Databases of records of herpetofauna and threatened plants (Department of Conservation Bioweb).

- Threatened Environment Classification GIS layer (LENZ Level 4).
- Queen Elizabeth II Open Space Covenant GIS layer.
- Heathlands (potential and confirmed) GIS layer and report (Wildland Consultants 2017a).
- China Forest natural areas GIS layer and report (Wildland Consultants 2017b).
- Rayonier Forest natural area GIS layer and report (Wildand Consultants 2009).
- Northland Biodiversity Rankings GIS layer.

Personal knowledge of the ecologists working on the project was also utilised for relevant sites.

3.3 Site assessments

A site assessment sheet was prepared for each site using the information available. The site sheets include information on the ecological values of the site and likely threats to the site. An example site sheet with definitions of the headings is presented below (Table 1).

At the top of each sheet, information is provided on the protection status, extent of the site, altitudinal range, and ecological district. Following this, there is a table which lists descriptions of vegetation and habitat types, and landforms present at the site. Records of nationally ‘Threatened’, ‘At Risk’, or regionally uncommon plant species or features of vegetation present at the site are presented in the “flora” section of the main table on the site sheets. There are similar sections for “fauna”, threats or pressures that the site may be subject to, and additional notes/comments. Each site sheet also includes an assessment of ecological significance.

National-level threat classifications which were used are as follows:

- Robertson *et al.* (2017), for avifauna.
- Dunn *et al.* (2018), for freshwater fish.
- de Lange *et al.* (2018), for vascular plants.
- O’Donnell *et al.* (2001), for bats.
- Hitchmough *et al.* (2015), for herpetofauna.
- Mahlfeld *et al.* (2012), for terrestrial snails and slugs (Gastropoda).

Site maps are presented with each site sheet in Volumes 2 to 5 of this report. Within each of these sections, sites are presented by site number in ascending order.

3.4 GIS assessment and site mapping

The boundaries of each sites that were digitised were remapped at a scale of 1:5,000 on ArcGIS Desktop 10.7 using the 2017 aerial photographs (with protected area boundaries imported from the Department of Conservation, Ngā Whenua Rāhui, and QEII covenant GIS layers). During the remapping, the boundaries of these sites were

adjusted to 1:5,000 scale as required, based on the higher quality photographs which in many cases enabled better definition of sites than the previous aerial photographs.

Table 1: Example site information sheet with definition of each heading.

SITE NAME

Site Number:	Number of site, as shown on GIS layer and site map in 2019.							
Protection Status:	Protected (type of protection, e.g. Department of Conservation, Ngā Whenua Rāhui kawenata, and QEII covenant) and/or unprotected.							
Area (ha):	Total extent of site in hectares.							
Altitude Range (m):	Range of altitude within the site, in metres above sea level, from the lowest to highest point.							
Ecological District:	Ecological District which the site occurs in. If a site is in multiple ecological districts, then all of the ecological districts which the site occurs in are listed.							
Property address								
VEGETATION TYPE	LANDFORM							
Vegetation types as determined from existing information or aerial photographs (Reference to sources used for vegetation types)	Landform as determined from existing information or aerial photographs							
Flora:	Key botanical features of the site. Notes on threatened or uncommon plant species which are present or have been recorded at the site. In some cases, dated records are included in this section as an indication of what has been recorded at the site previously. The text has been composed in a way which indicates whether the species are likely to remain present or not, or if this is unknown.							
Fauna:	Notes on threatened or uncommon animal species which are present or have been recorded at the site. In some cases, dated records are included in this section as an indication of what has been recorded at the site previously. The text has been composed in a way which indicates whether the species are likely to remain present or not, or if this is unknown.							
Notes/Comments:	Additional notes about the site.							
Significant:	Yes, or Possible, based on the assessment against the criteria), as justified below.							
Significance Assessment:	<table border="1"> <thead> <tr> <th>Criteria Met</th><th>Justification</th></tr> </thead> <tbody> <tr> <td>Number of criterion</td><td>An explanation of the reason/(s) why the site meets this criterion.</td></tr> <tr> <td>Number of criterion</td><td>An explanation of the reason/(s) why the site meets this criterion.</td></tr> </tbody> </table>		Criteria Met	Justification	Number of criterion	An explanation of the reason/(s) why the site meets this criterion.	Number of criterion	An explanation of the reason/(s) why the site meets this criterion.
Criteria Met	Justification							
Number of criterion	An explanation of the reason/(s) why the site meets this criterion.							
Number of criterion	An explanation of the reason/(s) why the site meets this criterion.							
Threats/Modifications/Vulnerability (desktop assessment):	Threats which have been recorded at the site or are likely to threaten the ecological values of the site.							
References:	References about the site and/or records from the site. Species threat classifications are not listed here because they are provided in the main report.							
Assessment for Significance Based On:	Sources of information used to make the significance assessment.							
Boundary Changes Since 1999:	Information on changes in the site boundaries since 1999, which have been observed based on comparison of 2017 aerial photographs.							

Paper roads and river parcels which are within Department of Conservation administered areas were included in the protected sites where they appeared to meet the significance criteria.

Areas which did not obviously meet the significance criteria (such as exotic plantation forestry, residential dwellings, and pasture) were excluded from the sites.

Unprotected areas that are contiguous with Department of Conservation administered sites or QEII covenants were included with the protected site if they appeared to have similar vegetation and habitat types. An explanation of whether the site includes protected area(s) and/or unprotected areas was included on each site sheet. A separate study on the Council covenanted areas will be undertaken by KDC to add to the list of protected areas.

Details about each site were captured in an attribute table. Fields in the attribute table are listed and defined in Table 2.

Table 2: Fields of the attribute table associated with each site.

Attribute	Definition
Date	Date of digital mapping (for future reference).
DIG_SCALE	Digitised scale, 1:5,000.
BASE_MAP	Base map. 2017 aerial photographs.
SiteName	Name (most appropriate name if site has had different names in the past).
SiteNumber	Unique identifier (Site No.). (Each site throughout the region has a unique number).
EcologicalDistrict	Ecological District which the site occurs in. If a site is in multiple ecological districts, all ecological districts the site occurs in are listed.
Area_HA	Area (hectares).
MIN- ALT	Minimum altitude of the site (metres above sea level, m asl).
MAX- ALT	Maximum altitude of the site (metres above sea level, m asl).
MEAN- ALT	Mean altitude of the site (metres above sea level, m asl).
ProtectionStatus	Protected, unprotected, or part protected.
ProtectionType	If protected, provides the type of protection. For example, Department of Conservation, Ngā Whenua Rāhui kawenata, or QEII covenant. If unprotected, NA.
FIELD_CHK_B	Field check required to confirm site boundaries. Yes or No.
FIELD_CHK_SB	Field check required to confirm significance and site boundaries. Yes or No.
Criterion_1a(i)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_1a(ii)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_1a(iii)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_1(b)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_1b(ii)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_2a(i)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_2a(ii)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_2a(iii)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_2b	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_2c(i)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_2c(ii)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_2d(i)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_2d(ii)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_2d(iii)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_2d(iv)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_3a(i)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_3a(ii)	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_3b	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_3c	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_4a	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_4b	Y (Yes) or N (No), depending on whether criterion is met.
Criterion_4c	Y (Yes) or N (No), depending on whether criterion is met.
NOTE	Other relevant information.

3.5 Oblique aerial imagery

Following the Stage 1 site assessments, further inspection of ‘Likely’ SNAs was undertaken using oblique aerial photography flown in 2017 (Biospatial oblique photography 2017). The photography captured very high resolution images of vegetation at oblique angles, which in most cases, proved useful in determining whether or not a potential SNA met any of the significance criteria. The photography did not cover the entire Kaipara District, meaning that several ‘Likely’ sites will require ground-truthing field work which is Stage 2 of the project.

4. ECOLOGICAL CONTEXT – AN OVERVIEW

4.1 Overview

Kaipara District (Northland) covers approximately 310,871 hectares, approximately 9.4% of which are legally protected (Table 3). The district contains significant areas of indigenous forest, shrubland, wetlands, dune lakes and dune lands which have very important ecological values. These habitats support a range of unique range of plants and animals, including many species classified as ‘Threatened’ and ‘At Risk’. The District also contains the Kaipara Harbour, which is the largest harbour in New Zealand and the Southern Hemisphere and provides a nationally and internationally important habitat for migratory and non-migratory bird species (KDC 2013).

Table 3: Number and size of protected areas within Kaipara District.

Protection Type	Number of Sites	Area (hectares)	Percent of District
Council Covenant		5.11*	<1
Department of Conservation	318	26,834.0	8.6
Ngā Rāhui Whenua Kawenata	0	0	0
QEII covenant	155	2,374.4	< 1
Total	473	29,208.4	9.4

* this area is likely to be an underestimate due to lack of recent Council data.

4.2 Land cover

The dominant landcover within Kaipara District is ‘Herbaceous Saline Vegetation’ comprising 62 percent land area (Table 4). ‘High Producing Grassland’ is the second most extensive landcover type (c.12.32^{Error! Bookmark not defined.} percent) followed by ‘Estuarine Open Water’ (c.12.23 percent) and ‘Mangrove’ (c.3.9^{Error! Bookmark not defined.} percent combined). Other landcover types occur in small extents such as ‘Broadleaved Indigenous Hardwoods’ (c.1.4 percent), ‘Exotic Forest’ (c.0.1 percent) and ‘Herbaceous Freshwater Vegetation’ (c.0.8^{Error! Bookmark not defined.} percent).

Table 4: Landcover types by area within the Kaipara District.

Landcover Type	Area (hectares)	Percentage of District
Broadleaved Indigenous Hardwoods	4,353.00	1.40
Built-up Area (settlement)	1061.94	0.34
Deciduous Hardwoods	648.23	0.21
Depleted Grassland	1661.24	0.53
Estuarine Open Water	38,092.34	12.23
Exotic Forest	16.29	0.01
Fernland	65.73	0.02
Flaxland	4,770.17	1.53
Forest - Harvested	560.71	0.18
Gorse and/or Broom	0.23	0.00
Gravel or Rock	2,246.90	0.72
Herbaceous Freshwater Vegetation	260.33	0.08
Herbaceous Saline Vegetation	193,011.44	61.97
High Producing Exotic Grassland	38,358.90	12.32
Indigenous Forest	1,223.21	0.39
Lake or Pond	0.98	0.00
Landslide	4,845.23	1.56
Low Producing Grassland	879.08	0.28
Mangrove	10,571.19	3.39
Manuka and/or Kanuka	443.34	0.14
Matagouri or Grey Scrub	406.18	0.13
Mixed Exotic Shrubland	285.15	0.09
Orchard, Vineyard or Other Perennial Crop	1,364.69	0.44
River	2672.06	0.86
Sand or Gravel	2912.36	0.94
Short-rotation Cropland	76.70	0.02
Surface Mine or Dump	35.65	0.01
Transport Infrastructure	226.66	0.07
Urban Parkland/Open Space	4,353.00	1.40
Total	311,050.93	

4.3 Threatened land environments

Approximately 11 percent of land is on 'Acutely Threatened' and 20 percent on 'Chronically Threatened' land environments (Cieraad *et al.* 2015; Table 5). 'Acutely Threatened' and 'Chronically Threatened' land environments are highly modified with less than 20 percent indigenous vegetation, and the vegetation that does remain is typically highly fragmented and often degraded. The remaining area of the district is on 'At Risk' (30 percent), 'Critically Underprotected' (14 percent), 'Less Reduced and Better Protected' (17 percent), and 'Under Protected' (16 percent).

Table 5: Threatened land environments within Kaipara District.

Category	Name	Criteria	Area of District (hectares)	Percent of District
1	Acutely Threatened	Less than 10 percent indigenous cover left	34,219.4	11.01
2	Chronically Threatened	10-20 percent indigenous cover left	63,467.9	20.42
3	At Risk	20-30 percent indigenous cover left	95,498.2	30.72
4	Critically Underprotected	Greater than 30 percent left and less than 10 percent protected	43,943.1	14.14
5	Underprotected	Greater than 30 percent left and 10-20 percent protected	15,600.8	5.02
6	Less Reduced and Better Protected	Greater than 30 percent left and greater than 20 percent protected	53,007.3	17.05
n/a	Unclassified	n/a	5,134.5	1.65

4.4 Ecological districts of Kaipara District

Kaipara District encompasses all or part of eight ecological districts (Table 6). The ecological district with the largest extent within the district is Kaipara, followed by Tokatoka, and then Otamatea, Tangihua and Tutamoe, which have similar extents.

Table 6: Ecological districts within Kaipara District.

Ecological District	Area of ED (hectares)	Area of ED Within Kaipara District	Percent of ED Within Kaipara District
Kaipara	197,502.0	89,926.8	46
Otamatea	83,182.0	45,972.8	55
Rodney (part Northland)	38,362.0	20,361.4	53
Tangihua	166,875.0	47,949.2	29
Tokatoka	74,610.0	60,402.0	81
Tutamoe	81,658.0	40,958.0	50
Waipū	49,725.0	4,438.4	9
Whāngārei	81,291.0	862.5	1
Total		310,871.2	

5. INFORMATION ON EACH ECOLOGICAL DISTRICT

5.1 Overview

The following information is presented for each Ecological District in Sections 4.2-4.9:

- Background information and overview
- Geology, physiography and soils
- Landform units or land systems
- Vegetation (historic and present)
- Fauna (where information is available)

5.2 Kaipara Ecological District (adapted from Smale *et al.* 2009)

5.2.1 Overview

Kaipara Ecological District (Northland) covers approximately 87,700 hectares, encompassing a long, narrow strip of mostly consolidated sand country between Maunganui Bluff and North Kaipara Head, including what is colloquially known as the 'Poutō 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. Kaipara Ecological District adjoins four other ecological districts: Tutamoe to the north, Tangihua to the northeast, Tokatoka to the east, and Otamatea to the southeast.

Significant natural features of particular note are:

- The Kaipara Harbour and its estuaries at Poutō, which 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 (*Limosa* spp.), and also constitute an important habitat for resident species such as rails (Rallidae), herons (Ardeidae), gulls (Laridae.), terns (Sterninae), shags (Phalacrocoracidae), and North Island fernbird (*Bowdleria punctata*).
- The dune lakes along the western coast, particularly in the north at Kai Iwi, west of Dargaville, and south at Poutō. They have been augmented in recent decades by farm ponds. The lake and ponds provide habitat for a range of wetland flora and fauna including grebes (Podicipedidae), waterfowl, rails, shags, and rarer species such as banded rail (*Gallirallus philippensis*) and spotless crane (*Porzana tabuensis*) (both sparse).
- The very extensive Poutō 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 present include resident waders (such as New Zealand dotterels/*Charadrius obscurus* and oystercatchers/*Haematopus* spp.), rails, herons, gulls, terns, shags, fernbird, katipo (*Latrodectus katipo*), and the moth *Notoreas* sp. "northern".

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

Of the natural areas identified by Smale *et al.* (2009) comprising some 23,652 hectares, less than one percent (324 hectares) of the total area is covered in forest, 17 percent (4,037 hectares) in forest/shrubland, four percent (901 hectares) in shrubland, three percent (687 hectares) in flaxland, four percent (857 hectares) in freshwater wetland (including small areas of open water), two percent (532 hectares) in open water, four percent (1,027 hectares) in estuarine wetland, 47 percent (11,145 hectares) in estuarine waters (Kaipara Harbour), and 16 percent (3,818 hectares) in sand communities.

5.2.2 Vegetation

Historic

Before human settlement of New Zealand 800 years before present (BP, McGlone and Wilmschurst 1999), most of Kaipara Ecological District (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 ago), about half of New Zealand was cleared by fire, mostly in the lowlands (McGlone 1983).

By the time of European settlement (1850s onward), Kaipara Ecological District was essentially deforested, the predominant vegetation being kānuka (*Kunzea robusta*)/mānuka (*Leptospermum scoparium*) shrubland and wetland. The Kaihu valley on the northeastern boundary of the ecological district supported kauri (*Agathis australis*)-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 (*Dacrycarpus dacrydioides*) forest on valley floors.

Old-growth forest is now extremely scarce in Kaipara Ecological District, with only a handful of surviving remnants (Tapu Bush, Pretty Bush, Upper Okaro Bush, and Lake Humuhumu Island) left. Kauri-broadleaved species 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 (*Beilschmiedia tarairi*) and kohekohe (*Dysoxylum spectabile*), with pūriri (*Vitex lucens*), titoki (*Alectryon excelsus*), and mangeao (*Litsea calicaris*) common. Tōtara (*Podocarpus totara*) and narrow-leaved maire (*Nestegis montana*) 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 tōwai (*Weinmannia silvicola*) would have been present in the canopy. Sheltered coastal valley sides would have supported coastal forest dominated by pōhutukawa (*Metrosideros excelsa*) (absent today from most of the west coast) and karaka (*Corynocarpus laevigatus*), along with a variety of other species now

rare (e.g. whau/*Entelea arborescens* and wharangi/*Melicope ternata*) or apparently absent (e.g. tawapou /*Planchonella costata*). Subcanopies everywhere would have been dominated by māhoe (*Melicytus ramiflorus*).

Swamp and semi-swamp forests would have been dominated by kahikatea, with pukatea (*Laurelia novae-zelandiae*) frequent to common. Kānuka forest with divaricating shrub (e.g. *Coprosma crassifolia*, korokio/*Corokia cotoneaster*) understories on drier sites and sedge (*Machaerina juncea*) ground layers on damper areas would have occupied unconsolidated sands in the west, as they still do at Poutō.

Shrub heaths dominated by scattered shrubs (mānuka, *Dracophyllum* spp.), sedges (*Machaerina* spp., *Lepidosperma* spp., *Schoenus* spp., *Tetraria* spp.), and ferns (*Gleichenia* spp.) 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 ecological district 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 (*Austroderia splendens*), harakeke (*Phormium tenax*), knobby clubrush (*Ficinia nodosa*), and *Coprosma propinqua*, as it is today, except that now-widespread adventive pampas (*Cortaderia selloana*) would have been absent.

Saline and semi-saline wetlands dominated variously by mangrove (*Avicennia marina* subsp. *australasica*) shrublands or rushlands of sea rush (*Juncus kraussii* subsp. *australiensis*), oioi (*Apodasmia similis*), and *Machaerina juncea* are probably the least modified plant community of the ecological district; they would have been much as they are today. The notable exceptions are the swathes of the highly invasive, adventive Manchurian wild rice (*Zizania latifolia*) that now 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 ecological district. High-fertility surface and groundwater-fed swamps were probably the most common type of wetland, dominated by mosaics of varying scales dominated variously by raupō (*Typha orientalis*), *Machaerina articulata*, *Eleocharis sphacelata*, *Machaerina 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 *Machaerina teretifolia*, *Schoenus brevifolius*, mānuka, tangle fern (*Gleichenia* spp.), and wire rush (*Apodasmia similis*). Adventive species like lotus (*Lotus pedunculatus*) that are now widespread amongst indigenous wetland plant species would have been absent.

Mobile sands on frontal dunes would have supported transient plant communities very similar to those dominated by spinifex (*Spinifex sericeus*) and to a limited extent, pīngao (*Ficinia spiralis*), today. More consolidated rear dunes would also have supported mixtures of grass species (e.g. coastal toetoe), grasses (e.g. sand wind grass/*Lachnagrostis billardiarei*), sedges (e.g. knobby clubrush), sub-shrubs (e.g. sand coprosma/*Coprosma acerosa*), and shrubs (e.g. tauhinu/*Ozothamnus leptophyllus*) in communities similar to those of today, with the notable exception of widespread adventive grasses like pampas and haretail (*Lagurus ovatus*) and dicotyledonous herbs like iceplant (*Carpobrotus edulis*) and catsear (*Hypochaeris radicata*), which would have been absent.

Present Day

The key features of the current vegetation pattern of the Kaipara Ecological District (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 very small amount of old-growth forest remaining.

The large tracts of old-growth forest that are so characteristic of the adjacent Tutamoe Ecological District are completely absent (as previously mentioned, old-growth forest is now restricted to a few small remnants in Kaipara Ecological District). Unlike more remote parts of Northland, where secondary succession back to predominantly indigenous 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 Ecological District (Northland).

