

Natural areas of Otamatea Ecological District (Northland Conservancy)

Reconnaissance Survey Report for the Protected Natural Areas Programme

2006



Department of Conservation
Te Papa Atawhai

Natural areas of Otamatea Ecological District (Northland Conservancy)

Reconnaissance Survey Report for the Protected Natural Areas Programme

Jenny Lux and Sarah Beadel

Published by
Department of Conservation
Northland Conservancy
P.O. Box 842
Whangarei, New Zealand

© Crown copyright 2006

This report may be freely copied provided that the Department of Conservation is acknowledged as the source of the information.

Cover photograph: Te Opu Scenic Reserve at the centre of Whakapirau Creek (December 2005).

Photo supplied by Simon Cocker (Littoralis Landscape Architecture).

Topographic base maps reproduced under the Land Information New Zealand Map Authority 1991/42: Crown Copyright Reserved

Cataloguing-in-Publication data

Natural areas of Otamatea Ecological District : reconnaissance survey report for the Protected Natural Areas Programme / Jenny Lux and Sarah Beadel. Whangarei, N.Z. : Dept. of Conservation, Northland Conservancy, 2006.

1 v. : maps ; 30 cm

ISBN 0-478-14084-3

ISSN 0112-9252
(New Zealand Protected Natural Areas Programme (Series))

(Contract report (Wildland Consultants) ; no. 1242)

I. Lux, Jenny II. Beadel, S. M. (Sarah M.) III. Wildland Consultants Ltd. IV. New Zealand. Dept. of Conservation. Northland Conservancy.

1. Ecological surveys 2. New Zealand 3. Northland Region 4. Otamatea Ecological District (N.Z.)

Foreword

This report forms part of a series of reconnaissance survey reports for the Protected Natural Areas Programme (PNAP) in the Northland Conservancy of the Department of Conservation. It describes the significant natural areas of the Otamatea Ecological District within Northland Conservancy, and was surveyed during the summer of 2005/06. There has been no previous comprehensive survey and review of ecological information of this geographical area. This report therefore provides a significant information resource for the Department of Conservation, iwi, landowners, Kaipara District Council, Northland Regional Council, resource management planners, interest groups, and the general public to help conserve natural areas.

The Northland Conservancy part of Otamatea Ecological District is a geologically diverse landscape of low rolling hills dissected by three inner arms of the northern Kaipara Harbour. On land, much of the original vegetation cover and wildlife habitat has been lost; however, the estuarine habitats are still relatively intact. Calm, mangrove-filled inlets, extensive mudflats, and small remnants of diverse coastal forest characterise the gentle, estuarine nature of this part of the Ecological District. The shallow intertidal areas are essential winter feeding grounds for many New Zealand waders, which migrate within New Zealand, as well as for large flocks of transequatorial migrant birds resident over summer.

This study provides an objective assessment of the elements of nature that remain, protected and unprotected, their value as representative examples of our natural heritage, and their relative ecological significance. The focus of the Protected Natural Areas Programme is to provide this information and guidance. The challenge then is for the community to work collaboratively to protect and enhance these natural areas.

The Otamatea (Northland Conservancy) PNAP survey report was prepared by Wildland Consultants Ltd under contract to the Department of Conservation.



Chris Jenkins

Conservator Northland

CONTENTS

Foreword 3

Abstract 6

Map 1. Location map of Otamatea Ecological District (Northland Conservancy) 7

Map 2. Map of surveyed sites, Otamatea Ecological District (Northland Conservancy) 8–9

1. Introduction 10

1.1 The Protected Natural Areas Programme 10
1.2 Ecological Regions and Districts 11
1.3 Contents of this report 12
1.4 Otamatea Ecological District (Northland Conservancy) 12

2. Methods 14

2.1 General approach 14
2.2 Consultation with landowners 14
2.3 Data acquisition and analysis 15
2.4 Criteria for assessment of habitat significance 16
2.5 Updating of data 17

3. Ecological character 19

3.1 Topography/geology 19
3.2 Climate 19
3.3 Vegetation 20
3.3.1 Historical 20
3.3.2 Broad pattern 22
3.3.3 Main vegetation types 24
3.3.4 Species of botanical interest 35
3.3.5 Threatened plant species 36
3.3.6 Regionally significant plant species 37
3.3.7 Threatened and regionally significant plant species not recorded recently in the Northland part of the Ecological District 39
3.4 Fauna 41
3.4.1 Overview of indigenous fauna 41
3.4.2 Threatened bird species 42
3.4.3 Regionally significant bird species 47
3.4.4 Threatened mammal species 48
3.4.5 Threatened landsnail species 48
3.4.6 Threatened lizard species 49
3.4.7 Regionally significant lizard species 49
3.4.8 Threatened fish species 49
3.4.9 Regionally significant fish species 50
3.5 Threats 50

4. Site descriptions 53
4.1 Level 1 sites 53
4.2 Level 2 sites 290
5. Summary and conclusions 421
5.1 Analysis of existing protected areas 421
5.2 Priority natural areas for protection in the Northland Conservancy part of Otamatea Ecological District 427
6. Acknowledgements 478
7. References 479
8. Appendices 482
8.1 Field survey form 482
8.2 Letter to ratepayers and news media item 484
8.3 Categories of threat 486
8.4 Categories of importance for geological sites 492
8.5 Checklist of plant species in Otamatea Ecological District (Northland Conservancy) 493
8.6 Common plant names used in text 499
8.7 Checklist of fauna species in Otamatea Ecological District (Northland Conservancy) 501
8.8 Glossary of terms 505
9. Index of sites 509

List of Tables

Table A: Links between the PNAP criteria and Levels 1 and 2 21
Table B: Classification of vegetation and related map units 30
Table C: List of Level 1 sites 70
Table D: List of Level 2 sites 290
Table E: Summary of Level 1 sites with immediate priority for protection 428

Table 1: Protected Natural Areas Network in the Northland Conservancy part of Otamatea Ecological District 422
Table 1A: List of vegetation types within protected areas in Otamatea Ecological District (Northland Conservancy) 424
Table 2: Ecological units recorded in Otamatea Ecological District (Northland Conservancy) and protection status 430
Table 3: Summary of site evaluations 465

Abstract

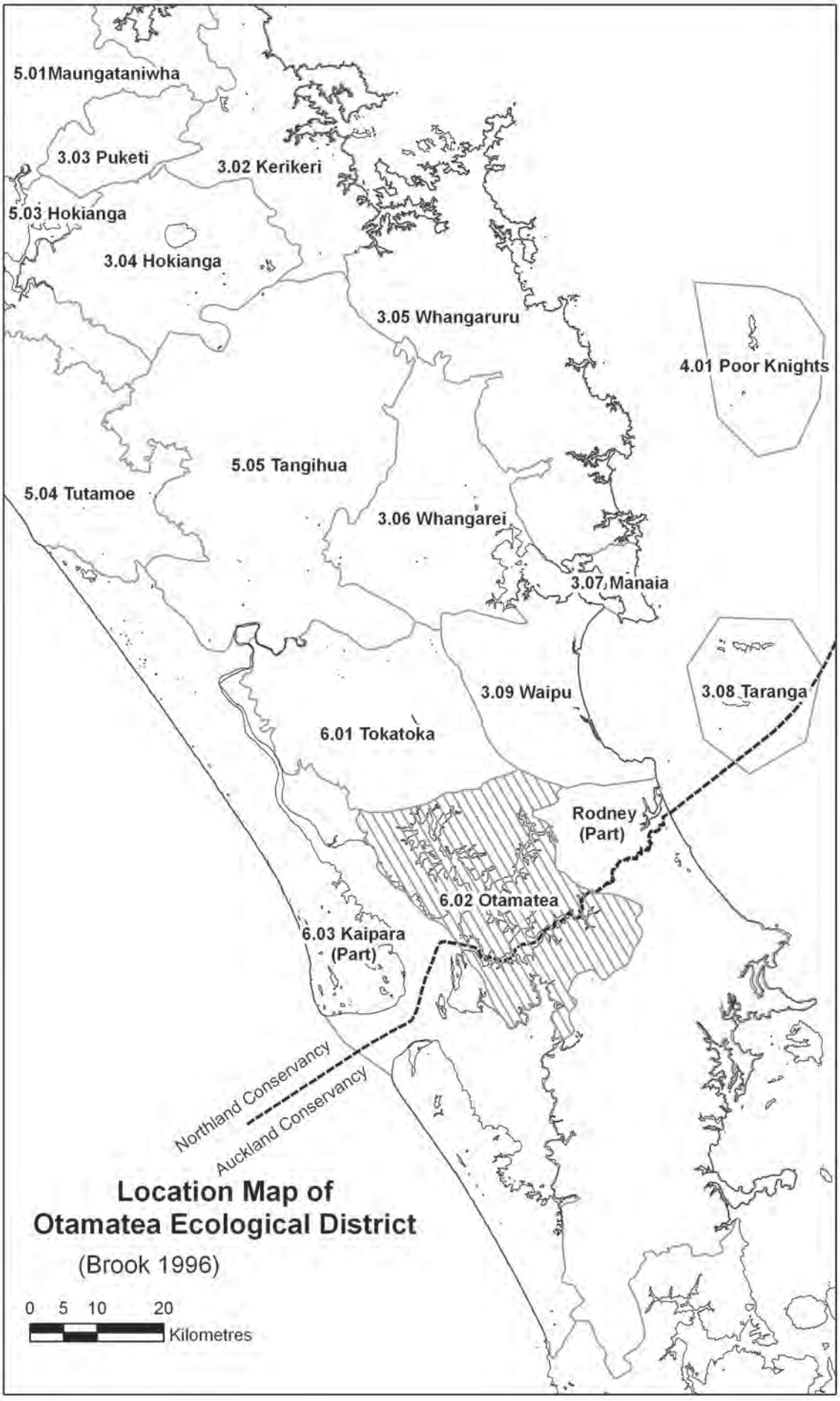
Otamatea Ecological District is located in the Kaipara Ecological Region, centred on the northern inner arms of the Kaipara Harbour. It straddles the boundary between the Northland and Auckland Conservancies of the Department of Conservation, which is the same boundary as that between the Northland and Auckland Regional Councils. The Northland part encompasses 57,950 ha, or 55% of the Ecological District. The balance of Otamatea Ecological District located within Auckland Region has been previously surveyed by the Auckland Regional Council (Davis 2002).

Natural areas of ecological significance in the Northland Conservancy part of the Ecological District were identified using information from a reconnaissance survey undertaken over the summer of 2005/06, together with information from a range of reports, existing databases and other unpublished information.

The Northland part of the Otamatea Ecological District (Otamatea ED Northland) comprises three major tidal saltwater rivers (Arapaoa, Otamatea, and Oruawharo), each of which has extensive mangroves, mudflats and sandflats. The intertidal zone is a nationally and internationally important habitat for both non-migratory and migratory bird species. Estuarine and harbour areas in the Northland part of the Ecological District support populations of eight 'acutely threatened', six 'chronically threatened', and eight 'at risk' bird species. The low, undulating hills between Hukatere peninsula in the north-west, Whakapirau to Batley in the centre, and Puketotara Peninsula in the south, support hundreds of small remnants of a diverse range of secondary coastal and semi-coastal forest types, as well as a limited extent of regenerating shrubland. The main freshwater wetlands are constructed ponds and lakes.

At total of 209 natural areas were identified. Of these, 126 are considered to be of particular ecological significance (Level 1 sites). In a small number of cases the values of natural areas could not be assessed fully due to insufficient information.

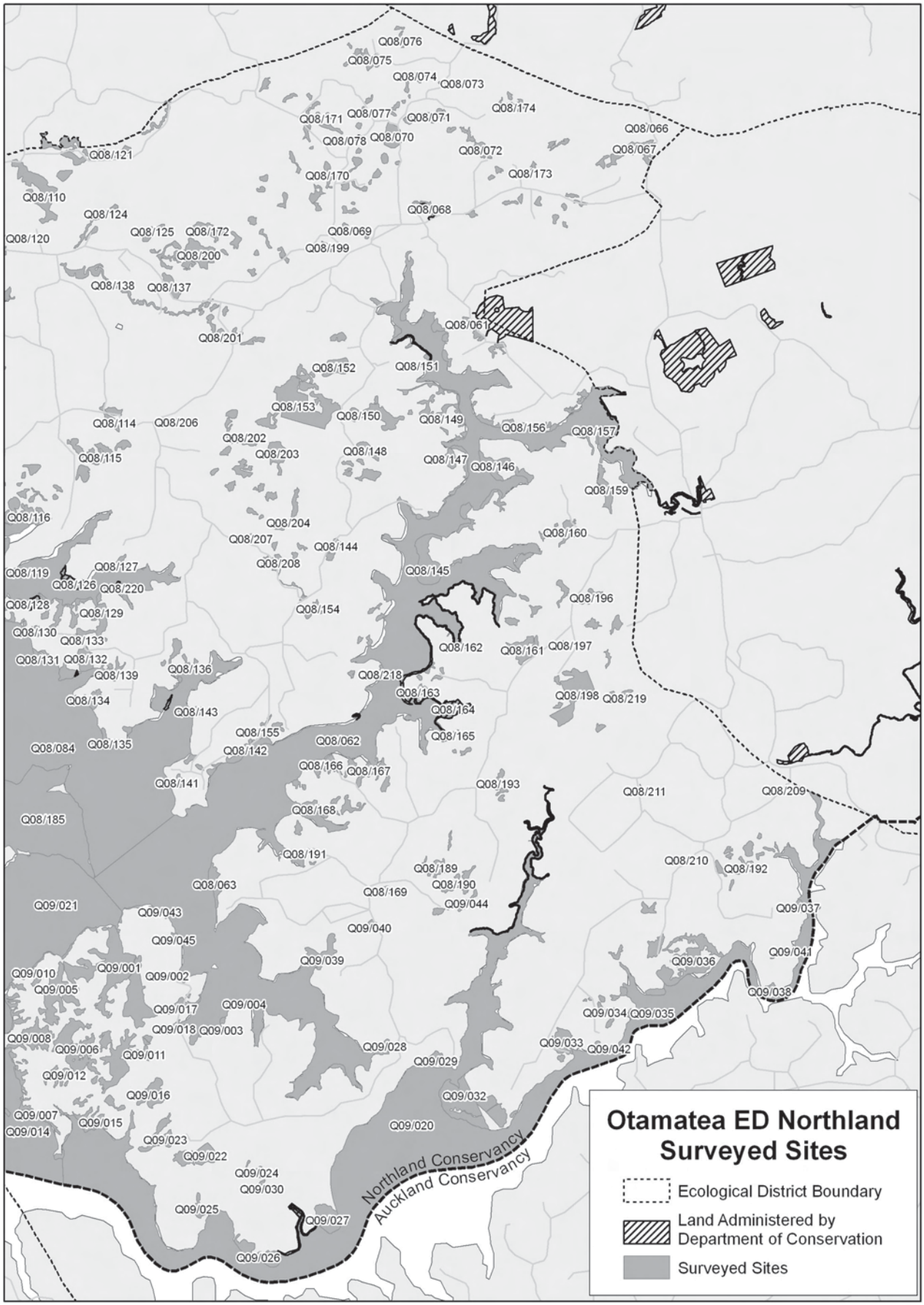
Much of the former indigenous biodiversity of Otamatea ED Northland has been lost. At present, only 9.75% of the land cover is indigenous vegetation or wetland, though estuarine habitat is still extensive. Only 1.6% of the identified natural areas are currently legally protected, which is less than 0.5% of the total extent of Otamatea ED Northland. The physical and legal protection of priority areas for protection would constitute an important first step in safeguarding remaining indigenous biodiversity. However, even if all priority areas were protected, there would still be a need for ecological restoration of additional corridors, linkages and buffers to provide better connectivity between natural areas.



Map 1. Location map of Otamatea Ecological District.



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


Q08/076
Q08/075
Q08/074
Q08/073
Q08/174
Q08/171
Q08/077
Q08/071
Q08/066
Q08/078
Q08/070
Q08/072
Q08/067
Q08/121
Q08/170
Q08/173
Q08/110
Q08/068
Q08/124
Q08/125
Q08/172
Q08/069
Q08/120
Q08/199
Q08/200
Q08/138
Q08/137
Q08/061
Q08/201
Q08/152
Q08/151
Q08/153
Q08/150
Q08/149
Q08/114
Q08/206
Q08/156
Q08/157
Q08/202
Q08/203
Q08/148
Q08/115
Q08/147
Q08/146
Q08/159
Q08/116
Q08/204
Q08/160
Q08/207
Q08/144
Q08/208
Q08/119
Q08/127
Q08/145
Q08/126
Q08/220
Q08/196
Q08/128
Q08/154
Q08/129
Q08/130
Q08/133
Q08/162
Q08/161
Q08/197
Q08/131
Q08/132
Q08/136
Q08/139
Q08/218
Q08/163
Q08/198
Q08/219
Q08/134
Q08/164
Q08/143
Q08/155
Q08/165
Q08/084
Q08/135
Q08/062
Q08/142
Q08/166
Q08/167
Q08/141
Q08/193
Q08/211
Q08/209
Q08/168
Q08/185
Q08/191
Q08/189
Q08/210
Q08/192
Q08/063
Q08/190
Q08/169
Q09/021
Q09/044
Q09/037
Q09/043
Q09/040
Q09/045
Q09/039
Q09/041
Q09/036
Q09/010
Q09/001
Q09/002
Q09/005
Q09/038
Q09/017
Q09/004
Q09/034
Q09/035
Q09/018
Q09/003
Q09/008
Q09/028
Q09/033
Q09/042
Q09/006
Q09/011
Q09/029
Q09/012
Q09/016
Q09/032
Q09/007
Q09/015
Q09/020
Q09/014
Q09/023
Q09/022
Q09/024
Q09/030
Q09/025
Q09/027
Q09/026
Northland Conservancy
Auckland Conservancy
Otamatea ED Northland
Surveyed Sites
Ecological District Boundary
Land Administered by
Department of Conservation
Surveyed Sites

Natural areas of Otamatea Ecological District (Northland Conservancy)

Reconnaissance Survey Report for the Protected Natural Areas Programme

Jenny Lux and Sarah Beadel

Published by
Department of Conservation
Northland Conservancy
P.O. Box 842
Whangarei, New Zealand

© Crown copyright 2006

This report may be freely copied provided that the Department of Conservation is acknowledged as the source of the information.

Cover photograph: Te Opu Scenic Reserve at the centre of Whakapirau Creek (December 2005).

Photo supplied by Simon Cocker (Littoralis Landscape Architecture).

Topographic base maps reproduced under the Land Information New Zealand Map Authority 1991/42: Crown Copyright Reserved

Cataloguing-in-Publication data

Natural areas of Otamatea Ecological District : reconnaissance survey report for the Protected Natural Areas Programme / Jenny Lux and Sarah Beadel. Whangarei, N.Z. : Dept. of Conservation, Northland Conservancy, 2006.

1 v. : maps ; 30 cm

ISBN 0-478-14084-3

ISSN 0112-9252
(New Zealand Protected Natural Areas Programme (Series))

(Contract report (Wildland Consultants) ; no. 1242)

I. Lux, Jenny II. Beadel, S. M. (Sarah M.) III. Wildland Consultants Ltd. IV. New Zealand. Dept. of Conservation. Northland Conservancy.

1. Ecological surveys 2. New Zealand 3. Northland Region 4. Otamatea Ecological District (N.Z.)

Foreword

This report forms part of a series of reconnaissance survey reports for the Protected Natural Areas Programme (PNAP) in the Northland Conservancy of the Department of Conservation. It describes the significant natural areas of the Otamatea Ecological District within Northland Conservancy, and was surveyed during the summer of 2005/06. There has been no previous comprehensive survey and review of ecological information of this geographical area. This report therefore provides a significant information resource for the Department of Conservation, iwi, landowners, Kaipara District Council, Northland Regional Council, resource management planners, interest groups, and the general public to help conserve natural areas.

The Northland Conservancy part of Otamatea Ecological District is a geologically diverse landscape of low rolling hills dissected by three inner arms of the northern Kaipara Harbour. On land, much of the original vegetation cover and wildlife habitat has been lost; however, the estuarine habitats are still relatively intact. Calm, mangrove-filled inlets, extensive mudflats, and small remnants of diverse coastal forest characterise the gentle, estuarine nature of this part of the Ecological District. The shallow intertidal areas are essential winter feeding grounds for many New Zealand waders, which migrate within New Zealand, as well as for large flocks of transequatorial migrant birds resident over summer.

This study provides an objective assessment of the elements of nature that remain, protected and unprotected, their value as representative examples of our natural heritage, and their relative ecological significance. The focus of the Protected Natural Areas Programme is to provide this information and guidance. The challenge then is for the community to work collaboratively to protect and enhance these natural areas.

The Otamatea (Northland Conservancy) PNAP survey report was prepared by Wildland Consultants Ltd under contract to the Department of Conservation.



Chris Jenkins

Conservator Northland

CONTENTS

Foreword 3

Abstract 6

Map 1. Location map of Otamatea Ecological District (Northland Conservancy) 7

Map 2. Map of surveyed sites, Otamatea Ecological District (Northland Conservancy) 8–9

1. Introduction 10

1.1 The Protected Natural Areas Programme 10
1.2 Ecological Regions and Districts 11
1.3 Contents of this report 12
1.4 Otamatea Ecological District (Northland Conservancy) 12

2. Methods 14

2.1 General approach 14
2.2 Consultation with landowners 14
2.3 Data acquisition and analysis 15
2.4 Criteria for assessment of habitat significance 16
2.5 Updating of data 17

3. Ecological character 19

3.1 Topography/geology 19
3.2 Climate 19
3.3 Vegetation 20
3.3.1 Historical 20
3.3.2 Broad pattern 22
3.3.3 Main vegetation types 24
3.3.4 Species of botanical interest 35
3.3.5 Threatened plant species 36
3.3.6 Regionally significant plant species 37
3.3.7 Threatened and regionally significant plant species not recorded recently in the Northland part of the Ecological District 39
3.4 Fauna 41
3.4.1 Overview of indigenous fauna 41
3.4.2 Threatened bird species 42
3.4.3 Regionally significant bird species 47
3.4.4 Threatened mammal species 48
3.4.5 Threatened landsnail species 48
3.4.6 Threatened lizard species 49
3.4.7 Regionally significant lizard species 49
3.4.8 Threatened fish species 49
3.4.9 Regionally significant fish species 50
3.5 Threats 50

4. Site descriptions 53
4.1 Level 1 sites 53
4.2 Level 2 sites 290
5. Summary and conclusions 421
5.1 Analysis of existing protected areas 421
5.2 Priority natural areas for protection in the Northland Conservancy part of Otamatea Ecological District 427
6. Acknowledgements 478
7. References 479
8. Appendices 482
8.1 Field survey form 482
8.2 Letter to ratepayers and news media item 484
8.3 Categories of threat 486
8.4 Categories of importance for geological sites 492
8.5 Checklist of plant species in Otamatea Ecological District (Northland Conservancy) 493
8.6 Common plant names used in text 499
8.7 Checklist of fauna species in Otamatea Ecological District (Northland Conservancy) 501
8.8 Glossary of terms 505
9. Index of sites 509

List of Tables

Table A: Links between the PNAP criteria and Levels 1 and 2 21
Table B: Classification of vegetation and related map units 30
Table C: List of Level 1 sites 70
Table D: List of Level 2 sites 290
Table E: Summary of Level 1 sites with immediate priority for protection 428

Table 1: Protected Natural Areas Network in the Northland Conservancy part of Otamatea Ecological District 422
Table 1A: List of vegetation types within protected areas in Otamatea Ecological District (Northland Conservancy) 424
Table 2: Ecological units recorded in Otamatea Ecological District (Northland Conservancy) and protection status 430
Table 3: Summary of site evaluations 465

Abstract

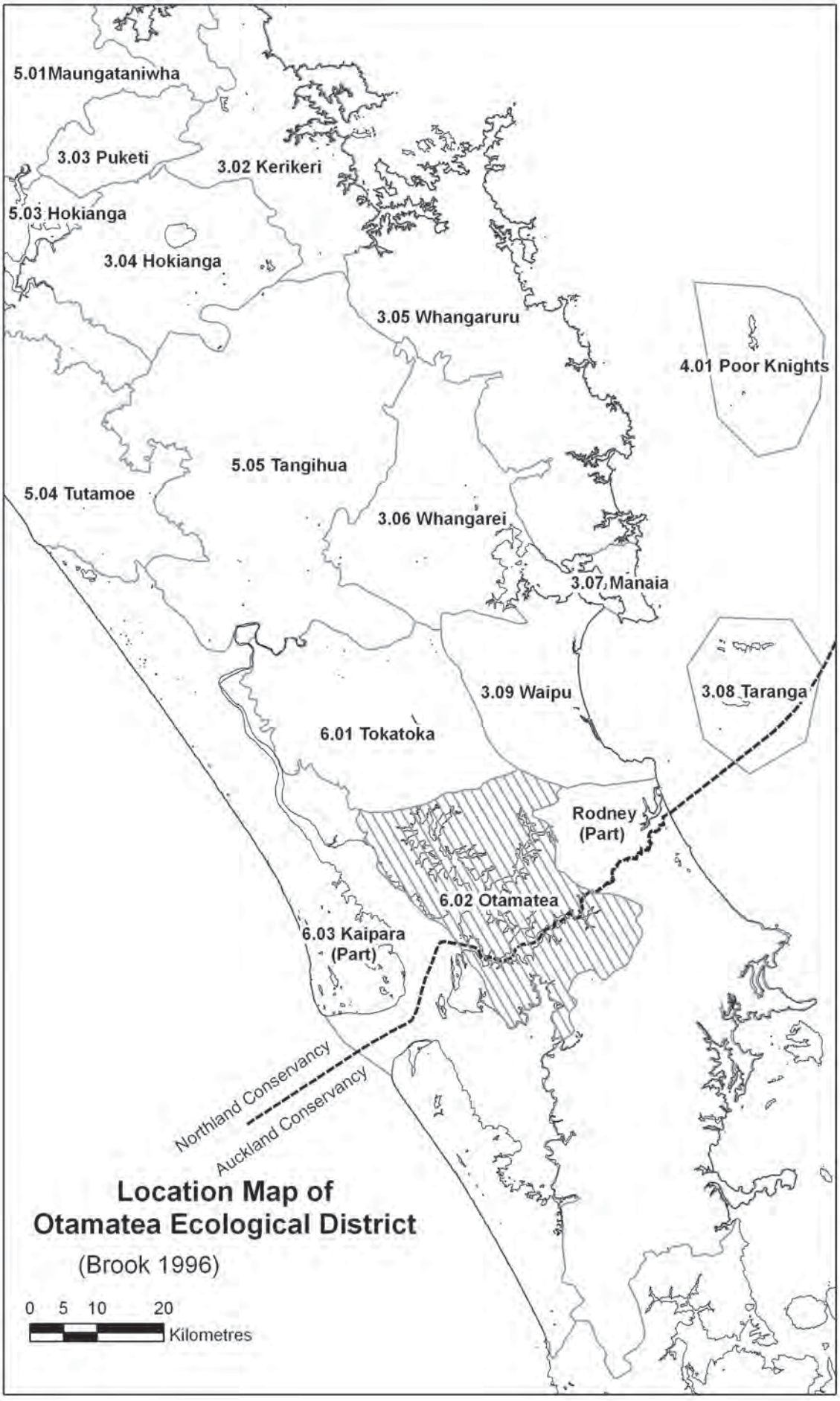
Otamatea Ecological District is located in the Kaipara Ecological Region, centred on the northern inner arms of the Kaipara Harbour. It straddles the boundary between the Northland and Auckland Conservancies of the Department of Conservation, which is the same boundary as that between the Northland and Auckland Regional Councils. The Northland part encompasses 57,950 ha, or 55% of the Ecological District. The balance of Otamatea Ecological District located within Auckland Region has been previously surveyed by the Auckland Regional Council (Davis 2002).

Natural areas of ecological significance in the Northland Conservancy part of the Ecological District were identified using information from a reconnaissance survey undertaken over the summer of 2005/06, together with information from a range of reports, existing databases and other unpublished information.

The Northland part of the Otamatea Ecological District (Otamatea ED Northland) comprises three major tidal saltwater rivers (Arapaoa, Otamatea, and Oruawharo), each of which has extensive mangroves, mudflats and sandflats. The intertidal zone is a nationally and internationally important habitat for both non-migratory and migratory bird species. Estuarine and harbour areas in the Northland part of the Ecological District support populations of eight 'acutely threatened', six 'chronically threatened', and eight 'at risk' bird species. The low, undulating hills between Hukatere peninsula in the north-west, Whakapirau to Batley in the centre, and Puketotara Peninsula in the south, support hundreds of small remnants of a diverse range of secondary coastal and semi-coastal forest types, as well as a limited extent of regenerating shrubland. The main freshwater wetlands are constructed ponds and lakes.

At total of 209 natural areas were identified. Of these, 126 are considered to be of particular ecological significance (Level 1 sites). In a small number of cases the values of natural areas could not be assessed fully due to insufficient information.

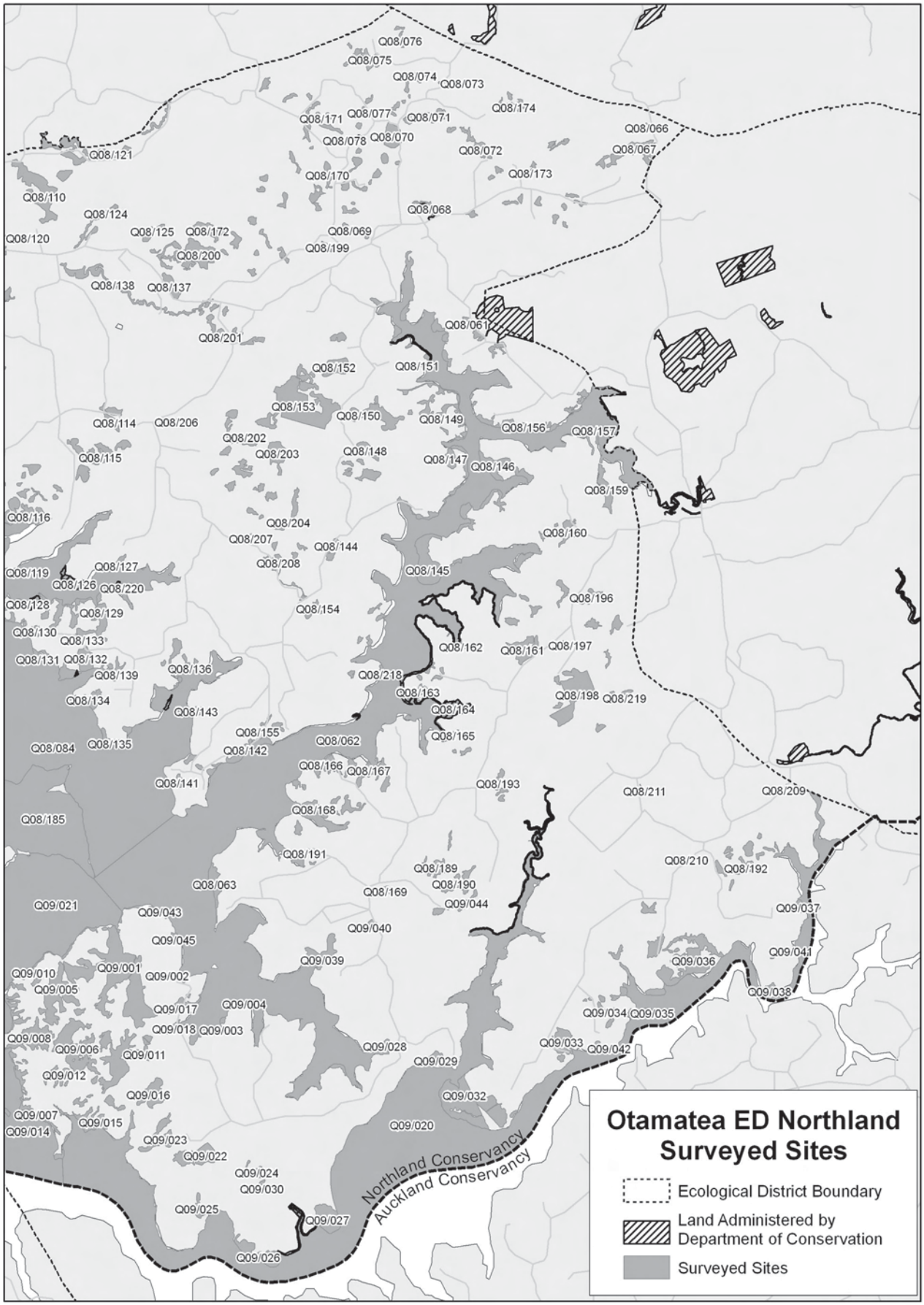
Much of the former indigenous biodiversity of Otamatea ED Northland has been lost. At present, only 9.75% of the land cover is indigenous vegetation or wetland, though estuarine habitat is still extensive. Only 1.6% of the identified natural areas are currently legally protected, which is less than 0.5% of the total extent of Otamatea ED Northland. The physical and legal protection of priority areas for protection would constitute an important first step in safeguarding remaining indigenous biodiversity. However, even if all priority areas were protected, there would still be a need for ecological restoration of additional corridors, linkages and buffers to provide better connectivity between natural areas.



Map 1. Location map of Otamatea Ecological District.



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


Q08/076
Q08/075
Q08/074
Q08/073
Q08/174
Q08/171
Q08/077
Q08/071
Q08/066
Q08/078
Q08/070
Q08/072
Q08/067
Q08/121
Q08/170
Q08/173
Q08/110
Q08/068
Q08/124
Q08/125
Q08/172
Q08/069
Q08/120
Q08/199
Q08/200
Q08/138
Q08/137
Q08/061
Q08/201
Q08/152
Q08/151
Q08/153
Q08/150
Q08/149
Q08/114
Q08/206
Q08/156
Q08/157
Q08/202
Q08/203
Q08/148
Q08/115
Q08/147
Q08/146
Q08/159
Q08/116
Q08/204
Q08/160
Q08/207
Q08/144
Q08/208
Q08/119
Q08/127
Q08/145
Q08/126
Q08/220
Q08/196
Q08/128
Q08/154
Q08/129
Q08/130
Q08/133
Q08/162
Q08/161
Q08/197
Q08/131
Q08/132
Q08/136
Q08/139
Q08/218
Q08/163
Q08/198
Q08/219
Q08/134
Q08/164
Q08/143
Q08/155
Q08/165
Q08/084
Q08/135
Q08/062
Q08/142
Q08/166
Q08/167
Q08/141
Q08/193
Q08/211
Q08/209
Q08/168
Q08/185
Q08/191
Q08/189
Q08/210
Q08/192
Q08/063
Q08/190
Q08/169
Q09/021
Q09/044
Q09/037
Q09/043
Q09/040
Q09/045
Q09/039
Q09/041
Q09/036
Q09/010
Q09/001
Q09/002
Q09/005
Q09/038
Q09/017
Q09/004
Q09/034
Q09/035
Q09/018
Q09/003
Q09/008
Q09/028
Q09/033
Q09/042
Q09/006
Q09/011
Q09/029
Q09/012
Q09/016
Q09/032
Q09/007
Q09/015
Q09/020
Q09/014
Q09/023
Q09/022
Q09/024
Q09/030
Q09/025
Q09/027
Q09/026
Northland Conservancy
Auckland Conservancy
Otamatea ED Northland
Surveyed Sites
Ecological District Boundary
Land Administered by
Department of Conservation
Surveyed Sites

1. Introduction

1.1 THE PROTECTED NATURAL AREAS PROGRAMME

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

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

The goal of the programme is:

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

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

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

This report differs from many PNAP reports in that:

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

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

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

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

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

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

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

The Convention on Biological Diversity (1992), under the auspices of the United Nations Environment Programme, has promoted the concepts of biodiversity and ecosystems. These concepts are reflected in this report by the number of sites, their size, and the emphasis on buffers and linkages in the identification and assessment of sites.

1.2 ECOLOGICAL REGIONS AND DISTRICTS

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

An Ecological District is a local part of New Zealand where the topographical, geological, climatic, soil and biological features, including the broad cultural pattern, produce a characteristic landscape and range of biological communities. Ecological Districts are grouped together into a series of Ecological Regions on the basis of shared general ecological and geological characteristics. In some cases, a single very distinctive Ecological District is given the status of Ecological Region to emphasise its uniqueness (Technical Advisory Group 1986).

The New Zealand Biological Resources Centre coordinated the mapping of the country into more than 268 Districts in 1982. Ecological Regions and Districts in northern New Zealand have since been redefined to more accurately classify ecological variation within the Northland and Auckland areas (Brook 1996).

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

1.3 CONTENTS OF THIS REPORT

This report presents the findings of the reconnaissance phase of the PNAP survey of the Otamatea Ecological District which falls within Northland Conservancy boundaries (hither to referred to as Otamatea ED Northland). The methods and terminology follow those defined and specified in the Hokianga Ecological District PNAP report (Conning *et al.* 2004). The Auckland Conservancy part of the Otamatea Ecological District has been previously surveyed and reported on, using different methods (Davis 2002). This report includes maps and brief descriptions of all of the indigenous natural areas within the Northland Conservancy part of the ED which were surveyed during the summer of 2005/06, together with an analysis of the main vegetation types and information on threatened species and other taxa of scientific and/or conservation interest. The assessment of representativeness, local rarity/ uncommonness and relative extents of different habitat types is made *in reference to the Northland Conservancy part of the ED only*.

No soil sites of international, national or regional significance are known to occur within this part of the Ecological District (Arand *et al.* 1993). Important geological sites and landforms within the Northland Region, including internationally, nationally and regionally significant sites are derived from Kenny & Hayward (1996). See Appendix 8.4 for ranking criteria.

1.4 OTAMATEA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

Otamatea ED Northland covers approximately 57,950 ha encompassing three convoluted arms of the Kaipara Harbour extending far inland (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 ED 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 ED covers approximately 46,842 ha, from the southern side of the Oruawharo River southeastwards.

Otamatea ED Northland adjoins four other Ecological Districts: Rodney to the east, Waipu to the northeast, Tokatoka to the north, and Kaipara to the west.

Results of this study show that, of the natural areas identified, 74% of the extent is estuarine, 23% is forest, 3.2% is shrubland, 0.05% is freshwater wetland and 0.01% is classed as 'other vegetation'. The total area of sites recorded in this report is 16,793 ha (including harbour and estuarine areas), or 4,445 ha (excluding harbour and estuarine areas).

Significant natural features of particular note are:

- Extensive shallow mudflats and sandflats on the margins of the 'saltwater rivers'[1] (Arapaoa, Otamatea, and Oruawharo), which are both nationally and internationally important feeding and roosting sites for a migrant waders such as wrybills, Northern New Zealand dotterels, banded dotterels, eastern bar-tailed godwits, lesser knots, variable oystercatchers, pied stilts and black stilts. These rich estuarine areas are used year-round by resident sea birds such as white-faced herons, pied shags, black shags, little shags, little black shags, Caspian terns, white-fronted terns, black-backed gulls and red-billed gulls, 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 and northern NI 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 ha) contains the last remaining example of mature kauri forest left in Otamatea ED Northland. All other remaining areas of this forest type are secondary (<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 totara, kanuka, kowhai, puriri, kahikatea and kauri. Kowhai 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 pohutukawa forest and other rare coastal vegetation types.
- In the semi-coastal zone further inland, there are also many small but significant secondary forest and shrubland areas. These are rich in kanuka, totara, taraire, puriri, kahikatea and kauri. The 10 largest sites are between 75 and 428 ha.
- With the lack of natural freshwater wetlands, the importance of constructed wetlands (both ponds and lakes) cannot be underestimated for the Northland part of the ED. The open water habitat in these areas is crucial for indigenous water birds such as grey duck, paradise shelduck, grey teal, black shag, pied shag, little shag and Australasian shoveler, while reedland around the margins is important habitat for species such as spotless crake, marsh crake, Australasian bittern and banded rail. Three constructed lakes and several ponds have been described and assessed as natural areas in this report.
- The Northland part of the Ecological District is very geologically diverse and contains nine important geological sites, eight of which fall within areas of indigenous vegetation. Under pohutukawa forest on northern coast of Puketotara Peninsula (also known as 'the Funnel'), there are exposed cliffs with internationally significant erionite deposits.

---

[1] These three major arms of the inner Kaipara Harbour are traditionally referred to as 'saltwater rivers' and carry river in their names, e.g. 'Arapaoa River', 'Otamatea River' and 'Oruawharo River'. Some of their tidal tributaries are referred to either as rivers or creeks, e.g. 'Wairau River', 'Kaiwaka River' and 'Kaira Creek'.

2. Methods

2.1 GENERAL APPROACH

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

Natural areas were identified using recent aerial photography (orthophotography flown in 2002 for Northland Regional Council and Kaipara District Council) and the Sites of Special Biological Interest (SSBI) information system. Sites were identified irrespective of tenure. Consequently, natural areas which are administered by the Department of Conservation, as well as other protected areas, were also surveyed using the same methods. This provided a consistent approach to determine the representativeness of all natural areas.

Each site was mapped, allocated a generic number and described. Having evaluated the sites (see Section 2.4 below), they were grouped according to one of two levels of ecological significance. Scientific names of species for which common names have been used can be found in Appendix 8.5 (Plant species list), Appendix 8.6 (Common plant names) or Appendix 8.7 (Fauna species list).

Extensive use was made of information from biological databases and information systems such as the SSBI, the Bioweb Threatened Plants Database, the Herpetofauna Database, the NIWA Freshwater Fish Database, published information and Department of Conservation internal reports. Herbarium records from Auckland Institute and Museum (prefixed 'AK') and Te Papa, Wellington (prefixed 'WELT') were also consulted. Geographical and geological information was gained from existing published and unpublished maps.

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

2.2 CONSULTATION WITH LANDOWNERS

Personal contact with all landowners was not possible because of the magnitude and geographic range of the surveys being undertaken. Therefore, all ratepayers were advised by mail by way of a letter (Appendix 8.2) informing them of the survey programme and the reason for it. The letter was signed by the Northland Conservator of DOC and provided contacts for further

information. A press release on the survey methods and a photograph of the survey team was issued and featured in the local newspapers (see Appendix 8.2). In a few instances, permission for access was sought from landowners in person and was always given.

Te Uri o Hau are the tangata whenua of Otamatea ED Northland. Consultation was undertaken with the Te Uri o Hau Settlement Trust Office.

2.3 DATA ACQUISITION AND ANALYSIS

Methods followed those prescribed by DOC, as described in Conning *et al.* (2004).

A rapid reconnaissance field survey was carried out to record and map the ecological and geomorphological characteristics, broad habitat type and canopy vegetation of each identified natural area. Most of this work was carried out using telescopes and binoculars from vantage points on public roads or farm tracks, or from a small boat or kayak on the Kaipara Harbour.

Seven sites were not surveyed in this manner due their isolation and/or lack of visibility from a point with permitted access. In these instances, sites were identified and described from aerial photographs (flown in 2002), using nearby sites on similar topography as a guide. Information on some of these sites, therefore, remains limited, and it is likely that some vegetation types/ecological units present were not identified.

Natural areas were mapped using four broad categories of habitat type: forest, shrubland, freshwater wetland, and estuary (see Appendix 8.8 for definitions of terms, and Table B for the vegetation classification system). Estuarine habitat was always placed in separate sites from terrestrial habitat (forest, shrubland, and freshwater wetland), even though they were contiguous in many places.

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

Canopy composition based on percentage cover abundance is widely considered to be an appropriate method of describing forest stands. This technique and variations of it have been used to describe canopy composition both within New Zealand (see Atkinson 1962, 1985; Leathwick & Rogers 1996; Park & Walls 1978) and in other parts of the world (see Kershaw & Looney 1985, Mueller-Dombois & Ellenberg 1974). The specific technique for vegetation description at each site is based on the approach described in Myers *et al.* (1987).

This semi-quantitative method was selected by DOC because it could be implemented over large areas with a small number of field surveyors during a limited time period, and could be applied to all vegetation types irrespective of the height of the canopy. More detailed, and therefore more time-consuming and expensive methods, would not necessarily provide more useful information for assessing representativeness. The disadvantage of this survey approach is that it does not provide a great deal of information on the distribution of

uncommon or threatened canopy and understorey species, nor does it provide full information on the distribution of bird species or other fauna. Fauna observations were incidental only.

Species present in the 'abundant' and 'common' columns of the field survey forms were used to define the vegetation type of each ecological unit. 'Abundant' species appear first in the name, followed by 'common' species in their relative order of cover. The standard technique of identifying emergent features in the canopy (i.e. /) was not employed in this project. Details of vegetation types and geological units within each site were entered into an Excel spreadsheet. Geological units were classified into 16 categories and vegetation types into 227 categories (see Table 2). Some sites had only one vegetation type on one geological unit, while others had multiples of each. Sorting of these ecological units gave information on their frequency and extent in the study area. This information was used to determine the representativeness of each ecological unit (see Section 5. Summary and Conclusions, Table 2 (p. 430) Ecological units recorded in Otamatea ED Northland and protected status).

Other relevant information, such as fauna observations, threats, and landowner information collected incidentally, was also recorded on the survey sheet for each site. Once the field reconnaissance or survey had been completed, sites were numbered and information from other databases and information systems was incorporated into the site descriptions. Completed field survey forms are held by the Department of Conservation, Northland Conservancy Office, Whangarei.

2.4 CRITERIA FOR ASSESSMENT OF HABITAT SIGNIFICANCE

Assessment criteria follow Conning *et al.* (2004).

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

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

The conservation values of these areas were assessed using a two-level classification of habitat significance based on the PNAP ecological criteria of representativeness, rarity and special features, diversity and pattern, naturalness, habitat structure and characteristics important for the maintenance of ecosystems (buffer, linkage or corridor, size and shape) (see Table 3, p. 465).

The PNAP criterion of long-term viability has not been included in Table 3. Long-term viability was considered under the umbrella of representativeness, diversity and pattern, naturalness, size and shape. Table A outlines the links between PNAP criteria and the Level 1 and 2 criteria.

2.4.1 Level 1 sites

A Level 1 site contains significant vegetation and/or significant habitats of indigenous fauna and is defined by the presence of one or more of the following ecological characteristics:

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

2.4.2 Level 2 sites

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

- contains common indigenous species but which is not one of the best representative examples of its type;
- may be small and isolated from other habitats;
- may contain a high proportion of pest species;
- may be structurally modified e.g. forest understorey grazed;
- has not been surveyed sufficiently to determine whether it meets the criteria for Level 1 sites.

2.5 UPDATING OF DATA

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

---

[2] For the purpose of this study this means the part of Otamatea ED within the Northland Conservancy (DOC). The remainder of the ED is in Auckland Conservancy (DOC) and has been surveyed and assessed separately (Davis 2002).

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

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

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

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

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

3. Ecological character

3.1 TOPOGRAPHY/GEOLOGY

Otamatea ED Northland is characterised by rolling to moderately dissected hill country up to 207 m elevation, divided into three large and a number of smaller peninsulas by arms of the Kaipara Harbour. Much of the eastern part of the district is underlain by a structurally complex jumble of allochthonous Mangakahia Complex and Motatau Complex sedimentary rock units (including tectonic blocks of Cretaceous sandstone, mudstone and siliceous mudstone; and Paleogene mudstone, glauconitic sandstone and micritic limestone; incorporated within melange). In the west are overlying sequences of Lower Miocene Waitemata Group sandstone and conglomerate, and Waitakere Group basaltic andesite lava flows, hyaloclasite, pumiceous tuff breccia, and associated volcaniclastic sediments (Brook 1996).

3.2 CLIMATE

3.2.1 General

Northland's climate is influenced by its northerly location (latitudes 34°S to 36°S), the narrowness of the peninsula (no areas are more than 50 km from the sea), and its generally low topography (most areas are below 150 m asl).

Summers are warm and humid, and winters mild. Mean annual air temperatures vary from 14.0°C to 16.0°C. Air frosts are infrequent in Northland, but ground frosts (< –1°C at 2.5 cm above ground) can be common, especially inland. Annual sunshine hours vary little across Northland, with 2000 at low altitudes, decreasing to 1700 at higher altitude sites.

Rainfall peaks in winter, with the driest seasons being summer and early autumn. Mean annual rainfall ranges from 1200 mm to 2400 mm. The predominant winds are from the southwest, with inland areas being more sheltered than exposed coastal sites (mean annual wind speeds range from 10 to 30 km/hour). Gale force winds can occur at any time, but are most common in winter. The occurrence of fog and thunderstorms varies from 1 to 75 and 3 to 16 days per year, respectively (Moir *et al.* 1986).

3.2.2 Climate of Otamatea Ecological District (Northland Conservancy)

Few specific climate data are available for the Otamatea Ecological District. However, mean annual rainfall in the ED parallels orography, increasing from approximately 1200 mm in western coastal areas to 1450 mm further east. Mean annual rainfall is 1239 mm at Claren Brae, an inner harbour climate station just outside the northwestern boundary of the ED. Monthly rainfall there is highest between May and August (range 119–146 mm) and lowest between November and March (range 74–90 mm).

Mean air temperatures in western areas tend to be lower than the Northland average, varying between 14.0°C and 15.5°C (Moir *et al.* 1986). However, at Pouto, situated at the north head of the Kaipara Harbour just outside the Otamatea ED to the west, mean annual air temperature between 1993 and 2004 was relatively high for the region, at 17.2°C. The mean annual rainfall for the same period was 1134.5 mm (Pearce *et al.* 2005).

3.3 VEGETATION

3.3.1 Historical

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, Maori oral history, accounts of timber milling, and written observations made by early European travelers and inhabitants.

During several millennia prior to the human settlement of New Zealand, which occurred around 800 years before present (BP) (McGlone & 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 6000 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 50% 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 ED Northland lies below 100 m asl, it is possible that large portions of the ED 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 hapu of Ngati Whatua (OTS 2006). Their ancestral waka, Mahuhu-ki-te-Rangi, commanded by Rongomai, made landfall at either Pouto (McKinnon (ed.) 1997) or Taporapora (Byrne 2002), and after periods of Ngati Apa and Kawerau (a Waitakere-based iwi) influence, Ngati Whatua emerged as the dominant people of the Kaipara around the 18th century. Their defeat in 1825 by Ngapuhi 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 Ngati Whatua 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 Maori (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 ED Northland:

- Smith and Brothers at Matakohe on the Arapaoa River (1881–1906) cut approximately 70,000–75,000 board feet per week, but not all of this wood was from within the local area. Logs were floated down the Awaroa Creek near Dargaville and rafted to Matakohe where they were processed. Large steam vessels at Pahi were used to take the wood to market in Auckland or Sydney.
- William Chadwick at Whakapirau on the Arapaoa River (1881–1912) cut approximately 50,000–60,000 board feet per week. They sledged logs down to the tidal waters and rafted them to Whakapirau, suggesting that the timber may have come from nearby.
- Nicholsons and Sons at Topuni on the Oruawharo River (1870–1900) cut approximately 50,000–60,000 board feet per week. Kauri was abundant in the 'Oruawharo block'.
- Bradley and Mander at Raekau (opposite Port Albert) on the Oruawharo River (1888–1901) cut approximately 60,000–70,000 board feet per week. By 1901 most of the kauri in the district had been logged and the mill had become uneconomic.

These establishments had about half the milling capacity of those in the kauri timber and commerce rich area around Dargaville on the Northern Wairoa River (Ryburn 1999).

Jane Mander, early New Zealand novelist and daughter of a sawmiller, spent parts of her childhood living in European logging settlements on the inner arms of the Kaipara Harbour. Her most famous novel, 'The Story of a New Zealand River', was set in late 1800s Otamatea River country, and evokes images of lush forest all around the waterways.

> *From the mangrove banks to the sky a great variety of trees in fifty shades of evergreen covered every yard of space. There was a riotous spring colour in the forest, voluptuous gold and red in the clumps of yellow kowhai and crimson rata, and there were masses of greeny white clematis and bowers of pale tree ferns to rest the satiated eye. Stiff laurel-like puriris stood beside the drooping fringe of the lacy rimu; hard blackish kahikateas brooded over the oak like titoki with its lovely scarlet berry.* (Mander 1920).

Before 1890 some valuable timber was lost through burn-offs, which were commonly set alight after the kauri had been removed, destroying other native 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'. Puriri, rimu, totara and matai were also considered valuable. Kahikatea was used for butter and fruit boxes, as were matai, taraire and 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 ED Northland had been decimated.

The first popular text on New Zealand's plant life (Laing & Blackwell 1906) featured hundreds of photographs and vivid descriptions of coastal forest plants from around Pahi. Ellen Blackwell (author) and her brother Frank Blackwell photographed and studied the flora around Frank's farm north of Aute Bay on the Pahi Peninsula (Scott 1987). Of the mangrove forests, Blackwell wrote:

> *... at high tide, a mangrove swamp is often a pleasant place to punt in, for then the somewhat sickly odour of the mud is replaced by the fresh smell of the sea.*

She also noted weka, or 'mangrove-hens' in the mangroves. While it is a delightful read, this book does not provide many specific details on plant distribution in the local area.

Pine plantations at Tinopai and Topuni (still operating today) were established in the 1930s. Immediately previous to this, Tinopai was an apple orchard area, and Topuni supported a milling industry based on kauri (Ryburn 1999). During the 20th century, pastoral farming established itself as the main industry in the Otamatea area, and only recently has there been substantial growth in bach and lifestyle block development around the harbour fringes.

3.3.2 Broad pattern

Otamatea ED 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 ED Northland is its fragmented character. Compared with Waipu ED to the northeast or Rodney ED 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 ED Northland.

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

Pohutukawa forest is most common on exposed western coasts of the Hukatere and Puketotara Peninsulas while totara–kowhai and totara–puriri 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 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, kanuka forest and treeland are the main early successional vegetation types.

Taraire forest is more prevalent on hillslopes away from the coast, while most kowhai forest occurs close to the sea. Puriri tends to be spread throughout, but is generally more abundant near coast. On the few alluvial soils present in Otamatea ED Northland, tall kahikatea and totara are the characteristic trees, along with frequent titoki.

Totara 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 is extremely uncommon, recorded only once in this survey. Tanekaha graces the driest parts of the landscape. Kauri is a member of a different gymnosperm family, the Araucariaceae, and is most similar to tanekaha in its ability to compete on poor, dry soils.

It appears that most secondary vegetation successions start with kanuka and/or manuka, though manuka is much less common in this ED than kanuka. Over time, kanuka and manuka are succeeded by broadleaved species (for example taraire, puriri, karaka, kowhai, 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 ED Northland are unfenced, and as a result kanuka, totara, and totara–kanuka 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 (one small site only).

As stated earlier, one of the special features of Otamatea ED 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.

3.3.3 Main vegetation types

OVERVIEW

All terrestrial vegetation in Otamatea ED Northland can be regarded as coastal or semi-coastal, as the furthest point from the sea within the ED is little more than 5 km inland and the highest point is only 207 m asl. In the vegetation classification system used for this study the term 'coastal' has only been applied to vegetation that directly abuts beaches, mudflats, mangroves or saltmarsh and the term 'semi-coastal' includes vegetation types that are near the coast but do not extend to the coast. This classification is outlined in Table B. Vegetation and habitat classes (used for mapping) have been divided into bioclimatic zones; and then further divided into broad vegetation classes based on composition. This study recorded 227 different vegetation types in Otamatea ED Northland, and these are listed in Table 2 (page 430). The following section describes the general patterns exhibited by these 227 types across the study area.

COASTAL FOREST AND TREELAND

Coastal early successional forest and treeland

All coastal early successional forests in Otamatea ED Northland are dominated by kanuka.

- **Kanuka forest** is typified by a stand at Gittos Point Forest and Shrubland (Q09/032) covering 18 ha of land bordering the Oruawharo River. Frequent associates include mapou, ti kouka, mamaku, ponga, kahikatea, totara, hangehange, mahoe, mamangi, mingimingi and putaputaweta. Kanuka–mamaku forest occurs in the south of Kohatutahi Forest and Wetland (Q08/178) only. Some coastal early successional forest remnants are quite weed infested, e.g. kanuka–tree privet forest in the Batley Road Coastal Forest Remnants (Q08/142).

Coastal broadleaved forest and treeland

Thirty-five types of coastal broadleaved forest were identified around the shores of Otamatea ED Northland. Most of these can be grouped into the following general types:

- **Pohutukawa forest and treeland** is most abundant on exposed coastlines, such as the west coasts of the Hukatere and Puketotara Peninsulas, which bear the brunt of prevailing southwesterly winds and currents coming through the Kaipara Harbour mouth. Scattered pohutukawa also occur in other coastal forest types as far inland as Matakohe and Whakapirau on the Arapaoa River and Gittos Point Forest and Shrubland (Q08/032) on the Oruawharo River, but this species appears not to grow naturally on the Otamatea River.[4] The most intact examples of pohutukawa forest (e.g. at Waitieke Creek Forest (Q08/092) and Pakaurangi Forest and Shrubland (Q08/185)) are associated with frequent or occasional kowhai, puriri, karaka, kanuka, kahikatea, harakeke, tawapou, houpara, mamangi, *Coprosma macrocarpa*, *C. rhamnoides*, ti kouka, tarata, mamaku, kiokio, mapou, mingimingi, rengarenga, kowharawhara, akepiro, turutu and *Gahnia lacera*. Houpara is only a common or frequent associate of

[4] Pohutukawa has been planted in and around Takahoa Creek Forest (Q08/163) as part of a subdivision which is on the eastern shore of the Otamatea River.

TABLE B: CLASSIFICATION OF VEGETATION AND RELATED MAP UNITS.

VEGETATION/ HABITAT CLASS (MAP UNIT)	BIOCLIMATIC ZONE	BROAD VEGETATION CLASS (NO. VEGETATION TYPES WITHIN)
Forest (F)	Coastal	Early successional forest and treeland (4)
		Broadleaved forest and treeland (36)
		Broadleaved–podocarp forest (27)
		Podocarp-dominant forest (6)
		Kauri-dominant forest (5)
	Semi-coastal	Early successional forest (3)
		Broadleaved forest (16)
		Broadleaved–podocarp forest (41)
		Podocarp-dominant forest (20)
		Kauri-dominant forest (14)
		Unknown type (1)
Shrubland (S)	Coastal	Coastal shrubland (15)
	Semi-coastal	Semi-coastal shrubland (11)
Freshwater wetland (W)	Semi-coastal	Open water (2)
		Freshwater reedland (9)
		Freshwater rushland and tussockland (3)
		Unknown type (1)
Estuarine wetlands (E)	Coastal	Mangrove shrubland and forest (1)
		Saltmarsh and salt meadow (9)
		Exotic estuarine grassland and rushland (3)
Other (O)	Coastal	Grassland on islands (1)

pohutukawa on steep parts of west coast of the Hukatere peninsula (e.g. Kumete Bluff Forest Remnants (Q08/047), Otaiwhata Bay Forest and Shrubland (Q08/049)), or on offshore islands (e.g. Motuouhi Island (Q09/014)). At Oneriri Pa Forest (Q09/027), Puketotara Peninsula, there is a good example of pohutukawa–kanuka forest, which appears to be present at recently disturbed sites. More degraded examples of pohutukawa–kanuka forest and treeland occur all around Puketotara Peninsula coast and along the Tinopai coast. Radiata pine and brush wattle sometimes share the canopy in disturbed/small narrow examples of pohutukawa forest.

- **Puriri forest and treeland** occurs frequently on both saltwater river and outer coasts. Various mixtures with kanuka, karaka, kowhai, taraire, pohutukawa and ti kouka occur, depending on local conditions. It appears that puriri-dominant treeland may sometimes be an artifact of land clearance in which puriri trees are preferentially protected (e.g. at Puriri Point Forest and Shrubland (Q08/183), Kohatutahi Forest and Wetland (Q08/178), Raepere Creek Coastal Forest (Q08/098)).
- **Taraire forest** is uncommon in the coastal zone. Taraire dominates part of the forest canopy at eight sites, associated mainly with puriri, and occasionally with karaka, kowhai and/or kanuka.

Each of the following coastal broadleaved forest types occurs at only one site in Otamatea ED Northland and is considered to be particularly distinctive:

- **Kowhai–*Coprosma areolata*–ti kouka forest** on basalt colluvium at Kohatutahi Forest and Wetland (Q08/178). In this case, both the geological unit and the vegetation type are unique and distinctive in the study area.
- **Houpara–kowhai forest** at Owhareao Point Remnants (Q08/179) and **houpara–kowhai–tawapou forest** at Bushy Point Forest Remnants (Q09/046); these are two steep, exposed headlands on the western Hukatere peninsula coast.
- **Karaka–kowhai–tree privet forest** at Lower Pahi River Scenic Reserve (Q08/103) contains locally uncommon associates of mangeao and tawa.
- **Karaka–tawapou–harakeke forest** with frequent ti kouka grows on the western side of Kaiwhitu Island (Q08/175). This island was thought to be rat-free during a 1993 survey, which may explain the abundance of tawapou in the canopy (SSBI Q08/H056).

Coastal broadleaved–podocarp forest and treeland

Twenty-seven types of coastal broadleaved–podocarp forest were identified along the coast of Otamatea ED Northland. Most of these can be grouped into the following general types:

- **Totara–kowhai forest** is the most common coastal podocarp–broadleaved forest type, and tends to occur on sheltered coasts around the inner-harbour waterways of the Arapaoa, Otamatea and Oruawharo Rivers, and appears to be associated with limestone and calcareous siltstone of the Motatau Complex. Good examples of this type occur in the Wairau River Coastal Forest Remnants (Q08/151) near Maungaturoto. This forest type often contains common or frequent emergent kahikatea, with occasional mamangi, ti kouka, tarata, kanuka and titoki. Kowhai is more abundant that totara in a few places (e.g. Raepere Creek Coastal Forest (Q08/098) and Smith's Point (Q08/079)), and puriri and karaka also share the canopy in a few places (e.g. Takahoa Creek Forest (Q08/163), Whakapirau Creek Coastal Forest (Q08/127) and Pakaurangi Forest and Shrubland (Q08/185)). Kanuka is more prominent in this type in places that are more degraded or recently disturbed (e.g. Upper Raepare Creek Forest Remnants (Q08/160) and Donaldson's Forest (Q08/157)).
- **Totara–puriri forest** is the next most widespread coastal broadleaved–podocarp forest type and is slightly more tolerant of exposure than totara–kowhai forest. A good representative example occurs at Te Kowhai Scenic Reserve (Q08/132), which is semi-sheltered from northwest winds blowing down the Arapaoa River. Kahikatea and kanuka are commonly associated with this type; only occasionally kowhai and taraire.

Each of the following coastal broadleaved–podocarp forest types occurs at only one site in Otamatea ED Northland and is considered to be particularly distinctive:

- **Totara–kohekohe–puriri forest** at Whakapirau North Forest (Q08/107). This is the only remaining patch of forest where kohekohe comprises over 20% of the canopy.
- **Puriri–taraire–kahikatea–kauri forest** at Te Ope Headland Forest (Q08/119).

- **Kahikatea–puriri–taraire–kanuka forest** at Kaira Creek Forest (Q09/029).
- **Karaka–kanuka–kahikatea forest** at Puketotara Forest Remnant 15 (Q09/045).
- **Totara–kahikatea–karaka forest** at Hanerau Stream Forest Remnants (Q08/218).

Coastal podocarp-dominant forest and treeland

Podocarp-dominant forest tends be more common inland, but six types of coastal podocarp-dominant forest were identified during the present study. They are all mixtures of kahikatea and totara with differing amounts of kanuka. The most outstanding and representative examples are listed below:

- **Kanuka–kahikatea forest** at Whakapirau River Scenic Reserve (Q08/128) contains common mature emergent kahikatea over tall kanuka.
- **Kanuka–totara forest, totara forest** and **totara–kahikatea forest** are typified by the Wairau River Coastal Forest Remnants (Q08/151). The latter type is the most intact example of podocarp-dominant forest within the site. Diverse stands of coastal totara–kahikatea forest have frequent emergent matai and/or kauri, and also frequent kowhai, and may be associated with occasional titoki, karaka, kauri, ti kouka, puriri, lancewood and nikau. A single example of kahikatea-totara forest occurs at Karakanui Road Forest Remnants (Q08/187).
- **Totara–kanuka forest and treeland:** A good example occurs at the Pahi Coastal Strip (Q08/105), which contains the regionally threatened coastal shrub *Olearia solandri.* All forest types with abundant totara and kanuka, to the exclusion of other species, reflect high levels of disturbance and/or grazing. Totara–kanuka forest is more likely to contain hardy, unpalatable associates such as tarata, kauri, kowhai, kahikatea, ti kouka, mamaku and mamangi, rather than more palatable species like kohekohe, karaka, taraire, tawapou, houpara or mahoe. Their history of frequent disturbance has also made them more likely to contain weed infestations.

Coastal kauri-dominant forest

Five forest types with abundant or common kauri occur immediately adjacent to the coastline of Otamatea ED Northland. All of them are secondary forest containing kauri rickers. The following three are representative examples of their types:

- **Kauri–kanuka forest** occurs on gentle coastal terraces on the shores of the Otamatea River at Wahiwaka Creek Forest Remnants (Q08/146). The Topuni River Forest Remnant 1 (Q09/037) is a magnificently dense stand of this type, occurring on a steep coastal margin. At this location tanekaha and totara are frequent members of the canopy, with scattered rimu, rewarewa, kowhai and karaka. Kauri–kanuka–tanekaha forest is known only from James Road Forest (Q08/147).
- **Kauri–totara forest** is best represented at Raepare Creek Headland Forest (Q08/145) where it is associated with frequent taraire, rewarewa, karaka, puriri, and tall kahikatea spars.
- **Totara–kauri–kahikatea forest** occurs at two points on the southern shores of Point Curtis (Q08/156) and has abundant totara with equal amounts of emergent kauri rickers and kahikatea spars.

SEMI-COASTAL FOREST AND TREELAND

Semi-coastal early successional forest and treeland

There is one main type of semi-coastal early successional forest in Otamatea ED Northland. This is kanuka forest and treeland, which is also the most extensive vegetation type seen during the present survey.

- **Kanuka forest and treeland** is present in 38 semi-coastal remnants which together cover almost 700 ha throughout the Northland Conservancy part of Otamatea ED (that is *c.* 18% of the forest and treeland recorded). Kanuka associations range from very disturbed, monospecific treeland with few other tree species regenerating through them (e.g. at Te Ruruku Bay Forest Remnants (Q08/089) and Puketotara Forest Remnants 3 (Q09/006)) to extremely diverse, dense forest (e.g. Hukatere North Forest (Q08/087)) containing mixtures with emergent podocarps (kahikatea, totara, matai, rimu, tanekaha), emergent kauri rickers, and a multitude of broadleaved species (e.g. kowhai, ti kouka, rewarewa, tarata, nikau, puriri, mamangi, puka, five finger, karamu, akepiro and mahoe). It seems that kanuka forest is an early stage in the succession to almost all semi-coastal forest types in Otamatea ED Northland. Kanuka forest with manuka in equal proportions in the canopy is present at one site only (Kirikiri Creek Forest and Wetland (Q08/091)).

The following type occurs at only one site in Otamatea ED Northland and is considered to be particularly distinctive:

- **Mamaku–manuka forest** is a low forest type occurring at the top of Otuhianga Hill Forest (Q08/065) where it is frequently associated with mahoe and ti kouka.

Semi-coastal broadleaved forest

Forest composed mainly of broadleaved canopy species is not particularly common in the semi-coastal zone. Sixteen types were identified in the current study, most of which can be grouped to these two general types:

- **Taraire and puriri forest associations** comprise the majority of broadleaved forests inland. Taraire is more likely to grow furthest from the coast in the northern and eastern parts of the ED, as represented by taraire-dominant forests on Barton's Hill Forest (Q08/137) and at Bickerstaffe Forest and Shrubland (Q08/153). Puriri becomes more abundant nearer the coast. Taraire often occurs mixtures with puriri, which together form an even, rounded canopy (sometimes with karaka, nikau or kowhai), only punctuated by occasional emergent kahikatea, pukatea, rewarewa, matai or kauri (e.g. Te Ope Stream Remnants (Q08/116)). Taraire and puriri forest associations are more likely to occur in gullies and on steep hillslopes than on ridges or in gentle valleys.
- **Kowhai forest** is unusual in the semi-coastal zone, but it does occur at two sites. Kowhai–puriri forest, with frequent mamaku and occasional ti kouka is present in a small gully at Hautakima South Forest (Q08/088). Kanuka–kowhai forest in the upper gullies of Waihungaru Stream Forest (Q08/083) with frequent ti kouka and occasional puriri.

Each of the following semi-coastal broadleaved forest types occurs at only one site in Otamatea ED Northland and is considered to be particularly distinctive:

- **Nikau forest** at the Waipikopiko Stream Headwaters (Q08/171).

- **Mamaku–nikau–pukatea forest** at Puketotara Forest Remnants 3 (Q09/006).

Semi-coastal broadleaved–podocarp forest

This forest class comprises the largest number of vegetation types (41) identified during the site surveys in Otamatea (Northland) ED. There are multiple, complex associations within this class, however some general patterns have been identified as follows:

- **Taraire–podocarp forest** commonly comprises taraire in association with kahikatea, but also with totara. Kahikatea is the main associate of taraire on wetter, more fertile soils, while totara tends to accompany it on drier ground. A large block in a valley on the eastern side of the Huarau Ridge Forest Remnants (Q08/200) typifies taraire–kahikatea forest. A good example of taraire–totara forest is in the Paparoa Stream Headwaters (Q08/110). Note that both these representative examples are from northeastern areas of the ED where taraire is most common.
- **Kowhai–podocarp forest** is quite unusual in the semi-coastal zone, as kowhai is far more likely to occur at high abundance near the coast, however it does occur in places such as Puketotara Forest Remnant 16 (Q09/024) (kowhai–kanuka–kahikatea forest) which was once immediately adjacent to the coast, but has since become removed from the coastline over 500 m through mudflat reclamation.
- **Totara–kahikatea–broadleaved forest** is found in four places within the study area, and can occur in the riparian zone (e.g. totara–kahikatea-kowhai forest at Hames Road Forest Remnants (Q08/124)) or on steep hillslopes (e.g. totara–kahikatea–puriri forest at Raepere Creek Forest Remnants (Q08/094) and totara–puriri–kahikatea forest at Payne Road Forest Remnants (Q08/192)).
- **Totara–broadleaved forest** includes associations of totara with karaka, kowhai and puriri. The best examples of totara associated with karaka are present further inland at Waipikopiko Stream Headwaters (Q08/171) and in the North Maungaturoto Forest Remnants (Q08/069). Puriri and kowhai are associated with totara nearer the coastal zone, e.g. at Otuhianga Coastal Forest Remnants (Q08/194) which constitute another example of coastal forest isolated from its original formative influences through reclamation of estuarine mudflats.
- **Kahikatea–broadleaved forest** includes associations of abundant kahikatea with broadleaved species that prefer or can tolerate wet soils, e.g. pukatea, kowhai, titoki, puriri, ti kouka and taraire. The best example of kahikatea-pukatea gully forest is at Mohinui Forest Remnants 3 (Q08/190).

Each of the following semi-coastal broadleaved–podocarp forest types occurs at only one site in Otamatea ED Northland and is considered to be particularly distinctive:

- **Mature matai over secondary kahikatea–ti kouka forest** at Kowhai Road Matai–Kahikatea Remnant (Q08/064) is remarkable for its tall, emergent, mature matai.
- **Totara–titoki forest** on alluvium in the Paparoa Stream Riparian Forest (Q08/121); only one other forest remnant in the Northland Conservancy part of the ED has titoki a major part of the canopy, and this is small and more degraded.

- **Nikau–kahikatea forest** at Waipikopiko Stream Headwaters (Q08/171).
- **Puriri–nikau–totara forest** at Raepere Creek Forest (Q08/094).
- **Tanekaha–tarata–mamangi forest** at Oneriri Station Homestead Forest (Q09/022). Tanekaha is not usually the main canopy component. This type stands out visually, as all canopy species have bright yellow foliage in summer.
- **Tanekaha–rewarewa–kanuka forest** at Hautakima South Forest (Q08/088).

Semi-coastal podocarp-dominant forest and treeland

In terms of extent, semi-coastal podocarp-dominant forest covers the largest areas within Otamatea (Northland Conservancy). Twenty forest types were identified. Totara and kahikatea feature prominently in most, the former being better adapted to drier situations and the latter occurring mainly in small stream gullies or on alluvial soils of large streams. The main types present (from dry to wet) are as follows:

- **Totara forest and treeland** is usually very species poor in the canopy and bare underneath. Most examples of this type were formed through a long history of trampling and grazing by livestock, which allowed the prickly totara saplings to establish and eliminated more palatable species. A representative example occurs in the Pukehuia Forest Remnants (Q08/115).
- **Totara–kanuka forest and treeland** indicates a similar situation with stock disturbance to the above, but the prevalence of kanuka shows the disturbance to be more recent. A representative example of this forest type on moderate hillslopes covers most of Raepere Creek Forest (Q08/094), while a good example of this type in a gully is present at Puketotara Forest Remnant 10 (Q09/017), which supports frequent emergent kahikatea and a range of associated species at low abundance, e.g. kowhai, mahoe, kauri, mamangi, puriri, tarata, tanekaha, ti kouka, karaka, kohekohe, heketara, mapou and rangiora.
- **Totara–kahikatea forest and treeland** is a very common forest type in semi-coastal gullies and hillslopes of grazed pastoral land. Representative examples of this type on alluvium occur in widely scattered remnants on the upper Wairau River (Q08/173) and in the Waipikopiko Stream Headwaters (Q08/171). The best examples on hilly topography are at Brynderwyn Road Forest Remnants (Q08/067) and the Lower Pukeareinga Forest Remnants (Q08/061).
- **Kahikatea forest** thrives on alluvial soil, and since this is not characteristically plentiful in Otamatea ED Northland, there are few examples of it. A magnificent stand in a QEII Open Space Covenant occurs in the Pahi River Headwaters (Q08/170).

Each of the following semi-coastal podocarp-dominant forest types occurs at only one site in Otamatea ED Northland and is considered to be particularly distinctive:

- **Mature totara–kahikatea forest** in the Upper Paparoa Creek Scenic Reserve (Q08/100), which also has large emergent matai associated with it.
- **Rimu–kanuka forest** in the Sherwin QEII Open Space Covenant (Q08/100) and **kanuka–rimu forest** with frequent totara at Raepare Creek Headland Forest (Q08/145).
- **Tanekaha forest** and **kanuka–totara–tanekaha forest** on the banks of a small stream at the Payne Road Forest Remnants (Q08/192).

- **Tanekaha–totara forest** in the Totara Creek Forest Remnant (Q08/095).
- **Mamaku–totara forest** at Paparoa Stream Headwaters (Q08/110) and **totara-mamaku forest** at Eastern Boundary Forest (Q08/214).

Semi-coastal kauri-dominant forest

Fourteen types of semi-coastal kauri-dominant forest were identified in Otamatea ED Northland. These can be divided into young or 'ricker' kauri associations and mature kauri associations:

- **Kauri ricker forest** approximately 100–120 years old constitutes 10 of the 14 types. These stands would have regenerated following widespread logging of kauri in the late 1800s. Tall kanuka is a common associate. Totara, tanekaha, rimu or kahikatea are occasional associates. Kauri ricker stands tend to occur in the driest and least favourable parts of the landscape to growth, hence their association with kanuka and gymnosperms that can compete in poor situations. Ridge tops are the most common topographical sites. Some of the finest examples of semi-coastal kauri ricker forest are at Raepere Creek Forest (Q08/094) on the Hukatere peninsula and Timber Bay Forest (Q09/001) on the Puketotara Peninsula.
- **Mature kauri forest.** There are four examples of mature kauri forest in Otamatea ED Northland. There is only one sizeable (*c.* 30 ha) example: mature kauri–kahikatea forest at Hukatere Scenic Reserve (Q08/081) is associated with frequent taraire, puriri, nikau and mamangi. Young kauri and kahikatea are also present in this mixture, and may have established during the time when some limited logging was carried out (Wright & Beever 1990). The other three sites where mature or semi-mature kauri still occur are Oneriri Station Homestead Forest (Q09/022), Paparoa Mature Kauri Stand (Q08/122) in association with totara, and Collins Scenic Reserve (Q08/078) in association with rimu.

COASTAL SHRUBLAND

Indigenous shrubland is far less common than indigenous forest around the coastal margin of Otamatea ED Northland. Fifteen coastal shrubland types were identified during the current survey, covering an estimated extent of only 71 ha spread over 18 sites. Almost all of these types have kanuka, manuka and mapou as abundant or common components. Harakeke, ti kouka and hangehange are common in places. Coastal shrublands are often associated with small amounts of akepiro, kowharawhara, toetoe, rengarenga, karamu, *Coprosma macrocarpa,* mingimingi, *Gahnia lacera,* lancewood, mamangi, rangiora and young karaka. Weeds, in particular gorse, woolly nightshade and pampas, are present in many of the shrubland canopies; however these are likely to become shaded out over time. One of the best quality examples of coastal shrubland on a nearshore island is mapou–manuka–harakeke shrubland at Kaiwhitu Island (Q08/175) off the Hukatere peninsula. The most extensive example of coastal kanuka shrubland occurs at Te Ruruku Bay (Q08/089), and a range of coastal shrubland types occur within the Mangaiti Creek Forest Remnants (Q08/167).

Each of the following coastal shrubland types occurs at only one site in Otamatea ED Northland and is considered to be particularly distinctive:

- **Tutu shrubland** on the steep face of a limestone cliff at Otara Head Forest and Shrubland (Q08/063).

- **Ti kouka–kanuka shrubland** at the top of the limestone cliff at Otara Head Forest and Shrubland (Q08/063).
- **Ti kouka shrubland** on Puriri Point Forest and Shrubland (Q08/183).
- **Mahoe shrubland** on the shores of the upper Paparoa Creek (Q08/108).

SEMI-COASTAL SHRUBLAND

Eleven types of semi-coastal shrubland were identified, covering approximately 450 ha spread over 24 sites. Most semi-coastal shrublands contain dominant kanuka, manuka or a mixture of both. Mamaku is notably more common in shrublands away from the coast, while mapou and harakeke are less common. Ti kouka is ubiquitous both in coastal and semi-coastal environments. More than half of the total semi-coastal shrubland extent (*c.* 260 ha) comprises tall kanuka–radiata pine shrubland within the Pakaurangi Forest and Shrubland (Q08/185) on the eastern end of Hukatere peninsula. Approximately 52 ha of kanuka–mamaku shrubland is present at Nathan Road Forest and Shrubland (Q08/198), and *c.* 55 ha of manuka–kanuka–mahoe shrubland occurs at the Bickerstaffe Forest and Shrubland (Q08/153).

Each of the following semi-coastal shrubland types occurs at only one site in Otamatea ED Northland and is considered to be particularly distinctive:

- ***Coprosma propinqua* shrubland** at Oruawharo Road Stream (Q08/209) is the only location where *Coprosma propinqua* is the dominant vegetation cover.
- **Harakeke–manuka shrubland** at Hillstone Road Forest Remnants 3 (Q08/208) is unusual for having abundant harakeke on an inland hillslope.
- **Putaputaweta shrubland** at Bayer Road Shrubland (Q08/211) is the only location where putaputaweta is the dominant vegetation cover.
- **Totara–mapou shrubland** at Oruawharo School Forest (Q09/033).

FRESHWATER WETLAND

Open water

No natural lakes or ponds have been identified in the Northland Conservancy part of this ED, but the following constructed water bodies were identified as natural areas, primarily as bird habitat:

- **Constructed freshwater farm ponds** with occasional floating *Azolla pinnata* and indeterminate subaquatic vegetation were recorded at 19 sites. Hundreds of ponds are present within the study area, but they were only identified as natural areas if they were large, or contiguous with indigenous forest, or had indigenous marginal vegetation such as raupo or lake clubrush.
- **Constructed lakes**, formed through embankment of tidal inlets, are found at three sites, two on the east coast of the Otamatea River (Kaitara Constructed Lake (Q08/159) and Takahoa Government Purpose Wildlife Management Reserve (Q08/164)), and one on the north coast of the Whakaki River (Wainonororo Constructed Lake (Q09/039).

Freshwater reedland

Reedlands comprise 20–100% cover of reeds, which are tall erect herbs emergent from shallow water, having branched leaves or stems that are either hollow or have very spongy pith (Johnson & Gerbeaux 2004, adapted from Atkinson 1985), and are important as wetland bird habitat.

- **Raupo reedland** is the most common reedland type in Otamatea ED Northland, and can occur either in constructed ponds, in small natural depressions or slow-flowing stream gullies. Various associations of raupo with bracken, lake clubrush, ti kouka and willow weed occur. The largest (3.6 ha) and most significant raupo reedland is at the southern end of Kaitara Constructed Lake (Q08/159).
- **Lake clubrush reedland** was recorded at only two sites (Ngamotu Farm Pond (Q09/031) and Takahoa Government Purpose Wildlife Management Reserve (Q08/164)) where it is extremely limited in extent. It may be naturally established, or it may have been planted at either or both of the sites, as both are constructed.
- ***Baumea articulata* reedland** is known only from the margins of Kaitara Constructed Lake (Q08/159).

These two reedland types were recorded at only one site each in Otamatea ED Northland, and are considered particularly distinctive:

- **Raupo–*Baumea articulata*–pink bindweed reedland** at Kohatutahi Forest and Wetland (Q08/178).
- **Raupo–*Baumea articulata*–marsh clubrush reedland** at Owhareao Point Remnants (Q08/179).

Freshwater rushland and tussockland

The rushland and tussockland types found in Otamatea ED Northland are small. Indigenous rushlands in the study area comprise mainly scattered *Juncus sarophorus* amongst exotic grasses. There was only one example of tussockland recorded (*Carex virgata*–pampas tussockland at Puketotara Forest Remnant 10 (Q09/017), and it covers a tiny area at the edge of a constructed pond.

ESTUARINE WETLAND

The upper intertidal zone of the calm, inner Kaipara Harbour waters is host to a vegetation sequence from mangrove forest in the deepest water, to mangrove shrubland in shallower water, to various types of indigenous saltmarsh or exotic estuarine grassland and rushland near the terrestrial margin. Extensive mudflats and sandflats are present throughout the lower intertidal zone, but eelgrass (*Zostera* spp.), which can occur on sandflats in other parts of the harbour, was not recorded during this survey.

Mangrove shrubland and forest

Otamatea ED Northland encompasses *c.* 1817 ha of the extensive mangrove forest and shrubland of the Kaipara Harbour. A large part of the 1817 ha is in the Arapaoa River (*c.* 997 ha), followed by the Otamatea River (*c.* 470 ha) and then the Oruawharo River (north coast only = *c.* 350 ha). The tallest mangrove forests are on the edges of channels, where the trees are in optimal conditions for growth, while shrub-sized mangroves tend to be restricted to the upper tidal areas, bordering saltmarsh habitats. Saltmarsh species often occur within mangrove shrublands creating a patchwork mosaic of habitat.

Saltmarsh associations

Only eight saltmarsh vegetation types were identified within Otamatea ED Northland, but field survey in estuarine areas was much less intensive than that

undertaken in terrestrial areas, so some types may not have been recorded. The final three of the following are herbfields, also known as 'salt meadow'.

- **Sea rush rushland** is the most extensive saltmarsh type.
- **Mangrove–sea rush shrubland** often occurs at the boundary of mangrove shrubland and sea rush rushland.
- **Oioi–sea rush rushland** occurs at freshwater outflows (e.g. at the mouths of small creeks) or above the pure sea rush rushlands.
- **Saltmarsh ribbonwood shrubland** occurs at the extreme upper tidal limit and is often associated with frequent harakeke, mapou, pohuehue and *Coprosma propinqua*. Other associates recorded in Otamatea ED Northland include ngaio, *C. propinqua* × *C. robusta*, tanekaha, totara, manuka, sharp rush, oioi, remuremu periwinkle, Japanese honeysuckle, gorse, woolly nightshade. The best example of this type is in the upper Paparoa Creek of the Arapaoa River (Q08/084). *Olearia solandri,* a regionally significant plant species, was recorded there.
- ***Baumea articulata* reedland** was recorded at one site (Judd Road saltmarsh, Otamatea River (Q08/062)) where it was strictly limited to brackish water area.
- **Glasswort–*Suaeda novae-zelandiae*–sharp rush herbfield.** At the southern side of Gittos Point Forest and Shrubland on the Oruawharo River North Coast (Q09/020) there are shellbanks holding tidepools which are populated with scattered glasswort, *Suaeda novae-zelandiae* (a regionally significant plant species) and the exotic sharp rush around their edges.
- **Sea primrose–arrow grass–saltwater paspalum herbfield** is present at the Judd Road saltmarsh, Otamatea River (Q08/062), and is the only known site for the regionally threatened arrow grass in Otamatea ED Northland.
- **Sea primrose–remuremu–saltwater paspalum-sharp rush herbfield** is found all around the shores of Otamatea ED Northland, but is never very extensive.

Exotic estuarine grassland and rushland

- **Saltwater paspalum grassland** is the most extensive exotic vegetation type within the estuarine areas of Otamatea ED Northland. Saltwater paspalum has the potential to smother large areas of upper intertidal mudflat, and is now a component of all indigenous salt meadow communities and may overwhelm them in time. The extent of this vegetation type was not estimated in this study. More work is needed to determine the effects of saltwater paspalum grassland on indigenous salt meadows, and on threatened or uncommon plants which inhabit them (e.g. arrow grass, *Leptinella tenella*).
- ***Spartina alterniflora* grassland** tends to establish on upper intertidal mudflats, and is a more aggressive invader than saltwater paspalum. According to Northland Regional Council maps, there were 22 known infestations of the grass in Otamatea ED Northland. However, since 2002, eight have been eradicated and the remaining 14 are at 1–3% of their former extent, having been vigorously controlled via helicopter spray operations (Peter Joynt, Northland Regional Council, pers. comm.).
- **Sharp rush rushland** was recorded as a monospecific stand at only one location (on an estuarine shellbank in the Whakapirau Creek), but this species is common and is present in most saltmarshes and salt meadows.