Smale *et al.* (2009) identified 19 major vegetation types in Kaipara Ecological District (Northland). These comprise five forest types, one forest shrubland type, two shrubland types, one flaxland type, five freshwater wetland types, two estuarine wetland types, one grassland type, and two sandfield types:

- Pōhutukawa forest
- Tōtara forest
- Kahikatea forest
- Tī kōuka-kahikatea forest
- Pūriri forest
- Kānuka forest/shrubland
- Kānuka/mānuka shrubland
- Mānuka shrubland
- Harakeke flaxland
- Raupō reedland
- Raupō-*Machaerina articulata* reedland
- *Machaerina arthropphylla* sedgeland
- *Eleocharis sphacelata* reedland
- *Machaerina articulata* reedland
- Mangrove scrub/forest
- Oioi rushland
- Pampas grassland
- Spinifex sandfield
- Sandfield

5.3 Otamatea Ecological District (adapted from Lux and Beadel 2006)

5.3.1 Overview

Otamatea Ecological District (Northland) covers approximately 57,950 hectares encompassing three convoluted arms of the Kaipara Harbour, which extend far inland. These arms comprise the ‘saltwater rivers’: Arapaoa, Otamatea, and Oruawharo, which are interwoven with three major peninsulas (Hukatere, Whakapirau-Batley, and Oneriri-Puketotara) and several smaller peninsulas and headlands of varying dimensions. The most characteristic feature of Otamatea Ecological District (Northland) is the long, relatively sheltered coastline with numerous saltmarsh and mangrove areas flanked by extensive intertidal mudflats and sandflats. The Auckland Conservancy part of Otamatea Ecological District covers approximately 46,842 hectares, from the southern side of the Oruawharo River southeastwards.

Otamatea Ecological District (Northland) adjoins four other ecological districts: Rodney to the east, Waipū to the northeast, Tokatoka to the north, and Kaipara to the west.

Of the natural areas identified by Lux and Beadel (2006), 74 percent of their extent is estuarine, 23 percent is forest, 3.2 percent is shrubland, 0.05 percent is freshwater wetland and 0.01 percent is classed as ‘other vegetation’. The total area of sites recorded in the report is 16,793 hectares (including harbour and estuarine areas), or 4,445 hectares (excluding harbour and estuarine areas).

Significant natural features of particular note are:

- Extensive shallow mudflats and sandflats on the margins of the ‘saltwater rivers’ (Arapaoa, Otamatea, and Oruawharo), which are both nationally and internationally important feeding and roosting sites for migrant waders such as wrybills (*Anarhynchus frontalis*), New Zealand dotterels, banded dotterels (*Charadrius bicinctus*), eastern bar-tailed godwits (*Limosa lapponica*), lesser knots (*Calidris canutus*), variable oystercatchers (*Haematopus unicolor*), pied stilts (*Himantopus leucocephalus*) and black stilts (*Himantopus novaezelandiae*). These rich estuarine areas are used year-round by resident sea birds such as white-faced herons (*Egretta novaehollandiae*), pied shags (*Phalacrocorax varius*), black shags (*Phalacrocorax carbo*), little shags (*Phalacrocorax melanoleucos*), little black shags (*Phalacrocorax sulcirostris*), Caspian terns (*Hydroprogne caspia*), white-fronted terns (*Sterna striata*), black-backed gulls (*Larus dominicanus*) and red-billed gulls (*Chroicocephalus novaehollandiae scopulinus*), some of which have colonies on trees, cliffs or ponds near the coast.
- Extensive mangroves and saltmarshes fringe the shores of the saltwater rivers and provide habitat for bird species such as banded rail (*Gallirallus philippensis*) and northern North Island fernbird.
- The largest and best-connected indigenous forest remnants are on the Hukatere peninsula (particularly on the west coast and at Pakaurangi in the east) and on the Puketotara Peninsula.

- Hukatere Scenic Reserve (30 hectares) contains the last remaining example of mature kauri forest left in Otamatea Ecological District Northland. All other remaining areas of this forest type are secondary (less than 120 years old), except for two other tiny sites with only one or a few mature kauri trees remaining.
- Many significant (albeit small) secondary coastal forest remnants occur along the margins of the Arapaoa, Otamatea and Oruawharo Rivers. These are rich in tōtara, kānuka, kōwhai (*Sophora chathamica*), pūriri, kahikatea and kauri. Kōwhai is a common component of forest on limestone and calcareous siltstone, which is characteristic on in the inner harbour waterways. The more exposed western coasts of the Hukatere and Puketotara peninsulas, as well as some small offshore islands have significant pōhutukawa forest and other rare coastal vegetation types.
- The many small but significant secondary forest and shrubland areas in the semi-coastal zone further inland. These are rich in kānuka, tōtara, taraire, pūriri, kahikatea and kauri. The 10 largest sites are between 75 and 428 hectares.
- Constructed wetlands (both ponds and lakes) which are important due to the lack of natural freshwater wetlands in the Northland part of the ecological district. The open water habitat in these areas is crucial for indigenous water birds such as grey duck (*Anas superciliosa*), paradise shelduck (*Tadorna variegata*), grey teal (*Anas gracilis*), black shag, pied shag, little shag and Australasian shoveler (*Anas rhynchos*), while reedland around the margins is important habitat for species such as spotless crane (*Porzana tabuensis*), marsh crane (*Porzana pusilla*), Australasian bittern (*Botaurus poiciloptilus*) and banded rail. Three constructed lakes and several ponds have been described and assessed as natural areas in this report.
- Nine important geological sites in the geologically diverse Northland part of the ecological district, eight of which fall within areas of indigenous vegetation. Under pōhutukawa forest on northern coast of Puketotara Peninsula (also known as ‘the Funnel’), there are exposed cliffs with internationally significant erionite deposits.

5.3.2 Vegetation

Historic

A vegetation history specific to the inner shores of the Kaipara Harbour has never been written, and the best information available about the extent of natural vegetation and the changes wrought on it comes from pollen studies, Māori oral history, accounts of timber milling, and written observations made by early European travellers and inhabitants.

During several millennia prior to the human settlement of New Zealand, which occurred around 800 years before present (BP) (McGlone and Wilmshurst 1999), most of Otamatea Ecological District would have been clothed in a dense mantle of forest, from the ridge crests down to the shores of the Kaipara Harbour. In earlier times, however, the extent of forest had waxed and waned with the changes in the Earth’s climate. During the most recent ice age (14,000-10,000 years BP), harsher climatic conditions forced the forests into sheltered pockets and valleys, with vast areas of fern and shrubland in between (Dodson *et al.* 1988). The beginning of the Holocene (10,000

years BP) saw a return to warm, humid and equable conditions, which allowed forest to expand from these refuges onto hillsides and down to the coast. The sea level stabilised around 6,000 years BP, and the climatic conditions which we know today were similar to those that the first Polynesian explorers encountered.

Pollen and charcoal analyses from Northland show that fire and fire-tolerant heathland was abundant during the ice age, decreased during the most of the Holocene, and then dramatically increased after the arrival of humans (Dodson *et al.* 1988). During the Polynesian period (800-200 years BP), approximately 50percent of the land in all of New Zealand was cleared by fire, but most of this was concentrated in the lowlands (McGlone 1983). Since most of Otamatea Ecological District (Northland) lies below 100 metres above sea level, it is possible that large portions of the ecological district were burnt at that time. There is no specific pollen history of this area, however.

Tangata whenua of the Otamatea area are Te Uri O Hau, a hapū of Ngāti Whātua (OTS 2006). Their ancestral waka, Mahuhu-ki-te-Rangi, commanded by Rongomai, made landfall at either Poutō (McKinnon *et al.* 1997) or Taporapora (Byrne 2002), and after periods of Ngāti Apa and Kawerau (a Waitakere-based iwi) influence, Ngāti Whātua emerged as the dominant people of the Kaipara around the 18th century. Their defeat in 1825 by Ngāpuhi musketry at the battle of Ika-a-Ranginui, near Kaiwaka, precipitated swift and widespread de-population of the region. Restoration of the balance of power in the 1830s allowed Ngāti Whātua to re-occupy their lands to the point where Te Uri O Hau were largely reinstalled in Otamatea by 1845 (Byrne 2002).

Increasing European interest in the Kaipara area was reflected in the accounts of individuals such as Joel Samuel Polack, Nathaniel Turner, Ernst Dieffenbach, and Henry Kemp. Collectively they provided a picture of the Kaipara that was particularly complimentary of its fine waterways, like the Otamatea River, and the kahikatea and kauri that so heavily lined its banks, and estimated a human population size of 40-70 Europeans and 700-800 Māori (Byrne 2002).

European settlers were attracted by the wealth of kauri timber and gum in the Kaipara and its exploitation became the focus of the second half of the 1800s. The main period of timber milling was from the 1880s to 1906, although the port of Kaipara was open from 1854 to 1947, and most trade was plied on the open water, using steamer boats. Four mills were set up by private individuals in the area of Otamatea Ecological District Northland:

Before 1890, some valuable timber was lost through burn-offs, which were commonly set alight after the kauri had been removed, destroying other indigenous trees. Kauri gum-diggers picked over logged areas, and settlers continued to clear them and establish pasture and orchards. Kauri was the primary wood in the logging industry, but after 1890, mills were opened to process other woods, in particular kahikatea or ‘white pine’. Pūriri, rimu, tōtara and matai (*Prumnopitys taxifolia*) were also considered valuable. Kahikatea was used for butter and fruit boxes, as were matai, taraire and tawa (*Beilschmiedia tawa*). A mill which cut local timbers only (kauri, matai and kahikatea) was established at Maungaturoto in 1912 and worked for only four years (Ryburn 1999). This suggests that by the early part of the twentieth century, most of the forest in Otamatea Ecological District (Northland) had been decimated.

Present Day

Otamatea Ecological District (Northland) contains a wide variety of indigenous forest types, including some of the largest and best quality examples of mangrove forest in New Zealand. Indigenous shrublands cover only a small area. Freshwater wetlands are very limited in extent and most of them are constructed.

After diversity, the most obvious feature of the indigenous terrestrial vegetation in Otamatea Ecological District (Northland) is its fragmented character. Compared with Waipū Ecological District to the northeast or Rodney Ecological District to the southeast, there are no extensive tracts of indigenous forest or shrubland encompassing the full range of topography present, i.e. from the highest peaks down to the coast, over gullies, ridges, hillslopes and plains. The large-scale vegetation patterns have been reduced to disconnected segments. Indeed, almost all remaining forest is secondary, having developed since widespread logging and burning in the late 1800s. Piecemeal land clearance over the last century has greatly reduced the extent of this secondary mantle, and re-initiated succession many times in different places on the landscape. A mosaic of remnant secondary forest (the majority) with regenerating secondary shrubland and occasional surviving mature, emergent trees is what can be observed today in Otamatea Ecological District Northland.

Despite the large scale of fragmentation, distinct ecological patterns can be identified from the remaining natural areas.

Pōhutukawa forest is most common on exposed western coasts of the Hukatere and Puketotara Peninsulas, while tōtara-kōwhai and tōtara-pūriri forest are characteristic types on the sheltered shorelines of the Arapaoa, Otamatea and Oruawharo Rivers. Dense stands of kauri rickers and kahikatea spars sometimes extend right down to the shores of the saltwater rivers, but are not common on the open, western coasts. Houpara (*Pseudopanax lessonii*) and tawapou, on the other hand, are only common on west coast cliffs or steep coastal slopes where they are less threatened by herbivorous mammals. Throughout the coastal zone, kānuka forest and treeland are the main early successional vegetation types.

Taraire forest is more prevalent on hillslopes away from the coast, while most kōwhai forest occurs close to the sea. Pūriri tends to be spread throughout, but is generally more abundant near coast. On the few alluvial soils present in Otamatea Ecological District Northland, tall kahikatea and tōtara are the characteristic tree species, along with frequent tītoki.

Tōtara is overwhelmingly abundant in almost all forest remnants, except on the very western margin of Hukatere. Kahikatea is the next most common podocarp, preferring gullies and wetter soils, followed by matai and rimu, which are sparse. Miro (*Prumnopitys ferruginea*) is extremely uncommon, recorded only once in this survey. Tānekaha (*Phyllocladus trichomanoides*) graces the driest parts of the landscape. Kauri is a member of a different gymnosperm family, the Araucariaceae, and is most similar to tānekaha in its ability to compete on poor, dry soils.

It appears that most secondary vegetation successions start with kānuka and/or mānuka, although mānuka is much less common in this ecological district than kānuka. Over

time, kānuka and mānuka are succeeded by broadleaved species (for example taraire, pūriri, karaka, kōwhai, kohekohe), podocarps and kauri in different proportions according to the site (the exact composition at any place depends on many factors such as the topography of the site, soil properties, hydrology, and proximity of seed sources).

Grazing can interfere with this process by eliminating palatable and trampling-sensitive species (usually broadleaves). Most habitats within Otamatea Ecological District (Northland) are unfenced, and as a result kānuka, tōtara, and tōtara-kānuka forest with little palatable understorey are by far the most common forest types. Grazing and trampling also reduce the natural density of trees in the forest, as well as the density of the understorey, creating 'treeland'. Coastal forests often contain more palatable broadleaved species in the canopy because they are on more difficult terrain which livestock find hard to access. These areas are still open to the depredations of possums and rats. This may explain the general lack of kohekohe in coastal forest canopies (today, only one small site contains canopy kohekohe).

As stated earlier, one of the special features of Otamatea Ecological District (Northland) is its extensive mangrove forest, which covers a much larger area than terrestrial forest. Saltmarsh vegetation on the landward side of the mangroves (e.g. saltmarsh ribbonwood shrubland, sea rush rushland, oioi-sea rush rushland, and low salt meadow), covers a smaller area and is less intact due to weed infestation and occasional land reclamation.

5.4 Rodney Ecological District (Northland) (adapted from Goldwater *et al.* 2012)

5.4.1 Overview

Rodney Ecological District (Northland) lies partly in the Northland Region and partly in the Auckland Region. The northern part of the ecological district covers approximately 178,934 hectares and is located in the south-eastern corner of the Northland Region. This part of Rodney Ecological District shares key features with adjacent ecological districts. The Brynderwyn Range to the north straddles the boundary dividing Rodney Ecological District (Northland) and Waipū Ecological District. On the east coast of the ecological district, the dominant feature of Mangawhai Sandspit is part of an extensive duneland habitat that extends south towards Te Arai and Pakiri in Rodney Ecological District (in the Auckland Region). The ecological district has watersheds that feed into both the Kaipara and Mangawhai harbours.

The dunes and prominent headlands and coastal cliffs at Mangawhai Heads that define the east coast of Rodney Ecological District (Northland) are in stark contrast to the western part of ecological district, which borders Otamatea Ecological District. It is here that the calm inlets of the Kaiwaka and Wairau Rivers, dominated by the mangroves and extensive mudflats that abut pockets of indigenous forest, characterise the gentle, estuarine nature of this part of the ecological district. Key habitat types in Rodney Ecological District (Northland) include inland forests dominated by kauri, tōtara, kahikatea and kānuka/mānuka, together with dunelands and saltmarsh. Freshwater wetlands and originally rare ecosystem types such as gumland are poorly represented in the ecological district. Gumlands were once a feature of Rodney Ecological District (Northland), but they have nearly all been modified or cleared. The

majority of the remaining indigenous vegetation is situated in the north-west of the ecological district, which is contiguous with the larger tract of forest in the Brynderwyn Range, a significant forested area remaining in Northland. The central and southern parts of Rodney Ecological District (Northland) are characterised by numerous small forest remnants scattered across a sea of pastoral land. Many of these remnants typically comprise common indigenous species such as tōtara, kahikatea and kānuka/mānuka.

Te Uri o Hau, Ngātiwai and its hapū Patuharakeke all have traditional links with the area spanning from Bream Tail across to the Brynderwyn Hills (Pierce *et al.* 2010). Mangawhai was of strategic importance for both the local iwi and early European settlers. The close proximity of the Mangawhai Harbour to the Kaipara Harbour enabled portage of Māori waka from coast to coast. The rich volcanic soils of the Tara Valley provided excellent growing conditions for kumara, while the sea and the foreshore provided prolific shellfish and seafood. Early European settlement depended significantly on Mangawhai Harbour as a point of access for the first settler farmers who included the former soldiers. Albertlanders, who settled further to the west on the Kaipara, used Mangawhai as a place of entry and Nova Scotians also were among the early arrivals (Mangawhai Historical Society 2012).

5.4.2 Vegetation

Historic

In pre-human times, Rodney Ecological District (Northland) would have been dominated by old-growth podocarp-broadleaved forests reflecting a temperate climate with plentiful rain (Mitchell *et al.* 1992, McEwen 1987, Lux *et al.* 2007). These forest communities would have included tall kauri forest on the inland ridges and slopes and moderately diverse podocarp-broadleaved forest throughout. Some of the valley floors (e.g. tributaries of Tara Creek) would have supported dense taraire, tōtara and kahikatea forest (Mitchell *et al.* 1992, Lux *et al.* 2007) merging with extensive swamp forests, wetlands and saltmarshes in the lower reaches of Mangawhai Estuary. Coastal headlands and beaches at Mangawhai Heads would have featured pōhutukawa-dominant coastal forest. Some of the species which are now less common, such as tawapou, karo (*Pittosporum crassifolium*), milk tree (*Streblus heterophyllus*), coastal maire (*Nestegis apetala*), puka (*Meryta sinclairii*), and parapara (*Pisonia brunoniana*), may have been present. Harakeke, wīwī (*Juncus gregiflorus*) and kakaha (*Astelia banksii*) would have festooned the steep coastal cliffs. Holocene dunefields would have supported shrubland dominated by *Kunzea linearis* and mānuka, while extensive mobile dune systems would have been characterised by spinifex, pīngao, and shore spurge with occasional *Pimelea villosa* and *Poa billardierei*.

Significant areas of primary forest were cleared during Māori settlement in Rodney Ecological District (Northland), and by the time Europeans arrived and settled during the latter half of the 19th and early 20th centuries, much of the ecological district was covered in kānuka/mānuka shrubland (Lindsay *et al.* 2009). However, the arrival of Europeans saw the exploitation of kauri and other forest timbers from the Brynderwyn Hills (known then as “Waipū Hills”). Permanent European settlement occurred when further land was obtained from Māori and cleared for livestock farming. Some early farming families conserved pockets of bush in clearing the land (Mangawhai Historical Society 2012), and occasionally stands of indigenous forest were retained on steeper

slopes as a source of domestic timber and food (Lux *et al.* 2007). Overall, however, the forest cover was decimated. After the timber boom of the 1870s-1890s, farming and later exotic forestry activities became prevalent.

Present Day

Rodney Ecological District (Northland) has a long and effective history of human occupation and modification of the natural landscape. The natural areas of the Rodney Ecological District (Northland) are highly modified and most of the remaining indigenous vegetation is fragmented. There are, however, sizeable areas of regenerating forest in the ecological district, often dominated by kānuka, kauri, tōtara, taraire, pūriri and kahikatea. Small, scattered remnants dominated by tōtara are a feature of the ecological district. Areas of kānuka or mānuka-dominant shrubland are rare in Rodney Ecological District (Northland), and are largely restricted to Mangawhai Heads.

Freshwater wetlands and swamp forests have been significantly reduced from their original extent and as such are very under-represented in Rodney Ecological District (Northland). Many former wetlands have been modified or destroyed by vegetation clearance and drainage. Existing wetlands are small and scattered in the ecological district and consist mainly of raupō and *Machaerina* spp. reedlands. Gumland soils would have once been a feature of the ecological district, particularly around Mangawhai, although most of these have either been developed or degraded by weeds. Conversely, large areas of intact saltmarsh and estuarine intertidal flats are present in Mangawhai Harbour.