GRASSLAND ON ISLANDS

As a result of the need to classify entire nearshore islands as natural areas (rather than just the parts covered by indigenous shrubland and forest), three areas of mainly exotic grassland were included in sites in this study, on Kaiwhitu Island (Q08/175), Motuouhi Island (Q09/014) and Pupuia Island (Q08/177). A species list for Pupuia Island was compiled in 1993 which identified the main exotic grasses (kikuyu, buffalo grass and saltwater paspalum at the lower edge) and recorded occasional ti kouka, harakeke, kowharawhara, gorse and *Austrostipa stipoides* (SSBI Q08/H072). These islands were not visited as part of this study and the current composition of the grasslands is not known; they could have some indigenous grass cover.

3.3.4 Species of botanical interest

There is very little recent information about specific botanical values in Otamatea ED Northland. Botanists appear to have largely overlooked the area, with an average of only three indigenous plant specimens per decade lodged at the Auckland Museum Herbarium (accession numbers for some of these are given with the prefix 'AK'). Famous early botanist, Thomas Kirk, spent time around Paparoa at the beginning of his New Zealand career (after emigrating from England in 1863) and collected several specimens there which are now lodged at the Auckland Museum Herbarium (of which he was the curator from 1868 to 1873) and the Te Papa Herbarium ('WELT'). Many of his Paparoa collections are now classified as extinct or threatened plants, e.g. *Trilepidea adamsii* (Extinct), *Ophioglossum petiolatum* (Nationally Endangered), and *Picris burbidgeae* (Nationally Endangered).

The most recent (and maybe only) Auckland Botanical Society visit to the area, in which the authors exclaimed 'one cannot but feel saddened by the decimation of the once extensive Kaipara kauri forest' (Wright & Beever 1990), was made to Hukatere Scenic Reserve in 1990. A plant species list for Pukehau QEII covenant (Q08/182) was compiled by Maureen Young and Frank Hudson (members of the above Society) on a field visit in 1992 (SSBI Q08/H073). Several plants lists have been compiled by DOC personnel during the last two decades, in particular Tony McCluggage, Richard Parrish, Peter Anderson, Wendy Holland, Lisa Forester, and Karen Riddell. These lists provide recent information on threatened, regionally significant and locally uncommon plants.

Observations made during the present study suggest that several plant species which are relatively common in other parts of Northland and the rest of the North Island are locally uncommon in Otamatea ED Northland, e.g. tawa, mangeao, northern rata, miro, manatu, kaikomako, kanono, ti ngahere, swamp maire, and *Alseuosmia* spp. These are either species which would have been naturally uncommon prior to human arrival (due to a natural lack of suitable habitat), or species which have lost much of their population as a result of habitat destruction. It is sometimes difficult to tease out these two causes of rarity. Tawa, mangeao, kanono, manatu, kaikomako, and ti ngahere probably fit into the 'naturally uncommon' group, while northern rata, miro, swamp maire, and *Alseuosmia* spp. are probably all in the 'uncommon due to habitat destruction' group. Some of the latter have been recognised as 'regionally significant' by the Northland Conservancy (Wendy Holland, pers. comm.), and are discussed in the next section. It is remarkable that towai (*Weinmannia*

silvicola), one of the most common indigenous trees in the rest of Northland, was not recorded in this survey nor in any of the reference material consulted. With a maximum altitude of 207 m (Hautakima peak on Hukatere peninsula), and a strong coastal influence, it is possible that the climate of Otamatea ED Northland is not suitable for towai. However, it may have been present in the past, and could still be present, but remain unrecorded, given the rapid nature of the current survey.

A few species which are not listed as threatened or regionally significant have failed to appear in recent records. *Alseuosmia banksii* var. *banksii* was collected near Paparoa by Thomas Kirk (AK 11699), but has not been recorded in the Northland part of the ED since. *Alseuosmia quercifolia* is known from three sites only. All species of this genus are vulnerable to browsing animals such as possums and goats, which appear to be particularly prevalent in Otamatea ED Northland. Three indigenous grasses collected by Kirk in the late 1800s around Paparoa and Matakohe, coastal wind grass (*Lachnagrostis littoralis*), *Trisetum arduanum,* and *Poa pusilla*, have not been recorded since. In 1903 Donald Petrie collected a specimen of short-hair plume grass (*Dichelachne inaequiglumis*, WELT SP067113), but this species has also gone unrecorded for more than a century. This probably reflects a lack of field survey in the ensuing decades, rather than an absence, as these are all locally common grasses in the rest of Northland. A relatively common fern species in other parts of New Zealand, *Hypolepis distans,* has not been recorded since 1867 (another T. Kirk record from Paparoa).

3.3.5 Threatened plant species

The current threat status of species listed below follows de Lange *et al.* (2004). Appendix 8.3 gives the definitions of threat categories as set out in Molloy *et al.* (2002).

CHRONICALLY THREATENED

Mida *Mida salicifolia* (Gradual Decline)
Endemic

This small, shiny-leaved, hemiparasitic tree is known in Otamatea ED Northland from Hukatere Scenic Reserve (Q08/081) (Wright & Beever 1990), Whakapirau/ Rocky Point Forest and Shrubland (Q08/135) (SSBI Q08/H067), and Paparoa Creek Marginal Strip No. 2 and Surrounds (Q08/102) (Julia Walker, pers. comm.). It is threatened by possum and goat browse.

AT RISK

***Doodia mollis* (Sparse)**
Endemic

This narrow, hairy fern is known to be present in the ED from one 1992 record from Pukehau QEII Covenant (Q08/182) (SSBI Q08/H073). It tends to occur in rather local populations in coastal forest between Kaitaia and Thames, and almost always grows with *D. australis,* but occupies damper situations (Brownsey & Smith-Dodsworth 2000). It is probably present elsewhere in Otamatea ED Northland.

***Leptinella tenella* (Sparse)**
Endemic

This is a naturally uncommon herb of sporadic distribution. It was collected in 1997 (AK 233971) in a tidal muddy seepage in the upper Paparoa Creek area of the Arapaoa River (Q08/084) in part of a high value saltmarsh, and probably occurs elsewhere in the ED. It is probably becoming more uncommon through invasion of its habitat by saltwater paspalum.

Kawaka *Libocedrus plumosa* (Sparse)
Endemic

Kawaka is a tall conifer with bark falling in narrow strips and compressed, feather-like leaves. It has a naturally scattered distribution throughout its range (from southern Waikato northwards and in Northwest Nelson). Within Otamatea ED Northland it is known from one site only: Paparoa Creek Marginal Strip No. 2 and Surrounds (Q08/102) (Julia Walker, pers. comm.).

Large-leaved milk tree *Streblus banksii* (Sparse)
Endemic

This is a small coastal tree up to 12 m tall, similar to small-leaved milk tree (*Streblus heterophyllus*), except leaves are larger. It is very sensitive to seed predation by rats, as well as possum browse, and now exists at only a handful of sites around the Northland coast, and on offshore islands. It was recorded during this survey in the Whakapirau Creek Conservation Area (Q08/220), which is the only known site for this species on the Kaipara Harbour.

3.3.6 Regionally significant plant species

The following species are included in a draft list of regionally significant species prepared by DOC Northland Conservancy (DOC, in prep.).

Coprosma crassifolia
Endemic

This *Coprosma* is a small, divaricating tree with thick, rounded leaves which are white on the undersides. Its northern distributional limit in New Zealand is southern Northland, where it normally occurs in close proximity to the coast. It was recorded at three sites in Otamatea ED Northland, once in the present survey, once by an independent surveyor in 2005 (Julia Walker, pers. comm.) and once in 1990 by the Auckland Botanical Society (Wright & Beever 1990).

Gully tree fern *Cyathea cunninghamii*
Endemic

This is a very tall, narrow-trunked tree fern (when mature), similar to mamaku (*Cyathea medullaris*), but with thinner stipes and shorter fronds that curl upwards slightly at the ends. It is usually sporadic in its distribution. During this survey it was recorded at one site only, Waitieke Creek Forest (Q08/092), on the coastal margin.

Painted woodrush *Luzula picta* var. *picta*
Endemic

This is a small, hairy, tufted, grass-like rush which grows on dry ground, often in forest margins or scrub. One record exists from Hukatere Scenic Reserve

(Wright & Beever 1990). It is often overlooked, so may be more common that this suggests.

Northern rata × pohutukawa hybrid ***Metrosideros robusta* × *M. excelsa***

Endemic hybrid

In northern regions of New Zealand, where both northern rata and pohutukawa grow naturally in close proximity (though not usually in the same forest type), hybrids of these species are sometimes present in low numbers. There are at least two sites within Otamatea ED Northland where hybrids are known to occur, both approximately 1 km from the coast. One was noted during this survey and another was previously recorded in 1994 (SSBI Q08/H051).

Olearia solandri

Endemic

This is a coastal shrub of local distribution, found only in the Kaipara and Hokianga Harbour regions in Northland. There are records from three sites within Otamatea ED Northland, all of which are in or continuous with saltmarsh habitat. One record is from the upper Paparoa Creek saltmarsh of the Arapaoa River estuary (Q08/084) in 1997 (AK 233985), another is from Pahi Coastal Strip (Q08/105) in 1999 (SSBI Q08/H066), and the third record is from Smith's Point (Q08/079) near Matakohe in 2001 (SSBI Q08/H071).

Kaikomako ***Pennantia corymbosa***

Endemic

This is a small tree which begins life with a small-leaved, divaricating growth habit and matures into a larger-leaved, more open form. It appears to be naturally sparse in Northland. In the Northland part of this ED it has been recorded at Te Kowhai Scenic Reserve (Q08/132) in 1996 (SSBI Q08/H038) and Paparoa Stream Headwaters (Q08/110) in 1995 (SSBI Q08/H015).

Tawapou ***Pouteria costata***

Endemic

This is coastal, shiny-leaved tree (up to 20 m tall) which has large red-brown berries that are a favourite with rats. As a result of seed and seedling predation, these trees are becoming increasingly uncommon in Northland. It was found at four sites in Otamatea ED Northland during the present survey, all on the west coast of the Hukatere peninsula (or islands off it).

Leafless lawyer ***Rubus squarrosus***

Endemic

The leafless lawyer is a vine with yellow prickles and almost no leaves (it can photosynthesise using its stems). A few scattered populations of this species exist in Northland. In Otamatea ED Northland this species recorded only once at Takahoa Creek Forest (Q08/163) in 2001 (SSBI Q08/H070), where it is abundant in the canopy of secondary coastal broadleaved forest.

Arrow grass ***Triglochin striata***

Endemic

This is a small salt meadow monocotyledonous plant, which grows on mudflats in sparse swards like a tiny grass (although it is not a grass), and is often mixed

with other salt meadow herbs such as sea primrose and remuremu. It is becoming less common around the fringes of the Kaipara Harbour due to competition with invasive weeds, e.g. saltwater paspalum. At least two populations were noted in the present study in Otamatea ED Northland, one on the Arapaoa River (Q08/084) and one on the Otamatea River (Q08/062). It is probably more common than this suggests, but detailed surveys have not been undertaken.

3.3.7 Threatened and regionally significant plant species not recorded recently in the Northland part of the Ecological District

EXTINCT

Adams mistletoe *Trilepidea adamsii*
Endemic

Thomas Kirk recorded this North Island endemic, semi-parasitic mistletoe near Paparoa Bridge around 1867 (WELT SP031299). It is now thought to be extinct throughout its former range through a combination of habitat loss, over-collecting, loss of pollinators, loss of dispersers, and possum browse (NZPCN 2006). The last specimen was collected at Cambridge in 1954. Its known hosts were mamangi, other *Coprosma* species, mapou, and wharangi. It was probably restricted to coastal and lowland kauri forest margins and associated open, seral shrublands (NZPCN 2006), which are abundant in Otamatea ED Northland.

ACUTELY THREATENED

Hairy willowherb *Epilobium hirtigerum* (Nationally Endangered)
Endemic

A collection of this robust, woody herb was made in 1924 by Walter Oliver on Pakaurangi Point (WELT SP042470). It was also known from the Paparoa area (Thomas Kirk collected it in 1867, AK 11459), so it may have been quite widespread in the ED, however it has not been recorded since 1924.

Stalked adder's tongue *Ophioglossum petiolatum* (Nationally Endangered)
Endemic

This annual fern was last recorded in Paparoa by Thomas Kirk in 1867 (DOC Bioweb database). Its habitat is in herbfields on the edges of streams, lakes or ephemeral wetlands; occasionally it occurs in podocarp forest (NZPCN 2006).

***Picris burbidgeae* (Nationally Endangered)**
Endemic

This species was collected by Thomas Kirk in the vicinity of Paparoa in 1867 (AK 11814), but has not been recorded since. It is an annual herb in the daisy family which colonises disturbed soil, but is presumably out-competed by introduced annuals and grasses which now occupy the same niche.

CHRONICALLY THREATENED

***Tupeia antarctica* (Gradual Decline)**
Endemic

This is a shrubby hemiparasitic mistletoe with small yellow-green flowers and white to pink berries that has a range of host species. In 1867 specimens were collected by Thomas Kirk in the locality of Paparoa, parasitic on tarata (AK 11268) and another parasitic on kohuhu (WELT SP031346). Throughout its present-day range (North Island and South Island) this species is threatened by possum browse, and could be locally extinct in Otamatea ED Northland.

AT RISK

Sand brome *Bromus arenarius* (Sparse)
Thomas Kirk collected this indigenous coastal grass at 'Te Pahi' in 1867 (WELT SP076361), however it has not been recorded since. Its distribution is naturally sporadic, and it is often associated with seabird nesting grounds (NZPCN 2006).

***Calystegia marginata* (Sparse)**
Endemic

This disturbance-related species was recorded by Thomas Kirk at Paparoa in the late 1800s (WELT SP004696). It occurs primarily in coastal, lowland shrublands, rough pasture or bracken dominated sites, usually on coastal headlands, but also on road sides, along railway embankments and in rough pasture and lawns (NZPCN 2006). There is no reason to suspect it is no longer present in Otamatea ED Northland, it has probably just gone unnoticed (it is often confused with convolvulus or other *Calystegia* species).

REGIONALLY SIGNIFICANT

***Green mistletoe* Ileostylus micranthus**
Endemic

This is another 1867 record by Thomas Kirk from around Paparoa (AK 11264). No other records of this species exist from the Northland part of the ED. This is a yellow-green flowered, woody semi-parasite with yellow berries that has been recorded on over 300 host species throughout the country (NZPCN 2006). Like all mistletoes it is threatened by possum browse, and is becoming less common in Northland.

Carmine rata *Metrosideros carminea*
Endemic

Two early collections of this species are stored in the Auckland Museum Herbarium: one from Paparoa in 1867 by Thomas Kirk (AK 11444), and one from Gitto's Point (called 'Stephen's Bush') in 1935 by F. H. Browne. This species, along with all larger-leaved rata (*Metrosideros* spp.), are threatened by browsing mammals.

3.4 FAUNA

3.4.1 Overview of indigenous fauna

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

- Sites of Significant Biological Interest (SSBI) files held at the Northland Conservancy office, Department of Conservation.
- The Northland Region Ornithological Society of New Zealand Newsletter 'Amokura' (Crockett (comp.) 1992–2004).
- The Bioweb Herpetofauna database (DOC 2006).
- Uncommon and rare landsnails in the Northland region of New Zealand, and an assessment of conservation management priorities (Brook 2002).
- The NZ Freshwater Fish Database (NIWA 2006).
- Incidental field observations during November/December 2005 and January 2006 (current study).
- Surveys and incidental observations of Dr Ray Pierce between 1987 and 2005.

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

The Kaipara Harbour is the largest enclosed harbour and estuarine system in New Zealand, with a total surface area of 947 km^2 (Cromarty & Scott 1996). It is predominantly shallow, with 409 km^2 of the total surface area exposed as mudflats at low tide (Heath 1975). Otamatea ED Northland has approximately 68 km^2 of mudflats and sandflats, or 17% of the total present within the Kaipara Harbour. Kaipara Harbour shallow intertidal areas are vital non-breeding sites for New Zealand-breeding waders such as pied oystercatcher, variable oystercatcher, pied stilt, black stilt, banded dotterel, northern NZ dotterel, and wrybill (Dowding & Moore 2006), some of which are threatened (see below). Even greater numbers of waders and other waterbirds are present in the Kaipara Harbour in summer, when transequatorial migrants, such as bar-tailed godwit, lesser knot and turnstone, flock to the harbour to feed. Year-round seabirds or waterbirds which are common in the Northland Conservancy part of the ED

include white-faced heron, black-backed gull, red-billed gull, and pied shag. Species which are occasionally seen include Australasian gannet, Arctic skua, reef heron, little egret, and white heron. The harbour waters are also feeding grounds for four threatened tern species, at least three of which (Caspian tern, white-fronted tern, and NZ fairy tern) occur in Otamatea ED Northland (see below).

Mangroves provide habitat for several avifauna species, including white-faced herons, all the shag species and banded rails. In the Kaipara as a whole, banded rails occur mainly where mangroves merge with saltmarsh or dense terrestrial vegetation (Ray Pierce pers. comm.), but there is only one recent record from Otamatea ED Northland (Wildland Consultants Ltd 2004).

Natural freshwater wetland habitat is extremely limited in Otamatea ED Northland and it appears that the most important sites for fauna are now constructed lakes and ponds. Common indigenous bird species associated with the numerous farm ponds and three larger constructed lakes include white-faced heron, pukeko, paradise shelduck and kingfisher. During the present survey, a tape of spotless crake and NI fernbird calls was played at all wetlands which could be reached. A fernbird was heard in one location (Tinopai Wetland Q08/216), but spotless crake was not detected.

Indigenous birds of forests, shrublands and grasslands which are common throughout include grey warbler, tui, welcome swallow, kingfisher, NZ pipit, fantail, Australasian harrier, paradise shelduck, pukeko, spur-winged plover, black-backed gull, morepork, shining cuckoo, and silvereye.

There are records of three lizard species from Otamatea ED Northland: copper skink, ornate skink, and Auckland green gecko (DOC 2006).

Only one threatened endemic landsnail (*Amborhytida dunniae*) occurs in Otamatea ED Northland. Kauri snail may occur, but information is severely lacking on its distribution within the study area. A similar situation exists for other invertebrates.

New Zealand fur seals, *Arctocephalus forsteri*, come up the harbour arms and tidal creeks of this part of the ED quite frequently. These are mainly juveniles (Ray Pierce, pers. comm.).

The New Zealand, conservation status of species is derived from Hitchmough (comp.) (2002) which uses the threat classification system of Molloy *et al.* (2002) (see Appendix 8.3). Species classed as 'regionally significant' are determined by DOC Northland Conservancy (DOC, in prep., Wendy Holland pers. comm.). Nomenclature follows Heather & Robertson (2000) for birds, Gill & Whitaker (1996) for reptiles, McDowall (1990) for fish, and Brook (2002) for snails, and King (2005) for mammals.

A checklist of fauna recorded in Otamatea ED Northland is presented in Appendix 8.7.

3.4.2 Threatened bird species

Otamatea ED Northland has high numbers of threatened bird species: eight species are currently acutely threatened, six species are chronically threatened,

and a further eight species are at risk. The conservation status of northern NZ dotterel may be upgraded from Sparse to Nationally Vulnerable and that of grey duck may be upgraded from Serious Decline to Nationally Endangered (Ray Pierce, pers. comm.) increasing the acutely threatened species count to ten in the 2006 edition of the national list of threatened species. However, pied shag is likely to be removed from the threatened species list in future (Ray Pierce, pers. comm.).

ACUTELY THREATENED

Black stilt *Himantopus novaezelandiae* (Nationally Critical)
Endemic

Four black stilt-pied stilt (*Himantopus himantopus leucocephalus*) hybrids were recorded at Batley-Tanoa in 2001 (Crockett (comp.) 1992–2004). The only breeding sites for black stilts are in the Upper Waitaki (Mackenzie) Basin in North Otago and South Canterbury, from whence only 10–15% of the population migrates to other places for the winter. Kaipara Harbour is the fifth most important wintering site in the country for this species (Dowding & Moore 2006).

New Zealand fairy tern *Sterna nereis davisae* (Nationally Critical)
Endemic subspecies

Virtually the entire population winters at the Kaipara Harbour and it is likely that some birds feed over the harbour waters of the ED and roost at shellbanks (Ray Pierce, pers. comm.).

White heron *Egretta alba modesta* (Nationally Critical)
Indigenous

Occasional visitor to the Bickerstaffe area, at least up to 1978 (Veitch 1979).

Australasian bittern *Botaurus poiciloptilus* (Nationally Endangered)
Indigenous

There is one anecdotal record from Frenchman's Bay Forest and Wetland (Q09/015) (Tony Walden, Oneriri Station, pers. comm.). The Kaipara Harbour is an important site for bittern in New Zealand. Harbour habitats frequented include tidal flats, mangroves, saltmarsh, tidal creeks and nearby freshwater wetlands (Ray Pierce pers. obs.). Focused field survey is needed to identify important sites for bittern in the Northland Conservancy part of this ED.

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

A single recent record (July 2004) exists of a pair of kaka visiting the area around Paparoa (Richard Gillies, pers. comm.). These birds may have originated from islands in the Hauraki Gulf to the east, or from protected forest further south on the mainland.

Reef heron *Egretta sacra sacra* (Nationally Endangered)[5]
Indigenous

This species is now occasionally sighted around the Hukatere peninsula, Arapaoa River and Otamatea River on rocky shoreline (Crockett (comp.) 1992–2004; Bull *et al.* 1985). Titipu Island (Q08/176) was a breeding place of long standing until 1965 at least (Veitch 1979), however the presence of the breeding colony has not been confirmed for many years. No birds were present during a survey in 1993 (SSBI Q08/H057) which determined the island to be covered in exotic grassland with rat and possum remains, so the birds' continued presence seems unlikely.

Caspian tern *Sterna caspia* (Nationally Vulnerable)
Indigenous

The Kaipara Harbour supports the largest breeding colony of Caspian terns in New Zealand. The largest numbers recorded in Otamatea ED Northland are from the Arapaoa River, where up to 29 have been seen at one time in recent years (Crockett (comp.) 1992–2004).

Wrybill *Anarbynchus frontalis* (Nationally Vulnerable)
Endemic

In recent years 16-42 wrybills have been recorded in the Arapaoa River (Pahi – Whakapirau area) (Crockett 1992-2004). The Raepere Creek on the eastern shore of the Hukatere peninsula is the most important roosting site for this species in the Kaipara Harbour (Veitch 1979), and the harbour itself is the fourth most important autumn/winter site in the country, after Manukau Harbour, Firth of Thames and Lake Ellesmere (Dowding and Moore 2006).

CHRONICALLY THREATENED

Grey duck *Anas superciliosa superciliosa* (Serious Decline)[6]
Indigenous

This species was recorded at several ponds and constructed lakes within the part-ED, however many are hybrids (to an unknown extent) with the introduced mallard (*Anas platyrhynchos*). Introgressive hybridisation is one of the primary reasons for the serious decline of the species.

North Island brown kiwi *Apteryx mantelli* (Serious Decline)
Endemic

Kiwi were recorded in two Hukatere peninsula forest remnants by the former New Zealand Wildlife Service in the 1970s (Hukatere Scenic Reserve (Q08/081) and Raepere Creek Forest (Q08/094) where they were found in 'good numbers'), but a subsequent survey in 1992 found no kiwi (Miller and Pierce 1995). There are old anecdotal records of kiwi in forest remnants on Puketotara Peninsula (Tony Walden, Oneriri Station, pers. comm.), but kiwi are now

---

[5] Reef heron may be downgraded in conservation status to Nationally Vulnerable (Ray Pierce, pers. comm.).

[6] Grey duck may be upgraded in conservation status to Nationally Endangered (Ray Pierce, pers. comm.).

probably locally extinct in Otamatea ED Northland, largely due to habitat loss and particularly the uncontrolled predation by the full range of introduced mammalian predators known to threaten kiwi (dogs, cats, stoats, ferrets, rats, etc.). During the 1970s and early 1980s there was large-scale land clearance throughout Northland (encouraged by government-subsidised rural bank land clearance loans), which, combined with the release of ferrets into the wild after the 'fitch' farming industry failed, may have contributed to the dramatic decline of kiwi witnessed around that period (Peter Anderson, pers. comm.).

Banded dotterel *Charadrius bicinctus bicinctus* (Gradual Decline)
Endemic

The Kaipara Harbour is the fourth most important wintering site in the country for banded dotterels, most of which originate from breeding grounds in Marlborough and the southern and central North Island (Pierce 1999). Within Otamatea ED Northland, the area where most birds congregate is around the southern Otamatea River and Puketotara Peninsula (Crockett (comp.) 1992–2004), but birds visit and forage in grazed pasture at high tide in several areas.

Kukupa *Hemiphaga novaeseelandiae* (Gradual Decline)
Endemic

This species occurs sparsely in Otamatea ED Northland, generally in the larger indigenous forest blocks that are not heavily dominated by kanuka.

Northern little blue penguin *Eudyptula minor iredalei* (Gradual Decline)
Endemic subspecies

This species is present in the harbour waters and has attempted to breed at Tinopai and probably elsewhere in the Northland Conservancy part of the ED (Ray Pierce, pers. comm.).

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

White-fronted terns are the most frequently encountered tern over the estuarine waters of Otamatea ED Northland, but flocks >20 are very uncommon. A flock of 56 was recorded off Tinopai in 1999, but otherwise low numbers are usually seen.

AT RISK

Banded rail *Gallirallus philippensis assimilis* (Sparse)
Indigenous

This species was formerly widespread in Northland (Bull *et al.* 1985), but there are few recent records. One was recorded in saltmarsh around Puketi Point, Tinopai in 2002 (Q09/021) (Wildland Consultants 2004). Ideal habitat exists in many areas of the part-ED, but these birds are probably threatened by predation from introduced mammals.

Black shag *Phalacrocorax carbo novaehollandiae* (Sparse)
Indigenous

Over 100 birds have been recorded in the Ngamotu area in the past (Veitch 1979). Black shags were recorded in the present study at Brynderwyn Farm

Pond (Q08/066) and Kaitara Constructed Lake (Q08/159), which emphasizes the importance of human-made wetlands to waterbirds in this part of the ED. There are occasional coastal records from Puketotara and Tinopai (Crockett (comp.) 1992-2004).

Little black shag *Phalacrocorax sulcirostris* (Sparse)[7]
Indigenous

This species is seen occasionally around the coast of Hukatere peninsula (Crockett (comp.) 1992–2004).

Marsh crake *Porzana pusilla affinis* (Sparse)
Indigenous

This species was formerly present (Bull *et al.* 1985), but there are no recent data.

North Island fernbird *Bowdleria punctata vealeae* (Sparse)
Endemic

Fernbirds were heard in Tinopai Wetland (Q08/216) and around the saltmarsh fringe near Puketi Point, Tinopai (Q09/021) in 2002 (Wildland Consultants Ltd 2004), but there are no other recent reports from Otamatea ED Northland. Just outside the ED boundary, in a shrubby, raupo wetland within the Topuni Carter Holt Harvey pine plantation (grid ref Q08 403 550) there were reports of 'many fernbirds' in a 2002 survey (Wildland Consultants Ltd 2004).

Northern New Zealand dotterel *Charadrius obscurus aquilonius* (Sparse)[8]
Endemic

In recent years, 2–7 New Zealand dotterel have been seen in the Batley-Tanoa area in winter, and 1–2 individuals have remained resident over summer. Since 1992, this species has only been seen in two areas of Otamatea ED Northland, at Ngamotu (Whakaki River) and Batley-Tanoa (both on the lower Otamatea River). The highest number recorded was 35 in winter 1999. As a result of recent overall population decline in New Zealand in the three years since it was last evaluated, this species' threat status is likely to increase to 'Nationally Vulnerable' (Ray Pierce, pers. comm.).

Pied shag *Phalacrocorax varius varius* (Sparse)[9]
Indigenous

This species occurs sparsely on all of the coastlines of Otamatea ED Northland. Roosts of 5–10 birds are frequently encountered in trees overhanging the water.

Spotless crake *Porzona tabuensis plumbea* (Sparse)
Indigenous

This species was formerly present (Bull *et al.* 1985) but there are no recent data.

---

[7] Little black shag may change in conservation status to Range Restricted (Ray Pierce, pers. comm.).

[8] Northern New Zealand dotterel may be upgraded in conservation status to Nationally Vulnerable (Ray Pierce, pers. comm.).

[9] Pied shag may be downgraded in conservation status to 'not threatened' (Ray Pierce, pers. comm.).

NON-RESIDENT NATIVE

Turnstone *Arenaria interpres* (Migrant)
Indigenous

Turnstones appear to be very uncommon in Otamatea ED Northland. Two turnstones were recorded by the OSNZ in winter 1992 on the lower Otamatea River (Crockett (comp.) 1992–2004).

Lesser knot *Calidris canutus* (Migrant)
Indigenous

Lesser knots are recorded sporadically in Otamatea ED Northland, but presumably return each year during the summer season to feed. Records at OSNZ survey points on the Otamatea and Arapaoa Rivers have ranged from 0-500 in the last 15 years (Crockett (comp.) 1992–2004).

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

Bar-tailed godwits are the most common transequatorial migrants arriving at Otamatea ED Northland each summer to feed on the mudflats and sandflats of the estuary. This species has been recorded every year for the past 15 years in flocks of up to 2220 (Crockett (comp.) 1992–2004).

Royal spoonbill *Platalea regia* (Coloniser)
Indigenous

During the present survey a pair was seen at Takahoa Government Purpose Wildlife Management Reserve (Q08/164), and up to 20 have been seen in recent years (Ray Pierce, pers. comm.). 2–3 birds have been recorded on occasion at Tinopai, Ngamotu (Whakaki River) and Batley-Tanoa by members of the OSNZ (Crockett (comp.) 1992–2004).

Arctic skua *Stercorarius parasiticus* (Migrant)
Indigenous

One Arctic skua was observed harassing white-fronted terns (their typical target for regurgitated food) over the Otamatea River Confluence (Q09/021) opposite Tinopai during the present survey.

3.4.3 Regionally significant bird species

The following species are included in a draft list of regionally significant species prepared by the Northland Conservancy (DOC, in prep.).

North Island tomtit *Petroica macrocephala toitoi*
Endemic

The tomtit (or 'pied tit') has not been recorded in Otamatea ED Northland since 1969 (Bull *et al.* 1985), and is probably locally extinct. It was recently noted in forest on Pukeareinga in neighbouring Rodney ED (Peter Anderson, pers. comm.). Whilst this species declined throughout the country after lowland forest clearance and the introduction of predatory mammals, it was able to adapt in many parts of the country and continued to live in forest remnants (Heather & Robertson 2000). Perhaps its absence in Otamatea ED Northland is due to the severe reduction in size of habitat remnants and the general lack of

pest control throughout the area. Tomtits are known to thrive in older pine plantations, but none were recorded in either of the two large pine plantations in the study area, at Topuni and Tinopai.

Variable oystercatcher *Haematopus unicolor*
Endemic

The variable oystercatcher is very uncommon in Otamatea ED Northland compared with its close relative, the pied oystercatcher, which is the most abundant wader by far in the part-ED. From 1992 to 2004, at most 9 birds were seen at one time, but usually 1–4 were present at scattered locations around the Arapaoa River, Otamatea River and Whakaki River.

3.4.4 Threatened mammal species

Neither of New Zealand's endemic bat genera is known to occur at present in Otamatea ED Northland. The nearest and most recent record of North Island long-tailed bat (*Chalinolobus tuberculata*, Nationally Vulnerable) is from Rodney ED in the southeastern Kaipara. The northern short-tailed bat (*Mystacina tuberculata aupourica*, Nationally Endangered) is now only known from Omahuta, Warawara and Little Barrier Island. Both of these bats would have occurred in Otamatea ED Northland before predators (cats, stoats, rats) became abundant and major habitat loss was induced by humans (Molloy 1995).

3.4.5 Threatened landsnail species

There are no confirmed records of threatened landsnails from Otamatea ED Northland, but suitable habitat is present for two species, and this is discussed further below.

CHRONICALLY THREATENED

***Amborbytida dunniae* (Gradual Decline)**
Endemic

This snail is endemic to Auckland and Northland with a sporadic distribution resulting from extensive habitat destruction. The main threats to the species are predation by mammalian predators and loss or degradation of habitat, especially through browsing and trampling by livestock or land clearance. One record of *Amborbytida dunniae* is known from Otamatea ED Northland, at Barton's Hill Forest (Q08/137) (Fred Brook pers. comm.).

Kauri snail *Paryphanta busbyi* (Gradual Decline)
Endemic

The kauri snail is endemic to Northland and north Auckland with a fragmented distribution resulting from extensive destruction of its habitat, which is primarily in indigenous forest. It is also known from plantations of radiata pine and rank exotic grassland adjoining forest and shrubland. Predation by pigs, rats, possums and possibly hedgehogs and continued loss of habitat are the main threats to the species (Brook 2002). There are no formal records for the species in Otamatea ED Northland, but there are anecdotal accounts of kauri snails in kauri forest on the Puketotara Peninsula (Tony Walden, Oneriri Station, pers. comm.).

3.4.6 Threatened lizard species

CHRONICALLY THREATENED

Auckland green gecko *Naultinus elegans* subsp. *elegans* (Gradual Decline)
Endemic

This is an arboreal species, endemic to Auckland and Northland (north to approximately Hokianga). There are three old records (1965–1967) of this species from Hukatere, Matakohe and Batley (the latter two geckos were yellow). There are only anecdotal recent records of the species in Otamatea ED Northland (Ray Pierce, pers. comm.), but their preferred habitat (manuka/kanuka shrubland and forest) is abundant. Threats to this species include predation by cats, rats, stoats, possibly other introduced mammals, blackbirds and magpies, as well as habitat loss and degradation.

3.4.7 Regionally significant lizard species

Ornate skink *Cyclodina ornata* [10]
Endemic

This species is endemic to the North Island and offshore islands. There are four recent records of ornate skink from Paparoa and the Hukatere peninsula (near Hukatere, and at Perkins QEII covenant (Q08/182)) (DOC 2006). These records were from underneath wood in both farmland and indigenous forest. Ornate skinks are not limited to indigenous vegetation, and can thrive under tall exotic grasses such as kikuyu. They are, however, much less common that the other skink found in Otamatea ED Northland, the copper skink (*C. aenea*) (DOC 2006).

3.4.8 Threatened fish species

CHRONICALLY THREATENED

Long-finned eel *Anguilla dieffenbachii* (Gradual Decline)
Indigenous

This species was recorded in the Topuni River in 1966, the Otamatea River in 1992 and the Wairau River in 1994 (NIWA 2006). Long-finned eels are found throughout New Zealand, but are threatened by over-harvesting (especially of large females) and habitat modification.

[10] Ornate skink may be upgraded in conservation status to Gradual Decline (Peter Anderson, pers. comm.).

3.4.9 Regionally significant fish species

Banded kokopu *Galaxias fasciatus*
Endemic

Banded kokopu were recorded in a tributary of the Topuni River in 1993 (NIWA 2006). This species occurs throughout New Zealand, but current records show this species as being sparse in Otamatea ED Northland, which is probably due to a lack of riparian forest, which creates the shaded stream environment that this fish needs. However, the lack of records may simply be due to only limited surveys being undertaken.

Giant bully *Gobiomorphus gobioides*
Endemic

Northland appears to be the stronghold for this species, which has an intermittent distribution throughout New Zealand (Conning *et al.* 2004). There is a 1994 record of giant bully from the Wairau River (NIWA 2006).

3.5 THREATS

There are various ongoing and potential threats to the natural areas of Otamatea ED Northland. Most of these are common to all of lowland New Zealand.

Invasive plants
Saltmarshes, freshwater wetlands and shrublands are the worst affected habitat types in terms of weed infestation. Apart from wilding pines (radiata pine and maritime pine) and crack willow which are relatively common, and occasional tree privet, brush wattle or black wattle, invasive tree species infrequently attain the forest canopy in Otamatea ED Northland. The main weed threat in forests is in the understorey. Weeds are particularly prevalent in riparian forest remnants, where the constant flooding disturbance plus the enhanced light from the edges of the remnant induces good habitat for some of the worst smothering weeds, e.g. periwinkle, tradescantia, selaginella, nasturtium, cleavers and montbretia. Flooding also spreads weeds by moving around plant fragments and seeds.

Pest animals
Several mammalian pest animals are present in Otamatea ED Northland (see Appendix 8.7). There is currently very little pest control to keep populations in check, in order to benefit indigenous biodiversity. Mustelids, rats and possums prey on indigenous birds, lizards and invertebrates. Possums also browse indigenous vegetation, causing canopy dieback and the loss of some species. In many areas, goats are responsible for the sparseness of the understorey. Pigs also browse and dig up vegetation, as well as prey on large invertebrates such as landsnails and earthworms.

Effects of agriculture on natural areas
Grazing and trampling by livestock in natural areas limits regeneration of sensitive species, leads to soil compaction and reduces habitat quality for

indigenous animals. In addition, high volumes of urine and faeces from livestock adversely affect freshwater quality, causing eutrophication of waterways, which degrades habitat for indigenous fish and sensitive aquatic macroinvertebrate species (e.g. stoneflies, caddisflies, and mayflies).

Effects of residential dwelling on natural areas

The main threats from residential areas in contact with natural areas are weed invasion through 'garden escapes' (horticultural plants which naturalise), dumping of refuse and predation by domestic pets (e.g. dogs and cats) on indigenous fauna. It has been shown that not only feral animals, but domestic ones too, can be important factors in the decline of species such as the North Island brown kiwi, which has gone extinct in Otamatea ED Northland in the last twenty years (Pierce & Sporle 1998). As residential development increases around the coasts of the Northland Conservancy part of the ED, the effects of agriculture may lessen, but the types of threats listed here are likely to increase. There is also the possibility that new residents will favour mangrove clearance, leading to illegal clearance activities, as has happened around many heavily populated estuaries in the North Island.

Ongoing effects of former land clearance

Former land clearance has lead to severe habitat fragmentation through Otamatea ED Northland. Smaller habitats have a greater ratio of edge to area, and are therefore more vulnerable to a wide range of threats; these processes are often referred to as 'edge effects'. Edge effects include: a) increased penetration by invasive weeds and pest animals, b) more light entering the understorey from the sides, which changes conditions for plant growth and hence vegetation composition, and c) increased wind in the understorey and consequent drying effects. Many forest remnants are so small and exposed that the edge effects render them ecologically dysfunctional; they are tree museums. They no longer contain palatable species and regeneration is limited by the combined impacts of grazing/trampling and infestation by pest animals and plants. In addition, the further away they are from other habitats and seed sources, the less likely it is that regeneration can occur.

Present-day land clearance

Since the 2002 aerial photography was flown, a 7.7 ha area of coastal totara–kahikatea forest on the shores of the Pahi River has been cleared, and in two or three other places, areas in the order of 10s of hectares of kanuka and/or manuka shrubland have been cleared. This is not a particularly rapid rate of clearance; however as only 9.75% of the terrestrial part of Otamatea ED Northland is covered with indigenous vegetation, any amount of further clearance could be considered ecologically unwise. For example, residential subdivision developments near or within natural areas can lead to small-scale clearances for house sites or gardens that may appear to be of little consequence when considered individually, but may collectively contribute to a loss or degradation of habitat that is unacceptable, given the already high degree of habitat fragmentation in Otamatea ED Northland.

Poaching of kukupa

Kukupa occur sparsely in Otamatea ED Northland and are chronically threatened at a national level. It is an offence to kill or harm kukupa, but there

are anecdotal reports of poachers active around the Puketotara Peninsula area (Tony Walden, pers. comm.).

Legal protection versus conservation management action

Though small areas of Otamatea ED Northland have some legal protection status under the Department of Conservation, the Kaipara District Council or the QEII National Trust, without active conservation measures, even these areas will continue to lose biodiversity. As a minimum, the following actions need to be undertaken to protect the immediate and long-term viability of the natural areas:

- Fencing to exclude livestock from forest and shrubland remnants. This includes fencing along the coastal strip (so that livestock do not have access to beaches and mudflats).
- Reducing the impact of invasive plants through targetted control programmes. The current *Spartina alterniflora* control programme lead by the Northland Regional Council is a positive example of a large-scale species-focused programme. Weed control can also be at a smaller scale and site-focused.
- Regular control of mammalian pests in particular goats, pigs, possums, rats and mustelids.

A lack of conservation management action, in the face of all the other pressures enumerated here, is probably the greatest threat to the future viability of the natural areas of Otamatea ED Northland. Priority areas for protection are described in Section 5.2 (page 427).

4. Site descriptions

Midpoint grid references are given for all sites. Where more than one remnant exists, the number of remnants is given in brackets after the grid reference.

Vegetation types within ecological units are defined by 'abundant' (species which form >50% of the canopy) and 'common' (species which form 20–50% of the canopy) species. If there is more than one canopy species, these are listed in descending order of abundance. The percentage cover of ecological units has been included in the site descriptions, however individual ecological units within sites are not mapped. Broad habitat types (e.g. 'forest', 'shrubland', 'freshwater wetland', 'estuarine wetland' and 'other') have been mapped according to the classification set out in Section 3.3.3.

Records of threatened flora and fauna have been sourced from herbaria and other databases and information systems mentioned in Section 2.1, or were direct observations during the course of this survey. The status of all records was checked prior to inclusion in this report. The Fauna section of each site description lists incidental indigenous fauna observations (exotic fauna are not recorded here) and identifies significant fauna with their current New Zealand conservation status in capitals (e.g. Gradual Decline) which is derived from Hitchmough (comp.) (2002). See Appendix 8.7 for a list of fauna present in Otamatea ED Northland.

'Not surveyed' is stated in the fauna section of the site description if, at the time of publication, the Department of Conservation, Northland Conservancy, did not have any information on indigenous fauna species from that natural area.

4.1 LEVEL 1 SITES

The following were assessed to be Level 1 sites. These are listed in Table C, and described and mapped in the ensuing sections.

TABLE C: LIST OF LEVEL 1 SITES.

SITE NAME	SURVEY NO.	GRID REF.
Lower Pukeareinga Forest Remnants	Q08/061	Q08 355 629
Otamatea River	Q08/062	Q08 321 537
Otara Head Forest and Shrubland	Q08/063	Q08 295 505
Kowhai Road Matai–Kahikatea Remnant	Q08/064	Q08 115 612
Otuhianga Hill Forest	Q08/065	Q08 106 616
Brynderwyn Farm Pond	Q08/066	Q08 392 676
Brynderwyn Road Forest Remnants	Q08/067	Q08 389 670
North Maungaturoto Forest Remnants	Q08/069	Q08 327 659
Piroa Road Forest Remnants 2	Q08/072	Q08 354 671
Collins Scenic Reserve and Surrounds	Q08/078	Q08 327 673
Smith's Point and Mateotetawa Creek Forest Remnants	Q08/079	Q08 171 616
Hukatere Scenic Reserve and Surrounds	Q08/081	Q08 150 563
Arapaoa River	Q08/084	Q08 226 576
Hukatere North Forest	Q08/087	Q08 150 568
Hautakima South Forest	Q08/088	Q08 144 570
Te Ruruku Bay Forest Remnants	Q08/089	Q08 133 562
Quarry Forest	Q08/090	Q08 160 556
Kirikiri Creek Forest and Wetlands	Q08/091	Q08 171 546
Waitieke Creek Forest	Q08/092	Q08 152 540
Te Kiakia Bay Forest Remnants	Q08/093	Q08 171 518
Raepere Creek Forest	Q08/094	Q08 198 526
Totara Creek Forest Remnant	Q08/095	Q08 181 541
Hukatere Peninsula West Coast	Q08/096	Q08 163 520
Raepere Creek Coastal Forest	Q08/098	Q08 204 548
Ararua Road Forest Remnants	Q08/099	Q08 168 644
Upper Paparoa Creek Scenic Reserve and Sherwin QEII Covenant	Q08/100	Q08 217 653
Paparoa Creek Marginal Strip No. 2 and Surrounds	Q08/102	Q08 206 638
Lower Pahi River Forest Remnants	Q08/103	Q08 228 641
Pahi Coastal Strip	Q08/105	Q08 205 612
North Whakapirau Forest Remnant	Q08/107	Q08 221 606
Paparoa Creek Scenic Reserve and Surrounds	Q08/108	Q08 206 644
Paparoa Stream Headwaters	Q08/110	Q08 256 662
Mooney QEII Covenant	Q08/111	Q08 235 637
Pukehuia Forest Remnants	Q08/115	Q08 269 602
Te Ope Stream Remnants	Q08/116	Q08 253 588
Whakapirau Airstrip Forest	Q08/117	Q08 239 594
Te Ope Headland Forest	Q08/119	Q08 246 576
Te Pahi River Road Forest Remnants	Q08/120	Q08 238 650
Paparoa Stream Riparian Forest	Q08/121	Q08 267 671
Paparoa Mature Kauri Stand	Q08/122	Q08 244 666
Hames Road Forest Remnants	Q08/124	Q08 268 654
Te Opu Scenic Reserve	Q08/126	Q08 263 573
Whakapirau Creek Coastal Forest	Q08/127	Q08 271 577
Whakapirau River Scenic Reserve and North Massey Road Forest Remnants	Q08/128	Q08 256 568
Massey Creek Forest	Q08/129	Q08 268 565
South Massey Road Forest Remnants	Q08/130	Q08 254 562
Arapaoa River Scenic Reserve and Surrounds	Q08/131	Q08 256 556
Te Kowhai Creek Scenic Reserve and Surrounds	Q08/132	Q08 264 554
Linton Road West Forest	Q08/134	Q08 265 547
Whakapirau/Rocky Point Forest and Shrubland	Q08/135	Q08 272 538
Barton's Hill Forest	Q08/137	Q08 285 640

SITE NAME	SURVEY NO.	GRID REF.
Upper Pahi River Riparian Forest	Q08/138	Q08 274 640
Page Point Forest and Shrubland	Q08/140	Q08 232 570
Te Tawhiti Forest Remnants	Q08/144	Q08 322 581
Raepare Creek Headland Forest	Q08/145	Q08 343 578
Wahiwaka Creek Forest Remnants	Q08/146	Q08 357 595
James Road Forest	Q08/147	Q08 347 597
Bickerstaffe Road Forest 2	Q08/148	Q08 323 600
Bickerstaffe Railbridge Forest Remnants	Q08/149	Q08 345 614
Upper Wairau River Coastal Forest Remnants	Q08/151	Q08 341 629
Bickerstaffe Rail Station Forest	Q08/152	Q08 322 623
Bickerstaffe Forest and Shrubland	Q08/153	Q08 316 614
Point Curtis Road Coastal Forest Remnants	Q08/156	Q08 365 610
Donaldson's Forest	Q08/157	Q08 380 606
Un-named Island in Kaiwaka River	Q08/158	Q08 377 608
Kaitara Constructed Lake	Q08/159	Q08 383 594
Rotokiekie Creek Forest Remnants	Q08/161	Q08 364 560
Takahoa Creek Forest	Q08/163	Q08 342 550
Takahoa Government Purpose Wildlife Management Reserve	Q08/164	Q08 349 545
Rangiora Road Forest Remnants	Q08/166	Q08 320 531
Mangaiti Creek Forest Remnants	Q08/167	Q08 329 530
Mohinui Forest Remnant 1	Q08/169	Q08 333 504
Pahi River Headwaters	Q08/170	Q08 315 666
Waipikopiko Stream Headwaters	Q08/171	Q08 316 679
Wairau River Riparian Forest Remnants	Q08/173	Q08 368 662
Kaiwhitu Island	Q08/175	Q08 174 506
Kohatutahi Forest and Wetland	Q08/178	Q08 108 597
Owhareao Point Remnants	Q08/179	Q08 186 510
Pukehau QEII Covenant	Q08/182	Q08 233 549
Puriri Point Forest and Shrubland	Q08/183	Q08 239 548
Pakaurangi Forest and Shrubland	Q08/185	Q08 260 520
Hamlin Road Shrubland	Q08/188	Q08 200 565
Mohinui Forest Remnant 3	Q08/190	Q08 350 505
Payne Road Forest Remnants	Q08/192	Q08 414 511
Otuhianga Coastal Forest Remnants	Q08/194	Q08 099 626
Kaitara Creek Forest Remnants	Q08/196	Q08 382 565
Nathan Road Forest and Shrubland	Q08/198	Q08 375 550
Huarau Ridge Forest Remnants	Q08/200	Q08 289 647
Hillstone Road Forest Remnants 3	Q08/208	Q08 310 577
Oruawharo Road Stream	Q08/209	Q08 423 527
Bayer Road Shrubland	Q08/211	Q08 392 526
Te Mira Road Wetland	Q08/212	Q08 212 524
Eastern Boundary Forest (Carter Holt Harvey)	Q08/214	Q08 238 520
Parry Road Wetland	Q08/215	Q08 232 511
Tinopai Road Wetland	Q08/216	Q08 204 511
Hanerau Stream Forest Remnants	Q08/218	Q08 330 559
Timber Bay Forest	Q09/001	Q09 272 480
Puketotara Forest Remnants 2	Q09/005	Q09 261 481
Puketotara Forest Remnants 3	Q09/006	Q09 272 458
Puketotara Forest Remnant 4	Q09/008	Q09 256 471
Moturoa Island	Q09/013	Q09 248 454
Motuouhi Island	Q09/014	Q09 249 450
Puketotara Forest Remnant 9	Q09/016	Q09 281 458
Puketotara Forest Remnant 10	Q09/017	Q09 288 477
Oruawharo River North Coast	Q09/020	Q09 338 453

SITE NAME	SURVEY NO.	GRID REF.
Otamatea River Confluence	Q09/021	Q09 243 479
Oneriri Station Homestead Forest	Q09/022	Q09 291 444
Puketotara Forest Remnant 13	Q09/024	Q09 304 440
Kaipara Forest, Puketotara	Q09/026	Q09 305 422
Oneriri Pa Forest	Q09/027	Q09 320 430
Upper Whakaki River Forest Remnants	Q09/028	Q09 328 466
Kaira Creek Forest	Q09/029	Q09 345 465
Ruataniwha Forest Remnant	Q09/030	Q09 305 438
Gittos Point Forest and Shrubland	Q09/032	Q09 352 455
Oruawharo School Forest	Q09/033	Q09 373 469
Koareare Creek Forest Remnants	Q09/036	Q09 399 487
Topuni River Forest Remnant 1	Q09/037	Q09 427 500
Topuni River Confluence Forest	Q09/038	Q09 420 481
Wainonororo Constructed Lake	Q09/039	Q09 319 489
The Funnel Pohutukawa Fringe	Q09/043	Q09 267 493
Mohinui Forest Remnant 4	Q09/044	Q09 350 500
Puketotara Forest Remnant 15	Q09/045	Q09 286 493
Bushy Point Forest Remnants	Q09/046	Q09 198 485
Kumete Bluff Forest Remnants	Q09/047	Q09 220 481
Otaiwhata Bay Forest and Shrubland	Q09/049	Q09 192 497

LOWER PUKEAREINGA FOREST REMNANTS

Survey no.	Q08/061
Survey date	9 November 2005
Grid reference	Q08 355 629 (3 remnants)
Area	16.9 ha
Altitude	32–102 m asl

Ecological units

(a) Totara–kahikatea forest on moderate to steep hillslope (80%)

(b) Totara–kanuka forest on moderate hillslope (15%)

(c) Totara–rimu forest on ridge top (5%)

Landform/geology

Hillsides and gullies underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex) and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

Two remnant examples of mature secondary forest (types (a) and (c)) are connected by a younger secondary forest type (b). This area is not fenced and appears to be grazed underneath (it is surrounded by pasture currently grazed with sheep).

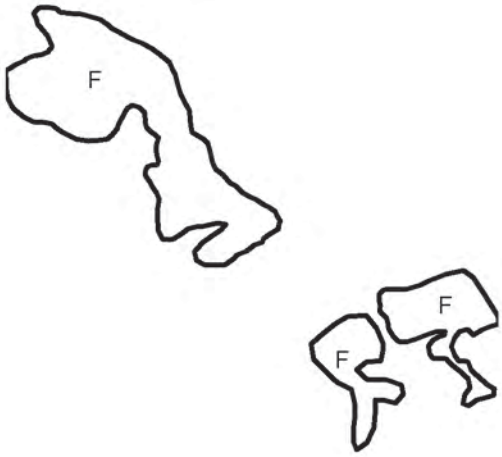
(a) Totara and kahikatea are co-dominant; the pointed secondary kahikatea crowns are often emergent above the totara. Matai is also occasionally emergent. Frequent components of the canopy are karaka, kowhai, puriri, kanuka, titoki and taraire, with a great diversity of other species present in lower numbers including kauri, nikau, tarata, kohekohe, pukatea, ti kouka, mahoe, rimu, karamu and mapou.



Q08/061 Lower Pukeareinga Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(b) This type comprises less diverse totara–kanuka forest with frequent ti kouka and kahikatea and occasional mapou and manuka.

(c) On the southern side of the site there is a small stand of totara and rimu, in association with frequent kanuka and rewarewa, and occasional mamaku, karaka, kohekohe and nikau.

Fauna

Tui, welcome swallow, kukupa (Gradual Decline).

Significance

Presence of a threatened bird species (kukupa), observed perching in totara within the site.

This site benefits from its proximity to a large continuous area of forest on Pukeareinga in the neighbouring Rodney ED (including Maungaturoto Scenic Reserve). It is a representative site for ecological unit (a) totara–kahikatea forest on moderate to steep hillslope.

OTAMATEA RIVER

Survey no.	Q08/062
Survey date	Various (December 2005 – January 2006)
Grid reference	Q08 321 537
Area	2790.9 ha
Altitude	sea level

Ecological units

(a) Mangrove shrubland and forest in estuary

(b) Sea rush rushland in estuary

(c) Mangrove–sea rush shrubland in estuary

(d) Oioi–sea rushland in estuary

(e) Sea primrose–arrow grass–saltwater paspalum herbfield in estuary

(f) Saltmarsh ribbonwood shrubland in estuary

(g) Saltwater paspalum grassland in estuary

(h) *Spartina alterniflora* grassland in estuary

(i) *Baumea articulata* reedland in estuary

(j) Mudflats and sandflats on estuary

Landform/geology

Holocene estuaries, beaches, and intertidal rock flats.

Vegetation/habitats

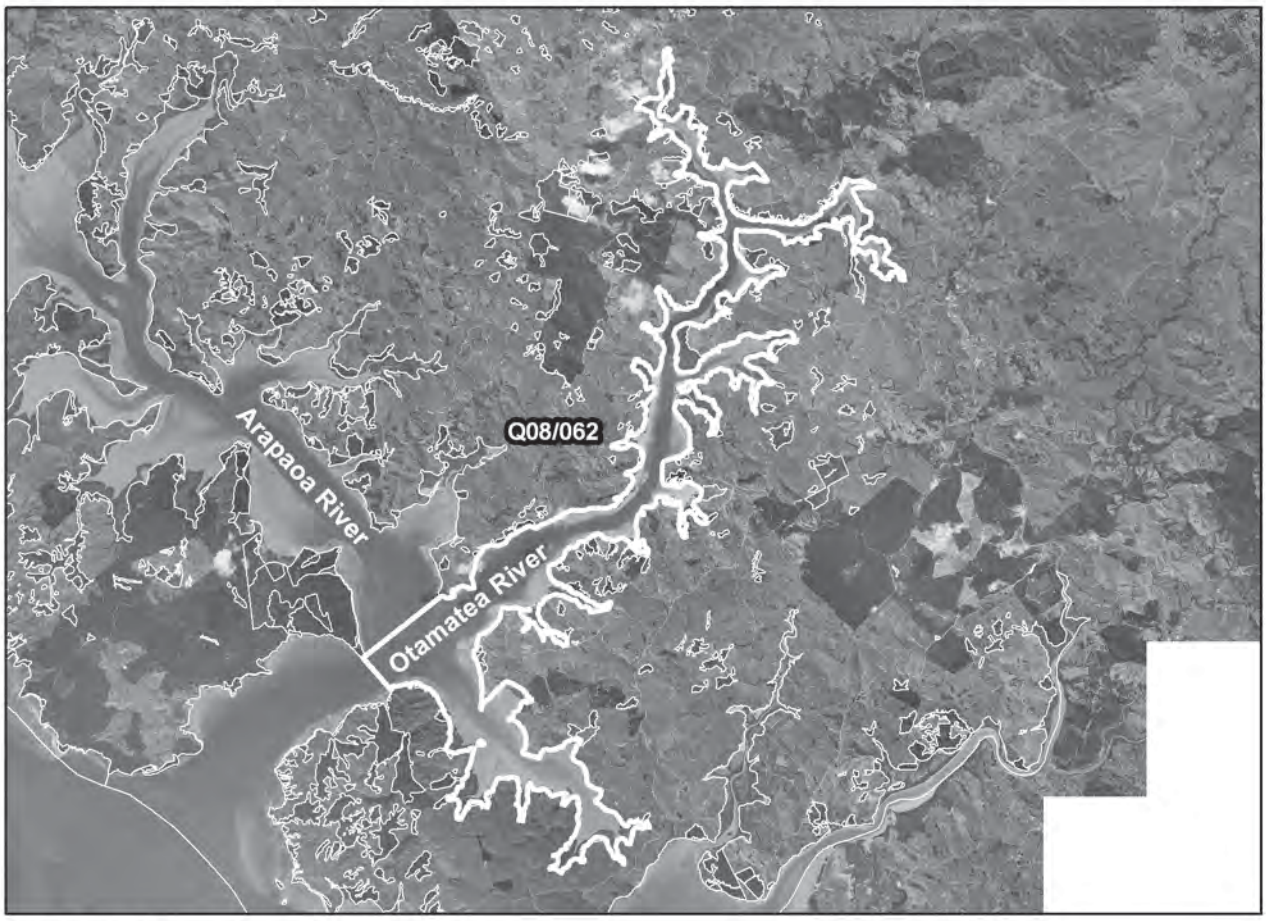
(a) Mangrove shrubland and forest covers *c.* 17% (470 ha) of the site, generally in the upper reaches of the estuary, in areas away from the main current. The tallest mangrove forests are on the edges of channels, where the trees are in optimal conditions for growth, while shrub-sized mangroves tend to be restricted to the upper tidal areas, bordering saltmarsh habitats.

(b) Stands of pure sea rush are the most common type of saltmarsh.

(c) Where mangrove shrubland and sea rush rushland meet there is often a mingling of these two vegetation types over several metres of upper-tidal mudflat, creating habitat with cover for species such as banded rail which may be present in the estuarine margins.

(d) In some places oioi and sea rush are equally common. This is generally at freshwater outflows or above the pure sea rush rushlands.

(e) Herbfields with indigenous species dominant are very uncommon. One example of an indigenous herbfield was observed at the intersection of Judd Road and Bickerstaffe Road in which arrow grass (a regionally significant plant)



Q08/062 Otamatea River

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 2,500 5,000 10,000 Metres



was mixed with sea primrose in equal proportions, with frequent saltwater paspalum threatening to smother them. Pampas occurred occasionally.

(f) Saltmarsh ribbonwood occurs at the extreme upper tidal limit, with various mixtures of indigenous and exotic species. The following were recorded as occasional associates in this type: *Coprosma propinqua,* harakeke, ngaio, mapou, periwinkle, Japanese honeysuckle, gorse and woolly nightshade. Tiny scattered examples of this type are present, mainly in the Otamatea River part.

(g) Saltwater paspalum is present in most saltmarsh areas of Otamatea River, and can form extensive grasslands, through which indigenous salt meadow herbs often grow, e.g. sea primrose, bachelor's button, remuremu. It does not

tend to occur on more exposed, sandy beaches. The preferred habitat is in quiet tidal inlets above mangrove forests and shrublands.

(h) Five known infestations of *Spartina alterniflora* occur between Takahoa Creek and the Bickerstaffe rail bridge. These are currently being eradicated by helicopter spraying; otherwise the Otamatea River and Whakaki River appear free of this weed. These infestations have been regularly treated over the past four years, and are currently at 1–3% regrowth (Peter Joynt, Biosecurity Officer, Northland Regional Council, pers. comm.).

(i) A small area (20 m^2) of *Baumea articulata* reedland was recorded at the Judd–Bickerstaffe Road intersection, at a freshwater seepage draining out from underneath the road. Such habitats may occur at other points along the coast, but were not recorded.

(j) Intertidal mudflats and sandflats cover approximately 42% (1163 ha) of the surface area of Otamatea and Whakaki Rivers. These calm, shallow, productive, saltwater habitats are vital as feeding grounds to both NZ-breeding waders (particularly in winter) and Arctic migrant waders (particularly in summer) (Sagar *et al.* 1999). Included within the figure quoted above (area measured as being exposed at low tide), are all of the saltmarsh types (b, d, e, f, i), saltwater paspalum grasslands (g) and *Spartina alterniflora* grasslands (h) and colonies of the introduced Pacific oyster (*Crassostrea gigas*), which occur frequently around the coast either in natural beds or on constructed racks of small-scale oyster farms.

Significant flora

Arrow grass (regionally significant).

Fauna

A wide variety of bird species uses this site. Some of these are listed below, based on records from Crockett (1992–2004), in which counts for 'Batley–Tanoa' and 'Ngamotu' apply to the lower parts of Otamatea River and Whakaki River. Frequency of encounter and the range of numbers of individuals across the two areas over the period are stated in brackets.

- NZ fairy tern (1993 – 2 recorded), black stilt (2001 – 4 recorded, possibly hybrids with pied stilt) (Nationally Critical)
- Caspian tern (regular, 1–8), wrybill (1994 – 4 recorded, 2001 – 1 recorded) (both Nationally Vulnerable)
- Banded dotterel (sporadic in winter, 16–53), white-fronted tern (regular, 1–17) (both Gradual Decline)
- Pied shag (regular, 2–53), NZ dotterel (1–35) (both Sparse)
- Royal spoonbill (sporadic, 3–5) (Coloniser)
- Bar-tailed godwit (up to 2220 in summer, 1–29 in winter), lesser knot (sporadic, up to 500 in summer, winter 1997 – 2 recorded), turnstone (winter 1992 – 2 recorded) (all Migrant)
- Variable oystercatcher (sporadic, 2–4) (regionally significant)
- White-faced heron (regular, 4–56), pied oystercatcher (regular, 203–1120), pied stilt (regular, especially at Ngamotu, 19–1411), black-backed gull (sporadic, 1–13), red-billed gull (sporadic, 4–45), spur-winged plover (regular, 2–20), little shag (sporadic, 1–6) (all not threatened)

- Batley – Tanoa (southern Otamatea River) is the most important area in Otamatea ED Northland for pied oystercatcher, with winter numbers regularly exceeding 600.

In addition to these records, little egrets (Migrant) and white herons (Nationally Critical) are known to occasionally visit the Otamatea River (Veitch 1979).

Significance

Combined, the Otamatea River and Whakaki River (which are both part of this site) have 1269 km of coastline and 2791 ha of estuarine habitat, of which approximately 42% is open mudflat or sandflat (1163 ha), and 17% is mangrove forest or shrubland (470 ha). The full extent of saltmarsh habitats (i.e. types (b), (d), (e), (f) and (i)) was not measured, but these occupy a very low percentage of the overall area (collectively <1%).

A recent review of indigenous shorebird habitat networks deemed the Kaipara Harbour to be a 'site of particular importance', as it is within the top five non-breeding sites for seven species of indigenous-breeding waders, and is also used by 1000+ Arctic migrants during summer months (Dowding & Moore 2006). This site contains a quarter of the wading habitat in Otamatea ED Northland.

This is a representative site for two ecological units: (e) sea primrose–arrow grass–saltwater paspalum herbfield in estuary and (i) *Baumea articulata* reedland in estuary.

Marginal Strips (DOC-administered) cover 11.4 ha of this site, QEII Open Space Covenants cover 0.8 ha of the site and 0.2 ha of the Takahoa Government Purpose Wildlife Management Reserve (Q08/164), also DOC-administered, is within the site. All of these protected areas are at the upper intertidal margins of the Otamatea River.

OTARA HEAD FOREST AND SHRUBLAND

Survey no.	Q09/063
Survey date	9 November 2005
Grid reference	Q08 295 505
Area	14.5 ha (5.3 ha forest, 9.2 ha shrubland)
Altitude	0–60 m asl

Ecological units

(a) Ti kouka–kanuka shrubland on steep coastal margin (50%)

(b) Kanuka forest on gentle hillslope (20%)

(c) Pohutukawa–kowhai–puriri–taraire forest on steep coastal margin (15%)

(d) Tutu shrubland on coastal cliff (10%)

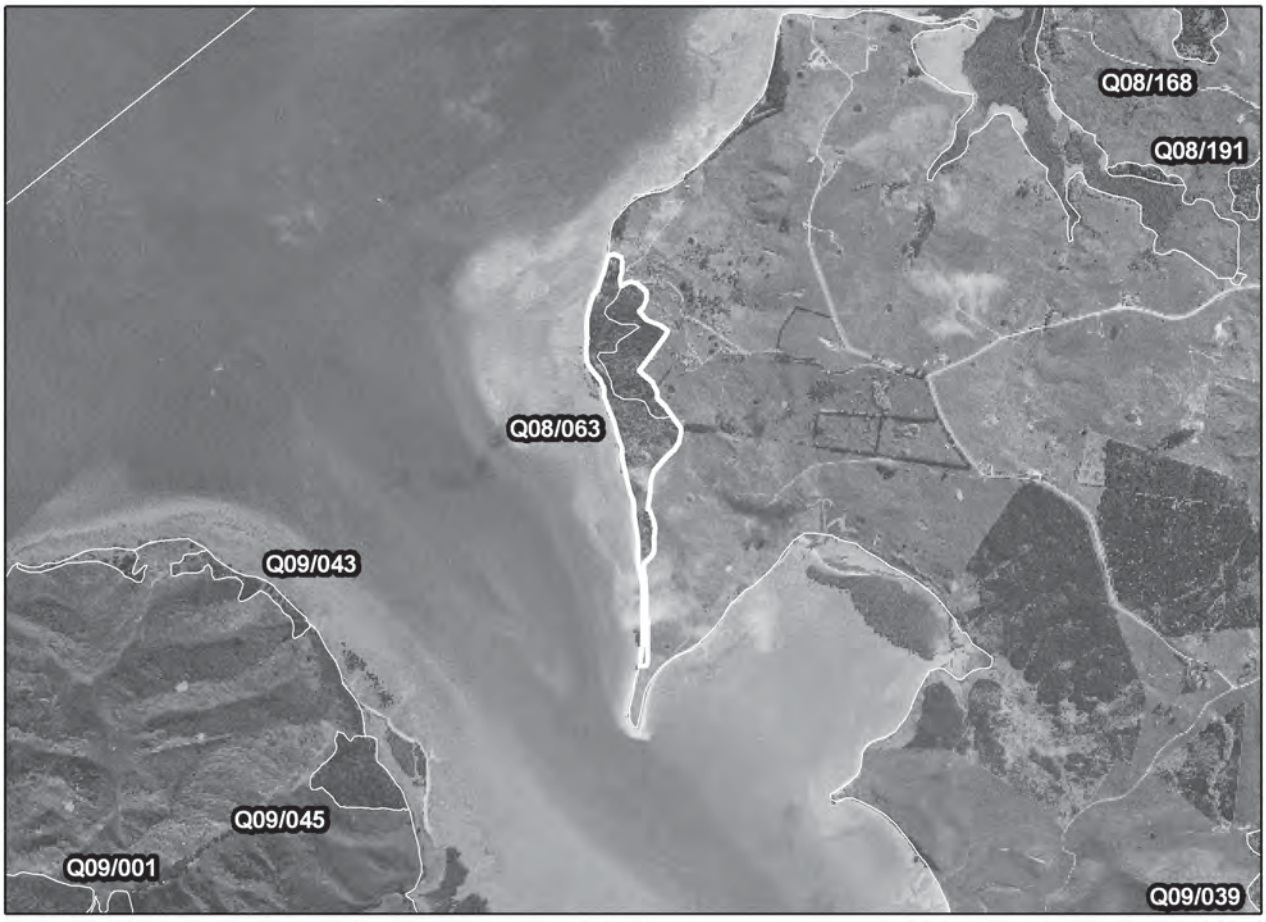
(e) Pohutukawa treeland on steep coastal margin (5%)

Landform/geology

Steep coastal hillside of Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex) and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

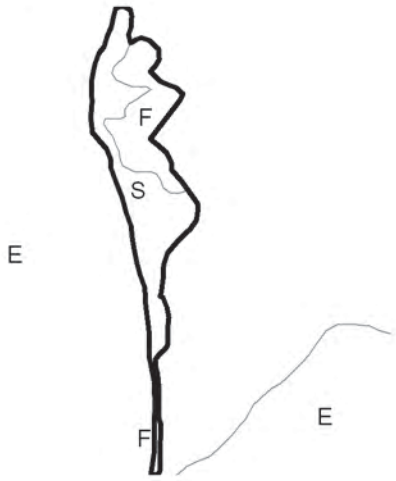
A gentle kanuka forested slope drops off through ti kouka–kanuka shrubland to a west-facing coastal cliff with tutu clinging to near vertical faces. Surrounding land is covered in pasture.



Q08/063 Otara Head Forest and Shrubland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(a) Kanuka forest is present on most of the flatter areas above the cliff, the canopy of which is punctuated occasionally by yellow ti kouka.

(b) A dense band of bright yellow ti kouka mixed with dark kanuka is conspicuous above the cliff. Harakeke, mapou and mamaku are frequent.

(c) South of the cliff a diverse remnant of pohutukawa–kowhai–puriri–taraire forest extends most of the way down a steep slope to the beach and rock platforms of the lower Otamatea River (Q08/062). Karaka and kanuka are frequent here, and there are occasional rewarewa.

(d) The cliff face has 50% cover of tutu shrubland. The intervening spaces are either bare rock or are covered by unidentified grasses and herbs.

(e) Towards the southern part of the remnant a few sparse, very large pohutukawa cling to steep coastal slopes.

Fauna

Not surveyed.

Significance

This is a representative site for three ecological units: (a) ti kouka–kanuka shrubland on steep coastal margin, (c) pohutukawa–kowhai–puriri–taraire forest on steep coastal margin and (d) tutu shrubland on coastal cliff. Indigenous woody vegetation extends to the harbour's edge, providing some catchment protection functions.

KOWHAI ROAD MATAI–KAHIKATEA REMNANT

Survey no.	Q08/064
Survey date	10 November 2005
Grid reference	Q08 115 612
Area	5.4 ha
Altitude	20 m asl

Ecological units

(a) Kahikatea–ti kouka treeland on alluvium (70%)

(b) Mature matai over secondary kahikatea–ti kouka forest on alluvium (30%)

Landform/geology

Holocene alluvium and freshwater wetlands.

Vegetation

On the southeastern side of Otuhianga Hill there is a small alluvial basin partly covered with indigenous forest and treeland.

(a) The northern two thirds of the remnant comprise sparse kahikatea–ti kouka treeland.

(b) The southern third comprises denser vegetation warranting the classification of 'forest', and has several tall (45–50 m), mature matai towering above a younger canopy of kahikatea poles fringed by ti kouka. Also present are lancewood, karaka and pukatea. This part of the site is fenced.

Fauna

Not surveyed.

Significance

Ecological unit (b) exists nowhere else in the Otamatea ED Northland, and is a very rare vegetation type throughout Northland. It is remarkable for the presence of unusually tall, mature matai trees. Despite its disturbed condition, it is representative of mature podocarp forest on alluvium, an ecological unit which would never have been extensive in this ED.



Q08/064 Kowhai Road Matai-Kahikatea Remnant

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



OTUHIANGA HILL FOREST

Survey no.	Q08/065
Survey date	10 November 2005
Grid reference	Q08 106 616 (3 remnants)
Area	21.9 ha (16.5 ha forest, 5.4 ha shrubland)
Altitude	20–120 m asl



Q08/065 Otuhianga Hill Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Kahikatea–puriri–totara forest on moderate hillslope (70%)

(b) Totara–kahikatea forest on moderate hillslope (20%)

(c) Mamaku–manuka forest on gentle slope (5%)

(d) Manuka shrubland on ridge top (5%)

Landform/geology

Gullies and hillslopes underlain by Oligocene micritic limestone (Mahurangi Limestone), Miocene thinly interbedded sandstone and mudstone (Waitemata

Group), and a Miocene basaltic flow remnant and boulder colluvium (Waitakere Group).

Vegetation

On the northern and southern slopes of Otuhianga hill, there are scattered remnants of indigenous forest and shrubland amongst pasture and residential housing. The site comprises a mosaic of secondary vegetation of different ages, from about 10–15 years to greater than 120 years. Most areas appear unfenced.

(a) Gullies on the southern side of the hill have forest dominated by kahikatea in association with puriri and totara. Kowhai is frequent; ti kouka and karaka are occasional. There are some houses at the edge of this forest, however all dwellings and gardens are excluded from this site.

(b) A compact area of totara and kahikatea forest occurs on the northern side of the hill. Puriri is a common associate with occasional mamaku, ponga, nikau, kanuka, ti kouka and false acacia.

(c) Mamaku–manuka forest is present below the summit on the southern side of the site. Mahoe and ti kouka are also frequent in the canopy.

(d) Manuka shrubland with occasional ti kouka occurs near the summit on the north-facing slope.

Fauna

Australasian harrier.

Significance

This is a representative site for ecological unit (c) mamaku–manuka forest on gentle slope, which is not found anywhere else in Otamatea ED Northland. This site comprises three small remnants, which appear to be regenerating. The condition of the understorey is not known, but is probably affected by livestock.

BRYNDERWYN FARM POND

Survey no.	Q08/066
Survey date	14 November 2005
Grid reference	Q08 392 676
Area	1.2 ha
Altitude	127–139 m asl

Ecological units

(a) Open water (constructed freshwater farm pond) (99%)

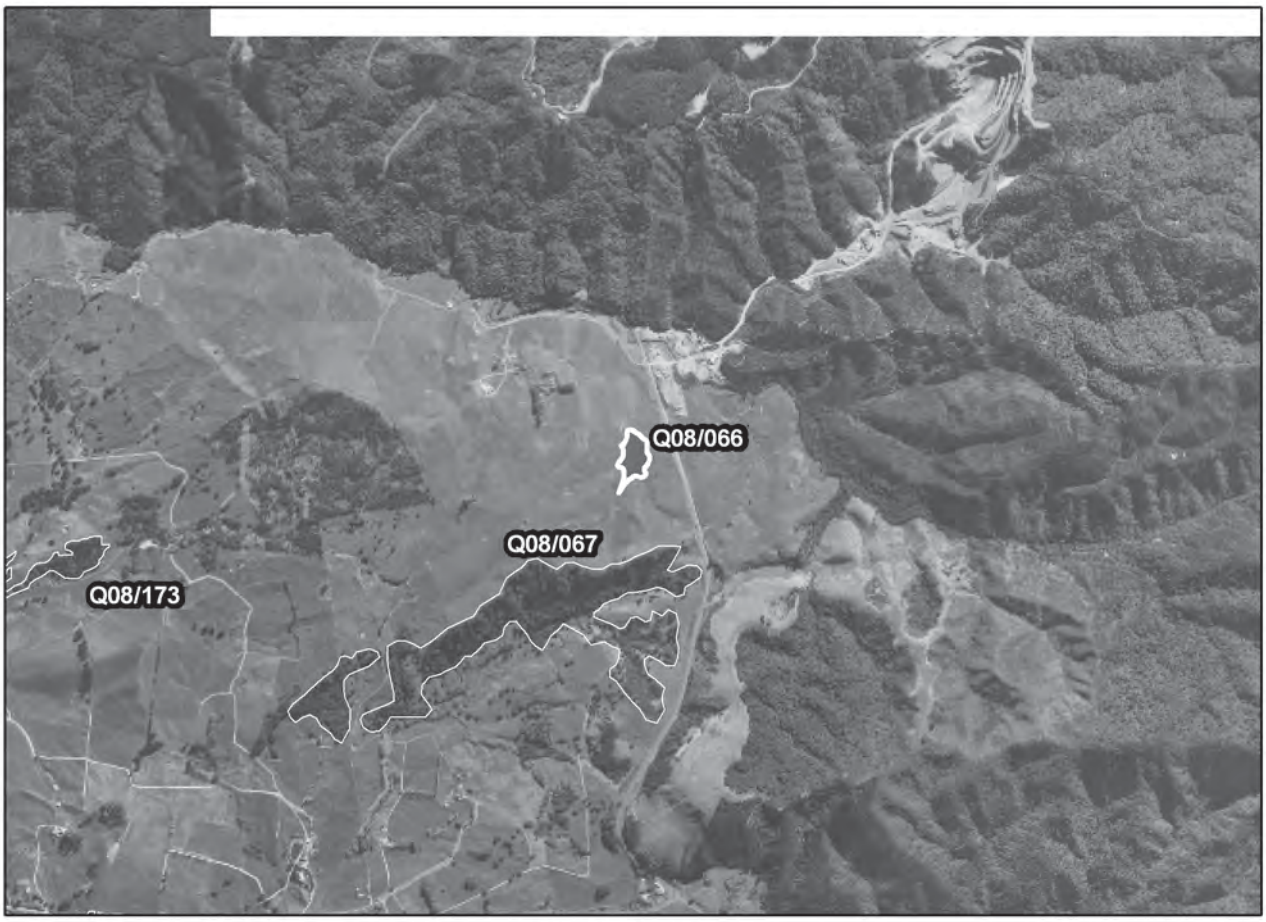
(b) *Juncus sarophorus* rushland on constructed pond fringe (1%)

Landform/geology

Man-made pond/lake.

Vegetation

This site comprises a large constructed farm pond approximately 160 m long and 80 m wide lying in a north–south orientation. The paddock around this pond appears to be grazed down to the water's edge and consequently has little indigenous marginal freshwater vegetation. The fringes of the pond are vegetated with pasture (excluded), sparse indigenous rushes (*Juncus sarophorus* and *J. edgariae*) and a few overhanging poplars.



Q08/066 Brynderwyn Farm Pond

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Fauna

At the time of the survey it was being used by a black shag (Sparse), paradise shelducks, mallard ducks, welcome swallows, spur-winged plovers and black swans.

Significance

This is one of the largest farm ponds in Otamatea ED Northland and is an important habitat for both common and threatened indigenous water bird species. The presence of threatened species (black shag) elevates this site to Level 1. However, it is acknowledged that the site is artificially constructed and

is therefore not a true 'significant natural area' even though it is now habitat for a threatened species.

BRYNDERWYN ROAD FOREST REMNANTS

Survey no.	Q08/067
Survey date	14 November 2005
Grid reference	Q08 389 670 (2 remnants)
Area	26.4 ha
Altitude	43–160 m asl

Ecological units

(a) Totara–kahikatea forest on moderate to steep hillslope (60%)

(b) Totara–kanuka treeland on moderate to steep hillslope (35%)

(c) Kauri forest on ridge top (5%)

Landform/geology

Steep hillsides and gullies underlain by Miocene thick-bedded sandstone (Waitemata Group) and Miocene dacite (Waitakere Group).

Vegetation

This site comprises indigenous forest remnants on the northern side of a small tributary in the upper Wairau River catchment, next to State Highway 1 and Brynderwyn Road. Dense forest covers the steepest parts of the mainly south-facing slope while treeland is present around the margins of the stream and in outlying remnants. Radiata pine and willows are commonly planted in the paddocks surrounding this site.

(a) Totara and kahikatea are equally common in the canopy of the forest on the steep slope. Due to the moist nature of the site, nikau and mamaku are also frequent. Associated species at low abundance are rewarewa, puriri, titoki, karaka, ti kouka, kohekohe, pukatea, mahoe, five finger, tawa, tanekaha and macrocarpa.

(b) Totara is abundant and kanuka is common in the grazed treeland areas. Also found here occasionally are manuka, kahikatea, mamaku and ponga.

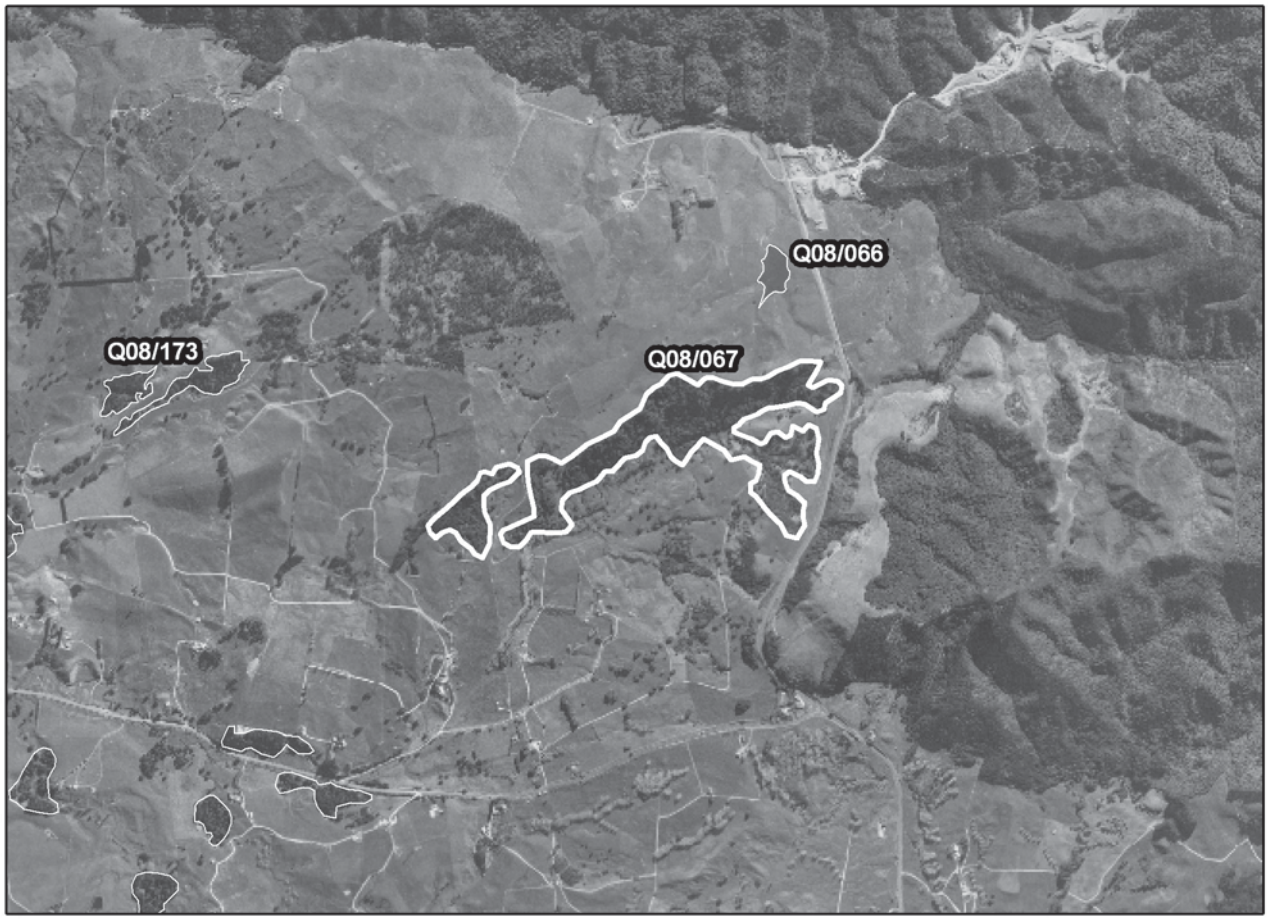
(c) Kauri ricker forest perches on the ridge with occasional radiata pine and macrocarpa. The frequency of exotic conifers increases towards the western end of the ridge where the indigenous forest merges with a small pine plantation. Totara is frequent in the ridge top forest, with occasional rimu, ti kouka and kanuka.

Fauna

Grey warbler.

Significance

This is a representative site for ecological unit (a) totara–kahikatea forest on moderate to steep hillslope, which is particularly diverse in its canopy composition.



Q08/067 Brynderwyn Road Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



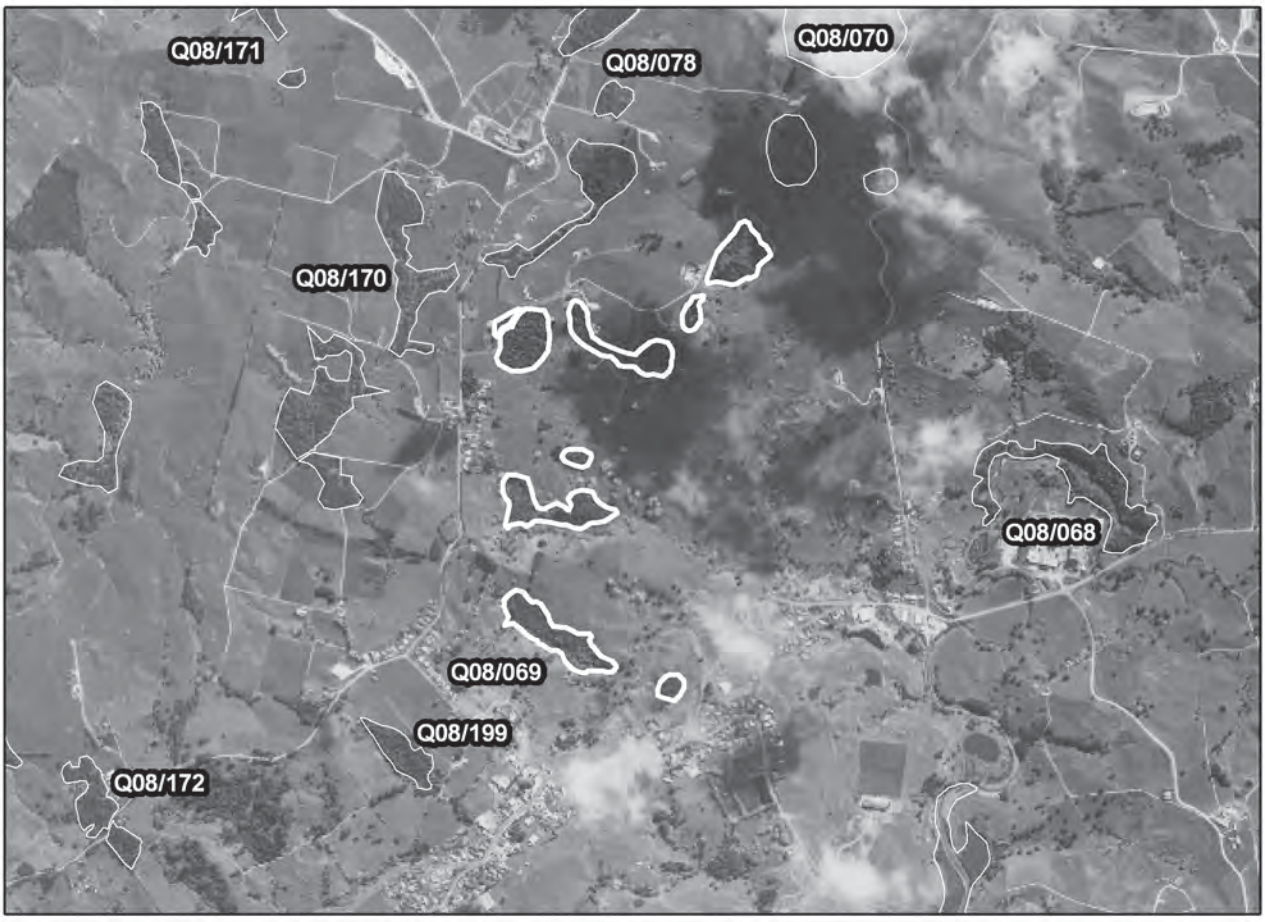
NORTH MAUNGATUROTO FOREST REMNANTS

Survey no.	Q08/069
Survey date	16 December 2005
Grid reference	Q08 327 659 (9 remnants)
Area	16.6 ha
Altitude	20–80 m asl

Ecological units

(a) Totara–karaka forest in gully (25%)

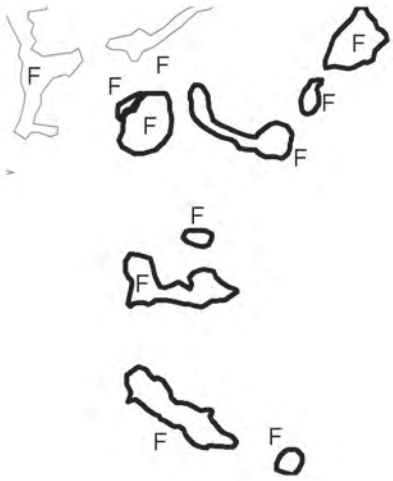
(b) Taraire–totara forest in gully (20%)



Q08/069 North Maungaturoto Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(c) Totara–kahikatea forest on moderate hillslope (20%)

(d) Kahikatea–totara forest on moderate hillslope (20%)

(e) Totara forest in gully (15%)

Landform/geology

Hillslopes and gullies underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

These forest remnants are in the western catchment of the Wairau River, just north of the town of Maungaturoto in a landscape of rural residential and pastoral farming use, with an abundance of exotic trees such as macrocarpa, willow, tree privet, hawthorn and poplar dotted around the paddocks. Some of the latter are cultural plantings and others appear to be naturalised.

(a) The northernmost remnant (next to Doctor Hill Road) has totara and karaka equally dominant in the canopy, in striking contrast to most of the other nearby forest remnants. Kowhai, nikau and kanuka are frequent canopy components, while puriri, tarata, ti kouka, titoki, kahikatea and tawa are all occasional.

(b) The gully remnant north of Hurndall Street East comprises abundant taraire and common totara. Frequent species include pukatea, nikau, kowhai and kahikatea. Other species comprising under 5% canopy cover include kohekohe, karaka, puriri, titoki and kanuka.

(c) Forest with abundant totara mixed with kahikatea is found on hillslopes above the gullies.

(d) On gentle slopes kahikatea is much more abundant than totara, although they still share dominance in the canopy to the exclusion of other species. Types (c) and (d) share similar associates such as matai, rewarewa, kanuka and ti kouka.

(e) Gully forest that is limited to smaller or more disturbed remnants tends to have a canopy of predominantly totara, with frequent kanuka and occasional kahikatea and matai.

Significant flora

Tawa (locally uncommon)

Fauna

Not surveyed.

Significance

This is a representative site for ecological unit (a) totara–karaka gully forest, as well as having a high diversity of habitat types within a small area. It contains a locally uncommon tree species (tawa).

PIROA ROAD FOREST REMNANTS 2

Survey no.	Q08/072
Survey date	14 November 2005
Grid reference	Q08 345 671 (6 remnants)
Area	15.4 ha
Altitude	20–104 m asl

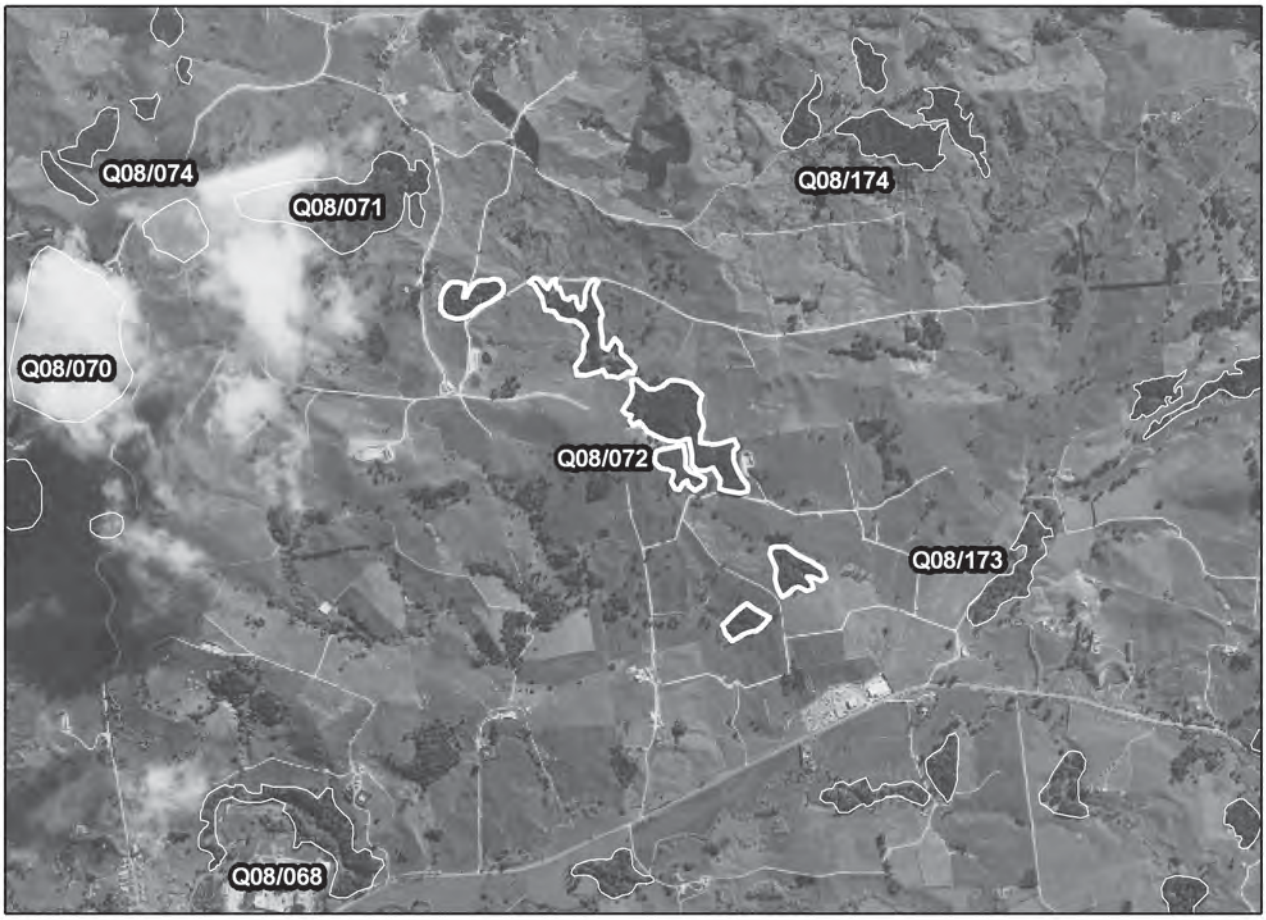
Ecological units

(a) Totara–kahikatea forest in gully (90%)

(b) Kahikatea forest on alluvium (10%)

Landform/geology

Hillslopes and gullies underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies), and river flats on Holocene alluvium.



Q08/072 Piroa Road Forest Remnants 2

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Vegetation

This site comprises six indigenous forest remnants linked by tributaries in the upper Wairau River catchment. The surrounding landscape comprises pasture with scattered, isolated totara trees, dissected by several farm tracks.

(a) Totara is dominant to kahikatea in the canopy of the majority of the forest remnants. Rimu and kanuka are frequent, while kauri, radiata pine and hawthorn are scattered around dry edges.

(b) A small, dense remnant of kahikatea is present on alluvium in the lower valley near State Highway 12.

Fauna

Australasian harrier.

Significance

Although very small (approximately 1.5 ha), the best representative example of ecological unit (b), kahikatea forest on alluvium, remaining in Otamatea ED Northland occurs at this site. These remnants also provide a riparian protection function for the Wairau River.

COLLINS SCENIC RESERVE AND SURROUNDS

Survey no.	Q08/078
Survey date	14 November 2005
Grid reference	Q08 327 673
Area	2.7 ha
Altitude	80–93 m asl

Ecological unit

(a) Kauri–rimu forest on gentle hillslope (100%)

Landform/geology

Low terrace underlain by Pleistocene alluvium.

Vegetation

Collins Scenic Reserve is a tiny remnant of indigenous forest next to Gorge Road in the upper Waipikopiko Stream catchment. The canopy is formed of semi-mature kauri and rimu with frequent totara, kanuka and taraire, and occasional rewarewa. During a short walk-through survey, the following plant species were recorded in the understorey:

Subcanopy: Manuka, nikau, pigeonwood, mahoe, karaka, tarata, puriri, tawa, small-leaved milk tree, mamangi

Shrub tier: Hangehange, *Coprosma spathulata*, *C. areolata*, *C. rhamnoides,* elaeagnus*, Alseuosmia quercifolia*, kawakawa, mapou

Ground cover: Tradescantia, parataniwha, hooked sedge, hound's tongue fern, mokimoki, *Blechnum chambersii*, thread fern, wheki, ponga, mamaku, hanging spleenwort, gully fern, shining spleenwort, leather-leaf fern, sickle spleenwort

Vines (throughout): NZ jasmine, NZ passionfruit, supplejack, *Metrosideros perforata, M. diffusa*

Significant flora

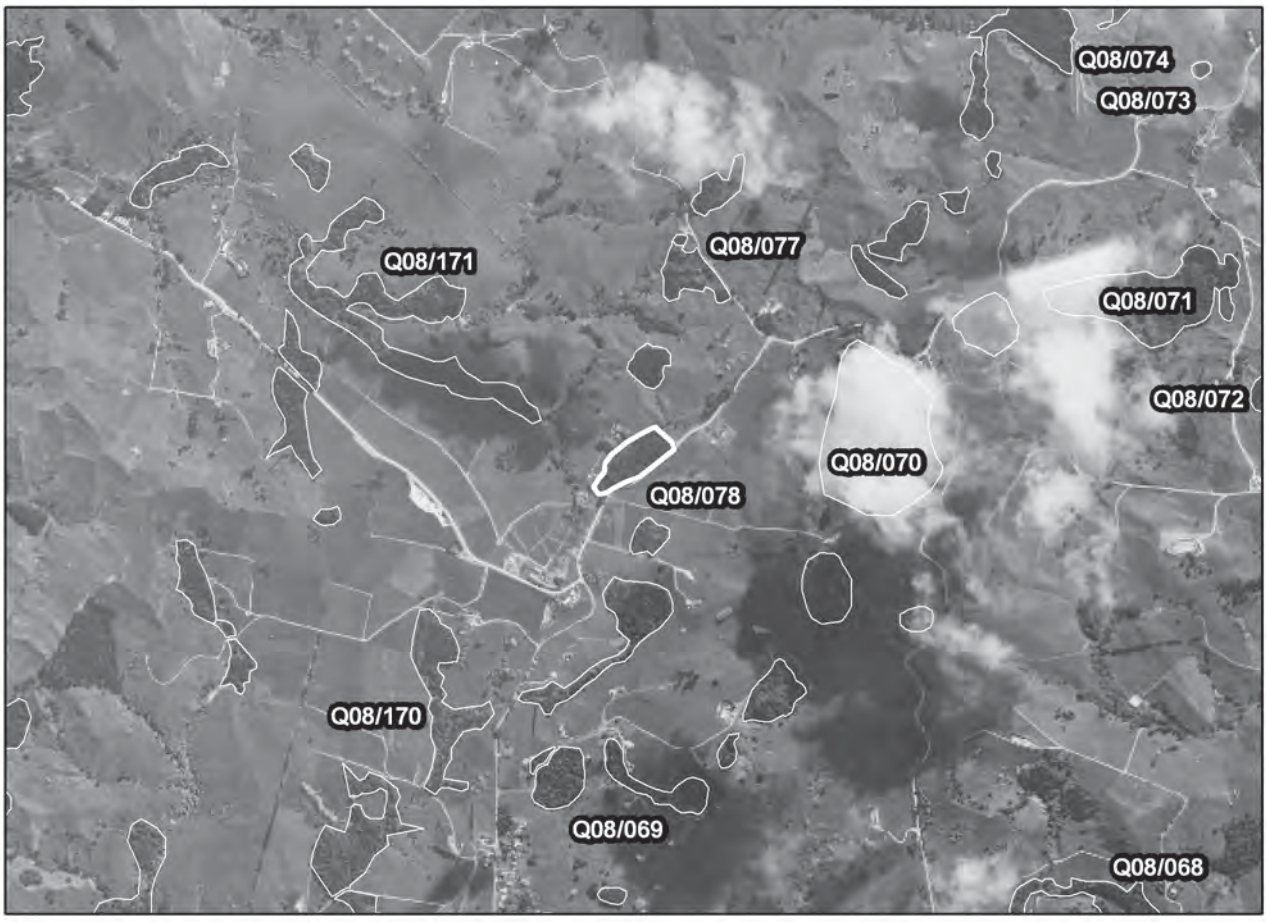
Alseuosmia quercifolia and tawa are both considered locally uncommon in Otamatea ED Northland.

Fauna

Fantail, grey warbler, shining cuckoo, tui.

Significance

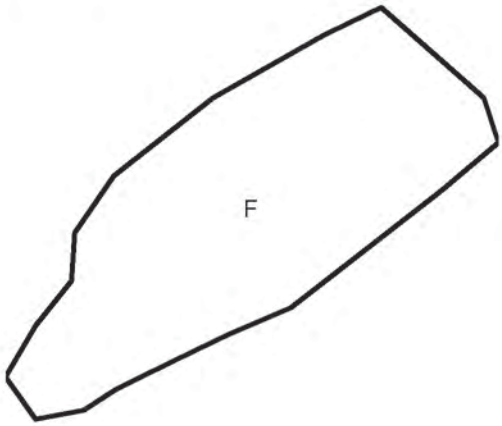
The Scenic Reserve, which is administered by the Department of Conservation, encompasses 1.4 ha (52%) of the identified natural area. The rest of the site is



Q08/078 Collins Scenic Reserve and Surrounds

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



on private land. The vegetation of this site is significant owing to the presence of a unique, therefore representative, forest type which, being fully fenced from stock, possesses a diverse understorey of indigenous trees, shrubs, ferns and herbs. Two locally uncommon plants in Otamatea ED Northland are present (*Alseuosmia quercifolia* and tawa). The most problematic environmental weeds in the reserve are elaeagnus and tradescantia, however both of these are relatively limited in their extent.

SMITH'S POINT AND MATEOTETAWA CREEK FOREST REMNANTS

Survey no.	Q08/079
Survey date	15 November 2005
Grid reference	Q08 171 616 (4 remnants)
Area	42.7 ha
Altitude	0–40 m asl

Ecological units

(a) Kanuka forest on gentle hillslope (45%)

(b) Totara–kowhai–kahikatea forest on steep coastal margin (40%)

(c) Kowhai–totara forest on steep coastal margin (10%)

(d) Totara–kahikatea forest on moderate hillslope (5%)

Landform/geology

Coastal hillsides and gullies underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex) and melange (undifferentiated Mangakahia & Motatau Complexes).

Vegetation

The Mateotetawa Creek drains agricultural land at Matakohe West, flowing out to the Arapaoa River (Q08/084) past a prominent, forested headland known as Smith's Point (after the former timber mill in operation from 1881 to 1906). Three other small patches of coastal/riparian forest along the fresh to saltwater transition form part of this site.

(a) The majority of the headland, in particular the summit and the south-facing slope, is covered in kanuka forest with frequent manuka and occasional totara, kauri, tanekaha, ti kouka, lancewood and mamangi. Some local clumps of kauri rickers occur.

(b) Totara–kowhai–kahikatea forest extends from mid-slope down to the coast. Emergent radiata pine are frequent throughout this type, and become almost common on the north-facing coastal margin. Also present in the canopy are occasional kauri, matai, tanekaha, puriri, pukatea, karaka, mamangi, mapou, ti kouka and tree privet.

(c) Two of the smaller remnants next to mangroves on the northern banks of the Arapaoa River have strikingly abundant kowhai with subdominant totara, frequent hawthorn and occasional poplar.

(d) The most inland remnant comprises totara dominant forest with abundant kahikatea, frequent kanuka, ti kouka and hawthorn, and occasional manuka and mamaku.

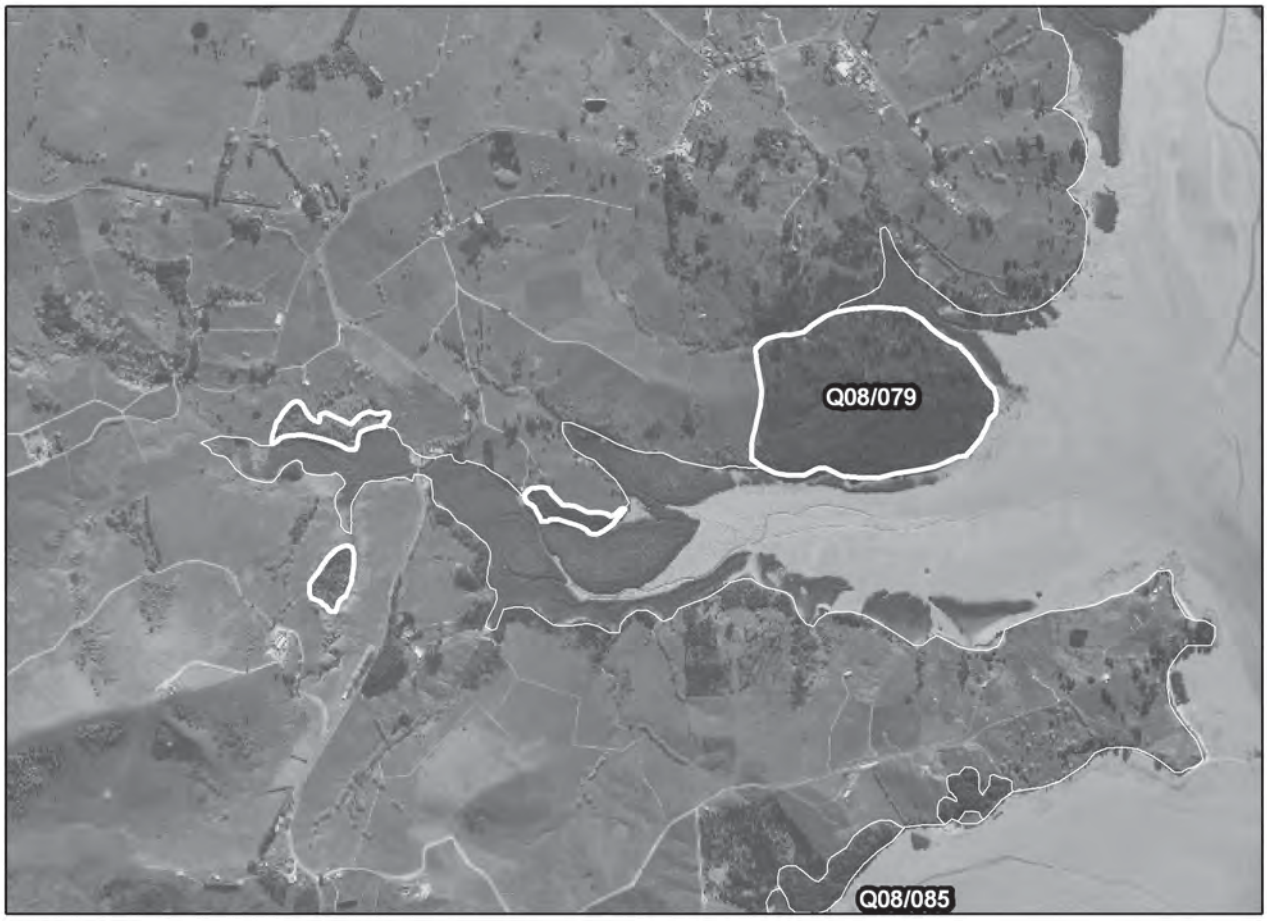
Significant flora

In 2001 *Olearia solandri* (regionally significant) was recorded on the coastal margin at this site (SSBI Q08/H071).

Fauna

Grey warbler, kingfisher, shining cuckoo, white-faced heron, welcome swallow.

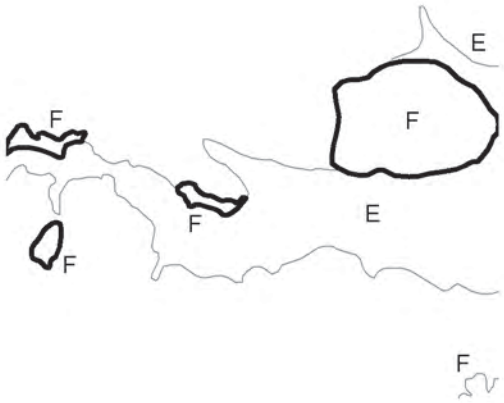
Kukupa (Gradual Decline) were recorded in 2001, as well as the non-threatened Australasian harrier and morepork (SSBI Q08/H071).



Q08/079
Smith's Point and Mateotetawa Creek Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Significance

This site is significant for the presence of a threatened fauna species (kukupa) and a regionally significant plant species (*Olearia solandri*). It is a representative site for two ecological units: (a) kanuka forest on gentle hillslope and (b) totara–kowhai–kahikatea forest on steep coastal margin. This site is also archaeologically significant for the presence of a pa with well-defined terraces at the highest point (SSBI Q08/H071).

HUKATERE SCENIC RESERVE AND SURROUNDS

Survey no.	Q08/081
Survey date	10 November 2005
Grid reference	Q08 150 563
Area	35.9 ha (32.2 ha forest, 3.5 ha shrubland, 0.2 ha wetland)
Altitude	47–143 m asl

Ecological units

(a) Mature kauri–kahikatea forest on moderate hillslope (80%)

(b) Kanuka forest on moderate hillslope (15%)

(c) Manuka shrubland on ridge top (4%)

(d) Raupo reedland in small depression (1%)

Landform/geology

Hillslope underlain by Miocene thinly interbedded sandstone and mudstone (Waitemata Group).

Vegetation

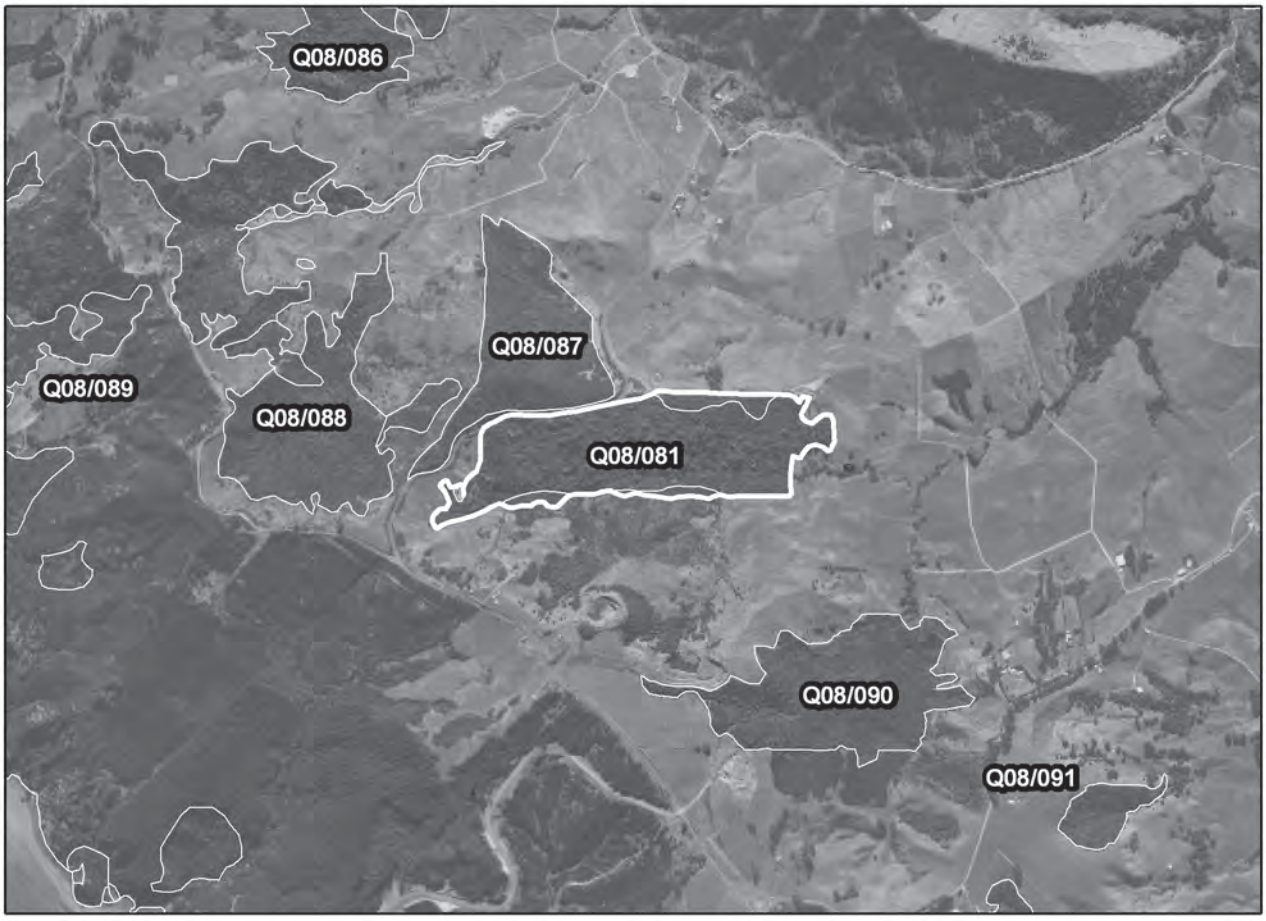
This site encompasses the last remaining area of tall forest with stands of mature kauri left in the whole of Otamatea Ecological District. Even so, research by Dr Nigel Clunie of the former Department of Scientific and Industrial Research, shows that most of the area was selectively logged in early times (presumably late 1800s), and subsequently browsed by cattle which have sporadically breached fences into the reserve (Wright & Beever 1990). In the present day, a lush and diverse indigenous forest survives with only occasional weed incursions on road edges and stream margins. Fencing appears to be adequate. The Scenic Reserve is approximately 1 km long by approximately 300 m wide, extending west–east on a south-facing, moderately sloping hillside. A small, contiguous area of forest outside the reserve is included in the site, part of which is a QEII Open Space covenant. A similar sized area of forest, Hukatere North Forest (Q08/087), is situated directly across Tinopai Rd to the north. Full vascular plant and moss species lists for the reserve are published in Wright & Beever (1990) and Beever (1990), respectively. Here follows a brief description of the main forest types based on canopy composition.

(a) Large emergent kauri and kahikatea and younger poles of both species are the most prominent features of the canopy. Of the great diversity of other trees in the forest matrix four cover more than 5% of the total area (taraire, puriri, nikau and mamangi), while the others all occur at less than 5% and are often patchily distributed (matai, miro, totara, rimu, tanekaha, pukatea, white maire, mahoe (*Melicytus ramiflorus* and *M. macrophyllus*), kowhai, kohekohe and rewarewa).

(b) Kanuka forest occurs on the north-facing true right bank of the creek and at the gully head on private land. Emergent conifers (rimu, kauri and matai) and occasional mamangi add texture to the otherwise quite uniform canopy.

(c) Manuka shrubland is present at the north–eastern edge of the reserve on a broad ridge. This has probably regenerated after burning or clearance.

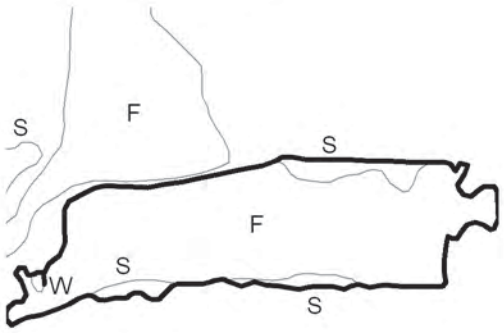
(d) A tiny depression in the head of the catchment nestled amongst kanuka forest contains raupo reedland.



Q08/081 Hukatere Scenic Reserve and Surrounds

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres





Significant flora

Mida (Gradual Decline), *Coprosma crassifolia* (regionally significant), *Luzula picta* var. *picta* (regionally significant), miro (locally uncommon) and swamp maire (locally uncommon) were recorded by Wright & Beever (1990).

Fauna

Not surveyed during the present study. NI brown kiwi (Serious Decline) were reported as occurring here in 1977 by the NZ Wildlife Service (though even then the reports were not confirmed), but a subsequent survey in 1992 found

no kiwi (SSBI Q08/H040). This species is probably locally extinct in Otamatea ED Northland.

Species recorded in 1992 include kukupa (Gradual Decline), morepork, kingfisher, grey warbler and fantail (SSBI Q08/H040), all of which probably still occur.

Significance

This site is significant for the maturity and diversity of the remaining forest (representative for ecological unit (a) mature kauri–kahikatea forest on moderate hillslope), and the presence of one threatened, two regionally significant and two locally uncommon plant species. It still supports a good population of common forest birds, as well as one threatened bird species (kukupa). It was one of the last sites where NI brown kiwi occurred in Otamatea ED Northland, and is a potential site for their reintroduction, if threats are managed. This site is part of an important group of large indigenous forest remnants on the Hukatere peninsula formed by adjacent Hukatere North Forest (Q08/087), and nearby Hautakima South Forest (Q08/088). The Hukatere Scenic Reserve is administered by the Department of Conservation and covers 31 ha of this site, mainly corresponding to the mature forest type (a), as well as parts of (b) kanuka forest and (c) manuka shrubland. 1.6 ha of a QEII Open Space Covenant encompasses type (b) kanuka forest and the small raupo reedland (d).

ARAPAOA RIVER

Survey no.	Q08/084
Survey date	Various (December 2005–January 2006)
Grid reference	Q08 226 576
Area	4957.5 ha
Altitude	sea level

Ecological units

(a) Mangrove shrubland and forest in estuary

(b) Sea rush rushland in estuary

(c) Mangrove–sea rush shrubland in estuary

(d) Oioi–sea rush rushland in estuary

(e) Sea primrose–remuremu–saltwater paspalum–sharp rush herbfield in estuary

(f) Sharp rushland on estuarine shellbank

(g) Saltmarsh ribbonwood shrubland in estuary

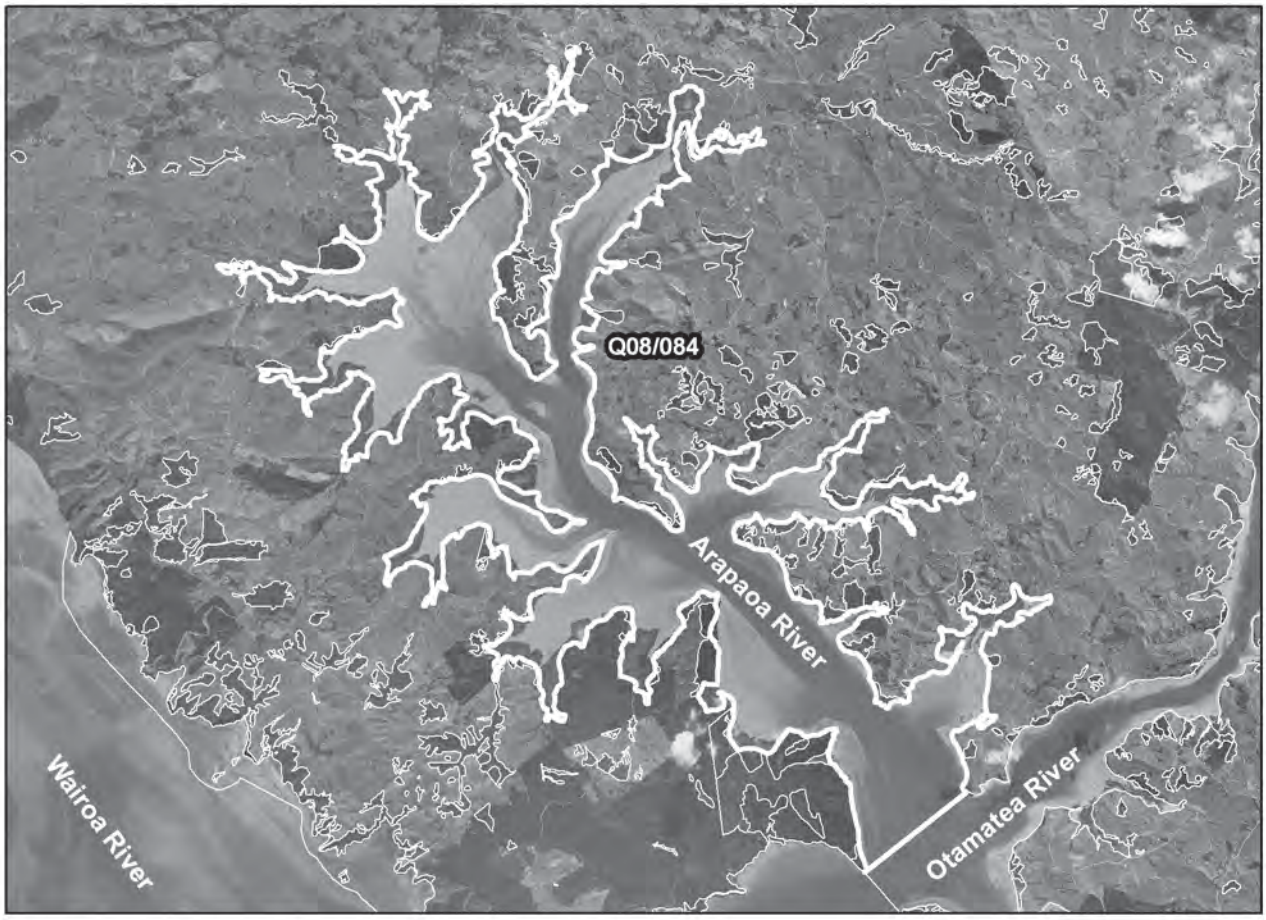
(h) Saltwater paspalum grassland in estuary

(i) *Spartina alterniflora* grassland in estuary

(j) Mudflats and sandflats in estuary

Landform/geology

Holocene estuaries, beaches, and intertidal rock flats. The shore platforms on the west coast of the Pahi Peninsula are regionally significant geological sequences including turbidite greensand, shelly shelf greensand and bathyal argillaceous limestone (Kenny & Hayward 1996).



Q08/084 Arapaoa River

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 1,250 2,500 5,000 Metres



Vegetation/habitats

(a) The Arapaoa River contains more than half the mangrove forest and shrubland found in Otamatea ED Northland, a total of 997 ha.

(b) Areas of pure sea rush are the most common type of saltmarsh.

(c) Where mangrove shrubland and sea rush rushland meet there is often a mingling of the two over several metres of upper-tidal mudflat, creating habitat for species such as banded rail which may be present in the estuarine margins.

(d) Large areas of oioi and sea rush are equally abundant at Whakapirau Creek.

(e) Amongst herbfields of sea primrose, remuremu and occasional bachelor's button, sharp rush and saltwater paspalum are also common.

(f) Sharp rush forms a continuous sward on a shellbank in the Whakapirau Creek.

(g) Saltmarsh ribbonwood shrublands are sparsely distributed around the shores of the estuary, however at the upper Paparoa Creek, adjacent to Pahi Road, there is an extensive patch (approximately 1.5 ha) of this type (grid ref. Q08 215 650). Harakeke, ngaio, mapou and pohuehue are all frequent components, while *Coprosma propinqua*, *C. propinqua* × *robusta*, tanekaha, totara, manuka, sharp rush, oioi and remuremu are occasional (SSBI Q08/H068). *Leptinella tenella* (Sparse) was collected on the edge of the saltmarsh in a tidal muddy seepage in 1997 (AK 233971). *Olearia solandri* (regionally significant) was also collected in this saltmarsh around the same time (AK 233985).

(h) Saltwater paspalum is present in most saltmarsh areas of the Arapaoa River, and can form extensive grasslands, through which indigenous salt meadow herbs often grow, e.g. sea primrose, bachelor's button, remuremu. It does not tend to occur on more exposed, sandy beaches. The preferred habitat is in quiet tidal inlets above mangrove forests and shrublands.

(i) This site contains the greatest area of infestation of *Spartina alterniflora* in Otamatea ED Northland, with nine extant infestations and six recently eradicated infestations (Peter Joynt, Northland Regional Council, pers. comm.). These infestations are concentrated around the upper estuary at Whakapirau, Pahi River, Paparoa Creek, Matakohe River, Mateotetawa Creek, Te Taumataka Creek and Okorako Creek, where they are around the fringes of mangrove forest, occupying potential indigenous saltmarsh habitat.

(j) Intertidal mudflats and sandflats cover approximately 48% (2389 ha) of the surface area of this site. These calm, shallow, productive, saltwater habitats are vital as feeding grounds to both NZ-breeding waders (particularly in winter) and Arctic migrant waders (particularly in summer) (Sagar *et al.* 1999). Included within the figure quoted above (area measured as being exposed at low tide), are all of the saltmarsh types (b, d, e, g), saltwater paspalum grasslands (h) and *Spartina alterniflora* grasslands (i) and colonies of the introduced Pacific oyster (*Crassostrea gigas*), which occur frequently around the coast either in natural beds or on constructed racks of small-scale oyster farms.

Significant flora

Leptinella tenella (Sparse), *Olearia solandri* (regionally significant).

Fauna

A wide variety of bird species uses this site. Some of these are listed below, based on records from Crockett (1992–2004), in which counts for 'Pahi–Whakapirau' apply to the mid-upper Arapaoa River. Frequency of encounter and the range of numbers of individuals over the period are stated in brackets.

- White heron (1997– 5 recorded, 2000 – 3 recorded) (Nationally Critical)
- Caspian tern (regular, 2–29), wrybill (sporadic, 16–42) (both Nationally Vulnerable)
- Wrybills mostly roost at Raepere Creek, which is the most important site for this species in Otamatea ED Northland, and indeed in the Kaipara Harbour (Veitch 1979).
- Bar-tailed godwit (sporadic, up to 580 in summer), lesser knot (sporadic, up to 134 in summer) (Migrant)
- Pied shag (regular, 1–10) (Sparse)

- Variable oystercatcher (1–2 occasionally recorded) (regionally significant)
- Pied stilt (regular, up to 549 in winter), pied oystercatcher (regular, up to 681 in winter), white-faced heron (regular, 1–10), little shag (1992 – 1 recorded, and one was seen during the present survey), spur-winged plover (sporadic, 2–4), black-backed gull (sporadic, 1–4), red-billed gull (sporadic, 13–55) (all not threatened).

In addition to these records, 10–15 white-fronted terns (Gradual Decline) were observed feeding off the wharf at Pahi in January 2006.

Significance

The Arapaoa River has 1,729 km of coastline and 4,958 ha of estuarine habitat, of which approximately 48% is open mudflat or sandflat (2,389 ha), and 20% is mangrove forest or shrubland (997 ha). The full extent of saltmarsh habitats (i.e. types (b), (d), (e), (f) and (i)) was not measured, but these occupy a very low percentage of the overall area (collectively <1%).

A recent review of indigenous shorebird habitat networks deemed the Kaipara Harbour to be a 'site of particular importance', as it is within the top five non-breeding sites for seven species of indigenous-breeding shorebirds, and is also used by 1000+ Arctic migrants during summer months (Dowding & Moore 2006). This site contains almost half the wading habitat in Otamatea ED Northland, including a very important winter roost for wrybills (Raepere Creek). Five threatened and one regionally significant bird species use this site.

This site contains the best representative example of saltmarsh ribbonwood shrubland (g) in Otamatea ED Northland, which includes one threatened and one regionally significant plant species (*Leptinella tenella* and *Olearia solandri*).

The Pahi Peninsula greensand–limestone sequence is a regionally significant geological feature (Kenny & Hayward 1996).

Tiny, narrow areas (totalling 4.2 ha) of upper intertidal habitats within the Arapaoa River site are in reserves: 0.2 ha of the site is within an area of Stewardship Land (DOC-administered), 1.3 ha is within Scenic Reserves (DOC-administered), 1.7 ha is within Marginal Strips (DOC-administered) and 1.0 ha is within QEII Open Space Covenants.

HUKATERE NORTH FOREST

Survey no.	Q08/087
Survey date	16 November 2005
Grid reference	Q08 150 568
Area	21.7 ha
Altitude	59–160 m asl

Ecological unit

(a) Kanuka forest on moderate to steep hillslope (100%)

Landform/geology

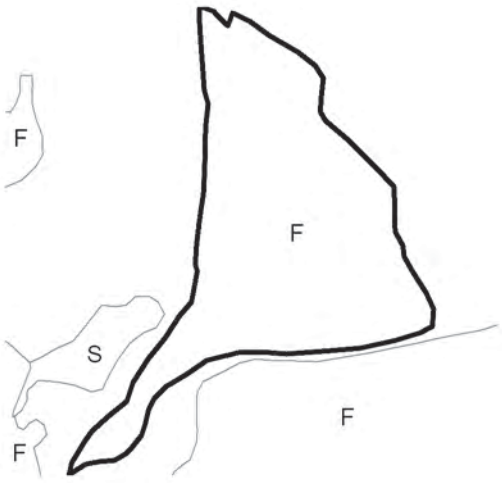
Hillslopes and gullies underlain by micritic limestone (Mahurangi Limestone, Motatau Complex) and thinly interbedded sandstone and mudstone (Waitemata Group).



Q08/087 Hukatere North Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Vegetation

This site comprises kanuka forest north of Tinopai Road, directly opposite Hukatere Scenic Reserve and Surrounds (Q08/081). There is a large diversity of associated species in the canopy. Only kahikatea and totara are frequent. The following species were recorded as occasional: kowhai, kauri, ti kouka, rewarewa, rimu, tarata, nikau, matai, tanekaha, puriri, mamangi, puka, five finger, karamu, akepiro and mahoe.

Fauna

Grey warbler, kingfisher, shining cuckoo.

Significance

This is a particularly good quality example of kanuka forest, with diverse associated species, and is representative of this ecological unit in the Northland Conservancy part of the ED. This site is of similar value to neighbouring Hukatere Scenic Reserve and Surrounds (Q08/081), and provides a significant buffer to the reserve on its northern side (though the road is a source of disturbance and weed invasion for both sites). Hukatere North Forest differs mainly in its maturity (it is younger forest) and in not being fully fenced or formally protected. Together with Hukatere Scenic Reserve and Surrounds and Hautakima South Forest (Q08/088), it forms part of an important area of indigenous forest on the Hukatere peninsula.

HAUTAKIMA SOUTH FOREST

Survey no.	Q08/088
Survey date	16 November 2005
Grid reference	Q08 144 570
Area	55.6 ha (48.8 ha forest, 4.8 ha shrubland, 2.0 ha wetland)
Altitude	40–197 m asl

Ecological units

(a) Kanuka forest on moderate to steep hillslope (45%)

(b) Taraire forest in gully (20%)

(c) Tanekaha–rewarewa–kanuka forest on ridge top (12%)

(d) Kanuka–manuka shrubland on moderate hillslope (9%)

(e) Kauri–kanuka forest on ridge top (5%)

(f) Kowhai–puriri forest in gully (5%)

(g) Raupo reedland in small depression (4%)

Landform/geology

Hillslopes and gullies underlain by Miocene thinly interbedded mudstone and sandstone (Waitemata Group), and Miocene volcaniclastic gravelly sandstone (Waitakere Group).

Vegetation

This site encompasses moderate to steep forested hillslopes falling away to the east of Summer Road, and to the south of Hautakima peak. Two small stream gullies extending eastward towards Arapaoa River are present, joining at the bottom of the remnant.

(a) The uniting feature of the remnant is tall kanuka, which dominates the forest throughout almost half the area, especially around upper slopes. Rewarewa and tanekaha are frequently associated with this type, with occasional ti kouka, lancewood, rimu, rimu, kauri, tarata, mamaku and ponga.

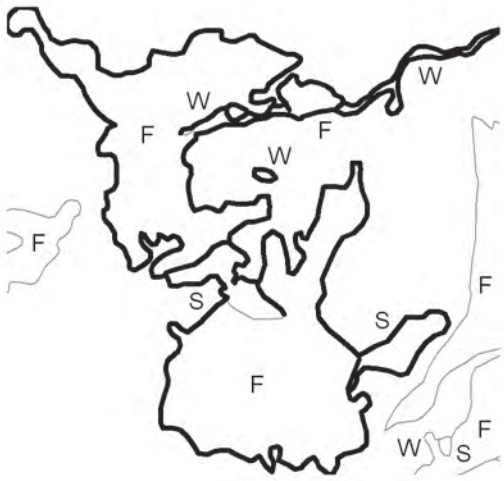
(b) The wide gully bottoms support taraire forest with frequent puriri. Occasional species present include kohekohe, matai, kahikatea, titoki, lancewood, nikau and pukatea.



Q08/088 Hautakima South Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(c) A ridge to the north of the main gully is covered with tanekaha–rewarewa–kanuka forest with frequent totara and occasional kauri rickers.

(d) Two separate areas of younger regeneration are present. These are mixed kanuka–manuka shrublands with frequent ti kouka and mapou, and occasional hangehange, akepiro and five finger. The gorse-dominated fringes around the indigenous shrublands are excluded from the site. These indicate that the indigenous shrublands have probably regenerated after a reduction in grazing of the upper paddocks.

(e) Kauri–kanuka forest, with all kauri as rickers is present in the extreme northwestern part of the remnant.

(f) The upper parts of the gullies have kowhai–puriri forest, with frequent mamaku and occasional ti kouka.

(g) Along the northern gully, and where the two streams meet, there is a string of raupo-dominant wetlands.

Fauna

Kingfisher, tui, kukupa (Gradual Decline).

Significance

With 48.8 ha of indigenous forest, Hautakima South Forest is the sixth largest single remnant of indigenous forest in Otamatea ED Northland, as well as having a high diversity of habitat types. Of the seven ecological units present, three are representative. Tanekaha–rewarewa–kanuka forest on ridge top (c) is the only example of its type in Otamatea ED Northland and kanuka–manuka shrubland on moderate hillslope (d) is the best example of its type. Despite being very small, the raupo reedlands (g) are the sixth largest freshwater wetland complex recorded in Otamatea ED Northland and are one of the best representative examples of their type. The diversity of vegetation types enhances the ecological significance of this site. Not far away, within 200 m, are two other significant, large forested areas: Hukatere Scenic Reserve (Q08/081) and Hukatere North Forest (Q08/087). Together, these sites form a particularly important group of large forest remnants on the Hukatere peninsula. A threatened bird species (kukupa) uses the area.

TE RURUKU BAY FOREST REMNANT

Survey no.	Q08/089
Survey date	16 November 2005
Grid reference	Q08 133 562 (8 remnants)
Area	46.5 ha (29.5 ha forest, 16.9 ha shrubland, 0.1 ha wetland)
Altitude	0–152 m asl

Ecological units

(a) Kanuka shrubland on gentle coastal margin (36%)

(b) Kanuka treeland on moderate hillslope (33%)

(c) Kanuka forest on gentle coastal margin (15%)

(d) Kowhai–puriri forest on gentle coastal margin (10%)

(e) Puriri–taraire forest on moderate to steep hillslope (5%)

(f) Raupo–lake clubrush reedland in small depression (1%)

Landform/geology

Steep coastal hillsides and gullies underlain by thinly interbedded mudstone and sandstone (Waitemata Group), and volcaniclastic gravelly sandstones and basaltic lava flows (Waitakere Group).

Vegetation

This site comprises eight separate remnants dispersed across a landscape of pasture and radiata pine forest which is drained by two small streams. The link



Q08/089 Te Ruruku Bay Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



between the remnants is their location on Te Ruruku Bay on the west coast of the Hukatere peninsula.

(a) Most of the site is kanuka shrubland adjacent to the coast, with frequent ti kouka and mamangi. Houpara, mamaku, karaka and mapou are occasional. Pampas is a problem weed in this shrubland.

(b) The next most frequent vegetation type is relatively degraded kanuka treeland on the upper slopes away from the coast. Manuka is frequent here, and ti kouka, totara, pohutukawa and rimu are occasional.

(c) A small area of kanuka forest is also present next the coast, in the southern part of the remnant around the mouth of the stream. The canopy is frequently pierced by ricker kauri, and in places it is blended with karaka and kowhai. Mamaku occurs occasionally.

(d) Next to the kanuka shrubland, on the southern side of Paraoanui Point, there is relatively diverse coastal forest with abundant kowhai and puriri. Frequent kanuka and occasional totara, mamangi, rewarewa and karaka occur. A small remnant nestled in the pine forest is also of this type.

(e) Puriri-dominant forest with associated taraire is present in one coastal remnant. Ti kouka, karaka and kowhai are frequent, while harakeke and titoki are occasional.

(f) A tiny freshwater seepage with raupo and lake clubrush occurs next to the coast.

Significant flora

Coprosma crassifolia was recorded in kanuka shrubland (a) during the present survey.

Fauna

Kingfisher, kukupa (Gradual Decline).

Significance

This site is significant for the presence of a regionally significant plant species, *Coprosma crassifolia*, which is near its northern distributional limit in New Zealand. The kanuka shrubland (a) at this site is the fifth largest area of indigenous shrubland in Otamatea ED Northland, and is a representative example of its type. This site is also representative for ecological unit (f), raupo–lake clubrush reedland in small depression, which has not been recorded elsewhere.

QUARRY FOREST

Survey no.	Q08/090
Survey date	16 November 2005
Grid reference	Q08 160 556
Area	28.3 ha
Altitude	60–140 m asl

Ecological units

(a) Taraire forest on moderate to steep hillslope (45%)

(b) Totara–kanuka forest on ridge top and steep hillslope (40%)

(c) Kanuka forest on moderate hillslope (10%)

(d) Kauri forest on ridge top (5%)

Landform/geology

Hillslopes and gullies underlain by Miocene thinly interbedded mudstone and sandstone (Waitemata Group) and Miocene basaltic lava flows and intrusives (Waitakere Group).

Vegetation

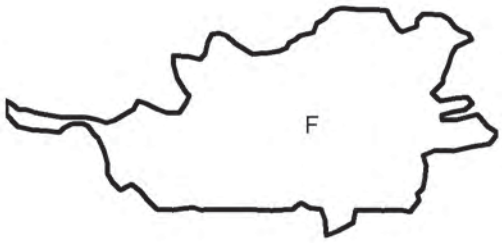
This site comprises a compact indigenous forest remnant covering a gully and a hill next to an active opencast quarry on the Hukatere peninsula. There is a



Q08/090 Quarry Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



clear differentiation in forest types between the western and eastern sides of the hill. The forest is at least partially fenced from stock.

(a) On the eastern side of the hill, which is a relatively steep slope, the forest is extremely diverse. Taraire occupies approximately 25% of the canopy, and its main associates (between 10% and 20% cover) are karaka, rewarewa, kohekohe and puriri. The following species also contribute to the forest canopy: kowhai, totara, pukatea, kanuka, lancewood, mamaku, nikau, tarata, puka, titoki, tawa, five finger and kauri. Some of the puriri are showing signs of dieback, most likely due to possum browse.

(b) On the western side, the forest is noticeably less diverse in canopy species, comprising mainly totara and kanuka. Tanekaha, rewarewa, rimu and kahikatea are occasional.

(c) Successional kanuka forest occurs around the eastern fringe of the remnant. This forest is clearly younger and more disturbed than type (a) taraire forest which is adjacent. It has frequent totara and occasional tarata and lancewood associated with it.

(d) Two small stands of kauri rickers occur near the hill crest. These have frequent totara and occasional rewarewa and emergent radiata pine. One of the stands appears to be older than the other, with trees in a mature phase of crown development.

Significant flora

Tawa is locally uncommon in Otamatea ED Northland.

Fauna

Australasian harrier, tui.

Significance

This site is representative for (a), one of the most diverse taraire forest areas currently in existence within Otamatea ED Northland. This type contains a locally uncommon tree species (tawa).

KIRIKIRI CREEK FOREST AND WETLANDS

Survey no.	Q08/091
Survey date	16 November 2005
Grid reference	Q08 171 546 (7 remnants)
Area	40.9 ha (39.9 ha forest, 1.0 ha wetland)
Altitude	20–140 m asl

Ecological units

(a) Taraire–puriri forest in gully (60%)

(b) Kanuka–manuka forest in gully (28%)

(c) Kauri–totara–kanuka forest on moderate to steep hillslope (10%)

(d) Raupo reedland in small depression (2%)

Landform/geology

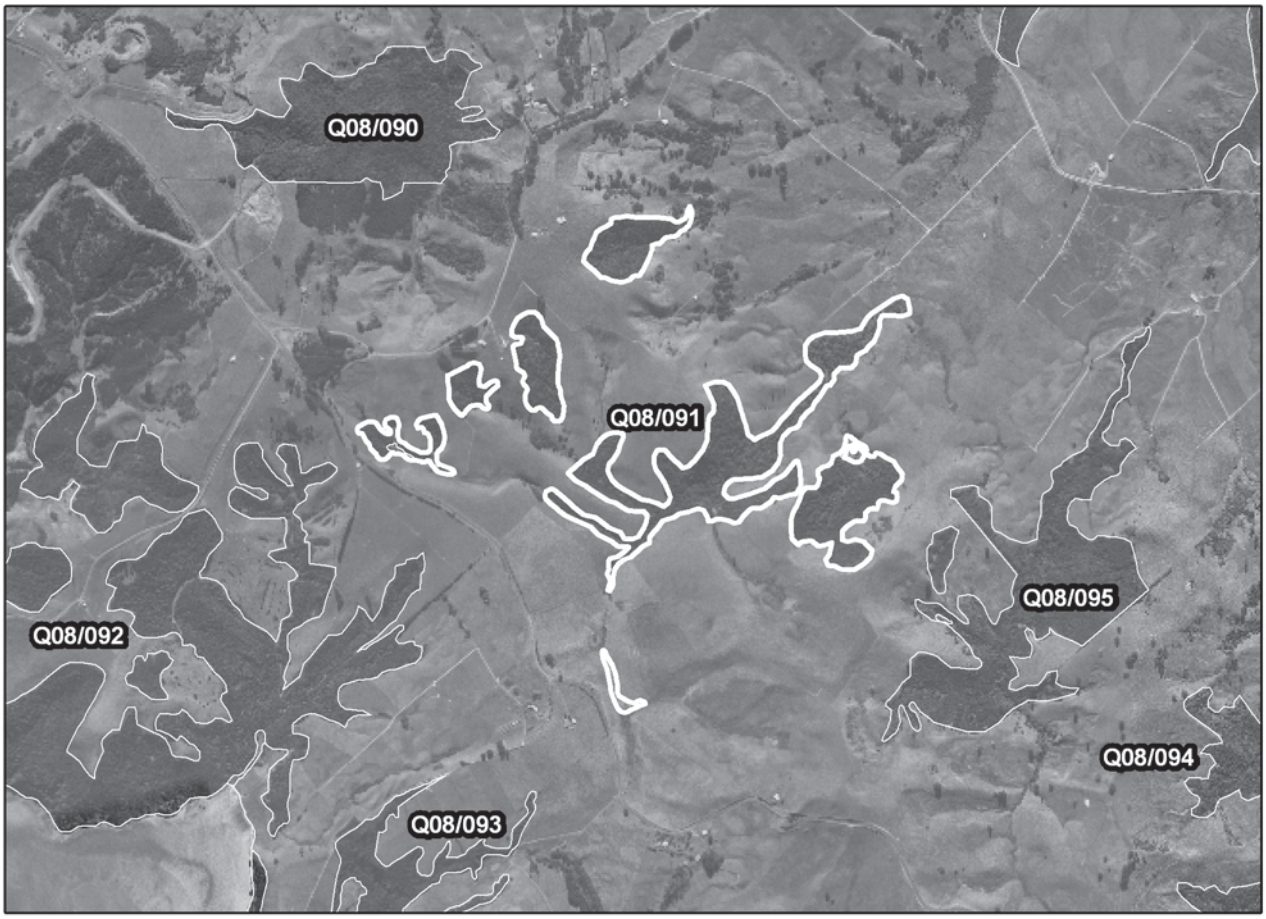
Hillslopes and gullies underlain by Miocene thinly interbedded mudstone and sandstone (Waitemata Group) and Miocene volcaniclastic gravelly sandstone and basaltic lava flows (Waitakere Group), and with a valley floor of Pleistocene alluvium.

Vegetation

This site comprises seven remnants of indigenous forest and wetland clustered around the Kirikiri Creek headwaters. Most of the site is gully-bottom or gully-head on moderate to steep topography. The flatter areas between the gullies have been cleared for pastoral farming.

(a) Taraire–puriri forest occurs in most of the remnants, especially in the bottom of gullies where it is buffered by the topography and surrounding forest of type (b). Karaka, kohekohe and tarata are occasional components of the canopy.

(b) The remainder of the gully forests are younger, dominated by kanuka and manuka with frequent totara and occasional ti kouka, black wattle and poplar.



Q08/091 Kirikiri Creek Forest and Wetlands

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(c) The most prominent feature of this site is the dense stands of kauri rickers with associated totara and kanuka. Young kahikatea are also frequent associates of these stands, with occasional rewarewa, rimu and nikau.

(d) Three small areas of raupo reedland occur in this site. Together they cover 1 ha, which is large in comparison to other remaining raupo reedlands in Otamatea ED Northland.

Significant flora

In 1994, a flowering example of a northern rata × pohutukawa hybrid (*Metrosideros robusta* × *M. excelsa*, regionally significant) was recorded. At

that time the forest understorey was 'eaten out' and required fencing (SSBI Q08/H051).

Fauna

Kingfisher, shining cuckoo, welcome swallow. A spotless crake tape was played at two of the raupo reedlands, with no response. Grey warbler, fantail, silvereye and kukupa (Gradual Decline) were recorded in 1994 (SSBI Q08/H051), and probably still use the area.

Significance

This site is significant for the presence of a regionally significant plant hybrid (*Metrosideros robusta* × *excelsa*) and a threatened bird species (kukupa). The southern-most wetland, which is surrounded by grazed pasture, is mostly fenced but the fence excludes some of the wetland. The latter area is grazed by cattle. None of the other forest/wetland remnants appear to be fenced. A 1977 NZ Wildlife Service survey found that there had been more extensive raupo wetlands in the lower Kirikiri Creek which had been drained (SSBI Q08/H051). The total area of forest is large relative to other natural areas in Otamatea ED Northland (it is the 22nd largest out of 188 sites with forest habitat). However, it comprises many separate remnants, which increases the edge effects and decreases its ecological values.

WAITIEKE CREEK FOREST

Survey no.	Q08/092
Survey date	16 November 2005
Grid reference	Q08 152 540 (4 remnants)
Area	104.8 ha (103.6 ha forest, 0.8 ha shrubland, 0.4 ha wetland)
Altitude	0–140 m asl

Ecological units

(a) Kanuka forest on moderate hillslope (45%)

(b) Kanuka forest on moderate to steep hillslope (13%)

(c) Kauri-kanuka forest on ridge top (10%)

(d) Kowhai-kahikatea forest in gully (10%)

(e) Kanuka-totara forest on moderate to steep hillslope (10%)

(f) Pohutukawa forest on steep coastal margin (10%)

(g) Kanuka shrubland on steep coastal margin (1.5%)

(h) Raupo reedland in small depression (0.5%)

Landform/geology

Steep coastal hillsides and gullies underlain by Miocene thinly interbedded mudstone and sandstone (Waitemata Group), and Miocene volcaniclastic gravelly sandstone and basaltic lava flows (Waitakere Group).

Vegetation

This site encompasses scattered remnant riparian vegetation throughout the Waitieke catchment, as well as the largely forested coastal headland culminating in Pakaukau Point on the west coast of the Hukatere peninsula.



Q08/092 Waitieke Creek Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Together these remnants form a broken forest sequence from the coastal fringe to 140 m asl. The site comprises mainly the steeper landforms in the catchment, i.e. gullies and steep coastal hillslopes, because easier country has been cleared for agriculture some of which appears to have been recent.

(a) The majority of the site is kanuka forest with occasional manuka, mamangi, tanekaha, kahikatea, ti kouka and mamaku. Pohutukawa occurs sporadically throughout this type.

(b) Younger kanuka forest on steep land occurs at the top of the catchment. This type has frequent emergent kauri rickers, and occasional rewarewa, mamaku, matai, tarata and ti kouka.

(c) Dense stands of kauri rickers mixed with smaller amounts of kanuka occur on ridges at the top of the catchment, and also on ridges a short distance from the sea adjacent to pohutukawa forest (f).

(d) Gully-heads at the top of the catchment support kowhai forest with numerous emergent, young kahikatea.

(e) Kanuka forest with abundant totara occurs the south of the remnant near the coast. Puriri, karaka and ti kouka are occasional.

(f) Along the exposed coastal margin, a healthy and diverse fringe of pohutukawa forest occurs. Frequent associate species in this type are kowhai, puriri, karaka, kanuka, kahikatea and harakeke. Occasional species include tawapou (regionally significant), gully tree fern (regionally significant) *Coprosma macrocarpa*, ti kouka, tarata, mamaku, mamangi, mamaku and akepiro.

(g) A small area of kanuka shrubland borders Oararo Creek to the north. Ti kouka and harakeke are frequent associates. Akepiro and kowharawhara are occasional.

(h) A tiny raupo reedland is present on one edge of a partially drained flat next to the Waitieke Creek mouth.

Significant flora

Gully tree fern (regionally significant), tawapou (regionally significant).

Fauna

Australasian harrier, kingfisher, white-faced heron.

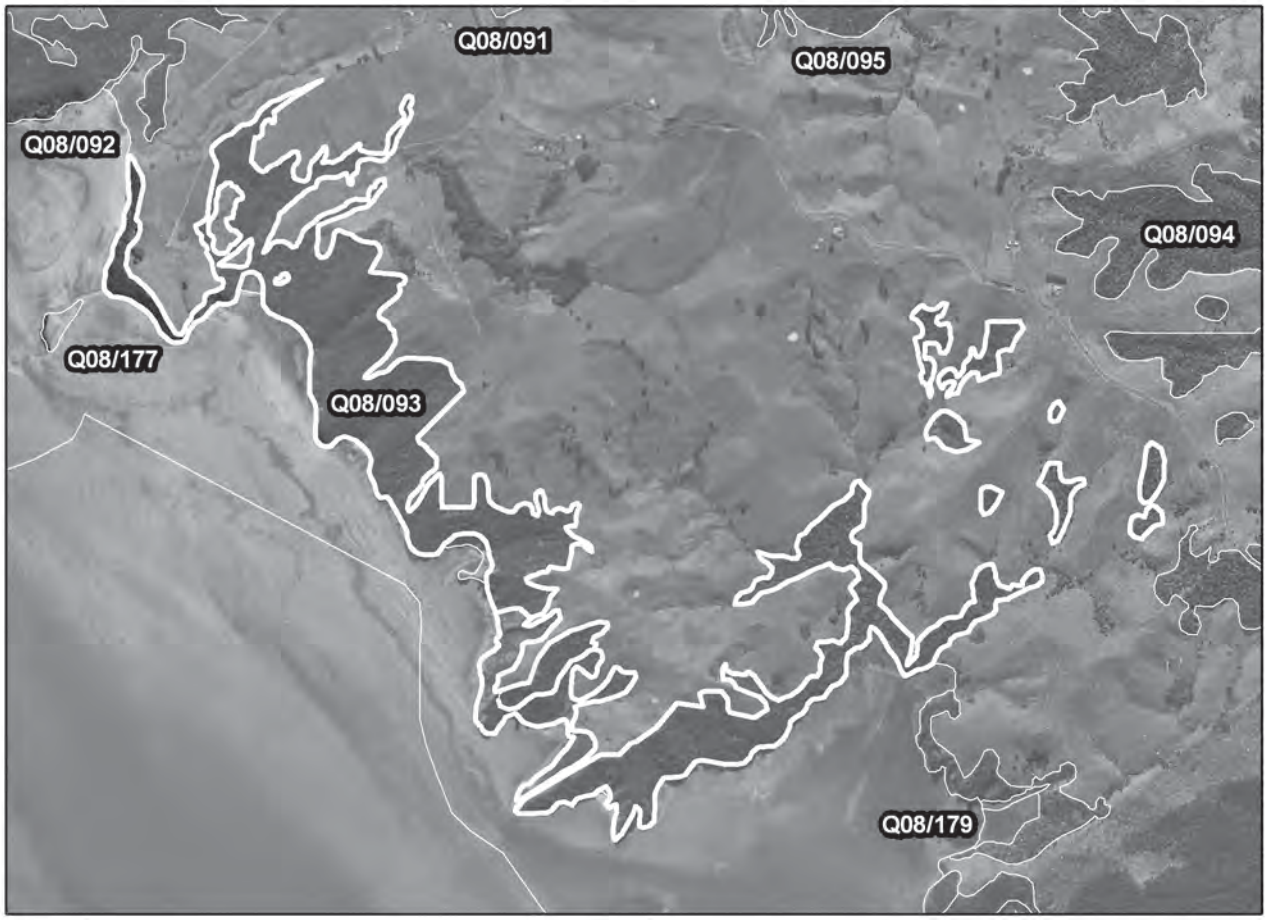
In 1977 there were anecdotal reports of NI brown kiwi (Serious Decline) and indigenous frogs, but these were never confirmed (SSBI Q08/H043).

Significance

This site is representative for four ecological units: (a) kanuka forest on moderate hillslope, (d) kowhai–kahikatea forest in gully, (c) kanuka–totara forest on moderate to steep hillslope and (f) pohutukawa forest on steep coastal margin. It contains two regionally significant plant species (tawapou and gully tree fern). It has the fifth largest area of forest of any site in Otamatea ED Northland and contains a diverse array of habitat types. The presence of kauri ricker forest adjacent to pohutukawa forest is a notable juxtaposition, not seen elsewhere in Otamatea ED Northland during the current survey.

TE KIAKIA BAY FOREST REMNANTS

Survey no.	Q08/093
Survey date	16 November 2005
Grid reference	Q08 171 518 (10 remnants)
Area	111.0 ha (101.7 ha forest, 9.3 ha shrubland)
Altitude	0–120 m asl



Q08/093 Te Kiakia Bay Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Kanuka forest on moderate to steep hillslope (50%)

(b) Kanuka–kauri forest on moderate to steep hillslope (25%)

(c) Kanuka–totara–kauri forest on moderate to steep hillslope (10%)

(d) Kanuka shrubland on steep coastal margin (8%)

(e) Pohutukawa–kanuka forest on steep coastal margin (4%)

(f) Pohutukawa treeland on coastal cliff (2%)

(g) Puriri–pohutukawa forest on steep coastal margin (1%)

Landform/geology

Steep coastal hillsides and gullies underlain by Miocene volcaniclastic gravelly sandstone and basaltic lava flows (Waitakere Group).

At Strawberry Bay (opposite Pupuia Island) there is a sequence of well developed pillow lava flows repeated over a syncline and anticline, overlying fossiliferous flysch and intruded by a younger dyke (Kenny & Hayward 1996).

Vegetation

This large site comprises approximately 5 km of coastline and 10 remnants of indigenous forest which are each separated by only 10–20 m of pasture, and hence form an essentially continuous forest cover from the Strawberry Bay pillow lava point in the north (opposite Pupuia and Titipu Islands), through to Te Kiakia Bay in the south. Three creeks (Nihotetea Creek, Ngawhero Creek and one un-named creek) drain this section of the Hukatere peninsula. Several narrow fingers of forest extend up gullies towards Tinopai Rd, but otherwise the forest is mainly within 500 m of the coast, some of which falls within a Marginal Strip.

(a) As in many areas on the western side of Hukatere peninsula, the main forest type is kanuka forest. At this particular location, vegetative cover on just qualifies as 'forest' (i.e. the majority of trees are only just over 10 cm dbh), and contains frequent early successional species such as ti kouka and mamaku. Young tanekaha are also frequent.

(b) Numerous stands of kanuka and kauri rickers are dotted around the site on steep slopes or ridges. Kahikatea and ti kouka are frequent members of these stands. Puriri, kowhai, pohutukawa, mamaku and tanekaha are scattered throughout.

(c) Small patches of kanuka–totara–kauri forest occur in the steep upper gully heads. Only one of these is fenced. Occasional associated species are ti kouka, kahikatea, five finger, nikau and puriri.

(d) In the Marginal Strip, kanuka shrubland has regenerated after past clearance on the forest margin. Ti kouka and harakeke are frequent here, and mamangi is occasional.

(e) Pohutukawa and kanuka are dominant in the canopy around the steep margins of the coast most of the way along the site, including the pillow lava at Strawberry Bay in the north. Harakeke is frequent. Occasional emergent radiata pine occurs above the kanuka and pohutukawa. At Te Kiakia Bay a small willow-leaved hakea infestation is present within this ecological unit.

(f) Coastal cliffs have a similar community to (e), but more sparse, with pampas frequently occurring on slips.

(g) A very small, but dense area of pohutukawa and puriri forest occurs next to the coast in the mid-section of the site.

Fauna

Not surveyed.

Significance

This site is representative for five ecological units: (a) kanuka forest on moderate to steep hillslope, (b) kanuka–kauri forest on moderate to steep hillslope, (c) kanuka–totara–kauri forest on moderate to steep hillslope, (e) pohutukawa–kanuka forest on steep coastal margin, and (g) puriri–pohutukawa

forest on steep coastal margin. It comprises the sixth largest area of forest and the ninth largest area of shrubland in Otamatea ED Northland and includes a diverse range of habitat types. 10.6 ha (9.5%) of this site is within Te Kiakia Bay Marginal Strip, which is administered by DOC. The Strawberry Bay pillow lava is a nationally important geological site (Kenny & Hayward 1996).

RAEPERE CREEK FOREST

Survey no.	Q08/094
Survey date	16 November 2005
Grid reference	Q08 198 526 (7 remnants)
Area	116.1 ha (107.7 forest, 8.4 ha shrubland)
Altitude	6–108 m asl

Ecological units

(a) Totara–kanuka forest on moderate hillslope (40%)

(b) Kauri–kanuka forest on ridge top (30%)

(c) Kanuka–manuka shrubland on gentle hillslope (10%)

(d) Puriri–nikau–totara forest on moderate hillslope (10%)

(e) Totara–kahikatea–puriri forest on moderate to steep hillslope (5%)

(f) Totara forest on moderate hillslope (5%)

Landform/geology

Hillslopes and gullies underlain by Miocene thinly interbedded sandstone and mudstone (Waitemata Group) and Miocene volcaniclastic gravelly sandstone (Waitakere Group).

Vegetation

This site includes the fourth largest area of indigenous forest in Otamatea ED Northland), with one large remnant along the Raepere Creek and tributaries, and six much smaller associated remnants. The areas of indigenous vegetation are surrounded by grazed pastoral land, and it seems that livestock have access to most parts.

(a) Most of the forest is dominated by equally by totara and kanuka, two very hardy species resistant to grazing. Puriri is frequent, but often badly browsed. Other species occasionally seen are manuka, kowhai, rimu, nikau and kohekohe.

(b) This site stands out from similar sites on Hukatere peninsula because of its relatively extensive forest of kauri rickers and kanuka, which rises above surrounding canopies to form a distinctive profile on the skyline. This forest tends to be set in a matrix of type (a) forest, which buffers it.

(c) Large areas of kanuka–manuka shrubland occur in the southern part of this site, accompanied by frequent young tanekaha, and occasional ti kouka, mamangi and emergent radiata pine. Seedling radiata pine are also establishing here.

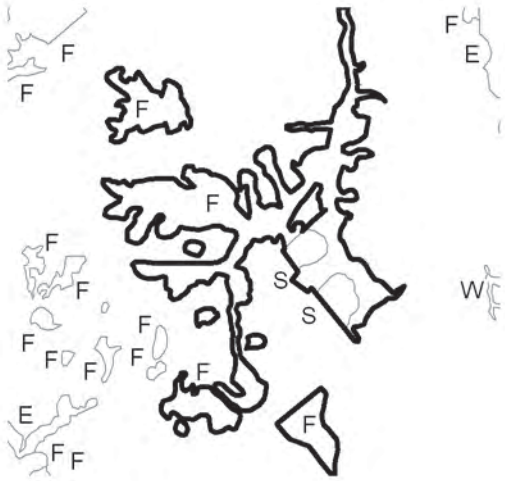
(d) On the western side of Tinopai Road, forest dominated by puriri with abundant totara and nikau occurs. Although not in the catchment of Raepere Creek (rather facing the western side of Hukatere from the crest of the hill), it is



Q08/094 Raepere Creek Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



included in this site because of its close physical connection to forest directly on the eastern side of the road. Kahikatea is frequent in this type, and rewarewa and kowhai are occasional.

(e) The remnant around a house on Tinopai Road is composed of abundant totara with associated kahikatea and puriri, and occasional very tall, emergent eucalypts. Other species present in the canopy include taraire, tarata and nikau.

(f) Forest with a canopy of pure totara and little else occupies some of the smaller remnants and forest edges.

Significant flora

During a 1977 NZ Wildlife Service survey, miro (locally uncommon), was recorded here also (SSBI Q08/H042).

Fauna

NI brown kiwi (Serious Decline) were found here as recently as 1977, but a survey in 1992 failed to establish their continued presence, and they are suspected to be extinct in Otamatea ED Northland now. Birds recorded in 1992 include kukupa (Gradual Decline), shining cuckoo, morepork, kingfisher, welcome swallow, fantail, silvereye and tui (SSBI Q08/H042).

Significance

By comparison with reports from three decades ago, this site appears to have become more degraded (species loss, degradation of condition of trees, and forest composition), though it still shows considerable diversity in the canopy layers (at least from a distance). This degradation has probably been caused by continued grazing and browsing (which reduces vegetation health and eliminates sensitive plant species), as well as the likely less visible effects of invasive predators on indigenous fauna (e.g. stoats killing kiwi). Despite this, the site is still representative for four ecological units: (a) totara–kanuka forest on moderate hillslope, (b) kauri–kanuka forest on ridge top, (c) kanuka–manuka shrubland on gentle hillslope, and (e) totara–kahikatea–puriri forest on moderate to steep hillslope. This is reflection of the rarity of larger forest blocks in Otamatea ED, as well as the poor quality of many natural areas. The very bottom end of the totara–kanuka forest in the gully next to the coast (0.1 ha) is within the Raepere Creek Marginal Strip (administered by DOC).

TOTARA CREEK FOREST REMNANT

Survey no.	Q08/095
Survey date	16 November 2005
Grid reference	Q08 181 541
Area	34.9 ha (34.8 ha forest, 0.1 ha wetland)
Altitude	20–116 m asl

Ecological units

(a) Kanuka forest on moderate to steep hillslope (45%)

(b) Totara–kanuka forest on moderate hillslope to steep hillslope (35%)

(c) Kauri–kanuka forest on gentle hillslope (10%)

(d) Tanekaha–totara forest on moderate hillslope (9.5%)

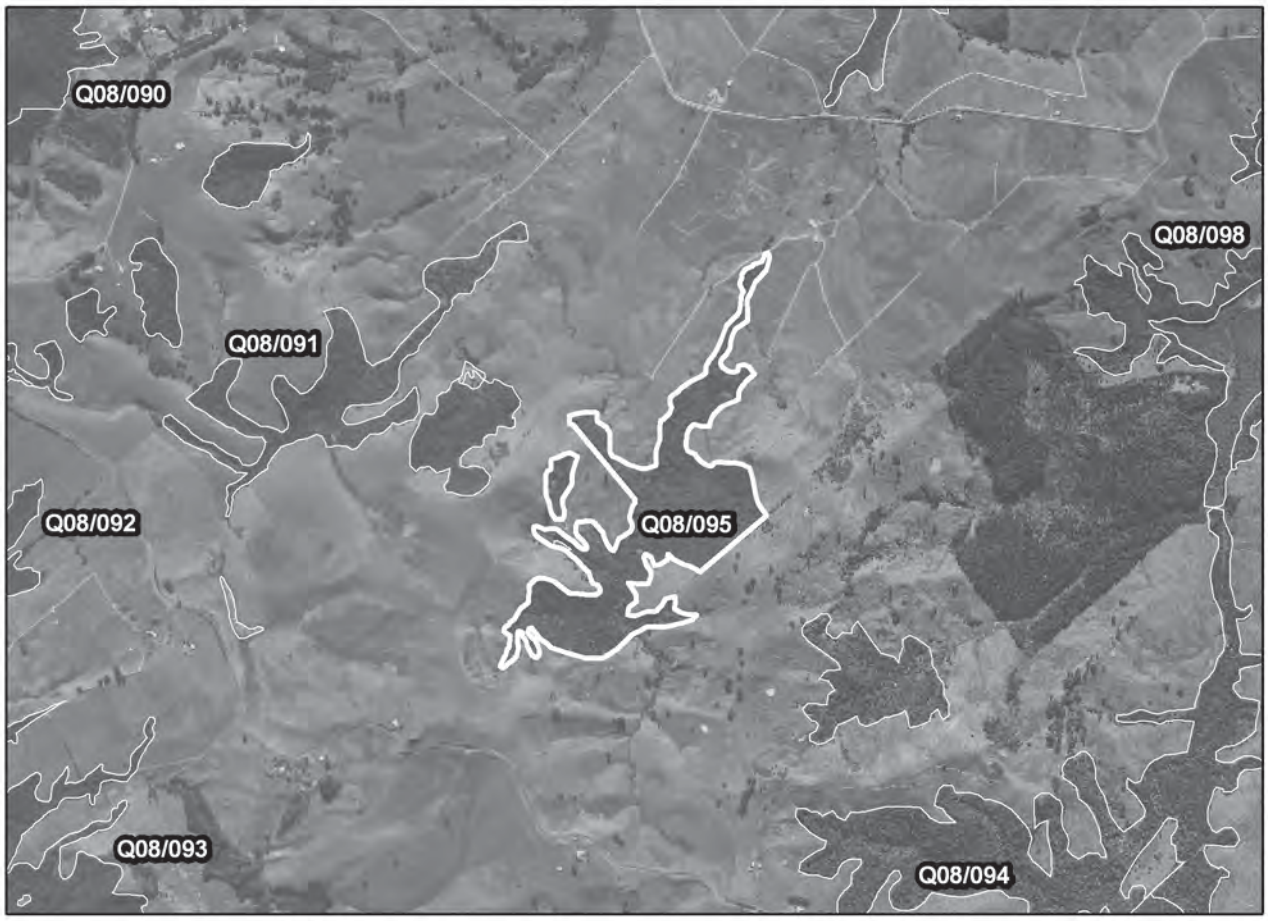
(e) Raupo reedland in small depression (0.5%)

Landform/geology

Hillslopes and gullies underlain by Miocene thinly interbedded mudstone and sandstone (Waitemata Group) and Miocene volcaniclastic gravelly sandstone (Waitakere Group), and with a valley floor of Pleistocene alluvium.

Vegetation

This site comprises a smaller example of forest types similar to neighbouring Raepere Creek Forest (Q08/094) and Kirikiri Creek Forest and Wetlands (Q08/091). It is less visible from roads than either of the latter; therefore the



Q08/095 Totara Creek Forest Remnant

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



descriptions here are supplemented by knowledge of what occurs in similar areas nearby, as well as interpretation from aerial photos.

(a) Kanuka forest is the main forest type.

(b) Totara–kanuka forest with frequent kahikatea is the next most common forest type. Other species present are ti kouka, kowhai, mamangi and puriri.

(c) Near the bottom of the remnant there is a small stand of dense kauri ricker and kanuka with a few emergent radiata pine.

(d) A narrow finger of forest extending northwards is dominated by young totara and tanekaha. Ti kouka, mamaku and kanuka were recorded here as occasional.

(e) A very small raupo reedland was identified from the aerial photograph (flown in 2002).

Fauna

Australasian harrier. Kukupa (Gradual Decline) are known to use this forest frequently.

Significance

This site is significant as it is habitat for a threatened indigenous bird species (kukupa). The forest covers a relatively large geographic area for Otamatea ED Northland, and is in one continuous tract. Tanekaha–totara forest on moderate hillslope (d) is not found anywhere else in the study area, therefore it is a representative example of its type. The site provides a valuable riparian and catchment protection function for the Totara Creek flowing into the Kirikiri Inlet.

HUKATERE PENINSULA WEST COAST

Survey no.	Q08/096
Survey date	Various (December 2005–January 2006)
Grid reference	Q08 163 520
Area	736.5 ha
Altitude	sea level

Ecological units

(a) Mangrove shrubland and forest in estuary

(b) Mudflats and sandflats in estuary

Landform/geology

Holocene estuaries, beaches, and intertidal rock flats.

Vegetation/habitats

(a) Very few mangroves occur along the southwest coast of the Hukatere peninsula (an extensive mangrove forest is present on the northwest coast opposite Kohatutahi Conservation Area (Q08/178) and Waihungaru Stream Forest (Q08/083) however this is part of Kaipara Ecological District). The only substantial cluster of mangrove trees is in a sheltered bay behind Owhareao Point Remnants (Q08/179), otherwise only scattered shrubs and trees occur.

(b) Most of the site is either shallow mudflat and sandflat (35%) or estuarine open water (64%). Beaches with sand are more common than anywhere else in Otamatea ED Northland, due to the greater proximity of the site to the Kaipara Harbour mouth. A few scattered saltmarsh plants are present (e.g. bachelor's button, sea primrose, remuremu, oioi, sea rush, *Austrostipa stipoides*, glasswort, sharp rush, saltmarsh ribbonwood).

Fauna

This site provides habitat for several bird species:

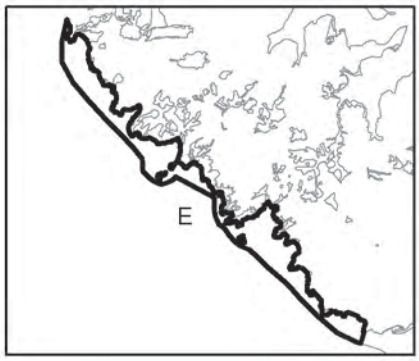
- Reef herons (Nationally Endangered) were known to occur here regularly in low numbers prior to approximately 1976 (Veitch 1978; Bull *et al.*



Q08/096 Hukatere Peninsula West Coast

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 1,250 2,500 5,000 Metres



1985), breeding on Titipu Island (Q08/176). However their continued presence is unconfirmed. They have been sighted occasionally around the Hukatere peninsula coast in recent times (Crockett (comp.) 1992–2004).

- Pied shags (Sparse) occur occasionally.
- Many of the common shorebirds are present including pied stilt, pied oystercatcher, spur-winged plover and white-faced heron (a colony of approximately 30 was observed nesting in macrocarpa trees on the coast just south of Waihungaru Stream Forest (Q08/083)).
- The western Hukatere peninsula coast tends to have fewer waders in general due to less shallow wading habitat compared to other estuarine areas nearby.

Significance

This site supports at least two threatened bird species (reef heron and pied shag) and a number of common bird species, though data about fauna in this area are lacking. The site has scenic values, as it has the greatest length of sandy beaches in the ED, many of which are fringed by pohutukawa and other coastal forest types. Sixty percent of the adjacent coastline of this site is bordered by indigenous vegetation (see sites, in order from north to south: Waihungaru Stream Forest (Q08/083), Te Ruruku Bay Forest Remnants (Q08/089), Waitieke Creek Forest (Q08/092), Te Kiakia Bay Forest Remnants (Q08/093), Owhareao Point Remnants (Q08/179), Otaiwhata Bay Forest and Shrubland (Q09/049), Bushy Point Forest Remnants (Q09/046)). At the upper intertidal margins of the site, 2 ha of habitat lies within Marginal Strips and a Recreation Reserve (administered by DOC).

RAEPERE CREEK COASTAL FOREST

Survey no.	Q08/098
Survey date	17 November 2005
Grid reference	Q08 204 548 (2 remnants)
Area	28.2 ha
Altitude	0–59 m asl

Ecological units

(a) Kowhai–totara–kahikatea forest on gentle coastal margin (70%)

(b) Puriri–kowhai–kanuka forest on gentle coastal margin (25%)

(c) Puriri–ti kouka treeland on steep coastal margin (5%)

Landform/geology

Coastal hillslopes underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex); melange (undifferentiated Mangakahia & Motatau Complex lithologies); Miocene thinly interbedded mudstone and sandstone, and polymict breccia (Waitemata Group).

Vegetation

This site comprises coastal forest remnants along the Raepere Creek, which are largely continuous with mangrove forest in the Arapaoa River site (Q08/084). The site is physically linked with Raepere Creek Forest (Q08/094) at a narrow junction where the creek flows out to the inlet.