Large, intact areas of dunelands are present at Mangawhai Sandspit, supporting extensive sand dune communities characterised by pīngao, spinifex and the ‘At Risk-Declining’ indigenous grass *Poa billardiarei*. These communities continue to be threatened by human activities such as quad-biking and invasive weeds such as marram (*Ammophila arenaria*), Sydney golden wattle (*Acacia longifolia*), pampas (*Cortaderia selloana*) and lupin (*Lupinus* spp.).

Twelve main vegetation/habitat types were identified in the Rodney (Northland) Ecological District by Goldwater *et al.* (2012):

- Kauri forest
- Tōtara forest
- Kahikatea forest
- Pōhutukawa forest
- Taraire forest
- Kānuka and/or mānuka forest
- Kānuka and/or mānuka shrubland
- Harakeke flaxland
- Estuarine wetlands
- Gumland
- Rockland
- Dunelands

5.5 Tangihua Ecological District (adapted from Goldwater *et al.* 2009)

5.5.1 Overview

Tangihua Ecological District is located inland and covers c.167,024 hectares of mainly rolling and dissected, slump-prone hill country. Isolated, steep-sided volcanic hills including the Tangihua, Mangakahia, Motatau and Houto ranges rise up to 700 metres above sea level. Pre-human vegetation would have comprised broadleaved-podocarp forest with local areas of kauri on the hills, and raupō swamps, swamp shrubland, alluvial forests and other wetlands in the fertile valleys. The ranges remain mostly forested while the lower hills have a mix of indigenous and exotic forest as well as large areas of indigenous scrub. Extensive riverine freshwater wetlands and swamp forests in this ecological district include some of the best flood-plain wetland complexes remaining in the North Island. The alluvial riverine forest remnants in this ecological district are also notable. Currently c.24 percent of the Tangihua Ecological District has an indigenous vegetation cover, with c.19 percent forest, c.4.8 percent shrubland and less than one percent wetland vegetation (MfE 2004).

Tangihua Ecological District adjoins eight other ecological districts: Hokianga to the north-west, Kaikohe and Kerikeri to the north, Tutamoe to the west, Kaipara to the south-west, Tokatoka to the south, Whāngārei to the east, and Whangaruru to the north-east.

Significant ecological features of Tangihua Ecological District include:

- Several large, botanically diverse forest tracts such as Mangakahia Forest and Te Tarahiorahiri (3,643.3 hectares), Hikurangi and Tokawhero Forests (3,481 hectares), South Houto Forest and Maungaru Range (783.2 hectares), and Tangihua Forest (3,931 hectares).
- Several large, relatively unmodified wetland systems, particularly those which are part of the Motatau wetland complex (e.g. Taikirau Wetland and Shrublands and Taikirau Swamp), which is probably the largest and most significant mineralised freshwater wetland system remaining in Northland.

5.5.2 Vegetation

Historic

Little information is available on the vegetation history of Tangihua Ecological District, but based on landform and current patterns it is assumed that this ecological district would have comprised a mosaic of broadleaved-podocarp forest, with a few discrete areas of kauri forest. In the fertile valleys, extensive swampy habitats of raupō, swamp shrubland, alluvial forest and other wetlands are likely to have occurred (Conning 2001). On a regional scale, mixed lowland kauri-podocarp-broadleaved forest was the most common forest type found in Northland, comprising more than 50 percent of the original forested area (Conning 2001). It is estimated that there was originally c.200,000 hectares of kauri-dominated forest in what is now the Northland Conservancy of the Department of Conservation.

Logging of forests on the coast to the east of Tangihua Ecological District began in the 1830s, but it was not until the late 1800s that large quantities of timber were extracted from the ecological district. In the 1860s, timber mills were established in the ‘heavy bush’ of the Hikurangi area, and in 1872, Dargaville was founded by Joseph McMullen Dargaville, a timber merchant. Kauri was felled and processed using pit saws, and transported either to Whāngārei or Dargaville. The Northern Wairoa River and the Kaipara Harbour formed an important access route, linking Northland’s kauri forests and gum fields to Helensville and Auckland. In 1875, construction of a road from Hikurangi to Whāngārei facilitated the carting of the timber to the eastern coast of Northland. In the 1890s, the government sold 2,360 cubic metres of standing kauri to sawmillers alone, and during the same period acquired, subdivided and sold hundreds of blocks of land to new settlers. In Northland, many of these blocks contained areas of indigenous forest, which were mostly felled or burnt to create pasture, or felled and the timber sold to gain income for development (Haigh 1991).

Despite the proliferation of timber mills and the huge volume of timber exported, the extraction of timber was only one contributing factor in the loss of Northland’s forests. Forests were burned to clear land for pasture or to facilitate the extraction of kauri gum, and during dry summers many of these fires burned uncontrolled. *“By 1840, 58 percent of the forest land had been converted into permanent open plains, rolling downs and uplands”* (Haigh 1991). From the 1840s through to as late as the 1940s, fires swept across large areas of Northland, not only burning large tracts of forest, but also threatening homes. The bush fires of the summer of 1901-1902 destroyed hundreds of square miles of standing kauri in the Te Kopuru, Kaipara, and Dargaville areas. Drained swamps also burned, the fires burning the peat deep down into the ground, only halting when reaching the water table (Metcalf 1981).

Although the kauri industry was the economic mainstay of Northland in the late 19th century and early 20th century (Anderson & Moran 1983), kauri timber was soon to be supplanted by radiata pine. The first exotic plantings in Northland occurred in 1904, but it was not until the 1920s and 1930s that the Region, and New Zealand as a whole, experienced the first minor wave of afforestation. Several forestry companies were formed in Northland at this time, and they acquired land and funded planting either by way of bondholding or by offering shares for purchase. The following decades saw the industry grow steadily, with involvement from both the state (New Zealand Forest Service) and the private sector (from Wheeler and Moran 1985). Pine plantation currently occupies c.43,350 hectares in Tangihua Ecological District (MfE 2004), the majority of which is owned by private companies such as Carter Holt Harvey.

Present Day

As with most other parts of Northland, the current vegetation of Tangihua Ecological District is mostly secondary in origin. The largest areas of indigenous vegetation are on hill country above 100 metres above sea level, while the remaining landforms have small and highly modified examples of their former vegetation.

Of the natural areas identified by Goldwater *et al.* (2009), 80 percent (25,816 hectares) are forest or treeland, 16.3 percent (5,265 hectares) are shrubland and 3.1 percent

(994 hectares) are freshwater wetland. The total area of sites recorded in this report is 32,214 hectares (19.3percent of the ecological district).

Extensive forest tracts occur on the steeper massifs, often joined by plantation forests, resulting in a vast mosaic of production and protection forestry (Conning 2001). Kauri, rimu, kahikatea, tānekaha, tōtara, miro, and northern rātā characteristically occur as infrequent emergent trees. Kānuka, mānuka, kauri, rimu, tānekaha, rewarewa, and tōtara associations are prevalent on ridges within these ranges, while upper slopes support forest dominated by tōtara, kānuka, karaka, kohekohe, pūriri, and/or tānekaha. Tawari (*Ixerba brexioides*), tāwheowheo (*Quintinia serrata*), mangeao and *Dracophyllum* species occur at the highest altitudes where sub-montane conditions exist. Tawa is a feature of high-altitude forest in Mangakahia Forest, which is unusual in Northland. Lower hillslopes and gullies are characterised by broadleaved forest containing taraire, pūriri, tōtara, tawa, kohekohe, pukatea, and kahikatea. Kohekohe, māmāngi (*Coprosma repens*), pigeonwood (*Hedycarya arborea*), māhoe, nikau (*Rhopalostylis sapida*), and ponga (*Cyathea dealbata*) are generally the prominent understorey species. Shrubland is relatively common in Tangihua Ecological District, where it is dominated by mānuka and/or kānuka. At cooler higher altitudes, from about 550-600 metres above sea level (e.g. Hikurangi Forest, Tokawhero Forest, and Mangakahia Forest), kauri is either sparse or absent (Conning 2001).

Riverine flood and alluvial vegetation are limited to numerous small, scattered forest remnants and shrubland along riparian and wetland margins, and occasionally on floodplains away from main river channels. Although it would have been relatively common in low lying swampy plains and valleys throughout Tangihua Ecological District, it is now one of the rarest, most fragmented and under-represented forest types occurring in Northland (Conning 2001). Kahikatea is the dominant species in this habitat type, occurring with associations of taraire, tōtara, kānuka, mānuka, tī kōuka (*Cordyline Australis*) and harakeke.

Shrubland comprises a smaller component of vegetation cover in Tangihua Ecological District and throughout Northland (less than 10 percent). The vast majority of this comprises mānuka-kānuka in successional stages and as corridors, buffers, and ecotones to mature forest and wetlands. Mingimingi, hangehange (*Geniostoma ligustrifolium*), māpou, *Coprosma rhamnoides* and horoeke/lancewood (*Pseudopanax crassifolius*) are commonly found in shrubland habitats (Conning 2001).

Gumlands are seasonally waterlogged, infertile and acidic habitats which are characterised by 'heathland' species such as mānuka, sedges, *Gleichenia* species and *Dracophyllum lessonianum*. This habitat type is unique to Northland, Auckland and Coromandel and is one of the rarest habitat types in Northland. The Department of Conservation has estimated that less than one percent of its original extent remains today. Gumland is known from three sites in Tangihua Ecological District, although it is likely to more common than the records indicate.

Tangihua Ecological District contains c.994 hectares of freshwater wetlands, which in the Northland Region is second only in extent to Aupouri Ecological District with c.2,734 hectares (MfE 2004). While many of the wetlands are small and degraded, there are at least four sites (greater than 100 hectares) which are excellent examples of relatively intact inland freshwater swamps that provide significant habitat for

indigenous fauna and flora. Raupō reedland is the most common wetland vegetation type.

5.6 Tokatoka Ecological District (adapted from Holland 2011)

5.6.1 Overview

The Tokatoka Ecological District covers approximately 74,610 hectares and is located just east of Dargaville, in Northland. The Wairoa River and the Tangihua Range form the northern boundary with the Tangihua and Whāngārei Ecological Districts. The Waipū Ecological District borders to the east, with the boundary running from the eastern end of the Tangihua Range to the western boundary of Mareretu Forest and Waipū Gorge. The Otamatea Ecological District lies directly south, where the boundary runs from Waipū Gorge west through Paparoa and skirts the northern side of the Ruawai flats to Tokatoka. Kaipara Ecological District borders the western side of Tokatoka Ecological District.

Natural areas identified by Holland (2011) comprise approximately 7.4 percent (5,514.9 hectares) of the District. Of these, 69.7 percent (3,840.7 hectares) is forest, 15.45 percent (852.5 hectares) shrubland, and 14.93 percent wetland (822.4 hectares), which includes riverine flood forest which is seasonally wet and river edge marsh mostly associated with the Manganui River Complex, and also includes gumland.

A distinctive feature of the Tokatoka Ecological District is the nationally significant geological and landform formations of Tokatoka peak and Maungaraho dike, prominent in the northern Wairoa landscape.

Much of the Tokatoka Ecological District has been modified, leaving many small and fragmented areas. However, highly important ecological values remain; in particular, the Manganui River Complex, the ecological district's most significant ecological feature. It is the only large river system remaining in Northland that retains substantial areas of original floodplain still functioning as a natural wetland. It contains the best example of riverine flood forest in Northland and is also recognised as perhaps the best example of its type in the North Island (Champion and Townsend 2008) and as one of the best in New Zealand.

High ecological values are also attributed to several remnants of nationally rare floodplain forest, old-growth forest and lowland forest. Maungaraho Rock Scenic Reserve supports four nationally threatened plant species, two of which are classified as Nationally Critical (*Veronica saxicola* and *Daucus glochidiatus*), and two as Nationally Endangered (*Picris burbridgeae* and *Senecio scaberulus*). *Veronica saxicola* has not been recorded anywhere else in the world.

It is not known whether North Island brown kiwi (*Apteryx mantelli*) still occur within the Tokatoka Ecological District. The latest records are around 18 years old, being largely derived from a DOC 1992-93 Northland kiwi survey. Sites such as Smoky Hill Scenic Reserve and Surrounds and Parahi Scenic Reserve and Surrounds could possibly still support kiwi; however, survey is required to determine their current status. If kiwi is present, these sites would contain Northland's southernmost kiwi population.

5.6.2 Vegetation

Historic

The clearance of formerly extensive kauri forests, along with intensive agricultural and other land development, has profoundly changed the character and ecology of the Tokatoka Ecological District.

The Kauri Bushmans Memorial Reserve (Q08/091) offers a small glimpse of what the kauri forest that once dominated this area was like.

Accounts of the ecological district by the first European settlers are dominated by references to the magnificent kauri forests and the associated kauri industry. One account refers to the impressive kauri forests that were to be seen around the headquarters of the Manganui, Tauraroa and Waiotira rivers. Other areas heavily forested in kauri were Waikiekie, Rehia, Parahi and Tokatoka (Stephens and Stephens, n.d.).

The harakeke (flax) industry was also an important industry for the early European settlers. One harakeke mill operated at the headwaters of the Okahu Stream, where harakeke was collected from kahikatea swamps (Bradley 1972).

There is little information available on vegetative cover before the influence of Europeans and probably even less on the pre-Māori landscape. Today, the remnants that remain provide only glimpses of the vegetation and habitats that existed in the area prior to human occupation. Almost, certainly, many other vegetative types and their associated range of plants and animals would have existed within the ecological district.

Present Day

The Tokatoka Ecological District is characterised by a mosaic of mostly small forested remnants, reflecting the high degree of landscape modification that has occurred throughout the ecological district. Because of the quick reconnaissance nature of Holland's (2011) survey, it is very likely that vegetation types exist within the Tokatoka Ecological District that are not presented in the report.

The largest areas of natural habitats remaining are contained within the Manganui River Complex at P07/086 (875.6 hectares). This site has a complete sequence of vegetation zones from wetland to riverine flood forest to hillslope forest.

Kahikatea, kōwhai, and mānatu riverine flood forest are distinctive vegetation types within the Manganui River Complex and are the best examples of their type in Northland.

A range of divaricating species occur in association with each other, including round-leaved coprosma, *Coprosma rigida*, *C. propinqua*, *Hoheria angustifolia*, *Melicope simplex*, *Melicytus micranthus*, kaikomako (*Pennantia corymbosa*), mānatu (*Plagianthus regius*), and small-leaved milktree (*Streblus heterophyllus*).

Outside of the Manganui River Complex, the largest natural areas are Pukekohe Hill Scenic Reserve and Surrounds (209.1 hectares), Smoky Hill Scenic Reserve and Surrounds (153.8 hectares), Parahi Scenic Reserve and Surrounds (148.2 hectares) and Hoanga Road Shrubland and Forest (291.5 hectares). The first two sites contain old-growth forest while the last site is predominantly shrubland. Large areas of kānuka/mānuka shrubland are an increasingly diminishing habitat type within Northland and provide important habitat for threatened species such as North Island brown kiwi, orchids and lizard species such as Northland green gecko (*Naultinus grayii*).

Taraire-dominant forest is the most common forest type throughout the Tokatoka Ecological District. Even though many of the sites containing this forest are small, they provide important ‘stepping stone’ habitat, or corridors or patches of suitable habitat, for bird species such as kūkupa/kererū (*Hemiphaga novaeseelandiae*), as they provide berries over the winter months.

Regenerating tōtara forest is the second most common forest type and occurs at approximately half of the sites, mostly on hillslopes. Secondary tōtara forest, forming riparian ribbons, feature in several of these sites.

There are a few small lowland podocarp forest remnants dominated by rimu. This is an uncommon habitat type in the Tokatoka Ecological District and in Northland generally.

Kauri forest occurs in just under a quarter of the natural areas throughout the ecological district, mostly on hillslopes and ridges. A few sites contain large mature kauri.

In the northern Wairoa area and around the northern boundary of the Ruawai flats, some distinctive vegetation types occur. Dominant or co-dominant nīkau and pūriri forest are a feature; however, these sites are very small, modified and fragmented and they will need to be protected and managed if they are to survive into the future.

Apart from the alluvial floodplains of the Manganui River, freshwater wetlands are extremely rare within the Tokatoka Ecological District. It is very likely that there are more wetland types present within the Manganui River Complex that were not identified because of the reconnaissance nature of this survey.

5.7 Tutamoe Ecological District (adapted from Miller and Holland 2008)

5.7.1 Overview

The Tutamoe Ecological District comprises approximately 82,035.56 hectares of western Northland from South Head of Hokianga Harbour to south of Maunganui Bluff. The western boundary is along the west coast (Tasman Ocean), the southern boundary follows the eastern side of Kai Iwi Lakes and across to Kaihu Forest and the southern Hokianga Harbour entrance forms the northern boundary. The Marlborough and Mataraua Forests form the eastern boundary on the Waima Range.

The Hokianga Ecological District adjoins Tutamoe Ecological District along the north and north-eastern boundary, while the Tangihua Ecological District is located to the east and south-east, and the Kaipara Ecological District abuts the southern boundary.

The ecological district includes the largest contiguous tract of indigenous forest in Northland, including large areas of unmodified forest, featuring the largest mature kauri trees in the world and many threatened plants and animals. This forest tract contains the highest point in Northland (Te Raupua in the Waima Range at 781 metres above sea level) with an altitudinal sequence running unbroken from the swamp forest tablelands of the Mataraua Forest down to coastal dune complexes south of Waimamaku. Waima Forest contains plant species which are found nowhere else. *Olearia crebra* was discovered for the first time in 1982 followed by *Coprosma waima* in 1986, and turoa onamata (*Ackama nubicola*) in 2000. These plants are generally restricted to the cold, south-facing, windblasted cliffs of the Waima Range (over 500 metres above sea level) and due to their restricted distribution and threat from browsing animals are classified as being ‘Threatened’ by de Lange *et al.* (2018).

Waipoua Forest supports the largest population in the country of the ‘At Risk’ North Island brown kiwi, possibly between 1,000-2,000 birds, while the Waipoua/Mataraua plateau contains the most viable population of North Island kōkako (‘At Risk-Recovering’) in Northland.

The largely vegetated catchment of the Waipoua River is reflected in its high-water quality, and because of this is considered to be the least modified of all the large river systems in Northland. It contains a rich diversity and density of macroinvertebrate life (Seitzer 1996). Short-jawed kokopu (*Galaxias postvectis*), classified as ‘Threatened’ by Dunn *et al.* (2018), occur within the river.

Just to the south of this largest forest tract in Northland, a further 11,000 hectares within the Marlborough and Kaihu Forests adds significantly to the protected natural areas of the Tutamoe Ecological District as well as providing sizeable habitat for a wide diversity of species and vegetation types. The Tutamoe plateau environs contain the closest equivalent to submontane forest in Northland.

The Tutamoe Ecological District contains approximately 32 kilometres of unbroken coastline, which includes the outstandingly diverse coastal forest, shrubland and associations of Maunganui Bluff. Many threatened plant and animal species are found at Maunganui Bluff including a large population of titirangi/napuka (*Veronica speciosa*). This plant now only occurs on the west coast of the North Island at South Hokianga Heads and Maunganui Bluff in Tutamoe Ecological District and on the cliffs west of Aotea Harbour, Mokau and at Titirangi Bay in the Marlborough Sounds (de Lange 2006).

Trounson Kauri Park Scenic Reserve has been managed as a ‘mainland island’ since 1996. It is the only one of New Zealand’s six official mainland islands that represents old growth kauri. Many North Island brown kiwi have been tracked from Trounson moving into Waipoua and Marlborough Forests thus acting as a regenerative source for kiwi.

Of the natural areas identified by Miller and Holland (2008), 90.4 percent (42,669.8 hectares) are forest, 8.7 percent (4,116.3 hectares) shrubland (including coastal associations on bluffs and beaches), 0.4 percent (186.5 hectares) duneland/sandfield and 0.41 percent (196 hectares) freshwater wetland. Estuarine habitats do not occur in the Tutamoe Ecological District.

5.7.2 Vegetation

Historic

Large areas of unmodified indigenous forest remain in the Tutamoe Ecological District. In particular, there are some magnificent examples of unmodified kauri forest and associated forest types found within the Waipoua, Mataraua and Waima Forest tract.