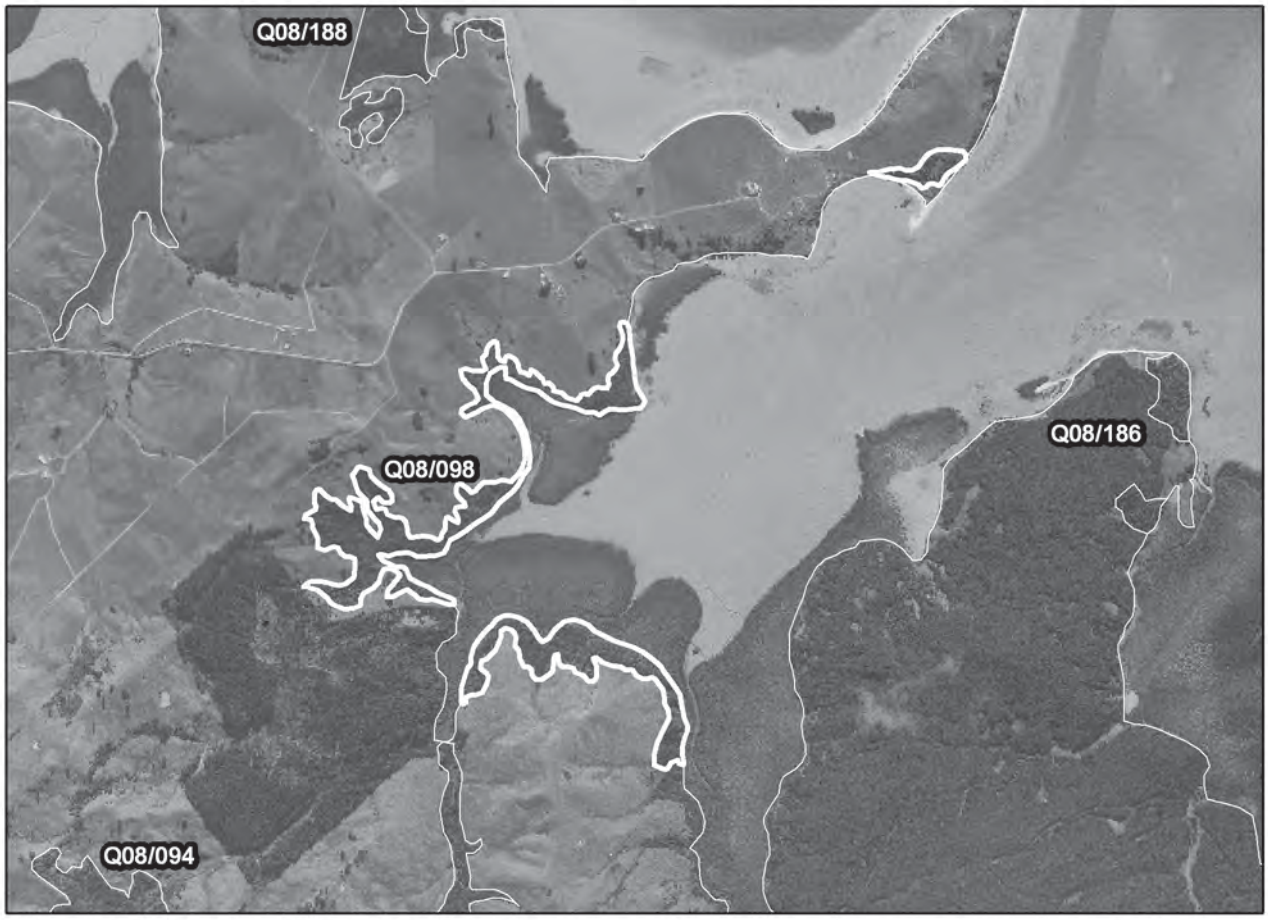
(a) The densest and richest areas of forest along the creek (in terms of species numbers and abundances) are at the western end, and have canopies dominated by kowhai with abundant totara and emergent kahikatea. Puriri, karaka and kanuka are frequent. Ti kouka and manuka occur occasionally, mainly around the edges.

(b) At the southern end of the site a forest dominated by puriri, kowhai and kanuka. Totara, kahikatea and ti kouka are frequent in this mixture.

(c) At the extreme northern end of the site a small area of puriri–ti kouka treeland with frequent kanuka occurs. This is quite battered and exposed, and appears to be only just surviving.

Fauna

Not surveyed.



Q08/098 Raepere Creek Coastal Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Significance

This site provides an important vegetation buffer and erosion control to the Arapaoa River (Q08/084). It is a representative site for two ecological units: (a) kowhai–totara–kahikatea forest on gentle coastal margin, and (b) puriri–kowhai–kanuka forest on gentle coastal margin, which are the best examples of their type in Otamatea ED Northland. 2.3 ha of the site (mainly ecological unit (b)) is within a Marginal Strip (administered by DOC).

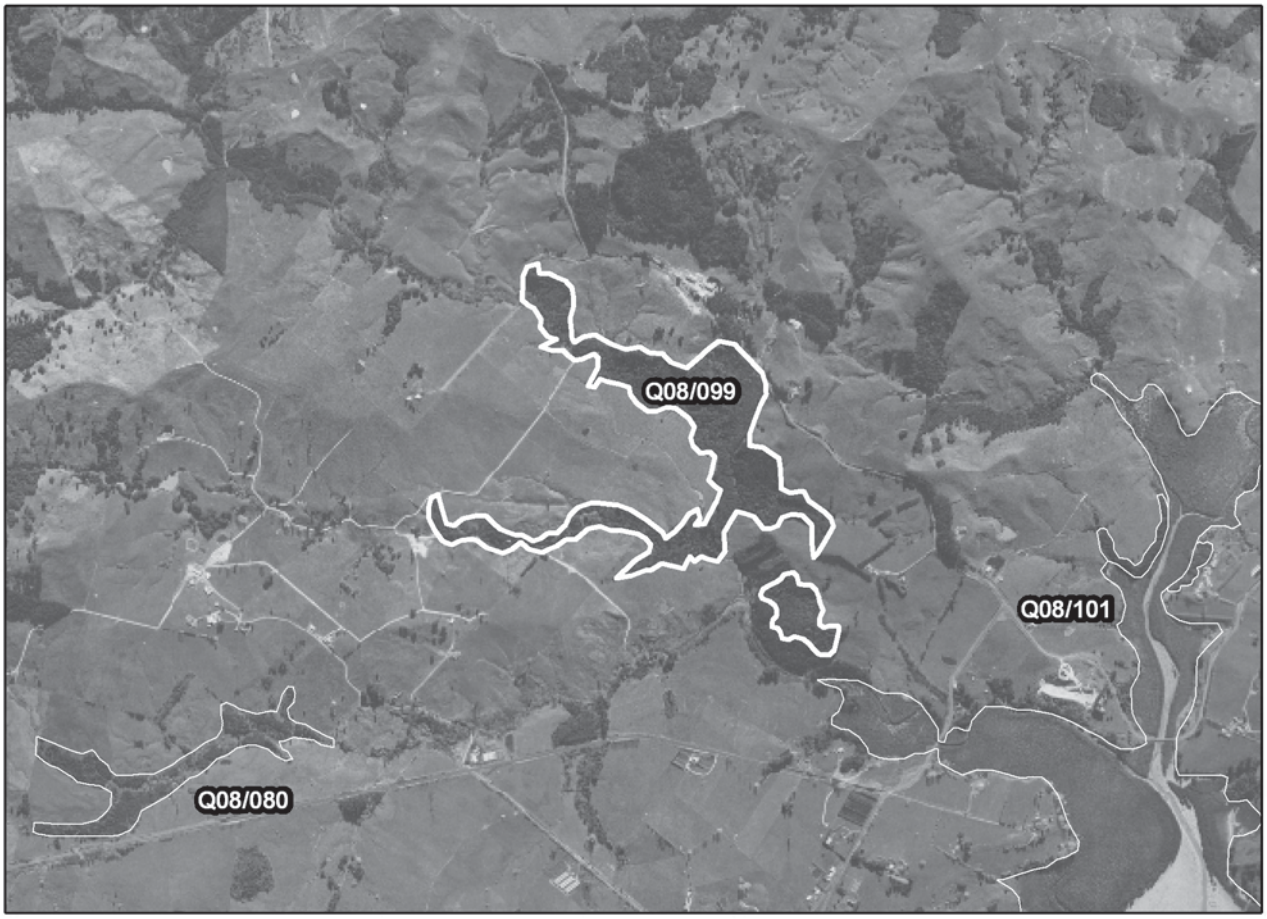
ARARUA ROAD FOREST REMNANTS

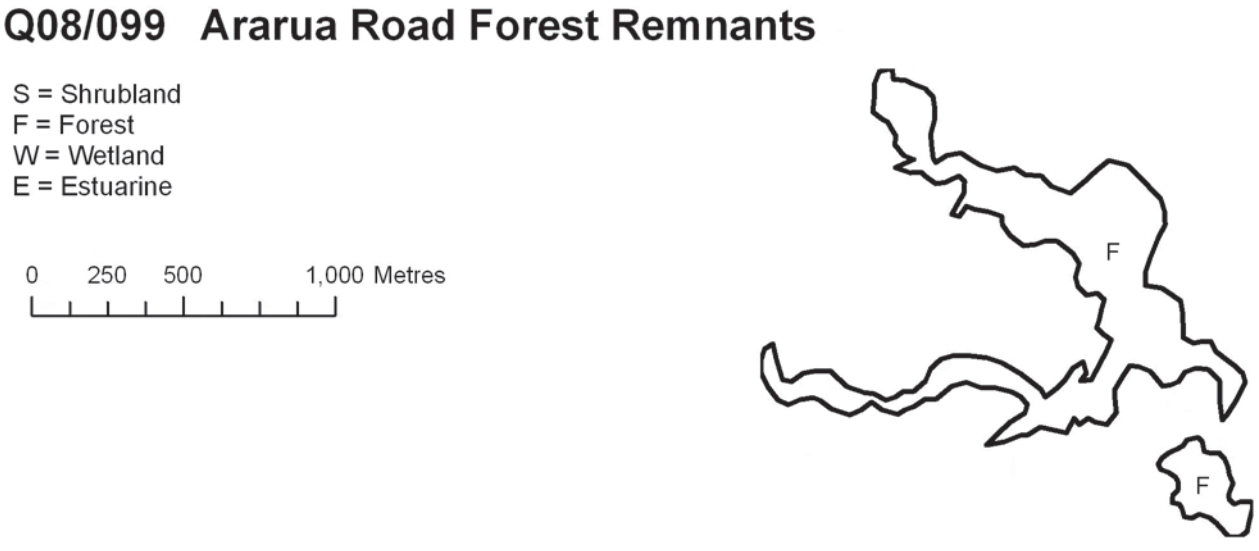
Survey no.	Q08/099
Survey date	17 November 2005
Grid reference	Q08 168 644 (2 remnants)
Area	35.0 ha
Altitude	20–40 m asl

Ecological units

(a) Kanuka forest in gully (75%)

(b) Totara–puriri forest on ridge top (25%)





Landform/geology

Hillslopes underlain by Cretaceous sandstone and mudstone (Mangakahia Complex), and valley flats on Pleistocene alluvium.

Vegetation

The vegetation of this site falls mostly within the boundary of Otamatea ED, but partially occurs in Tokatoka ED in the north. The site comprises two corridors of riparian forest which meet at a stream junction, and one hill top remnant along the main stream flowing into the Arapaoa River (Q08/084).

(a) The riparian forest is predominantly kanuka, with frequent totara, manuka and mamaku. Other species present at low percentage cover are kowhai, tanekaha, mamangi, karaka, kauri, kahikatea, rewarewa, mahoe and black wattle.

(b) The hill top remnant comprises totara (abundant) and puriri (common), with frequent rewarewa and kanuka, and occasional rimu, taraire and emergent radiata pine. Wilding pines (radiata pine) are a problem for the integrity of this hill top remnant.

Fauna

Grey warbler.

Significance

Although black wattle is quite common, this site contains the best representative example of successional kanuka forest in a stream gully system (a).

UPPER PAPAROA CREEK SCENIC RESERVE AND SHERWIN QEII COVENANT

Survey no.	Q08/100
Survey date	17 November 2005
Grid reference	Q08 217 653
Area	16.1 ha
Altitude	17–60 m asl

Ecological units

(a) Kauri forest on moderate to steep hillslope (50%)

(b) Totara–kanuka forest on moderate hillslope (30%)

(c) Kanuka–rimu forest on moderate to steep hillslope (10%)

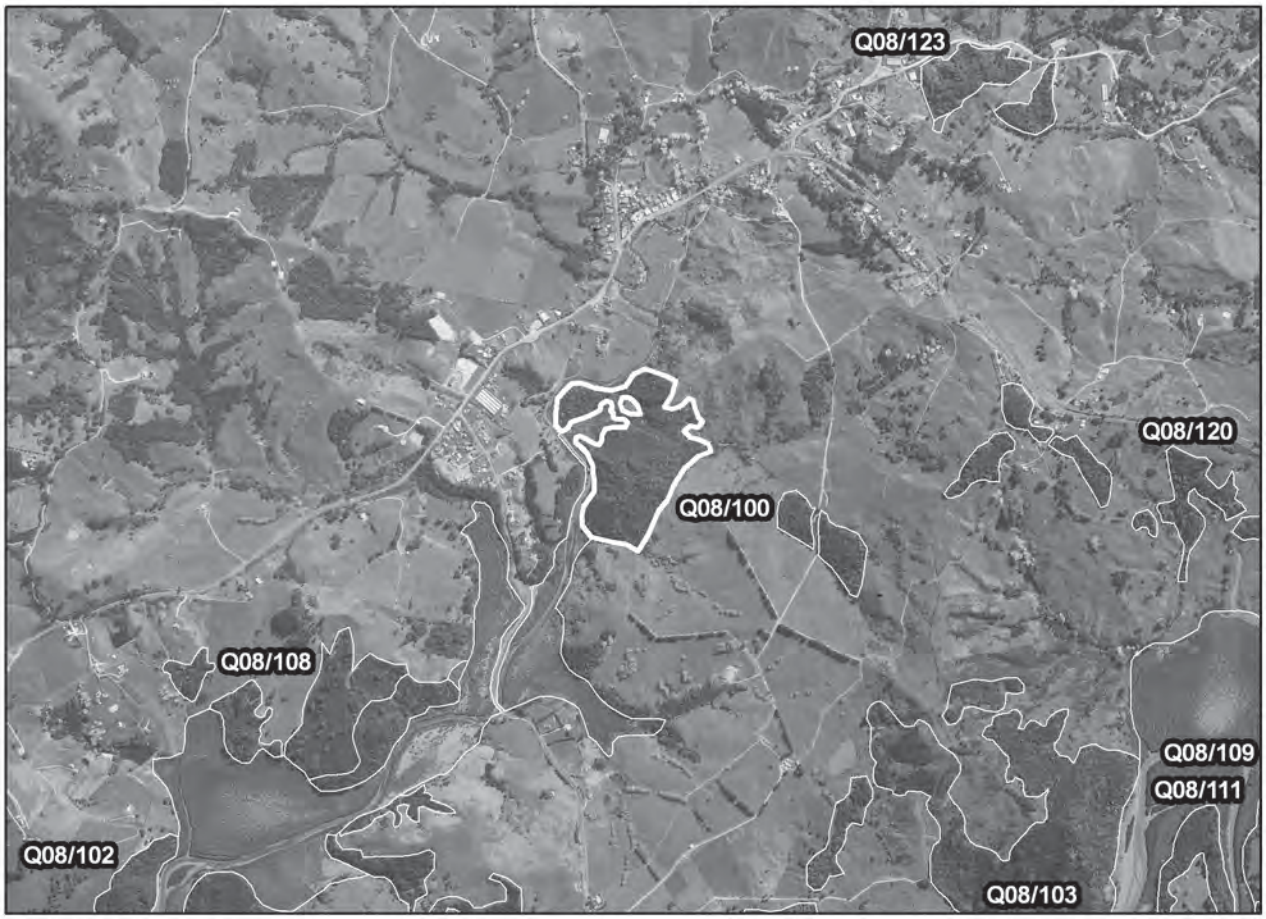
(d) Totara–kahikatea forest on moderate to steep hillslope (10%)

Landform/geology

Hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex), and valley flats on Holocene alluvium.

Vegetation

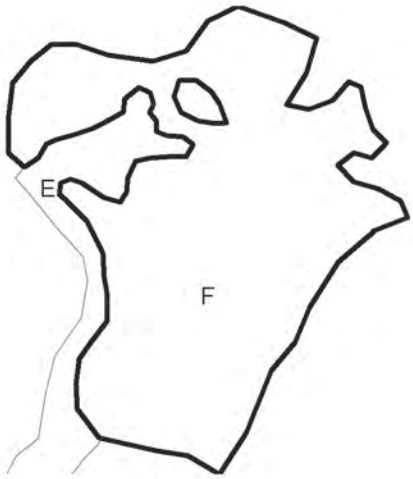
This site comprises a dense area of indigenous forest on two small knobs on the true left bank of the upper Paparoa Creek. Freshwater and saltmarsh habitat meet near the point where the site juts out into the creek. A tributary flowing westwards bisects the site, joining with the estuary at a small saltmarsh which is almost fully enclosed by the forest in this site.



Q08/100 Upper Paparoa Creek Scenic Reserve and Sherwin QEII Covenant

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(a) Most of the site is covered by dense kauri ricker forest with frequent kanuka and occasional kahikatea.

(b) The northern side, and areas beside the water, have abundant totara in the canopy, with a lesser amount of kanuka. Young rimu and kahikatea are frequently emergent above the canopy. Occasional species include ti kouka, rewarewa, kowhai, matai, karaka and puriri.

(c) An uncommon forest type of limited extent, kanuka with abundant emergent rimu, is present on the north-facing slope of the southernmost knob.

(d) Totara–kahikatea forest occurs in some parts of the Upper Paparoa Creek Scenic Reserve. Other parts have a similar forest type but are younger. A least one very large kahikatea overhangs the water from the Scenic Reserve and some large emergent matai are also present. Rewarewa, puriri, titoki and tanekaha occur occasionally.

Three plant species lists were compiled in 1996 for the Scenic Reserve, the northern part of the QEII Open Space Covenant (type b), and the southern part of the QEII Open Space Covenant (types a & c) (SSBI Q08/H062). Of interest was the occurrence of *Alseuosmia quercifolia*, manatu and miro which are all locally uncommon in the Otamatea ED Northland. The reserve showed good regeneration at that time, however several weeds were found invading the edges and understorey, e.g. periwinkle, Japanese honeysuckle, tradescantia, elaeagnus, tree privet and climbing asparagus. *Leptinella tenella* (Sparse) was collected on the edge of the saltmarsh under the shade of forest in this site in 1997 (AK 233971).

Significant flora

Leptinella tenella (Sparse), *Alseuosmia quercifolia* (locally uncommon), manatu (locally uncommon), miro (locally uncommon).

Fauna

Tui, fantail, Australasian harrier and kukupa (Gradual Decline) were observed using the area in 1996.

Significance

This site contains representative examples of two ecological units: (a) kauri forest on moderate to steep hillslope and (d) totara–kahikatea forest on moderate to steep hillslope. The latter is the only example of its type identified in Otamatea ED Northland. An area of 1.6 ha is within the Upper Paparoa Scenic Reserve (administered by the Department of Conservation, ecological units (a) and (d)), and a further 9.8 ha (ecological units (a), (b) and (c)) are within a QEII Open Space Covenant. The biodiversity values of this natural area are known to be threatened by possums, goats and weed invasion (SSBI Q08/H062).

PAPAROA CREEK MARGINAL STRIP NO. 2 AND SURROUNDS

Survey no.	Q08/102
Survey date	17 November 2005
Grid reference	Q08 206 638 (7 remnants)
Area	38.0 ha (33.8 ha forest, 4.2 ha shrubland)
Altitude	0–60 m asl

Ecological units

(a) Totara–kanuka forest on gentle coastal margin (65%)

(b) Totara–kowhai forest on gentle coastal margin (20%)

(c) Manuka shrubland on moderate hillslope (15%)



Q08/102 Paparoa Creek Marginal Strip No. 2 and Surrounds

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Coastal hillsloipes on Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex) and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site comprises coastal forest and shrubland remnants on both sides of the Paparoa Creek. The centre of the site is a low-relief, forested headland extending westwards out into the creek, which has associated forest on the

shore opposite, as well as further north and south along the same coast. The surrounding landscape is pasture/gorse and mangrove forest.

(a) The majority of the forest canopy comprises totara and kanuka in equal proportions with frequent emergent kauri and kahikatea. There are occasional puriri, kowhai, ti kouka and kawaka, as well as mature emergent macrocarpa and radiata pine. There are some stands of senescent manuka with a groundcover of tangle fern (Julia Walker pers. comm.).

(b) Forest on the true right bank comprises totara (abundant) and kowhai (common) with occasional ti kouka.

(c) One large area of recently regenerating shrubland is dominated by manuka, with frequent kanuka and occasional ti kouka.

Significant flora

According to 2005 ground-based survey, this site contains two threatened plant species, mida (Gradual Decline) and kawaka (Sparse), a regionally significant plant species, *Coprosma crassifolia*, and two locally uncommon plant species, mangeao and tawa (Julia Walker, pers. comm.)[11].

Fauna

Not surveyed.

Significance

The site contains the best representative example of manuka shrubland (c) in Otamatea ED Northland, and is also significant for the presence of threatened, regionally significant and locally uncommon plant species. 1 ha of the site is within the Paparoa Creek Marginal Strip No. 2 (administered by DOC).

LOWER PAHI RIVER FOREST REMNANTS

Survey no.	Q08/103
Survey date	18 November 2005
Grid reference	Q08 228 641 (6 remnants)
Area	49.4ha
Altitude	0–100 m asl

Ecological units

(a) Totara–kanuka forest on moderate to steep hillslope (50%)

(b) Totara–kanuka–kahikatea forest on moderate to steep hillslope (35%)

(c) Totara–puriri–kowhai forest on gentle coastal margin (10%)

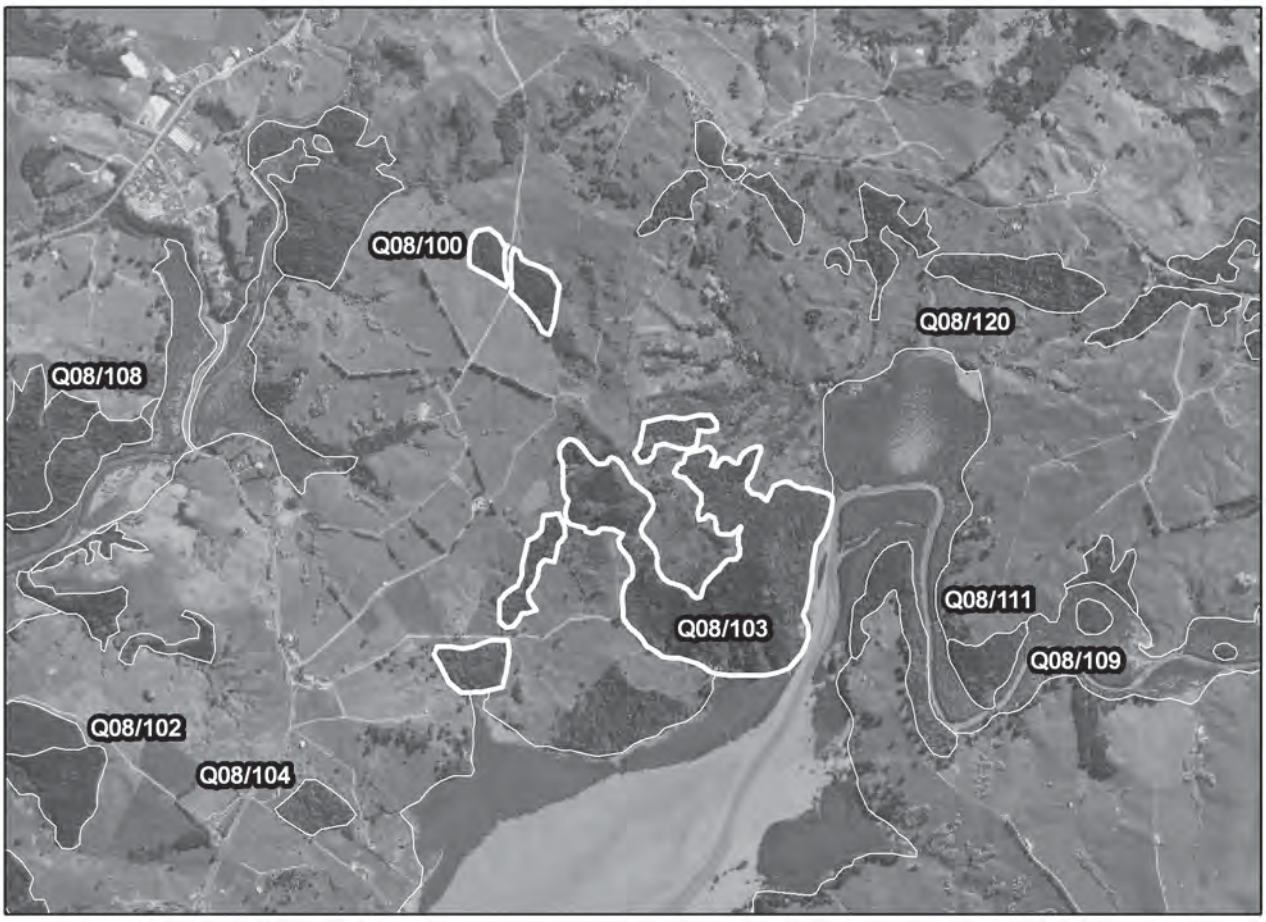
(d) Karaka–kowhai–tree privet forest on steep coastal margin (5%)

Landform/geology

Hillslopes and gullies underlain by undifferentiated Eocene–Oligocene mudstone, sandstone and bioclastic limestone (Motatau Complex), and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

---

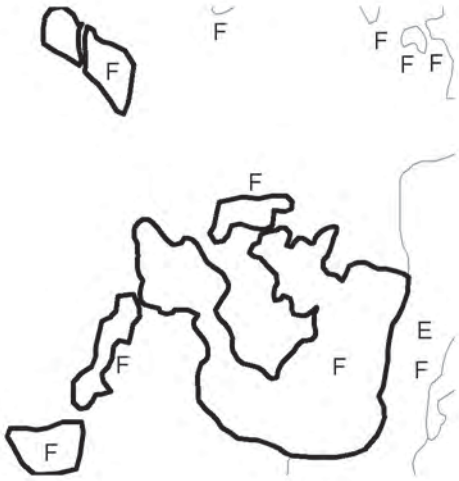
[11] Kawaka was recorded at grid reference Q08 208 635. Seedlings and saplings were abundant, but concentrated in one small area of the forest. *Coprosma crassifolia* was recorded at grid reference Q08 204 637 (on the southwestern side of the headland), on the edge of the older forest in the Marginal Strip (Julia Walker 2005, pers. comm.).



Q08/103 Lower Pahi River Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Vegetation

The site comprises six large indigenous forest remnants on the western side of the Pahi River surrounded by pastoral farming land. Near the site, a substantial area of coastal totara–kahikatea forest[12] has been cleared within the last three years, leaving only occasional totara and kahikatea standing. This area was not included within the site.

[12] The area cleared was approximately 7.7 ha and was located southwest along the coast from the Scenic Reserve.

(a) The majority of the remnants are totara–kanuka forest with scattered emergent radiata pine. Some very large pines are present on the south-facing slopes of the largest remnant.

(b) The next most frequent vegetation type, is a more diverse mixture of equally abundant totara, kanuka and kahikatea with frequent kowhai, taraire and kauri rickers, and occasional puriri, nikau, karaka, rewarewa, rimu and matai.

(c) In the southwestern corner, totara, puriri and kowhai are equally abundant in the canopy,

(d) An area of karaka forest with large kowhai and tree privet in the canopy occurs next to the coast. Totara and tawa are frequent, and nikau, matai, rewarewa, mangeao and radiata pine are occasional. This area is predominantly within the Lower Pahi River Scenic Reserve.

Significant flora

Tawa and mangeao are locally uncommon in Otamatea ED Northland.

Fauna

Kingfisher and little shag. Kukupa (Gradual Decline) were observed in the Scenic Reserve.

Significance

This site is significant as a habitat for a threatened bird species (kukupa). It is also significant as a coastal site for tawa (locally uncommon) and as one of only three sites where mangeao (locally uncommon) was recorded in Otamatea ED Northland (the others are Takahoa Creek Forest (Q08/163) and Paparoa Creek Marginal Strip No. 2 and Surrounds (Q08/102)). This a representative site for three ecological units: (b) totara–kanuka–kahikatea forest on moderate to steep hillslope, (c) totara–puriri–kowhai forest on gentle coastal margin and (d) karaka–kowhai–tree privet forest on steep coastal margin. Many goats were observed in the Scenic Reserve, and a woody weed, elaeagnus, is smothering vegetation along the coastal fringe. This site contains the twelfth largest extent of forest habitat in Otamatea ED Northland, however it is divided into six separate remnants, which reduces its value compared to other sites of a similar size. The Lower Pahi River Scenic Reserve (DOC-administered) makes up a very small part of the total area of this site (1.4%, 0.5 ha).

PAHI COASTAL STRIP

Survey no.	Q08/105
Survey date	17 November 2005
Grid reference	Q08 205 612
Area	39.3 ha (37.4 ha forest, 1.9 ha shrubland)
Altitude	0–60 m asl

Ecological units

(a) Totara–kanuka forest on gentle coastal margin (95%)

(b) Kanuka–manuka shrubland on gentle hillslope (5%)

Landform/geology

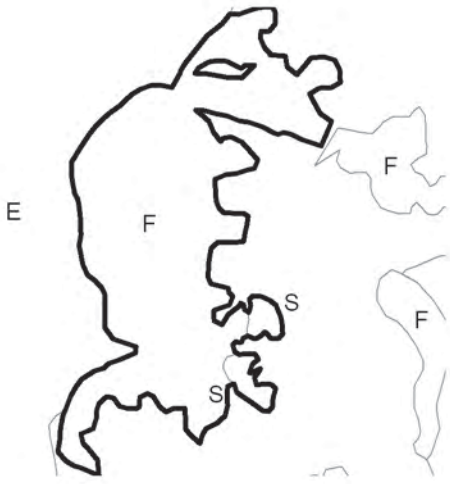
Coastal hillslopes underlain by Eocene thickly bedded glauconitic sandstone (Omahuta Sst, Motatau Complex). Well exposed coastal cliffs showing close



Q08/105 Pahi Coastal Strip

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



juxtaposition of two different late Eocene–Oligocene sequences in different blocks within Northland Allochthon. Superb Bortonian flysch (Kenny & Hayward 1996).

Vegetation

This is a relatively large natural area of secondary forest and shrubland on the western shore of the Pahi peninsula, on gentle slopes leading down to mudflats and scattered mangroves on the Arapaoa River (Q08/084). Much of the surrounding land on the peninsula is currently in residential housing or baches, or is in small lifestyle blocks with pasture and exotic trees.

(a) Totara–kanuka forest with frequent ti kouka and emergent old radiata pine is the main vegetation type. Also present in the forest are karaka, puriri and occasional clumps of large macrocarpa. Wild hedges of elaeagnus are a problem along the coastal fringe where they can extend 10 m over the ground right down to the water's edge. Other problem weeds include Mexican devil, Mexican daisy, brush wattle and pampas.

(b) A small stand of kanuka–manuka shrubland is present at the top of the remnant near Pahi Road. Within this shrubland there are occasional totara, kahikatea, rewarewa, mamangi and large emergent radiata pine.

Significant flora

Olearia solandri (regionally significant) was recorded in a survey in 1999 (SSBI Q08/H066).

Fauna

Little shag (present study), white-faced heron, black-backed gull, shining cuckoo, kingfisher, fantail, grey warbler (SSBI Q08/H066).

Significance

This is a representative site for ecological unit (a). Despite being a relatively large area of forest, this site is compromised by weed infestations (especially elaeagnus) and grazing. Nevertheless, it does provide an important protective buffer to the Arapaoa River (Q08/084), especially with land and housing development occurring on all sides. It is also habitat for a regionally significant plant species, *Olearia solandri.* The exposed coastal cliffs and adjacent shore platforms are considered to be regionally significant in terms of geology (Kenny & Hayward 1996).

NORTH WHAKAPIRAU FOREST REMNANT

Survey no.	Q08/107
Survey date	17 November 2005
Grid reference	Q08 221 606
Area	5.9 ha
Altitude	9–99 m asl

Ecological unit

(a) Totara–kohekohe–puriri forest on steep coastal margin (100%)

Landform/geology

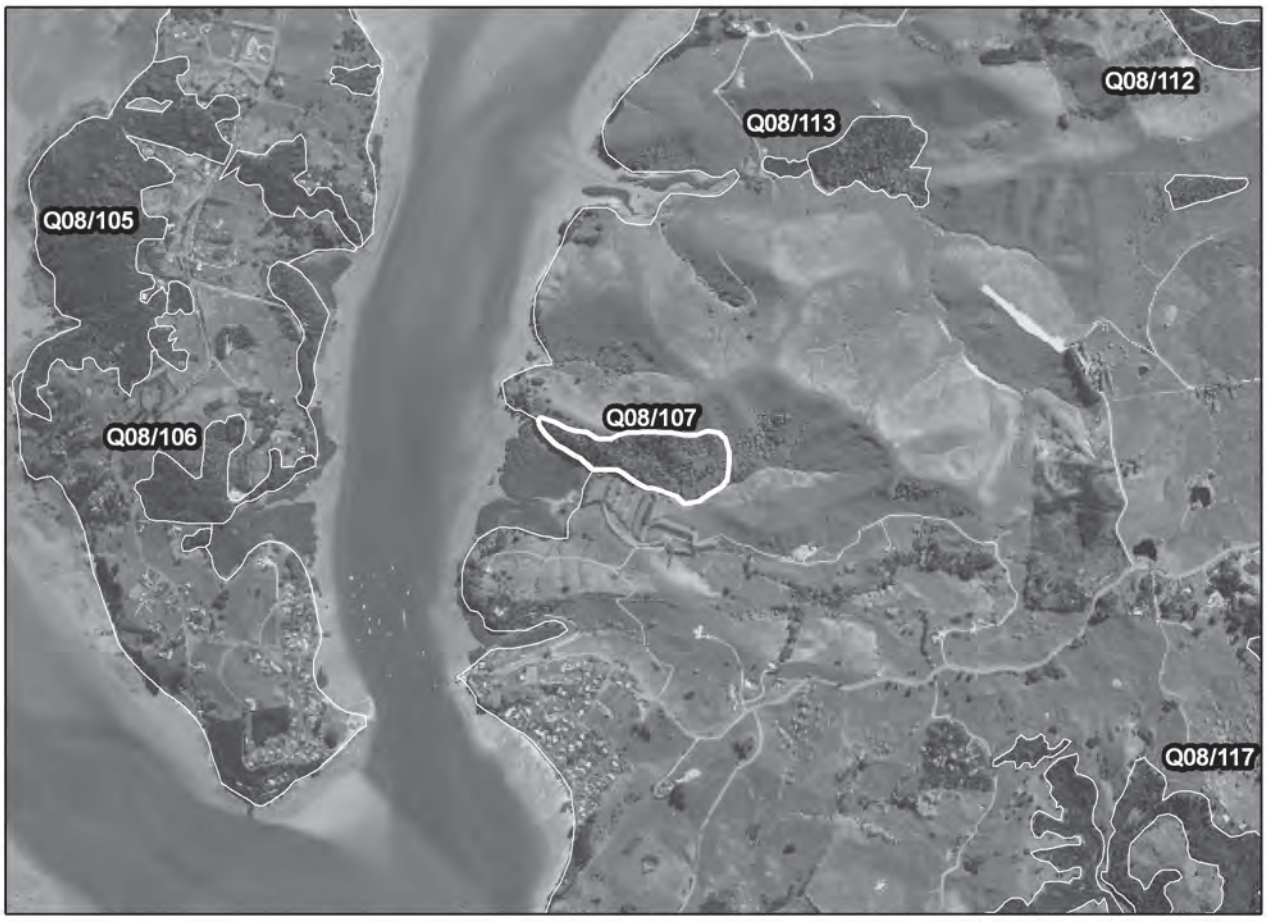
Coastal hillslopes underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex).

Vegetation

This site comprises forest on a south-facing, steep coastal slope bordering mangrove forest and pasture, including some reclaimed land. The vegetation is very distinctive, as three species are equally common in the canopy (totara, kohekohe and puriri), one of which, kohekohe, is unusual in its abundance. Karaka is frequent, and tarata and ti kouka are occasional associates in the canopy.

Fauna

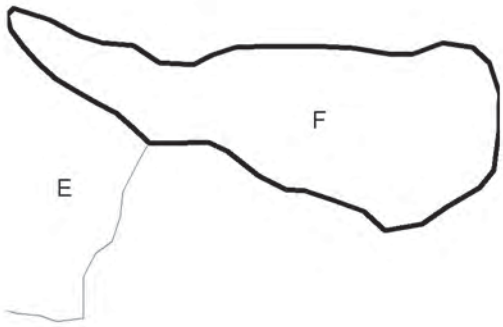
Not surveyed.



Q08/107 North Whakapirau Forest Remnant

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres

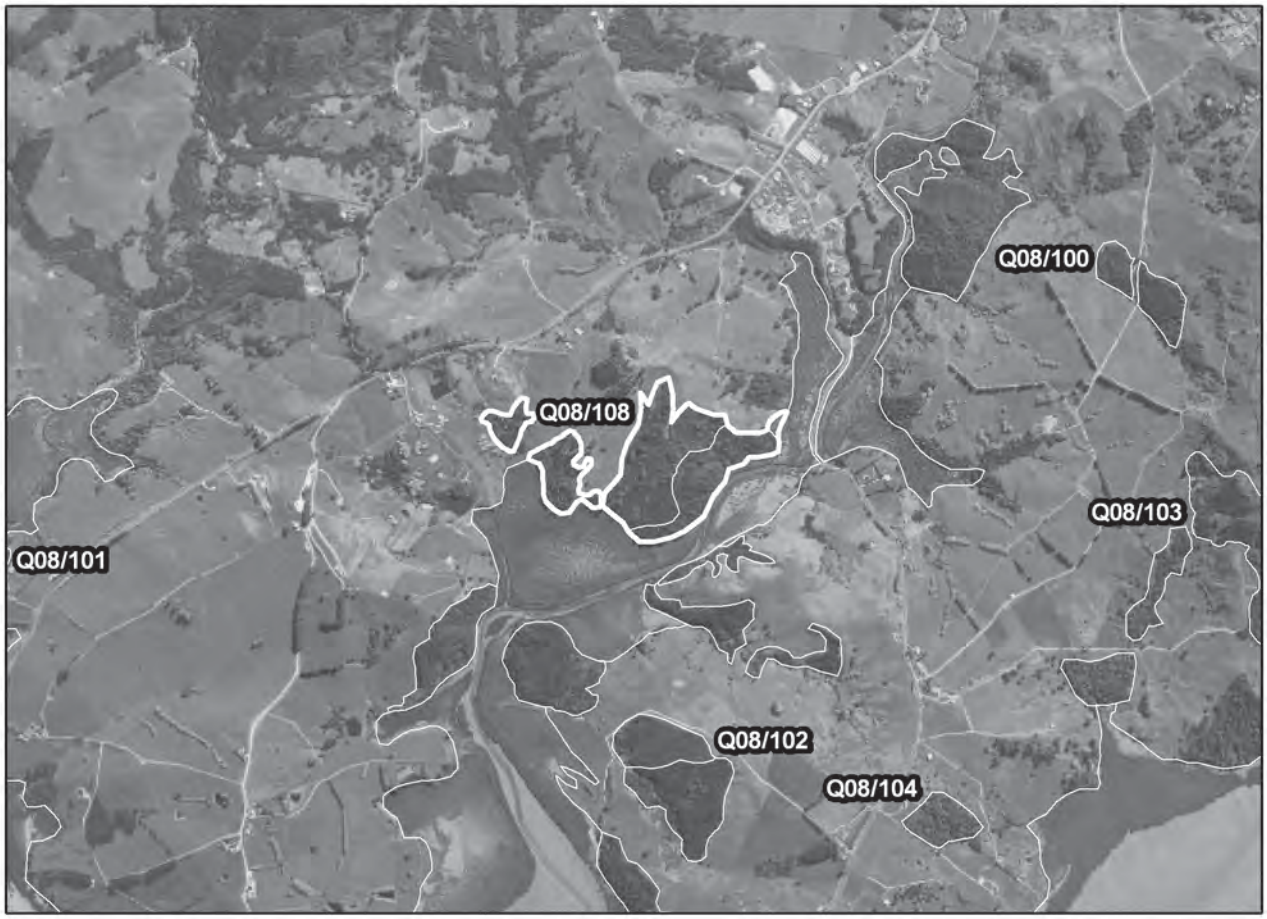


Significance

This forest is the only example of its type in Otamatea ED Northland and is therefore a representative ecological unit. The distinctive feature of the vegetation is the high proportion of kohekohe in the canopy. Some kohekohe appear to be suffering from canopy dieback (probably possum browse) and management action to prevent further damage is an immediate issue. Grazing is also a problem, as the site is not fenced. If mammalian pest control is carried out this site has good potential as kukupa habitat.

PAPAROA CREEK SCENIC RESERVE AND SURROUNDS

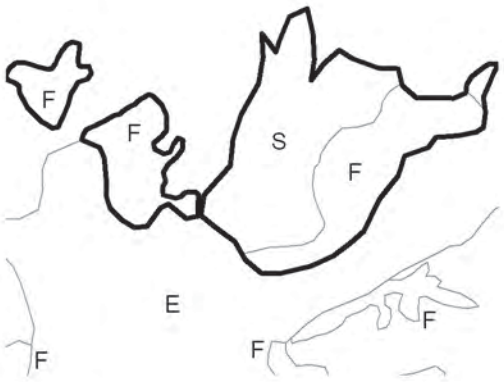
Survey no.	Q08/108
Survey date	17 November 2005
Grid reference	Q08 206 644 (3 remnants)
Area	20.6 ha (10.8 ha forest, 9.8 ha shrubland)
Altitude	0–58 m asl



Q08/108 Paparoa Creek Scenic Reserve and Surrounds

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Totara–kanuka forest on steep coastal margin (52%)

(b) Manuka–kanuka shrubland on moderate to steep hillslope (46%)

(c) Mahoe shrubland on steep coastal margin (2%)

Landform/geology

Coastal hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

The site comprises three indigenous forest/shrubland remnants on the western side of the Paparoa Creek..

(a) Totara–kanuka forest is present in the two smaller remnants and along the coastal margin. Emergent kauri rickers and tanekaha occur frequently in this type. Also present are ti kouka, kahikatea, mamaku, nikau, karaka and rimu. A stand of mature podocarps (kahikatea, rimu and totara) over kanuka appears to be within the boundary of the Scenic Reserve.

(b) The other common vegetation type is manuka–kanuka shrubland. Emergent mature radiata pine is scattered throughout the shrubland, as is mamaku. Emergent maritime pine is also present in localised groves.

(c) A very small patch of shrubland dominated by mahoe is present adjacent to the coast. Mamaku and ti kouka are frequent in the canopy with occasional kanuka, mapou, gorse and Japanese honeysuckle.

Fauna

Not surveyed.

Significance

This site comprises the seventh largest example of indigenous shrubland in Otamatea ED Northland. However this shrubland is not entirely indigenous in character with many radiata pine and maritime pine trees emergent above the canopy. The site is not fenced, and suffers ongoing degradation from stock grazing and trampling. Ecological unit (c), mahoe shrubland on steep coastal margin, is a unique and representative shrubland type in Otamatea ED Northland. A small part of this site (0.9 ha) is within the Paparoa Creek Scenic Reserve administered by the Department of Conservation.

PAPAROA STREAM HEADWATERS

Survey no.	Q08/110
Survey date	24 November 2005
Grid reference	Q08 256 662 (2 remnants)
Area	52.5 ha
Altitude	34–140 m asl

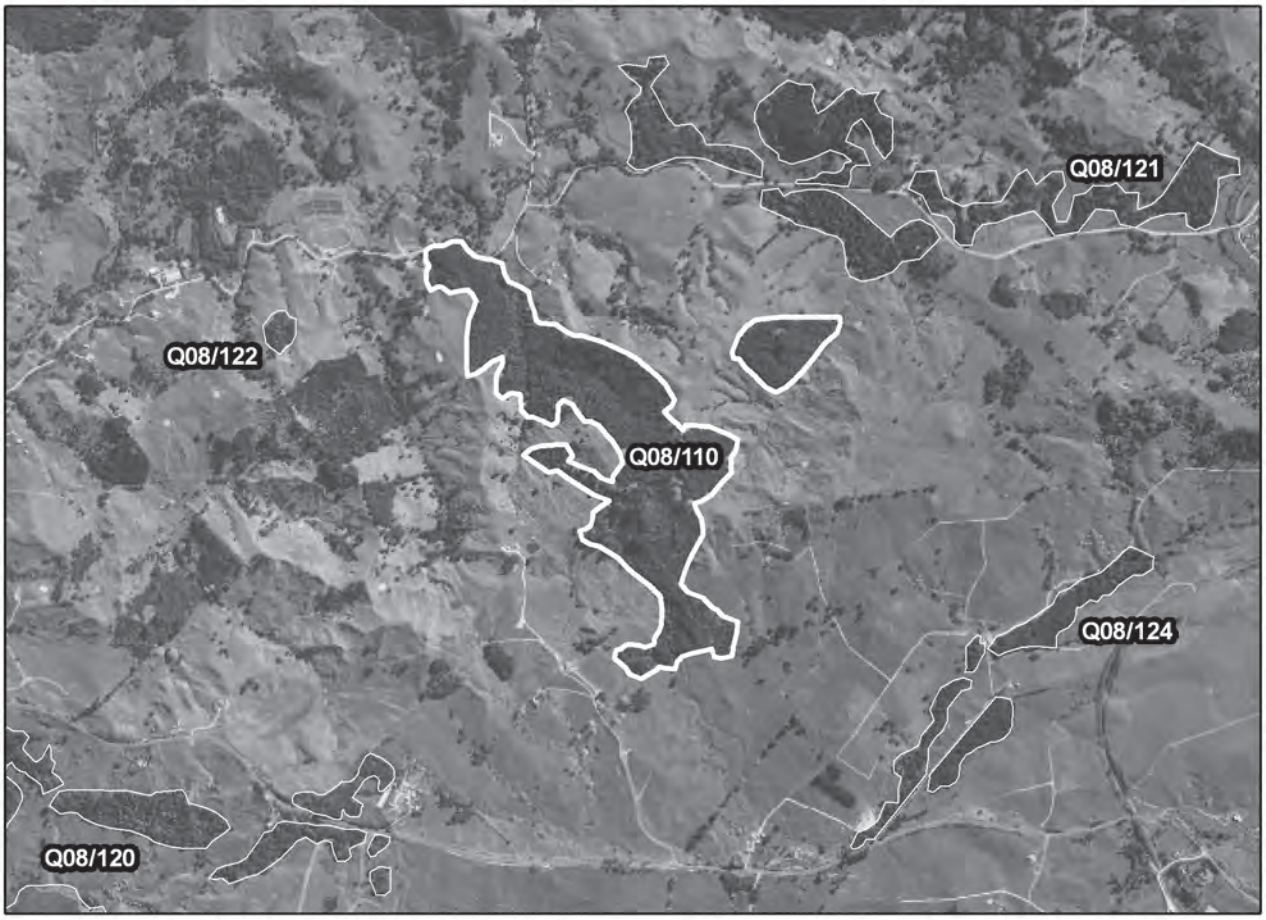
Ecological units

(a) Taraire–totara forest on moderate to steep hillslope (68%)

(b) Rimu–kanuka forest on gentle hillslope (20%)

(c) Kahikatea–totara forest in gully (10%)

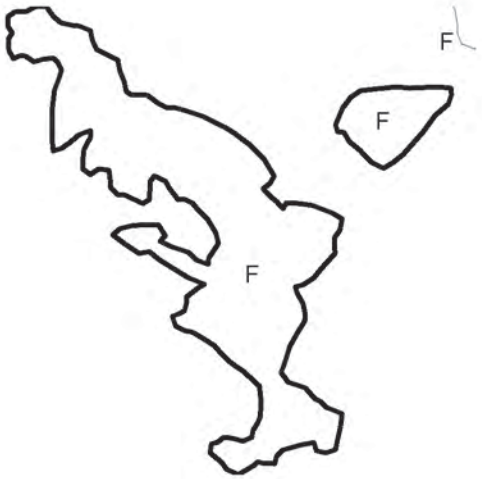
(d) Mamaku–totara forest on moderate to steep hillslope (2%)



Q08/110 Paparoa Stream Headwaters

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Hillslopes underlain by Cretaceous sandstone and mudstone (Mangakahia Complex), and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site comprises one large, forest remnant, and one smaller one on undulating topography at the headwaters of the Paparoa Stream. Most of the

large remnant is difficult to see from roads, and the vegetation type could not be described during this study. This area was described in a 1995 survey as 'mainly broadleaf, dominated by taraire'. A previous study by the NZ Wildlife Service (1977) described totara and taraire as the main canopy species. Hence it was determined that the areas that could not be seen were similar to the visible areas of totara–taraire forest, and that this was the major forest type present.

(a) A relatively even canopy of taraire in humid places and totara in drier places has frequent emergent trees of pukatea, rewarewa and kahikatea, with occasional nikau and macrocarpa.

(b) In the northern part of the remnant, dense young rimu are emergent above a canopy of kanuka. Also frequent in the canopy are kauri rickers, totara and tanekaha. Occasional species recorded include rewarewa, kahikatea, ti kouka, manuka and macrocarpa.

(c) Gully forest in the south of the remnant is composed principally of kahikatea and totara with occasional tarata.

(d) On a moderate to steep southeast-facing slope at the highest point of the remnant there is secondary forest (probably a landslide scar) of mamaku and totara. Rewarewa, kanuka and large radiata pine are frequent, and occasional rimu.

Significant flora

Kaikomako (regionally significant) was recorded at this site in 1995, along with miro and tawa (both locally uncommon in Otamatea ED Northland) (SSBI Q08/H015).

Fauna

Grey warbler, kingfisher, shining cuckoo. Kukupa (Gradual Decline) (SSBI Q08/H015).

Significance

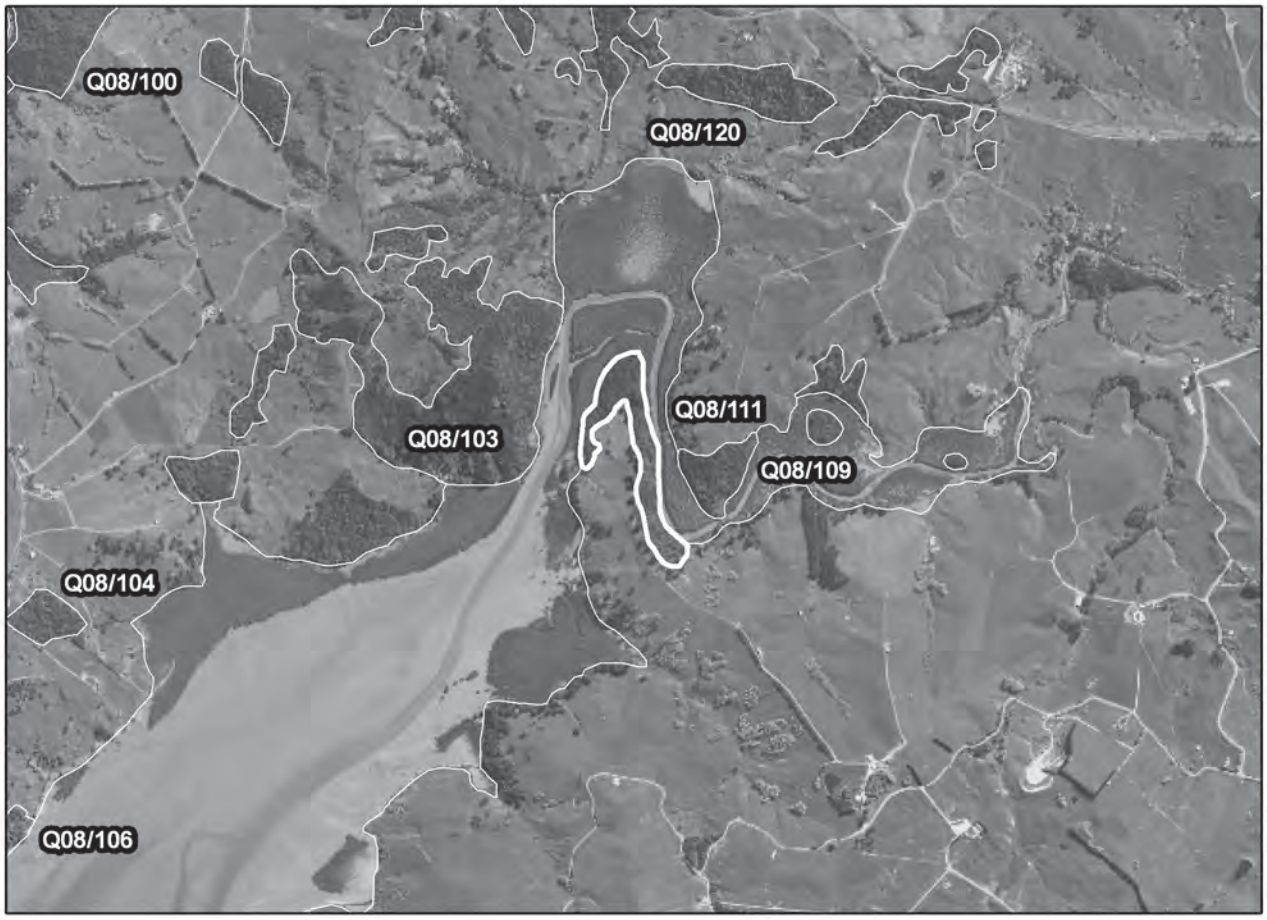
Parts of the site are heavily grazed underneath, however other parts have healthy understoreys, according to 1995 DOC records (SSBI Q08/H015). The current condition is not known. This is the eleventh largest forest area in Otamatea ED Northland, and is one of the most intact. It is representative for all of the ecological units present. Threatened (kukupa) and regionally significant (kaikomako) species are present. A pa site is present at the crest of the hill within this site (SSBI Q08/H015). Two QEII Open Space Covenants cover parts of this natural area (in total 13.7 ha, mostly of (a) taraire–totara forest on moderate to steep hillslope).

MOONEY QEII COVENANT

Survey no.	Q08/111
Survey date	18 November 2005
Grid reference	Q08 235 637
Area	7.2 ha
Altitude	0–29 m asl

Ecological unit

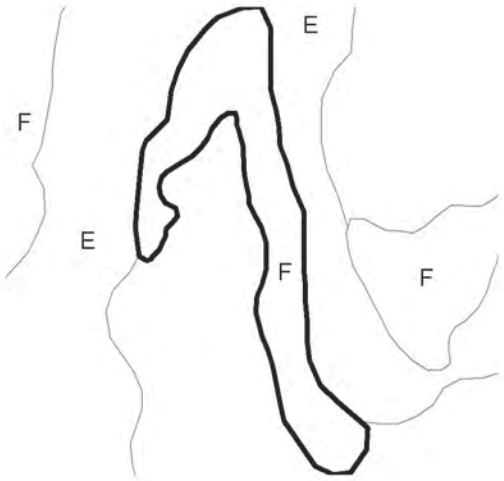
(a) Totara–kanuka forest on gentle coastal margin (100%)



Q08/111 Mooney QEII Covenant

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Peninsula underlain by undifferentiated Eocene–Oligocene mudstone, sandstone and bioclastic limestone (Motatau Complex).

Vegetation

Forest fringes the outer edges of a long, narrow peninsula at a sharp U-bend in the upper Pahi River. The inside of the river bend is thickly forested in mangroves, which buffer this site on all sides. Lower Pahi River Forest Remnants (Q08/103) is located opposite to the west, and the Upper Pahi River

Scenic Reserve, Rabbit and Goat Islands and Surrounds (Q08/109) lie directly to the east. The main canopy trees are totara and kanuka (the former more common), which are frequently overtopped by stands of kauri rickers, tanekaha, rimu and radiata pine. Kowhai is frequent around the water's edge. Occasional emergent macrocarpa are present.

Fauna

Kukupa (Gradual Decline).

Significance

This site is small and narrow, but forms an important buffer to the estuarine habitat in the Pahi River. It significance is increased by the presence of a threatened bird species (kukupa), and by its proximity to other natural areas. This site includes part of a QEII Open Space Covenant (4.7 ha), the rest of which is excluded due to it being dominated by exotic grass and willow.

PUKEHUIA FOREST REMNANTS

Survey no.	Q08/115
Survey date	18 November 2005
Grid reference	Q08 269 602 (4 remnants)
Area	36.0 ha (34.7 ha forest, 1.3 ha wetland)
Altitude	40–140 m asl

Ecological units

(a) Totara forest on moderate to steep hillslope (80%)

(b) Unknown forest type (16%)

(c) Open water (constructed freshwater farm pond) (2%)

(d) Raupo reedland on constructed pond fringe (1%)

(e) Soft rush rushland on constructed pond fringe (1%)

Landform/geology

Hillslopes and gullies underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies), and Miocene thinly interbedded sandstone and mudstone (Waitemata Group).

Vegetation

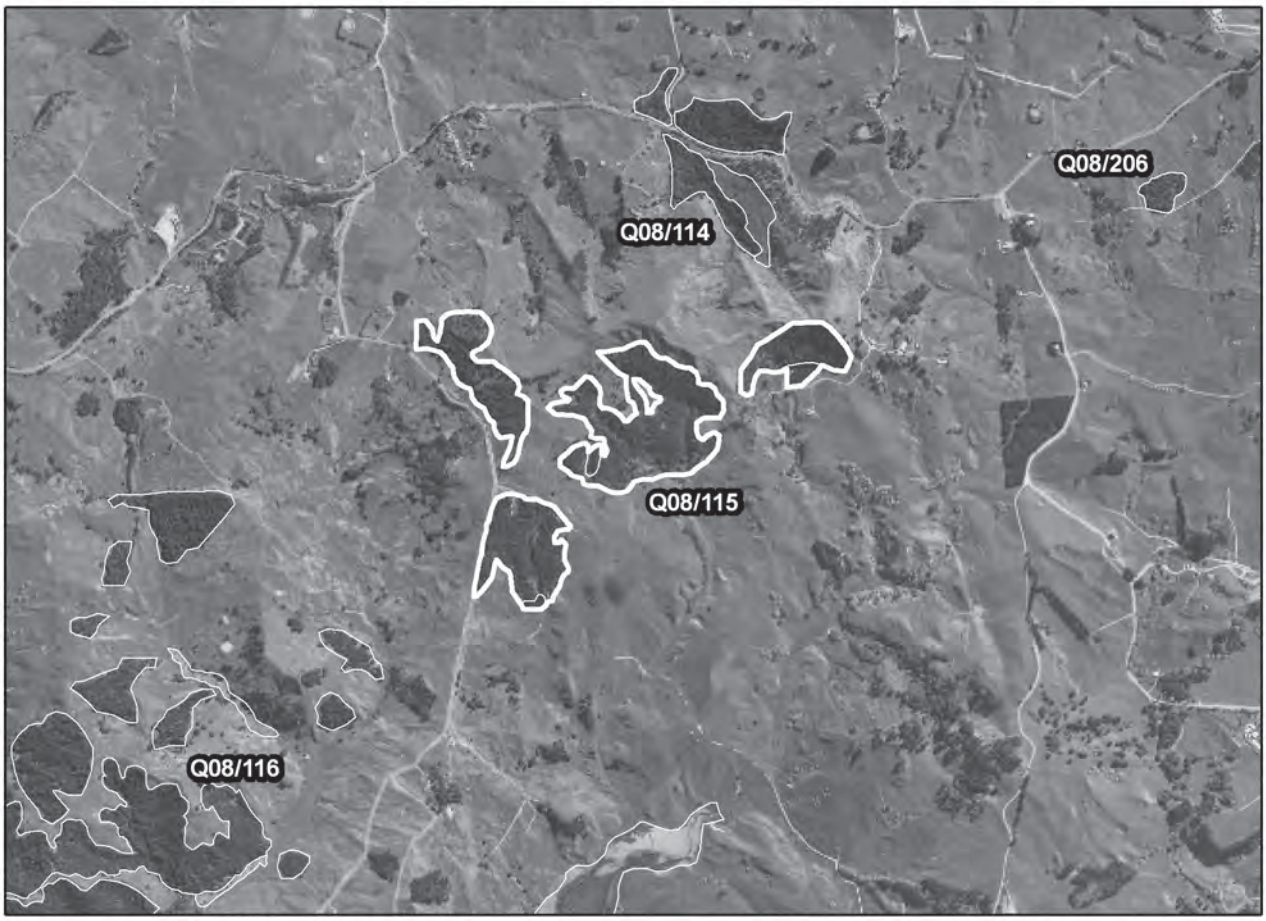
This site encompasses four indigenous forest remnants associated with three constructed farm ponds, which are clustered around the southern slopes of Pukehuia peak.

(a) Most of the forest is dominated exclusively by totara. Kahikatea, kanuka and manuka occur frequently, with occasional taraire, karaka, kohekohe, puriri, rewarewa, tarata, mamaku, poplar, macrocarpa and pine. The exotic conifers mainly occur in groves and some are quite large.

(b) The northeasternmost remnant obviously has a different vegetation type from (a), but was not able to be viewed from a public road, therefore its type remains indeterminate.

(c) Three open water ponds, created by damming, are present.

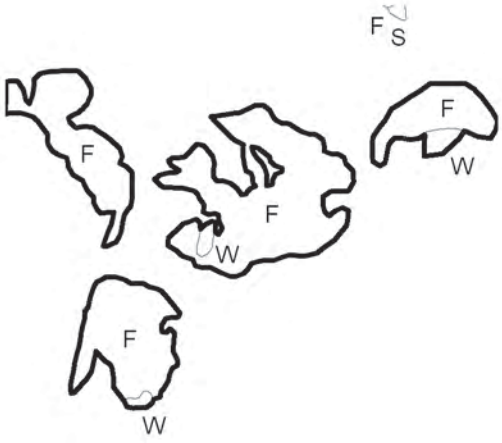
(d) One of the ponds has raupo as a major component of its fringing vegetation.



Q08/115 Pukehuia Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(e) Two of the ponds do not have indigenous fringing vegetation; it comprises mainly pasture and soft rush.

Fauna

Not surveyed.

Significance

This site has a significant extent of freshwater wetland for Otamatea ED Northland, being one of only fourteen sites with over 1 ha. It also has a relatively large forested extent for this part of the ED (over 30 ha). This is a representative site for (a) totara forest on moderate to steep hillslope.

TE OPE STREAM REMNANTS

Survey no.	Q08/116
Survey date	18 November 2005
Grid reference	Q08 253 588 (11 remnants)
Area	61.6 ha (59.5 ha forest, 2.1 ha wetland)
Altitude	13–100 m asl

Ecological units

(a) Taraire–puriri forest on moderate to steep hillslope (60%)

(b) Totara forest on moderate to steep hillslope (25%)

(c) Kanuka forest on moderate to steep hillslope (9%)

(d) Totara–kowhai forest on stream terrace (3%)

(e) Raupo–ti kouka reedland in stream gully (3%)

Landform/geology

Hillslopes and gullies underlain by Mangakahia Complex sandstone and mudstone, and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

The Te Ope Stream Remnants are a collection of 11 indigenous forest and freshwater wetland remnants located in the lower catchment of the stream, bordering extensive saltmarshes and mangroves in the Whakapirau Creek. The areas cleared for pasture tend to be along the ridges, hence the remnants are mainly in the steeper, more humid areas of the gullies.

(a) The predominant vegetation type is taraire–puriri forest. Karaka is frequent, with occasional totara, kahikatea, kauri, matai, pukatea, ti kouka and ponga.

(b) A forest canopy composed almost purely of totara is present in some of the drier areas, and on pasture edges. Other species occasionally present include tanekaha, karaka, kohekohe, kanuka, mapou and mamaku.

(c) One small, steep hillslope contains a disturbed forest of kanuka with frequent manuka. Also recorded here were ti kouka, mamaku and mamangi.

(d) Contiguous with raupo–ti kouka reedland in the south, an area of totara–kowhai forest is present on the terrace formed by the stream. Kahikatea and ti kouka are frequent, especially in the ecotone with the reedland.

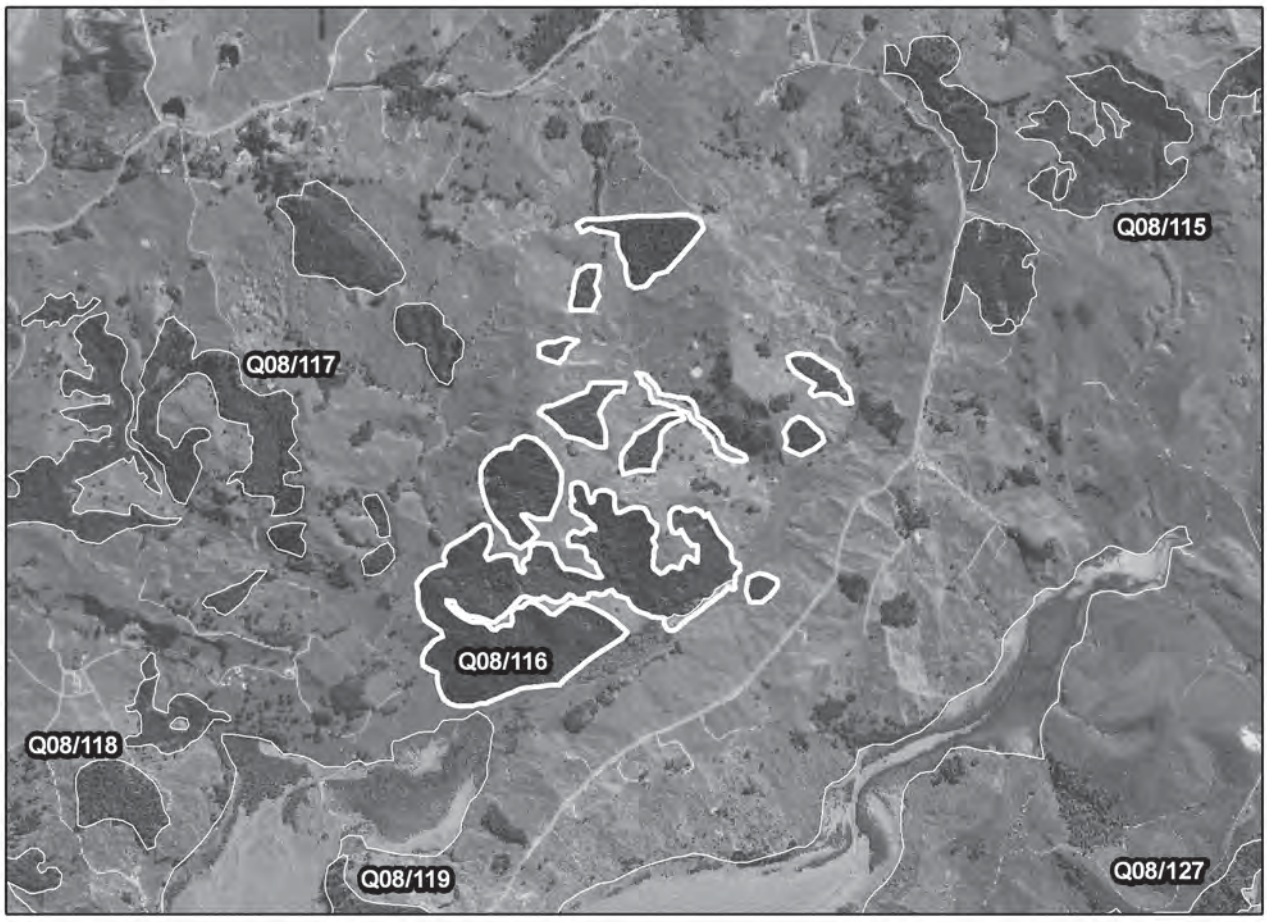
(e) Raupo–ti kouka reedland is present along two parts of the stream channel. Frequent emergent kahikatea also occur. Directly downstream of the southernmost remnant there is a similar area of wetland dominated by crack willow with some kowhai, ti kouka and kahikatea, however it was excluded from the site due to the high level of willow infestation.

Fauna

Australasian harrier, kingfisher, spur-winged plover.

Significance

The total extent of land covered by forest (tenth largest) and freshwater wetland (sixth largest) is relatively large for Otamatea ED Northland, although fragmentation and grazing of the area reduces its value. This site contains the only example of raupo–ti kouka reedland grading into totara–kowhai forest on a stream margin in Otamatea ED Northland. It is also one of the best examples of



Q08/116 Te Ope Stream Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



taraire puriri forest extending inland from the coast. Hence this is a representative site for (a) taraire–puriri forest on moderate to steep hillslope, (d) totara–kowhai forest on stream terrace, and (e) raupo–ti kouka reedland in stream gully. Crack willow invasion threatens the natural character of the wetlands in this site.

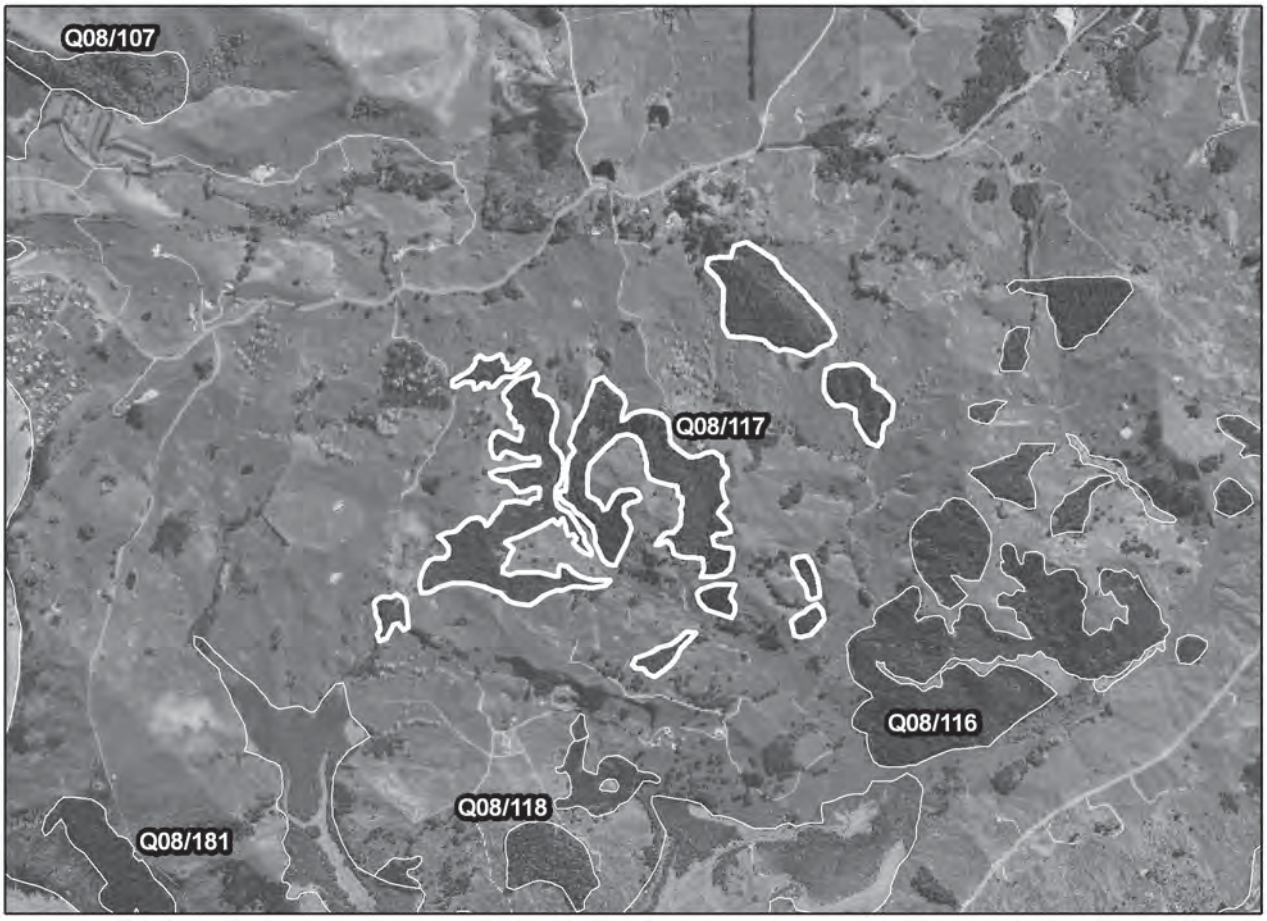
WHAKAPIRAU AIRSTRIP FOREST

Survey no.	Q08/117
Survey date	18 November 2005
Grid reference	Q08 239 594 (10 remnants)
Area	49.3 ha
Altitude	20–132 m asl

Ecological units

(a) Totara–kanuka–kahikatea forest on ridge top (50%)

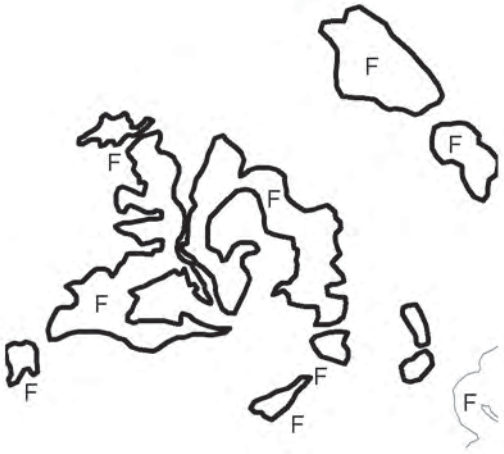
(b) Taraire–puriri–totara forest on moderate to steep hillslope (50%)



Q08/117 Whakapirau Airstrip Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Hillslopes and gullies underlain by Mangakahia Complex sandstone and mudstone, and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

Whakapirau Airstrip Forest occupies a small catchment with two streams flowing into the same saltmarsh and mangrove area as the Te Ope Stream Remnants (Q08/116). This is a relatively large indigenous forest site in 10 separate remnants which have long and convoluted edges. The intervening landscape is pasture. Both forest and pasture appear to be used for farming; consequently the forest has a depleted understorey and shows visible degradation from grazing, stock trampling and associated edge effects. Many parts of this site are not visible from public roads, therefore information from the field survey was combined with study of recent aerial photography (flown in 2002) to interpret the likely forest type for more than half of the forest remnants.

(a) Approximately half the area, in particular on drier ground, is occupied by totara forest with lesser and equal proportions of kanuka and kahikatea. Puriri is frequent, with occasional mamangi and tarata. A single emergent northern rata was observed.

(b) The other half comprises taraire forest with canopy associates of puriri and totara. Occasional emergent macrocarpa and a single Norfolk pine are also present.

Fauna

Not surveyed.

Significance

Northern rata (*Metrosideros robusta*) is extremely uncommon in Otamatea ED Northland, and is known from only this site and three others. The small, mature, emergent tree was observed in forest adjacent to Te Opi Road. This site has the thirteenth largest extent of indigenous forest in Otamatea ED Northland, however it is fragmented and has been severely modified.

TE OPE HEADLAND FOREST

Survey no.	Q08/119
Survey date	28 November 2005
Grid reference	Q08 246 576
Area	9.8 ha
Altitude	0–20 m asl

Ecological unit

(a) Puriri–taraire–kahikatea–kauri forest on steep coastal margin (100%)

Landform/geology

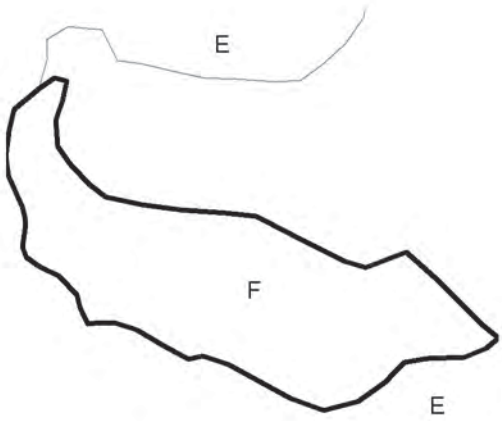
Coastal headland underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).



Q08/119 Te Ope Headland Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Vegetation

Te Ope Headland extends out into Whakapirau Creek just south of Te Ope Stream. The end of the headland is almost entirely clothed in coastal forest with a diverse canopy. Four species occupy roughly 20% of the canopy cover each: puriri, kahikatea, taraire and kauri. Kauri rickers and kahikatea poles are emergent above a canopy of taraire and puriri which have frequent associates of karaka, totara and kanuka. Emergent rimu and rewarewa are scattered

throughout. Ti kouka is occasional. An unusual feature of this vegetation is the presence of kauri growing within metres of the high tide mark, which a rare occurrence in this Ecological District and throughout the range of kauri in New Zealand.

Fauna

Not surveyed.

Significance

This diverse coastal broadleaved–podocarp–kauri forest is the only example of its type in Otamatea ED Northland hence it is representative, and it appears to be in relatively good condition as a result of adequate fencing.

TE PAHI RIVER ROAD FOREST REMNANTS

Survey no.	Q08/120
Survey date	18 November 2005
Grid reference	Q08 238 650 (10 remnants)
Area	24.9 ha
Altitude	20–120 m asl

Ecological unit

(a) Taraire–puriri–kahikatea–totara forest on moderate to steep hillslope (100%)

Landform/geology

Hillslopes and gullies underlain by undifferentiated Eocene–Oligocene mudstone and sandstone (Motatau Complex).

Vegetation

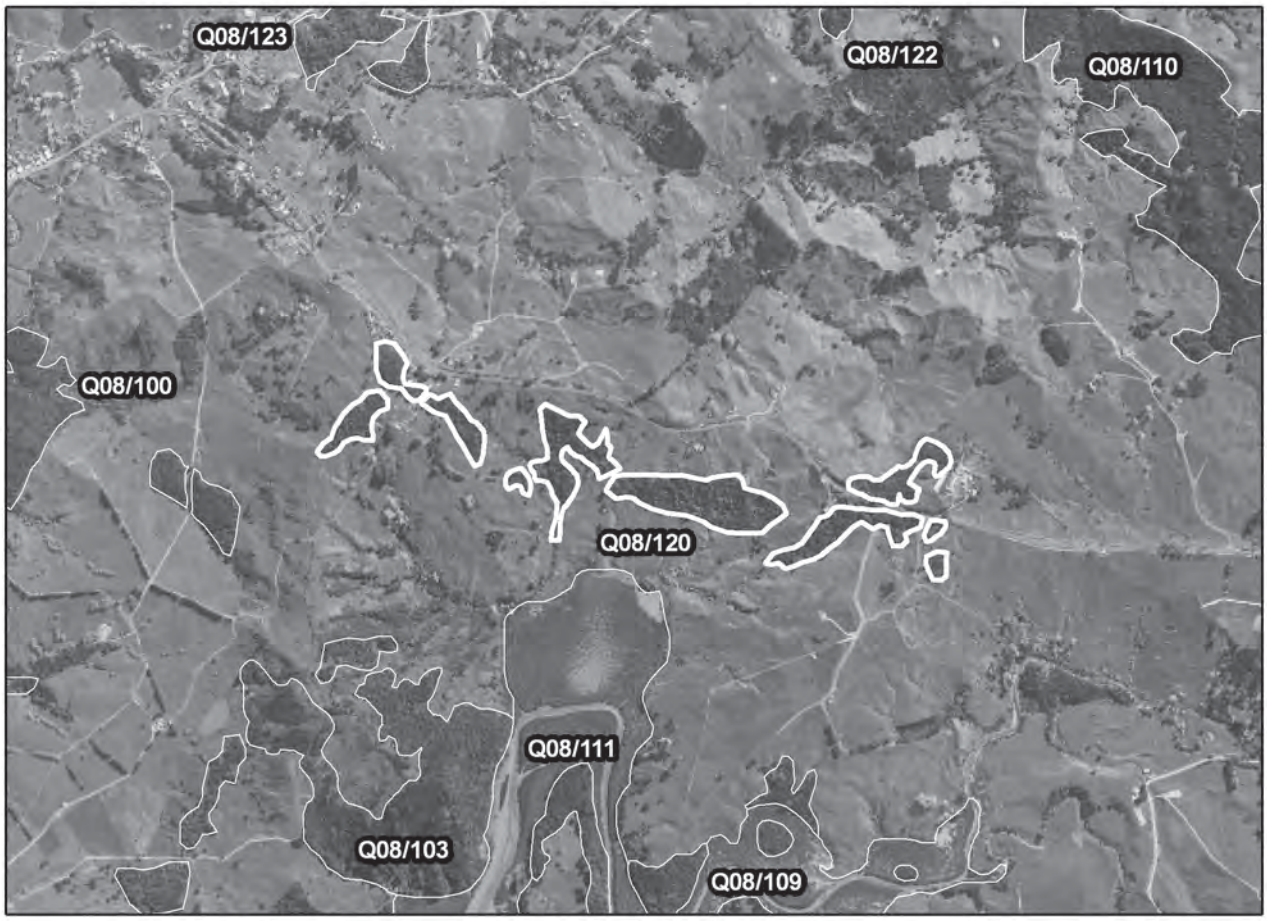
This site comprises ten forest remnants on a south-facing hillslope stretching approximately 1.5 km in a line westwards from Te Pahi River Road along the southern side of State Highway 12. Pasture surrounds the forest remnants and extends down to the estuarine mudflats and mangrove forests of the Pahi River. The dominant canopy species is taraire, while equal amounts of puriri, kahikatea and totara also occur in the canopy. Kauri and kanuka are frequent with occasional rewarewa, tarata, ti kouka, kohekohe, karaka, matai and northern rata.

Fauna

Kukupa (Gradual Decline).

Significance

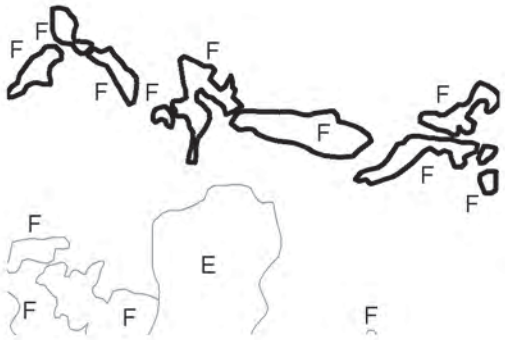
These forest remnants have relatively diverse canopies. This is one of only four sites where northern rata was recorded in Otamatea ED Northland. The site is also significant for the presence of a threatened bird species (kukupa). However, the indigenous vegetation in this area has been greatly reduced in extent through clearance, and only very small remnants now remain. The site is also suffering degradation through grazing and trampling.



Q08/120 Te Pahi River Road Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



PAPAROA STREAM RIPARIAN FOREST

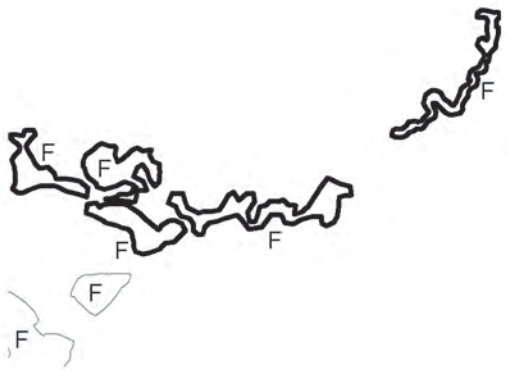
Survey no.	Q08/121
Survey date	24 November 2005
Grid reference	Q08 267 671 (5 remnants)
Area	42.0 ha
Altitude	29–60 m asl



Q08/121 Paparoa Stream Riparian Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Totara–titoki forest on alluvium (95%)

(b) Totara forest on ridge top (5%)

Landform/geology

Hillslopes underlain by Cretaceous sandstone and mudstone (Mangakahia Complex), and valley flats on Holocene alluvium.

Vegetation

Scattered riparian forest remnants follow a 4 km reach of the Paparoa Stream from the settlement of Wairere to just above the Wairere Valley Road bridge. All

of the remnants are extremely devoid of undergrowth as a result of cattle grazing and trampling. Stock were observed in the stream, and sheltering *en masse* under the riparian forest. Dogs were also observed running around unrestrained in the natural area. Between the indigenous forest remnants the riparian vegetation includes English oak, crack willow, radiata pine and other conifers as the main canopy cover; this vegetation was excluded from the present site. Along with crack willow, other problem weeds in an around the remnants include Chinese privet, tutsan, selaginella and tradescantia.

(a) The indigenous riparian forest is dominated by totara and titoki, with frequent crack willow and kahikatea. Associated occasional species include putaputaweta, ti kouka, kanuka, tarata, kohekohe, matai, mahoe, rimu, kowhai, pigeonwood, karaka, ponga, mamaku, *Muehlenbeckia australis*, tree privet, Chinese privet, false acacia and eucalyptus.

(b) A small knoll near the Wairere end of the site is covered by totara forest accompanied by frequent kanuka, rewarewa, taraire and mamaku. Occasional kahikatea are also present.

Fauna

Kingfisher, kukupa (Gradual Decline).

Significance

Totara–titoki forest on alluvium (a) is unique in Otamatea ED Northland for having a high percentage of titoki in the canopy. In addition, indigenous forest on alluvial soil is so rare now that although small, this example qualifies as a representative ecological unit. The site is also significant for the presence of a threatened species (kukupa). 3.2 ha of the totara–titoki forest lies within a QEII Open Space Covenant.