The largest kauri that survives today is Tane Mahuta (Lord of the Forest) at a circumference of 13.77 metres and a trunk height of 51.5 metres (Halkett and Sale 1986).

Māori and in particular European settlement resulted in significant modification to the ecological district through agriculture, kauri extraction and the gum industry.

These excerpts from Eadie, Burns and Leathwick (1987) describe landscape effects of Māori and European occupation in the Waipoua area;

Much of the coastal and inland areas that are in scrub today had their forest cover first burnt in pre-European times. Other areas cleared and inhabited can be recognised by the presence today of large kānuka and coppices of karaka (used for food).

Historical evidence indicates regular, extensive burning of the current scrub prior to European occupation. Much of the lower Waipoua River Valley and coastal area was a well-developed grassland at the time of the first gumdigger. The gumdiggers themselves lit numerous small fires to clear vegetation and hence make digging easier.

Eadie, Burns and Leathwick (1987) suggest that kauri, kānuka, miro and Hall's tōtara forest may be very similar to the original coastal forest type in the Waipoua area.

The Waipoua Forest was originally purchased from Māori in 1876. World War II initiated the beginning of intensive logging within the forest and this continued until 1948. It is likely that the forest was 'saved' prior to World War II because of difficulties in accessing and removing timber. It was not until 1952 that the forest was finally protected (Eadie, Burns and Leathwick 1987).

Maunganui Bluff became a reserve in 1911.

It is likely that the original vegetation on the more sheltered parts was similar in nature to that of Waipoua Forest, i.e. kauri (dense in places and sparse at others) with podocarps and northern rata reaching far above a canopy of tawa and taraire where the kauris are few. It is evident that all useable timber was removed, probably early this century.

Since then there have been many fires. Cattle have grazed and browsed all the accessible parts for a very long time, probably continuously since the land was reserved (Esler and Dobbins 1977).

Present Day

The Tutamoe Ecological District is notable for the fact that over 50 percent (57.4 percent) of the ecological district comprises natural areas including areas of old growth, unmodified forest.

The Waipoua/Mataraua/Waima Forest tract represents 38.9 percent of the land area of the ecological district or 67.7 percent cover of the natural areas identified by (Miller and Holland 2008).

The uniqueness of Tutamoe Ecological District is reflected particularly in its vegetative associations e.g. high-altitude swamp forest on the Tutamoe Plateau defined by kiekie, supplejack and tōwai with maire tawake and emergent rimu. In Waipoua Forest Sanctuary and the expanded protected areas, the intricate relationship between soil processes, altitude and forest type, are well described by Eadie, Burns and Leathwick (1987). They recognise 13 different forest types, which include two lowland coastal types described as māmāngi-māpou-kānuka and taraire/kohekohe-karaka-nīkau forest. On well-drained, lowland areas kauri/māmāngi-kānuka-tōwai and taraire-tōwai/kohekohe forest is prevalent and grades into extensive areas of taraire/kohekohe and kauri/taraire forest at mid-altitude. Also, at middle altitudes are variants of tōwai-kānuka-miro-Hall's tōtara forest with different frequencies of taraire and kauri. At high altitude, tōwai-tawa forest is found with varying proportions of rimu, miro, northern rata and maire tawake. Seven shrubland types with different mixtures of *Gleichenia-Machaerina*-mānuka-*Dracophyllum*-tōwai and rewarewa (*Knightia excelsa*) (depending on soil type and topography) were also identified.

Coastal and dune vegetation within Tutamoe Ecological District is much reduced from its former extent. A large amount of the tertiary back dunes has been developed for farmland or plantation forestry and primary coastal forest is restricted to the Maunganui Bluff and the lower Wairau River-Ohae Stream area, although much of the latter have been subject to historic modification.

Shrubland on coastal hillslopes and cliffs is perhaps best represented at Maunganui Bluff where an intricate mix of coastal associations occupies the coastal cliffs to an altitude of over 300 metres above sea level. Dominant species include harakeke, toetoe, indigenous iceplant, kōwharawhara, *Isolepis* spp., *Juncus* spp., māpou, taupata, kiekie, hangehange, *Rhabdothamus solandri*, *Veronica* spp., mānuka, mingimingi, māhoe, and pōhutukawa.

Similar associations are to be found around Hokianga South Head, but these have been subjected to much more intense modification and are restricted to small remnants.

Associations on dune complexes within Tutamoe Ecological District include various mixtures of primary sand-binding and woody stabilising plants. A good example of the diversity of plant associations can be found around the Muriwai Lagoon, south of the Waipoua River-mouth. Here, small wetlands have formed in the "slacks" between the

back dunes, some within adjacent farmed land. *Machaerina articulata*, harakeke, raupō, kiokio, and mānuka rapidly lose dominance to toetoe, knobby clubrush, *Ozothamnus*, and pōhuehue moving towards the coast. Small pockets of pōhutukawa remain in places between back dunes, the understorey and groundcover consisting of kōwharawhara, NZ spinach, *Coprosma macrocarpa*, *C. rhamnoides*, ngaio, and hangehange.

Closer to the foredunes, oioi, *Coprosma acerosa*, *Pimelea prostrata* and *Leucopogon fraseri* make an appearance before giving away to the true sand-binders of the foredune such as spinifex, pīngao and shore bindweed (*Calystegia soldanellais*).

Freshwater wetlands are few, but the best examples being amongst the consolidated dune sands south of the Waipoua River. Where deep dune lakes have formed, vegetation is largely restricted to a peripheral reed zone usually comprising raupō, *Machaerina articulata* or *Eleocharis sphacelata*. Where the adjoining land is not grazed, rush-like sedge associates melt into mānuka, whekī (*Dicksonia squarrosa*) and tī kōuka dominant associations. Harakeke and bracken (*Pteridium spp.*) also dominate in the more fertile drier sites.

5.8 Waipū Ecological District (adapted from Lux *et al.* 2007)

5.8.1 Overview

Waipū Ecological District (c. 49,413 hectares) is centred on the catchments flowing into Bream Bay, and extends from moderately dissected ranges up to 400 metres above sea level in the west, through low rolling hill country, down to alluvial plains and coastal dunelands in the east. A 23.5-kilometre-long sandy beach extends most of the length of Bream Bay from Marsden Point in the north, down to Waipū Cove in the south. The northern boundary of the ecological district is formed by the southern coastline of Whāngārei Harbour, and the southern boundary is delineated by the Brynderwyn Hills, which extend out to a rocky coastal headland named Bream Tail.

Waipū Ecological District adjoins five other ecological districts: Whangaruru and Whāngārei to the north, Tokatoka to the west, Otamatea to the south-west and Rodney to the south.

Of the natural areas identified by Lux *et al.* (2007), 90.4 percent (12,699 hectares) are forest or treeland, five percent (708 hectares) are shrubland, 0.8 percent (116 hectares) are freshwater wetland, 1.8 percent (257 hectares) are estuarine, 1.7 percent (239 hectares) are duneland, and 0.2 percent (26 hectares) are rockland. The total area of sites recorded in this report is 14,045 hectares (28.4 percent of the ecological district).

Significant features of Waipū Ecological District include:

- Several large, diverse, lowland forest tracts are present on moderately-dissected east-west trending hill country, which is the major landform in the ecological district. These include areas such as Waipū Caves Forest (371 hectares), Takahiwai Forest (637 hectares), North River Forest (973 hectares), Ruakaka

Forest (1,699 hectares), Mareretu Forest (2,820 hectares) and the Brynderwyn Hills Forest Complex (3,308 hectares).

- Bream Tail is the only prominent coastal headland in Waipū Ecological District, with diverse coastal forest, treeland, and shrubland remnants, two small wetlands, and extensive rocky cliffs and outcrops interspersed with small sandy beaches. The vegetation of this site has close affinities with that of Taranga (Chicken) Island, which lies approximately 13.5 kilometres offshore to the north-east. Grey-faced petrels (*Pterodroma gouldi*) probably nest here (Andrea Booth pers. comm.).
- Waipū Ecological District is the northern limit of distribution for Hochstetter's frog (*Leiopelma hochstetteri*), and populations in streams in the Brynderwyn Hills are the northern stronghold for the species. Waipū Ecological District is the only part of Northland where this species occurs.
- Holocene dunelands and beaches behind Bream Bay are extensive, although highly modified. They support small areas of *Kunzea linearis* forest, which is a species of kānuka specific to coastal sandy soils in the northern North Island.
- The Ruakaka and Waipū River estuaries are important breeding sites for variable oystercatchers and northern New Zealand dotterels (*Charadrius obscurus*), as well as feeding grounds for low to moderate numbers of national and international migrant wader species. Waipū River Estuary is the only breeding site for the acutely threatened New Zealand fairy tern in Waipū Ecological District, and one of only four breeding sites for the species nationwide. A shorebird protection programme is in place at both estuaries, but is more intense at the higher value Waipū River Estuary site.

5.8.2 Vegetation

Historic

A vegetation history specific to Waipū Ecological District has never been written, and the best information available about the extent of natural vegetation and the changes wrought on it comes from pollen studies, and the accounts of early European settlers.

During several millennia prior to the human settlement of New Zealand, which occurred around 800 years before present (BP) (McGlone and Wilmshurst 1999), most of Waipū Ecological District would have been clothed in a dense mantle of forest, from the ridge crests down to the dunelands along Bream Bay. In earlier times, however, the extent of forest had waxed and waned with the changes in the Earth's climate. During the most recent ice age (14,000-10,000 years BP) harsher climatic conditions forced the forests into sheltered pockets and valleys, with vast areas of fern and shrubland in between (Dodson *et al.* 1988). The beginning of the Holocene (10,000 years BP) saw a return to warm, humid and equable conditions, which allowed forest to expand from these refuges onto hillslopes and down to the coast. The sea level stabilised around 6,000 years BP, and the climatic conditions which we know today were similar to those that the first Polynesian explorers encountered.

Pollen and charcoal analyses from Northland show that the fire and fire-tolerant heathland which was abundant during the last ice age, decreased during most of the Holocene, and then dramatically increased after the arrival of humans (Dodson *et al.* 1988). During the Polynesian period (800-200 years BP), approximately 50 percent of the forest in New Zealand was cleared by fire, but most of this was concentrated in the lowlands (McGlone 1983). Most of Waipū Ecological District lies below 100 metres above sea level, and it is likely that large portions of the ecological district were burnt at that time.

A pre-human vista of Waipū Ecological District may have looked something like this: tall, densely wooded kauri-podocarp-broadleaved species forest on the inland hill country grading into alluvial terraces covered in dense tōtara, taraire and kahikatea forests with patches of kōwhai nearest the river margins; steep coastal hills clothed in large sprawling pōhutukawa in mixtures with pūriri, kohekohe, karaka, nikau (*Rhopalostylis sapida*), taraire, tawapou, coastal maire, large-leaved milktree (*Streblus banksii*) and kōwhai; steep coastal cliffs with scattered pōhutukawa, shrubs and tussocks such as harakeke and *Chionochloa bromoides*; Holocene dunefields supporting mosaics of *Kunzea linearis* forest and flammable indigenous shrublands dominated by mānuka; older (Pleistocene) consolidated dune ridges covered in pōhutukawa forest overhanging estuaries with open mudflats and small areas of mangrove and saltmarsh; mobile dunes supporting extensive spinifex, pīngao, and shore spurge with occasional sand pimelea (*Pimelea villosa*) and *Austrofestuca littoralis*; riverine raupō reedlands, marshes, and pools alongside meanders; and series of palustrine dune wetlands in interdune hollows and occasional deeper dune lakes.

Although major clearance for agriculture was already finished by the early 1900s, further piecemeal clearance and drainage of wetlands continued into the twentieth century. Conversely, some areas on hill country, such as around Brynderwyn Hills Forest Complex and in the Caves Road Forest, were abandoned in the mid-twentieth century, and are now covered in c.50-year-old kānuka forest.

Present Day

Currently the vegetation of Waipū Ecological District is almost entirely secondary in origin. The largest areas of indigenous vegetation are on hill country above 100 metres above sea level, while the remaining landforms have small and highly modified examples of their former vegetation.

Large tracts of secondary indigenous forest and treeland are present on the major east-west trending hills. Kānuka, kauri, rimu, tānekaha, rewarewa, and tōtara associations are common on ridges within these ranges, whilst upper hillslopes support forest dominated by tōtara, kānuka, and/or mamaku, and lower hillslopes and gullies have broadleaved species forest dominated by species such as taraire, tōwai, pūriri, nīkau, and tawa, often containing kahikatea. There are relatively few shrublands. On the Bream Tail coastal headland there are several coastal forest types which are not represented anywhere else in Waipū Ecological District. However, many of these sites are degraded due to fragmentation, grazing, and the presence of mammalian pests.

Vegetation on alluvial flats is limited to a few, scattered forest and treeland remnants along riparian margins, and occasional tiny stands of kahikatea and tōtara on floodplains away from main river channels.

Freshwater wetlands have been greatly reduced from their former extent, and several constructed ponds and dams now supplement this habitat for aquatic species. There are very few areas of natural or semi-natural wetland remaining; only five small examples within the coastal zone (including one dune lake), and nine small examples further inland. Raupō reedland is the most common wetland type.

The coastal dunelands are dominated by gorse (*Ulex europaeus*)-pampas scrub on backdunes and mixtures of indigenous and exotic grasses and herbs on the foredunes. There are also small islands of *Kunzea linearis* forest and exotic forest and treeland.

Estuaries support mosaics of saltmarsh vegetation at their margins, with the main types being mangrove shrubland and forest (although very little of the latter), and rushlands composed of oioi and sea rush. These estuaries are sandier than comparable sites further north in Eastern Northland Ecological Region, hence glasswort herbfield and sandflats are more extensive.

5.9 Whāngārei Ecological District (adapted from Manning 2001)

5.9.1 Overview

The Whāngārei Ecological District covers approximately 81,800 hectares (including Whāngārei Harbour 12,130 hectares). Whāngārei Harbour borders four ecological districts (Whāngārei, Whangaruru, Manaia and Waipū). Most of the harbour is included within the Whāngārei Ecological District, apart from the islands and coastal margin adjacent to Manaia and Whangaruru Ecological Districts.

The Whāngārei Ecological District is located west of Whāngārei city and extends from Akerama southwards to Mata, encompassing Whāngārei Harbour and as far inland as the Wairoa and Mangakahia Rivers. It adjoins the Whangaruru Ecological District to the north and east, Tangihua Ecological District to the west, and both the Tokatoka and Waipū Ecological Districts to the south.

Indigenous natural areas cover approximately one-fifth of the ecological district (19 percent), but only nine percent of land if the Whāngārei Harbour is excluded. Of the identified natural areas described in this report, 43 percent are forest, nine percent are shrubland, 47 percent are estuarine, and less than one percent are freshwater wetland.

Much of Whāngārei Ecological District has been modified, with very few large areas of natural vegetation remaining. The northern part of the ecological district contains the last remnants of the once extensive Hikurangi Swamp, associated with the Wairua River flood plain. It is habitat for the threatened black mudfish (*Neochanna diversus*), and is the only New Zealand site for the newly discovered, critically endangered swamp hebe (*Veronica* aff. *bishopiana*) and one of the largest populations in the country of heart-leaved kōhūhū (*Pittosporum obcordatum*).

Whāngārei Ecological District is characterised by the Whāngārei Harbour, a large drowned river estuarine ecosystem of international importance that features extensive areas of mudflats and mangroves. At times, the harbour supports over 10,000 waterbirds including a wide variety of coastal and wading birds such as New Zealand dotterel, wrybill, banded rail, and Caspian tern. Large numbers of international migrant waders including bar-tailed godwit and knot also utilise the expanses of mudflats and shellbanks for feeding and roosting. However, there is very little of the original coastal vegetation remaining in the ecological district, as this area suffered high impacts from urban and rural development.

A distinctive feature of the area are the volcanic broadleaf forests, restricted to the Whāngārei and Kaikohe Ecological Districts in Northland and to the Pukekohe area in Auckland. These occur as small fragmented remnants or as groups of individual trees on the rich volcanic soils of the scoria cones and surrounding flats. Taraire and to a lesser extent pūriri are the species which largely make up the broadleaf remnants. These two species are pivotal for the survival of kukupa in Northland.

Pukenui Forest dominates the area by being the only large forest tract remaining in the Whāngārei Ecological District. It has high diversity, with 32 vegetation types recorded for the forest, and forms protection for the upper catchments of the Mangere River and Waiharohia Stream. The area supports a large population of long-tailed bats (*Chalinolobus tuberculatus*).

The endangered North Island brown kiwi, whose habitat has also been reduced and fragmented, is found in low densities in some of the larger forest tracts and in moderate densities in forest remnants adjacent to the kiwi management sites in the neighbouring Tangihua Ecological District.

5.9.2 Vegetation

Historic

Historical records of the vegetation in the Whāngārei Ecological District refer largely to kauri forest. This is, no doubt, due to the interest of the early settlers in the kauri forest as a source of both high-quality timber and kauri gum. Many other forest types would almost certainly have also been present in the District, but records of these are scarce.

In February 1827, the French explorer Dumont D'Urville, described Whāngārei Harbour as he viewed it from Reotahi, Whāngārei Heads: "Here in Nature's favourite spot, there is a verdant mantle in every shade of green and sedge that clothes hillside and downland and water's edge, in due season spangled with the crimson of pōhutukawa and rata, the snow of clematis, and the gold of kōwhai, and lined by the shoreline of golden sand, white limestone and dark volcanic rock" (Vallance 1964).

In 1827, Earle the artist, traversed the kauri forests of Northland four times from coast to coast. He described the fine character of the forests in these words: "We travelled through a wood so thick that the light of heaven could not penetrate the trees that composed it. They were so large and close together that in many places we had some

difficulty to squeeze ourselves through them.... Not a gleam of sky was to be seen: all was a mass of gigantic trees, straight and lofty, their wide-spreading branches mingling overhead, and producing throughout the forest an endless darkness and unbroken gloom.” (Hutchins 1919).

In her book of Whāngārei County’s First 100 years, Florence Keene presents an account of the early timber industry. Logging of kauri, primarily for boat masts and other spars in the British navy, began in Whāngārei in the 1830s. “Timber was in abundance and available for building, especially kauri and tōtara...”

The timber industry continued to flourish into the 20th Century, as the following extract from the Northern Advocate shows: “4/13/1913 ... The beautiful barque, Joseph Craig, timber laden with timber for Australian ports... carried 537,206 feet of sawn kahikatea.” (Keene 1976).

The Whāngārei area has been influenced by human settlement for hundreds of years, with more intensive development since European settlement nearly two centuries ago. The natural forest cover was extensively cleared in colonial times for the production of timber and expansion of agricultural land.

Present Day

As well as the underlying topographical and geomorphological factors, the present vegetation pattern is largely the result of disturbance from clearance and burning. Past and present human influences have modified and fragmented the original vegetation pattern to the extent that there is no longer a strong pattern of ecological gradients apparent in this ecological district, apart from the geological influence. The entire ecological district lies within the lowland bioclimatic zone, from sea level to 395 metres above sea level (Maunu Mountain), so there are no major altitudinal sequences present.

The geological influence is strongly apparent in the vegetation pattern. Stands of volcanic broadleaf forest dominated by taraire are restricted to the rich volcanic soils and cones of the mid-central and eastern areas of the Whāngārei Ecological District. These forests are a unique feature of Northland and are restricted to the Whāngārei and Kaikohe Ecological Districts, where they have been reduced to remnants.

The majority of forest areas in Whāngārei Ecological District consist of secondary regenerating forest, with very little primary forest stands remaining. The most common vegetation types are forests dominated by taraire, tōtara, or kahikatea, and taraire-tōtara, kahikatea-tōtara or pūriri-taraire. The Whāngārei Ecological District has a high diversity of podocarp-broadleaf forest types which include various combinations of the above species, as well as tī kōuka, mamaku, pukatea, kōwhai, rimu, karaka and mataī occurring rarely. Rare podocarp-broadleaf forest types include:

- karaka-totara forest on rhyolite
- kōwhai-matai forest on alluvium
- kōwhai-totara forest alluvium

Overall, Manning (2001) identified 23 different vegetation types, with some variations of those vegetation types present (e.g. podocarp-broadleaved forest):

- Kānuka/mānuka shrubland
- Mamaku treefernland
- Tōtara shrubland
- Mānuka shrubland
- Tōtara forest
- Kahikatea forest
- Tānekaha forest
- Rimu forest
- Mataī forest
- Taraire forest
- Mānuka/mānuka forest
- Tōwai forest
- Pūriri forest
- Maire tawake-pukatea swamp forest
- Kōwhai-karaka forest
- Podocarp-broadleaved forests (taraire dominant with totara and/or tōwai, kahikatea dominant with kānuka/mānuka; pūriri, tōtara and/or taraire, tōtara dominant with taraire, titoki, tōwai and/or tānekaha; kānuka/mānuka dominant with tōtara or tānekaha)
- Kauri forest
- Kauri-podocarp (tānekaha, rimu, totara or kahikatea) forest
- Kauri-podocarp-broadleaf forest
- Raupō reedland
- Harakeke flaxland
- Mangrove forest
- Oioi-sea rush rushland
- *Machaerina juncea* rushland
- *Machaerina* spp.-*Juncus* spp. rushland

6. KEY FINDINGS

6.1 Extent and number of sites

A total of 570 Significant Natural Areas (SNAs) within Kaipara District, covering an area of c.58,361 hectares have been identified and described in this report. The total area and number of sites identified as SNAs within each ecological district in Kaipara District are shown in Table 7. Each site identified as a SNA in Kaipara District in 2019 is listed in Table 8. Where SNAs straddle the boundary between two or three districts, this is recorded in the ecological district column in Table 8, with the district in which the majority of the site occurs listed first. For example, site FNK001 sprawls over the boundaries of Kaikohe, Tangihua, and Tutamoe, with the majority of the site in Hokianga. In addition to the above, 31 SNAs were removed from the District, after inspection revealed that they were either too reduced or too degraded to be classified as significant. Twenty-seven of these were in the Otamatea Ecological District, three were in the Kaipara Ecological District, and one was in the Rodney Ecological District (part Northland).

Table 7: Summary of the number of SNAs and extent (hectares) of sites identified as SNAs located within the Kaipara District in 2020.

Ecological District	Number of SNAs ¹	Total Area of SNAs (ha) ²	% of Ecological District covered by SNAs
Kaipara	133	11,970.06	13.31%
Otamatea	187	4,645.85	10.11%
Rodney	43	4,527.99	22.24%
Tangihua	55	8,649.73	18.04%
Tokatoka	148	7,214.47	11.94%
Tutamoe	43	19,432.20	47.44%
Waipu	19	1,803.71	40.64%
Whāngārei	6	117.08	13.58%
Hokianga	0	0	0%
Grand Total	570	58,361.10	

Table 8: Sites and extent (hectares) identified as SNAs in Kaipara District in 2020.

Site Name	Indicative new site Number	Ecological District	Area (hectares)
Access Road Bush	K001	Tutamoe	3.97
Access Road Remnants	K002	Tokatoka	9.71
Airstrip Remnant	K003	Tokatoka	13.40
Airstrip Road Wetland 1	K004	Kaipara	8.57
Airstrip Road Wetland 2	K005	Kaipara	3.60
Airstrip Road Wetland 3	KL095	Kaipara	5.38
Aoroa Road Forest	K006	Kaipara	2.08
Aranga Beach Coastal Forest Remnant	K007	Tutamoe	1.47
Aranga Bog 1	K008	Kaipara	0.46
Arapaoa River Scenic Reserve and surrounds	K009	Otamatea	7.32
Arapohue Road Remnants	K010	Tokatoka	6.96
Ararua North Forest Remnants (Part of Manganui River Complex)	WK001	Tokatoka	76.65
Ararua Road Bush	K011	Tokatoka	118.25
Ararua Road Forest Remnants	K012	Tokatoka / Otamatea	27.79
Ararua South Forest Remnants	K013	Tokatoka	106.12
Arcadia Kauri Bush	K014	Tokatoka	57.26
Arnesen Farm Shrubland	KL067	Kaipara	18.56
Avoca Forest Remnants	K015	Tangihua	21.51
Avoca Road Kauri Remnant	K016	Tangihua	18.89
Avoca South Road Remnants	K017	Tangihua	85.15
Awakino and Flaxmill Swamps	K018	Tangihua / Kaipara	134.15
Awakino East Bush	K019	Tangihua	506.47
Awaroa Creek Coastal Forest Remnants	K020	Otamatea	4.41
Babylon Coast Road Bog	KL028	Kaipara	2.87
Babylon Coast Road Bog 2	KL029	Kaipara	0.70
Baker Road Bush	WK002	Whangarei	125.19
Baldrock Road Trig Bush	K021	Rodney (part Northland)	6.55
Ball Road Remnants	K022	Tokatoka	21.16
Barfoot's Shrubland	K023	Kaipara	15.42

¹ Some sites occur in more than one Ecological District in which case the total number of SNAs appears higher than the total number record in the whole of the Kaipara District.

² Based on the actual extent of each site in each Ecological District.

Site Name	Indicative new site Number	Ecological District	Area (hectares)
Barton's Hill	K024	Otamatea	11.97
Basin Road Shrubland 2	K025	Kaipara	13.53
Batley Road Coastal Forest Remnants	K026	Otamatea	25.83
Batley Road Riparian Forest Remnants	K027	Otamatea	3.16
Bayer Road Shrubland	K028	Otamatea	1.32
Baylys Basin Road Dune Lake	K029	Kaipara	2.82
Bayly's Basin Road Wetland 1	K030	Kaipara	5.20
Bayly's Basin Road Wetland 2	K031	Kaipara	1.24
Bayly's Coast Road Wetland	K032	Kaipara	5.40
Bayly's Coast Road Wetland and Shrubland	K033	Kaipara	11.77
Beatson Road Forest Remnant	K034	Otamatea	7.70
Bee Bush Road Remnants	K035	Tokatoka	12.40
Bellamy Road Remnants	K036	Tokatoka	8.44
Bentley Road Bush	K037	Tokatoka	83.06
Berghans Bush and Surrounds	K038	Tokatoka	105.54
Bickerstaffe Airstrip Forest	K039	Otamatea	5.02
Bickerstaffe Forest and Shrubland	K040	Otamatea	107.73
Bickerstaffe Rail Bridge Forest Remnants	K041	Otamatea	39.14
Bickerstaffe Road Forest 1	K042	Otamatea	30.99
Bickerstaffe Road Forest 2	K043	Otamatea	16.80
Bickerstaffe Road Forest 3	K044	Otamatea	17.18
Birch Road QEII Forest Remnants	K045	Tokatoka	26.31
Blong Road Remnants	K046	Tokatoka	37.59
Boar Stream Bush	K047	Tokatoka	120.95
Boundary Swamp	K048	Tangihua	1.96
Bradley Road Remnants	K049	Tokatoka	4.93
Bream Tail Coastal Headland	KW001	Waipu / Rodney (part Northland)	303.23
Brown Road Remnant	K050	Rodney (part Northland)	5.12
Bruce Clear's Wetland	K051	Kaipara	2.33
Brynderwyn Hills Forest Complex (a)	WK003	Waipu / Otamatea / Rodney (part Northland)	217.81
Brynderwyn Hills Forest Complex (c)	WK004	Waipu	485.02
Brynderwyn Hills Forest Complex (g)	WK005	Waipu	851.31
Brynderwyn Hills Forest Complex (h)	KW002	Waipu / Rodney (part Northland)	789.33
Brynderwyn Hills Forest Complex (i)	WK006	Waipu	81.09
Brynderwyn Hills Forest Complex (j)	KW003	Waipu / Rodney (part Northland)	108.11
Brynderwyn Road Forest Remnants	K052	Otamatea / Rodney (part Northland)	27.78
Bull Road Bush	WK007	Tokatoka	19.42
Burgess Road South Shrubland	K053	Kaipara	7.13
Bushy Point Forest Remnant; Bushy Point	K054	Otamatea	8.49
Cames Road Forest Remnants	K055	Rodney (part Northland)	97.75
Carter Road Remnants	K056	Rodney (part Northland)	60.70
Chadwick Road Forest Remnants	K057	Otamatea	66.57
Clear Road Shrubland	K058	Kaipara / Tokatoka	11.18
Collins Scenic Reserve and surrounds	K059	Otamatea	2.07
Cooks Creek Lakes	K060	Rodney (part Northland)	7.79
Cooks Stream Scenic Reserve and Surrounds	K061	Rodney (part Northland)	11.82
Cross Family Trust Covenant and Surrounds	K062	Tokatoka	17.77
Curnow Road Gemstone Conservation Area	K063	Tokatoka	47.29

Site Name	Indicative new site Number	Ecological District	Area (hectares)
Curnow Road Hillslope Remnants	K064	Tokatoka	34.59
Dargaville Bridge Forest	K065	Kaipara	1.52
Dargaville Domain Forest	K066	Kaipara	1.93
Dodd Road Forest Remnant	K067	Tokatoka / Otamatea	8.09
Dodd Road Forest Remnants	K068	Otamatea	16.18
Donaldson's Forest	K069	Otamatea / Rodney (part Northland)	19.43
Draffin Farm Wetland	WK008	Whangarei	56.86
Dreadon Road Bush	K070	Tokatoka	12.07
East Pahi Forest Remnants	K071	Otamatea	27.22
Eastern Boundary Forest (Carter Holt Harvey)	K072	Otamatea	4.69
Eastern Mangawai Catchment Remnants	KW004	Waipu	119.38
Farm Wetland	K073	Tutamoe	0.40
Ford Road Forest	K074	Otamatea	12.54
Franklin Road Bush	K075	Tokatoka	73.63
Freidrich's Lake and Wetland	K076	Kaipara	7.47
Frenchman's Bay Forest and Wetland; Frenchman's Bay	K077	Otamatea	25.71
Frith Road Northern Dairylands Forest	K078	Tangihua / Kaipara	89.01
Garabolino Road Bush	K079	Rodney (part Northland)	51.81
Garbolino Road Swamp	K080	Rodney (part Northland)	1.45
Gillon Road Bush	K081	Tokatoka	5.37
Gillon Road Remnants	K082	Tokatoka	51.43
Girls High School Road Bush	K083	Tokatoka	83.50
Gittos Point	K084	Otamatea	92.51
Glinks Gully Swamp	K085	Kaipara	1.45
Glinks Gully Wetland and Grassland	K086	Kaipara	8.06
Golden Stairs Road Bush	K087	Tokatoka	39.12
Golden Stairs Road Kahikatea Remnant	K088	Tokatoka	17.84
Golf Course Road Remnants	K089	Tokatoka	24.68
Greenhill Road Pūiri Remnant	K090	Kaipara / Tokatoka	7.96
Greenhill Road Shrubland	K091	Tokatoka	42.84
Greville's Lagoon and Wetland	K092	Kaipara	2.83
Griffin Road Forest Remnants	K093	Otamatea	38.31
Haast Road Bush	K094	Tangihua	33.46
Hakaru River Forest Ribbon	K095	Rodney (part Northland)	219.02
Hames Road Forest Remnants	K096	Otamatea	12.41
Hamlin Road Shrubland	K097	Otamatea	12.43
Hamlyns Bush Scenic Reserve	K098	Tokatoka	3.30
Hanerau Stream Forest Remnants	K099	Otamatea	11.64
Hartles QEII covenant and surrounds	K100	Otamatea	5.11
Hautakima East Forest	K101	Otamatea	26.57
Hautakima South Forest	K102	Otamatea	60.67
Hill Road Remnants	K103	Tokatoka	54.65
Hillstone Road Forest Remnant 2	K104	Otamatea	2.17
Hillstone Road Forest Remnants 1	K105	Otamatea	15.84
Hillstone Road Forest Remnants 3	K106	Otamatea	11.56
Hoanga Alluvial Forest Fragment	K107	Kaipara	5.17
Hoanga Road Forest	K108	Kaipara / Tokatoka	7.88
Hoanga Road Remnants	K109	Kaipara / Tokatoka	50.71
Hoanga Road Shrubland and Forest	K110	Tangihua / Tokatoka	305.85

Site Name	Indicative new site Number	Ecological District	Area (hectares)
Hokianga Road Railway Treeland	K111	Kaipara	6.02
Hokorako Creek Forest Remnants	K112	Otamatea	17.94
Hood Road Forest Remnant	K113	Tutamoe	7.41
Hooper Road Bush	K114	Tutamoe	63.87
Houto Cone Forest	KW005	Tangihua	30.44
Houto Road Remnants	WK009	Tangihua	40.43
Hoyle Road Remnants	K115	Tokatoka	3.51
Huarau Ridge Forest Remnants	K116	Otamatea	64.77
Hukatere North Forest	K117	Otamatea	21.99
Hukatere Scenic Reserve and surrounds	K118	Otamatea	43.65
Inch Road Remnant	K119	Tokatoka	4.74
James Road Forest	K120	Otamatea	22.76
Jones Road/Mangatu Bush Remnants	K121	Tutamoe	240.39
Kai Iwi Lakes Road Dune Wetlands	KL026	Kaipara	2.36
Kai Iwi Lakes Road Dune Wetlands 2	KL027	Kaipara	2.77
Kai Iwi Lakes Road Swamp	K122	Kaipara	1.14
Kai Iwi Lakes Road Wetlands	KL058	Kaipara	4.53
Kai Iwi Lakes South Shrubland	K123	Kaipara	51.87
Kaihu Bush Remnant	K124	Tutamoe	25.76
Kaihu Forest	KW006	Tangihua / Tutamoe / Kaipara	5572.78
Kaihu Scenic Reserve and Surrounds	K125	Tangihua	241.26
Kaihu Valley West Shrubland	K126	Kaipara	5.64
Kaihu Wood Road Shrubland	KL008	Tutamoe	21.42
Kaikohe Road Forest Remnant	K127	Tutamoe	74.89
Kaikowhiti Stream Forest Remnants	K128	Waipu	25.34
Kaipara Forest, Puketōtara	K129	Otamatea	25.42
Kaipara New Site 30	KL030	Kaipara	16.80
Kaira Creek Forest	K130	Otamatea	11.16
Kairara Bush	K131	Tangihua	84.60
Kaitara Constructed Lake	K132	Otamatea	18.30
Kaitara Creek Forest Remnants	K133	Otamatea	29.42
Kaiwaka Mangawhai Road Remnants	K134	Rodney (part Northland)	39.05
Kaiwaka Township Bush	K135	Rodney (part Northland)	14.30
Kaiwhitu Island	K136	Kaipara / Otamatea	2.74
Karaka Road Shrubland	WK010	Tangihua	82.54
Karakanui Road Forest Remnants	K137	Otamatea	11.89
Katui Scenic Reserve and Surrounds	K138	Tutamoe	412.58
Kauri Airstrip Remnant	K139	Tokatoka	4.07
Kauri Bushmans Memorial Reserve and Surrounds	K140	Tokatoka / Otamatea	57.40
Kauri Hill Bush Remnants	K141	Tokatoka	86.83
Kelly's Bay/ Punahaere Creek Estuary, Shrubland and Forest	K142	Kaipara	580.09
Kereru Lane Forest Remnants	K143	Rodney (part Northland)	38.48
Kernot Farm Shrubland	K144	Kaipara	52.05
Kidds Creamery Road Alluvial Remnants	K145	Kaipara	9.22
Kirikiri Creek Forest and Wetlands	K146	Otamatea	42.02
Kirikoponui Valley Bush	K147	Tangihua	35.77
Kirikopuni Valley Road Wetland	K148	Tangihua	5.19
Kiriopuni Station Road Covenant	K149	Tokatoka	2.60
Kirk Road Forest Remnants	K150	Otamatea	4.62
Kirk Road Hillslope Remnant	K151	Tokatoka / Otamatea	16.64
Koareare Creek Forest Remnants	K152	Otamatea	103.07

Site Name	Indicative new site Number	Ecological District	Area (hectares)
Kohatutahi Forest and Wetland	K153	Kaipara / Otamatea	5.39
Komiti Bay Forest Remnant	K154	Otamatea	8.87
Kowhai Road Matai-Kahikatea Remnant	K155	Otamatea	3.48
Kumete Bluff Forest Remnant; Kumete Bluff	K156	Otamatea	18.57
Lake Humuhumu, Wetland and Forest	K157	Kaipara	278.76
Lake Kahuparere, Wetland and Shrubland	K158	Kaipara	55.49
Lake Kai Iwi, Wetland and Shrubland	K159	Kaipara	35.72
Lake Kanono, Wetland and Forest	K160	Kaipara	210.66
Lake Kapoai and Wetland	K161	Kaipara	7.66
Lake Parawanui and Wetland	K162	Kaipara	8.64
Lake Rehutai and Wetland	K163	Kaipara	5.24
Lake Rotokawau and Wetland	K164	Kaipara	38.97
Lake Rotootuauru, Wetland and Forest	K165	Kaipara	25.79
Lake Rotopouua, Wetland and Forest	K166	Kaipara	54.89
Lake Rototuna and Wetland	K167	Kaipara	8.74
Lake Taharoa, Wetland and Shrubland	K168	Kaipara	235.82
Lake Waikere, Wetland and Shrubland	K169	Kaipara	57.33
Lake Waingata	K170	Kaipara	14.23
Lake Wainui and Wetland	K171	Kaipara	4.19
Lindquist Road Bush	K172	Tokatoka	190.37
Linton Road West Forest	K173	Otamatea	14.06
Lois Wintles Bush and Pohutukawa Remnant	K174	Rodney (part Northland)	7.25
Long Gully Wetland and Shrubland	K175	Kaipara	45.84
Lower Arcadia Road Remnants	K176	Tokatoka	140.22
Lower Blong Remnant	K177	Kaipara / Tokatoka	9.24
Lower Bull Road Bush	K178	Tokatoka	65.21
Lower Kai Iwi Stream Wetland, Grassland, Shrubland and Forest	K179	Kaipara	10.73
Lower Kaihu River Forest Fragments	K180	Kaipara	5.24
Lower Lake Rototuna Wetland	K181	Kaipara	13.32
Lower Mititai Road Remnants	K182	Tokatoka	7.79
Lower Pahi River Forest Remnants	K183	Otamatea	48.20
Lower Pukearenga Forest Remnants	K184	Otamatea	16.70
Lower Wainui Road Remnant	K185	Tokatoka	35.27
Lower Wearmouth Road Remnant	K186	Tokatoka / Otamatea	35.18
Lucich Wetland	K187	Kaipara	0.93
Lusk Road Bush	K188	Tokatoka	132.38
Maheno Remnants	K189	Tokatoka	28.45
Maitahi Wetland Scientific Reserve and Surrounds	K190	Kaipara	299.18
Mamaranui Farm Settlement Scenic Reserve and Surrounds	K191	Tangihua	338.54
Mangaiti Creek Forest Remnants	K192	Otamatea	24.60
Mangakahia Forest Wetland	K193	Kaipara	7.82
Manganui River Complex	KW007	Tokatoka	895.04
Manganui Trig Forest	K194	Tokatoka	40.21
Manganui-Tailors Road Bush and Surrounds	KW008	Tokatoka	358.73
Mangarātā Remnant	KL077	Tokatoka	42.54
Mangatara Flat Shrubland	KL078	Kaipara	8.55
Mangawhai Harbour, Sandspit and Surrounds	K195	Rodney (part Northland)	1014.02
Mangawhai Heads Dunelake and Wetland	K196	Rodney (part Northland)	7.97
Mangawhai North Head Remnants	K197	Rodney (part Northland)	51.23
Mapau Bush	K198	Kaipara	5.82