PAPAROA MATURE KAURI STAND

Survey no.	Q08/122
Survey date	24 November 2005
Grid reference	Q08 244 666
Area	1.1 ha
Altitude	54–76 m asl

Ecological unit

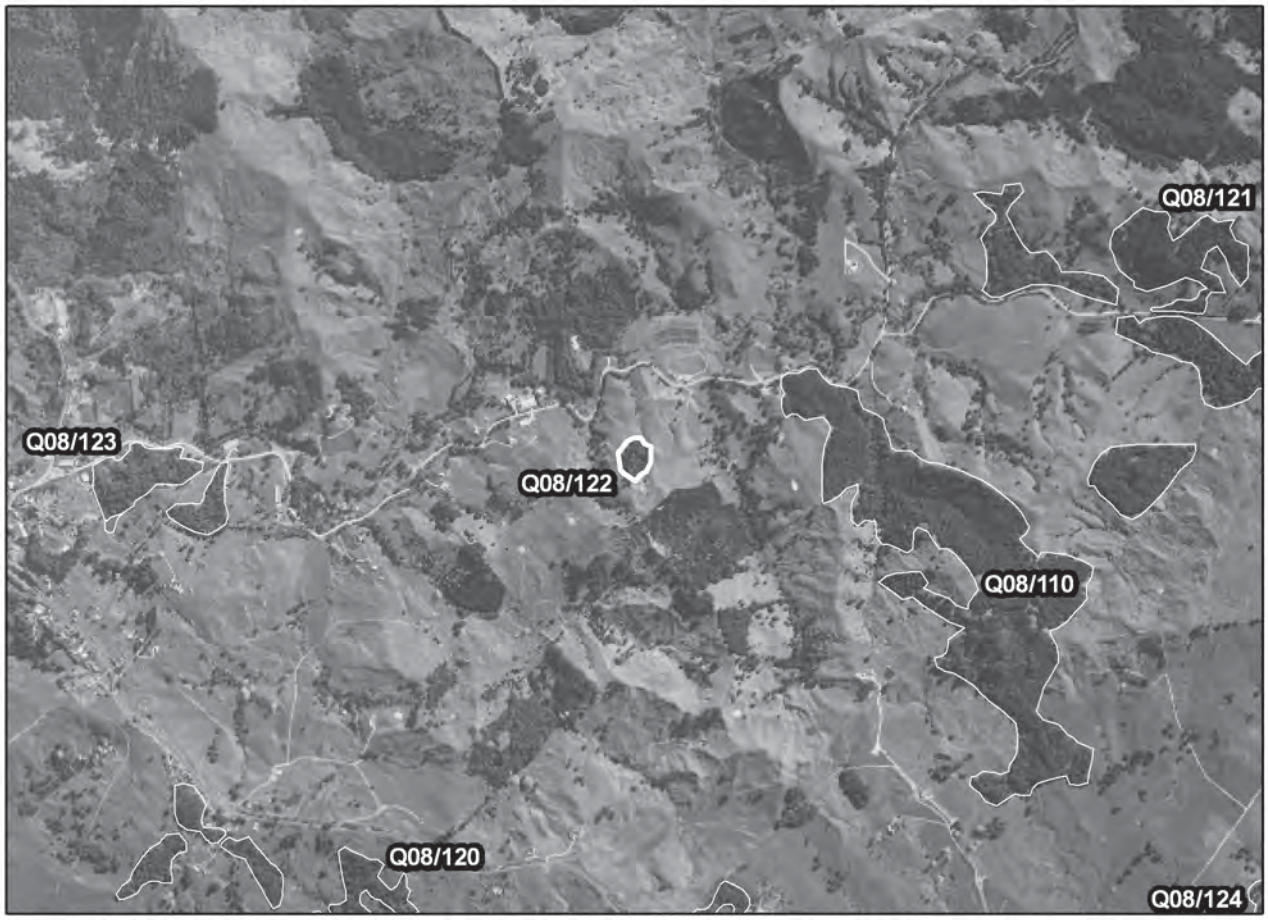
(a) Totara–kauri forest on ridge top (100%)

Landform/geology

Hillslope on Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

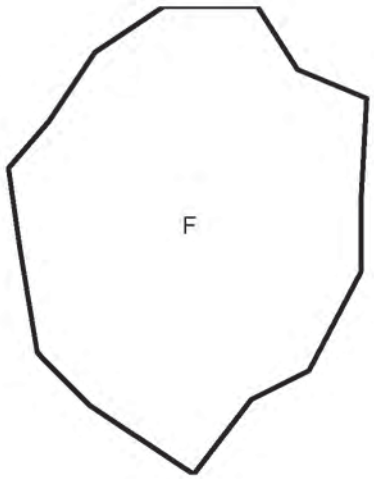
This site comprises a tiny stand of trees in the middle of a paddock, but it is remarkable due to the large size of the kauri present. Over a canopy of mainly totara, several (at least six) semi-mature kauri with spreading crowns and long, branchless trunks are present. Judging by their size these trees were estimated to be approximately 200 years old or more, which is significantly older than the majority of kauri remaining in Otamatea ED Northland. Proper age determination is not possible without counting tree rings. Other species in the remnant include frequent tanekaha and occasional nikau and kahikatea.



Q08/122 Paparoa Mature Kauri Stand

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Fauna

Not surveyed.

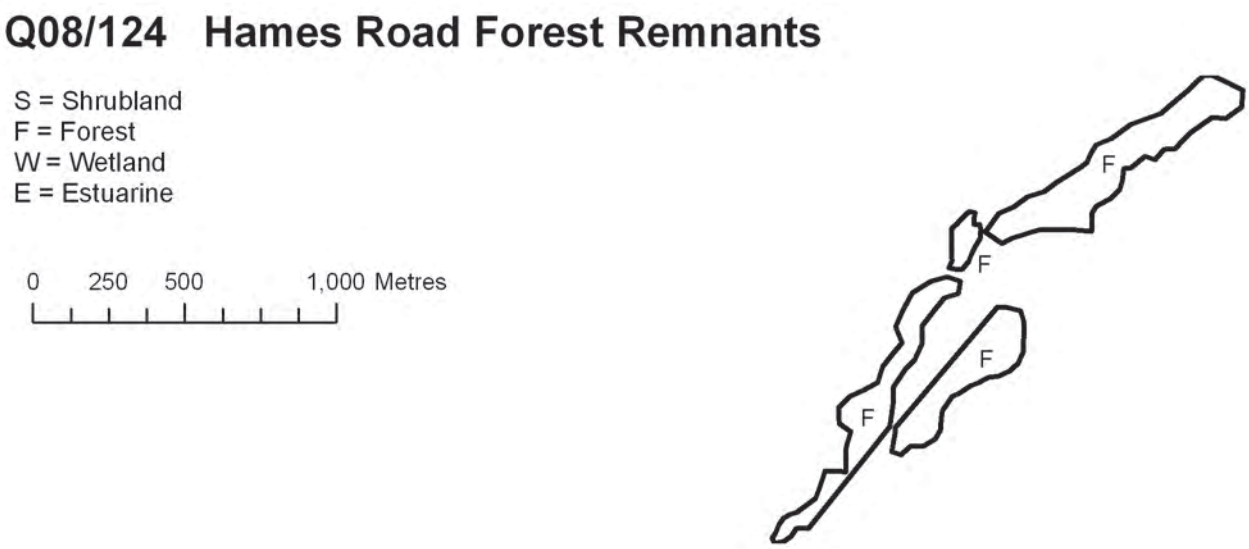
Significance

Despite being relatively small, this site is representative, as mature kauri trees are now very uncommon in Otamatea ED Northland.

HAMES ROAD FOREST REMNANTS

Survey no.	Q08/124
Survey date	24 November 2005
Grid reference	Q08 268 654 (4 remnants)
Area	11.8 ha
Altitude	20–40 m asl





Ecological units

(a) Totara–kahikatea–kowhai forest in gully (70%)

(b) Totara–kanuka forest on gentle hillslope (30%)

Landform/geology

Low ridge underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies), and valley floor of Holocene alluvium.

Vegetation

This site comprises remnants of relatively mature, but stock-damaged riparian forest on a small tributary of the Pahi River. Adjacent forest on a gentle hillslope next to Hames Road is also included.

(a) The riparian forest is dominated by totara (abundant), kahikatea (common) and kowhai (common). There are frequent kanuka, ti kouka and vines of *Muehlenbeckia australis,* as well as occasional tall emergent trees of rimu, tanekaha, tawa and kauri. The following weeds are present in low numbers: Japanese honeysuckle, woolly nightshade and tree privet.

(b) The eastern forest remnant is also dominated by totara, but has kanuka as an associate in the canopy. Frequent species include tanekaha, rimu and kahikatea, with occasional species include manuka, mapou, ti kouka and hawthorn.

Significant flora

Tawa (locally uncommon).

Fauna

Shining cuckoo.

Significance

This site is relatively small and fragmented, with several weed problems, however it is notable for the relative maturity of some trees (especially tawa and podocarps), compared with similar forest elsewhere in Otamatea ED Northland. Totara–kahikatea–kowhai forest in gully (a) is representative of a formerly more extensive semi-mature riparian forest. Tawa is a locally uncommon in the Northland Conservancy part of the ED.

TE OPU SCENIC RESERVE

Survey no.	Q08/126
Survey date	28 November 2005
Grid reference	Q08 263 573
Area	12.4 ha
Altitude	3–60 m asl

Ecological units

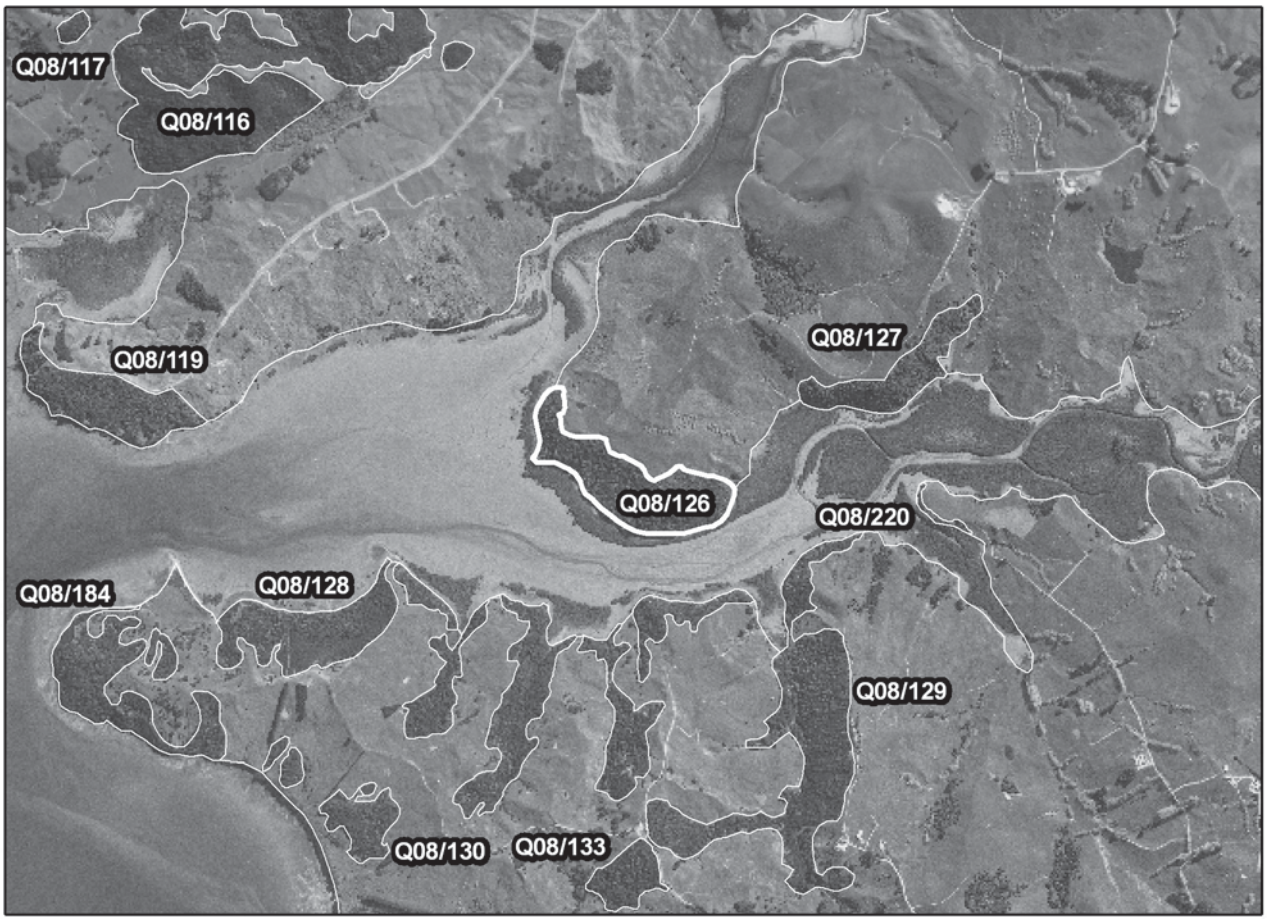
(a) Taraire–puriri[13] forest on steep coastal margin (85%)

(b) Puriri–kowhai forest on steep coastal margin (5%)

(c) Totara–puriri forest on steep coastal margin (5%)

(d) Kauri–kanuka forest on ridge top (5%)

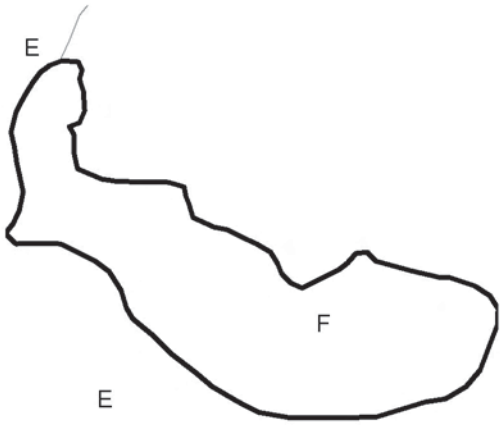
[13] The methods followed for this survey stipulate that vegetation types should be named after species at >20% canopy cover; however, in this area, no species occurred at >20% cover, and taraire and puriri were the most frequent.



Q08/126 Te Opu Scenic Reserve

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Coastal headland underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

This site comprises an excellent example of coastal broadleaved–podocarp forest on a prominent, inner Kaipara Harbour headland. The forest is particularly diverse, and four types were recognised, however they grade into each other seamlessly.

(a) The main forest type has taraire and puriri as the predominant species but both comprise <20% of the canopy. The other main canopy species are kanuka, kauri, kahikatea, totara and kowhai, with scattered nikau, rewarewa and ti kouka.

(b) At the northern end of the remnant totara–puriri forest occurs with frequent kowhai.

(c) At the southern end, forest dominated by kowhai and puriri occurs.

(d) The extreme eastern side of the site contains stands of maturing kauri rickers (i.e. losing lower branches) mixed with kanuka, and associated with frequent totara and tanekaha, and occasional rewarewa. Some of the kauri is adjacent to mangroves, which is an unusual juxtaposition of forest types.

The quality of the understorey appears to have improved between 1977, when there was a 'grass sward underneath', and 1991, when the understorey was referred to as 'regenerating' (SSBI Q08/H037). The 1991 survey also recorded very high canopy diversity at the site.

Significant flora

Miro (locally uncommon) was recorded in 1991 (SSBI Q08/H037).

Fauna

Kukupa (Gradual Decline) were recorded at the site during the present survey. In 1991 Australasian harrier, fantail and tui were also noted (SSBI Q08/H037).

Significance

This site has a high diversity of forest types for its size, and provides habitat for kukupa, a threatened bird species. It is a representative site for ecological unit (a). A former pa site is present at the high point of the headland, according to DOC records (SSBI Q08/H037). Little is known about the current condition of the understorey or the impacts of animal pests. The forested area is almost entirely encompassed by Te Opu Scenic Reserve, which is administered by the Department of Conservation.

WHAKAPIRAU CREEK COASTAL FOREST

Survey no.	Q08/127
Survey date	28 November 2005
Grid reference	Q08 271 577
Area	7.1 ha
Altitude	0–80 m asl

Ecological unit

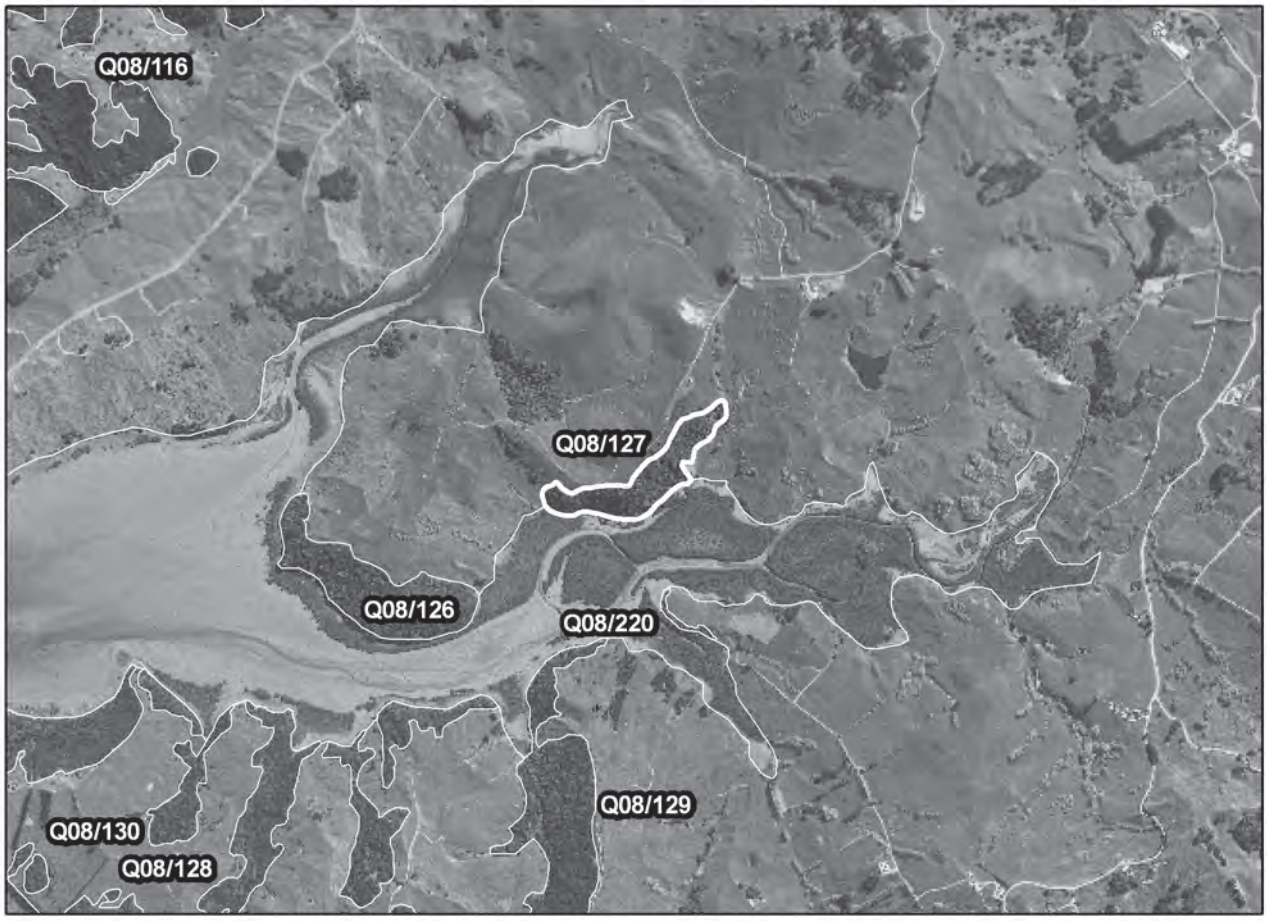
(a) Totara–kowhai–karaka forest on steep coastal margin (100%)

Landform/geology

Steep coastal hillside underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex).

Vegetation

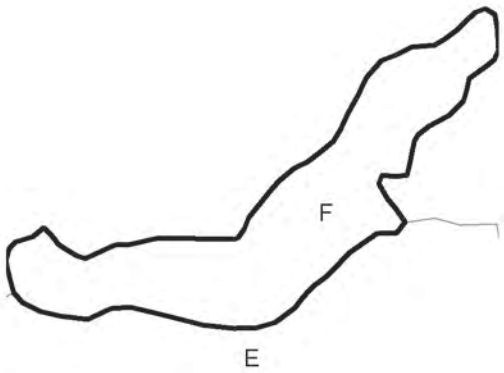
This site comprises a 700 m-long coastal forest remnant on a steep south-facing slope bordering tall mangrove forest in the upper Whakapirau Creek. Surrounding the site is farmland with grazed pasture. The site does not appear to be fenced to exclude livestock.



Q08/127 Whakapirau Creek Coastal Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Totara is abundant in the canopy, in association with kowhai and karaka. Puriri is frequent, with occasional kohekohe, ti kouka and pohutukawa.

Fauna

Not surveyed.

Significance

This site contains one of the best representative examples of totara–kowhai–karaka forest on steep coastal margin in Otamatea ED Northland. It also provides a valuable protective buffer on a steep slope above the Whakapirau Creek, which is part of the Arapaoa River site (Q08/084).

WHAKAPIRAU RIVER SCENIC RESERVE AND NORTH MASSEY ROAD FOREST REMNANTS

Survey no.	Q08/128
Survey date	28 November 2005
Grid reference	Q08 256 568 (6 remnants)
Area	33.9 ha (33.4 ha forest, 0.5 ha shrubland)
Altitude	0–80 m asl

Ecological units

(a) Totara–kanuka forest on steep coastal margin (70%)

(b) Kanuka forest on steep coastal margin (18%)

(c) Kanuka–kahikatea forest on gentle coastal margin (5%)

(d) Totara–puriri–kanuka forest on steep coastal margin (5%)

(e) Manuka shrubland on moderate hillslope (2%)

Landform/geology

Coastal hillslopes underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

This site comprises six remnants of forest on the northern coastal margin of Massey Point, part of which is included within the Whakapirau River Scenic Reserve. The forest remnants adjoin three small stream gullies below Massey Road and cover most of the steep hillslope above a small bay. Pasture separates the remnants. The reserve is partially fenced.

(a) The majority of the area is covered in totara–kanuka forest. All other species are occasional, including tarata, kauri, puriri, kowhai, kahikatea, ti kouka, mamaku and mamangi.

(b) The top of the Scenic Reserve and adjacent upper slopes are covered in kanuka forest with frequent totara. The understorey is quite heavily impacted by stock grazing and trampling.

(c) The bottom of the Scenic Reserve and adjacent gentle terrain next to the coast has kanuka–kahikatea forest, part of which includes at least some primary forest with old emergent kahikatea. Puriri and totara are frequent in the canopy. Occasional emergent rimu and kauri occur. Other species present include kowhai, ti kouka and rewarewa and epiphytic puka.

(d) Forest remnants on the sheltered eastern sides of small undulations in the coast comprise totara with lesser amounts of puriri and kanuka, and occasional kowhai and karaka.

(e) A small area above (but outside) the Scenic Reserve is covered in young manuka shrubland with occasional lancewood.

Significant flora

Coprosma rigida and *C. crassifolia*, both regionally significant plant species, were recorded in the Scenic Reserve in 1996 (SSBI Q08/H038).

Fauna

Grey warbler, tui. Kukupa (Gradual Decline) were recorded in 1996 (SSBI Q08/H038).



Q08/128 Whakapirau River Scenic Reserve and North Massey Road Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Significance

This site is representative for (a) totara–kanuka forest on steep coastal margin and (c) kanuka–kahikatea forest on gentle coastal margin. The latter is significant in particular for mature kahikatea, which are now very rare in Otamatea ED Northland. Together the remnants in this site comprise a relatively large area (i.e. >30 ha) for the Northland part of the ED, however the site is made up of several parts, which reduces its value somewhat. The site supports two regionally significant plant species (*Coprosma rigida* and *C. crassifolia*) and a threatened bird species (kukupa). 4 ha (12% of the site) is in the DOC-administered Whakapirau River Scenic Reserve (includes ecological units (b), (c) and (e)).

MASSEY CREEK FOREST

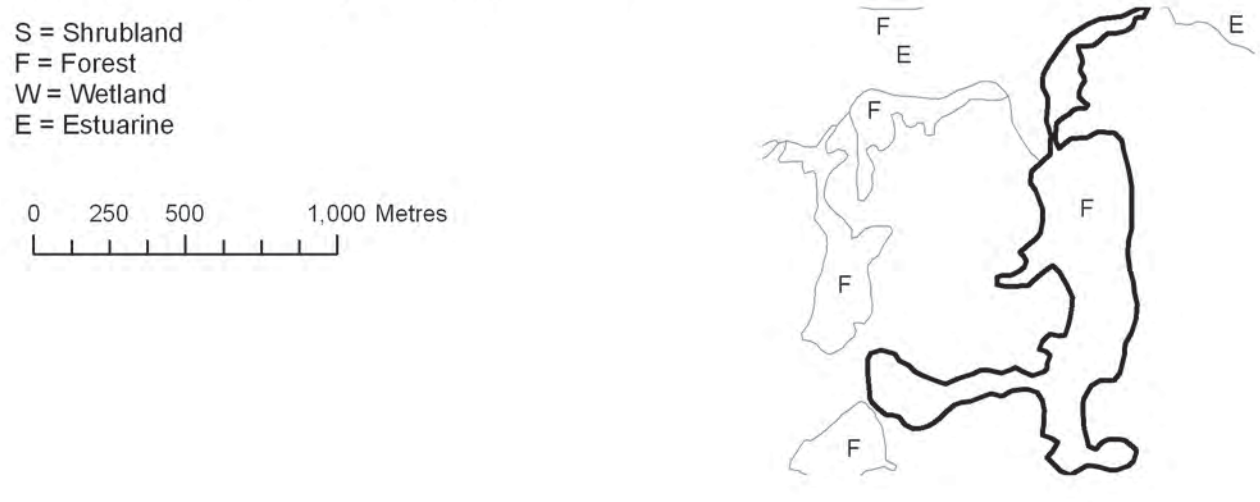
Survey no.	Q08/129
Survey date	28 November 2005
Grid reference	Q08 268 565
Area	23.1 ha
Altitude	0–80 m asl

Ecological units

(a) Totara–puriri–kanuka forest on moderate to steep hillslope (85%)

(b) Kanuka–kowhai–totara forest on steep coastal margin (15%)





Landform/geology

Coastal hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

This site comprises a relatively large remnant of forest in a steep stream gully flowing out to the Whakapirau Creek. Surrounding land is covered in pasture.

(a) The major slope is west-facing, and is covered in a mixture of totara, puriri and kanuka (in order of relative abundance). Frequent species include karaka, kahikatea, kowhai and macrocarpa. Some of the puriri appear to be suffering from exposure effects.

(b) The coastal margin is very steep (>45°) and has a cover of kanuka forest with canopy associates of totara and kowhai. Karaka is frequent, with occasional titoki, ngaio and woolly nightshade.

Fauna

Not surveyed.

Significance

This site is quite large and intact, and forms an important linkage between nearby forest remnants of high conservation value, e.g. Te Opu Scenic Reserve (Q08/126), Whakapirau River Scenic Reserve and North Massey Road Forest Remnants (Q08/128), Arapaoa River Scenic Reserve and Surrounds (Q08/131) and Te Kowhai Creek Scenic Reserve and Surrounds (Q08/132). The site is representative for both ecological units, which are both the best examples of their types. Stock grazing appears to be threatening the integrity of the understorey in places.

SOUTH MASSEY ROAD FOREST REMNANTS

Survey no.	Q08/130
Survey date	28 November 2005
Grid reference	Q08 254 562
Area	5.2 ha (5.0 ha forest, 0.2 ha wetland)
Altitude	6–53 m asl

Ecological units

(a) Totara–puriri forest on moderate to steep hillslope (96%)

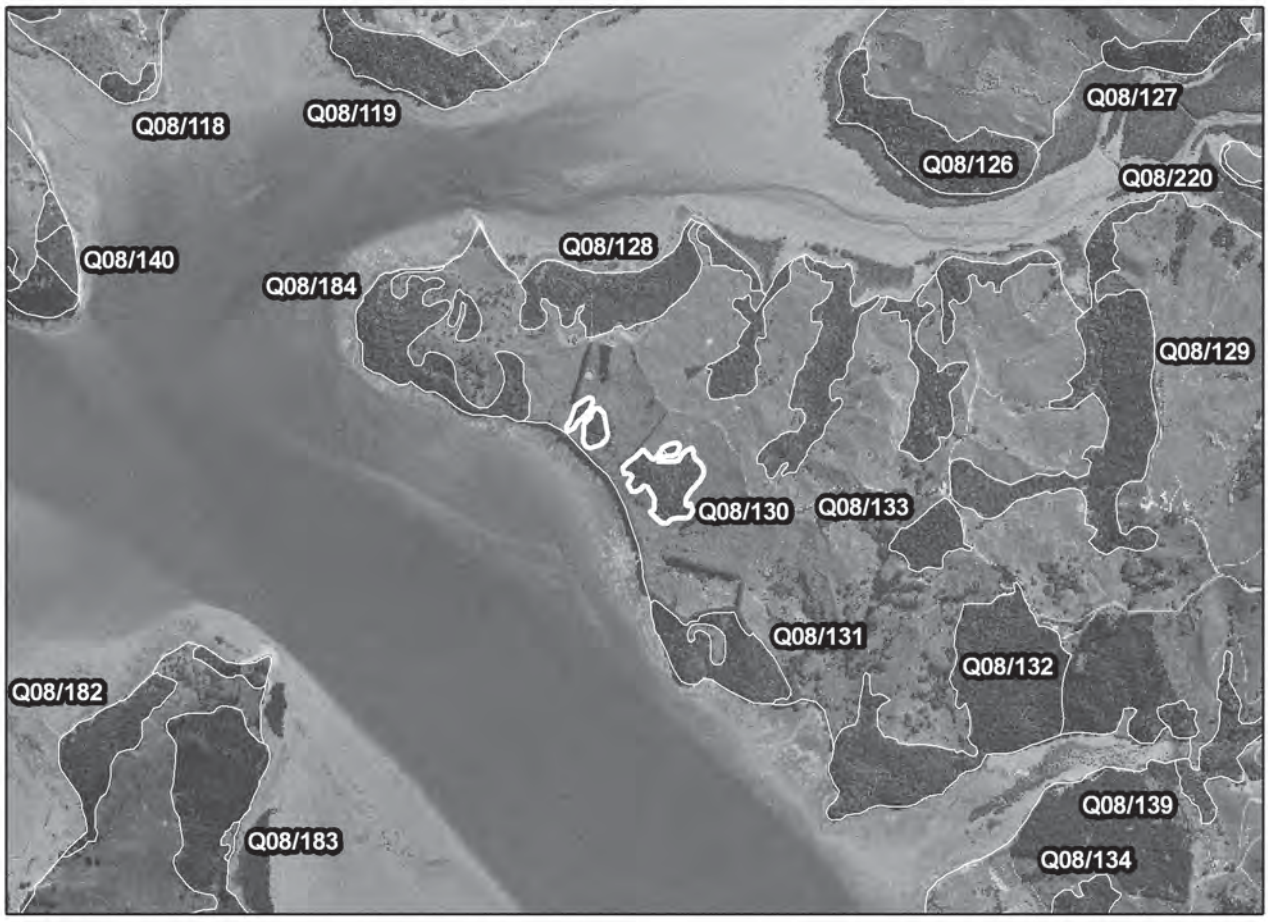
(b) Open water (constructed freshwater farm pond) (4%)

Landform/geology

Coastal hillslopes underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

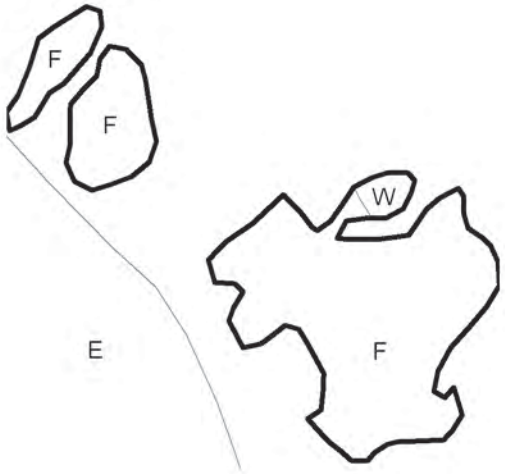
A small remnant of indigenous forest occurs next to a constructed farm pond with little marginal vegetation. Floating aquatic vegetation comprises the introduced water fern *Azolla pinnata* and an introduced willow weed (*Polygonum* sp.). The dominant forest canopy species are totara and puriri. These are associated with frequent kanuka and kahikatea, and occasional nikau, mamaku, rewarewa, tanekaha and manuka. The remnant is entirely surrounded



Q08/130 South Massey Road Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



by pasture, but is within close proximity of numerous other forest remnants on the peninsula.

Fauna

Welcome swallow and grey duck (Serious Decline) on pond. Hybridism with mallard duck cannot be excluded.

Significance

This is a small site, but it forms an important linkage between nearby larger forest remnants of higher conservation value, e.g. Te Opu Scenic Reserve (Q08/

126), Whakapirau River Scenic Reserve and North Massey Road Forest Remnants (Q08/128), Arapaoa River Scenic Reserve and Surrounds (Q08/131) and Te Kowhai Creek Scenic Reserve and Surrounds (Q08/132). It is also habitat for a threatened species (grey duck).

ARAPAOA RIVER SCENIC RESERVE AND SURROUNDS

Survey no.	Q08/131
Survey date	8 December 2005
Grid reference	Q08 256 556
Area	9.3 ha
Altitude	0–60 m asl

Ecological units

(a) Kanuka–totara forest on gentle coastal margin (45%)

(b) Totara–taraire–puriri forest on steep coastal margin (40%)

(c) Totara–kowhai forest on ridge top (15%)

Landform/geology

Coastal hillslopes underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

Arapaoa River Scenic Reserve and adjacent indigenous forest to the north is a particularly dense and diverse, small, coastal indigenous forest remnant. It lies opposite the main channel of the Arapaoa River (Q08/084) in a relatively exposed position to a northwest air stream which often blows over the Hukatere peninsula and down the river. A row of tall pines divides the indigenous forest from adjacent farmland.

(a) The middle section of the remnant, which is gently sloping, is dominated by kanuka with subdominant totara and frequent puriri. Ti kouka, karaka and mamaku are occasional.

(b) The northern section is very steep (>45°), and also has totara as the main canopy species, though taraire and puriri are also common. Karaka and rewarewa are frequent, and ti kouka, lancewood and hangehange are occasional. Pampas and gorse are invasive around the coastal fringe just above the sandy beach.

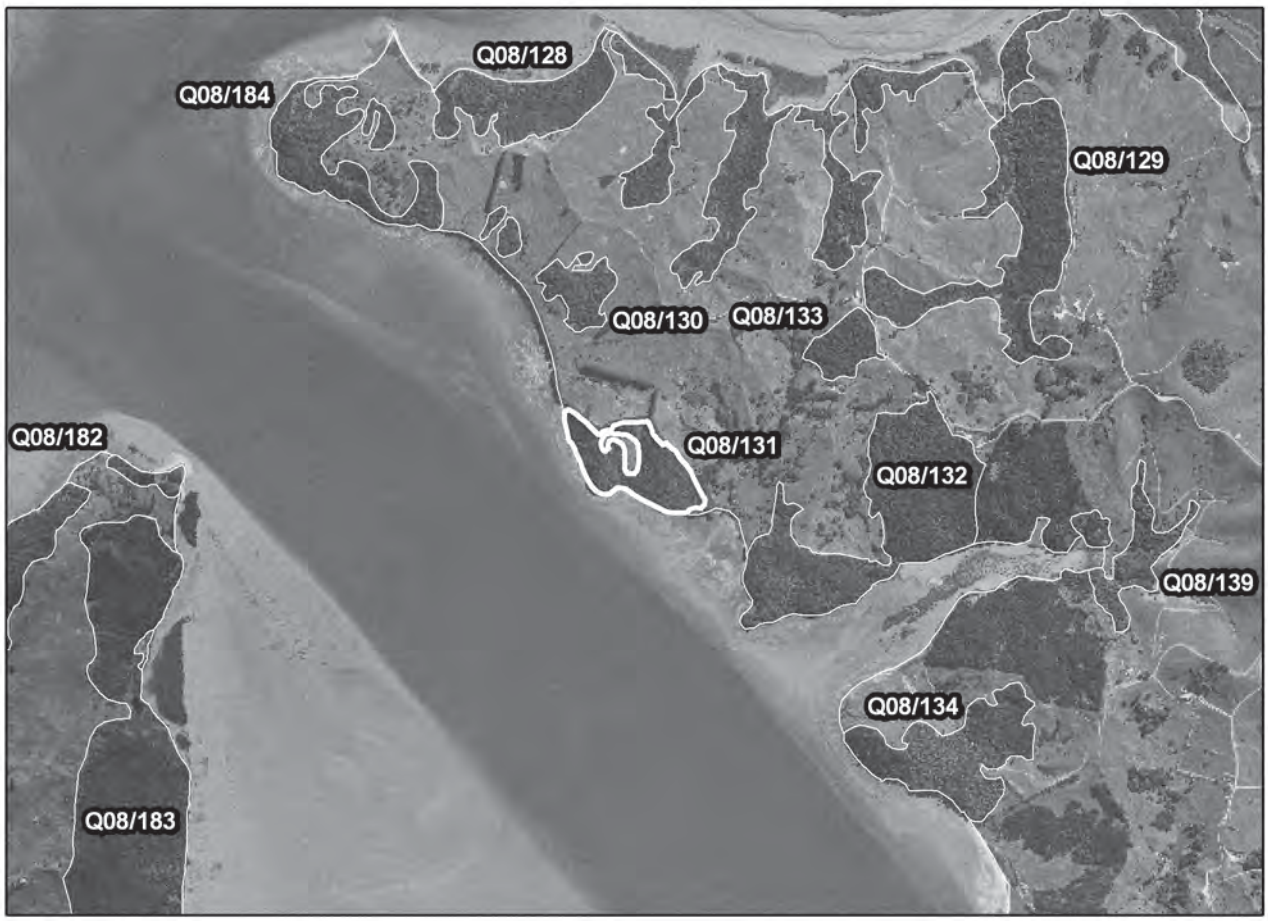
(c) Totara–kowhai forest with frequent kahikatea occurs in the southern part of the site (in an area roughly corresponding to Arapaoa Scenic Reserve). This reserve was surveyed in 1996 and found to be in good condition, with good regeneration (SSBI Q08/H038).

Fauna

A kukupa (Gradual Decline) nest was seen within the Scenic Reserve in 1996 (SSBI Q08/H038).

Significance

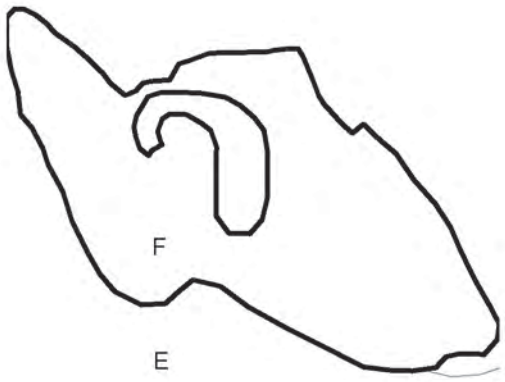
This site is representative for (b) totara–taraire–puriri forest on steep coastal margin, which was not recorded anywhere else in the Northland part of the ED. It has a high diversity of forest types for its small size. It is also significant for supporting a threatened fauna species (kukupa). It is not clear whether the site



Q08/131 Arapaoa River Scenic Reserve and Surrounds

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



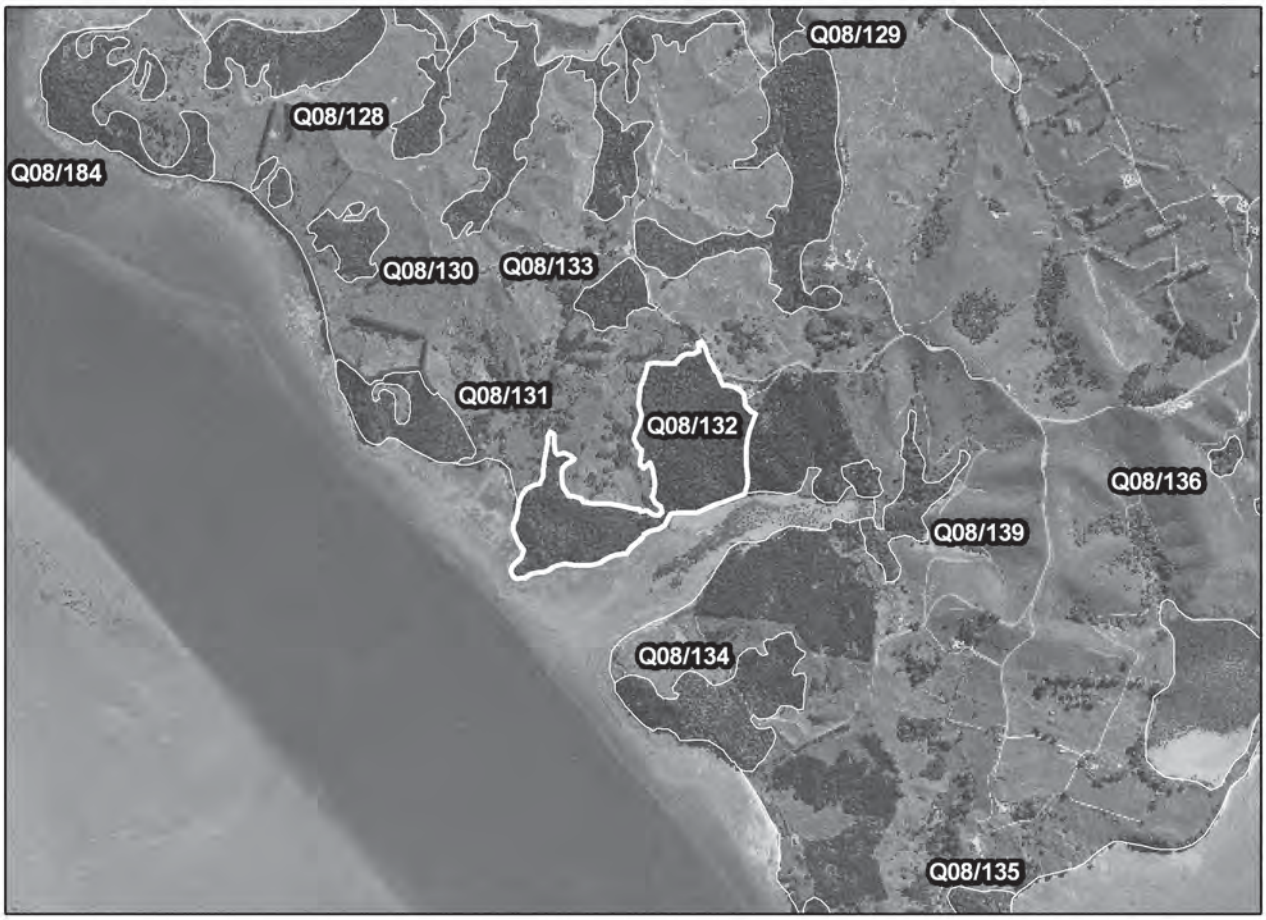
is grazed or not. Recent information suggests that it has a healthy understorey, at least in the reserve area (SSBI Q08/H038). The Arapaoa Scenic Reserve, which is administered by the Department of Conservation, covers 0.7 ha of totara–kowhai forest on ridge top. This site is also important as a protective vegetation buffer to the estuarine habitats of the Arapaoa River (Q08/084). It is very close to Te Kowhai Creek Scenic Reserve and Surrounds (Q08/132), and other forest remnants to the north.

TE KOWHAI CREEK SCENIC RESERVE AND SURROUNDS

Survey no.	Q08/132
Survey date	28 November 2005
Grid reference	Q08 264 554
Area	26.3 ha
Altitude	0–80 m asl

Ecological unit

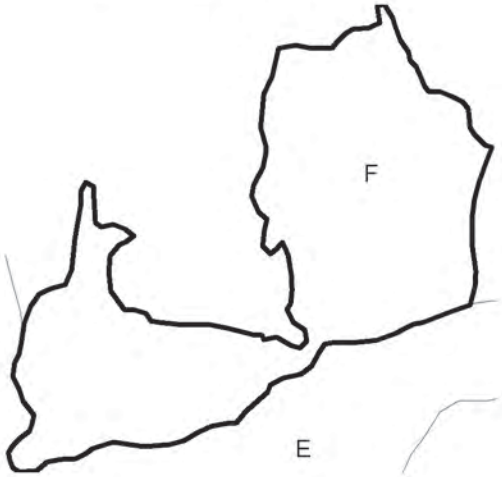
(a) Totara–puriri forest on steep coastal margin (100%)



Q08/132 Te Kowhai Creek Scenic Reserve and Surrounds

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Coastal hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

This site comprises a dense indigenous forest remnant on the northern side of Te Kowhai Creek, which is partially sheltered from northwest winds funnelling down the Arapaoa River (Q08/084) on its western side. The main canopy species is totara, which is abundant, and this is associated with a lesser amount of puriri. Kowhai and kahikatea are frequent. Occasional species include rewarewa, ti kouka, radiata pine and eucalyptus. Harakeke and gorse are common on the coastal fringe. The indigenous forest is contiguous with radiata pine and eucalyptus plantations on its eastern side. Some of the emergent eucalyptus in the indigenous forest are unlikely to be naturalised, and therefore may have been planted.

Significant flora

Kaikomako (regionally significant) was recorded in the Scenic Reserve in 1996 (SSBI Q08/H038).

Fauna

Kukupa (Gradual Decline) were recorded in 1996 (SSBI Q08/H038).

Significance

This site is a relatively large and continuous coastal forest remnant which supports a regionally significant plant species (kaikomako) and a threatened bird species (kukupa). It represents the best example of coastal totara–puriri forest in the Northland Conservancy part of the ED. Te Kowhai Creek Scenic Reserve (DOC-administered) covers 0.5 ha of the site (only 2 %). This site is important as a protective vegetation buffer to the estuarine habitats of the Te Kowhai Creek, and is very near to two other natural areas (Arapaoa River Scenic Reserve and Surrounds (Q08/131) and Te Kowhai Creek Forest Remnant (Q08/139)).

LINTON ROAD WEST FOREST

Survey no.	Q08/134
Survey date	8 December 2005
Grid reference	Q08 265 547 (2 remnants)
Area	13.3 ha (12.3 ha forest, 1.0 ha shrubland)
Altitude	0–60 m asl

Ecological units

(a) Puriri–kowhai forest on gentle coastal margin (50%)

(b) Totara forest on moderate hillslope (15%)

(c) Kahikatea forest on moderate hillslope (14%)

(d) Pohutukawa forest on steep coastal margin (13.5%)

(e) Kanuka–manuka shrubland on steep coastal margin (7.5%)

Landform/geology

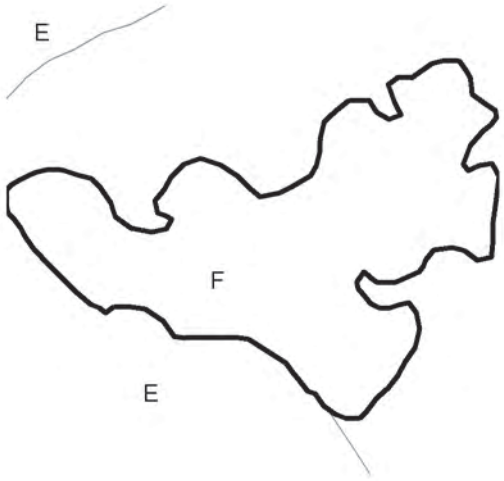
Coastal hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).



Q08/134 Linton Road West Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Vegetation

This site comprises two indigenous forest remnants on a stretch of inner Kaipara Harbour coastline bordering the Arapaoa River channel (Q08/084). The site is relatively exposed due to its position in the line of northwest winds rushing down the main channel of the river. On adjacent land to the east there is a mixture of pastoral land and small radiata pine plantations. The two remnants are divided by a farm track, and do not appear to be fenced from livestock.

(a) The major forest type on the coastal margin is puriri–kowhai forest. Other species appear occasionally in the canopy, including pukatea, kauri, kanuka, rewarewa, kahikatea, karaka and taraire.

(b) The inland part of the remnant comprises totara forest. This is not easily visible from public roads or from the coast, hence this type has been interpreted from aerial photography (flown in 2002) and brief glimpses from the river.

(c) An area of kahikatea forest occurs on a steep slope at the top end of the remnant in the south. Also present in the canopy are five finger, rewarewa and puriri.

(d) Pohutukawa forest is present on the point opposite Te Kowhai Creek, which bears the brunt of the weather.

(e) Kanuka–manuka shrubland is also on the headland. Occasional mingimingi and bracken are present.

Fauna

Not surveyed.

Significance

This site represents the best example of coastal puriri–kowhai forest in Otamatea ED Northland even though it appears to be grazed. It has quite a high diversity of vegetation types for its size, and forms a valuable indigenous forest and shrubland buffer to the Arapaoa River (Q08/084), which is otherwise mostly bordered by pasture.

WHAKAPIRAU/ROCKY POINT FOREST AND SHRUBLAND

Survey no.	Q08/135
Survey date	8 December 2005
Grid reference	Q08 272 538 (2 remnants)
Area	11.7 ha (11.6 ha forest, 0.1 ha shrubland)
Altitude	0–40 m asl

Ecological units

(a) Totara–kanuka forest on steep coastal margin (45%)

(b) Puriri forest on steep coastal margin (30%)

(c) Puriri–taraire forest on steep coastal margin (20%)

(d) Pohutukawa treeland on steep coastal margin (4%)

(e) Mapou–karamu–hangehange shrubland on steep coastal margin (1%)

Landform/geology

Coastal headland underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

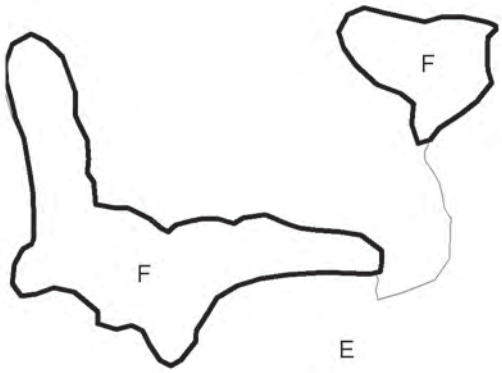
Whakapirau/Rocky Point is a headland next to the main channel of the Arapaoa River (Q08/084). The western side of the point is more exposed to strong winds blowing down the river than the eastern side. The coastal forest in this site is divided into two remnants, the major one being on the end of the point and the minor one on the eastern side. Scattered coastal broadleaved trees (e.g. puriri, karaka, taraire) are present in adjacent exotic grassland, but these are excluded from the site. They do, however, provide a role in linking the two remaining remnants of forest.



Q08/135 Whakapirau/Rocky Point Forest and Shrubland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(a) The terrain of the point is quite steep and rocky in places, as the name would suggest. The main canopy species is totara, followed by kanuka. Tall, emergent radiata pine and puriri are frequent.

(b) The eastern remnant has a majority of puriri in the canopy while kowhai, kanuka, karaka and titoki are all frequent. Emergent macrocarpa trees feature prominently above the indigenous canopy. This forest is more sheltered from predominant westerly winds than the rest of the site.

(c) On the sheltered, eastern side of the point there is a forest dominated by puriri (>50% canopy cover) in association with taraire. Several other species are frequent including karaka, heketara, tanekaha, kowhai, totara and kahikatea.

(d) Pohutukawa treeland occurs on the exposed, western side of the point, near to the water's edge. Directly underneath and behind the trees has been cleared for pasture.

(e) A small area of diverse shrubland is present on a very steep part of the coast, directly in the lee of the point. Mapou, karamu and hangehange are the most frequent species, in association with harakeke, mamaku, *Gahnia lacera*, *Coprosma macrocarpa*, mingimingi, manuka and koromiko. There is also occasional lancewood, karaka, mamangi, rangiora and tanekaha.

Significant flora

Mida (Gradual Decline) was recorded at this site in 2000 (SSBI Q08/H067).

Fauna

Kingfisher, fantail, Australasian harrier and kukupa (Gradual Decline) were noted here in 2000 (SSBI Q08/H067).

Significance

This site has diverse habitat types for its size, and is representative for ecological unit (e) which was not recorded elsewhere in Otamatea ED Northland. It is known to support a threatened plant species (mida) and a threatened bird species (kukupa). The site is also significant as an indigenous vegetation buffer and scenic headland on the edge of a large estuarine natural area (Arapaoa River, Q08/084).

BARTON'S HILL FOREST

Survey no.	Q08/137
Survey date	28 November 2005
Grid reference	Q08 285 640
Area	11.2 ha
Altitude	50–140 m asl

Ecological units

(a) Taraire forest on steep hillslope (90%)

(b) Totara forest on moderate to steep hillslope (10%)

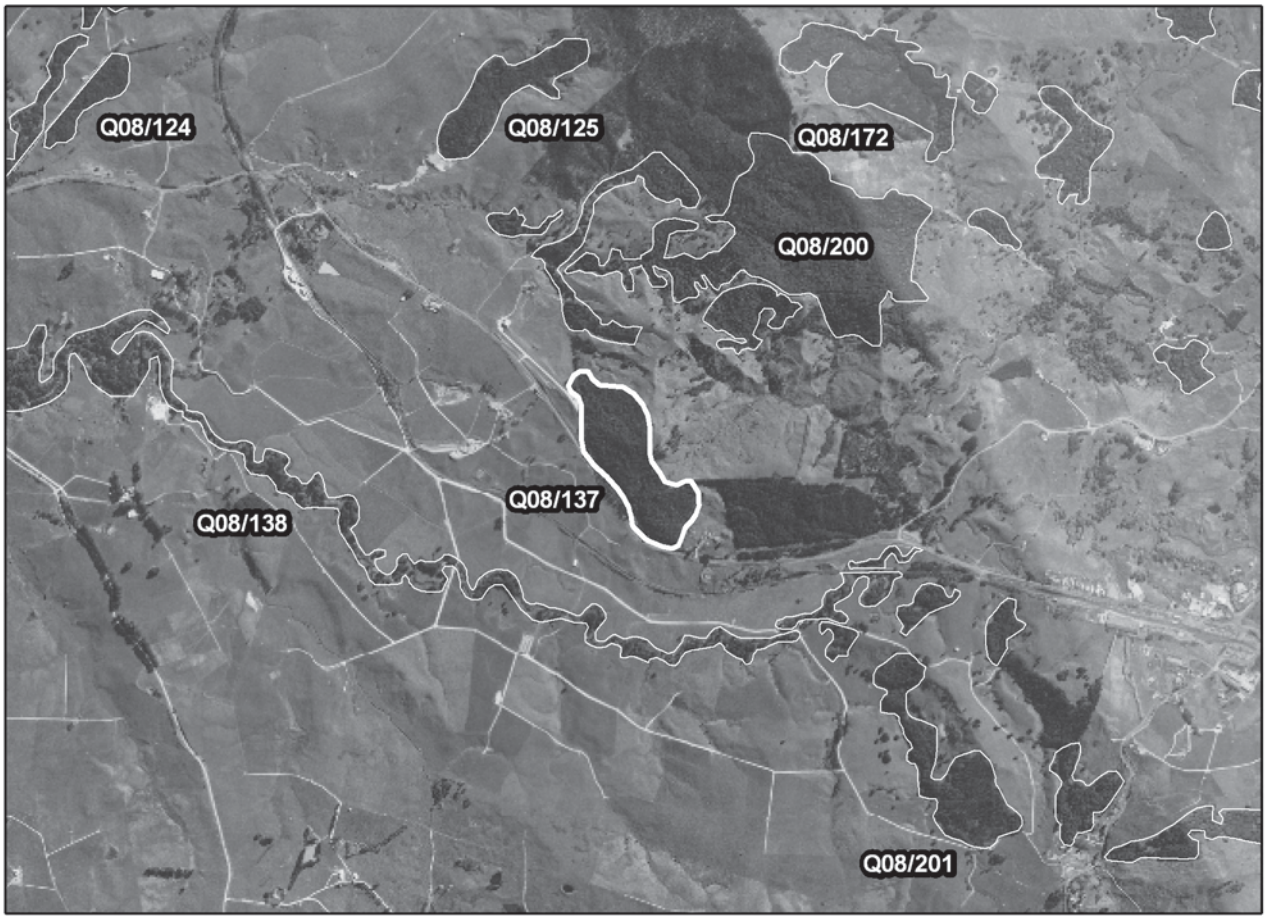
Landform/geology

Hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

Barton's Hill Forest is forested on its western side, from the peak at 140 m asl (a locally prominent point), down to where State Highway 12 curves around it at 50 m asl. The slope is generally steep throughout (>30°). The hill forest is at least partially fenced, and the canopy is apparently healthy.

(a) Most of the forest is dominated by taraire, whose windswept crowns give an even, sculpted texture to the canopy. Two other broadleaved trees are frequent (karaka and puriri), along with emergent rewarewa. A large variety of species are occasional throughout, including kohekohe, nikau, titoki, mamaku, tarata, karamu, *Coprosma macrocarpa*, mapou, and emergent pukatea and kahikatea.



Q08/137 Barton's Hill Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(b) On the northwestern side of the hill the forest is dominated almost entirely by totara. Tanekaha and kanuka are frequent, with occasional rimu, kahikatea, nikau, tarata and ti kouka.

Fauna

The threatened indigenous snail *Amborhytida dunniae* (Gradual Decline) was recorded at this site.

Significance

This is a representative site for (a) taraire forest on steep hillslopes. As one of the few places known to support a threatened snail species, this site is particularly significant. It appears to be in good condition and is physically linked with another large area of indigenous forest, the Huarau Ridge Forest Remnants (Q08/200).

UPPER PAHI RIVER RIPARIAN FOREST

Survey no.	Q08/138
Survey date	28 November 2005
Grid reference	Q08 274 640 (4 remnants)
Area	31.9 ha
Altitude	20–40 m asl

Ecological units

(a) Totara forest on alluvium (50%)

(b) Totara–kahikatea treeland on alluvium (50%)

Landform/geology

Valley floor on Holocene alluvium.

Vegetation

Remnants of indigenous riparian forest and treeland follow a 5 km stretch of the Pahi River from a point just upstream of the tidal influence back to the railway crossing and State Highway 12. There are some fine large old podocarps present, but all of the remnants have rather ragged edges, are grazed throughout by livestock (down to the water's edge) and have very little understorey.

(a) Towards the western end a dense canopy of totara forms a forest cover. Frequent examples of matai, kahikatea, kanuka, kowhai and tree privet are present. Also recorded were tanekaha, rimu, mamaku, hawthorn and elaeagnus.

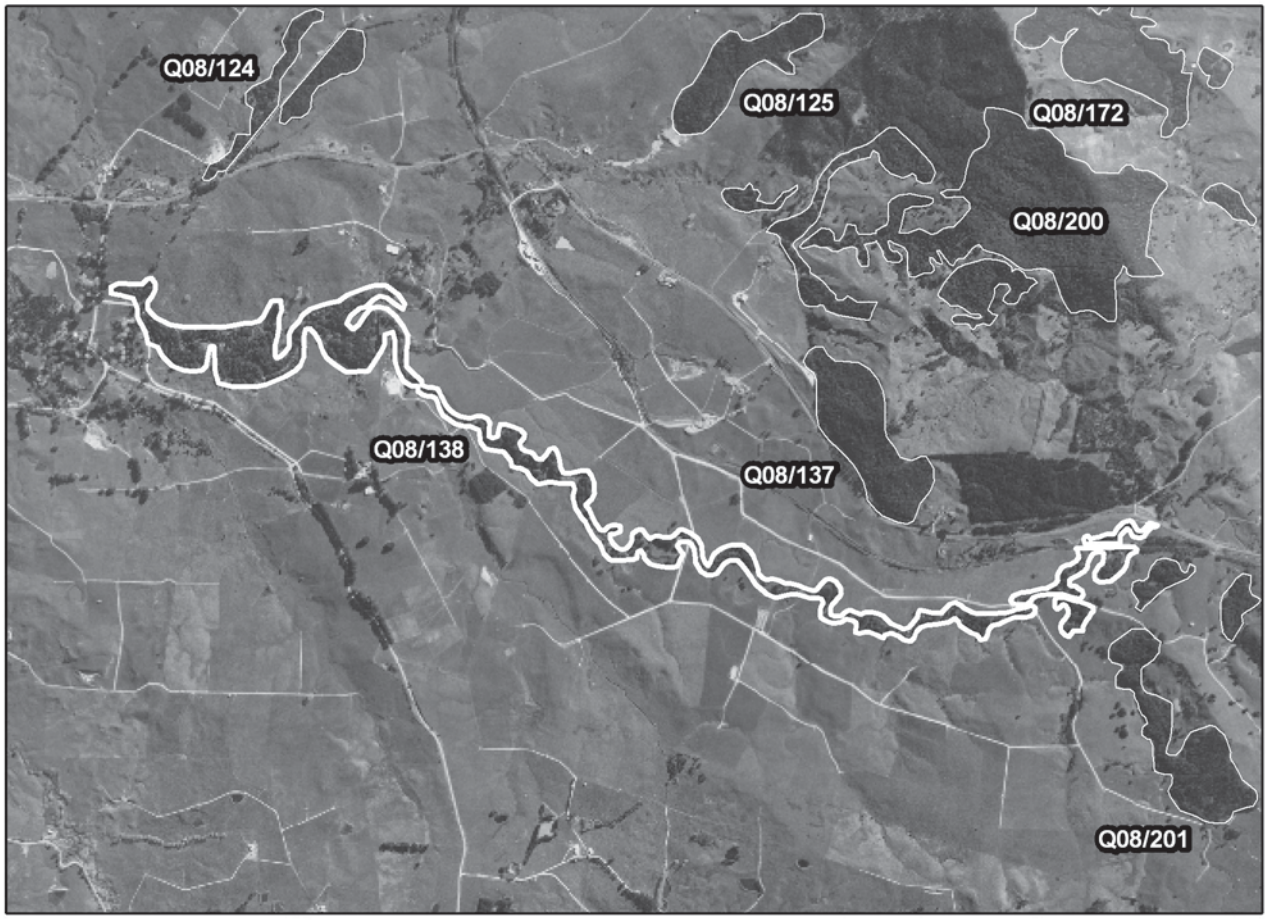
(b) The less densely covered eastern parts form 'treeland' (i.e. an interrupted canopy, scattered trees). The main trees are totara and kahikatea, but titoki, karaka and kanuka are frequent also, with occasional ti kouka, weeping willow and crack willow.

Fauna

Not surveyed.

Significance

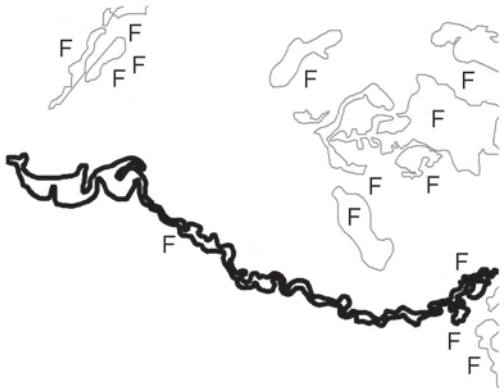
Although this site is degraded and reduced to small, scattered remnants which are prone to weed invasion, this site is representative for (b) totara forest on alluvium, which is a rare forest type in Otamatea ED Northland and in all of Northland. There are some mature trees, some more dense areas of forest and the site has considerable length.



Q08/138 Upper Pahi River Riparian Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



PAGE POINT FOREST AND SHRUBLAND

Survey no.	Q08/140
Survey date	8 December 2005
Grid reference	Q08 232 570
Area	12.3 ha (9.4 ha forest, 2.9 ha shrubland)
Altitude	0–40 m asl

Ecological units

(a) Kanuka forest on steep coastal margin (35%)

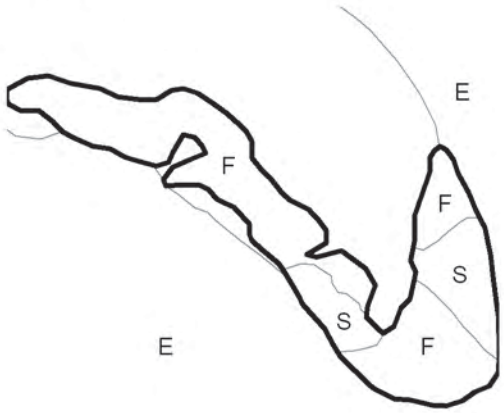
(b) Taraire–puriri forest on steep coastal margin (35%)



Q08/140 Page Point Forest and Shrubland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(c) Kanuka shrubland on steep coastal margin (15%)

(d) Manuka shrubland on steep coastal margin (9%)

(e) Totara–puriri forest on steep coastal margin (6%)

Landform/geology

Coastal headland underlain by Cretaceous sandstone and mudstone (Mangakahia Complex); Cretaceous siliceous mudstone (Whangai Fmn, Mangakahia Complex).

Vegetation

Page Point Forest and Shrubland comprises coastal forest which has developed within the past half century following previous clearance, and an established shrubland which is probably <20 years old. There appears to have been some recent work carried out to fell mature emergent pines around the coast. The edges of the remnant are frayed and inhabited by gorse (these parts have generally been excluded from the site). Grazing livestock have access throughout.

(a) The main forest canopy tree on the western side is kanuka. Frequent karaka, puriri, kahikatea, taraire, ti kouka and gorse are present, along with occasional tarata, kauri and rewarewa.

(b) Small pockets of taraire–puriri forest are present (these probably escaped the major clearance), in which karaka and kohekohe are frequent and rewarewa is occasional.

(c) The eastern side of the remnant has regenerated following relatively recent clearance to kanuka shrubland. Juvenile totara and mature puriri are frequent. Occasional species include radiata pine, kahikatea and kowhai.

(d) Recent clearance in the west has regenerated to manuka shrubland (perhaps due to the more exposed nature of the coast there). Mapou, gorse and mamangi are frequent, with occasional mingimingi, *Gahnia lacera, Metrosideros perforata, Haloragis erecta* and *Coprosma macrocarpa*.

(e) On the very sheltered, eastern side of the point, a patch of totara–puriri forest with frequent kowhai and karaka is present.

Fauna

Grey warbler, welcome swallow, kingfisher, Australasian harrier, kukupa (Gradual Decline).

Significance

This site is significant as it is known to support a threatened bird species (kukupa) and contains a relatively high diversity of habitat types for its size. However, the effects of continued livestock access to the forest reduces its value.

TE TAWHITI FOREST REMNANTS

Survey no.	Q08/144
Survey date	29 November 2005
Grid reference	Q08 322 581 (2 remnants)
Area	7.6 ha (6.9 ha forest, 0.7 ha shrubland)
Altitude	61–107 m asl

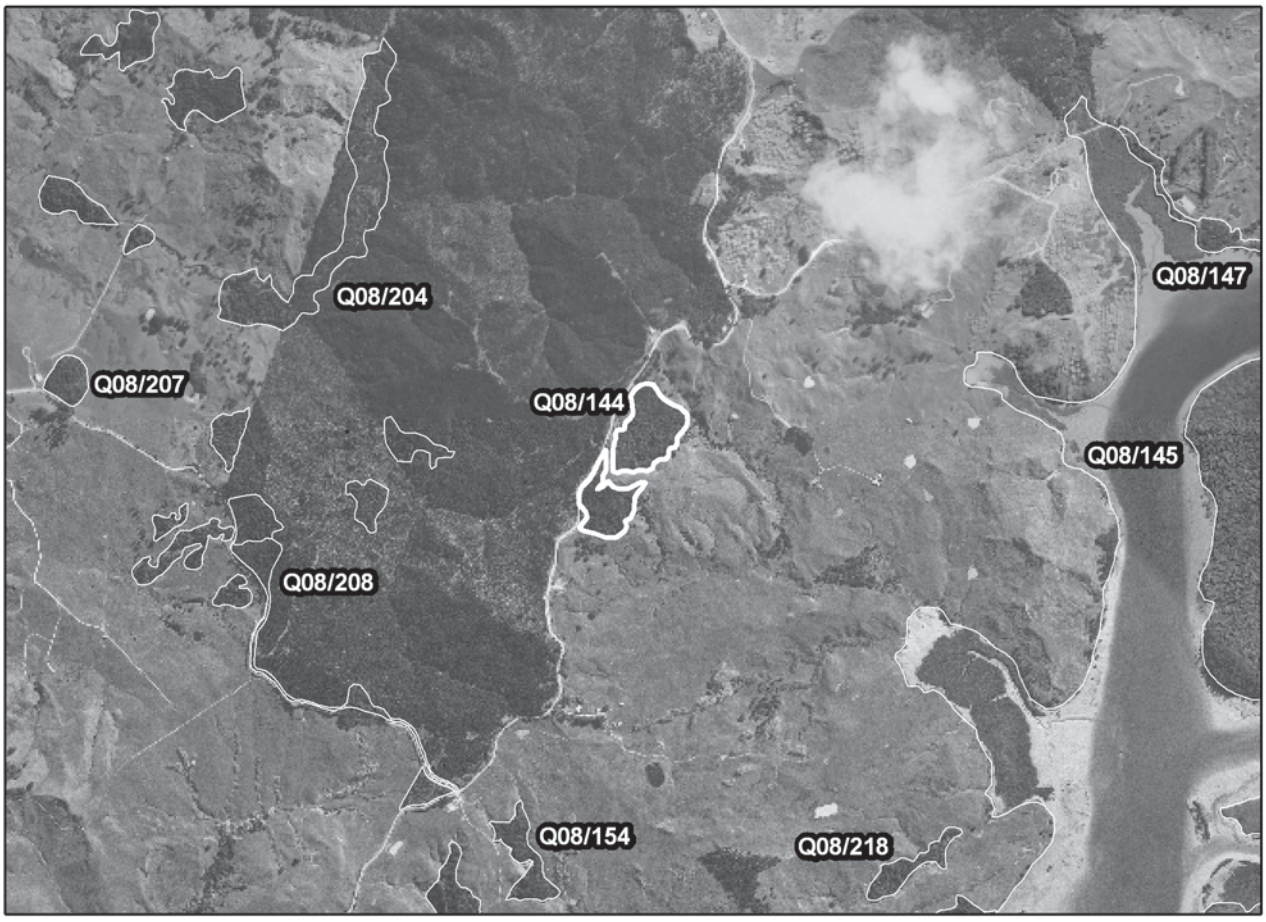
Ecological units

(a) Taraire forest on moderate to steep hillslope (91%)

(b) Manuka–kanuka shrubland on local steep slope (9%)

Landform/geology

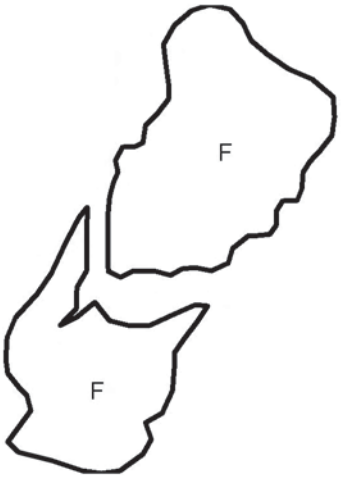
Hillslopes underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).



Q08/144 Te Tawhiti Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Vegetation

This site comprises two compact forest remnants on a predominantly east-facing hillslope 1 km inland from the Otamatea River (Q08/062). To the west lies an extensive radiata pine plantation forest and surrounding the site there is pasture. There appears to be no fencing around the forest to exclude stock, hence the understorey is grazed almost bare. Tree privet, woolly nightshade, elaeagnus and wild grape vines are problem weeds in the immediate surrounding landscape.

(a) Both remnants are composed primarily of taraire forest. Frequent associates of this type are puriri, karaka, totara and emergent kahikatea. Some of the kahikatea are large and old. Nikau, rewarewa, pukatea, titoki, tawa and puka (epiphytic) occur occasionally.

(b) Next to Bickerstaffe Road, in the southern remnant, a steep west-facing slope supports a shrubland of manuka and kanuka with frequent ti kouka, and occasional tarata, totara, mingimingi, mahoe, mapou, karamu, tanekaha, mamaku, hangehange and pampas.

Fauna

Grey warbler, shining cuckoo, welcome swallow, kingfisher.

Significance

Despite being relatively small and with poor understorey, these remnants are still a representative example of (a) taraire forest on moderate to steep hillslopes, because the forest contains occasional emergent mature kahikatea, which are very uncommon in Otamatea ED Northland.

RAEPARE CREEK HEADLAND FOREST

Survey no.	Q08/145
Survey date	29 November 2005
Grid reference	Q08 343 578 (2 remnants)
Area	46.3 ha
Altitude	0–60 m asl

Ecological units

(a) Taraire–puriri–totara forest on moderate hillslope (40%)

(b) Kanuka forest on gentle hillslope (35%)

(c) Kauri–totara forest on gentle coastal margin (15%)

(d) Kanuka–rimu forest on moderate to steep hillslope (5%)

(e) Totara–puriri–kahikatea forest on gentle coastal margin (5%)

Landform/geology

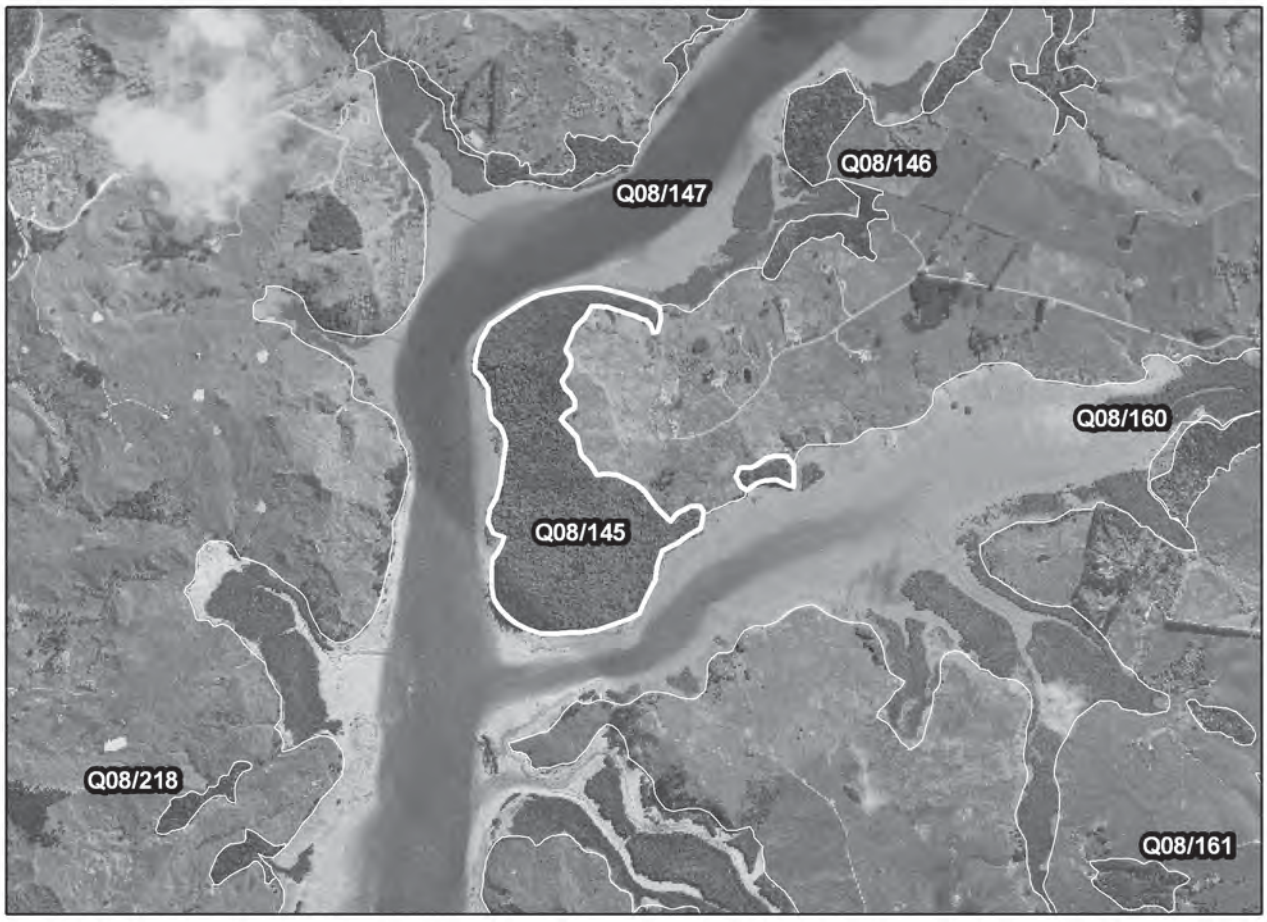
Coastal headland underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

This site comprises indigenous forest on the western end of a prominent peninsula jutting out into the Otamatea River (Q08/062). On the southern side of the headland is Raepare Creek, a small tidal inlet of predominantly mudflats and shallow water. To the north and west lies the main channel of the saltwater river. The forest remnant is large, diverse and appears to be fenced off from neighbouring exotic grassland and residential housing. Several forest types can be distinguished:

(a) Through the mid-section of the forest the predominant vegetation type is taraire–puriri–totara forest with frequent kowhai, karaka, rewarewa and emergent kahikatea. Nikau, mamangi, pukatea and puka are occasional.

(b) Along the top, adjacent to the grassland, kanuka forest with frequent young totara and kahikatea is present.



Q08/145 Raepare Creek Headland Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(c) At several points around the coast, clusters of tall kauri rickers grow right down to the beach. These are interspersed with abundant totara, and frequent taraire, rewarewa, karaka, puriri and tall kahikatea spars.

(d) A distinct patch of kanuka-dominant forest with emergent young rimu spars is present at about the mid-point of the remnant. Totara is frequent here also.

(e) The southern coastal forest (including the small separate remnant) comprises abundant totara with common puriri and kahikatea. Kanuka is frequent, with occasional karaka, ti kouka, pukatea and titoki.

Fauna
Welcome swallow, kingfisher, kukupa (Gradual Decline).

Significance
This is the fifteenth largest forested site in Otamatea ED Northland. The site is representative for four ecological units: (a) taraire–puriri–totara forest on moderate hillslope, (b) kanuka forest on gentle hillslope, (c) kauri–totara forest on gentle coastal margin, and (d) kanuka–rimu forest on moderate to steep hillslope. It supports a high diversity of forest types and at least one threatened bird species (kukupa). Some of the puriri in the small separate remnant appear to be affected by dieback. Most of this natural area is within two separately owned QEII Open Space Covenants (43.2 ha in total, or 93% of the forest described here).

WAHIWAKA CREEK FOREST REMNANTS

Survey no.	Q08/146
Survey date	2 December 2005
Grid reference	Q08 357 595 (5 remnants)
Area	44.2 ha
Altitude	0–60 m asl

Ecological units
(a) Totara–puriri–kahikatea forest on steep coastal margin (40%)

(b) Totara forest on gentle coastal margin (23%)

(c) Taraire–karaka forest on gentle coastal margin (15%)

(d) Kauri–kahikatea–totara forest on ridge top (10%)

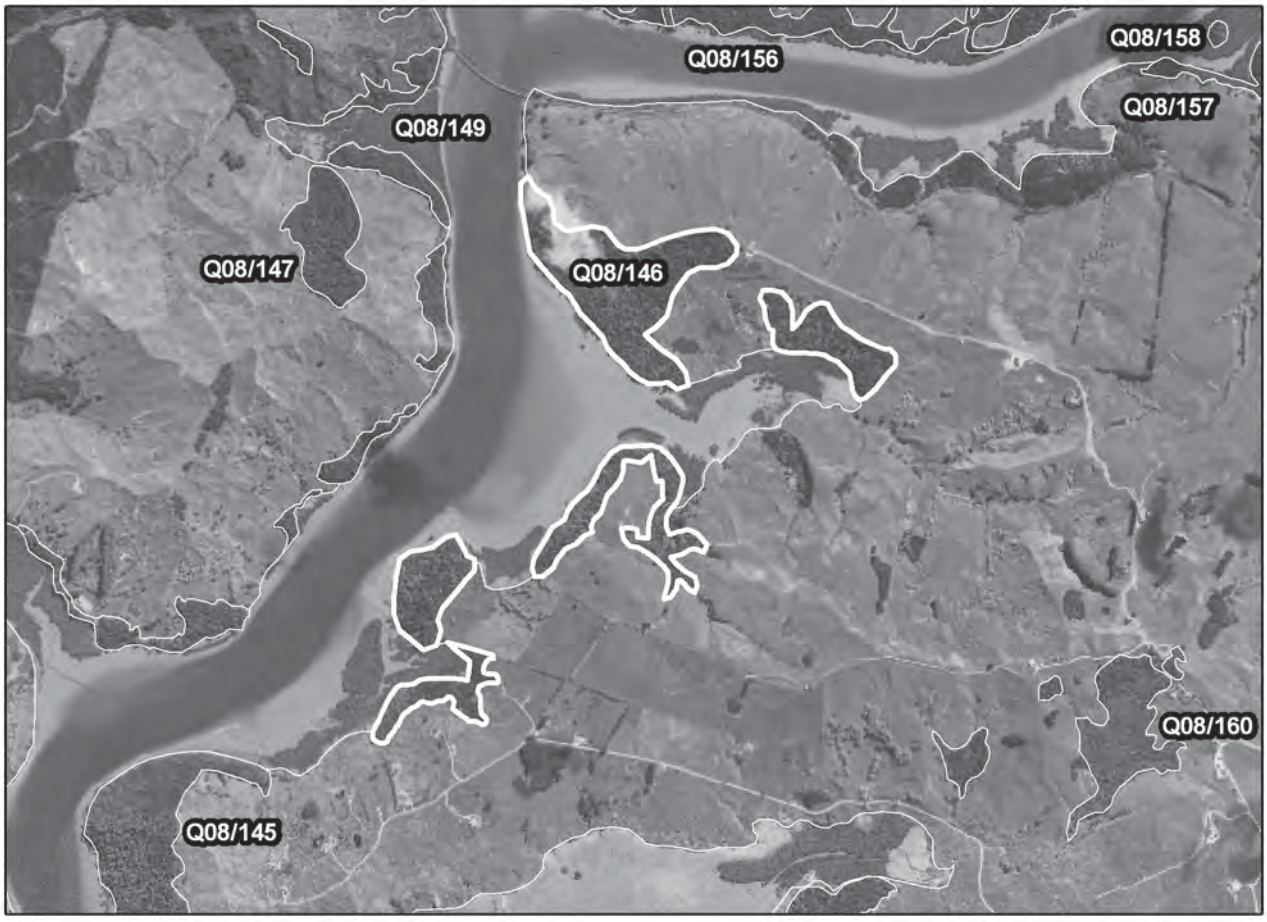
(e) Totara–kahikatea forest on moderate hillslope (10%)

(f) Kauri–kanuka forest on gentle coastal margin (2%)

Landform/geology
Coastal hillsides underlain by melange (undifferentiated Mangakahia Complex, Motatau Complex and Waitemata Group lithologies).

Vegetation
This site comprises five coastal forest remnants on the east coast of the Otamatea River (Q08/062) centred on the Wahiwaka Creek, which is a small mangrove-filled tidal inlet. Pasture dominates the surrounding landscape, and some small pine plantations and occasional willow plantations also occur. The site contains several forest types, most of which have totara as a main component. The easternmost forest remnant was fenced off from neighbouring paddocks in 2002 (David Hargreaves, pers. comm.), but there is no fence along the coastal margin, hence stock can still gain access from time to time by walking around the mudflats. None of the other remnants are effectively protected from stock access either.

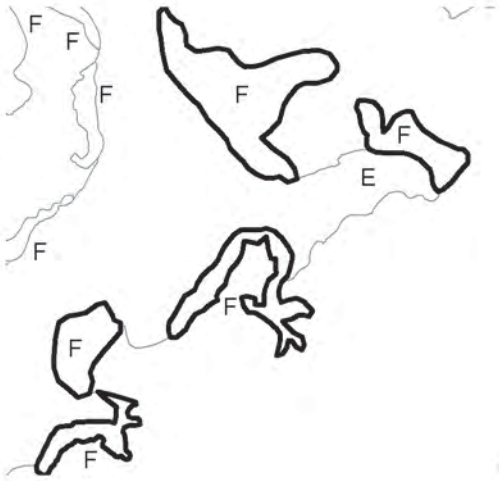
(a) The most common forest type at this site, which generally occurs on steep parts of the coastline, has abundant totara with subdominant puriri and kahikatea. Frequent associates are karaka, kanuka, rewarewa, kauri and nikau, and there is occasional tarata and ti kouka.



Q08/146 Wahiwaka Creek Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(b) A more heavily totara-dominant forest is present on the gentle slopes of the upper Wahiwaka Creek and in the very south of the site. Kowhai, kanuka and kahikatea are frequent. Karaka, nikau, kauri, rimu, ti kouka and tanekaha are occasional.

(c) The long strip just south of the creek mouth comprises taraire and karaka with frequent kohekohe, kahikatea and puriri, and occasional titoki.

(d) At the end of a private road, towards the top of the ridge, there is a patch of tall forest comprising kauri rickers, kahikatea spars and totara. Kanuka and

puriri are frequent, and there are occasional emergent macrocarpa and eucalyptus trees which appear to have been planted at an earlier time.

(e) In the middle of the largest remnant, as well as in the southern portion of the site, small areas of totara–kahikatea forest with occasional kowhai and kanuka are present.

(f) At a point on the coast just north of the Wahiwaka Creek mouth there is a stand of kauri rickers mixed with kanuka on a coastal terrace. Another stand of kauri occurs in the southernmost remnant.

Fauna

Australasian harrier, kingfisher, kukupa (Gradual Decline).

Significance

This site has a high diversity of habitat types relative to other sites in Otamatea ED Northland, but they are all separated into small remnants, without good continuity between patches. The site is representative for (a) totara–puriri–kahikatea forest on steep coastal margin and (c) taraire–karaka forest on gentle coastal margin, which are the best examples of their type in Otamatea ED Northland. It also supports a threatened bird species (kukupa). David Hargreaves (landowner) reports that a pa site is present within this natural area. At the southern end of the site, parts of (b) totara forest on gentle coastal margin, and (e) totara–kahikatea forest on moderate hillslope are within a QEII Open Space Covenant (2.2 ha).

JAMES ROAD FOREST

Survey no.	Q08/147
Survey date	2 December 2005
Grid reference	Q08 347 597 (6 remnants)
Area	22.0 ha
Altitude	0–71 m asl

Ecological units

(a) Totara–kahikatea forest on gentle coastal margin (33%)

(b) Kauri–kanuka–rimu forest on moderate hillslope (33%)

(c) Totara forest on gentle coastal margin (17%)

(d) Taraire–kahikatea forest on gentle coastal margin (8%)

(e) Kauri–kanuka–tanekaha forest on gentle coastal margin (7%)

(f) Kanuka forest on moderate hillslope (2%)

Landform/geology

Coastal hillsides and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

This site comprises six indigenous forest remnants extending along approximately 2.5 km of the western coastline of the upper Otamatea River (Q08/062). Pastoral farmland and occasional willow/poplar plantations surround these remnants.