Site Name	Indicative new site Number	Ecological District	Area (hectares)
Mapuna Road Remnants	K199	Tangihua / Tokatoka	5.21
Mareretu Bush Remnants	K200	Tokatoka	68.54
Mareretu Forest	WK012	Waipu / Tokatoka	2877.66
Marlborough Forest	KW009	Tangihua / Tutamoe	6254.93
Marlborough Road Forest	K201	Tutamoe	71.63
Marlborough Road Wetland and Environs	KL022	Tutamoe	4.62
Marohemo Road Forest Remnants 1	K202	Otamatea	17.98
Marohemo Road Forest Remnants 2	K203	Otamatea	32.36
Mason Road Covenant	K204	Tokatoka	11.04
Massey Creek Forest	K205	Otamatea	34.33
Massey Road Point	K206	Otamatea	8.95
Massey Road Remnant	K207	Tangihua	0.22
Matakohe River Bridge Forest Remnants	K208	Otamatea	2.92
Matakohe West Forest Remnants	K209	Otamatea	18.34
Maunganui Bluff Scenic Reserve	K210	Tutamoe	435.01
Maunganui Outlier Forest Remnant	K211	Tutamoe	11.61
Maungaraho Rock Scenic Reserve and Surrounds	K212	Tokatoka	17.29
Maungaru Trig Forest	K213	Tangihua	254.86
Maungatawhiri Forest Remnant	K214	Tokatoka	24.60
Maungaturoto Marginal Strip	K215	Otamatea	11.21
Maungaturoto Town Forest	K216	Otamatea	3.67
Maxwell Creek Forest Remnant	WK013	Waipu	40.39
McCarroll Gap Bush Remnants	K217	Tokatoka	167.01
Mid Ararua Road Bush Remnants	KW010	Tokatoka	62.39
Mid Bull Road Bush Remnant	K218	Tokatoka	7.04
Millbrook Dam and Forest Remnants	KL079	Waipū	37.69
Mititai Remnants	K219	Tokatoka	11.15
Mititai Road Forest (Part of Manganui River Complex)	WK014	Tokatoka	140.09
Mititai Road Forest Remnants	K220	Tokatoka	5.37
Mititai Road Kahikatea Remnant	K221	Tokatoka	1.14
Mititai/Okahu Stream Remnants	K222	Tokatoka	20.11
Mohinui Forest Remnant 1	K223	Otamatea	3.95
Mohinui Forest Remnant 2	K224	Otamatea	13.38
Mohinui Forest Remnant 3	K225	Otamatea	29.20
Mohuta Road Swamp	KL066	Kaipara	0.69
Molloy Road Remnant	K226	Tokatoka	0.93
Montgomeries Memorial Bush Scenic Reserve and Surrounds	K227	Tokatoka	34.44
Montieth South Road Shrubland	K228	Tutamoe	29.37
Mooney QEII covenant	K229	Otamatea	10.35
Mooney Road Forest Remnant	K230	Otamatea	24.74
Mosquito Gully Wetland	K231	Kaipara	28.42
Motukumara Point Forest Remnants	K232	Otamatea	19.31
Motuouhi Island	K233	Otamatea	0.48
Moturoa Island - Kaipara	K234	Otamatea	1.42
Mountain Road Remnant	K235	Otamatea / Rodney (part Northland)	10.14
Mud Alley Road Wetland	K236	Otamatea	0.29
Muriwai Bush	K237	Tutamoe	21.28
Muriwai Stream Swamp	K238	Tutamoe	156.09
Murray Road Bush	KW011	Tangihua	27.95
Nathan Road Forest and Shrubland	K239	Otamatea	82.03
Nathan Road Shrubland	K240	Tangihua	90.60
Newlove Airstrip Wetland	K241	Kaipara	6.16
Newsham Road North Forest	K242	Kaipara	1.12

Site Name	Indicative new site Number	Ecological District	Area (hectares)
Newsham Road South Forest	K243	Kaipara	2.06
Ngakiripara Stream Hillslope Remnant	KL080	Tutamoe	112.74
Ngakiripara Stream Shrubland and Wetland	K244	Tutamoe / Kaipara	23.13
Ngaupiko Point Forest Remnant	K245	Otamatea	3.30
North Houto Forest	KW012	Tangihua	596.78
North Kai Iwi Stream Setlands 2	KL063	Kaipara	1.91
North Maungaturoto Forest Remnants	K247	Otamatea	17.27
North Pole Alluvial and Hillslope Remnants	K248	Tokatoka	16.36
North Pole Road Remnants	K249	Tokatoka	48.12
North Whakapirau Forest Remnant	K250	Otamatea	15.91
Northern Mataraua Forest	FNK001	Hokianga / Kaikohe / Tangihua / Tutamoe	34946.13
Northern Wairoa River Broadleaf Remnant	K251	Tokatoka	6.22
Northwest Swamps	K252	Tutamoe	2.59
NRC Opanake Road Reserve Forest	K253	Kaipara	1.98
Okahu Airstrip Remnant	K254	Tokatoka	9.53
Okahu Bush	K255	Tokatoka	11.21
Okahu Stream and Surrounds - Wainui Road	K256	Tokatoka	93.95
Okahu Stream Forest and Alluvial Remnants	K257	Tokatoka	61.16
Okaro Creek/Waikere Creek Duneland, Wetland and Shrubland	K258	Kaipara	679.02
Old Waipu Road Remnants	K259	Rodney (part Northland)	30.45
Omamari Government Purpose Wildlife Management Reserve and Surrounds	K260	Kaipara	203.12
Omamari Road Raupo Swamp No.1	K261	Kaipara	3.87
Omamari Road Raupo Swamp No.2	K262	Tutamoe / Kaipara	11.32
Omamari Road Reedland	K263	Kaipara	1.37
Omamari Station North Shrubland and Wetland	K264	Kaipara	19.70
Omamari Station Wetland 1	KL096	Kaipara	3.92
Omamari Station Wetland 2	KL097	Kaipara	1.97
Omamari Station Wetland and Shrubland	K265	Kaipara	35.28
Omana Lowland Forest Remnant	K266	Tokatoka	4.21
Omana Remnants	K267	Tokatoka	18.70
Oneriri Pa Forest	K268	Otamatea	27.47
Oneriri Station Homestead Forest	K269	Otamatea	25.84
Onewa Remnants	K270	Tokatoka	42.03
Ongange Creek Wetland, Shrubland and Forest	K271	Kaipara	154.89
Opanake Road Davidson Forest and Shrubland	K272	Kaipara	4.27
Opanake Road Morris Forest	K273	Kaipara	10.21
Opanake Road Shrubland and Forest	K274	Kaipara	12.78
Opanake Road Swamp Forest	K275	Kaipara	4.61
Oparakau Road Shrubland	K276	Tokatoka	24.32
Oruawharo River Forest Remnant 1	K277	Otamatea	4.96
Oruawharo Road Stream	K278	Otamatea	0.49
Oruawharo Road Wetland	K279	Otamatea	1.25
Oruawharo School Forest	K280	Otamatea	23.23
Otairi Creek Forest and Wetland	K281	Otamatea	4.36
Otaiwhata Bay Forest and Shrubland; Otaiwhata Bay	K282	Otamatea	2.37
Otara Head Forest and Shrubland; Otara Head	K283	Otamatea	15.01
Otiro Road Forest Remnants	K284	Rodney (part Northland)	99.39
Otiria Stream Remnants	K285	Tangihua	56.61
Otiwhero Bush and Otaenga Bush	FNWK001	Tangihua	237.76
Otuhianga Coastal Forest Remnants	K286	Otamatea	21.18
Otuhianga Hill Forest	K287	Otamatea	22.97

Site Name	Indicative new site Number	Ecological District	Area (hectares)
Otuhianga Road Alluvial Remnant	K288	Otamatea	3.79
Owhareao Point Remnants; Owhareao Point	K290	Otamatea	17.71
Owhei Creek Forest Remnants	K291	Otamatea	27.72
Paerata Wildlife Management Reserve	KW013	Tangihua / Whangarei	226.45
Page Point Forest and Shrubland	K292	Otamatea	11.07
Pahi Coastal Strip	K293	Otamatea	41.50
Pahi River Headwaters	K294	Otamatea	28.45
Paiawa Road Forest (Part of Manganui River Complex)	KW014	Tokatoka	199.64
Pakaurangi Forest and Shrubland	K295	Otamatea	467.31
Pakotai Scenic Reserve	WK016	Tangihua	60.86
Paparoa Creek Marginal Strip No. 1 and surrounds	K296	Otamatea	10.36
Paparoa Creek Marginal Strip No. 2 and surrounds	K297	Otamatea	34.81
Paparoa Creek Scenic Reserve and surrounds	K298	Otamatea	20.90
Paparoa Mature Kauri Stand	K299	Otamatea	1.00
Paparoa Remnants	K300	Tokatoka	65.05
Paparoa Station Road Bush	K301	Tokatoka	28.67
Paparoa Stream Headwaters	K302	Otamatea	57.68
Paparoa Stream Remnant	K303	Tokatoka / Otamatea	21.69
Paparoa Stream Riparian Forest	K304	Tokatoka / Otamatea	71.20
Paparoa/Oakleigh Road QEII Forest Remnants	K305	Tokatoka	30.89
Paparoa-Oakleigh Road Riverine Remnants	K306	Waipu / Tokatoka	13.98
Parahi Road Remnant	K307	Tokatoka	8.19
Parahi Scenic Reserve and Surrounds	K308	Tokatoka	190.48
Parker Road Riverine Association and Forks Bush	FNK002	Tangihua	47.47
Parkers Road Bush	K309	Tokatoka	77.36
Parry Road Wetland	K310	Otamatea	2.07
Pasley Road Remnants	K311	Tokatoka / Otamatea	70.35
Payne Road Forest Remnants	K312	Otamatea	33.88
Peter Kelly's Lake and Wetland	K313	Kaipara	3.25
Pikiwahine Railway Bush Remnant	K314	Tokatoka	8.98
Pinaki Road South Wetland and Shrubland	K315	Kaipara	12.43
Piroa Peak Forest Remnants	K316	Otamatea	11.27
Piroa Road Forest Remnants	K317	Otamatea	26.38
Piroa Road Forest Remnants 2	K318	Otamatea	25.81
Point Curtis Road Coastal Forest Remnants	K319	Otamatea	27.00
Porter Road Hillslope Remnants	K320	Tokatoka	65.65
Pouto Point Wildlife Reserve Sandfield, Wetland and Shrubland	K321	Kaipara	93.55
Pouto Road Shrubland	KL045	Kaipara	13.12
Powell Road Remnant	K322	Tokatoka	13.92
Poyner Road Remnant	K323	Tokatoka	11.61
Poyner Road Shrubland	K324	Tokatoka	10.41
Pretty Bush Central	K325	Rodney (part Northland)	16.37
Pretty Bush West	K326	Kaipara	82.44
Pritchard Road Forest Remnants	K327	Rodney (part Northland)	32.92
Pukeareinga Scenic Reserve and Surrounds	K328	Otamatea / Rodney (part Northland)	488.07
Pukehau QEII Covenant	K329	Otamatea	11.08
Pukehuia Forest Remnants	K330	Otamatea	37.10
Pukehuia Hill Bush	K331	Tokatoka	27.63

Site Name	Indicative new site Number	Ecological District	Area (hectares)
Pukehuia Kahikatea Remnant	K332	Tokatoka	2.89
Pukehuia Remnants	K333	Tokatoka	20.28
Pukehuia Road Bush	K334	Tokatoka	57.30
Pukehuia Road Forest	KL041	Tokatoka	4.55
Pukehuia Road Remnants	K335	Tangihua	46.59
Pukekararo Scenic Reserve and Surrounds	K336	Rodney (part Northland)	230.72
Pukekohe Covenants	K337	Tokatoka	11.70
Pukekohe Scenic Reserve and Surrounds	K338	Tokatoka	266.64
Pukemiro Wetland and Forest	K339	Kaipara	34.51
Pukepohatu, Cattlemount and Surrounds	KW015	Waipu / Otamatea / Rodney (part Northland)	2218.96
Puketōtara Forest Remnant 10	K340	Otamatea	13.99
Puketōtara Forest Remnant 12	K341	Otamatea	18.39
Puketōtara Forest Remnant 13	K342	Otamatea	9.09
Puketōtara Forest Remnant 14	K343	Otamatea	6.94
Puketōtara Forest Remnant 15	K344	Otamatea	4.84
Puketōtara Forest Remnant 4	K345	Otamatea	33.77
Puketōtara Forest Remnant 5	K346	Otamatea	15.94
Puketōtara Forest Remnant 9	K347	Otamatea	19.64
Puketōtara Forest Remnants 2	K348	Otamatea	74.49
Puketōtara Forest Remnants 3	K349	Otamatea	138.20
Pukupō Bush	K350	Tangihua	131.02
Pūriri Point Forest and Shrubland	K351	Otamatea	44.37
Quarry Forest	K352	Otamatea	29.25
Raepare Creek Headland	K353	Otamatea	46.32
Raepere Creek Coastal Forest	K354	Otamatea	28.37
Raepere Creek Forest	K355	Otamatea	116.25
Rangiora Road Forest Remnants	K356	Otamatea	13.14
Reed's Farm Forest	K357	Kaipara	1.94
Rehia Bush and Surrounds	K358	Tokatoka	97.47
Rehia Road Remnants	K359	Tokatoka	4.59
Rehutai Road Lake and Wetland	K360	Kaipara	3.65
Reid Road Forest Remnants	KW016	Waipu	11.01
Ringrose Road Remnants	K361	Tokatoka	55.78
Rotokiekie Creek Forest Remnants	K362	Otamatea	31.48
Rotu Stream Forest	K363	Kaipara	9.89
Rowlands Road Remnant	K364	Kaipara / Tokatoka	37.56
Ruataniwha	K365	Otamatea	1.09
Russell Wetland	K366	Kaipara	9.82
Schiska Road Shrubland and Wetland	KL001	Rodney (part Northland)	9.30
Scotty's Camp Road Shrubland	KL086	Kaipara	11.15
Sentinel Rock	K367	Rodney (part Northland)	0.85
Settlement Road Forest Remnants	K368	Rodney (part Northland)	13.70
Shag Lake and Wetland	K369	Kaipara	18.96
Sharp Road Bush	WK017	Tangihua	34.50
Shirley Road Remnant	K370	Tokatoka	7.35
Sills Road Forest Fragments	K371	Kaipara / Tokatoka	13.36
Simpkin Road Bush	K372	Tokatoka	17.24
Smale's Road Forest Remnants	KW017	Waipu / Tokatoka	152.56
Smith Road Remnants	K373	Tokatoka	119.81
Smith's Point and Mateoteawa Creek Forest Remnants	K374	Otamatea	44.51

Site Name	Indicative new site Number	Ecological District	Area (hectares)
Smoky Hill Scenic Reserve and Surrounds	K375	Tokatoka	218.26
Sommerville and Karaka Road Riparian Forest	K376	Tangihua	33.98
South Hokorako Creek Forest Remnant	K377	Otamatea	3.46
South Houto Forest and Maungaru Range	K378	Tangihua	862.48
South Massey Road Forest Remnants	K379	Otamatea	5.30
Southern Kaikowhiti Stream Remnants	K380	Tokatoka	20.85
Spence's Bush	K381	Tokatoka	11.59
Staniforth Paper Road Remnants	K382	Rodney (part Northland)	19.87
State Highway 1 Remnant	K383	Rodney (part Northland)	16.07
State Highway 12 Forest Remnant	K384	Tutamoe	38.22
Stills Bush	K385	Tokatoka	8.10
Stony Creek Forest Remnants	K386	Otamatea	6.17
Swan Egg Pond and Wetland	K387	Kaipara	2.12
Tahupo Creek Coastal Forest Remnants	K388	Otamatea	4.63
Taipuha Bush	K389	Tokatoka	12.74
Takahoa Creek Forest	K390	Otamatea	16.76
Takahoa Government Purpose Wildlife Reserve	K391	Otamatea	13.74
Tana Road Shrubland	K392	Tokatoka / Otamatea	55.21
Tangihua Forest	KW018	Tangihua / Whangarei / Tokatoka	4130.58
Tangitiki Estuary, Wetland and Shrubland	K393	Kaipara	336.54
Tangowahine Remnants	K394	Tangihua	42.29
Tangowahine Scenic Reserve	K395	Tangihua / Tokatoka	107.75
Tangowahine Valley Road Remnants	KW019	Tangihua	54.97
Tangowahine-Settlement Roads Remnants	K396	Tangihua	10.89
Tapu Bush	K397	Kaipara	235.13
Tara Creek Remnants	K398	Rodney (part Northland)	42.98
Tarairae Scenic Reserve	K399	Tangihua	7.19
Tauhara Creek Sandfield Estuary, Wetland and Shrubland	K400	Kaipara	81.46
Tauraroa Riverine Remnants	KW020	Tangihua / Tokatoka	47.15
Te Kawa Stream Forest	K401	Tutamoe / Kaipara	38.88
Te Kiakia Bay Forest Remnants	K402	Kaipara / Otamatea	108.61
Te Kōwhai Creek Forest Remnant	K403	Otamatea	4.71
Te Kōwhai Creek Scenic Reserve and surrounds	K404	Otamatea	25.75
Te Ope Headland	K405	Otamatea	10.28
Te Ope Stream Remnants	K406	Otamatea	64.32
Te Opi Road Forest Remnants	K407	Otamatea	17.33
Te Opu Scenic Reserve	K408	Otamatea	13.40
Te Pahi River Road Forest Remnants	K409	Otamatea	30.85
Te Riu Lagoon	K410	Tutamoe	16.84
Te Riu Wetlands	KL053	Kaipara	1.68
Te Ruruku Bay Forest Remnants	K411	Otamatea	98.35
Te Taumatika Creek Forest Remnants	K412	Otamatea	15.72
Te Tawhiti Forest Remnants	K413	Otamatea	11.29
Te Whiro Bush and Surrounds	K414	Tokatoka	58.63
The Funnel Pōhutukawa Fringe	K415	Otamatea	10.91
The Spectacles Lakes and Wetland	K416	Kaipara	5.23
Timber Bay Forest	K417	Otamatea	147.11
Tinopai Road Wetland	K418	Otamatea	2.17
Titipu Island	K419	Kaipara / Otamatea	2.67

Site Name	Indicative new site Number	Ecological District	Area (hectares)
Tokatoka Remnants	K420	Kaipara / Tokatoka	5.66
Tokatoka Road Hillslope Forest	K421	Tokatoka	10.99
Tokatoka Road Remnants	K422	Tokatoka	25.18
Tokatoka Road Riverine Remnant	K423	Tokatoka	9.94
Tokatoka Scenic Reserve and Surrounds	K424	Kaipara / Tokatoka	44.58
Tokatoka/Okahu Stream Remnants	K425	Tokatoka	24.64
Tongariro Forest Remnants	K426	Tangihua	77.18
Topuni Bush Fragments	K427	Rodney (part Northland)	70.71
Topuni Farm Bush Remnants	K428	Rodney (part Northland)	60.81
Topuni Forest Remnants	K429	Rodney (part Northland)	35.78
Topuni River Confluence Forest	K430	Otamatea	6.24
Topuni River Forest Remnant 1	K431	Otamatea	6.32
Topuni River Forest Remnant 2	K432	Otamatea	2.82
Topuni Scenic Reserve and Saltmarsh	K433	Rodney (part Northland)	43.53
Tōtara Creek Forest Remnant	K434	Otamatea	34.12
Trounson Kauri Park Scenic Reserve	K435	Tutamoe	585.79
Turiwiri Forest Fragments	K436	Kaipara	1.71
Turiwiri Scenic Reserve	K437	Tokatoka	3.81
Tutamoe Domain Recreation Reserve and Surrounds	K438	Tutamoe	15.38
Tutamoe Maire tawake Forest Remnant	K439	Tutamoe	0.67
Un-named Island, Kaiwaka River	K440	Otamatea	0.45
Unnamed Island, Oruawharo River	K441	Otamatea	4.00
Upper Ahuroa River Forest Remnants 2	K442	Otamatea	9.93
Upper Arcadia Road Bush	K443	Tokatoka	161.01
Upper Mangawai River Wetlands	K444	Waipu / Tokatoka	6.64
Upper Okaro Bush	K445	Kaipara	31.24
Upper Page Road Remnant	K446	Tokatoka	29.63
Upper Pahi River Riparian Forest	K447	Otamatea	28.70
Upper Pahi River Scenic Reserve, Rabbit and Goat Island and surrounds	K448	Otamatea	9.10
Upper Paparoa Creek Scenic Reserve and Sherwin QEII covenant	K449	Otamatea	25.72
Upper Raepare Creek Forest Remnants	K450	Otamatea	26.01
Upper Te Kawa Stream Shrubland	K451	Kaipara	3.91
Upper Wairau River Coastal Forest Remnants	K452	Otamatea	32.64
Upper Whakaki River Forest Remnants	K453	Otamatea	8.63
Valley Road Remnants	K454	Rodney (part Northland)	63.90
Wahiwaka Creek Forest Remnants	K455	Otamatea	45.45
Waiarohia Creek Forest and Wetland	K456	Otamatea	6.98
Waihaupai Stream Shrubland and Forest	K457	Kaipara	116.05
Waihue Road Shrubland and Forest Remnant	K458	Tangihua	315.13
Waihungaru Stream Forest	K459	Otamatea	15.84
Waikara Road Bog 1	K460	Tutamoe	1.10
Waikara Road Bog 2	K461	Tutamoe	0.68
Waikara Road Farm Wetland	KL065	Tutamoe	1.07
Waikara Road Shrubland	KL049	Tutamoe	3.08
Waikara Road Wetland	K462	Tutamoe	2.49
Waikara South Dune Lake	K463	Tutamoe	7.57
Waikara South Raupo Reedland 2	K464	Tutamoe	0.87
Waikaraka Remnants	K465	Tokatoka	8.65
Waima Riverine Forest Remnant	K466	Tutamoe	9.28
Waima Stream Mouth Remnant	K467	Tokatoka	2.93