(a) In the southern half of the site the main forest type is totara–kahikatea forest with frequent kauri and kanuka, and occasional karaka, matai, lancewood, kowhai and puriri.



Q08/147 James Road Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(b) In the north, the main forest type comprises kauri, kanuka and rimu with frequent tanekaha and rewarewa.

(c) The northern coastline is covered by a diverse form of totara-dominant forest. Totara comprises just over 20% of the canopy, while several species are frequent in the canopy, including puriri, kahikatea, kauri, kowhai, rewarewa, kanuka and karaka. Occasional species include white maire, matai, rimu and nikau.

(d) At the mid-point of the site there is a coastal remnant with taraire dominant and kahikatea abundant in the canopy. A diverse range of associated species is present including frequent totara and occasional kanuka, karaka, nikau, mamangi, puka, tanekaha, pukatea and kauri.

(e) A small patch of coastal forest comprises kauri, tanekaha and kanuka with frequent totara and occasional rewarewa, ti kouka, rimu and kahikatea.

(f) In the northwestern remnant, there is one small patch of pure kanuka forest. This appears more recently disturbed than adjacent type (b).

Fauna

Kingfisher, Australasian harrier, kukupa (Gradual Decline). There are some anecdotal reports of NI brown kiwi (Serious Decline) from 1977 at this site, however none have been reported since then (NZ Wildlife Service 1977; SSBI Q08/H032).

Significance

This is another site with diverse coastal forest types in separate remnants, comparable to Wahiwaka Creek Forest Remnants (Q08/146) on the opposite shore. A threatened bird species was observed using these remnants (kukupa). Ecological unit (b), kauri–kanuka–rimu forest on moderate hillslope, is the only example of its type in Otamatea ED Northland, and as it covers approximately 7 ha, it is considered to be a representative example.

BICKERSTAFFE ROAD FOREST 2

Survey no.	Q08/148
Survey date	29 November 2005
Grid reference	Q08 323 600 (6 remnants)
Area	23.7 ha
Altitude	36–110 m asl

Ecological units

(a) Taraire forest on moderate to steep hillslope (55%)

(b) Totara forest on moderate to steep hillslope (45%)

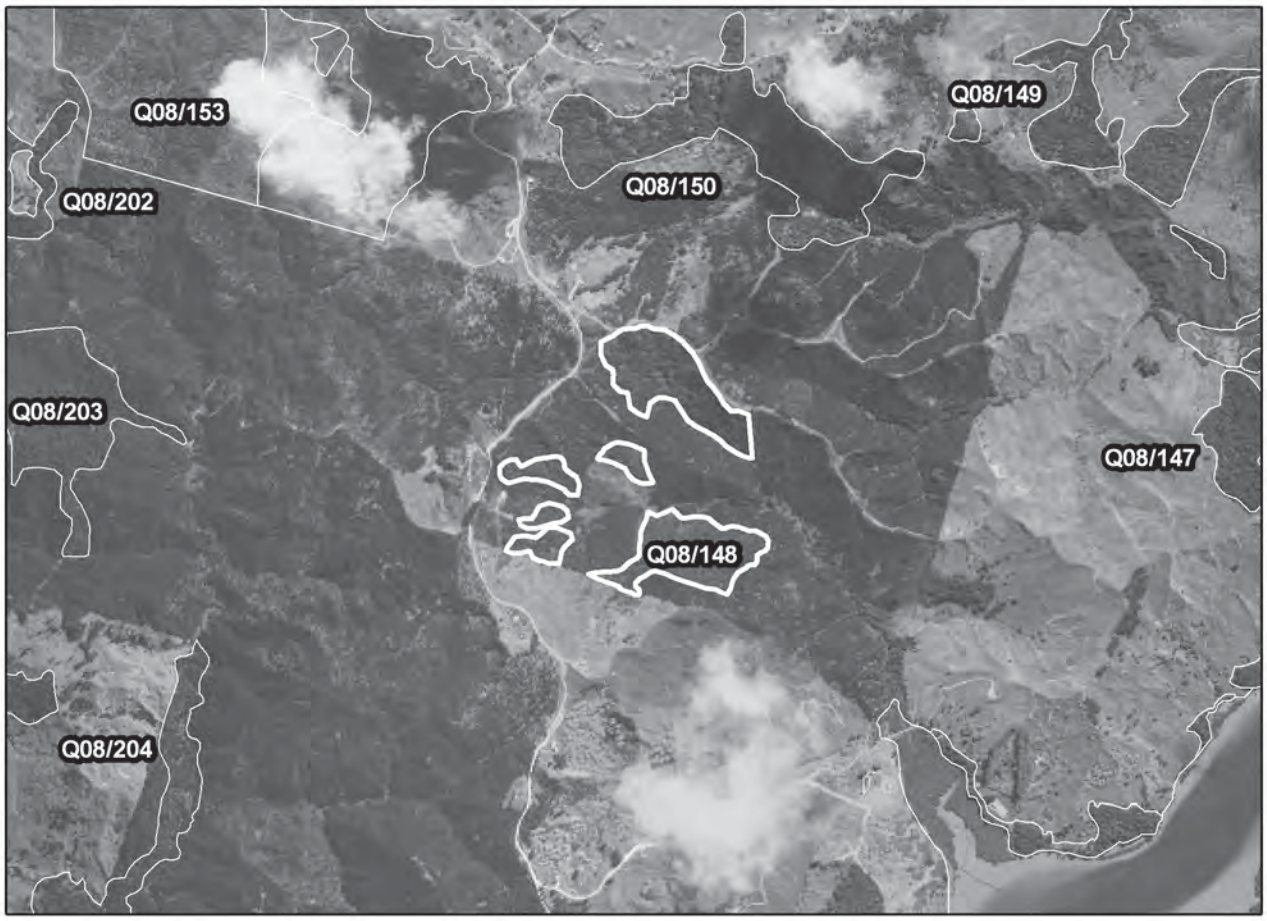
Landform/geology

Steep hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

These indigenous forest remnants are set within a matrix of radiata pine plantations on the east-facing slopes falling away from Bickerstaffe Road towards the Otamatea River (Q08/062). Visibility of all the remnants is restricted (due to the pines), however two main forest types could be determined from a combination of field observation and interpretation of recent aerial photography (flown in 2002).

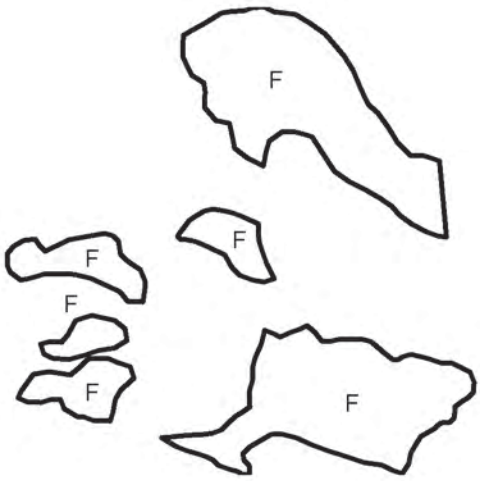
(a) The central areas of the two largest remnants are composed principally of taraire. Emergent kahikatea and rimu are present, a few of which appear quite mature, and are possibly older than the surrounding taraire forest. Also present are frequent totara and puriri, and occasional rewarewa, pukatea and puka.



Q08/148 Bickerstaffe Road Forest 2

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(b) The four smaller remnants and the edges of the large remnants have totara-dominant forest with frequent mamaku, kanuka and mahoe, and occasional kahikatea and puriri. These are obviously more recently established and less intact than the taraire forest.

Fauna

Not surveyed.

Significance

Several puriri were observed with canopy dieback. Taraire forest on moderate to steep hillslope (a) is a representative unit due to the presence of some older emergent kahikatea and rimu, which are now very uncommon in Otamatea ED Northland.

BICKERSTAFFE RAILBRIDGE FOREST REMNANTS

Survey no.	Q08/149
Survey date	13 January 2006
Grid reference	Q08 345 614 (6 remnants)
Area	31.8 ha (25.1 ha forest, 6.6 ha shrubland)
Altitude	0–80 m asl

Ecological units

(a) Totara–taraire–puriri forest on moderate to steep hillslope (45%)

(b) Totara forest on gentle coastal margin (30%)

(c) Kanuka shrubland on gentle coastal margin (21%)

(d) Kanuka–totara–kauri forest on gentle coastal margin (4%)

Landform/geology

Hillslopes and gullies underlain by Cretaceous–Paleocene sandstone and mudstone (Mangakahia Complex).

Vegetation

This site comprises scattered indigenous forest and shrubland remnants spread over paddocks colonised by gorse and woolly nightshade on the edge of the lower Wairau River. A railway line skirts around the coast forming the eastern and northern boundaries of the site. Grazing pressure underneath the indigenous forest and shrublands in this site appears to be low, as evidenced by the strong growth of indigenous and exotic shrublands in the paddocks between the remnants.

(a) In the inland parts of the site there are remnants of totara–taraire–puriri forest with frequent emergent kahikatea. There was some difficulty viewing all of the remnants from a boat on the river, therefore the percentage cover of this type was interpreted from aerial photography (flown in 2002).

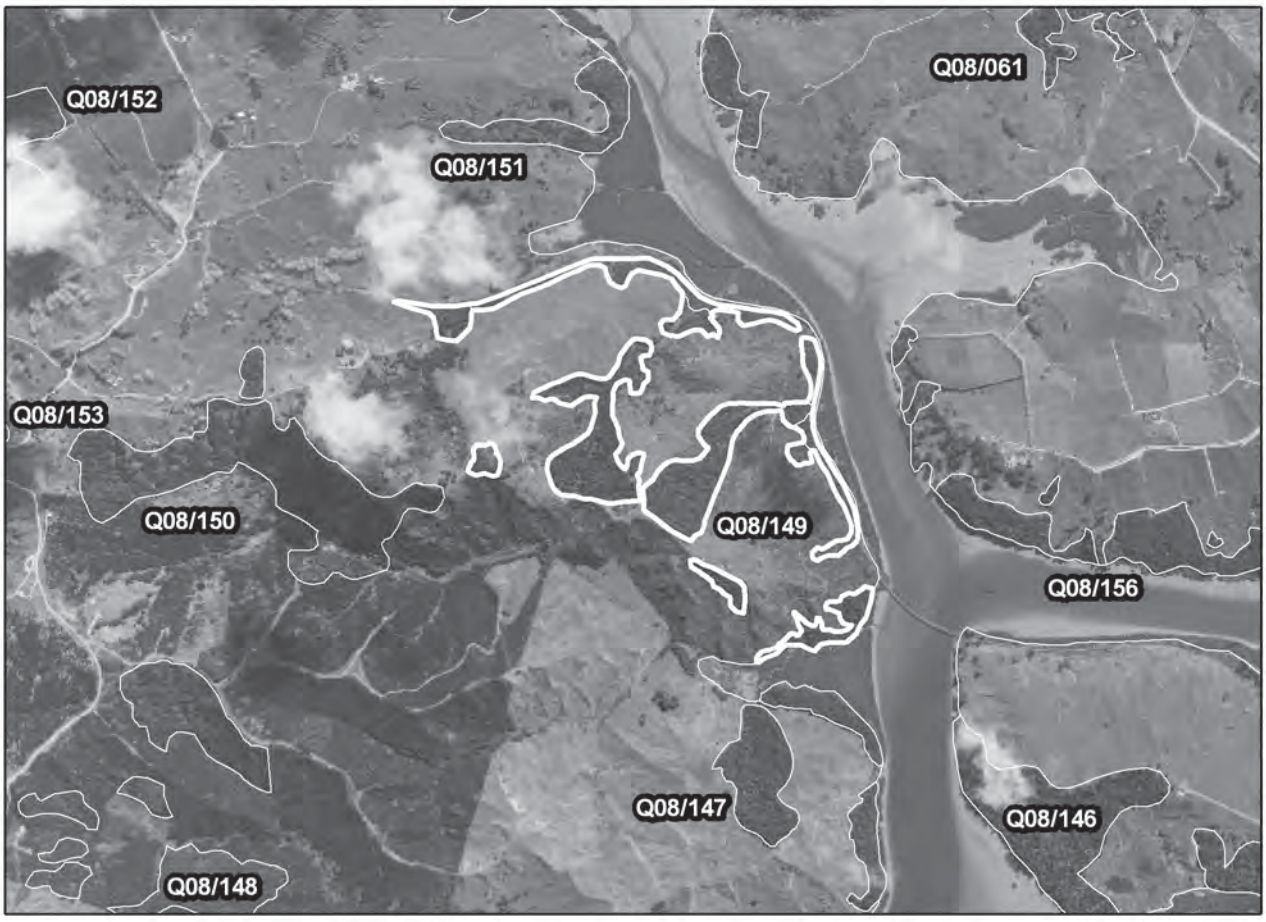
(b) Along the southern coastal margin, adjacent to tall mangrove forest in the Otamatea River (Q08/062), and in a few places along the Wairau River coast, there are remnants of totara-dominant forest with frequent tanekaha, kanuka and kahikatea, and occasional mamaku.

(c) Next to the railway line, a shrubland of kanuka with frequent young totara is present. Also recorded here were mamaku, ti kouka, tarata, karamu, mamangi and occasional emergent radiata pine.

(d) Two small areas of kanuka–totara forest with clumps of kauri rickers occur near the Wairau River coast, next to the shrubland and railway line.

Fauna

Not surveyed.



Q08/149 Bickerstaffe Railbridge Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Significance

This site is representative for (a) totara–taraire–puriri forest on moderate to steep hillslope. This site also has a significant area of indigenous shrubland, being one of only fourteen sites in Otamatea ED Northland with over 5 ha of indigenous shrubland. The intervening gorse and woolly nightshade scrub (not within the site) is dominated by shade–intolerant species which could be superceded by regenerating indigenous species in future, as they are surrounded by indigenous seed sources on all sides. However, radiata pine will be more persistent, and wilding pines could be a part of the future mix in the medium term.

UPPER WAIRAU RIVER COASTAL FOREST REMNANTS

Survey no.	Q08/151
Survey date	29 November 2005
Grid reference	Q08 341 629 (8 remnants)
Area	29.0 ha
Altitude	0–40 m asl

Ecological units

(a) Totara–kahikatea forest on gentle coastal margin (35%)

(b) Totara–kowhai forest on gentle coastal margin (25%)

(c) Totara forest on gentle coastal margin (25%)

(d) Kanuka–totara forest on gentle coastal margin (15%)

Landform/geology

Coastal hillsides underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex).

Vegetation

This site comprises eight separate remnants of coastal forest on the upper Wairau River, four on the west bank, and four on the east. Adjacent habitat in the river generally comprises either mangrove forest or open mudflat (wading bird habitat). Pastoral farmland borders the landward margins of the remnants. It appears that none of the sites are adequately fenced to exclude stock. Four main vegetation types are present, and almost all of the remnants are homogenous in their type (one is not). The differing dominance of totara relative to other species in the canopy is important in describing these remnants, because, in general, the progression from type (a) to (d) represents a scale of increasing disturbance (species diversity decreases with increased grazing).

(a) The most diverse and intact remnants comprise totara and kahikatea with frequent kowhai and matai, and occasional titoki, karaka, kauri, ti kouka, nikau and tree privet. Three remnants have this type.

(b) The southwestern remnant comprises primarily totara and kowhai, with frequent emergent kahikatea, and occasional mamangi, ti kouka, karaka, tarata, kanuka and titoki. A small part of the remnant opposite is like this too.

(c) Totara forest is present in the two northernmost remnants, and the third remnant down on the west bank (very small). Associated species include frequent kowhai, kanuka, tanekaha, kauri rickers, kahikatea and puriri, and occasional ti kouka, rimu and matai.

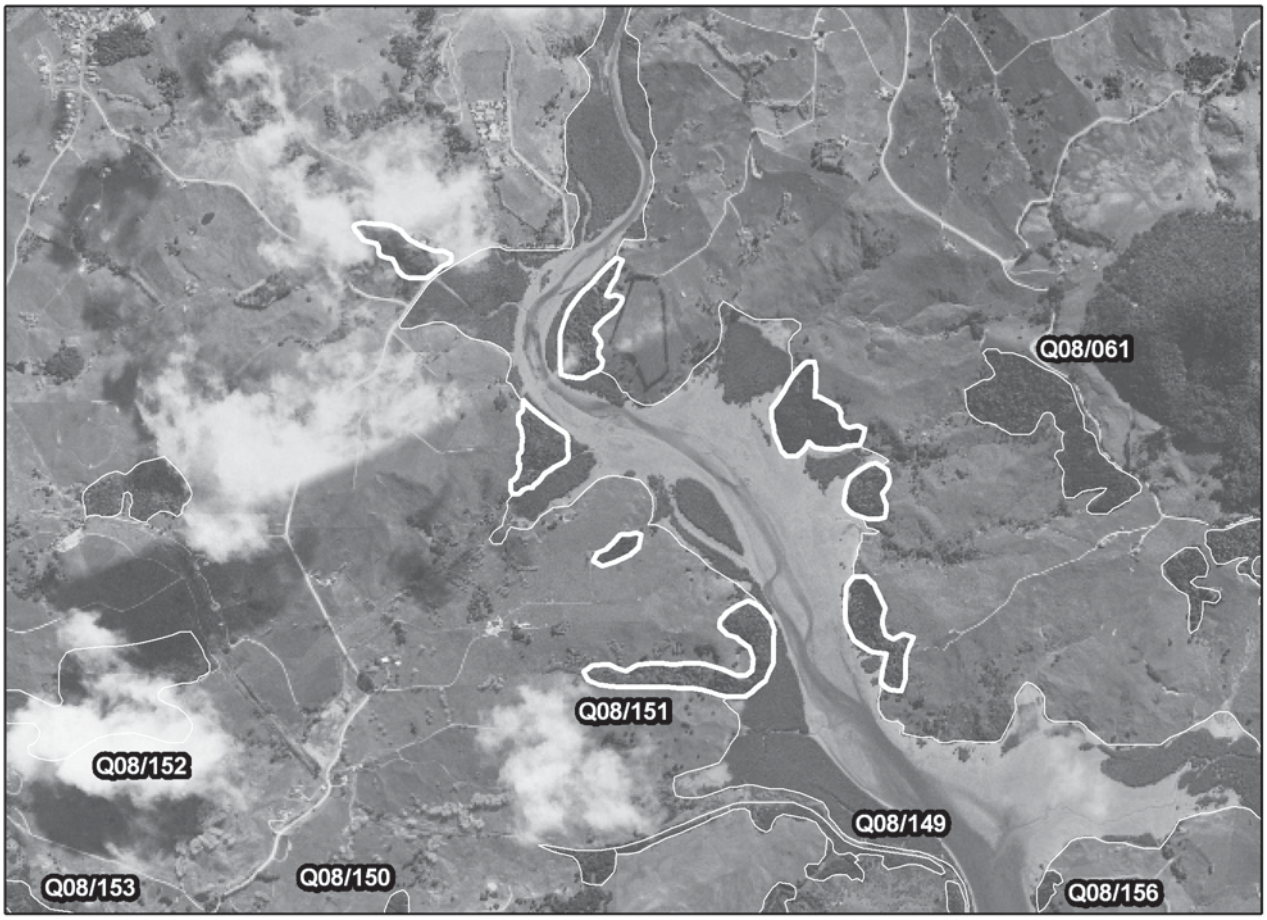
(d) Kanuka in association with totara is present in the second remnant down on the east bank. Associated species include occasional kowhai, karaka and lancewood.

Fauna

Silvereye, kingfisher, kukupa (Gradual Decline).

Significance

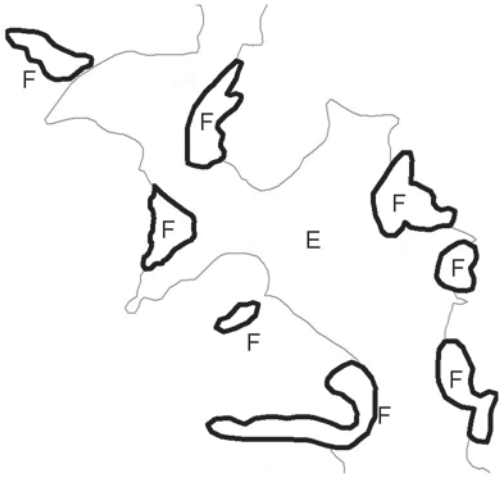
There are some very good quality and diverse coastal forest remnants at this site. The remnants are known to support a threatened bird species (kukupa). All of the ecological units present are considered to be the best representative



Q08/151 Upper Wairau River Coastal Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



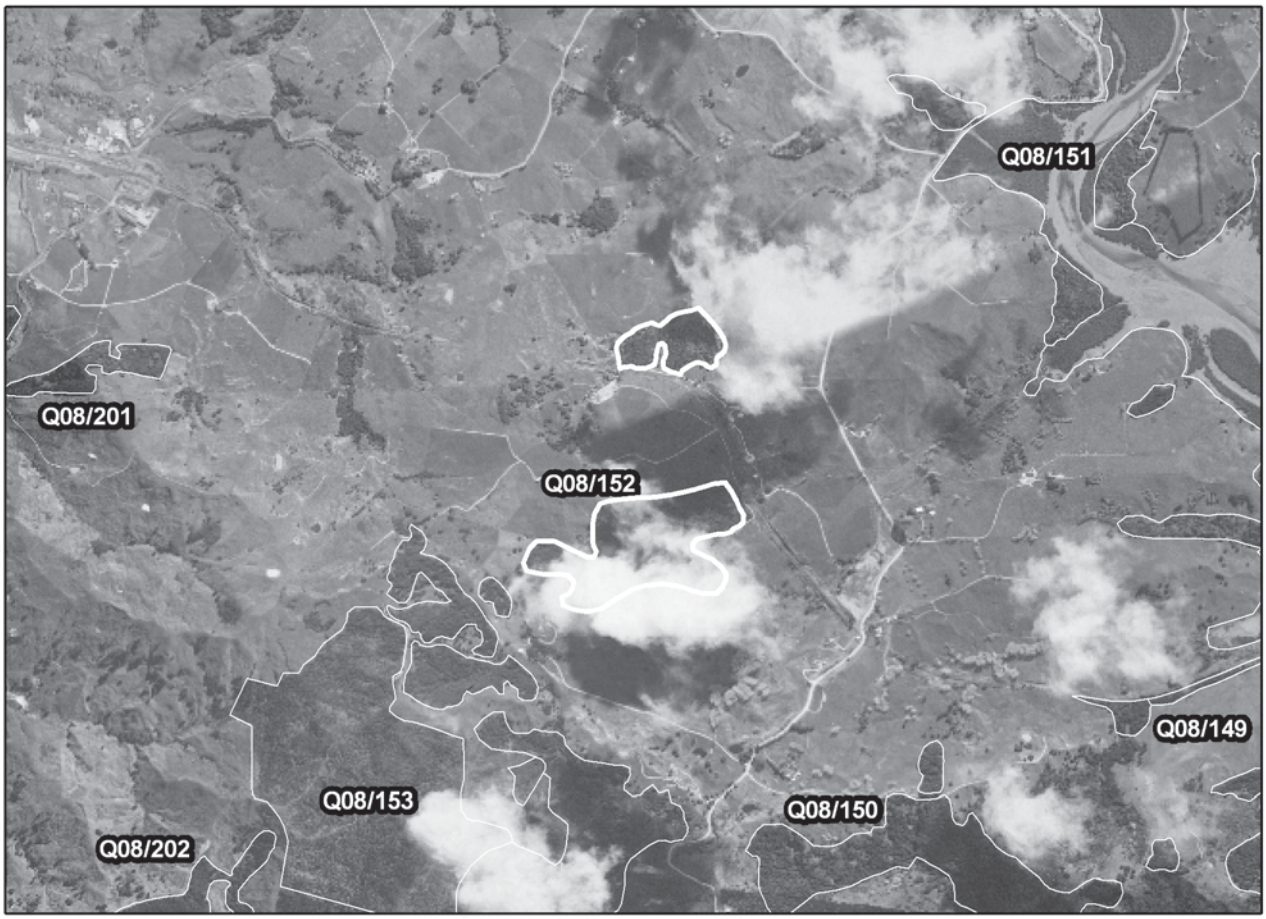
examples of their respective types. Tree privet is a problem is some of the remnants, and Japanese honeysuckle threatens to invade from the surrounding roadsides and paddocks. Grazing is also a negative pressure in many parts of the site. Part of the Wairau River Marginal Strip (0.7 ha), administered by DOC, covers part of ecological unit (b) in the southwest of the site.

BICKERSTAFFE RAIL STATION FOREST

Survey no.	Q08/152
Survey date	29 November 2005
Grid reference	Q08 322 623 (2 remnants)
Area	21.7 ha
Altitude	20–117 m asl

Ecological units

(a) Totara forest on gentle hillslope (60%)





(b) Totara–kahikatea forest in gully (30%)

(c) Totara–rimu forest on ridge top (10%)

Landform/geology

Hillslopes and gullies underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site comprises two indigenous forest remnants in the vicinity of the old rail station at Bickerstaffe, near Maungaturoto. The railway line runs between the two, disappearing into a tunnel just west of the northernmost remnant. The two remnants are some 500 m apart, but share a common forest type (a), and would presumably have been continuous before the intervening land was cleared for pastoral agriculture and mining.

(a) The main forest type has a canopy dominated by totara with frequent ti kouka and kanuka, and occasional kowhai and mamaku. Occasional emergent kahikatea and matai are present.

(b) The lower gully of the southern remnant (which has a small creek flowing through it) is dominated by totara, and has common emergent kahikatea. Frequent puriri and emergent rimu occur. Also present are several species at less than 5% canopy cover, including kowhai, karaka, ti kouka, titoki, taraire, tanekaha and hinau.

(c) Around a ridge top in the southern remnant there are stands of totara and rimu.

Fauna

Australasian harrier, kingfisher.

Significance

This site is representative for two ecological units: (a) totara forest on gentle hillslope, and (c) totara–rimu forest on ridge top. Two separately-owned but contiguous QEII Open Space Covenants (10.1 ha in total, or 47% of the site) cover the middle section of the southern forest remnant (ecological units (b) and (c)).

BICKERSTAFFE FOREST AND SHRUBLAND

Survey no.	Q08/153
Survey date	29 November 2005
Grid reference	Q08 316 614 (4 remnants)
Area	98.0 ha (43.0 ha forest, 55.0 ha shrubland)
Altitude	60–140 m asl

Ecological units

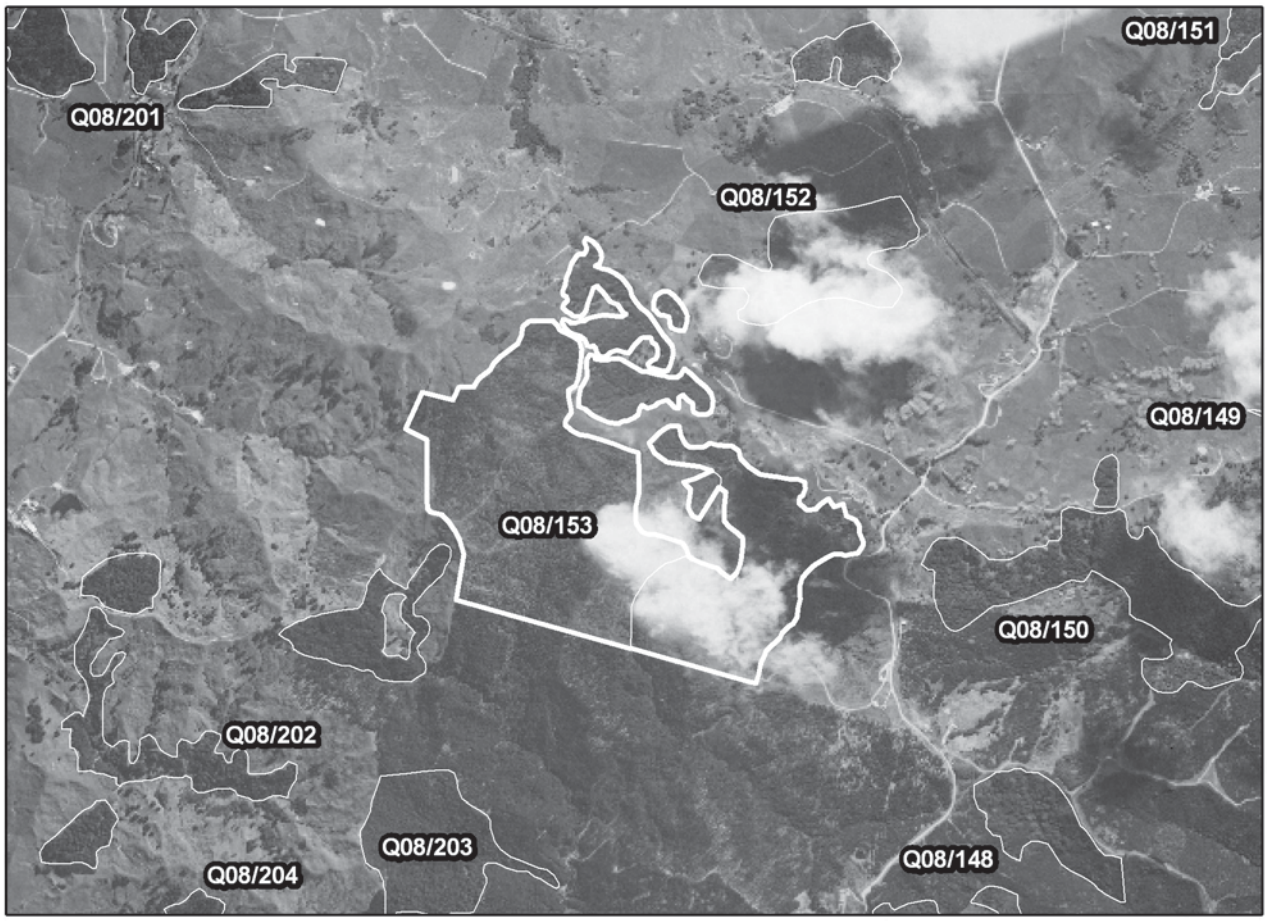
(a) Manuka–kanuka–mahoe shrubland on moderate to steep hillslope (56%)

(b) Taraire forest on moderate to steep hillslope (19%)

(c) Totara forest on moderate to steep hillslope (15%)

(d) Taraire–pukatea forest in gully (5%)

(e) Totara–puriri forest on moderate to steep hillslope (5%)



Q08/153 Bickerstaffe Forest and Shrubland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Hillslopes and gullies underlain by Cretaceous–Paleocene sandstone and mudstone (Mangakahia Complex).

Vegetation

This site comprises a large area of indigenous shrubland forest (seventh largest in Otamatea ED Northland) centred on a hill between Marohemo and Bickerstaffe Roads, near the town of the Maungaturoto. The southern edge of the site abuts extensive radiata pine, and the remaining edges abut pasture or

occasionally, gorse scrub. The most mature vegetation in the site is in the southeastern corner, which is within a QEII Open Space Covenant (6.3 ha in total). This has been fenced since 1986 (3-wire fence) to exclude livestock, but feral goats, and smaller mammals can still access it (according to QEII National Trust records). Three small creeks have their origins within the site.

(a) The main vegetation type is shrubland, dominated in varying percentages over the site by manuka, kanuka and mahoe. Many parts of the shrubland were not visible from public roads, therefore the composition and area covered by this type were estimated from field survey combined with study of recent aerial photography (flown in 2002). From both Marohemo and Bickerstaffe Roads it was possible to determine that gorse, ti kouka, totara and mamaku all appear frequently in the shrubland.

(b) The vegetation on east-facing slopes in the QEII Open Space Covenant (as well as in some areas outside the covenant) comprises a richly diverse community in which taraire occupies at most 30% of the canopy and other prominent elements are kahikatea, totara and nikau (all below 20% canopy cover). Occasional species include mamaku, rewarewa, rimu, puriri, karaka, pukatea, titoki, putaputaweta, lancewood, kohekohe, tarata, ti kouka and kanuka.

(c) In the northern part, near Bickerstaffe Rail Station Forest (Q08/152), there are isolated remnants of totara forest with frequent kahikatea and occasional tarata.

(d) In the gully below and upstream of the QEII Open Space Covenant occurs an interesting forest of taraire mixed with an equal proportion of emergent pukatea. Frequent species in this mixture are mamaku, nikau and emergent kahikatea. Also present are tarata, rewarewa, titoki, karaka, lancewood and ti kouka.

(e) In the northern area, totara forest occurs at the top of a small creek. Puriri is common with occasional nikau and taraire.

Fauna

Not surveyed.

Significance

This site is representative for taraire forest on moderate to steep hillslope and taraire–pukatea forest in gully (the latter is not known from elsewhere in the Northland Conservancy part of the ED). It is significant for being one of the largest areas of contiguous shrubland and forest in Otamatea ED Northland, and includes a wide variety of habitat types. A QEII Open Space Covenant covers 6.3 ha of this site, which corresponds to part of type (b) taraire forest.

POINT CURTIS ROAD COASTAL FOREST REMNANTS

Survey no.	Q08/156
Survey date	2 December 2005
Grid reference	Q08 365 610 (9 remnants)
Area	27.1 ha
Altitude	0–60 m asl



Q08/156 Point Curtis Road Coastal Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Totara–kanuka forest on gentle hillslope (40%)

(b) Totara–kahikatea forest on gentle coastal margin (35%)

(c) Totara–kauri–kahikatea forest on gentle coastal margin (20%)

(d) Kauri–totara forest on gentle coastal margin (5%)

Landform/geology

Coastal hillslopes of Cretaceous sandstone and mudstone (Mangakahia Complex) and Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex).

Vegetation

This site comprises a string of nine forest remnants along the southern coast of Point Curtis, which extends westwards from the foot of Pukeareinga out into the Kaipara Harbour, dividing the Wairau River from the Kaiwaka River. The remnants are narrow (at most 200 m wide) and fragmented, with various secondary forest types of different ages. Many parts appear to be fenced off from adjacent pasture.

(a) The main forest type is dominated by totara in association with kanuka, frequent kahikatea, kauri, rimu, and occasional kowhai, ti kouka, karaka and large radiata pine. This generally occurs on the upper side of the remnants, adjacent to paddocks.

(b) In one main area towards the centre of the site, totara–kahikatea forest with frequent kauri rickers occurs. There is an unusually high density of tall kahikatea spars.

(c) At two points along the coast a forest of abundant totara with common emergent kauri rickers and kahikatea spars. Associated with these are frequent tanekaha and occasional ti kouka and lancewood.

(d) At the western end, a relatively steep coastal ridge has stands of kauri rickers emergent over totara. Further east, similar topography also has a high density of kauri rickers, some of which extend down to the water's edge. Associated with this type are frequent kahikatea and tanekaha, and occasional puriri.

Fauna

Kingfisher.

Significance

This site is representative for (c) totara–kauri–kahikatea forest on gentle coastal margin, which is not recorded elsewhere in the Northland Conservancy part of this ED.

DONALDSON'S FOREST

Survey no.	Q08/157
Survey date	13 January 2006
Grid reference	Q08 380 606
Area	8.1 ha
Altitude	0–20 m asl

Ecological unit

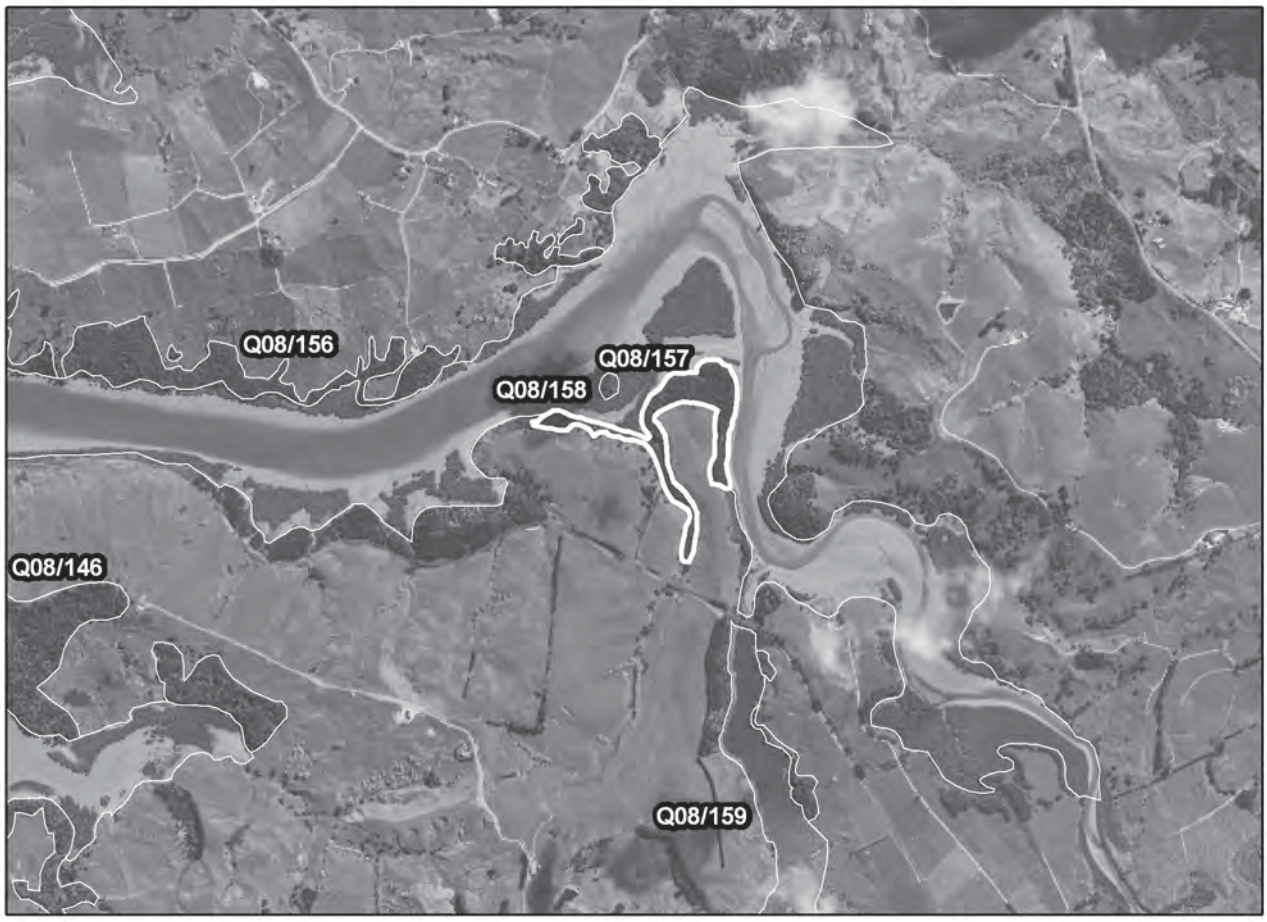
(a) Totara–kanuka–kowhai forest on gentle coastal margin (100%)

Landform/geology

Coastal banks on Pleistocene alluvium.

Vegetation

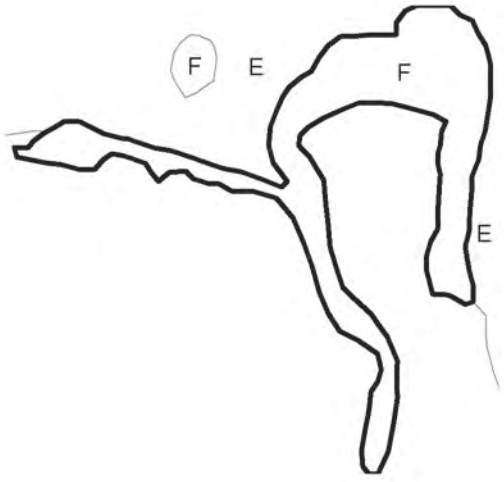
This site comprises a narrow (<150 m) coastal stretch of forest fringing a peninsula in the Kaiwaka River. The forest type appears to be quite consistent throughout: dominant totara with equally common kanuka and kowhai.



Q08/157 Donaldson's Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Occasional species in the canopy include tarata, rimu, matai, ti kouka, mapou, harakeke, *Coprosma macrocarpa*, mahoe, mamaku, kauri, tanekaha, titoki, rewarewa, koromiko and prickly mingimingi (many of these are on the coastal margin). The following weeds were recorded as occasional: woolly nightshade, hawthorn, gorse and wild peach. Manatu, which was reported as 'commonly occurring' in a 2003 survey (SSBI Q08/H074), was not recorded during the present survey.

Fauna

Kingfisher, Australasian harrier. A pied shag (Sparse) colony was noted in a totara on the water's edge.

Significance

This site contains a representative forest type (the best example of totara–kanuka–kowhai forest in Otamatea ED Northland), and supports a threatened bird species (pied shag). Its narrow, convoluted shape makes it subject to the negative effects of wind exposure, weeds and animal pests.

UNNAMED ISLAND IN KAIWAKA RIVER

Survey no.	Q08/158
Survey date	13 January 2006
Grid reference	Q08 377 608
Area	0.4 ha
Altitude	sea level

Ecological unit

(a) Totara–kowhai forest on gentle coastal margin (100%)

Landform/geology

Not surveyed.

Vegetation

This site comprises a tiny terrestrial islet rising above a forest of mangroves in the Kaiwaka River, within the Otamatea River site (Q08/062). The most abundant tree is totara, followed by kowhai. Other species include tarata, tanekaha, lancewood, ti kouka and titoki. In 2000, a field survey team landed on the island and compiled a plant species list comprising 57 indigenous species and 3 exotic species (SSBI Q08/H047). Most species recorded were common, apart from small-leaved milk tree, *Metrosideros diffusa* and kanono. This appears to be the only record for kanono in Otamatea ED Northland. *Hoheria sexstylosa* was recorded as present, however this is likely to be the more common northern species *H. populnea* (houhere).

Significant flora

Kanono is not known from any other site in Otamatea ED Northland and is therefore considered to be locally uncommon.

Fauna

Not surveyed.

Significance

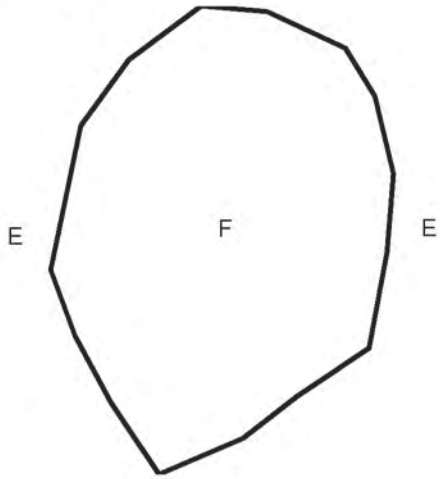
The forest trees appear to be healthy, perhaps as a result of the site's semi-isolation in a mangrove-filled inlet. It is only 100 m from Donaldson's Forest (Q08/157) on the southern shore. Though this is not a representative example of totara–kowhai forest in Otamatea ED Northland, the site is significant for being the habitat of a locally uncommon plant species (kanono).



Q08/158 Un-named Island in Kaiwaka River

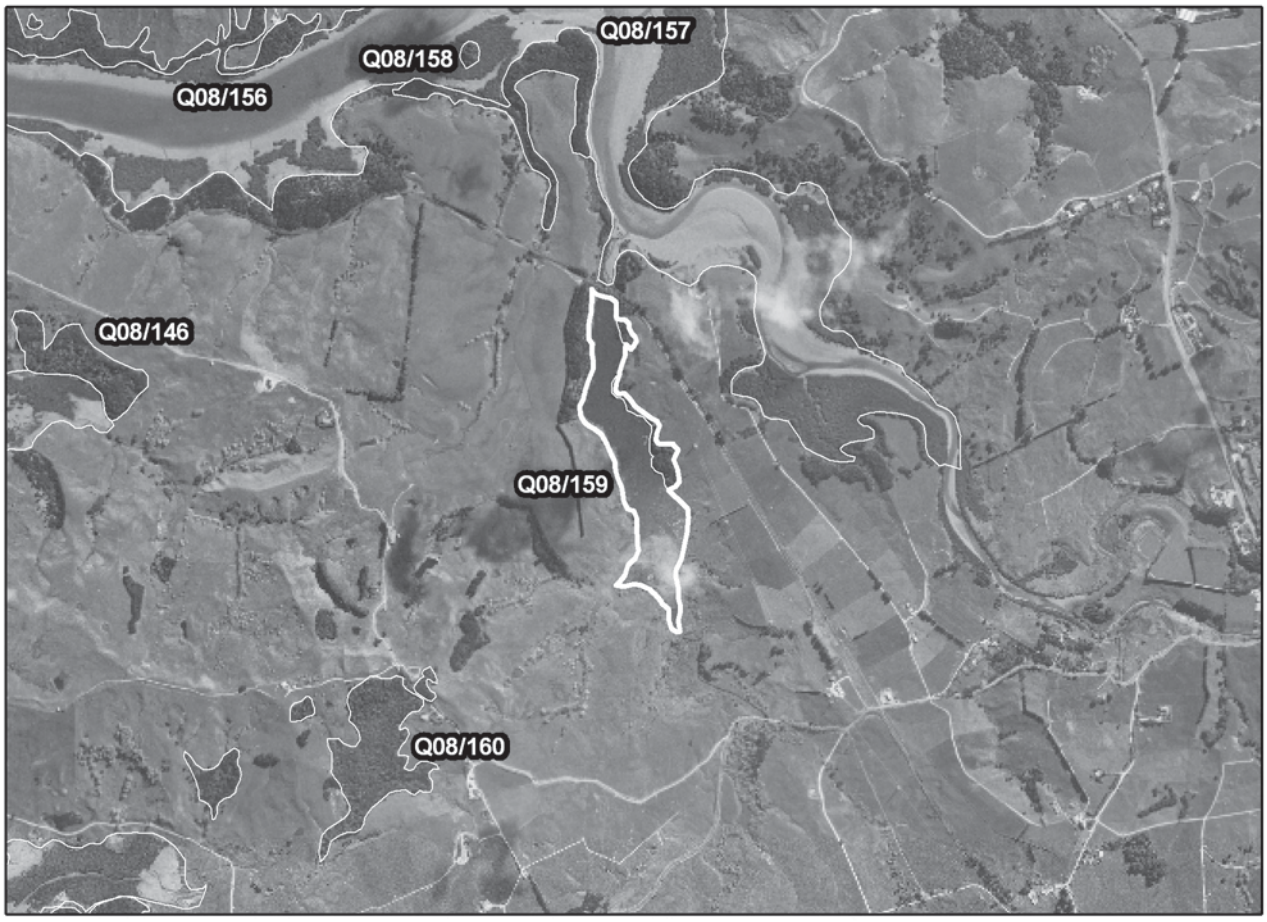
S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



KAITARA CONSTRUCTED LAKE

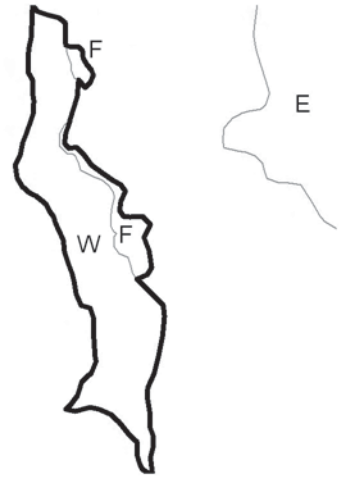
Survey no.	Q08/159
Survey date	13 January 2006
Grid reference	Q08 383 594
Area	15.8 ha (1.9 ha forest, 13.9 ha wetland)
Altitude	11–20 m asl



Q08/159 Kaitara Constructed Lake

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Open water (constructed lake) (60%)

(b) Raupo–willow weed reedland on lake margin (23%)

(c) Totara forest on moderate hillslope (12%)

(d) *Baumea articulata* reedland on lake margin (5%)

Landform/geology

Man-made pond/lake.

Vegetation

This site comprises the largest constructed lake in Otamatea ED Northland, which is a former tidal inlet/freshwater creek mouth which has been cut off from the harbour by a rail bridge that acts as a dam allowing freshwater to pool at the bottom of Kaitara Creek. The lake is approximately 120 m wide, 1.1 km long and is shallow, especially at its southern margin. The catchment is largely pasture, though along part of its western bank there is a Tasmanian blackwood and radiata pine plantation (excluded from site). A narrow margin of totara forest extends along the northeastern bank with frequent kowhai, which has been included in the site due to its indigenous character. At the south end is the largest raupo-dominant area in the Northland Conservancy part of the ED. The raupo occurs in association with willow weed, however it could not be determined from a distance whether the willow weed was the native species (*Persicaria decipiens*) or one of the exotic willow weeds (*Polygonum* spp.). *Baumea articulata* reedland occurs locally around the margins, and together these areas comprise the largest example of this vegetation type in Otamatea ED Northland.

Fauna

Australasian harrier, paradise shelduck, white-faced heron, pukeko, pied shag (Sparse), black shag (Sparse), grey duck (Serious Decline).

In 1977, this site was identified by the NZ Wildlife Service as one of the most outstanding waterfowl and rail habitats in Northland, with 50+ grey ducks, 20+ paradise shelducks and Australasian shoveler ducks (SSBI Q08/H031). During this survey and the 1977 survey the most common bird species were introduced species: mallard duck (*Anas platyrhynchos*) and black swan (*Cygnus atratus*). The mallards are likely to be hybridising with the grey ducks.

Significance

This is the largest freshwater wetland in Otamatea ED Northland. It is representative for ecological units (b) the raupo–willow weed reedland (which is the most extensive example of its type) and (c) the *Baumea articulata* reedland (the only one of its type). It has the capacity to support good populations of indigenous water birds (e.g. black shag, white-faced heron) and is potentially important as a seasonal site for indigenous migratory birds which use freshwater ponds and lakes to overwinter (e.g. pied stilt).

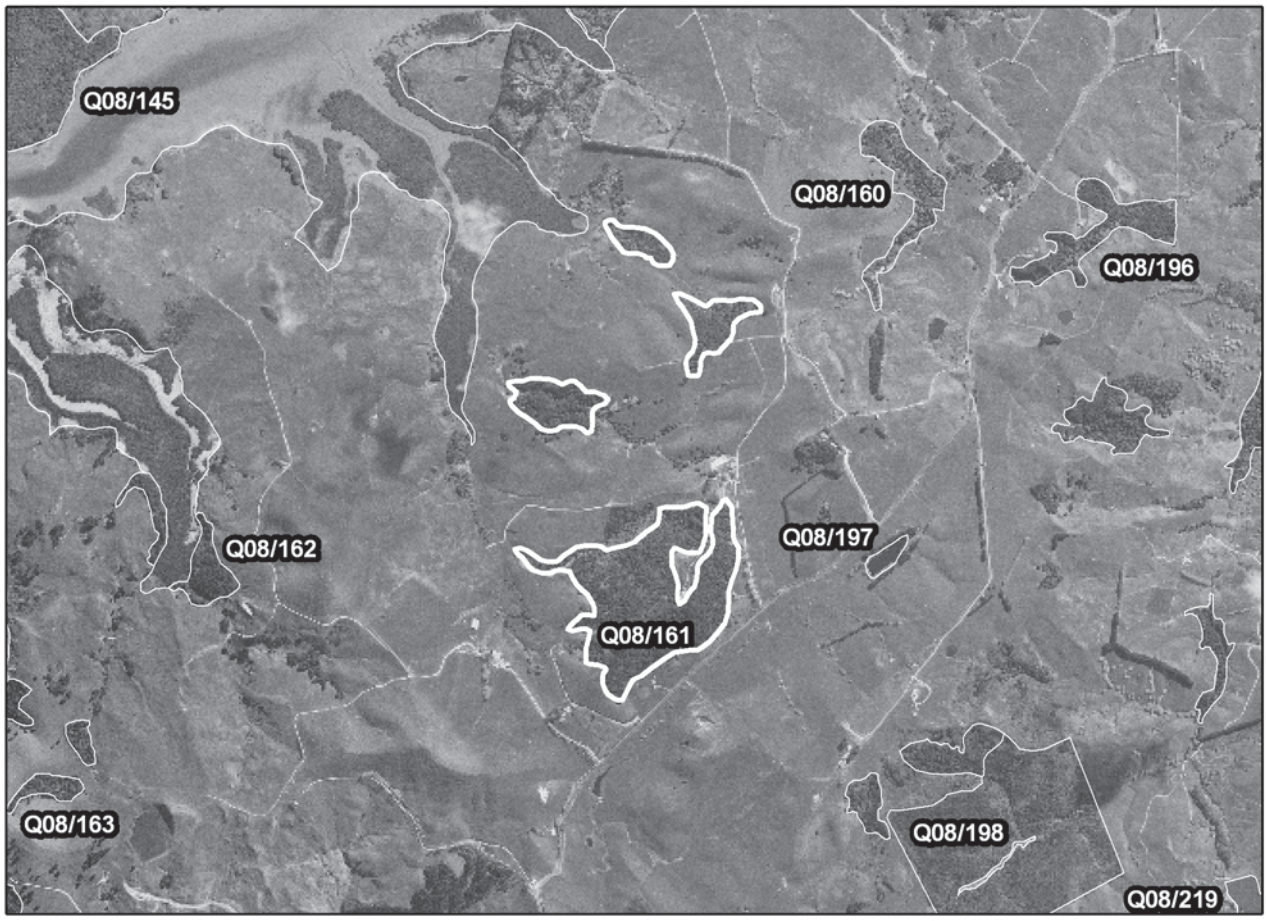
ROTOKIEKIE CREEK FOREST REMNANTS

Survey no.	Q08/161
Survey date	7 December 2005
Grid reference	Q08 364 560 (4 remnants)
Area	30.8 ha
Altitude	8–100 m asl

Ecological units

(a) Totara forest on moderate to steep hillslope (50%)

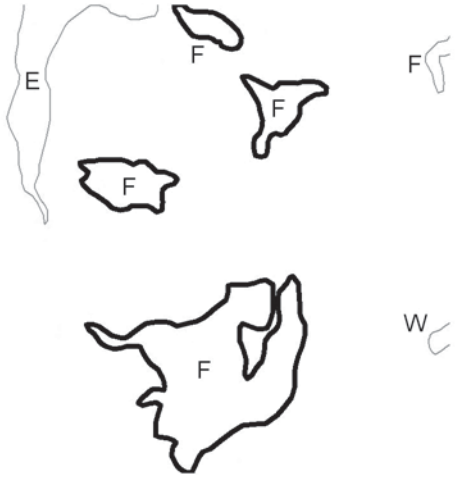
(b) Puriri forest in gully (50%)



Q08/161 Rotokiekie Creek Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Hillslopes and gullies underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex).

Vegetation

This site comprises three small forest remnants along two ephemeral creeks, and a larger forest remnant above them on a hilltop adjacent to Oneriri Road. The remnants are all within the immediate catchment of Rotokiekie Creek, a mangrove-filled inlet on the Otamatea River of the Kaipara Harbour (Q08/062).

The main land use in the surrounding area is pastoral farming. The upper forest remnant appears to be at least partially fenced from livestock, however the lower three are not, and have occasional willows around their edges. The vegetation type of the lower remnants was extrapolated from gully forest in the upper forest remnant, as well as study of a recent aerial photograph (flown in 2002).

(a) The drier parts of the landscape, especially on the hilltop and spurs support a forest dominated by totara almost exclusively. Occasional species include nikau, ti kouka, karaka, rewarewa and taraire.

(b) The wetter areas, including gullies on the hill and in the smaller remnants, support puriri-dominant forest with frequent large matai, nikau and kohekohe, and occasional pukatea, kowhai and small-leaved milk tree. A short walk-through survey was carried out in a south-facing gully of the hill remnant, in which good regeneration of the following species in the understorey was noted: karaka, kohekohe, nikau, taraire and kawakawa. The subcanopy had abundant supplejack and nikau, and frequent mapou and karaka. Gully fern, shaking brake, common maidenhair, and an indigenous grass (*Oplismenus hirtellus* subsp. *imbecilis*) were common on the forest floor.

Fauna

Kingfisher, tui, kukupa (Gradual Decline).

Significance

Landowners on Oneriri Road report that they undertake regular control of possums and rats with brodifacoum, and have noticed an increase in kukupa since poisoning began (over the last two years or so). Some of the landowners on Oneriri Road have fences on their properties to keep the indigenous forest separate from lawns and gardens. The presence of a threatened species (kukupa) and the best example of (b) puriri forest in gully affords these remnants Level 1 significance.

TAKAHOA CREEK FOREST

Survey no.	Q08/163
Survey date	13 December 2005
Grid reference	Q08 342 550 (6 remnants)
Area	17.3 ha
Altitude	0–80 m asl

Ecological unit

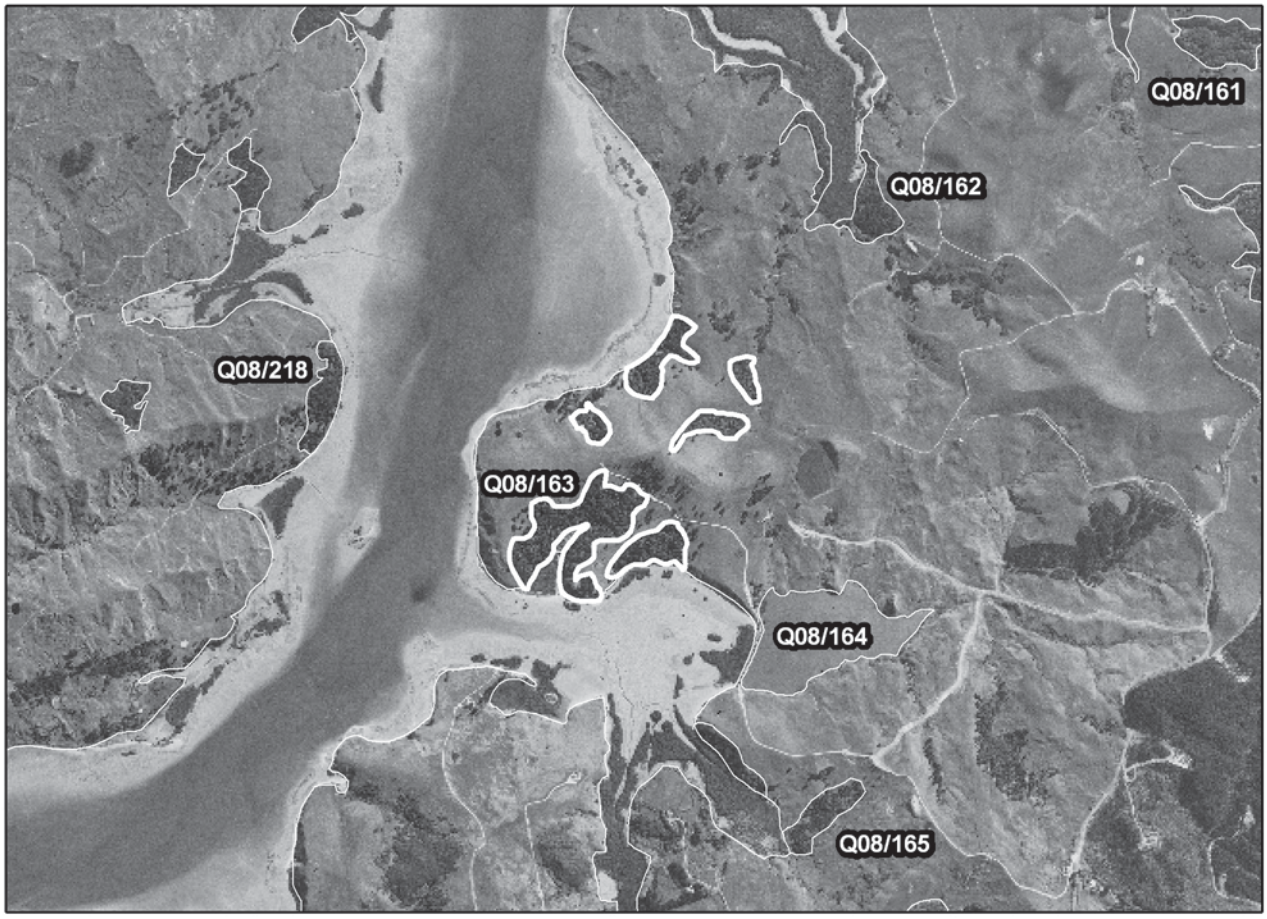
(a) Totara–kowhai–karaka–puriri forest on steep coastal margin (100%)

Landform/geology

Coastal hillslopes underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex).

Vegetation

This site comprises six closely associated forest remnants on a headland on the northern side of Takahoa Creek. The remnants are set within a landscape of pasture which is rapidly being converted to residential lifestyle blocks. Recently established plantings of mostly non-ecosourced indigenous species are dotted



Q08/163 Takahoa Creek Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



around the paddocks between the remnants (including whaririki, toetoe, harakeke, karaka, ngaio, pohutukawa, koromiko, manuka, *Carex testacea* and karo). The Takahoa Government Purpose Wildlife Management Reserve (Q08/164), an important site for resident and migratory waterbirds, lies just to the southeast of the forest remnants. All of the remnants are of the same type: totara is dominant, and kowhai, karaka and puriri are equally common. Kohekohe is frequent, and matai, nikau, ti kouka, *Hebe macrocarpa* and leafless lawyer occur occasionally.

Significant flora

Leafless lawyer (regionally significant) was collected during a 2001 survey of the forest remnants (AK 252397). Mangeao (locally uncommon) was also recorded during that survey (SSBI Q08/H070).

Fauna

Kukupa (Gradual Decline) were observed here in 2001 (SSBI Q08/H070).

Significance

The site is considered representative, as it supports the only example of such a diverse coastal forest type in Otamatea ED Northland. In addition, both regionally significant and locally uncommon plant species are present here (leafless lawyer, mangeao). A threatened bird species is known to use the forest (kukupa). This site is very near to the Takahoa Government Purpose Wildlife Management Reserve (Q08/164) and this site is considered to be an important complementary habitat for the wildlife associated with both itself and the wildlife reserve. The Otamatea Marginal Strip No. 2 (administered by DOC) covers 2 ha of forest on the coastal margin. The presence of non-ecosourced plants in such close proximity to the natural forest is an issue with potential genetic pollution. Another concern would be the future introduction of exotic weeds through residential gardening. Until recently the remnants have been grazed by livestock.

TAKAHOA GOVERNMENT PURPOSE WILDLIFE MANAGEMENT RESERVE

Survey no.	Q08/164
Survey date	13 December 2005
Grid reference	Q08 349 5545
Area	13.0 ha
Altitude	0 m asl

Ecological units

(a) Open water (constructed lake) (99%)

(b) Lake clubrush reedland on lake margin (1%)

Landform/geology

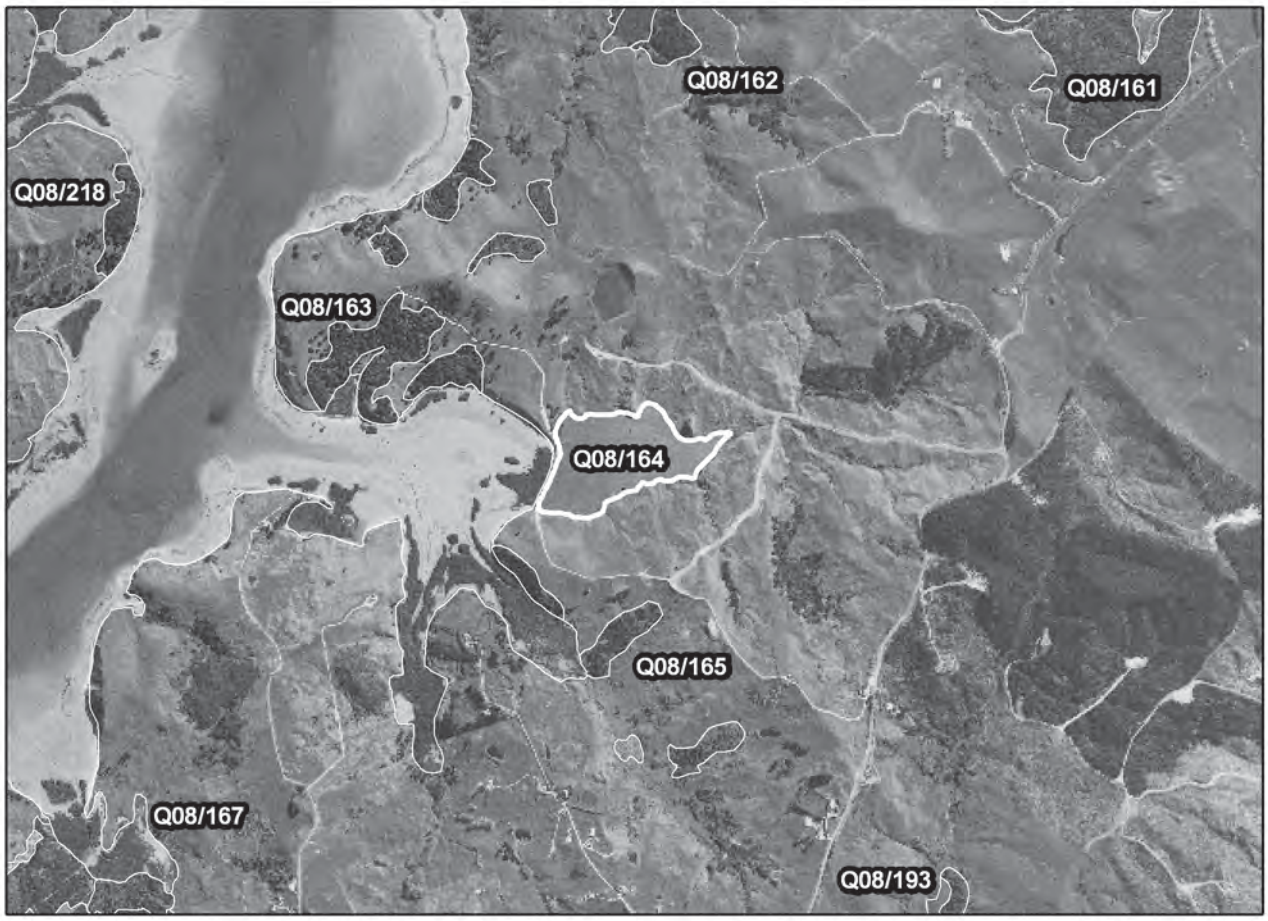
Pleistocene alluvial and/or estuarine sediments.

Vegetation

This site comprises a small lake (approximately 600 m in an east–west direction, and 400 m north–south), constructed by damming the inflow of small creek into a tidal inlet (Takahoa Creek on the Otamatea River). The lake is very sparsely vegetated in indigenous species; only a tiny section of the lake fringe has a reedland of lake clubrush. The rest of the vegetation is poplar (*Populus* sp.), willow (*Salix* sp., curly-leaved variety), woolly nightshade, pasture, or recently established conifers (on the northern bank). Dead mangroves in the centre of the lake (killed by changes in the water regimes as a result of the embankment) serve as roosts for waterbirds.

Fauna

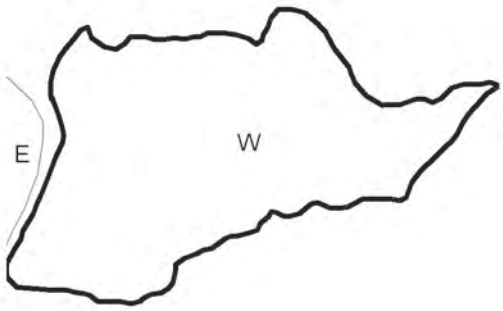
In the present study the following indigenous birds were observed on the lake or directly on the margins: pied shag (Sparse), NZ pipit, grey duck (Serious



Q08/164
Takahoa Government Purpose Wildlife Management Reserve

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Decline), paradise shelduck, spur-winged plover, royal spoonbill (Coloniser), welcome swallow.

Black shag (Sparse), little shag, kingfisher and Australasian shoveler were also recorded here in 2001 (SSBI Q08/H069).

Significance

This is the second largest freshwater wetland in Otamatea ED Northland, and although it has been constructed by damming a tidal inlet, it has the capacity to support good populations of indigenous waterbirds and is important seasonally for migratory birds. It is a representative site for (b) lake clubrush reedland,

which is only known from two sites (the other is Ngamotu Farm Pond (Q09/031)). Four threatened bird species are known to use the lake (see above). The lake is a moulting site for paradise shelduck (Peter Anderson, pers. comm.). The most abundant bird species on the wetland at the time of the site visit were, however, black swans (introduced and naturalised), and there were occasional domestic geese, Australian magpies and peafowl. The entire extent of the lake is within the Takahoa Government Purpose Wildlife Management Reserve, which is administered by the Department of Conservation.

RANGIORA ROAD FOREST REMNANTS

Survey no.	Q08/166
Survey date	7 December 2005
Grid reference	Q08 320 531 (3 remnants)
Area	11.7 ha (5.2 ha forest, 6.5 ha shrubland)
Altitude	2–40 m asl

Ecological units

(a) Manuka–kanuka shrubland on gentle coastal margin (55%)

(b) Totara–kanuka forest on gentle coastal margin (45%)

Landform/geology

Coastal hillslopes and gullies underlain by Cretaceous–Paleocene thinly bedded calcareous mudstone (Whangai Fmn, Mangakahia Complex).

Vegetation

This site comprises three remnants of indigenous shrubland and forest on the southern coastal margin of the lower Otamatea River (Q08/062).

(a). Manuka is currently dominant in the canopy of this manuka–kanuka shrubland but kanuka is likely to become dominant in the short term. Young totara are frequent and occasional examples of mapou, mingimingi, ti kouka, mamangi and pampas are present. The shrubland areas lie adjacent to Rangiora Road next to the largest infestation of dally pine recorded in this survey.

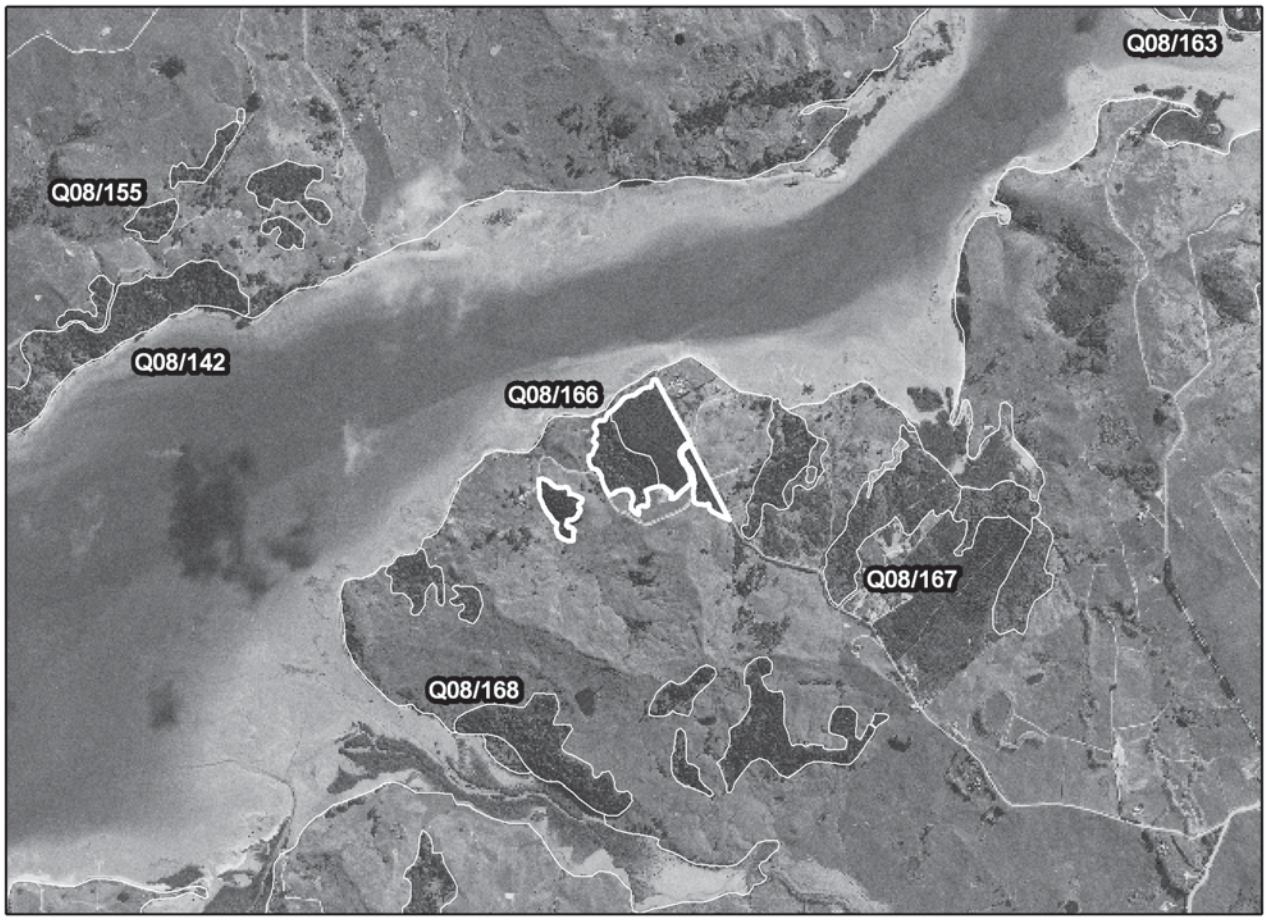
(b) The dominant species in the forest canopy, to the west, are totara and kanuka, accompanied by frequent puriri and kowhai, and occasional pukatea.

Fauna

Not surveyed.

Significance

This site supports quite a large area of regenerating shrubland comparative to other remaining examples in Otamatea ED Northland (13th largest), and it is also considered to be a representative example of manuka–kanuka shrubland. The natural character and function of the remnants is threatened by grazing and weeds, though dally pine is unlikely to be able to establish unless the shrubland cover is disturbed.



Q08/166 Rangiora Road Forest Remnants

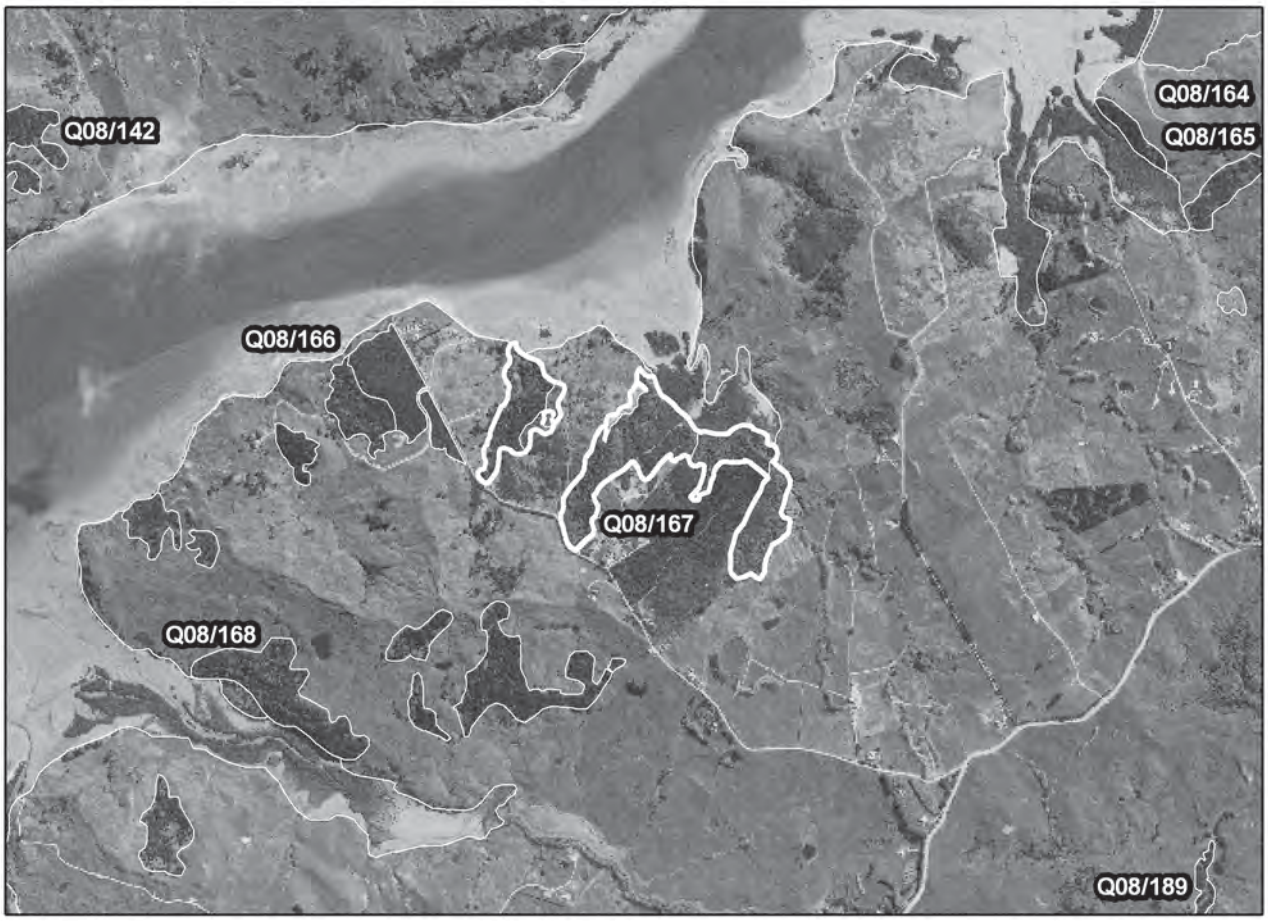
S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



MANGAITI CREEK FOREST REMNANTS

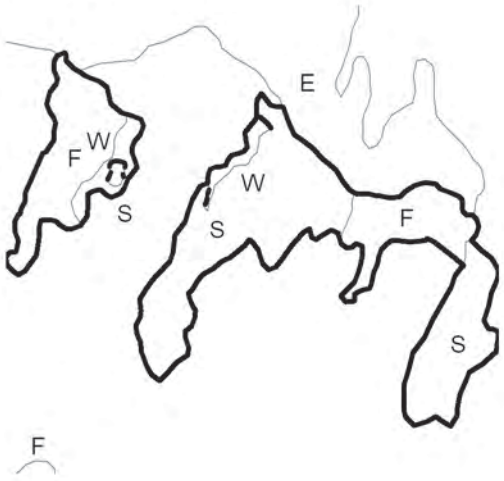
Survey no.	Q08/167
Survey date	7 December 2005
Grid reference	Q08 329 530 (2 remnants)
Area	22.7 ha (7.8 ha forest, 14.2 ha shrubland, 0.7 ha wetland)
Altitude	0–53 m asl



Q08/167 Mangaiti Creek Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Manuka–mapou shrubland on gentle hillslope (25%)

(b) Manuka shrubland on gentle hillslope (25%)

(c) Taraire–puriri forest in gully (15%)

(d) Manuka–ti kouka–mapou shrubland on gentle hillslope (13%)

(e) Totara–kahikatea–kowhai forest on moderate hillslope (10%)

(f) Kahikatea forest in gully (9%)

(g) Raupo reedland in small depression (3%)

Landform/geology

Coastal hillslopes underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site comprises indigenous forest, shrubland and freshwater wetland on the southwestern bank of the Mangaiti Creek, a small tidal inlet on the Otamatea River (Q08/062). It is a mosaic of habitat types interspersed with various land use activities such as pastoral farming, plantation forestry and residential dwelling. Many of the indigenous vegetation edges are fragmented and sparse. Some areas of indigenous shrublands have been interplanted with eucalyptus; these areas have been excluded from the site.

(a) In the upper catchment, next to Rangiora Road, the main vegetation cover is a shrubland of manuka and mapou, with frequent ti kouka and tarata, and occasional bracken, bush lawyer, putaputaweta, mamangi, akepiro, karamu, kahikatea and totara.

(b) In the lower catchment only manuka is dominant in the shrublands. Ti kouka are frequent. Tracks and clearings are present, and it seems that some active clearance is still going on.

(c) The westernmost gully comprises taraire–puriri forest with frequent karaka and kowhai, and occasional mapou. Stands of black wattles on the edges are excluded from the site.

(d) On the extreme eastern side, shrubland dominated by manuka, ti kouka and mapou occurs with frequent tarata and mamaku. The yellow hues of ti kouka and tarata make this area stand out quite starkly from the darker, pure manuka shrubland. This shrubland may be associated with a small waterway, though this was difficult to ascertain from the roadside.

(e) On the coastal margin at the upper end of the Mangaiti Creek, a small of area forest is composed of totara, kahikatea and kowhai with frequent tarata.

(f) A dense kahikatea stand is present next to Rangiora Road in a creek bed. Pukatea, karaka and kowhai are frequent, and mamangi and ti kouka are occasional.

(g) Two small areas of raupo reedland are present below the forest and shrubland in close proximity to the coast.

Fauna

Australasian harrier.

Significance

This site has a high diversity of habitat types for its size, although this is partially a result of a variety of recent disturbances. The site is representative for (a) manuka–mapou shrubland on gentle hillslope, and (d) manuka–ti kouka–mapou shrubland on gentle hillslope. The latter was not recorded elsewhere in Otamatea ED Northland.

MOHINUI FOREST REMNANT 1

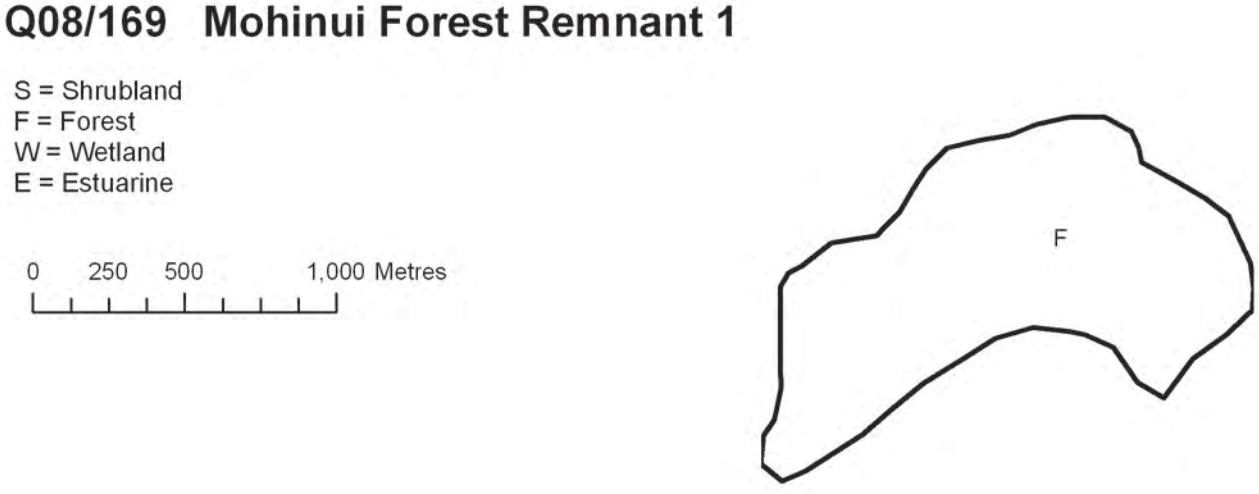
Survey no.	Q08/169
Survey date	13 December 2005
Grid reference	Q08 333 504
Area	4.0 ha
Altitude	72–100 m asl

Ecological units

(a) Totara–puriri forest on moderate to steep hillslope (50%)

(b) Kahikatea–puriri forest on gentle hillslope (50%)





Landform/geology

Hillslope underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site comprises a compact, oblong indigenous forest remnant on a south-east facing slope at the extreme western side of the Kaira Creek catchment. The surrounding land use is pastoral farming, and the forest does not appear to be fenced off from grazing livestock.

(a) Roughly half the area (in the east) is steep and covered in a forest of totara and puriri with frequent kahikatea, taraire, kanuka and kohekohe, and occasional matai, pukatea and tarata.

(b) The other half has more gentle terrain, and supports a forest with abundant, tall kahikatea (some of which are mature trees, much older than most of the surrounding forest) and puriri. Frequent species include matai, kanuka and pukatea. Occasional species include totara, titoki, ti kouka, ponga and rewarewa.

Fauna

Australasian harrier.

Significance

Some of the puriri appear stressed by exposure or stock damage to roots, and may be an indicator of the condition of the rest of the forest. Without fencing this remnant is unlikely to have much understorey. Despite problems with current condition, the presence of mature kahikatea is significant for Otamatea ED Northland, therefore ecological unit (b), kahikatea–puriri forest on gentle hillslope, is a representative type.

PAHI RIVER HEADWATERS

Survey no.	Q08/170
Survey date	16 December 2005
Grid reference	Q08 315 666 (10 remnants)
Area	31.0 ha (30.7 ha forest, 0.3 ha wetland)
Altitude	40–120 m asl

Ecological units

(a) Kahikatea forest in gully (45%)

(b) Totara–kanuka treeland in gully (20%)

(c) Totara treeland on moderate to steep hillslope (15%)

(d) Totara–kahikatea forest on gentle hillslope (10%)

(e) Taraire forest on moderate to steep hillslope (9%)

(f) Open water (constructed freshwater farm pond) (1%)

Landform/geology

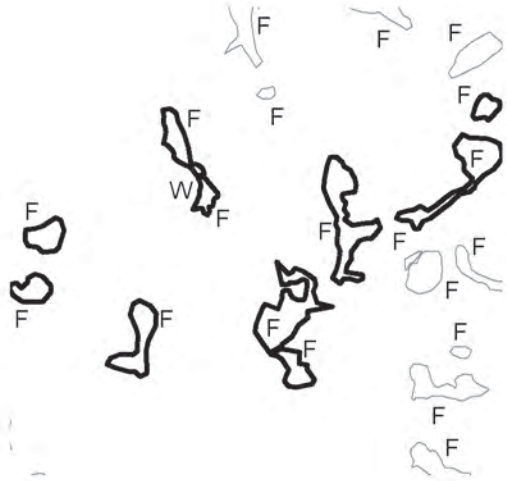
Hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex); Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex); melange (undifferentiated Mangakahia & Motatau Complex lithologies).



Q08/170 Pahi River Headwaters

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Vegetation

This site comprises ten separate indigenous forest remnants in the upper catchment of the Pahi River, in hills behind the town of Maungaturoto. The remnants are scattered up to 500 m apart, mostly along small watercourses, and are interspersed with pastoral land divided by farm tracks. Along the main stream there are reaches with a lot of crack willow, hawthorn and tree privet which have been excluded from the site.

(a) The main forest type comprises a dense kahikatea canopy with frequent nikau, rewarewa, rimu, kanuka, taraire and totara and occasional matai and ti

kouka are present. Hawthorn is often present on forest edges. Most of this type falls within the boundaries of a QEII Open Space Covenant.

(b) Narrow examples of totara–kanuka treeland occur along stream banks with frequent ti kouka, kowhai, kahikatea and hawthorn, and occasional matai, mapou, tarata, bush lawyer, poplar and radiata pine.

(c) Totara treeland is present on a drier hillslope in the upper catchment next to a farm pond.

(d) Totara–kahikatea forest often occurs at the edges of kahikatea gully forest.

(e) The two westernmost remnants on steep hill topography are dominated by taraire with frequent species pukatea and rewarewa, and occasional kanuka, kohekohe, kahikatea, nikau and rimu.

(f) A small farm pond is nestled between two totara treeland remnants of type (c).

Fauna

Grey warbler, kingfisher, spur-winged plover.

Significance

This site contains one of the best representative examples of (a) kahikatea forest in gully in Otamatea ED Northland. The forest remnants in this site provide valuable protection and stability to the upper catchment of the Pahi River. The largest continuous forest area on the stream banks (type (a)) is within a QEII Open Space Covenant (4 ha in extent).

WAIPIKOPIKO STREAM HEADWATERS

Survey no.	Q08/171
Survey date	16 December 2005
Grid reference	Q08 316 679 (7 remnants)
Area	24.5 ha
Altitude	60–100 m asl

Ecological units

(a) Totara–kahikatea forest on alluvium (75%)

(b) Taraire–kahikatea–nikau forest on moderate to steep hillslope (10%)

(c) Totara–karaka–kowhai forest on moderate to steep hillslope (7%)

(d) Nikau–kahikatea forest in gully (5%)

(e) Nikau forest on moderate hillslope (3%)

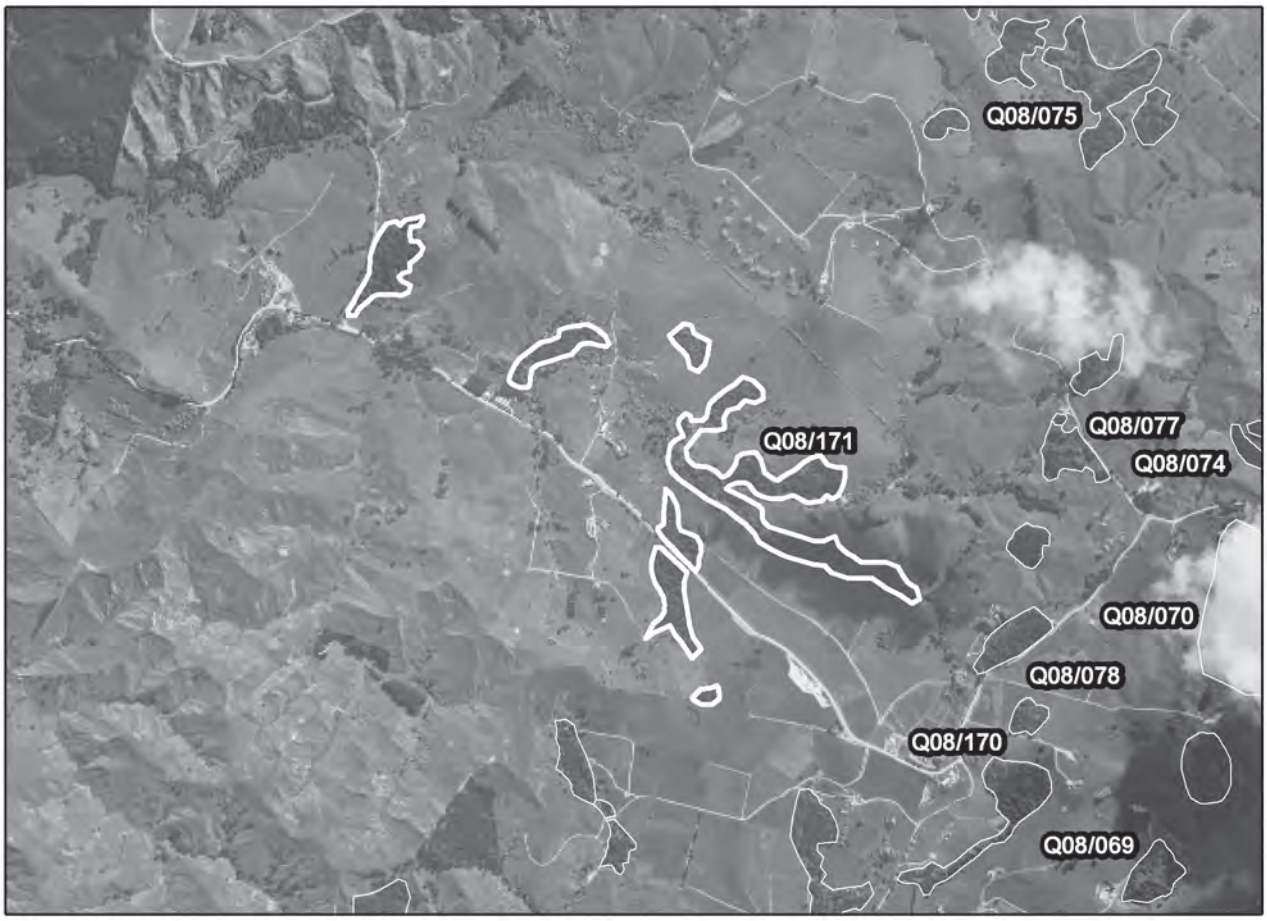
Landform/geology

Hillslopes underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex) and melange (undifferentiated Mangakahia & Motatau Complex lithologies), and valley flats on Pleistocene and Holocene alluvium.

Vegetation

This site encompasses indigenous forest remnants on the banks of the upper Waipikopiko Stream. Pastoral land surrounds the forest remnants, and hawthorn is widely naturalised in and around the stream banks.

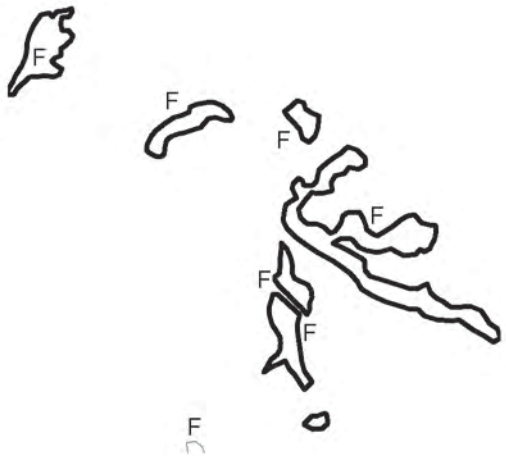
(a) The most common forest type is totara–kahikatea forest, the latter usually emergent above the former, with frequent kanuka and ti kouka (especially on



Q08/171 Waipikopiko Stream Headwaters

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



pasture edges) and occasional titoki, kowhai, matai, puriri, rimu, rewarewa, tanekaha, kauri and hawthorn.

(b) The forest cover on a small south-facing hillslope comprises abundant taraire in association with kahikatea and nikau. Karaka and totara are frequent, with occasional kohekohe.

(c) Contiguous with forest of type (b) on similar topography there is a small example of totara-dominant forest with common karaka and kowhai. Here,

nikau and kahikatea are frequent with occasional matai, titoki, puriri, rimu, rewarewa, tarata and ti kouka.

(d) One small, protected gully-head supports a forest with a nikau-dominant canopy shaded by numerous mature emergent kahikatea. Also present are frequent kowhai, frequent emergent pukatea and occasional matai, taraire and kauri.

(e) One small stand comprising abundant nikau in the canopy grows on an exposed hill paddock just north of the Waipikopiko Stream. The nikau are associated with frequent totara and hawthorn, and occasional pukatea, matai, ti kouka and taraire.

Fauna

Australasian harrier.

Significance

All of the ecological units in this site are considered representative. Type (a) totara-kahikatea forest on alluvium is considered to be one the best examples of its type recorded in Otamatea ED Northland. There are four other unique representative ecological units in this site: (b) taraire-kahikatea-nikau forest on moderate to steep hillslope, (c) totara-karaka-kowhai forest on moderate to steep hillslope, (d) nikau-kahikatea forest in gully, and (e) nikau forest on moderate hillslope.

WAIRAU RIVER RIPARIAN FOREST REMNANTS

Survey no.	Q08/173
Survey date	14 December 2005
Grid reference	Q08 368 662 (10 remnants)
Area	21.3 ha
Altitude	20–40 m asl

Ecological units

(a) Totara-kahikatea forest on alluvium (95%)

(b) Kahikatea forest on alluvium (5%)

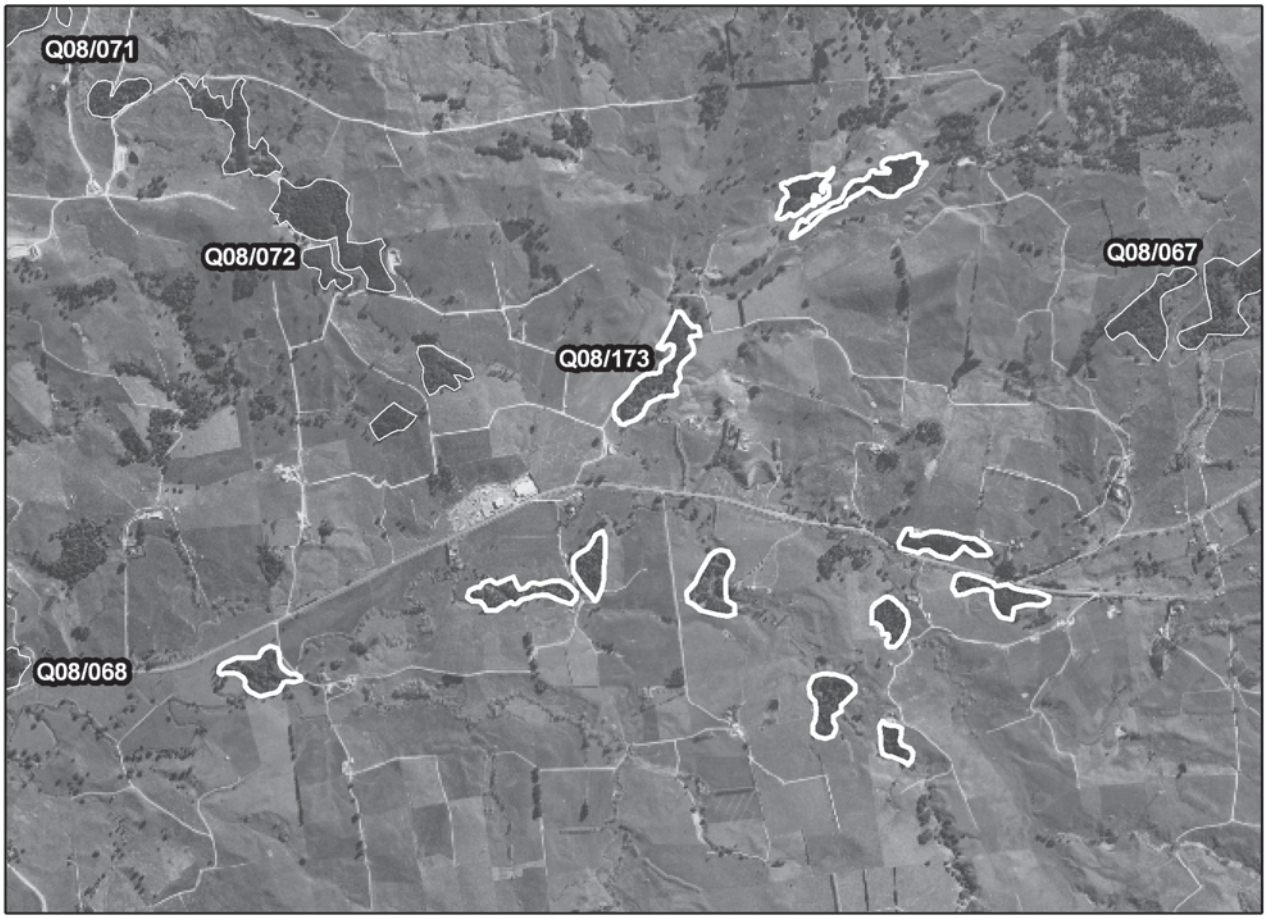
Landform/geology

Valley flats on Holocene alluvium, and valley sides underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site comprises ten indigenous forest remnants on floodplain alluvium of the Wairau River. Most indigenous forest on these soils has been cleared for beef and dairy farming (a dairy factory lies just east in the town of Maungaturoto), as these are some of the most fertile lands in the local area. What remains is scattered, narrow, elongated remnants with minimal indigenous understorey layers. However, there are some large, mature matai and kahikatea present.

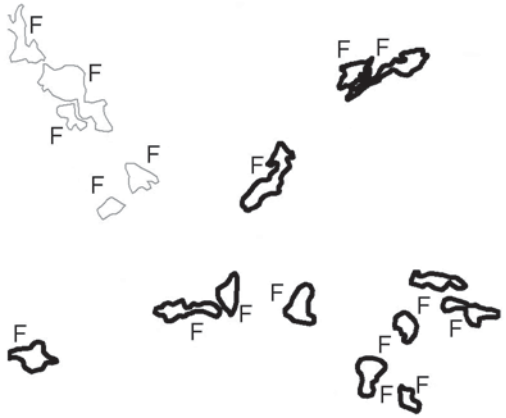
(a) The majority of the remnants comprise totara-kahikatea forest with frequent karaka, kanuka, kowhai, matai and titoki, and occasional mapou, ti kouka, putaputaweta, rimu, rewarewa, tree privet, crack willow and poplar. Large areas of mainly exotic trees are not included in the site.



Q08/173 Wairau River Riparian Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(b) At grid reference Q08 364 660 (towards the middle of the site) there is a dense stand of almost pure kahikatea with occasional matai, ti kouka and totara.

Fauna

Not surveyed.

Significance

Floodplain forest on alluvial soil is rare not only in Otamatea ED Northland, but throughout New Zealand, and is one of the rarest and most under-represented forest types in Northland (Wendy Holland, pers. comm.). Despite their obvious

degradation, both ecological units are representative types, as they are the last vestiges of forest on fertile alluvial soil in the study area.

KAIWHITU ISLAND

Survey no.	Q08/175
Survey date	12 January 2006
Grid reference	Q08 174 506
Area	2.6 ha (1.6 ha forest, 0.6 ha 'other', 0.3 ha shrubland)
Altitude	0–40 m asl

Ecological units

(a) Pohutukawa–kowhai forest on steep coastal margin (40%)

(b) Exotic grassland (26%)

(c) Karaka–tawapou–harakeke forest on steep coastal margin (22%)

(d) Mapou–manuka–harakeke shrubland on steep coastal margin (12%)

Landform/geology

Steep-sided islet formed of Miocene volcaniclastic gravelly sandstone (Waitakere Group)

Vegetation

Kaiwhitu Island lies in the inner Kaipara Harbour, approximately 350 m south of the nearest point on the Hukatere peninsula. It is a small, rounded, very steep island with a north–south saddle in the middle, covered in indigenous forest and shrubland. Shallow waters with a sandy bottom surround the island, which is a popular spot for flounder fishing.

(a) On the eastern, land-facing, side of the island there is a forest of pohutukawa and kowhai with frequent karaka and occasional mamangi.

(b) About quarter of the island is covered in exotic grassland in which the dominant species could not be identified from a distance.

(c) The western side of the island supports a forest of karaka, tawapou and harakeke with frequent ti kouka.

(d) On the southern side of the island the shrubland comprises equally dominant harakeke, mapou and manuka, and frequent pohutukawa, karaka, toetoe and kowharawhara.

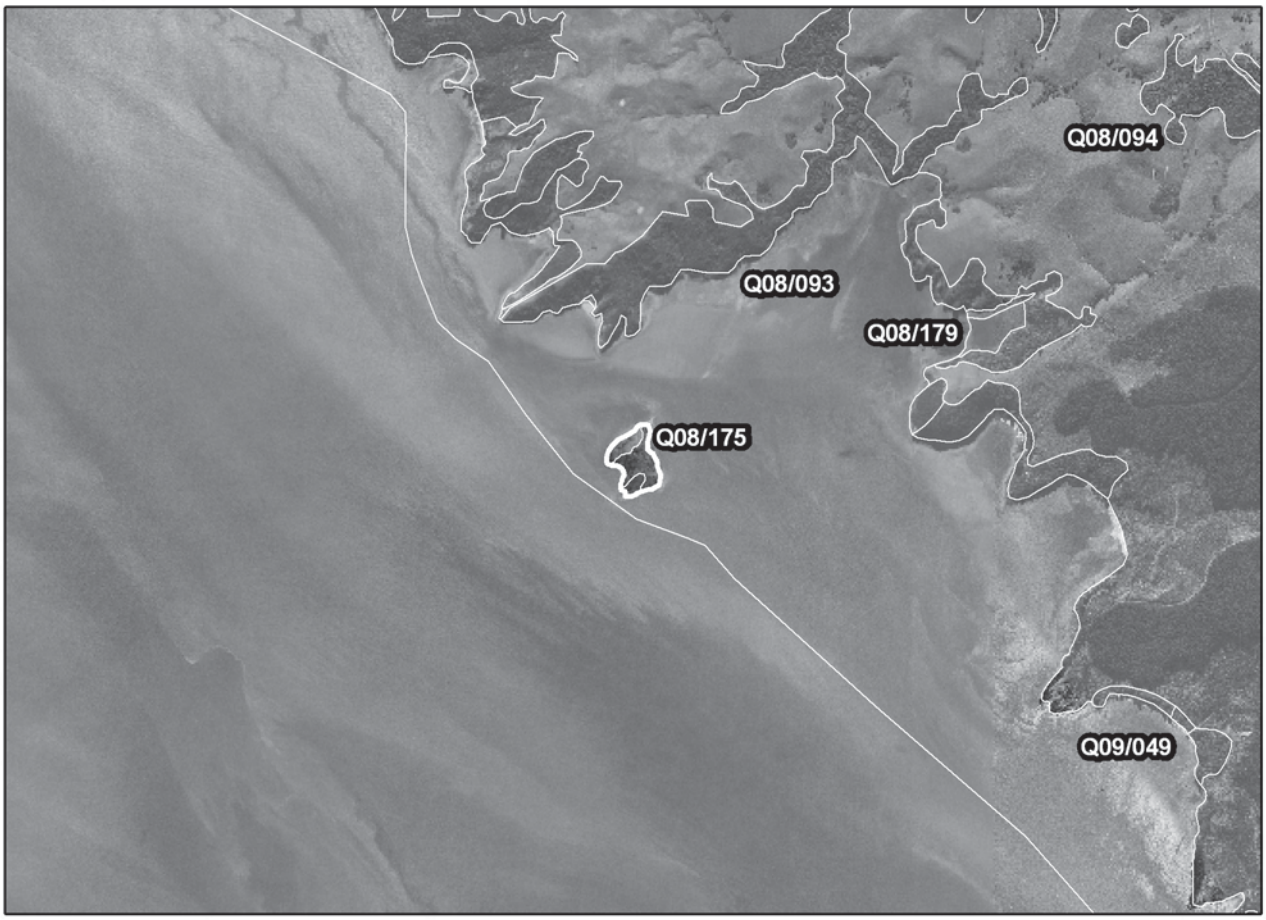
A 1993 survey recorded the island as possum–free and probably rat–free as well, as tawapou seed did not appear to be chewed (SSBI Q08/H056). Some interesting plant species were recorded which are not often noted in Otamatea ED Northland because they appear to be specific to exposed coastal environments, e.g. rengarenga lily, *Peperomia urvilleana* and native iceplant. There is also an unconfirmed record *Libertia ixioides* from this site (SSBI Q08/H056).

Significant flora

Tawapou (regionally significant).

Fauna

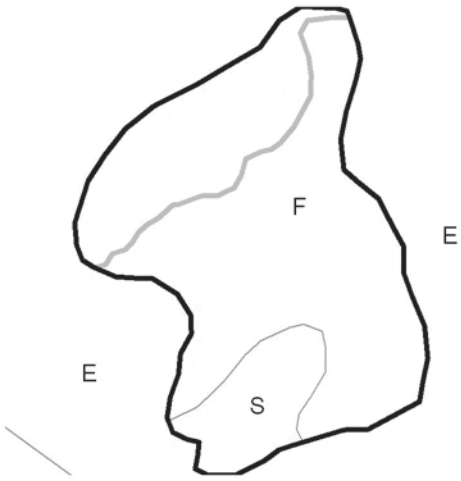
Fauna species were not surveyed during the present study, but a list of indigenous fauna recorded in 1993 includes the following bird species: little



Q08/175 Kaiwhitu Island

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



black shag (Sparse), kingfisher, welcome swallow, grey warbler, fantail and silvereye. Fourteen indigenous landsnail species were present: *Austroiotula arewa*, *Basimocella* 'Nth maculata', *Delos coresia, Egestula egesta, Flammulina perdita, Mocella eta, Phenacobelix giveni, P. pilula, Phrixgnathus moellendorffi, Paralaoma caputspinulae, Sinployea parva, Therasiella cehnde, Tornatellides subperforata* and *Tornatellinops novoseelandica* (SSBI Q08/H056).

Significance

Kaiwhitu is one of nine small inner harbour islands surveyed in Otamatea ED Northland, and represents one of the most intact examples of these. This is one of only a few sites with some tawapou remaining in Otamatea ED Northland. Three representative ecological units occur on the island (a) pohutukawa–kowhai forest on steep coastal margin, (c) karaka–tawapou–harakeke forest on steep coastal margin and (d) mapou–manuka–harakeke shrubland on steep coastal margin. Karaka–tawapou–harakeke forest is a rare forest type in the Northland Region (Wendy Holland, pers. comm.). The site is also significant as a habitat for the threatened little black shag. It is also habitat for several non-threatened indigenous landsnail species. Kaiwhitu has some archaeological features in the form of shell middens and a rock wall, according to DOC records (SSBI Q08/H056).

KOHATUTAHI FOREST AND WETLAND

Survey no.	Q08/178
Survey date	14 December 2005
Grid reference	Q08 108 597 (2 remnants)
Area	3.8 ha (2.7 ha forest, 1.1 ha wetland)
Altitude	18–40 m asl

Ecological units

(a) Kanuka–mamaku forest on gentle coastal margin (37%)

(b) Raupo–*Baumea articulata*–pink bindweed reedland in small depression (28%)

(c) Kowhai–*Coprosma areolata*–ti kouka forest on gentle coastal margin (20%)

(d) Puriri treeland on gentle coastal margin (15%)

Landform/geology

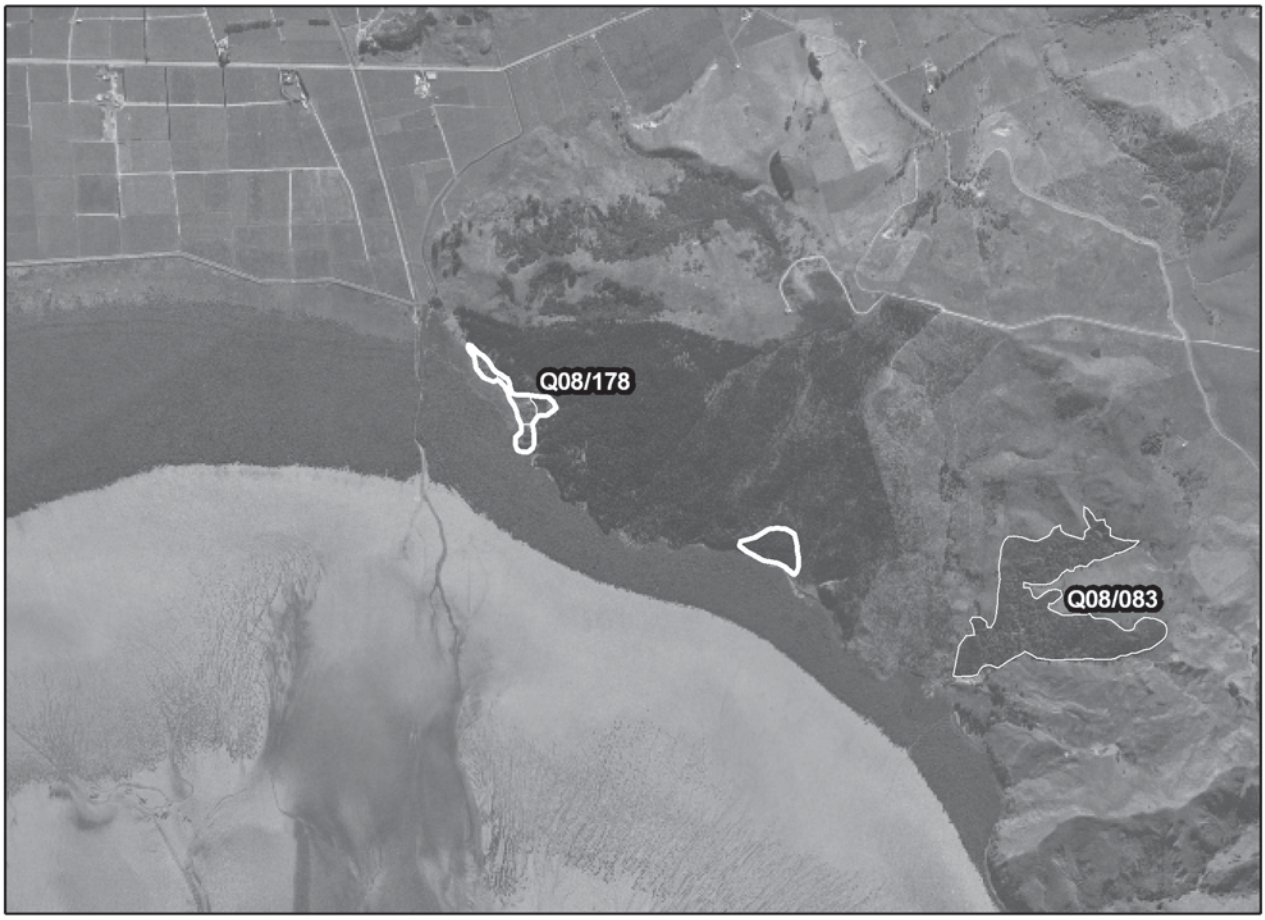
Steep hillside and coastal fringe underlain by colluvium of basalt boulders.

Vegetation

Kohatutahi Forest and Wetland contains small areas of coastal broadleaved forest on a wet, bouldery, west-facing slope above coastal freshwater wetlands at the toe of the slope. The name suggests something about the nature of the place (kohatu = stone, tahi = one, joint). On the seaward side, the freshwater wetlands grade into mudflats (covered 100% by saltwater paspalum) and extensive, very tall mangrove forest. The landward side is surrounded by a radiata pine plantation. Many pine trees have been felled around the margins of the site, sometimes falling into the site. The site is divided into a northern area and a southern area, separated by 400 m of coastline. The northern part of the site was surveyed on foot.

(a) Viewing the harbour, it was determined that the southern forest remnant has a canopy dominated by kanuka and mamaku, with frequent taraire, puriri and kahikatea, and occasional kohekohe.

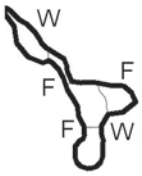
(b) The freshwater wetlands in the northern part are covered in raupo–*Baumea articulata* reedland with mats of pink bindweed vine covering over 20% of the surface area. Ti kouka and wheki are frequently emergent, and alligator weed, Yorkshire fog and bracken are frequent and dispersed throughout. Occasional



Q08/178 Kohatutahi Forest and Wetland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres





species include putaputaweta, karamu, manuka, *Muehlenbeckia australis*, knobby clubrush, oioi and purei (*Carex virgata*).

(c) Forest above the wetlands on the bouldery slope comprises a wide variety of species, three slightly more common than the others: kowhai, *Coprosma areolata* and ti kouka. Frequent canopy species include titoki, mapou, mamangi, karaka and puriri. Occasional canopy species include kahikatea, mamaku, rewarewa, *Coprosma macrocarpa*, *C. rhamnoides* karamu, mahoe, totara, kohekohe, taraire, kanuka and manuka. Many indigenous species were recorded in the understorey: kawakawa, hangehange, supplejack, pohuehue, *Haloragis erecta, Metrosideros perforata*, rasp fern, *Arthropteris tenella*,

leatherleaf fern, thread fern and *Oplismenus hirtellus* subsp. *imbecilis.* Occasional exotic species were also recorded: umbrella sedge, paspalum, saltwater paspalum, lotus and narrow-leaved plantain.

(d) On flat, bouldery coastal terraces in the northern part there is an indigenous treeland in which puriri is the most common species. Karaka and titoki are frequent, with occasional kohekohe, ti kouka, *Coprosma areolata,* karamu, mapou, saltmarsh ribbonwood, radiata pine (recently planted) and maritime pine (wild).

In 1996 an unconfirmed record of *Coprosma rigida* (regionally significant) was made at this site (SSBI Q08/H063), however no herbarium specimens were collected at this time. During the current survey a range of *Coprosma* specimens were collected and found to be *C. rhamnoides* (which was not recorded on the 1996 list).

Fauna

Grey warbler, kingfisher, kukupa (Gradual Decline), fantail, silvereye, shining cuckoo, Australasian harrier. A morepork was present during the 1996 survey (SSBI Q08/H063).

Significance

This is a representative site for three ecological units: (a) kanuka–mamaku forest on gentle coastal margin, (b) raupo–*Baumea articulata*–pink bindweed reedland in small depression, and (c) kowhai–*Coprosma areolata*–ti kouka forest on gentle coastal margin. Two species which negatively affect the ecological function and natural character of the wetland are alligator weed and saltwater paspalum, which rapidly choke open water and preclude indigenous species from establishing, as well as reducing habitat for indigenous fauna. The use of the site by a threatened bird species (kukupa) increases its significance. In addition, colluvium of basalt boulders is found nowhere else in Otamatea ED Northland.

Two different protection statuses are afforded to parts of Kohatutahi Forest and Wetland. The Kohatutahi Marginal Strip (administered by DOC) covers 0.6 ha of ecological units (a) kanuka–mamaku forest, and (d) puriri treeland. The Kohatutahi Conservation Area (stewardship land administered by the Department of Conservation) covers 0.6 ha of ecological units (b) raupo–*Baumea articulata*–pink bindweed reedland, and (c) kowhai–*Coprosma areolata*–ti kouka forest. 2.6 ha (72 % of the site) is on private land.

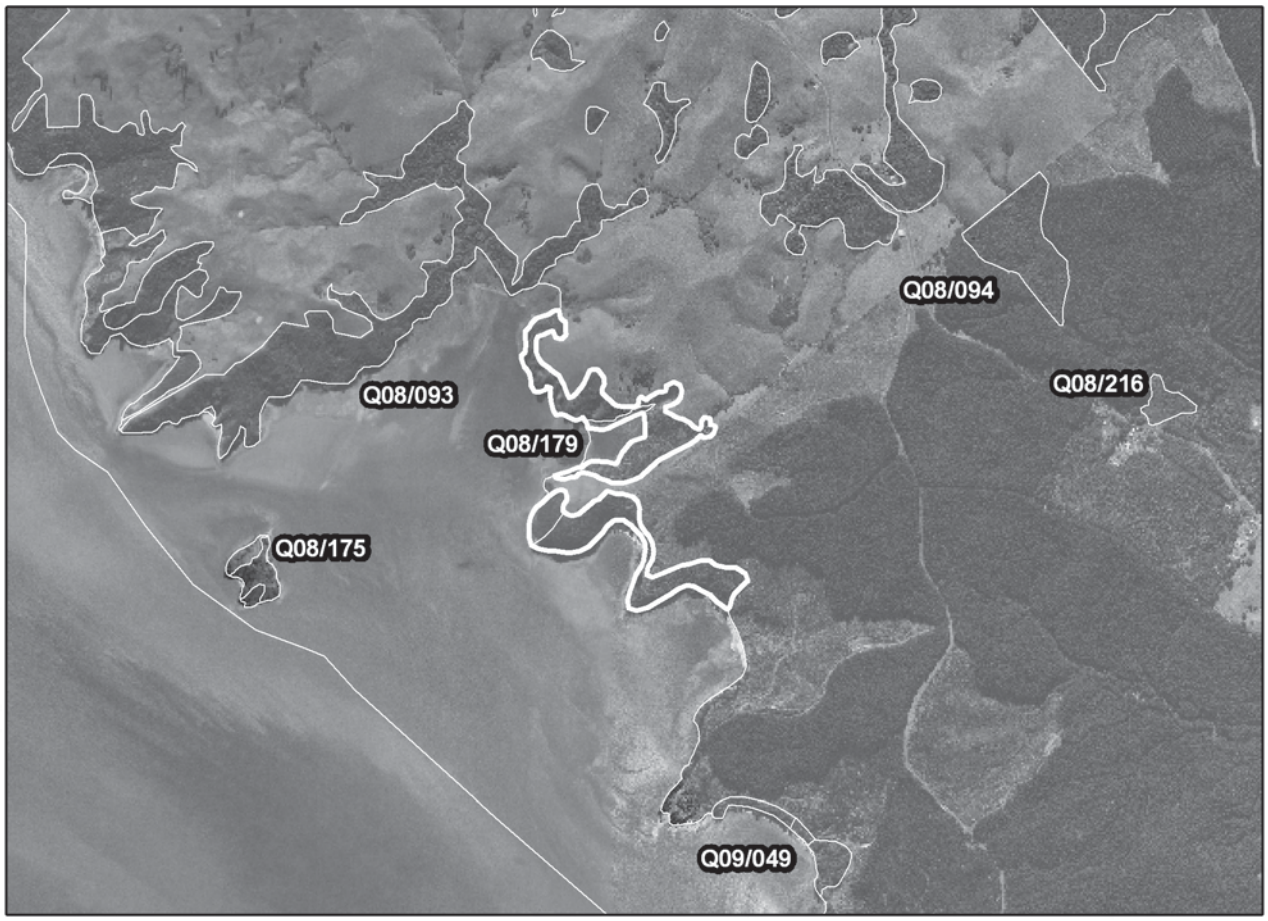
OWHAREAO POINT REMNANTS

Survey no.	Q08/179
Survey date	12 January 2006
Grid reference	Q08 186 510 (2 remnants)
Area	18.7 ha (16.9 ha forest, 1.3 ha shrubland, 0.5 ha wetland)
Altitude	0–60 m asl

Ecological units

(a) Houpara–kowhai forest on steep coastal margin (25%)

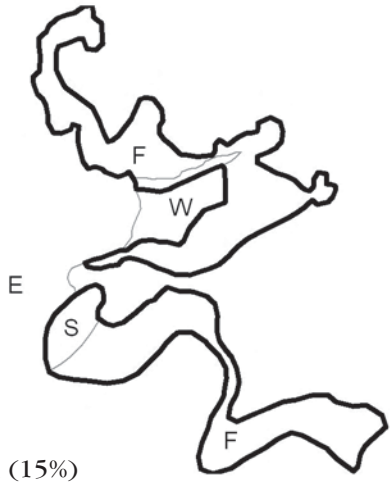
(b) Puriri–kowhai–kanuka forest on moderate to steep hillslope (20%)



Q08/179 Owhareao Point Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(c) Taraire forest on steep coastal margin (15%)

(d) Kauri–kanuka forest on ridge top (15%)

(e) Pohutukawa–radiata pine treeland on steep coastal margin (10%)

(f) Kanuka–manuka shrubland on gentle coastal margin (7%)

(g) Kanuka forest on moderate hillslope (5%)

(h) Raupo–*Baumea articulata*–marsh clubrush reedland in gully (3%)

Landform/geology

Coastal hillsides underlain by Miocene volcaniclastic gravelly sandstone and basaltic lava flows (Waitakere Group).

Vegetation

Owhareao Point forms the southern side of Te Kiakia Bay on the western Hukatere peninsula coast. This site encompasses all indigenous vegetation on the main point, behind Otarawhai Bay, on a smaller point south of the bay, and extending approximately 500 m north and south of the points. The southern half of the site is bounded by a radiata pine plantation, and the northern half is next to pastoral farmland. A small creek runs into the bay on the north side of the point, and some mangroves also shelter in the saltwater zone (the only sizeable mangrove stand on the Hukatere Peninsula West Coast Q08/096). The flats at the river mouth have saltwater paspalum and alligator weed, and appear to have been reclaimed from mudflats (these are excluded from the site). A small freshwater wetland extends along the northern side of the flats.

(a) Forest on very steep coastal slopes in the south is composed of abundant houpara with common kowhai, frequent puriri, karaka and harakeke, and occasional pohutukawa, kanuka, karamu, ti kouka, nikau, *Coprosma rhamnoides*, mahoe, kiekie and gully tree fern.

(b) On slopes around the exotic grassland flats, there is forest dominated by puriri with common kowhai and kanuka. Karaka is frequent, with occasional pukatea, taraire, ti kouka, totara, kauri, nikau, kahikatea and pohutukawa.

(c) The southern side of the main point supports taraire forest with frequent puriri, karaka, kowhai and kanuka, and occasional kohekohe, nikau and tawapou.

(d) Prominent ridges in two places have kauri ricker stands with common kanuka.

(e) The very northern end of the site comprises scattered treeland with pohutukawa and radiata pine in equal proportions. Harakeke occurs frequently on the coastal fringe, with occasional ti kouka.

(f) On the northern side of both points there is shrubland comprising young manuka and kanuka with frequent houpara, harakeke and ti kouka. Some emergent radiata pine are present.

(g) A small area of kanuka forest with frequent kauri and mamangi is present near kauri–kanuka stands of type (d).

(h) The wetland vegetation is a mixture of three main species: raupo, *Baumea articulata* and marsh clubrush.

A 1977 New Zealand Wildlife Service survey recorded kawaka (Sparse) in this area (Q08/H044), but its continued existence at the site is not confirmed.

Significant flora

Tawapou (regionally significant).

Fauna

Black-backed gull, white-faced heron, pied shag (Sparse), tui, kingfisher.

Significance

The site is representative for three ecological units, which are all unique in Otamatea ED Northland: (a) houpara–kowhai forest on steep coastal margin, (c) taraire forest on steep coastal margin, and (h) raupo–*Baumea articulata*–marsh clubrush reedland in gully. Tawapou, a minor component of the coastal taraire forest (c), is a regionally significant plant species found at only a few sites in the Northland Conservancy part of the ED.

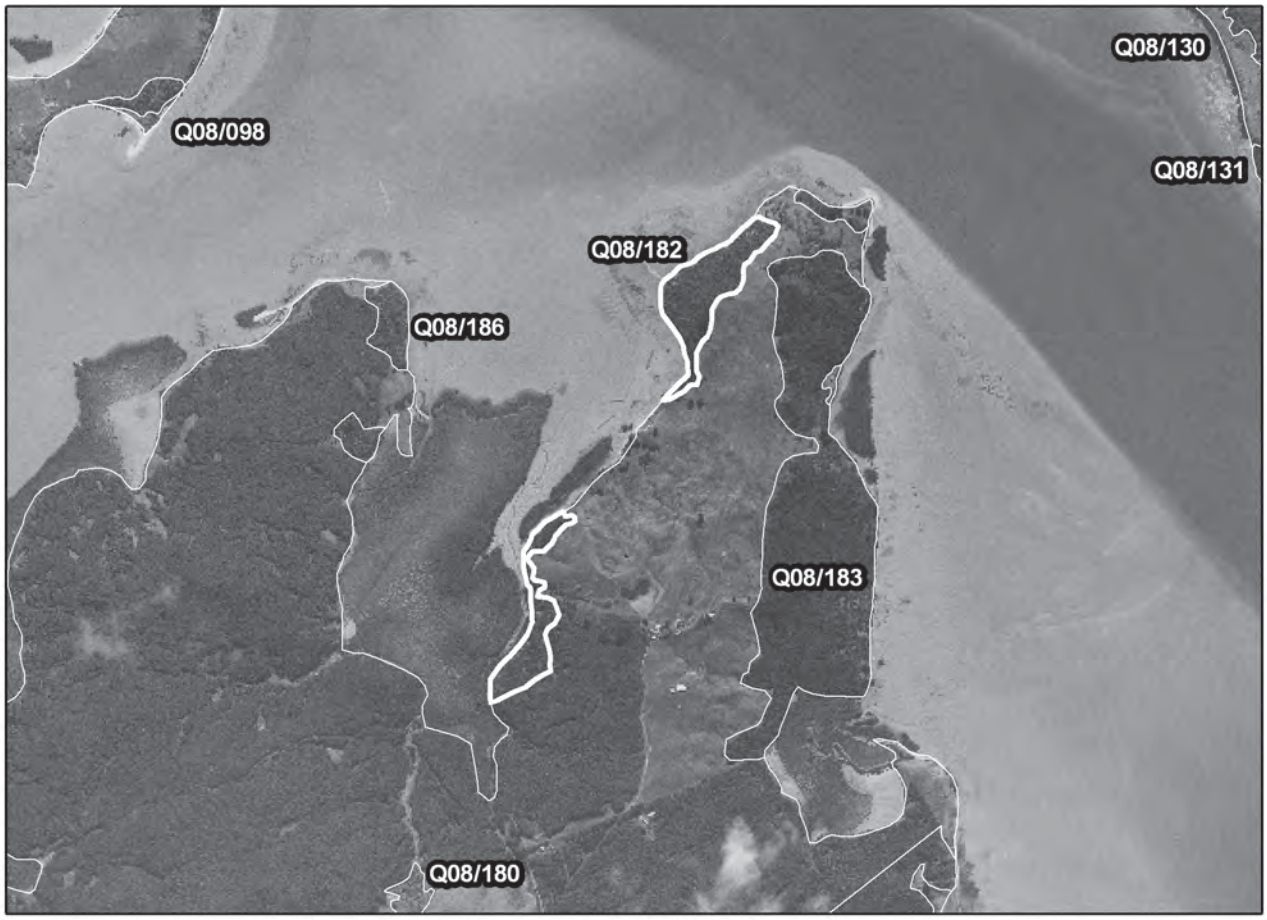
PUKEHAU QEII COVENANT

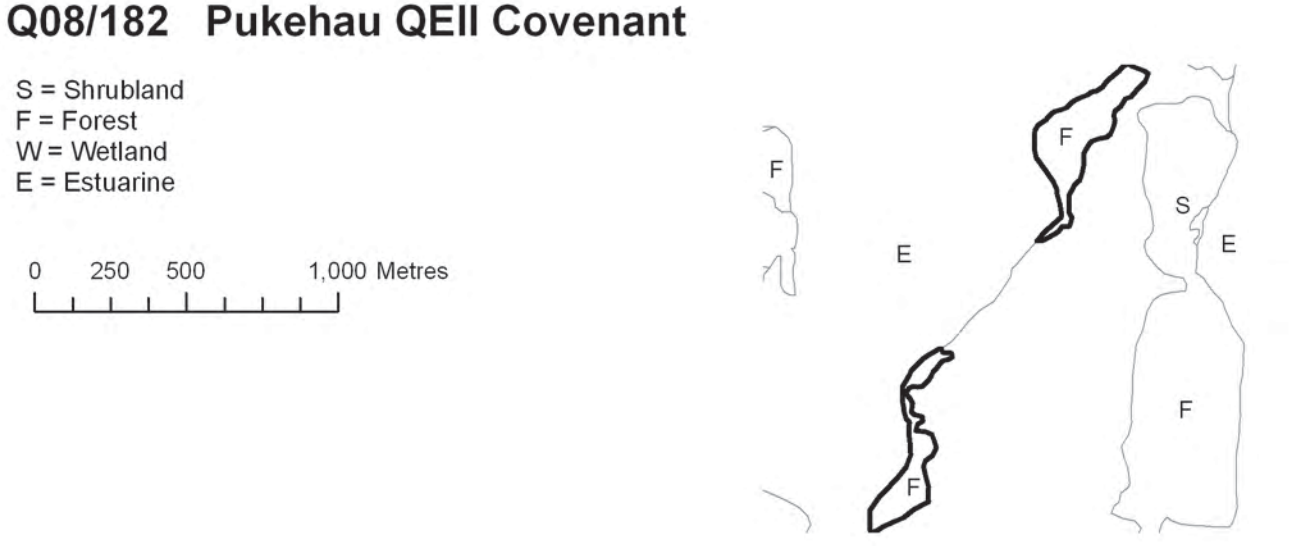
Survey no.	Q08/182
Survey date	9 December 2005
Grid reference	Q08 233 549 (2 remnants)
Area	12.4 ha
Altitude	0–47 m asl

Ecological units

(a) Totara–kowhai–kahikatea–puriri forest on gentle coastal margin (80%)

(b) Totara–puriri forest on gentle coastal margin (20%)





Landform/geology

Coastal hillsides underlain by Miocene volcaniclastic gravelly sandstone and basaltic lava flows (Waitakere Group).

Vegetation

The site comprises two indigenous coastal forest remnants on the western side of Puriri Point, which extends out into the Arapaoa River (Q08/084). The site abuts mangrove forest, saltmarsh, mudflats, coastal terraces, Pacific oyster beds and Pacific oyster farms on its seaward side, and pasture on its landward side.

(a) In the northern remnant the forest canopy comprises four main species, each occupying just over 20% cover: totara, kowhai, kahikatea and puriri. Frequent species include kauri, kanuka, ti kouka and radiata pine. Maritime pine and woolly nightshade occur occasionally.

(b) The southern remnant is not easily visible from public roads or from a boat on the harbour, however it could be determined that totara and puriri were the two main species in the canopy.

Significant flora

In 1992 a detailed flora and fauna list was prepared for the covenant as part of the covenant registration process. Three significant plant species were recorded: *Doodia mollis* (Sparse), *Olearia albida* (regionally significant) and *O. solandri* (regionally significant) (QEII National Trust records 1992; SSBI Q08/H047).

Fauna

Australasian harrier.

Kukupa (Gradual Decline) and ornate skink (regionally significant) were found using this area in recent times (SSBI Q08/H047).

Significance

Available information suggests that this site supports high biodiversity values of flora and fauna (several threatened and regionally significant species), especially in the fenced areas of the covenant, which have a dense understorey. This is a representative site for (a) totara–kowhai–kahikatea–puriri forest on gentle coastal margin. A QEII Open Space Covenant established in 1994 covers 9.6 ha of these forest remnants, as well as intervening grassland with scattered shrubs along the coast. This natural area also has significance as an archaeological site, with numerous shell middens dotted along the coast (QEII National Trust records 1992).

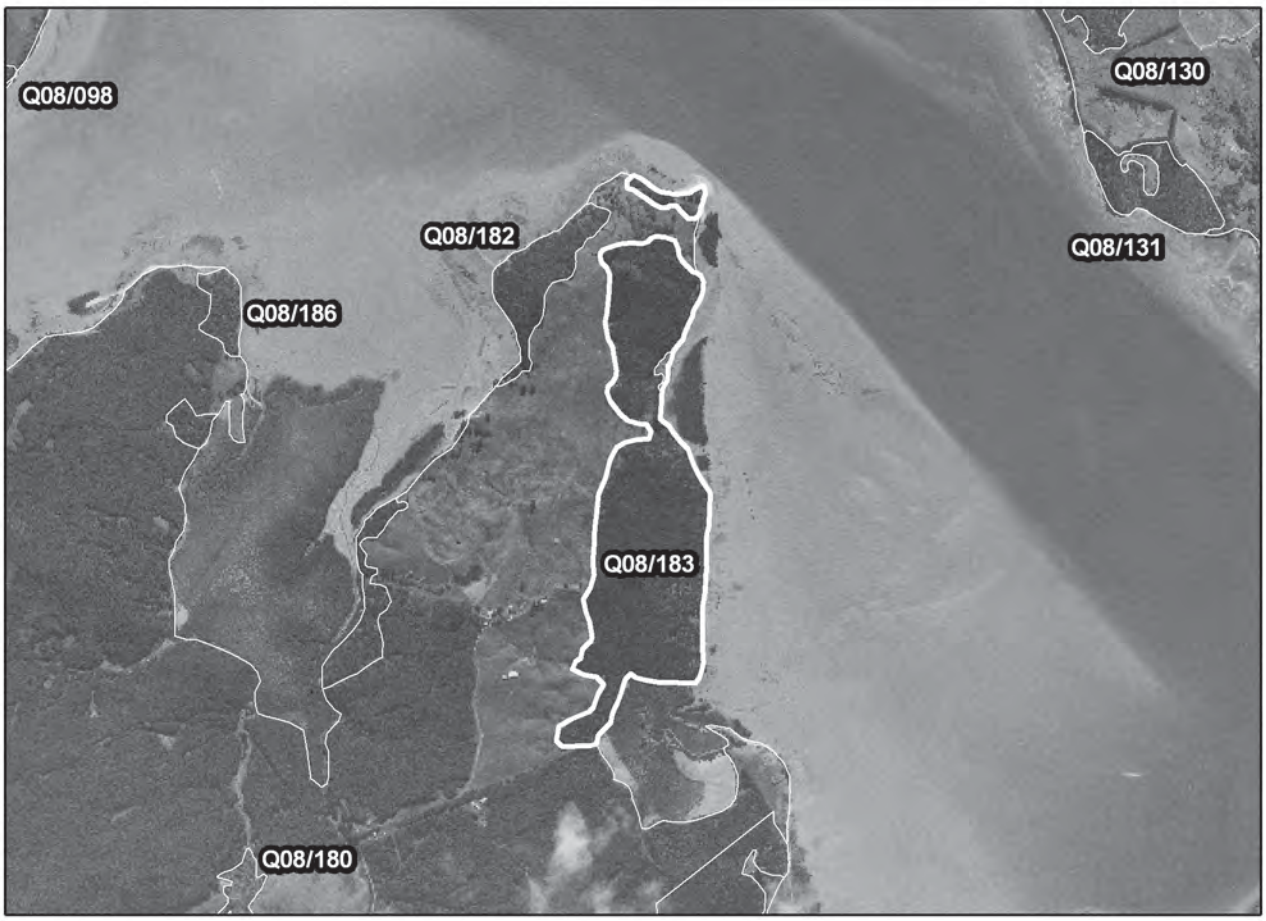
PURIRI POINT FOREST AND SHRUBLAND

Survey no.	Q08/183
Survey date	8 December 2005
Grid reference	Q08 239 548 (2 remnants)
Area	46.5 ha (46.2 ha forest, 0.3 ha shrubland)
Altitude	0–60 m asl

Ecological units

(a) Kanuka forest on moderate hillslope (50%)

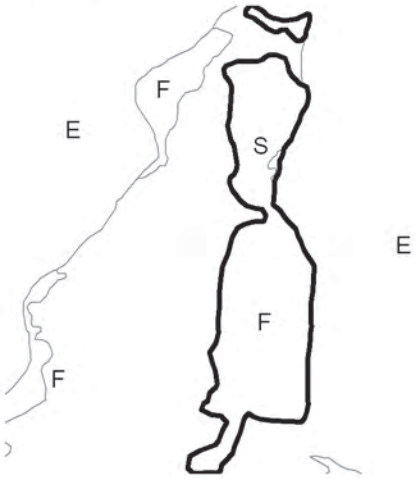
(b) Totara–kahikatea–ti kouka forest on ridge top (25%)



Q08/183 Puriri Point Forest and Shrubland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(c) Kowhai–puriri–kahikatea forest on gentle coastal margin (12%)

(d) Totara–kanuka forest on steep coastal margin (10%)

(e) Puriri–karaka treeland on estuarine shell bank (2%)

(f) Ti kouka shrubland on gentle coastal margin (1%)

Landform/geology

Coastal hillsides underlain by Miocene thinly interbedded mudstone and sandstone (Waitemata Group) and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site encompasses indigenous vegetation on the northern and eastern sides of Puriri Point, which extends out into the Arapaoa River (Q08/084). Pastoral land abuts the site to the west, and mudflats and sandflats abut the site to the east.

(a) Most of the inland forest is dominated by kanuka with frequent totara and ti kouka.

(b) In the south, there is a ridge extending along the coast which has a low forest of abundant young totara with frequent ti kouka and kahikatea.

(c) A southern finger of forest extending around a small bay comprises kowhai, puriri and kahikatea with frequent kanuka.

(d) On the northern coast, totara–kanuka forest is the main vegetation type. Puriri is frequent, with occasional mamaku, nikau and radiata pine.

(e) The northern tip of Puriri Point is a triangular shellbank. A stand of puriri and karaka trees is present, all of which are in poor condition and have been banded with metal, presumably to protect them from possum browse.

(f) A tiny patch of ti kouka-dominant shrubland occurs on the east coast.

Fauna

Not surveyed.

Significance

Three of the ecological units present are unique and representative in Otamatea ED Northland (despite poor condition or small extent): (b) totara–kahikatea–ti kouka forest on ridge top, (e) puriri–karaka treeland on estuarine shell bank, and (f) ti kouka shrubland on gentle hillslope.

PAKAURANGI FOREST AND SHRUBLAND

Survey no.	Q08/185
Survey date	9 December 2005
Grid reference	Q08 260 520
Area	427.3 ha (162.1 ha forest, 265.2 ha shrubland)
Altitude	0–125 m asl

Ecological units

(a) Kanuka–radiata pine shrubland on moderate to steep hillslope (61%)

(b) Kanuka forest on moderate to steep hillslope (24%)

(c) Puriri–kanuka forest on steep coastal margin (3%)

(d) Totara–kowhai–puriri forest on steep coastal margin (3%)

(e) Pohutukawa–radiata pine–kanuka forest on steep coastal margin (3%)

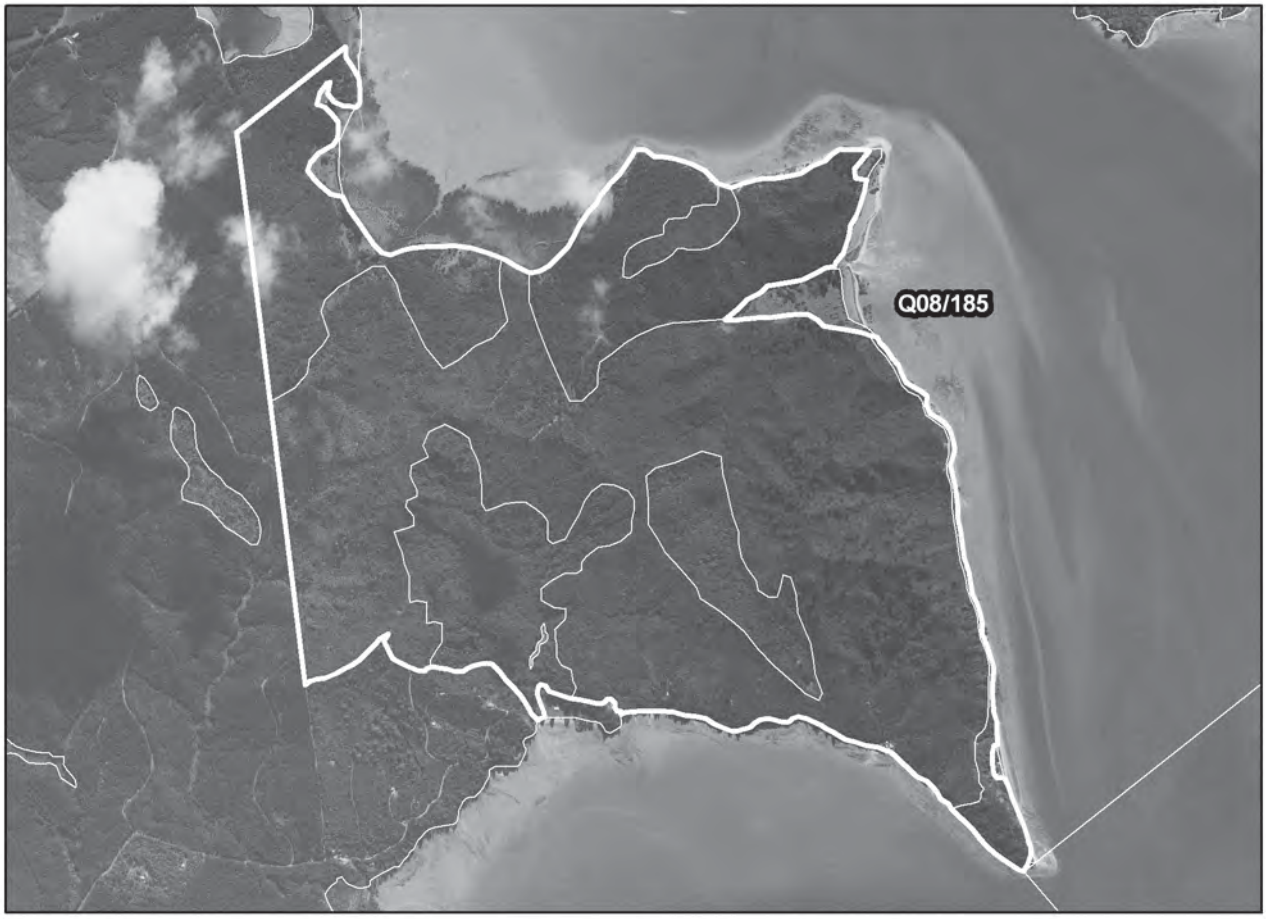
(f) Pohutukawa–akepiro–kowharawhara forest on steep coastal margin (2%)

(g) Pohutukawa treeland on coastal cliff (2%)

(h) Kauri–kanuka forest on ridge top (2%)

Landform/geology

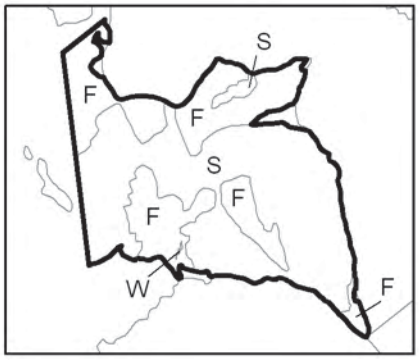
Coastal and inland hillslopes and gullies underlain by Cretaceous siliceous mudstone (Whangai Fmn, Mangakahia Complex); Oligocene calcareous



Q08/185 Pakaurangi Forest and Shrubland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



siltstone (Puriri Formation, Motatau Complex); melange (undifferentiated Mangakahia & Motatau Complex lithologies); volcaniclastic muddy and gravelly sandstone (Waitakere Group).

The southwest coast of Pakaurangi Point is a classic locality (type locality for many fossil taxa) containing a very diverse molluscan and foraminiferal fauna. This same section of coast, extending out to Puketi Point has the most complete exposure of shelf sequence of volcaniclastic fossilierous sandstone and siltstone of the Pakaurangi Formation and marginal marine to non-marine Puketi Formation. At Te Kopua Point there is a synclinally folded sequence of tuffaceous foraminiferal micrite and intercalated volcaniclastic mass flow deposits, unconformably overlying Northland Allochthon (Kenny & Hayward 1996).

Vegetation

Pakaurangi Forest and Shrubland is the largest, continuous, predominantly indigenous forest and shrubland block in Otamatea ED Northland. It covers 427 ha at the southeastern end of Hukatere peninsula, and includes Pakaurangi peak (125 m asl), Pakaurangi Point (in the southeast) and Te Kopua Point (in the northeast). On the northern coast there is an open, shallow, sandy bay with mangrove forest on its western side. To the east there are sandy beaches dropping off more steeply into the main channel of the Arapaoa River (Q08/084). To the south lies another shallow, open bay (Coates Bay) which falls within the Otamatea River Confluence site (Q09/021). The southern coast is more exposed than the other two, as it is open to winds from a southwesterly direction, funnelling through the Kaipara Harbour mouth. Extensive radiata pine plantations border the western side of this site. Small settlements or individual houses are present at various points around the coast. Where visible, these have been excluded from the site. Most of the site cannot be seen from the harbour or from public roads, therefore the vegetation description here relies on interpretation of recent aerial photography (flown in 2002).

(a) Kanuka–radiata pine shrubland covers almost two thirds of the area. This is a relatively mature shrubland, with kanuka over 3 m tall in most places. Within a decade or two, if left undisturbed, the vegetation will probably develop into kanuka forest with local radiata pine groves. The radiata pine trees, which are common, appear to be wilding pines established from nearby plantations, and most of these are emergent and concentrated along ridges (they are the most prominent feature on the skyline). Mamaku occurs occasionally in this shrubland.

(b) The next most common vegetation type is kanuka forest, which also has frequent emergent radiata pine, but contains several other associates including frequent tanekaha, kauri, kahikatea and totara. This type is present along the northern side of Pakaurangi Forest and Shrubland, and in valleys in the south.

(c) On the north coast, at grid reference Q08 254 532, the coastal forest comprises puriri and kanuka with frequent tanekaha, pohutukawa and radiata pine, and occasional kowhai.

(d) On Te Kopua Point, the forest comprises equal proportions of totara, kowhai and puriri with frequent taraire, kanuka and karaka, and occasional kauri and kahikatea.

(e) All the way along the steep eastern coastal fringe, large, overhanging pohutukawa are abundant, and kanuka and radiata pine are both common. Occasional puriri also occur.

(f) The vegetation on the southwestern side of Pakaurangi Point has a relatively open pohutukawa canopy with abundant akepiro and kowharawhara in light wells and under the pohutukawa. During the survey a landing was made here and the following additional species were recorded in the understorey or on the coastal fringes: rengarenga, harakeke, kowharawhara, *Coprosma macrocarpa*, *C. rhamnoides*, bracken, knobby clubrush, *Gahnia lacera*, kiokio, mapou, mingimingi and turutu.

Fauna

Not surveyed.

Significance

The significance of this site lies in its large size (it is the largest area of indigenous terrestrial vegetation in Otamatea ED Northland), as well as in containing four representative ecological units: (b) kanuka forest on moderate to steep hillslope, (d) totara–kowhai–puriri forest on steep coastal margin, (f) pohutukawa–akepiro–kowharawhara forest on steep coastal margin, and (g) pohutukawa treeland on coastal cliff. In particular, ecological unit (g) is significant as it is the only example of its type in the Northland Conservancy part of Otamatea ED. The length of Arapaoa River and Otamatea River coastline bordered by the vegetation in this site is considerable; hence it provides a valuable protective buffer to the estuarine habitats of the inner Kaipara Harbour. The presence of numerous emergent wilding pines, especially on ridge tops, diminishes the natural character of the site. There are three nationally important geological sites within Pakaurangi Forest and Shrubland: the Pakaurangi Point Miocene fauna, the Pakaurangi–Puketi shelf sediments and Te Kopua Point Hukatere Miocene volcaniclastics and sedimentary structures (Kenny & Hayward 1996).

HAMLIN ROAD SHRUBLAND

Survey no.	Q08/188
Survey date	9 December 2005
Grid reference	Q08 200 565 (3 remnants)
Area	12.5 ha (2.9 ha forest, 9.6 ha shrubland)
Altitude	0–40 m asl

Ecological units

(a) Manuka shrubland on moderate hillslope (77%)

(b) Totara–ti kouka forest on gentle coastal margin (18%)

(c) Totara forest on gentle coastal margin (5%)

Landform/geology

Coastal hillsides underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site comprises indigenous shrubland and forest to the northeast of Hamlin Road, on the southern coastal margin of the Kirikiri Inlet.

(a) The shrubland, which occupies most of the site, appears to be relatively recent regeneration after exclusion of livestock from the area. Manuka is abundant and ti kouka and gorse are frequent, with occasional small emergent totara. At least two tall radiata pine trees are present.

(b) The coastal margin of the main remnant comprises totara–ti kouka forest with frequent manuka and occasional kahikatea, puriri, karaka, mamaku and mapou.

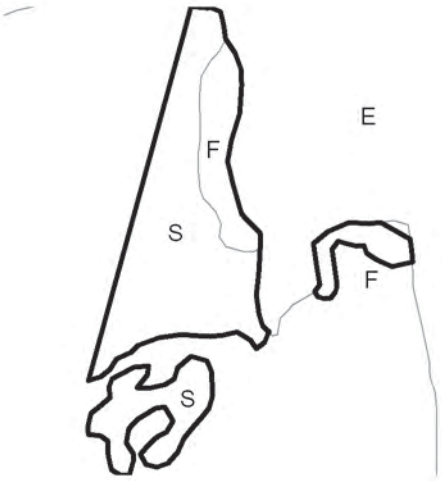
(c) A small isolated stand of totara lies to the east. There are occasional titoki, kahikatea, ti kouka and macrocarpa in the canopy.



Q08/188 Hamlin Road Shrubland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Fauna

Not surveyed.

Significance

This site contains the eighth largest area of indigenous shrubland in Otamatea ED Northland, and manuka shrubland (a) is a representative example of its type. The shrubland appears to be mostly fenced, which is allowing coastal forest to regenerate. The tall pines are a threat to the natural character of the vegetation, as they may give rise to wilding pines amongst the shrubland.

MOHINUI FOREST REMNANT 3

Survey no.	Q08/190
Survey date	13 December 2005
Grid reference	Q08 350 505 (2 remnants)
Area	15.1 ha
Altitude	40–80 m asl

Ecological units

(a) Totara forest on moderate to steep hillslope (35%)

(b) Taraire–kahikatea forest in gully (30%)

(c) Kanuka forest on gentle hillslope (20%)

(d) Kahikatea–pukatea forest in gully (15%)

Landform/geology

Hillslopes and gullies underlain by Cretaceous siliceous mudstone (Whangai Fmn, Mangakahia Complex) and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site encompasses one of the best examples of indigenous forest remaining on the slopes of Mohinui Peak (119 m asl), Oneriri Peninsula. The remnants follow the headwater gully of a tributary of the Kaira Creek for approximately 1 km.

(a) The edges of the main remnant and the outlying remnant comprise totara forest with frequent mamangi, rewarewa, kahikatea and puriri, and occasional emergent pines (radiata pine and maritime pine).

(b) The main forest type in the lower gully is taraire–kahikatea forest with frequent rewarewa, puriri, totara, karaka and tree ferns (mamaku and ponga). Nikau, ti kouka and pukatea occur occasionally.

(c) Kanuka forest with frequent totara (as opposed to the other margins which have type (a) totara forest) occurs at the uppermost margins of the remnant. These may be recently disturbed forest patches, or possibly pasture that has regenerated in the last several decades. Kauri, karaka, ti kouka and lancewood occur occasionally.

(d) The main forest type in the upper gully is dense kahikatea with subdominant pukatea. Rewarewa, mamaku, puriri and karaka are common, while titoki occurs occasionally.

Fauna

Australasian harrier, kingfisher.

Significance

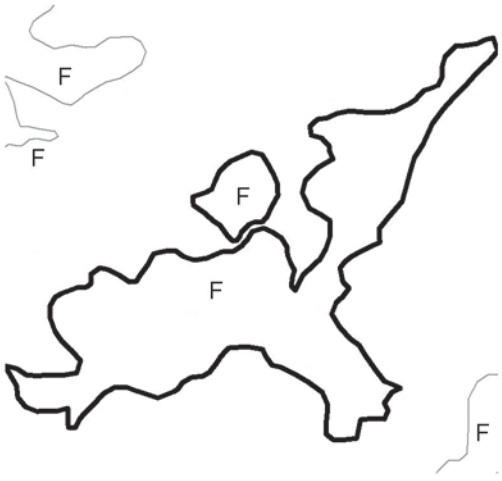
This site is representative for (d) kahikatea–pukatea forest in gully, as well as having high species and habitat diversity for its size. The forest provides riparian protection to the upper section of a small stream. The site lies between other forest remnants on the slopes of the Mohinui Peak (sites Q08/189 and Q09/044), and may be part of a larger habitat network for mobile wildlife (e.g. forest birds).



Q08/190 Mohinui Forest Remnant 3

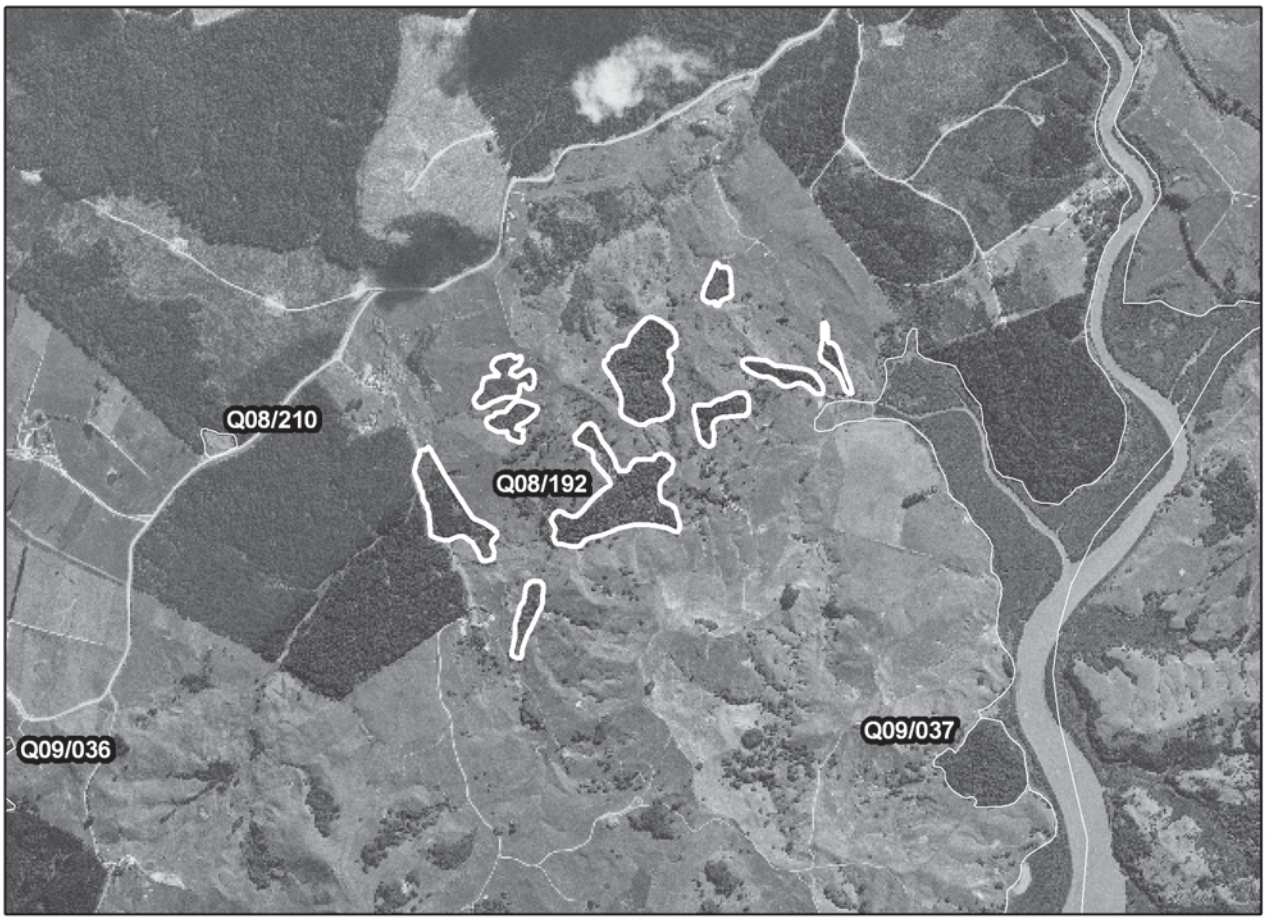
S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



PAYNE ROAD FOREST REMNANTS

Survey no.	Q08/192
Survey date	15 December 2005
Grid reference	Q08 414 511 (10 remnants)
Area	25.9 ha
Altitude	5–95 m asl



Q08/192 Payne Road Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Totara–puriri–kahikatea forest on moderate to steep hillslope (65%)

(b) Kanuka–totara–tanekaha forest in gully (15%)

(c) Totara–kahikatea forest on moderate hillslope (15%)

(d) Tanekaha forest in gully (5%)

Landform/geology

Hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

The Payne Road Forest Remnants lie within the immediate catchment of the upper tidal part of the Topuni River. Ten remnants are spread out across a pastoral farming landscape, mostly in gullies. Many individual indigenous trees are dotted around the paddocks between the remnants. The entire landscape appears to be grazed, though some of the remnants may be fenced without this being obvious. A lot of the site was difficult to see from Payne Road, therefore some of the vegetation description has been extrapolated to include areas which were invisible, based on study of recent aerial photography (flown in 2002).

(a) The main forest type on general hillslope topography appears to be a mixture of totara with lesser quantities of puriri and kahikatea. Taraire and pukatea are frequent associates, while tarata, kauri, rewarewa, matai and kanuka are occasional.

(b) Next to Payne Road, a gully forest type comprises kanuka, totara and tanekaha with frequent five finger, tarata, kahikatea and pate, and occasional ti kouka and crack willow.

(c) Some of the forest remnants have totara and kahikatea dominant in the canopy with frequent tanekaha, and occasional kowhai, kauri, puriri, matai and kanuka.

(d) The upper part of the gully directly adjacent to Payne Road supports an unusual forest type for Otamatea ED Northland: tanekaha-dominant forest with a high diversity of secondary successional species in the 'frequent' category, including kanuka, tarata, ti kouka, mapou, mamaku, karamu, five finger, pate, lancewood and mahoe.

Fauna

Tui, kingfisher, fantail.

Significance

This site contains three representative ecological units: (a) totara–puriri–kahikatea forest on moderate to steep hillslope, (b) kanuka–totara–tanekaha forest in gully and (d) tanekaha forest in gully. Gully forests of type (b) and (d), which both have a lot of tanekaha associated with them, are particularly unusual in Otamatea ED Northland. This site is grazed and trampled by livestock, which reduces its value as a natural area.

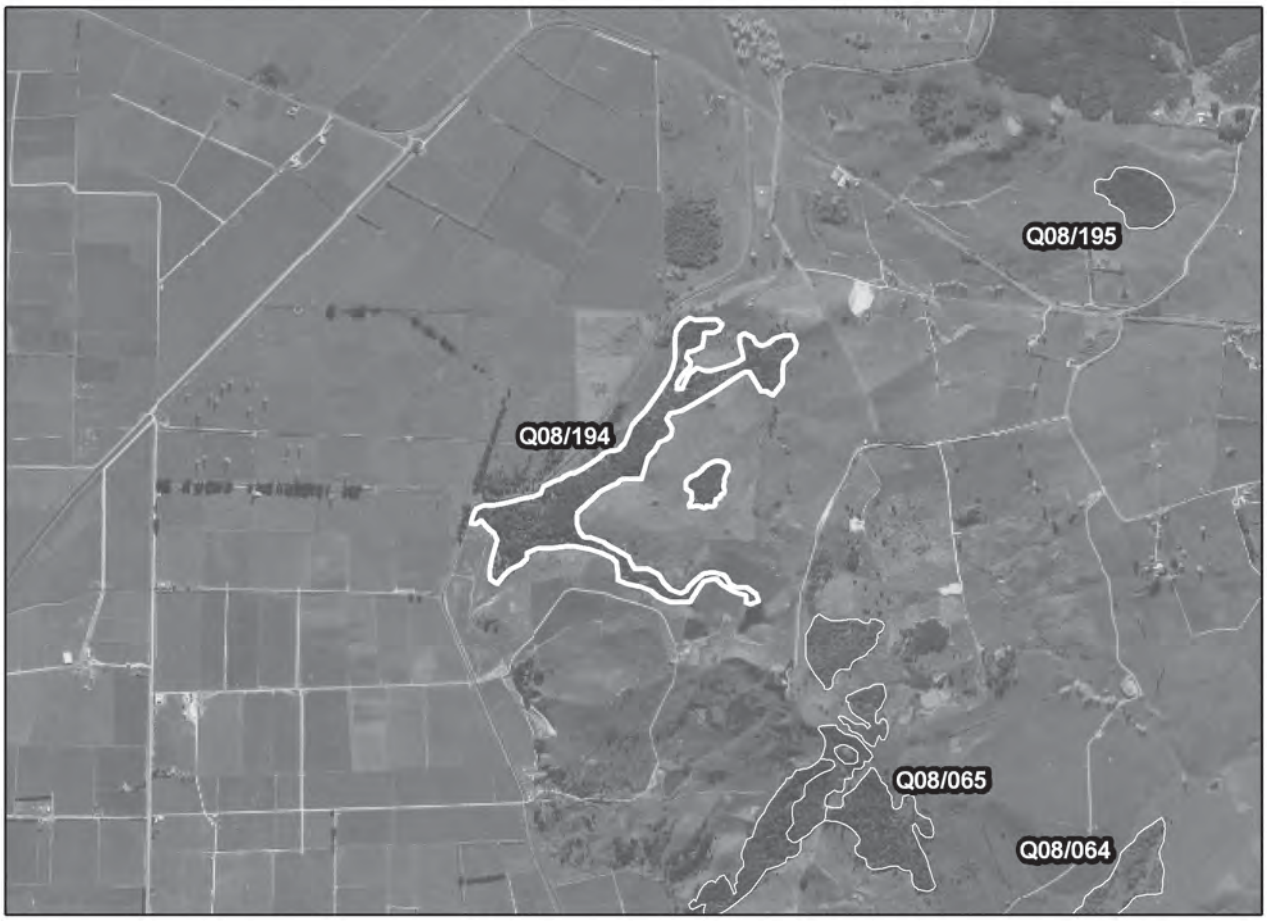
OTUHIANGA COASTAL FOREST REMNANTS

Survey no.	Q08/194
Survey date	14 December 2005
Grid reference	Q08 099 626 (2 remnants)
Area	20.9 ha
Altitude	20–102 m asl

Ecological units

(a) Totara–puriri forest on moderate to steep hillslope (80%)

(b) Totara–kahikatea forest on moderate hillslope (20%)



Q08/194 Otuhianga Coastal Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Fossil seacliffs, hillslopes and gullies in Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex).

Vegetation

This site comprises indigenous forest at the foot of the western side of Otuhianga Hill (spanning map sheets Q08 and P08) which would have once been continuous with coastal saltmarshes and mangroves. However, through

means of floodgating and canalisation of the tidal area for agricultural purposes, this site now lies roughly 3 km inland, next to the reclaimed 'Ruawai flats'.

(a) The main forest type is totara–puriri forest with frequent kowhai, kahikatea and karaka, and occasional ti kouka and nikau.

(b) The more sparse northern section is composed of totara–kahikatea forest with frequent ti kouka.

Fauna

Not surveyed.

Significance

This site contains the best example of totara–puriri forest occurring inland from the coast (type a).

KAITARA CREEK FOREST REMNANTS

Survey no.	Q08/196
Survey date	15 December 2005
Grid reference	Q08 382 565 (4 remnants)
Area	18.6 ha
Altitude	20–80 m asl

Ecological units

(a) Totara–kahikatea forest in gully (55%)

(b) Totara–kanuka forest in gully (30%)

(c) Kauri forest on gentle hillslope (10%)

(d) Totara forest on moderate hillslope (5%)

Landform/geology

Hillslopes and gullies underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies) and Miocene thick-bedded sandstone (Waitemata Group).

Vegetation

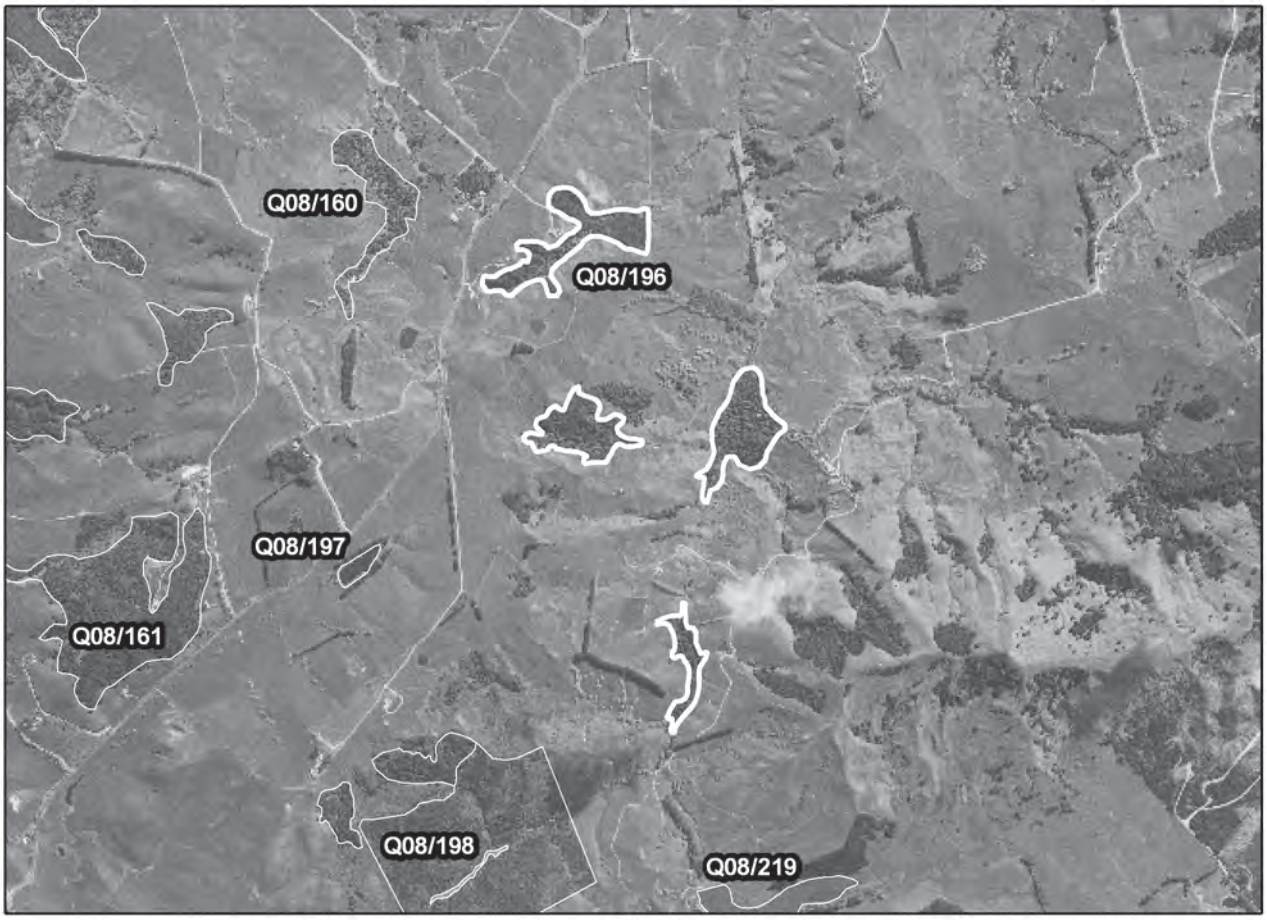
This site comprises four indigenous forest remnants in the upper Kaitara Creek catchment. Surrounding land is currently covered in pasture with occasional planted poplars, Tasmanian blackwoods, pines and other exotic trees used either as slope stabilisers or shelterbelts.

(a) The most common forest type is totara–kahikatea forest. Some kahikatea are older, mature trees, which are emergent above the forest. Kauri and pukatea are frequent with occasional puriri.

(b) The northernmost forest remnant comprises mainly totara and kanuka. Kahikatea occurs frequently with occasional mamaku and tanekaha.

(c) In the easternmost forest remnant, there are dense stands of kauri rickers on a gentle slope above the river. Totara is a frequent associate, and tall kahikatea and rimu spars occur occasionally.

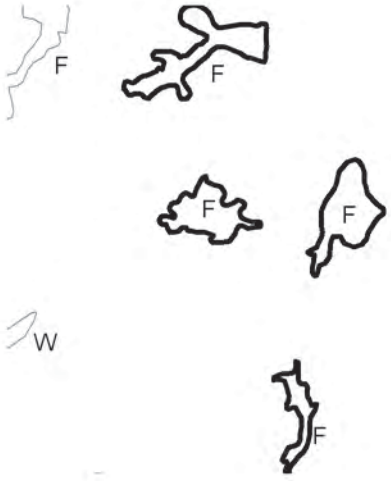
(d) A small area of totara-dominant forest with frequent tanekaha and rewarewa is present on a moderate hillslope above a gully in the middle, western remnant.



Q08/196 Kaitara Creek Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Fauna

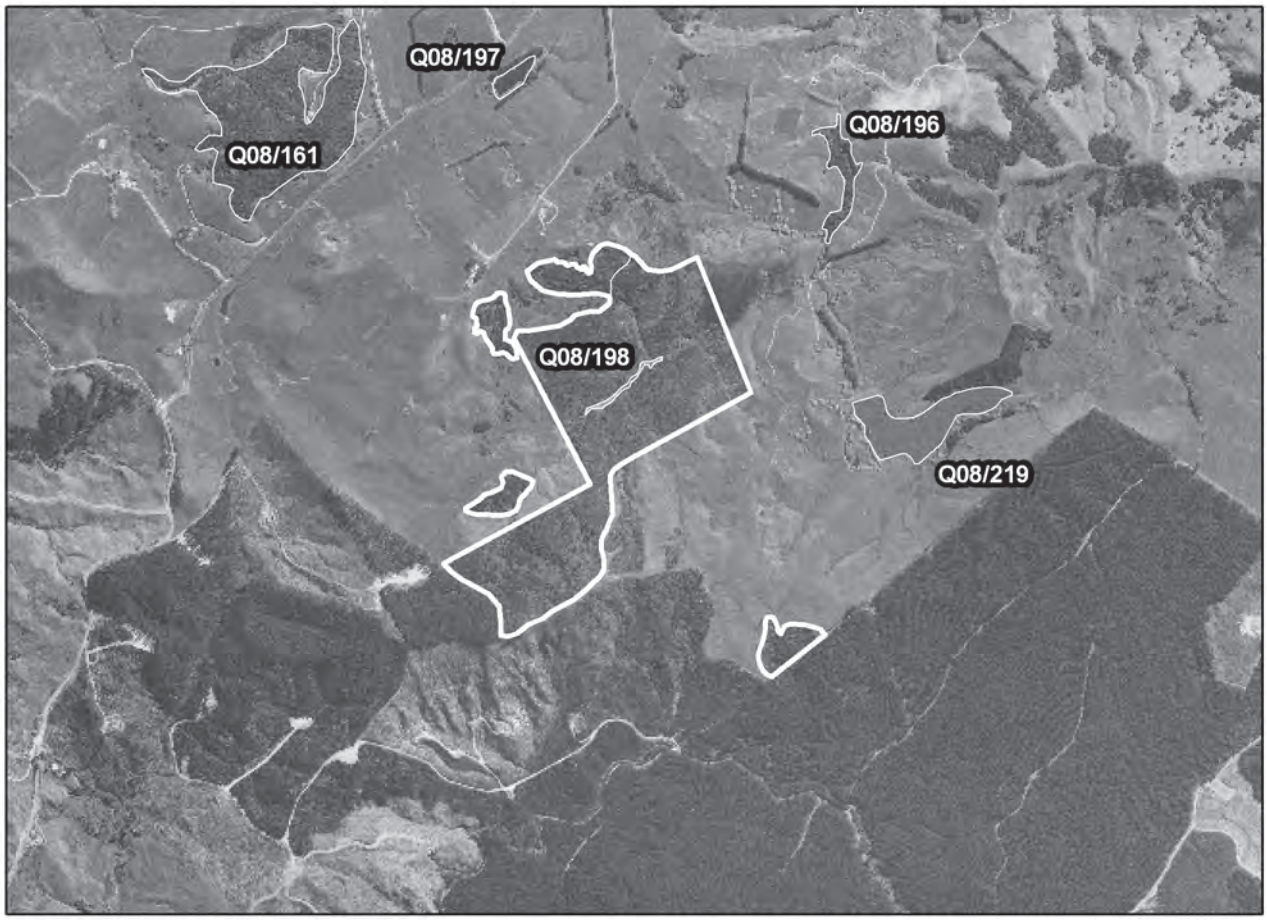
Kukupa (Gradual Decline).