Site Name	Indicative new site Number	Ecological District	Area (hectares)
Waimamaku Estuary, Shrubland and Rushland	K468	Kaipara	105.55
Waimata Scenic Reserve and Surrounds	K469	Tangihua	355.67
Waimatenui Road Riverine Forest	K470	Tangihua	12.00
Waiokumurau Road Bush	K471	Tangihua	11.84
Waiokumurau Stream Riverine Forest	K472	Tangihua	56.63
Waiokumurau Stream Wetland	KL025	Tangihua	3.10
Waiotama Reserve	K473	Whangarei	99.68
Waiotama River	KW021	Whangarei	10.36
Waiowhata Stream Wetland	KL023	Tangihua	6.13
Waiowhata Stream Wetland 2	KL024	Tangihua	5.58
Waipikopiko Stream Headwaters	K474	Otamatea	22.21
Waipikopiko Stream Remnants	K475	Tokatoka / Otamatea	103.76
Waipoua Coastal Strip and Taha Moana Scenic Reserve	FNK003	Tutamoe	617.71
Waipu Gorge Forest Remnants	WK018	Waipu / Otamatea	622.05
Wairau River Riparian Forest Remnants	K476	Otamatea	19.25
Wairere Valley Bush Remnant	K477	Tokatoka / Otamatea	78.07
Wairoa River Fragments	K478	Tangihua	18.64
Waitapu Road Bush	K479	Tutamoe / Kaipara	109.00
Waitieke Creek Forest	K480	Otamatea	108.82
Waiwhakangari Stream Bush Remnants	WK019	Tokatoka	12.78
Wallace Road Bush	K481	Tokatoka	44.57
Wallbank Way Bush	K482	Rodney (part Northland)	5.47
Wearmouth Road Bush	K483	Tokatoka	94.86
Western Coast A: Aranga Beach North Coastal Communities	K484	Kaipara	17.22
Western Coast B: Aranga Beach South Coastal Communities	K485	Kaipara	351.30
Western Coast C: Glinks Gully North Grassland, Flaxland and Forest	K486	Kaipara	1549.90
Western Coast D: Glinks Gully South Grassland, Wetland and Shrubland	K487	Kaipara	1526.84
Western Coast E: Pouto Dune System	K488	Kaipara	6104.63
Wetland East of Lake Rotopouua	K489	Kaipara	18.17
Whakapirau Airstrip Forest	K490	Otamatea	55.94
Whakapirau Creek Coastal Forest	K491	Otamatea	10.93
Whakapirau Creek Conservation Area and Surrounds	K492	Otamatea	0.58
Whakapirau River Scenic Reserve and North Massey Road Forest Remnants	K493	Otamatea	34.64
Whakapirau/Rocky Point Forest and Shrubland	K494	Otamatea	11.03
Whenuanui Scenic Reserve	K495	Kaipara / Tokatoka	41.00
Wiki Brown Road Forest Remnants	K496	Otamatea	14.71
Wilson Road Forest Remnant	K497	Tangihua	11.60
Windy Hill Remnants	K498	Tokatoka	26.80
Woodcock's Forest	K499	Kaipara	0.54
Woodcock's Wetland	K500	Kaipara	2.73
Young Road QEII Remnant and Surrounds	K501	Tokatoka	30.74

6.2 Likely significant sites

Twenty eight additional sites identified in the original SNA GIS layer were identified as 'Likely' significant (Table 10). Additional sites include natural areas which may not

have been visible on older aerial photographs, or which have regenerated since the last time the area was assessed, and could now potentially meet the significance criteria. Where possible, all likely sites were viewed using recently flown oblique aerial imagery (Biospatial aerial imagery 2017). It is noted that oblique aerial photography was not available for all of the Kaipara District, thus several sites could not be inspected using this methodology.

These sites would benefit from a field assessment to update site information and ensure that non-significant vegetation is excluded from these sites. Site inspections will enable the vegetation and habitat types present, fauna values, and potential threats to the continued existence of these sites to be determined. In order to accurately identify the values required to confirm significance and site boundaries, on-site field visits should be undertaken rather than site checks from publicly accessible vantage points. This avenue of field visits would require landowner consultation and consent, and development of a field assessment programme in conjunction with a suitably qualified ecologist(s).

Table 10: Likely significant sites identified as SNAs in Kaipara District in 2019.

Site Name	Site Number	Area	Ecological district
Kaipara New Site 02	KL002	4.13	Otamatea
Kaipara New Site 03	KL003	7.33	Tutamoe
Kaipara New Site 10	KL010	1.75	Otamatea
Kaipara New Site 11	KL011	24.83	Kaipara
Kaipara New Site 12	KL012	4.23	Tokatoka
Kaipara New Site 13	KL013	1.62	Tangihua
Kaipara New Site 32	KL032	20.78	Kaipara
Kaipara New Site 33	KL033	12.93	Kaipara
Kaipara New Site 34	KL034	8.87	Kaipara
Kaipara New Site 35	KL035	4.02	Kaipara
Kaipara New Site 36	KL036	25.87	Kaipara
Kaipara New Site 43	KL043	3.82	Kaipara
Kaipara New Site 47	KL047	1.68	Kaipara
Kaipara New Site 48	KL048	5.95	Kaipara
Kaipara New Site 64	KL064	9.37	Tutamoe
Barfoot's Gully Shrubland	KL069	18.94	Kaipara
Black Lake and Shrubland	KL070	4.14	Kaipara
Chadwick Road Wetland	KL071	4.12	Otamatea
Clarke's Lake and Wetland	KL072	2.98	Kaipara
Harrison Wetland	KL073	32.72	Kaipara
Ngatawhiti Road Wetland	KL081	8.10	Kaipara
Phoebe's Lake and Wetland	KL085	2.14	Kaipara
Scotty's Camp Road Shrubland	KL086	28.84	Kaipara
Upper Arātāpu Creek Shrubland	KL087	36.66	Kaipara
Wainui Shrubland	KL089	14.56	Tokatoka
Wightmans Lawrence Road Swamp	KL091	9.83	Rodney
Part of Kelly's Bay/ Punahaere Creek Estuary, Shrubland and Forest	KL093	16.76	Kaipara
ROTO/3	KL094	11.50	Kaipara

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NORTHLAND SIGNIFICANCE CRITERIA FROM THE RPS WITH ASSOCIATED GUIDELINES AND LIMITED EXAMPLES

Criteria	Guidelines	Examples
1. Representativeness 1(a)(i) & (ii) Regardless of its size, the <u>ecological site</u> is largely indigenous vegetation or habitat of indigenous fauna that is representative, typical or characteristic of the natural diversity at the relevant and recognised ecological classification and scale to which the <u>ecological site</u> belongs: 1(a)(i) if the <u>ecological site</u> comprises largely indigenous vegetation types and 1(a)(ii) is typical of what would have existed circa 1840.	This assessment is undertaken at the ecological district scale. Representative vegetation and habitats are those that are typical of those that would have been present at a baseline of 1840, i.e. prior to the bulk of European settlement. At this time, the Northland Region would already have been affected by fires lit by Polynesian settlers in earlier periods. This means that representative indigenous vegetation and habitats will include successional vegetation types such as gumland and mānuka/kānuka scrub. Indigenous vegetation types or indigenous fauna assemblages that are the most similar in composition and structure to those that would have been present in 1840 are ranked the highest. As most indigenous vegetation types and fauna assemblages have been modified to some extent, modified examples will often be the closest in composition and structure to the 1840 condition, and thus rank highly for representativeness.	High representativeness value (meets threshold): Good quality examples of: • Kauri forest in Tutamoe Ecological District; coastal forest at Bream Head, Manaia Ecological District, and Whangaruru North Head, Whangaruru Ecological District. • Large raupō-dominant wetland systems in Tangihua Ecological District. • Dunelands in Te Pahi Ecological District, Aupōuri Ecological District, and Kaipara Ecological District. • Riverine and alluvial kahikatea forest, e.g. Manganui River. • Wet heathlands including large intact gumland systems, e.g. Lake Ohia, Kaimaumau-Motutangi Wetlands, Ahipara Plateau (refer to Appendix 2 for definitions). • Lower montane and cloud forest habitats of the Waima Range, Tutamoe Ecological District. Moderate representativeness value (modified but meets threshold): • Wet heathlands, including gumlands and ironstone heaths, with some invasion of woody species (e.g. Kerikeri Airport). • Moderate to large wetland systems with some exotic component, e.g. Rototuna forestry supports extensive wetlands characterised by raupō and sedgeland, but they have been invaded to varying extents by pampas and willow. • Small to moderate sized remnants of kānuka forest and scrub on dunes (e.g. Poutō peninsula) with some exotic component, e.g. small amounts of wilding pine and/or pampas. • Moderate to large inland forest and scrub remnants, e.g. Maungapohatu Bush, Hokianga Ecological District. Low representativeness value (does not meet threshold for this criterion): • Isolated wetlands dominated by raupō (noting that these systems may still meet other criteria such as rarity and size). • Grazed remnants of kānuka forest and scrub, e.g. Poutō Peninsula. Highly typical and characteristics (meets threshold):
1(a)(i) & (iii) Regardless of its size, the <u>ecological site</u> is	This assessment is undertaken at the ecological district or regional scale. This criterion relates specifically to the	

Criteria	Guidelines	Examples
largely indigenous vegetation or habitat of indigenous fauna that is representative, typical or characteristic of the natural diversity at the relevant and recognised ecological classification and scale to which the <u>ecological site</u> belongs: 1(a)(i) if the <u>ecological site</u> comprises largely indigenous vegetation types, and 1(a)(iii) is represented by faunal assemblages in most of the guilds expected for the habitat type.	faunal assemblage of the site being assessed. The highest ranked sites would include habitats where the assemblage of a specific fauna group (e.g. beetles) was close to the composition and structure that would be expected, where representatives of the natural range of indigenous vertebrate fauna groups are present (e.g. indigenous birds, lizards, frogs, bats, fish) or where the assemblage contains representatives of each of the feeding guilds of a single fauna group (e.g. among birds, nectivorous, frugivorous, herbivorous, and insectivorous species).	- Estuaries that support natural assemblages of shore and wading birds such as Poutō estuaries within the Kaipara Harbour, Parengarenga Harbour. - Forest providing habitat for bellbird (<i>Anthornis melanura</i>), kākūpā/kererū (<i>Hemiphaga novaeseelandiae</i>), tomtit (<i>Petroica macrocephala</i>) or toutoutwai (North Island robin; <i>P. longipes</i>) in addition to more widely distributed indigenous forest bird species (e.g. pīwakawaka/<i>Rhipidura fuliginosa</i>, tūī/<i>Prothemadera novaeseelandiae</i>). - Freshwater wetlands providing habitat for a wide range of indigenous fauna, including species now uncommon or of restricted distribution such as Waitangi Wetlands, Kerikeri Ecological District, which are habitat for spotless crane, and Northland mudfish. Low (does not meet threshold for this criterion): - Habitats where only one or two widely distributed indigenous bird species are present (e.g. grey warbler (<i>Gerygone igata</i>) and fantail (<i>Rhipidura fuliginosa</i>)).
1(b)(i) The <u>ecological site</u> is a large example of indigenous vegetation or habitat of indigenous fauna.	This assessment focuses on large examples of types of indigenous vegetation and habitats of indigenous fauna assessed at the ecological district scale. Whether the vegetation is a large example of its type will depend on the pattern of vegetation remaining in the relevant ecological district. For example, a one-hectare example of indigenous swamp forest in Kaipara Ecological District might be considered large, whereas one hectare of indigenous forest in Tutamoe Ecological District might be considered small.	High - very large sites (meets threshold): - Dunelands in Te Pahi Ecological District and Aupōuri Ecological District. - Large raupō-dominant wetland systems in Tangihua Ecological District. - Extensive secondary forest, including coastal forest and kauri forest, in the Whangaruru Ecological District (e.g. Russell Forest) and Whangaroa Ecological District, e.g. North Whangaroa. Moderate - moderately large sites (meets threshold): - Dunelands in the Waipū Ecological District, Rototuna wetlands and saltmarsh in Kaipara Ecological District. Low representative value (does not meet threshold for this criterion): - Small areas of indigenous forest and scrub.
1(b)(ii) The <u>ecological site</u> contains a combination of landform and indigenous vegetation and habitat of indigenous fauna, that is considered to be a good example of its type at the relevant and recognised ecological classification and scale.	This assessment is made at the ecological district scale and relates to indigenous vegetation and habitat for indigenous fauna that is of good quality and not substantially degraded by anthropogenic activities or exotic species (pest plants and animals). The ecological site should be representative of vegetation types and habitat of indigenous fauna that currently occur in the ecological district and not only historically, i.e. prior to 1840.	High value - good example of type (meets threshold): - Russell State Forest in Kerikeri Ecological District, Valley floor to ridge forest in Puketi Forest in Puketi Ecological District. Moderate example of type (meets threshold): - Lowland forest in the Brynderwyn Ranges in Waipū Ecological District. Low representative value (does not meet threshold for this criterion): - Sites that are significantly degraded by stock, pest plants or pest animals or other anthropogenic activities.

Criteria	Guidelines	Examples
2. Rarity/Distinctiveness		
2(a)(i) The <i>ecological site</i> comprises indigenous ecosystems or indigenous vegetation types that are either 'Acutely Threatened' or 'Chronically Threatened' Land Environments associated with LENZ Level 4.	This assessment is made at the national scale of Level IV LENZ environment. The Threatened Environment Classification (Walker <i>et al.</i> 2015) provides information on land environments which retain less than 20% of their original indigenous cover, i.e. 'Acutely Threatened' and 'Chronically Threatened'.	High values for rarity/distinctiveness (meets threshold): - Indigenous vegetation within the site that occurs on 'Acutely Threatened' or 'Chronically Threatened' land environments as per LENZ Level IV, e.g. Ruakaka River forest remnants in the Waipū Ecological District and the Awanui River forest remnants in Aupōuri Ecological District. • Does not meet threshold: - No part of the site is situated on 'Acutely Threatened' or 'Chronically Threatened' land environments as per LENZ Level IV.
2(a)(ii) The <i>ecological site</i> comprises indigenous ecosystems or indigenous vegetation types that excluding wetlands, are now less than 20% of their original extent.	This assessment is made at the scale of the Northland Region, the relevant ecological district, and/or Level IV LENZ environment. Any example of an indigenous vegetation type or fauna habitat that is reduced to less than 20% of its original extent at any one or more of these scales would meet the threshold of this indicator.	Ecosystems/vegetation types that are below 20% of their original extent (meet threshold): - Coastal forest (e.g. Bream Head); gumlands, wet heathlands (including gumland); riparian kahikatea forest; dunelands. • Ecosystems/vegetation types with over 20% remaining (does not meet threshold): - Inland totara forest on hills. - Kānuka forest, e.g. Opua Forest, Kerikeri Ecological District and Russell Forest in Whangaruru Ecological District.
2(a)(iii) The <i>ecological site</i> comprises indigenous ecosystems or indigenous vegetation types that excluding <i>man made wetlands</i> , are examples of the wetland classes that either otherwise ¹ trigger any other criteria or exceed any of the area thresholds.	This criterion refers to wetlands dominated by indigenous vegetation that meet any other criteria within the RPS or exceed minimum area thresholds for wetland types as follows: saltmarsh (0.5 hectares), shallow water (0.5 hectares), swamp (0.4 hectares), bog (0.2 hectares), wet heathlands (0.2 hectares) and, marsh, fen, and ephemeral wetlands or seepage/flush (0.05 hectares). Wetland boundaries should be delineated using the Landcare Research/Manaaki Whenua wetland delineation tool.	Good wetlands (meets threshold): - A wetland that exceeds the relevant threshold for its class, or meets any one or more of the other criteria within the RPS. There are numerous examples of wetlands that meet the minimum size thresholds for their type. • Does not meet threshold: - A wetland smaller than the relevant threshold for its class that does not meet any of the other criteria within the RPS.
2(b) Indigenous vegetation or habitat of indigenous fauna that supports one or more indigenous taxa that are threatened, at risk, data deficient or uncommon,	This criterion refers to the presence of 'Threatened', 'At Risk', 'Data Deficient' or uncommon species. It should be assessed at a regional and national scale. A higher threshold is justifiable for mobile indigenous fauna such as birds and bats, as they tend not to depend on a single habitat patch, whereas the persistence of plants and less mobile fauna such as many invertebrates, lizards and some	High rarity value for threatened taxa (meets threshold): - Indigenous Plants and Fauna with Restricted Ranges: site contains one or more species that are 'Threatened' or 'At Risk' according to the threat system classification of Townsend <i>et al.</i> (2008); or are uncommon to the Northland Region. - Sites supporting flax snail, e.g. Te Paki.

¹ Wording taken from Northland RPS

Criteria	Guidelines	Examples
either nationally or at the relevant ecological scale.	fish species depends heavily on the maintenance of specific sites. National threat classifications of indigenous species are reviewed at approximately three-yearly intervals, but different groups tend to be reviewed at different times. The most recent threat classification for each species group should be referred to. Information on local rarity is likely to be available from the Department of Conservation, Regional and District Councils, and from PNAP survey reports. Note: All species within Myrtaceae have been classified as 'Threatened' or 'At Risk', including those that are relatively common in many areas (e.g. kānuka/<i>Kunzea robusta</i>, mānuka/<i>Leptospermum scoparium</i> var. <i>scoparium</i>, and rātā (<i>Metrosideros</i> spp.) species, due to the potential threat posed by myrtle rust. If one or more of these species is present at a site expert discretion should be applied and the site should not be classified as significant purely on the presence of one of those species. Several of the Myrtaceae present in Northland were previously classified as 'Threatened', 'At Risk' or regionally significant prior to myrtle rust being present in New Zealand. For example, Bartlett's rātā (<i>Metrosideros bartlettii</i>) is only known from three forest remnants near Spirits Bay and clearly triggers this criterion for significance. Likewise, regionally significant Myrtaceae include carmine rātā (<i>M. carminea</i>), southern rātā (<i>M. umbellata</i>), pōhutukawa × northern rātā hybrids (<i>M. excelsa</i> × <i>M. robusta</i>), <i>M. fulgens</i> (yellow flower), and maire tawake (<i>Syzygium maire</i>). Kauri has been classified as 'Threatened-Nationally Vulnerable' due to the threat posed by the kauri dieback. This is a precautionary approach; if kauri is present at a site expert discretion should be applied and the site should not be classified as significant purely on the presence of kauri.	• All wetlands with Northland mudfish in the Kaikohe and Kerikeri Ecological Districts. • Waima Forest - supports the only known population of <i>Ackama nubicola</i>. • Surville cliffs - many threatened endemic species adapted to ultramafic soils. • Lake Ohia - high diversity of threatened plant species including <i>Phylloglossum drummondii</i> (Threatened-Nationally Endangered), and the orchid <i>Calochilus herbaceus</i> (Threatened-Nationally Critical). • Whirinaki skink - only known from one hectare at Bream Head, Manaia Ecological District. • Mobile Indigenous Fauna: site contains one or more species that are 'Threatened' or 'At Risk' according to the threat system classification of Townsend et al. 2008. • Offshore islands that support 'Threatened' or 'At Risk' sea bird species. • Larger forest and shrubland tracts in the Kerikeri and Whangaruru Ecological Districts that are habitat for North Island brown kiwi. Low rarity value for threatened taxa (does not meet threshold for this criterion): • Site contains no 'Threatened', 'At Risk', or regionally significant species.
2(c)(i) The <u>ecological site</u> contains indigenous vegetation or an indigenous	This criterion refers to the presence of taxa classified as endemic to Northland-Auckland Region and therefore applied at the regional scale.	High value for endemism (meets threshold): • Site contains one or more species, or a vegetation type that are endemic to the Northland-Auckland region. For example: - Kauri snail (<i>Paraphanta busbyi</i>)

Criteria	Guidelines	Examples
taxon that is endemic to the Northland-Auckland region.		- Flax snail at Bream Head - Whirinaki skink - only known from one hectare at Bream Head, Manaia Ecological District • Many land snail species are endemic to small areas of Northland, such as <i>Allodiscus camelinus</i> which is endemic to a forest remnant on Mount Camel (Aupōuri Ecological District), and <i>Hyalolaoma "Waimatenui"</i> endemic to Mount Hikurangi (Whangarei Ecological District). • <i>Ackama nubicola</i>, <i>Coprosma waima</i>, <i>Olearia crebra</i> - all endemic to high peaks in Waima Forest. • <i>Veronica flavida</i> - endemic to upland forest in western Northland, from near Kaitaia, south to Tangihua. • <i>Veronica rivalis</i> - endemic to riverbanks in central Northland, from Waipoua Forest in the west to Kerikeri in the east. • Low value for endemism (does not meet threshold): no species endemic to the Northland-Auckland region occurs at the site.
2(c)(ii) The <i>ecological site</i> contains indigenous vegetation or an indigenous taxon that is at its distributional limit within the Northland region.	This criterion refers to the presence of taxa or vegetation type classified as at or near to its distributional limit in Northland Region and is therefore applied at the regional scale. A higher threshold is justifiable for mobile indigenous fauna such as birds and bats, as they tend not to depend on a single habitat patch, whereas the persistence of plants and less mobile fauna such as many invertebrates, lizards and some fish species depends heavily on the maintenance of specific sites. Information on distributional limits is likely to be available from the Department of Conservation, Regional and District Councils, and from PNAP survey reports.	High value for distributional limits (meets threshold): • Site contains one or more species or vegetation types that reach their distributional limit within Northland. • Te Paki Ecological District is at the northern tip of the North Island, thus • a significant proportion of New Zealand's endemic species reach their • northern limit of distribution here. The only opportunities for species • to occur further north in New Zealand are on the Three Kings and • Kermadec Islands. Species that reach their northern limit in Te Paki Ecological District include kauri, tānekaha, kawaka, the podocarps rimu, kahikatea, tōtara. • Hall's tōtara, miro, mataī, manao, and many broadleaf species such as • taraire, tawa, tītoki, and whauwhaupaku. • The high peaks of western Northland (primarily in the Tutamoe Ecological District) are the northern limit for a suite of plant species of montane or cloud forest habitats, including <i>Blechnum fluviatile</i>, <i>Dracophyllum traversii</i> and <i>Ascarina lucida</i>. • Mangonui is the northern limit for hard beech (<i>Fuscospora truncata</i>), Maungataniwha Ecological District. • Taraire forest reaches its northern distribution limit at Spirits Bay, Te Paki Ecological District. • Wet mixed podocarp forest reaches its northern distribution limit at Radar Bush, Te Paki Ecological District. • Forested hill country in Waipu Ecological District from North River south to the Brynderwyn Range is the northern limit for Hochstetter's frog in New Zealand. • Flax snail (<i>Placostylus</i> spp.) which is restricted to Northland reaches its southern limit in Whangaruru Ecological District.

Criteria	Guidelines	Examples
		Low rarity value for distributional limits (does not meet threshold for this criterion): Site contains no species or vegetation types that reach their distributional limit within Northland.
2(d)(i) The <i>ecological site</i> contains indigenous vegetation or an association of indigenous taxa that is distinctive [or] of a restricted occurrence.	This criterion should be applied at the ecological district, regional, and national scales.	High distinctiveness value for indigenous vegetation or taxa (meets threshold): Examples include: - Gumlands. - Cloud forest on Hauturu, Tutamoe Ecological District. - Lowland swamp forest remnants with <i>Astelia grandis</i> and <i>Syzygium maire</i> (e.g. Puhipuhi, Whangaruru Ecological District). - Surville Cliff ultramafics. - Wet heathland on ironstone (e.g. Kerikeri Airport) Low distinctiveness value for indigenous vegetation or taxa (does not meet threshold for this criterion): - A site that doesn't contain vegetation or association of taxa that is distinctive or of restricted occurrence e.g. kānuka/mānuka scrub and forest.
2(d)(ii) The <i>ecological site</i> contains indigenous vegetation or an association of indigenous taxa that is part of an <i>ecological unit</i> that occurs on an originally rare ecosystem.	This assessment refers to any unusual natural biotic or abiotic characteristics of a site which contribute to its value, for example vegetation associated with unusual landforms such as dune slacks or gumlands. 'Originally rare' ecosystems should be assessed at the national scale classified by Williams <i>et al.</i> (2007). Twenty-eight are known to occur in Northland Region: Rare indigenous ecosystems and vegetation types known or likely in Northland Coastal Active sand dunes Coastal rock stacks Shell barrier beaches Coastal turfs Stony beach ridges Shingle beaches Stable sand dunes Dune deflation hollows Coastal cliffs on quartzose rocks	High rarity value (meets threshold): 'Ultramafic seacliffs' such as Surville Cliffs are classified as historically rare ecosystems. The soils of Surville Cliffs at the northern tip of Te Hiku (formerly Aupōuri) Peninsula are sub-tropical laterites, derived from serpentinite, and are unique. These serpentinite soils have been created by the underlying geology comprising Ophiolite which is an ultramafic rock, i.e. high in toxic heavy metals. These conditions have given rise to a unique assemblage of endemic plant species that are able to tolerate the toxic heavy metals such as <i>Veronica punicea</i>, <i>Carex ophiolitica</i>, and <i>Pittosporum serpentinum</i>. - Seabird-burrowed soils (Moturoa Islands). - Waimango Lagoon, Aupōuri Ecological District. - Ephemeral wetlands ponded by lava flows (Te Taro Pond, Kerikeri Ecological District). - Wet heathlands (e.g. Kerikeri Airport gumland, Kerikeri Ecological District). Low distinctiveness value for indigenous vegetation or taxa (does not meet threshold for this criterion): - The site does not occur on an originally rare ecosystem.

Criteria	Guidelines	Examples
	<u>Coastal cliffs on acidic rocks</u> <u>Basic coastal cliffs & rock outcrops</u> Calcareous coastal cliffs <u>Ultra-basic sea-cliffs</u> <u>scree & rock outcrops</u> <u>Seabird guano deposits</u> <u>Seabird-burrowed soils</u> <u>Marine mammal rookeries & haul-outs</u> damp sand-plains <u>Dune slacks</u> <u>Damp sand plains</u> <u>Wetlands</u> <u>Lake margins</u> <u>Bogs</u> <u>Lagoons</u> <u>Estuaries</u> <u>Seepages & flushes (including soda springs)</u> <u>Ephemeral wetlands including wet heathlands</u> <i>Note: Habitat that delineates as wetland and is wet heathland (including gumland and ironstone heathland) are included in wetlands because it is recognised that they are seasonally wet and are often mosaics including other low fertility habitat such as bogs and heathland.</i> <u>Inland</u> <u>Volcanic debris flows</u> <u>Volcanic boulder- fields</u> Basic cliffs scarps and tors <u>Ultra-basic hills</u> <u>Cloud forests</u> Vegetation on extremely low fertility soils <u>Geothermal systems</u> <u>Heated (dry) ground</u> Fumeroles Geothermal streamsides <u>Hydrothermally altered (now cool) ground</u>	

Criteria	Guidelines	Examples
	Subterranean or semi-subterranean Cave entrances Caves and cracks in karst Sinkholes Subterranean basalt fields	
2(d)(iii) The <i>ecological site</i> contains indigenous vegetation or an association of indigenous taxa that is an indigenous ecosystem and vegetation type that is naturally rare or has developed as a result of an unusual environmental factor(s) that occur or are likely to occur in Northland.	This criterion is applied at the regional scale and relates to the entire assemblage of taxa at a site. The assemblages may comprise plant or fauna species, although in most cases they will relate to plants.	High value for naturally rare ecosystem or vegetation type (meets threshold): • Fire induced gumland/heathland. • Waiomio Limestone Caves. • Exposures of subfossil kauri forests and stumps, with associated wetland flora at Lake Ohia margins. • Basalt karst at Waiere boulders in Kaikohe Ecological District. Low value for naturally rare ecosystem or vegetation type (does not meet threshold for this criterion): • No distinctive features present at the site.
2(d)(iv) The <i>ecological site</i> contains indigenous vegetation or an association of indigenous taxa that is an example of nationally or regionally rare habitat as recognised in the New Zealand Marine Protected Areas Policy.	This criterion is applied at the national and regional scale. The coastal marine environment is the responsibility of regional councils and is therefore outside of the scope of these guidelines. Northland Regional Council has already identified Significant Ecological Areas in the Proposed Regional Plan within the coastal and marine areas.	
3. Diversity and Pattern		
3(a)(i) Indigenous vegetation or habitat of indigenous fauna that contains a high diversity of indigenous ecosystem or habitat types.	This assessment is made at the scale of Northland Region and the relevant ecological district. Diversity is the number of indigenous habitats or ecosystem types contained within an area. Changes in the distribution and abundance of habitats across the site is driven by underlying variation in the environment, e.g. aspect differences, natural disturbance, altitudinal change, soil characteristics. It can be represented by successional sequences, vegetation mosaics, and ecological gradients. High habitat diversity allows ecological processes (e.g. dispersal, nutrient	High diversity of indigenous ecosystems or habitats (meets threshold): • Twenty-four vegetation types on the Ahipara Massif (Ahipara Ecological District) including coastal cliffs, dunes, sand flats, swamps, hillslope forest, and gumland plateaus. • Altitudinal changes in vegetation on Tutamoe Range - includes cloud forest at its summit together with areas of swamp forest. • Te Paki dunes and wetland complex - extensive areas of duneland that form a sequence with high quality wetland and lagoon systems, e.g. Paranoa Swamp, Waitahora Lagoon and Waitahora Lakes Wetland Complex, which is a large wetland complex that supports many Threatened, At Risk, and regionally significant plant and animal species.

Criteria	Guidelines	Examples
	transfer) to operate and resources (e.g. nesting and feeding habitat) to be shared across different ecosystems.	Moderate diversity of indigenous ecosystems or habitats (meets threshold): - Bream Head coastal forest - intact transition from pōhutukawa-dominant forest at sea level to mixed broadleaved species at higher altitudes. Low (does not meet threshold for this criterion): - Isolated patches of kānuka, e.g. Poutō Peninsula. - Small, isolated patches of raupō reedland that support only a few plant species. (noting that they could still meet other criteria, e.g. rarity).
3(a)(ii) Indigenous vegetation or habitat of indigenous fauna that contains a high diversity of indigenous taxa.	This assessment is made at the scale of Northland Region and the relevant ecological district. Diversity is the number of indigenous taxa contained in an area. Like habitats should be compared with like because diversity differs markedly between different habitats, e.g. indigenous sand dune vegetation has relatively low species diversity compared with indigenous broadleaved forest vegetation. Changes in the distribution and abundance of species across the site is driven by underlying variation in the environment, e.g. aspect differences, natural disturbance, altitudinal change, soil characteristics. High species diversity provides for greater interaction between species.	High taxa diversity value (meets threshold): - Surville Cliffs. - Te Pahi duneland and wetland complexes. - Bream Head coastal forest. - Large, intact areas of gumland, e.g. Lake Ohia. - Large tracts of inland forest on hills, e.g. Puketū Forest, Tangihua Forest, Waima Forest. - Offshore islands, e.g. Poor Knights, Hen and Chickens - good example of interaction of tuatara and seabirds. Moderate taxa diversity value (meets threshold): - Areas of gumland that may have been adversely affected by invasive woody species. - Large, relatively intact area of kānuka on dunes, e.g. Poutō Peninsula. Low taxa diversity value (does not meet threshold for this criterion): - Small remnants of kānuka; raupō-dominant wetlands.
3(b) Changes in taxon composition reflecting the existence of diverse natural features or ecological gradients.	Changes in the distribution and abundance of species across the site, and is driven by underlying variation in the environment, e.g. aspect differences, natural disturbance, altitudinal change, soil characteristics. It can be represented by successional sequences, vegetation mosaics, and ecological gradients. This criterion may overlap substantially with Criteria 3(a)(i) and 3(c).	High diversity of natural features or gradients (meets threshold): - Saltmarsh to freshwater wetland, to riparian forest, e.g. Mangataipa Scenic Reserve, Hokianga Ecological District. Moderate diversity of natural features or gradients (meets threshold): - Forest tracts with transitions from lowland to lower montane forest, e.g. Mangakahia Forest, Tangihua Ecological District. Low diversity of natural features or gradients (does not meet threshold for this criterion): - Forest areas of similar altitude and geology with one or few vegetation types.
3(c) Intact ecological sequences.	Ecological sequences are spatial changes in occurrences of taxa, typically across environmental gradients. An example of an intact ecological sequence is the change in	High value for intact ecological sequences (meets threshold): Te Pahi dunes and wetland complex - extensive areas of duneland that form a sequence with high quality wetland and lagoon systems.

Criteria	Guidelines	Examples
	plant species composition from the sea shore through to coastal forest comprising saline wetland, brackish wetland and freshwater wetland to low-stature scrub and into forest. Intact ecological sequences are uninterrupted sequences where natural environmental gradients are maintained.	- Duneland-coastal kānuka forest sequence on Poutō Peninsula. Moderate value for intact ecological sequences (meets threshold): - Full sequences with less intact components. Vegetation types or invertebrate assemblages with a moderate degree of species richness for their type. e.g. transitions from mangroves and saltmarsh in the Bay of Islands to coastal forest remnants. Low value for intact ecological sequences (does not meet threshold for this criterion): - Ecologically isolated vegetation types with low species richness for their type (e.g. patches of isolated remnants of grazed kānuka forest, exotic-dominated sand dune vegetation backed by pasture).
4. Ecological Context		
4(a) Indigenous vegetation or habitat of indigenous fauna is present that provides or contributes to an important ecological linkage or network, or provides an important buffering function.	The degree to which an area of indigenous habitat or vegetation links to other such areas or contributes to local ecological processes. Such areas have a significant ecological function if they are within the flying distance for most indigenous bird species (i.e. from their habitat areas) or if they provide a buffer from adverse effects such as predation, disturbance, or pollution. The intention of this criterion is to ensure that the ecological functions of areas of indigenous vegetation are taken into consideration. The criterion places buffering, or ecological linkages to maintain ecological processes in the surrounding environment at a higher priority than sites which are poorly buffered and do not contribute to the functioning of surrounding ecosystems. The values of the site itself may be relatively low (e.g. a small area of indigenous scrub) but its context may give the site a higher value (e.g. the scrub links two large and high value forest remnants). Degraded vegetation and habitat can nevertheless potentially have important ecological context value.	High value for ecological linkage, buffer, or network (meets threshold): - Continuous riparian forest; wetlands with direct links to river systems; forest areas that are important for kiwi dispersal; vegetation buffering wetlands from external influences such as sedimentation and excessive nutrient inputs; and regenerating kānuka forest surrounding old growth podocarp-hardwood forest. Also: - Bream Head coastal forest - likely to provide an important stepping stone/linkage between the mainland and the Hen and Chicken Islands. - Indigenous forest corridors alongside rivers in the Kerikeri Ecological District that links larger areas of kiwi habitat. - Tangihua Forest, Puketi Forest, Russell Forest. Moderate value for ecological linkage, buffer, or network (may meet threshold): - Moderate to large remnants of kānuka and secondary forest within a pastoral landscape or exotic forest provide linkages to larger tracts of indigenous forest. Low value for ecological linkage, buffer, or network (unlikely to meet threshold for this criterion): - Smaller and/or degraded remnants that are geographically isolated from larger areas of habitat. Note that many covenanted sites are very small and isolated, and are therefore unlikely to meet this criterion.
4(b) The <u>ecological site</u> plays an important	The assessment is made at the scale of Northland Region or the relevant ecological district. This criterion seeks to	Important wetland functions (meets threshold):

Criteria	Guidelines	Examples
hydrological, biological or ecological role in the natural functioning of riverine, lacustrine, palustine, estuarine, plutonic (including karst), geothermal or marine system.	identify examples of wetlands that provide wider benefits to areas and ecosystems beyond their immediate boundaries.	• Extensive floodplain swamp forest wetlands in the Manganui River Complex in Tokatoka Ecological District. • Wetlands on a river floodplain that are hydrologically connected to a river. • Riparian wetlands on streams that flow into a coastal lagoon. • Wetlands that provide an important seed source for other wetlands in the catchment. Low wetland functionality (unlikely to meet threshold for this criterion): • An isolated valley floor swamp in the catchment of a small second order stream. • Small ephemeral wetlands on terraces with no hydrological connections to streams or rivers. • Toe slope fens in intensively-farmed catchments, recognising that the size threshold may be met if the sites are characterised predominantly by indigenous vegetation.
4(c) The <i>ecological site</i> is an important habitat for critical life history stages of indigenous fauna including breeding/ spawning, roosting, nesting, resting, feeding, moulting, refugia or migration staging point (as used seasonally, temporarily or permanently).	This criterion places importance on areas of vegetation or habitat that provide important habitat for indigenous fauna. This can apply to common fauna, so long as the habitat is an important one, for example, an area of forest that supports a large number of indigenous species of avifauna or large numbers of particular species. Many indigenous fauna species congregate on a seasonal or daily basis and these congregation sites will often be important and rank as significant under this criterion.	High fauna habitat value (meets threshold): • Any site that supports seabird colonies, e.g. ōi (grey-faced petrel; <i>Pterodroma macroptera</i>) at Bream Head and Cape Reinga; spawning sites for indigenous fish, high tide bird roosts in estuaries, wetlands with habitat for black mudfish or Northland mudfish (<i>Neochanna heleioides</i>); exotic trees that provide known roosting habitat for long-tailed bats (<i>Chalinolobus tuberculatus</i>). The Draft National Policy Statement on Indigenous Biodiversity suggests that exotic plantation forests should not be classified as being significant (BCG 2018). It is recognised, however, that exotic habitats in Northland can provide important habitat and corridors for mobile fauna, e.g. long-tailed bats in pine plantations and North Island brown kiwi in exotic forest and orchards in Kerikeri Ecological District. Rather than SNA status, such known habitats could potentially be subject to different District Plan provisions. For example, they might require: - Monitoring and maintenance to ensure that values are maintained or enhanced. - Changes to other land uses could become discretionary or non-complying. Moderate fauna habitat value (meets threshold): • For example, small saline-freshwater ecotones that supports vegetation used by inanga as spawning habitat, e.g. oioi salt meadow grading into <i>Bolboschoenus</i> and associated freshwater riparian sedges and grasses. Low fauna habitat value (does not meet threshold for this criterion): • Intensively grazed exotic pasture.



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