Significance

This site is significant for the presence of a threatened bird species (kukupa) and well as for being a representative example of type (c) kauri forest on gentle hillslope.

NATHAN ROAD FOREST AND SHRUBLAND

Survey no.	Q08/198
Survey date	15 December 2005
Grid reference	Q08 375 550 (4 remnants)
Area	57.3 ha (5.1 ha forest, 51.9 ha shrubland, 0.3 ha wetland)
Altitude	44–135 m asl





Ecological units

(a) Kanuka–mamaku shrubland on gentle hillslope (90%)

(b) Totara forest on moderate hillslope (9%)

(c) Raupo reedland in gully (1%)

Landform/geology

Hillslopes and gullies of Miocene thick-bedded sandstone (Waitemata Group).

Vegetation

This site comprises a large block of mixed indigenous–exotic shrubland, with smaller amounts of indigenous forest and wetland, situated at the end of Nathan Road on Oneriri Peninsula. The southern part of the block borders a large radiata pine plantation, and the rest is surrounded by pastoral farmland. The long straight edges imply that the shrubland is fenced from neighbouring paddocks and has regenerated since livestock exclusion, perhaps only over the last few decades.

(a) Kanuka is abundant and mamaku is common in the shrublands. Woolly nightshade and gorse are frequent. These two exotic weeds and mamaku appear to be concentrated in the small valleys and depressions, while kanuka is more dense on the drier parts of the landscape. Occasional species recorded include ti kouka, nikau, puriri and kahikatea.

(b) At the northern end of the site there are three separate areas of indigenous forest dominated by totara, which have frequent kahikatea and occasional rimu, matai, lancewood and tanekaha.

(c) A small raupo reedland occurs in a gully bottom (part of a Kaitara Creek tributary) surrounded by regenerating shrubland.

Fauna

Not surveyed.

Significance

This site contains the second largest area of indigenous shrubland (after Pakaurangi Forest and Shrubland Q08/185) remaining in Otamatea ED Northland. Ecological unit (a), kanuka–mamaku shrubland on gentle hillslope, is a representative type.

HUARAU RIDGE FOREST REMNANTS

Survey no.	Q08/200
Survey date	16 December 200
Grid reference	Q08 289 647 (4 remnants)
Area	44.7 ha
Altitude	40–120 m asl

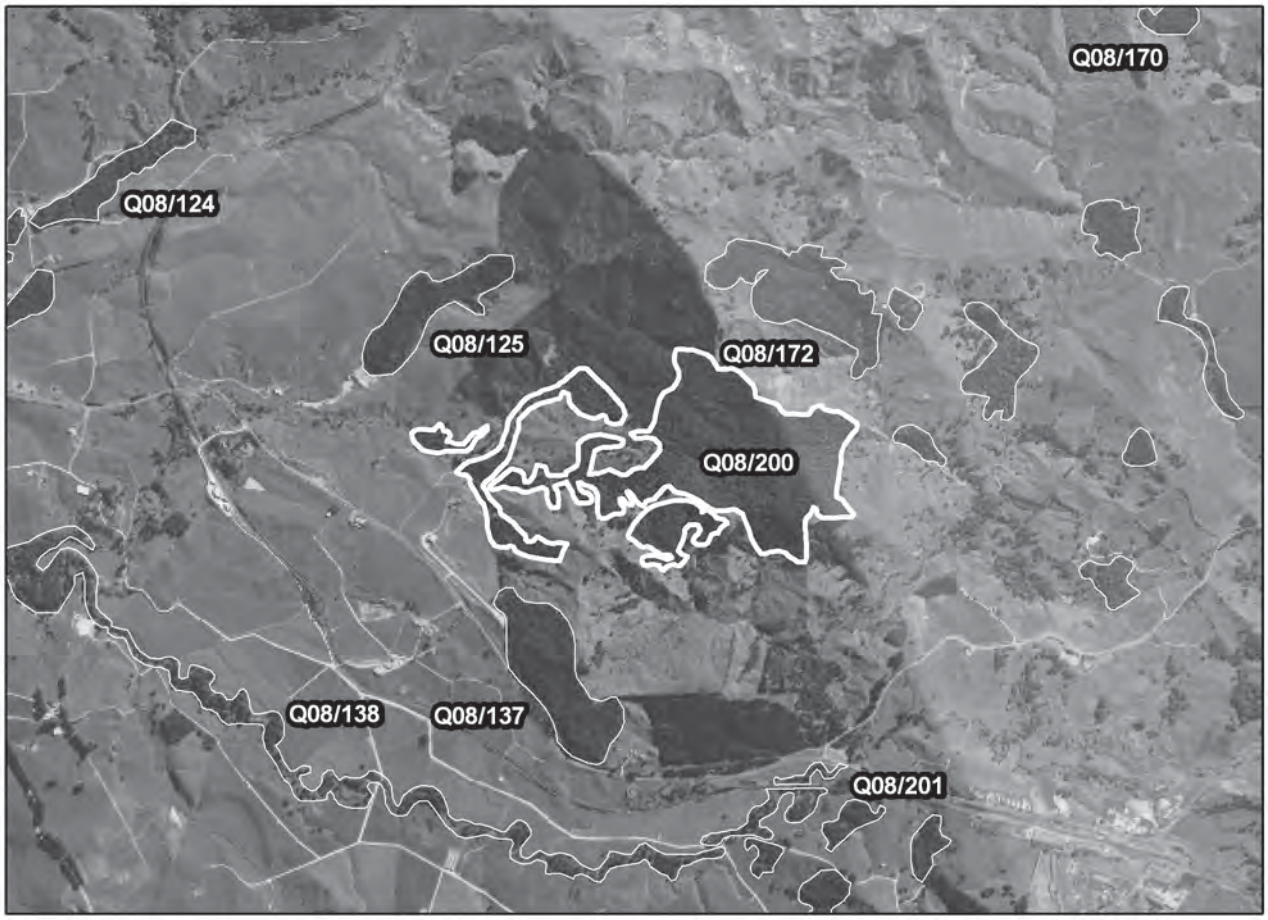
Ecological units

(a) Totara–kanuka forest on moderate to steep hillslope (40%)

(b) Taraire–kahikatea forest on moderate to steep hillslope (30%)

(c) Totara forest in gully (25%)

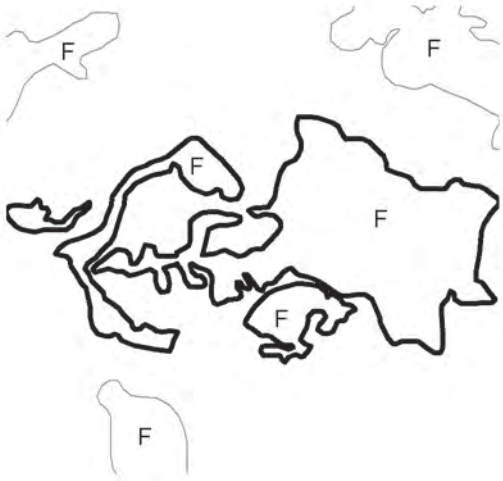
(d) Kahikatea–totara forest in gully (5%)



Q08/200 Huarau Ridge Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex), and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

Located to the east of Huarau on a prominent ridge on the skyline, directly adjacent to Barton's Hill Forest (Q08/137), this site comprises remnants of indigenous forest on the ridge and in gullies descending westwards from it,

which protect part of the headwaters of the Pahi River. A mixture of pastoral farmland and radiata pine plantation forest surrounds the site.

(a) Totara–kanuka forest dominates in drier areas towards the eastern side of the ridge. Here mamaku and kahikatea are frequent, with occasional kauri, ponga and ti kouka.

(b) Forest in which taraire is abundant and emergent kahikatea is common occurs in wetter places on the ridge. Rewarewa and totara are frequent, with occasional puriri, matai, mamaku, pukatea and radiata pine.

(c) The main forest type in the gullies on the western side is dominated by totara. Kanuka frequently occurs on the edges, and occasional nikau, taraire, kahikatea, tawa, puriri, ti kouka and rimu are also present.

(d) The small remnant at the bottom of the gully is composed mainly of kahikatea and totara with frequent kowhai, karaka and matai, and occasional titoki and pukatea.

Fauna

Not surveyed.

Significance

This site is one of the largest areas of indigenous forest in Otamatea ED Northland and is an important extension of forest habitat to nearby Level 1 site Barton's Hill Forest (Q08/137). This site is representative for (b) taraire–kahikatea forest on moderate to steep hillslope, which is one of the best of is type within Otamatea ED Northland, and is also a rare forest type in the Northland Region (Wendy Holland, pers. comm.).

HILLSTONE ROAD FOREST REMNANTS 3

Survey no.	Q08/208
Survey date	20 December 2005
Grid reference	Q08 310 577 (8 remnants)
Area	14.5 ha (12.2 ha forest, 2.3 ha shrubland)
Altitude	40–120 m asl

Ecological units

(a) Totara–kahikatea forest on moderate hillslope (40%)

(b) Puriri–taraire–karaka forest on moderate hillslope (20%)

(c) Kanuka–manuka–rimu forest on moderate to steep hillslope (15%)

(d) Kanuka–totara forest on moderate hillslope (10%)

(e) Manuka shrubland on moderate hillslope (10%)

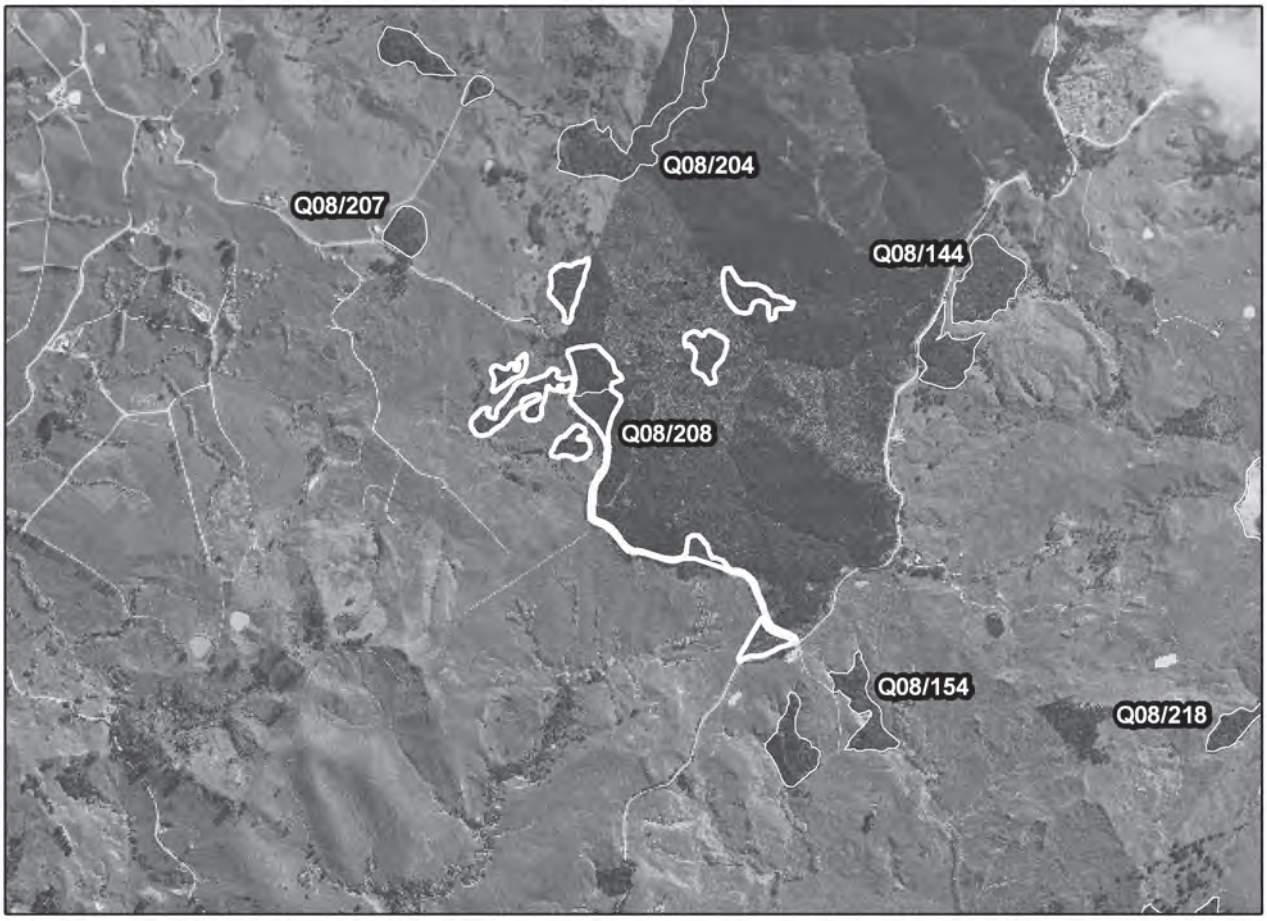
(f) Harakeke–manuka shrubland on moderate hillslope (5%)

Landform/geology

Hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

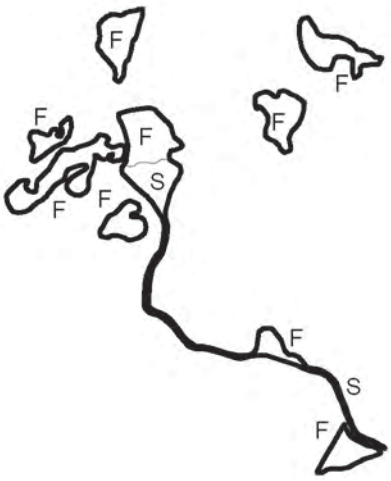
This site comprises a range of different shapes and sizes of remnants of indigenous forest and shrubland at the intersection of Hillstone Road and



Q08/208 Hillstone Road Forest Remnants 3

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Bickerstaffe Road. A large radiata pine plantation lies directly north of the road, and pastoral farmland lies directly south.

(a) It appears that the forest type of greatest extent is totara–kahikatea forest. Frequent associates of this type at this location are puriri, rimu, karaka and kanuka, while kohekohe, titoki, taraire and matai occur only occasionally. The two remnants in the northeast, which are entirely within the pine plantation, were obscured from view at the time of the survey and were assumed to be of this type.

(b) The western remnants below the road contain a lush, broadleaved forest of puriri, taraire and karaka with frequent kohekohe, nikau, rimu, kahikatea, totara, kanuka and occasional matai, mamaku, lancewood, mahoe, titoki, koromiko and Japanese honeysuckle.

(c) Directly opposite type (b) on the northern side of the road, there is an area of secondary kanuka–manuka forest with common emergent rimu, and frequent tanekaha and rewarewa. Occasional kauri ricker, lancewood, ti kouka and puriri are dotted throughout this type.

(d) At the southern end, by the road intersections, there is a triangle of young kanuka–totara forest with frequent mapou, tarata, tanekaha, ti kouka and harakeke, and occasional akepiro, mamangi, hangehange, rimu and karamu.

(e) The most extensive shrubland type, which lies on the northwestern side, is dominated by manuka with frequent karamu, ti kouka and tanekaha, and occasional harakeke, hangehange and mapou. Pampas and Japanese honeysuckle make up a small proportion of the composition.

(f) In the southwestern strip, the shrubland has equal amounts of manuka and harakeke, and frequent bracken, but otherwise is similar to type (e).

Fauna

Australasian harrier, tui.

Significance

This site contains a high diversity of vegetation types for its size, and is representative for three ecological units: (c) kanuka–manuka–rimu forest on moderate to steep hillslope, (e) manuka shrubland on moderate hillslope and (f) harakeke–manuka shrubland on moderate hillslope. Detractors to its value include the small size of the remnants, degradation and the effects of livestock grazing and trampling in parts.

ORUAWHARO ROAD STREAM

Survey no.	Q08/209
Survey date	13 November 2002 (Wildland Consultants 2004)
Grid reference	Q08 423 527
Area	0.5 ha (0.4 ha shrubland, 0.1 ha wetland)
Altitude	20 m asl

Ecological units

(a) *Coprosma propinqua* shrubland in gully (80%)

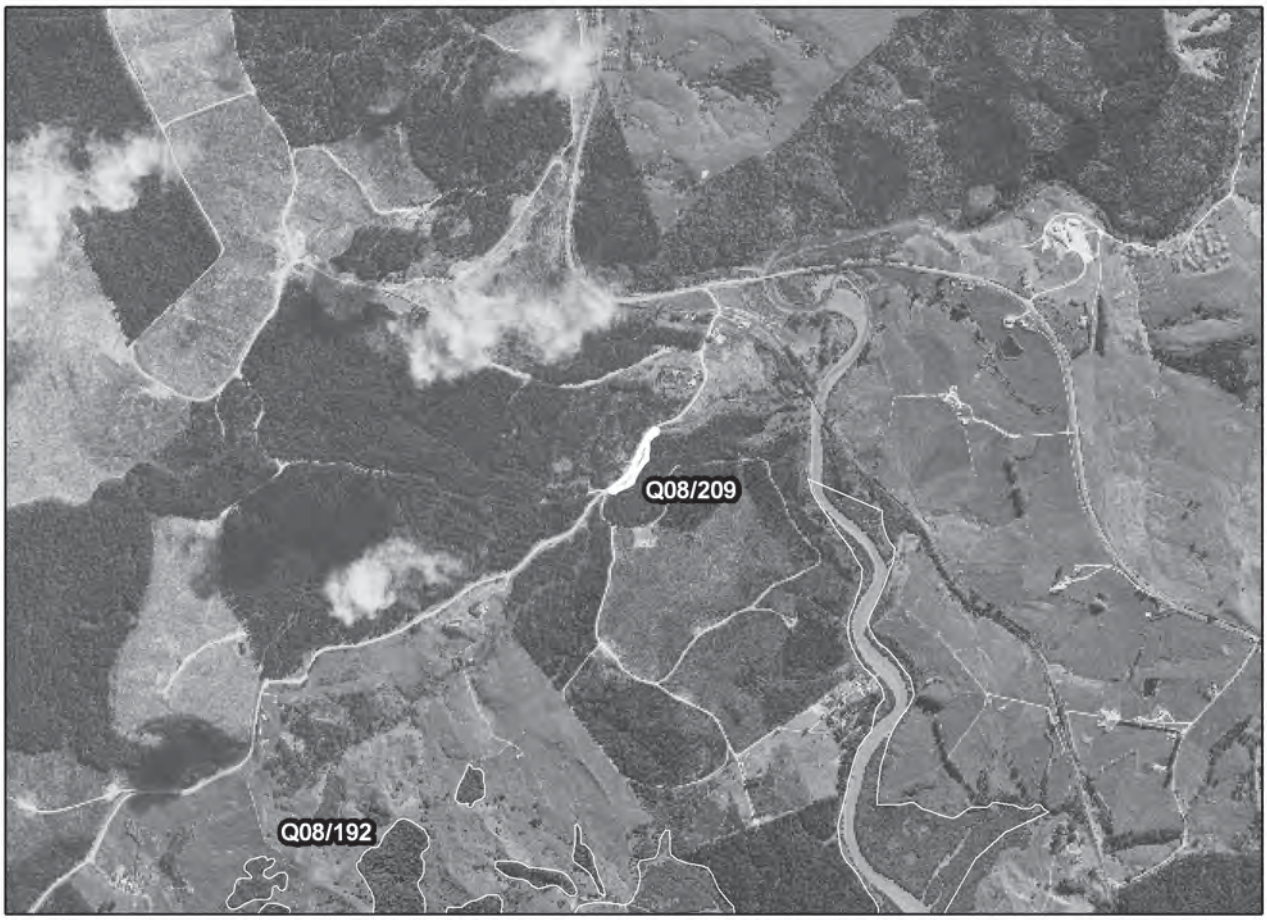
(b) Raupo reedland in gully (20%)

Landform/geology

Valley floor wetland on Holocene alluvium.

Vegetation

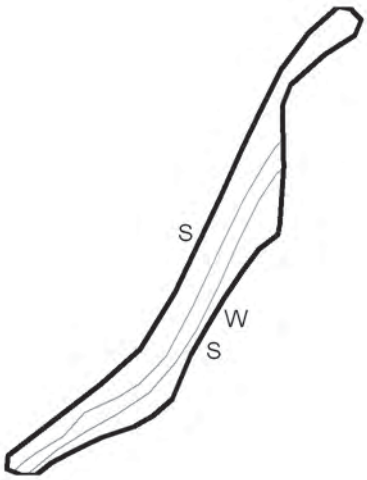
This site comprises a narrow convoluted stream gully, up to 20 m wide, next to Oruawharo Road, in which raupo reedland grows. Shrubs of *Coprosma propinqua* associated with frequent harakeke, mahoe, bracken, karamu, mapou and scattered ti kouka occur on either side of the stream. Gorse, pampas, blackberry and crack willow are frequent exotic weed species in the mixture.



Q08/209 Oruawharo Road Stream

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Fauna

Fantail, kingfisher.

Significance

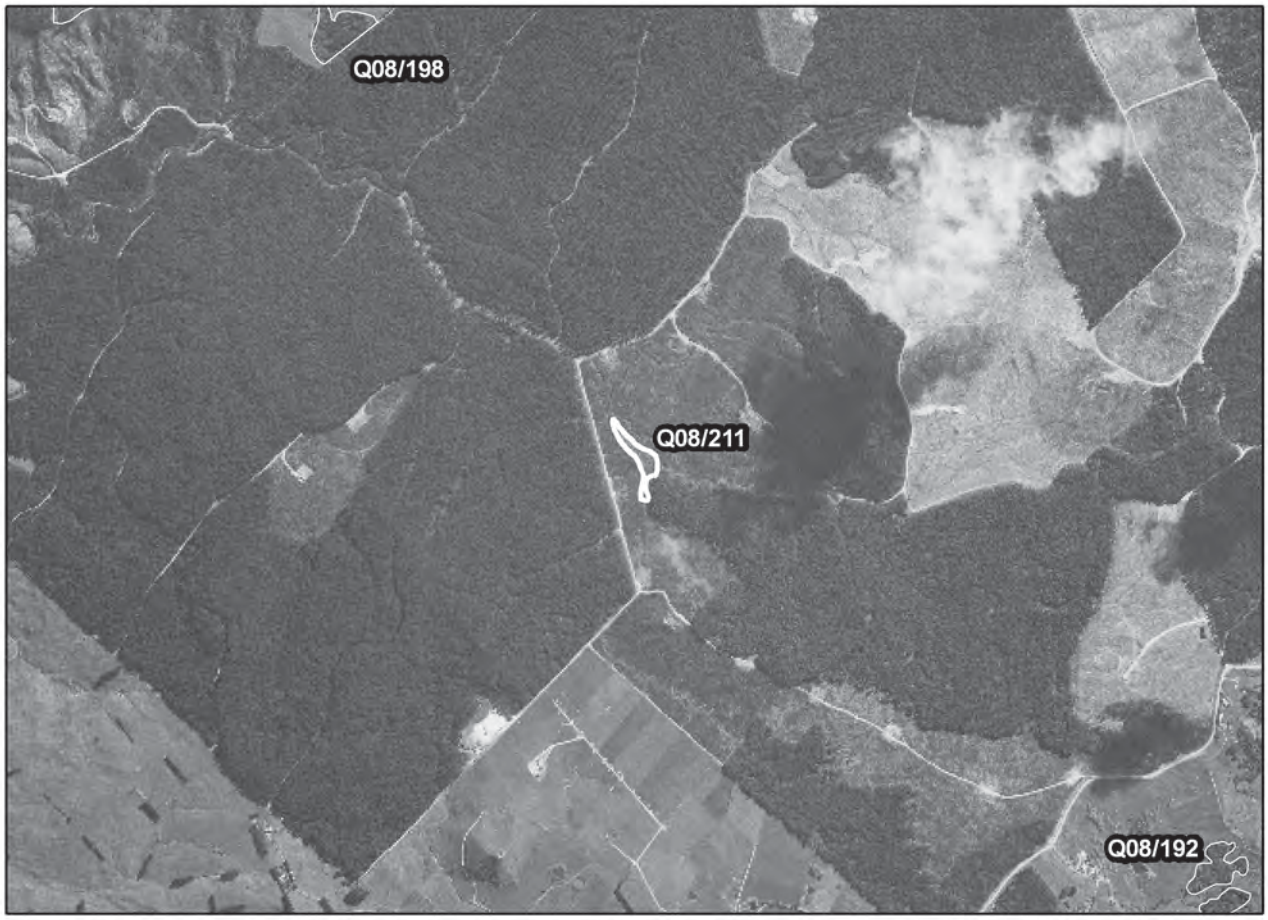
This site contains potential habitat for threatened avifauna associated with freshwater wetand, such as the NI fernbird and spotless crake, though none were detected here at the time of the survey. This site is considered to be representative for ecological unit (a) *Coprosma propinqua* shrubland in a gully system. The site is poorly buffered as it occurs next to the continual disturbance of a road. It is potentially threatened by the eventual felling of pines around it.

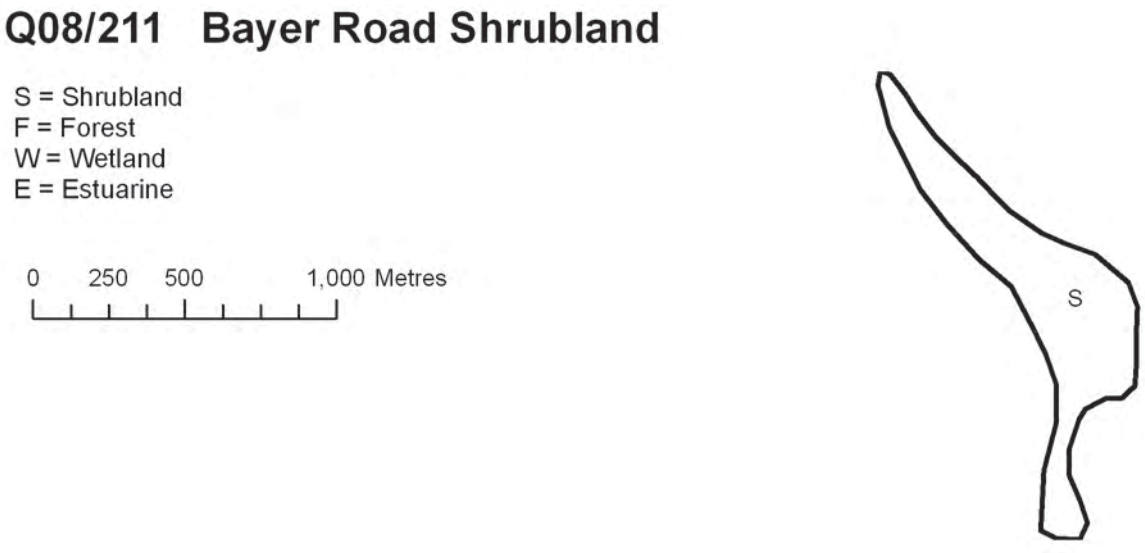
BAYER ROAD SHRUBLAND

Survey no.	Q08/211
Survey date	14 November 2002 (Wildland Consultants 2004)
Grid reference	Q08 392 526
Area	1.0 ha
Altitude	40 m asl

Ecological unit

(a) Putaputaweta shrubland in small depression (100%)





Landform/geology
Valley floor wetland on Pleistocene alluvium.

Vegetation
This narrow site is surrounded by a tall radiata pine plantation. It has an upper tier of putaputaweta with frequent emergent manuka, wheki and ti kouka, and a few scattered emergent radiata pine. Harakeke and karamu are frequent throughout the site, while gorse and pampas are restricted to the margins. The ground cover is exotic grass, with kiokio, blackberry, umbrella sedge and lake clubrush scattered throughout the site. Occasional *Carex virgata* and bush lawyer are present. This site is swampy in places.

Fauna
Fantail, grey warbler, shining cuckoo.

Significance
This site merits Level 1 significance as it is the only example of putaputaweta shrubland found in Otamatea ED Northland. It also has potential habitat value for threatened birds of shrubland/wetland habitat, such as the NI fernbird and spotless crake, though none were detected here at the time of the survey. Due to its high water table, this site is vulnerable to a sudden change in hydrology and/or exposure if pines are felled directly around it.

TE MIRA ROAD WETLAND

Survey no.	Q08/212
Survey date	29 October 2002 (Wildland Consultants 2004)
Grid reference	Q08 212 524
Area	4.5 ha (3.1 ha shrubland, 1.4 ha wetland)
Altitude	40–104 m asl

Ecological units
(a) Manuka shrubland in gully (60%)

(b) Raupo reedland in gully (30%)

(c) Mahoe shrubland in gully (10%)

Landform/geology
Valley wetland on Holocene alluvium.

Vegetation
This site comprises a narrow raupo reedland at the bottom of two upper tributaries of Te Mira Creek on the eastern Hukatere peninsula. An extensive radiata pine plantation surrounds it. The banks and upper sections of the wetland are vegetated in a narrow, predominantly indigenous shrubland, dominated either by manuka or mahoe. Frequent species in the shrubland include putaputaweta, ti kouka, wheki, *Coprosma propinqua*, karamu, hangehange, raupo, koromiko, kiokio, bracken, pate and mamaku. Blackberry and pampas can be locally common.

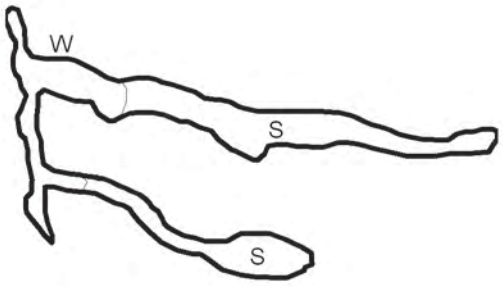
Fauna
Fantail, grey warbler.



Q08/212 Te Mira Road Wetland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Significance

This site contains one of the best representative examples of raupo reedland in a gully system remaining in Otamatea ED Northland, but it would be very vulnerable to disturbance if the entire surrounding pine plantation were clear-felled around it. The site has potential habitat value for threatened avifauna associated with freshwater wetland, such as the NI fernbird and spotless crake, though none were detected here at the time of the survey.

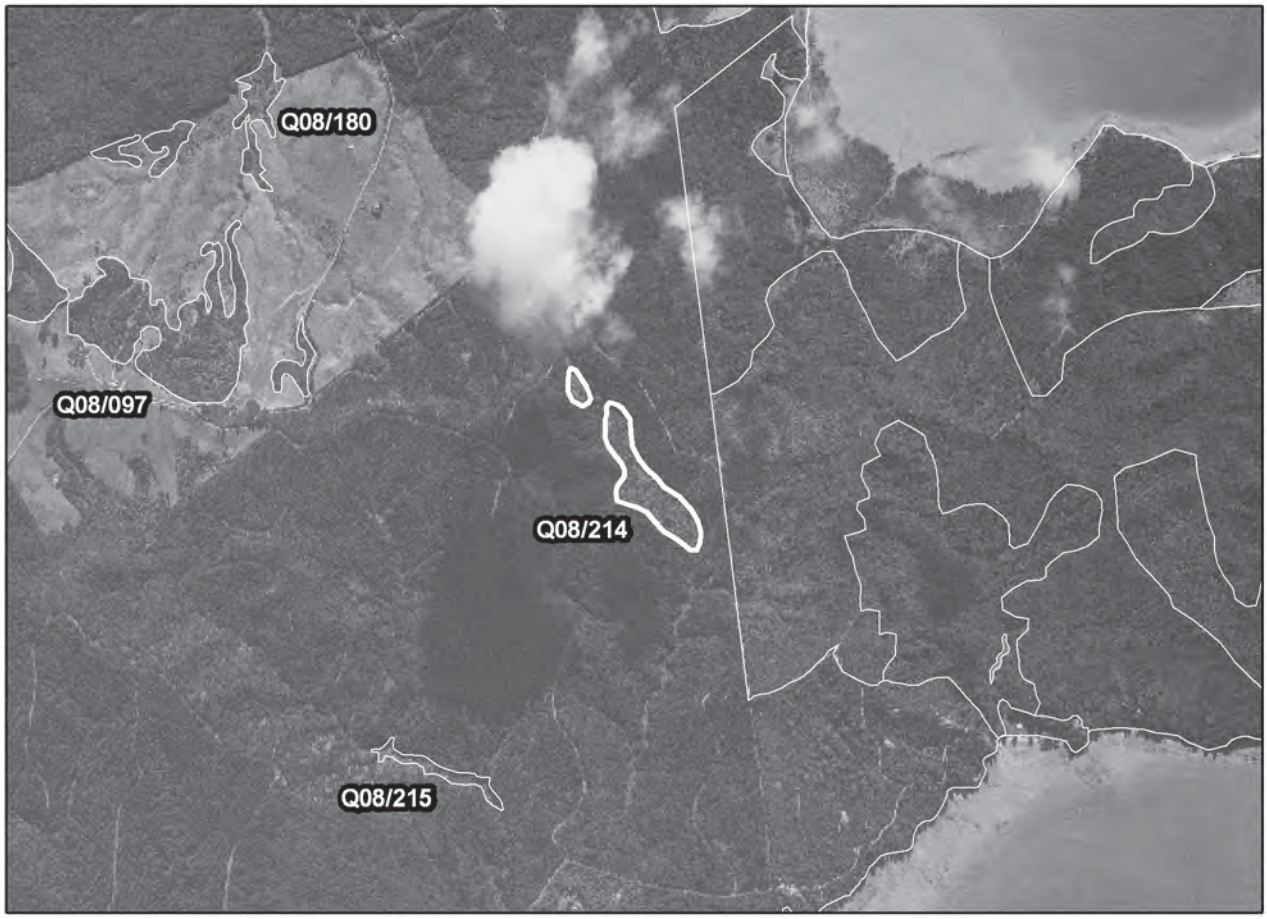
EASTERN BOUNDARY FOREST (CARTER HOLT HARVEY)

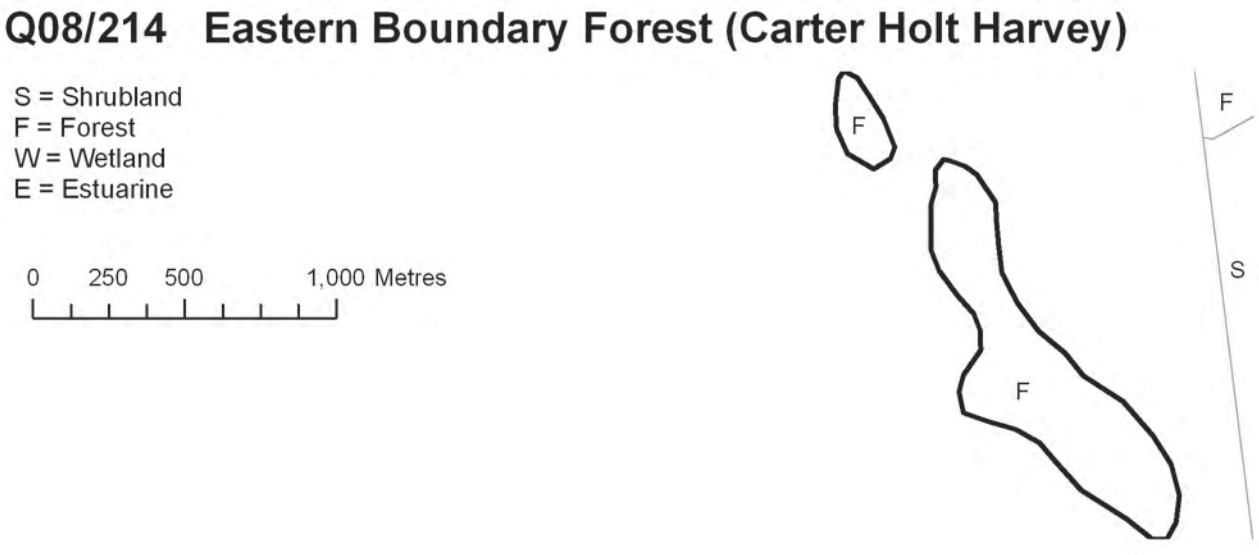
Survey no.	Q08/214
Survey date	31 October 2002 (Wildland Consultants 2004)
Grid reference	Q08 238 520 (2 remnants)
Area	5.8 ha
Altitude	60–94 m asl

Ecological units

(a) Totara–mamaku forest in gully (90%)

(b) Kauri–totara–tanekaha forest on moderate hillslope (10%)





Landform/geology
Valley wetland on Holocene alluvium.

Vegetation
This site comprises two indigenous forest remnants nestled in an extensive radiata pine plantation, in the gully head of a small stream flowing southeast to Hollands Bay. It has a more dense understorey than comparable remnants in pastoral landscape due to the buffering effect of surrounding tall pines and the lack of grazing and trampling by livestock.

(a) The main forest type in the gully is dominated by totara and mamaku with frequent ti kouka and manuka, and occasional putaputaweta, pate, mahoe, karaka and pampas.

(b) On drier slopes there are groves of kauri, tanekaha and totara with frequent kanuka and puriri. A large number of occasional canopy species was recorded, including ti ngahere, ti kouka, ponga, kahikatea, hangehange, rewarewa, tawa, mahoe, mapou, tarata, putaputaweta, northern rata, pate, karaka, kiekie, radiata pine and black wattle.

Significant flora
Ti ngahere, northern rata and tawa are all locally uncommon in Otamatea ED Northland.

Fauna
Grey warbler, fantail, silvereye, kingfisher.

Significance
Three locally uncommon species were recorded here (northern rata, tawa and ti ngahere). The occurrence of northern rata is particularly significant, as it is currently only known at four sites in the whole of Otamatea ED Northland. This site also contains the only example of ecological unit (a), totara–mamaku gully forest in the Northland Conservancy part of the ED. The site is vulnerable to exposure and climatic impacts if pines are clear-felled around it.

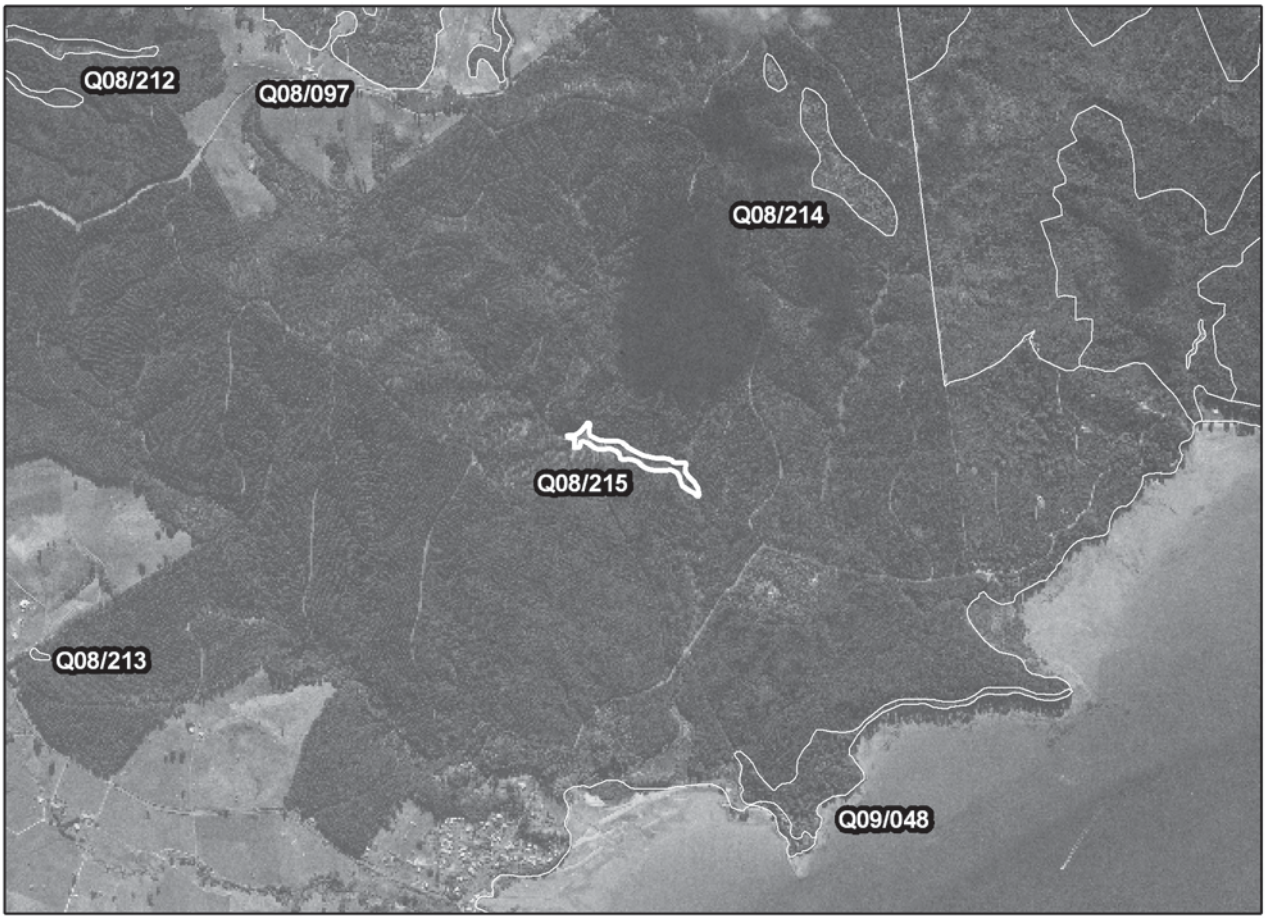
PARRY ROAD WETLAND

Survey no.	Q08/215
Survey date	30 October 2002 (Wildland Consultants 2004)
Grid reference	Q08 232 511
Area	1.6 ha
Altitude	28–46 m asl

Ecological unit
(a) Raupo–bracken reedland in small depression (100%)

Landform/geology
Valley wetland on Holocene alluvium.

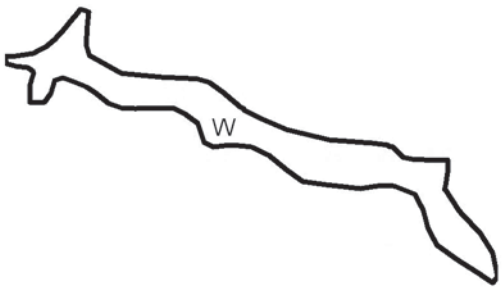
Vegetation
This site comprises a moderate-sized wetland in a shallow stream valley surrounded by an extensive radiata pine plantation. The vegetation is predominantly indigenous though Mexican devil occurs throughout, and pampas and black wattle are scattered around the margins. The main canopy cover in the wetland is formed by raupo and bracken, while ti kouka, manuka,



Q08/215 Parry Road Wetland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



harakeke and tutu are frequently emergent. Occasional patches of *Baumea* sp., *Carex virgata*, *C. secta,* kiokio, karamu, koromiko, pampas and tangle fern are present.

Fauna

Grey warbler, silvereye, fantail.

Significance

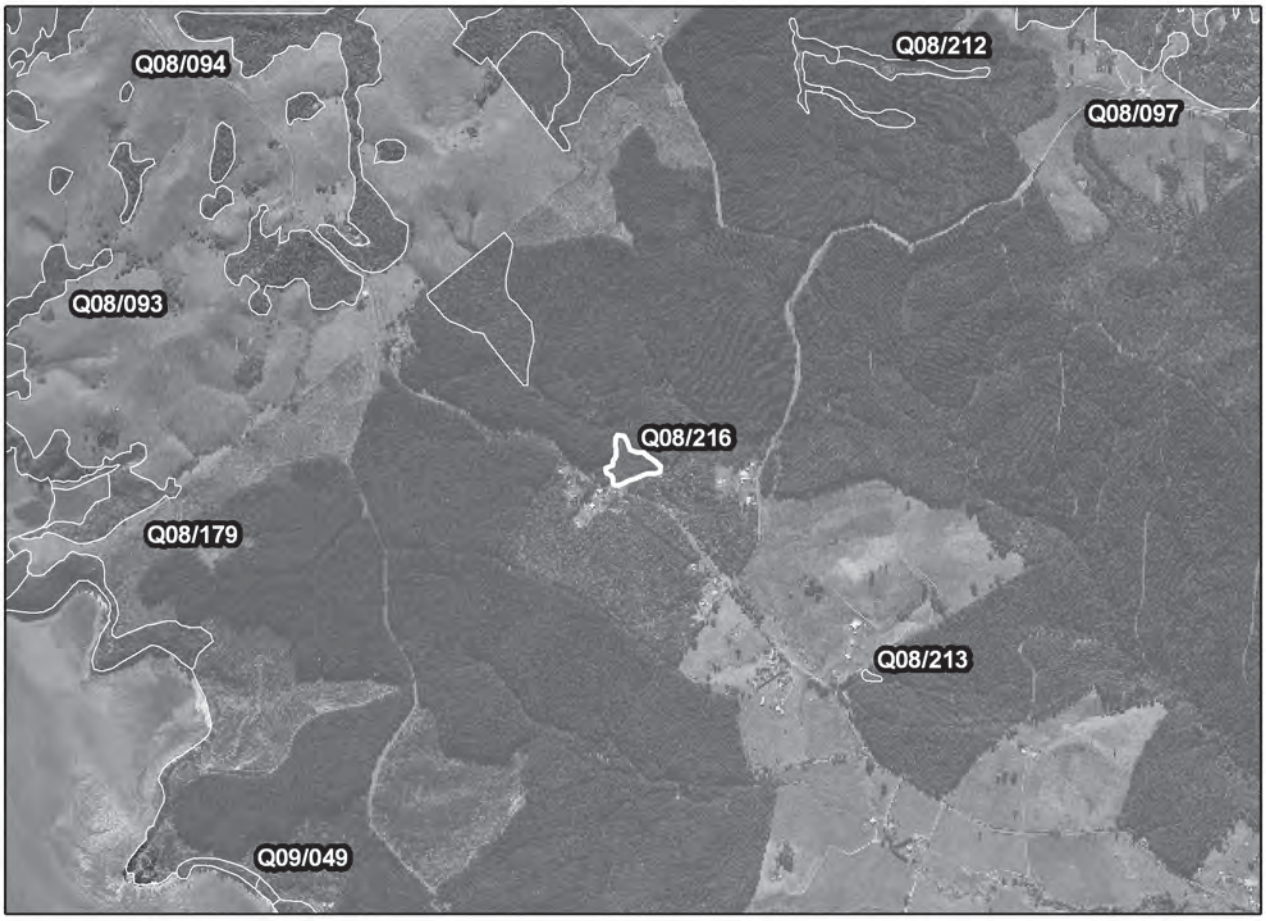
This is a unique and representative example of raupo–bracken reedland in Otamatea ED Northland. The site is potential habitat for threatened avifauna associated with freshwater wetland, such as the NI fernbird and spotless crake, though none were detected here at the time of the survey. As with all indigenous habitat remnants in a pine forest landscape, this site is vulnerable to sudden changes in microclimate caused by clear-felling of the plantation.

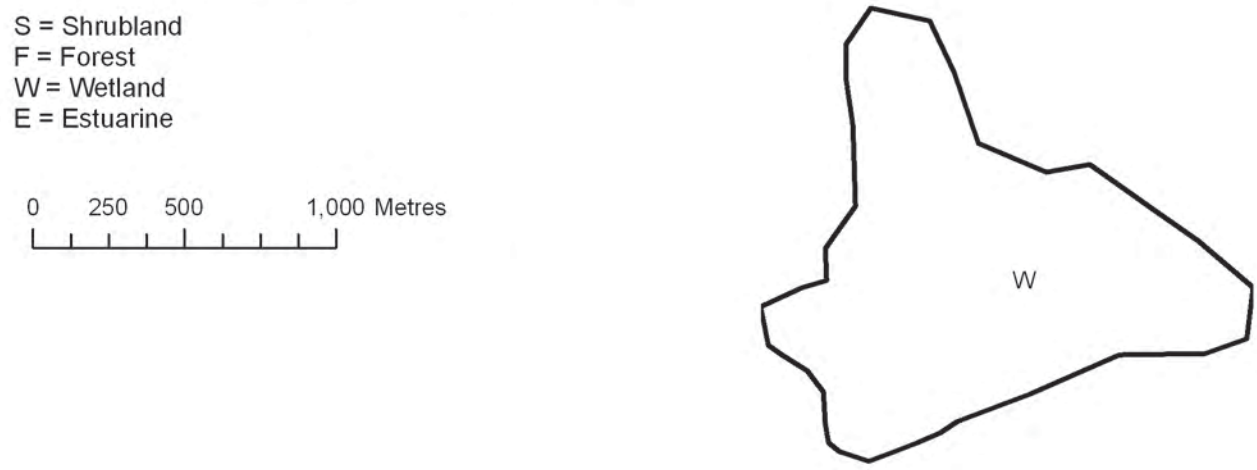
TINOPAI ROAD WETLAND

Survey no.	Q08/216
Survey date	29 October 2002 (Wildland Consultants 2004)
Grid reference	Q08 204 511
Area	1.5 ha
Altitude	40 m asl

Ecological unit

(a) Raupo reedland in small depression (100%)





Landform/geology
Valley wetland on Holocene alluvium.

Vegetation
This site comprises a moderate-sized wetland of indigenous vegetation set in a landscape of radiata pine plantations and weedy treeland (mainly wattles). Raupo dominates, with frequent emergent manuka, ti kouka and harakeke. In patches, *Baumea* sp. and lake clubrush, bracken and kiokio are mixed with the raupo. The site's narrow margins are dominated by brush wattle have several other weed species including Japanese honeysuckle, blackberry, pampas and Kahili ginger. Despite this, frequent mahoe, karamu, ponga and hangehange occur in the margins and the occasional tall mamaku leans out over the wetland.

Fauna
North Island fernbird (Sparse), kingfisher, fantail.

Significance
This site is representative of some of the best raupo reedland in the Northland Conservancy part of Otamatea ED, mainly due to its medium size and high species richness. It is significant as a habitat for the threatened North Island fernbird, and is one of only two locations where this bird is currently known to survive within Otamatea ED Northland. The site is severely impacted by weed infestation, however, and is at risk of further invasion if plantations are clear-felled up to its margins.

HANERAU STREAM FOREST REMNANTS

Survey no.	Q08/218
Survey date	12 January 2006
Grid reference	Q08 330 559 (6 remnants)
Area	11.7 ha
Altitude	0–78 m asl

Ecological units
(a) Totara–kahikatea–karaka forest on gentle coastal margin (60%)

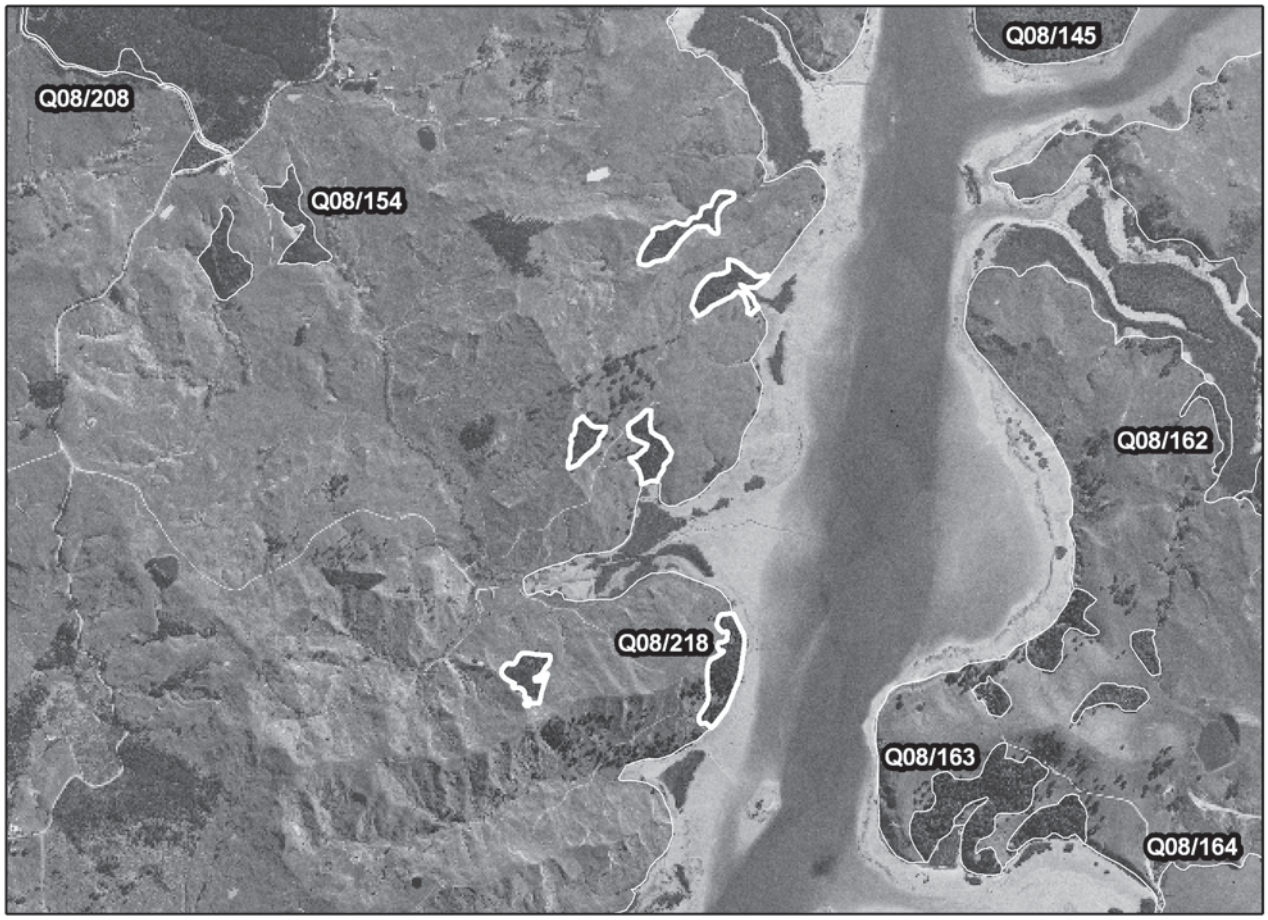
(b) Taraire–karaka–totara forest on moderate hillslope (40%)

Landform/geology
Hillslopes and gullies underlain by Mangakahia Complex sandstone and mudstone, and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation
This site comprises widely scattered indigenous forest remnants spread over a pastoral landscape in the vicinity of Hanerau Stream, on the western bank of the Otamatea River (Q08/062).

(a) Remnants adjacent to the coast comprise mainly totara, kahikatea and karaka, with frequent puriri and occasional rewarewa, matai and kowhai.

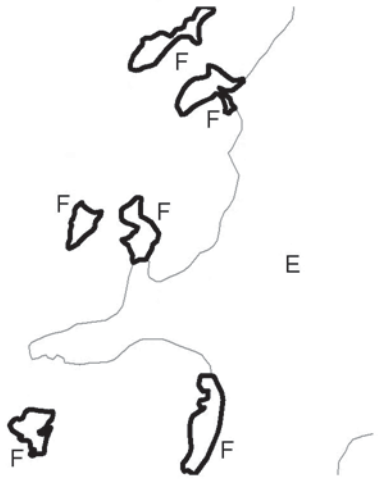
(b) Further from the coast, the forest composition changes to a mixture of taraire, karaka and totara. Puriri are frequent, with occasional kahikatea and kowhai.



Q08/218 Hanerau Stream Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Fauna

Kingfisher, tui.

Significance

These remnants are all rather small and isolated, but they represent the last vestiges of indigenous vegetation in the local area. Totara–kahikatea–karaka forest on gentle coastal margin (a) is unique and representative, which increases the significance of this site, which is otherwise in poor condition. The site serves as a protective vegetation buffer to the shores of the Otamatea River, and appears to serve as habitat to common forest birds.

WHAKAPIRAU CREEK CONSERVATION AREA AND SURROUNDS

Survey no.	Q08/220
Survey date	2 May 2006
Grid reference	Q08 273 573
Area	0.5 ha
Altitude	0–20 m asl

Ecological unit

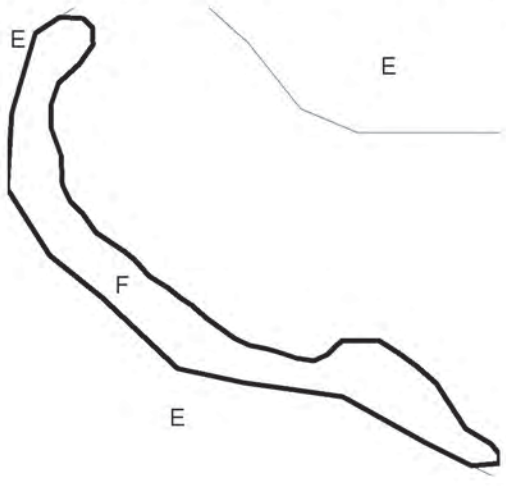
(a) Kowhai–karaka forest on gentle coastal margin (100%)



Q08/220 Whakapirau Creek Conservation Area and Surrounds

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology
Not surveyed.

Vegetation
This site comprises a narrow strip of kowhai–karaka forest on the southwestern coastal margin of a small peninsula in the upper Whakapirau Creek. Totara is frequent with a localised group of large-leaved milk tree, occasional titoki, tawa and single examples of mature emergent kahikatea and matai. The remnant is grazed and relatively bare underneath.

Significant flora
Large-leaved milk tree (Sparse); nine trees and one sapling were counted at this site. Tawa (locally uncommon).

Fauna
Not surveyed.

Significance
This site is significant for the presence of a threatened coastal tree species, large-leaved milk tree (Sparse), which is not known to occur anywhere else on the Kaipara Harbour shoreline. The site is currently unfenced. Approximately 0.2 ha of the site is within the Whakapirau Creek Conservation Area (administered by DOC), which includes the large-leaved milk tree population.

TIMBER BAY FOREST

Survey no.	Q09/001
Survey date	9 November 2005
Grid reference	Q09 272 480 (3 remnants)
Area	125.8 ha (123.8 ha forest, 1.8 ha shrubland, 0.2 ha wetland)
Altitude	0–160 m asl

Ecological units
(a) Kanuka–totara–kahikatea forest on moderate to steep hillslope (50%)

(b) Kauri forest on ridge top and moderate hillslope (15%)

(c) Kauri–tanekaha forest on moderate to steep hillslope (14%)

(d) Mamaku–nikau–pukatea forest in gully (13%)

(e) Puriri–kowhai forest on gentle coastal margin (2%)

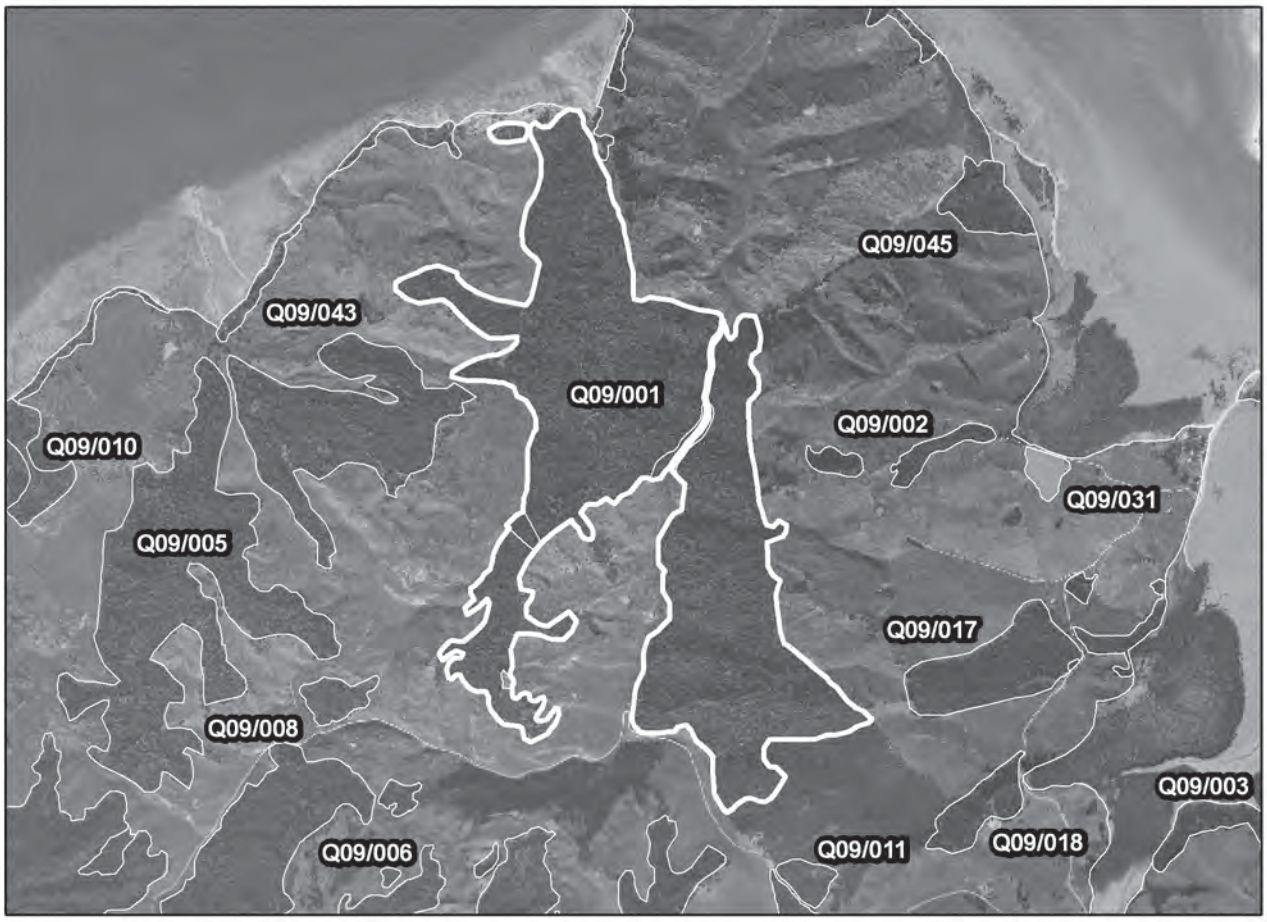
(f) Kanuka–manuka shrubland on moderate to steep hillslope (2%)

(g) Totara–puriri–kanuka forest on steep coastal margin (2%)

(h) Raupo reedland in small depression (1%)

Landform/geology
Hillslopes and gullies underlain by Miocene thinly interbedded sandstone and mudstone, and polymict igneous conglomerate (Waitemata Group).

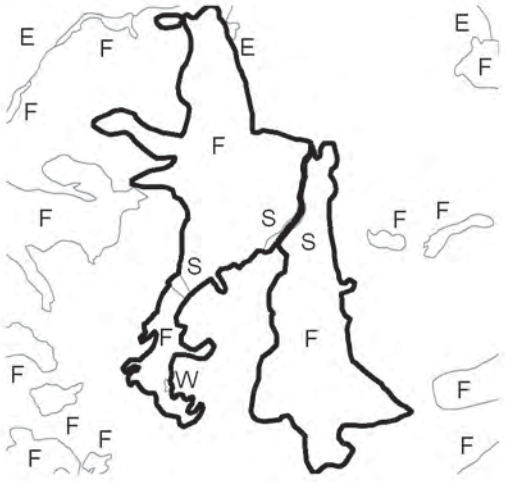
Vegetation
This is the largest continuous forest remnant on Puketotara Peninsula and contains all elements of a sequence of secondary forest types (i.e. none probably older than 150 years) extending from the coast to ridges 2 km inland. Pohutukawa occurs sporadically from the coast right up to the top of the remnant. Timber Bay Forest is currently grazed and has a relatively sparse



Q09/001 Timber Bay Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



understorey, though landowners plan to exclude stock in the near future (Tony Walden, landowner, pers. comm.). A fence is present along the western margin of the site, however it excludes two small arms of forest extending westwards.

(a) The main forest matrix comprises kanuka, kahikatea and totara, which clothe the predominantly east-facing hillslopes. Other species in this forest type include frequent kauri and pohutukawa, and occasional rewarewa, nikau, rimu, tarata and lancewood.

(b) The tops of ridges and hillslopes support dense stands of kauri rickers, with local occurrences of rewarewa, kanuka, tanekaha, totara, toru and mamangi. The associated species are often just below the kauri stand on the ridge crest where it grades into the main forest matrix.

(c) In the southern part of the remnant, on spurs running eastwards down from the trig station, there are stands of dense kauri rickers and young tanekaha. Rewarewa and mamangi occur frequently with occasional toru and lancewood. This forest type reflects the very dry and infertile conditions on ridge tops.

(d) The Waikanai Stream gully and tributaries support very diverse broadleaved–podocarp forest dominated by tree ferns (mamaku and ponga), nikau, and pukatea, with occasional taraire and very local northern rata. A pohutukawa–northern rata hybrid was noted in this forest type.

(e) A small patch of puriri–kowhai forest with occasional ti kouka and pohutukawa is present on the steep coastal hillslope facing Timber Bay.

(f) Small patches of kanuka–manuka shrubland have regenerated from former pasture, probably due to recent fencing and exclusion of stock.

(g) An isolated remnant of totara–puriri–kanuka forest stands above the cliffs on Timber Bay.

(h) Raupo reedland is present in a small depression in a gully head.

Significant flora

Northern rata × pohutukawa (regionally significant), northern rata (locally uncommon).

Fauna

Australasian harrier, paradise shelduck, welcome swallow. Kukupa (Gradual Decline) regularly use this forest remnant.

Significance

This is one of the largest and most diverse forest tracts remaining in Otamatea ED Northland, and the whole site is representative of a coastal vegetation sequence from ridge top to gully bottom on Waitemata Group geological units. The Waikanai stream catchment is the only catchment in the Northland part of the ED which is predominantly covered in indigenous forest, and provides a valuable contribution to Kaipara Harbour catchment protection. This is one of only four sites where northern rata has been recorded in the study area, and is a site of northern rata × pohutukawa hybridism (*Metrosideros robusta* × *M. excelsa* is a regionally significant hybrid). The forest has the capacity to provide habitat for good populations of common forest birds. It may support indigenous geckos and skinks (though none have been found), and possibly large invertebrates such as kauri snails and weta. Kukupa are known to use this forest, but they are threatened by poachers who gain access to the site from the water (Tony Walden, pers. comm.). The other less visible threats to forest birds and other fauna are introduced predatory mammals (e.g. possums, stoats, rats, feral cats, etc.), which are definitely present in high numbers (Tony Walden, pers. comm.). Still very little is known about the ecology of this extensive and valuable remnant.

PUKETOTARA FOREST REMNANTS 2

Survey no.	Q09/005
Survey date	9 November 2005
Grid reference	Q09 261 481 (3 remnants)
Area	75.4 ha
Altitude	20–149 m asl

Ecological units

(a) Kanuka–kahikatea forest on moderate hillslope (80%)





(b) Puriri–nikau–taraire forest in gully (10%)

(c) Kauri–kanuka forest on moderate slope (5%)

(d) Puriri–kahikatea forest on moderate hillslope (5%)

Landform/geology

Hillslopes and gullies underlain by Miocene polymict igneous conglomerate (Waitemata Group); Miocene muddy sandstone and volcaniclastic gravelly sandstone (Waitakere Group).

Vegetation

This site encompasses extensive secondary indigenous forest remnants in one of the northern catchments of Puketotara Peninsula, with two tributaries flowing northwards that meet near the coastline of the Funnel. It is very similar to Timber Bay Forest (Q09/001) in the neighbouring catchment to the east, although it contains more kanuka and kahikatea, and fewer kauri ricker stands. A considerable area on the western side, which includes the western stream gully (perhaps 40% of the site), has been ring-fenced within the last three years in order to exclude cattle (Tony Walden, pers. comm.). At the time of the site visit, cattle were heard lowing in the forest, indicating that the unfenced parts of the site are still grazed and trampled underneath.

(a) Kanuka–kahikatea forest is the major forest type, occurring in all mid-slope locations, with kahikatea becoming more common towards the bottom of the slopes. At the upper margins of the site, this forest type generally abuts gorse–woolly nightshade scrub.

(b) Puriri, nikau and taraire are common in gullies, with scattered pockets of pukatea, karaka and mamaku, and occasional titoki and kohekohe.

(c) Dense kauri ricker stands occur on some ridge tops within the site, with occasional associated manuka, rewarewa and kahikatea.

(d) Towards the lower end of the gully, where the coastal influence is stronger, there are puriri and kahikatea dominant stands with frequent kanuka and mahoe. Some of these puriri are in particularly poor condition, most likely due to possum browse.

Fauna

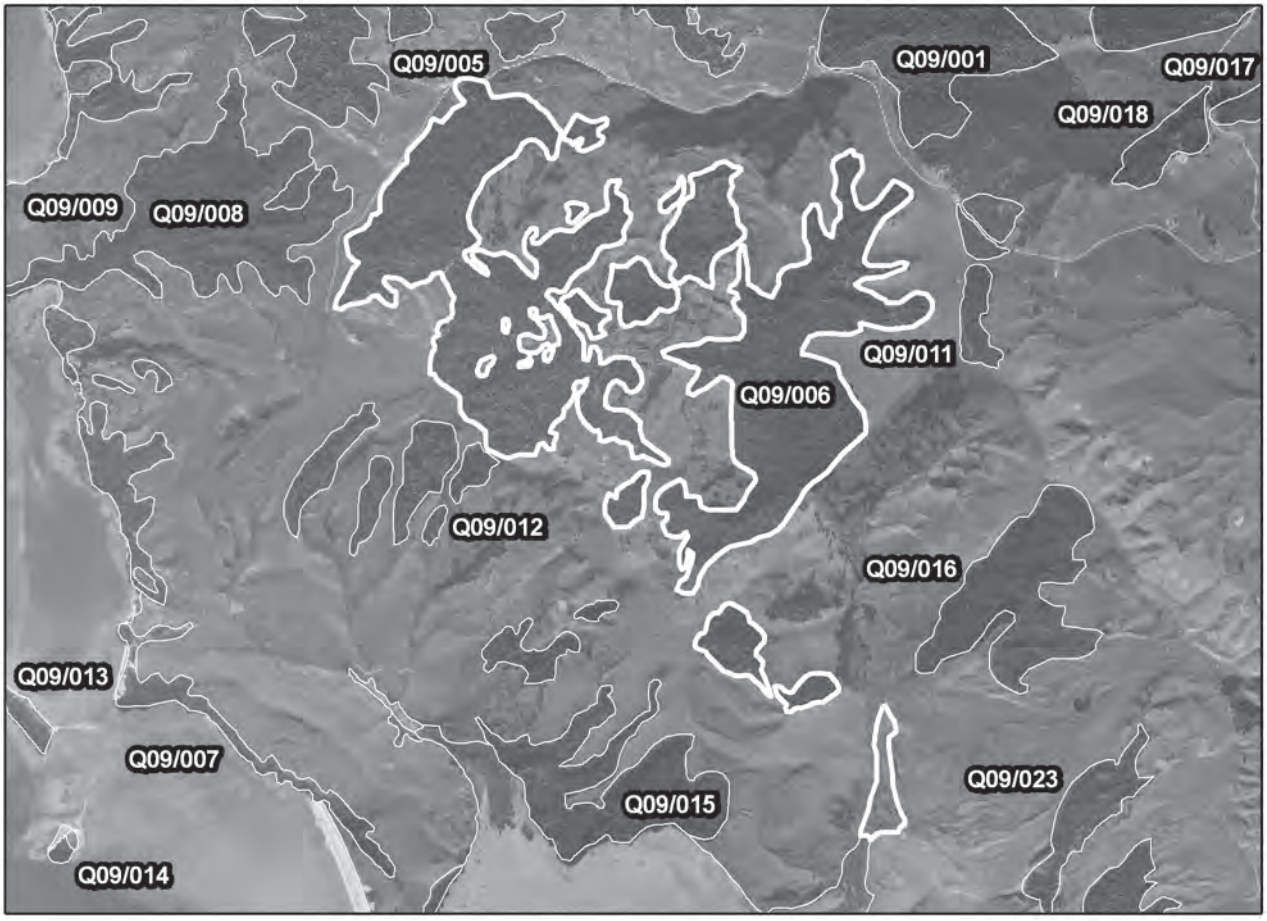
Australasian harrier, paradise shelduck.

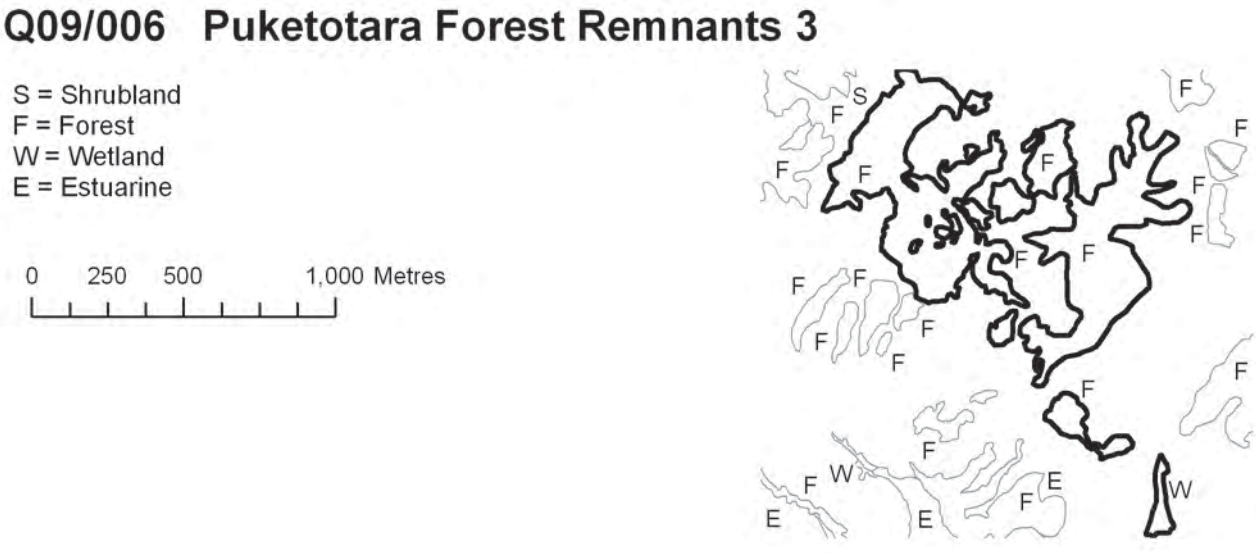
Significance

The large size of these remnants, their ridge top to coastal margin sequence, and their role in riparian protection of two major streams on the peninsula afford them Level 1 significance. In addition, this site is considered representative for (b) puriri–nikau–taraire forest in gully and (d) puriri–kahikatea forest on moderate hillslope. These forest remnants have the potential to provide habitat for good populations of common forest birds (e.g. taraire and puriri, species which are important for kukupa, are common here), and may support indigenous geckos and skinks (though none have been found). No pest control is currently carried out and it is likely that a host of common mammalian pests is present, e.g. possums, rats, stoats, feral cats, etc. Grazing and trampling effects have begun to be addressed by recent fencing, which is a positive step towards restoring natural functions to these remnants.

PUKETOTARA FOREST REMNANTS 3

Survey no.	Q09/006
Survey date	9 November 2005
Grid reference	Q09 272 458 (12 remnants)
Area	122.4 ha (119.5 ha forest, 2.9 ha wetland)
Altitude	20–144 m asl





Ecological units

(a) Kanuka forest on moderate to steep hillslope (60%)

(b) Taraire–puriri–kahikatea forest in gully (25%)

(c) Kauri–kanuka forest on moderate hillslope and ridge tops (10%)

(d) Raupo reedland in gully (5%)

Landform/geology

Hillslopes and gullies underlain by Miocene polymict igneous conglomerate (Waitemata Group); Miocene muddy sandstone and volcaniclastic gravelly sandstone (Waitakere Group).

Vegetation

This is a large area of secondary indigenous forest spread over multiple gullies and ridges leading south from the main axis of Puketotara Peninsula into a single stream gully. The forest does not extend to the coast, but ends at the head of a grazed freshwater wetland which flows out to the Oruawharo River (Q09/020).

(a) The forest making up the main matrix of this remnant tends to be dominated by kanuka. Totara is the next most common tree, through never forming more than 20% of the canopy, and occasional mamaku, puriri, ti kouka, nikau, kauri, kahikatea, rewarewa and tarata were also noted.

(b) The gully areas are dominated by taraire, puriri and emergent kahikatea, with frequent nikau, karaka and pukatea. Puka, tarata, tawa, rewarewa, mamaku, kohekohe and totara are also present in small quantities.

(c) Dense kanuka and kauri rickers, some of which are shedding lower branches and taking mature form, cover a broad ridge at the northern end of the remnant, as well as several other smaller ridge tops. Tanekaha is an occasional associate.

(d) Raupo reedland on the banks of the stream adjoins an area of saltmarsh and mangroves on the Oruawharo River.

Fauna

Grey warbler.

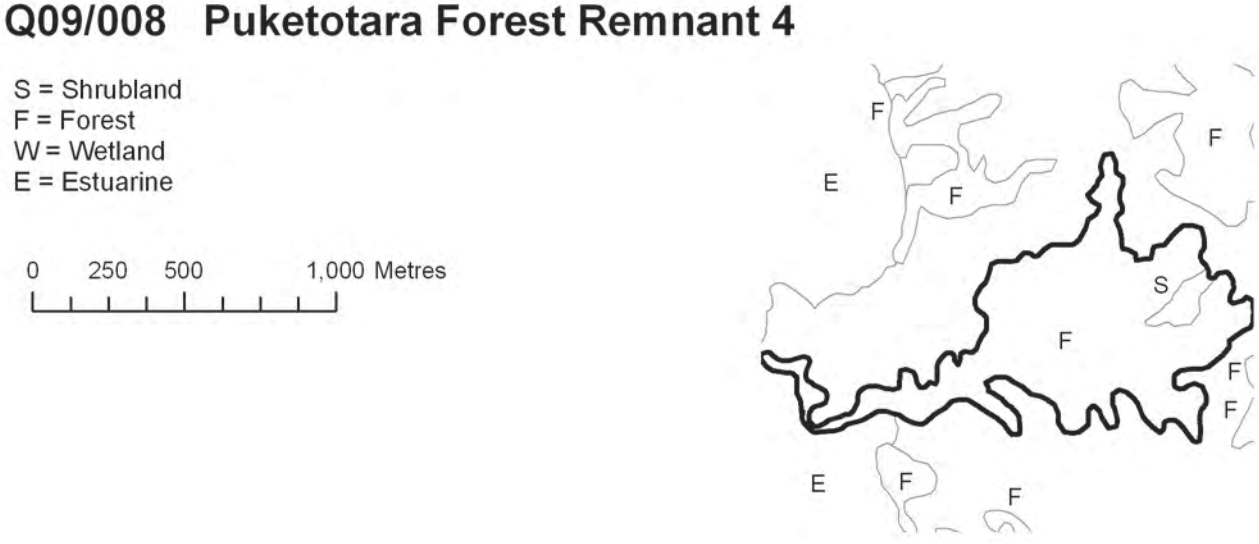
Significance

Most areas of this remnant are heavily grazed which may help to explain the dominance of kanuka, which is resistant to quite a high intensity of grazing. Despite the poor quality of the kanuka forest (a), this site does have particularly good and representative examples of (b) taraire–puriri–kahikatea forest in gully, (c) kauri–kanuka forest on moderate hillslope and ridge tops and (d) raupo reedland in gully. Due to their large size and diversity the forested areas in this site have the potential to provide habitat for good populations of common forest birds (in particular taraire and puriri are common in type (b); these species are important food for kukupa), and may support indigenous geckos and skinks (though none have been found). No pest control is currently carried out and it is likely that a host of common mammalian pests is present, e.g. possums, rats, stoats, feral cats, etc. The raupo reedland adjacent to the coast is the sixth largest in the Northland part of Otamatea ED Northland and is potential habitat for wetland birds such as spotless crake, marsh crake, banded rail and Australasian bittern, though none are known from here. Still, very little is known about the ecology of this large area.

PUKETOTARA FOREST REMNANT 4

Survey no.	Q09/008
Survey date	9 November 2005
Grid reference	Q09 256 471
Area	35.4 ha (34.1 ha forest, 1.3 ha shrubland)
Altitude	0–120 m asl





Ecological units

(a) Kanuka forest on moderate to steep hillslope (58%)

(b) Kauri–kanuka forest on ridge top (20%)

(c) Puriri–nikau forest in gully (10%)

(d) Manuka shrubland on gentle hillslope (5%)

(e) Puriri–pohutukawa–kanuka treeland on steep coastal margin (5%)

(f) Pohutukawa–kanuka treeland on steep coastal margin (2%)

Landform/geology

Hillslopes and gullies underlain by Miocene muddy sandstone, volcaniclastic gravelly sandstone and hyaloclastite tuff (Waitakere Group).

Vegetation

This site encompasses forest in a steep natural amphitheatre funnelling down to a narrowly forested stream mouth emptying into a small sandy bay. The forested coastal slopes on the westernmost point of Puketotara Peninsula are contiguous with the forest in the valley and are therefore included in this site. The site is approximately southwest-facing and sits opposite the Kaipara Harbour entrance within the influence of strong southwesterly winds.

(a) The upper parts of the remnant have a canopy of mainly kanuka, with scattered emergent kauri rickers, and occasional tarata, tanekaha and ti kouka. Mapou is common on the fringes with pasture.

(b) On elevated ridges dense forest of kauri rickers and kanuka is present. These stands contain local tanekaha and pohutukawa, and occasional karaka, kowhai, rewarewa and tarata.

(c) The gullies are predominantly forested in puriri and nikau, with frequent pukatea, kahikatea, karaka and occasional kohekohe.

(d) An area of manuka shrubland occurs on a flat ridge in the upper catchment, from which grazing animals appear to have been recently excluded.

(e) The more sheltered south-facing coastal slopes have puriri–pohutukawa–kanuka treeland.

(f) The exposed coastal slopes on the point have pohutukawa–kanuka treeland.

Fauna

Not surveyed.

Significance

This forest remnant is of a considerable size compared with most others in the Otamatea ED Northland (one of the top 30) and is relatively compact in shape. It protects most of a small stream catchment and the steep slopes of a prominent point on Puketotara Peninsula. It has a high diversity of habitat types ranging from ridge top to gully bottom and out to the coast. It is grazed underneath and is probably suffering a lack of regeneration of palatable species. The whole site is representative of a coastal vegetation sequence from ridge top to gully bottom on Waitakere Group geological units.

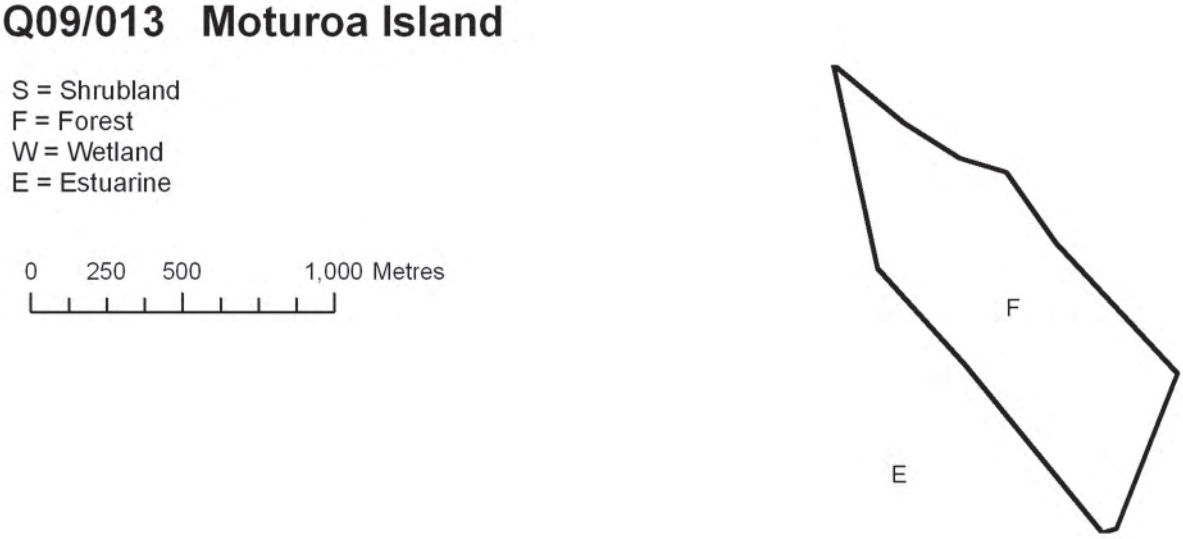
MOTUROA ISLAND

Survey no.	Q09/013
Survey date	9 December 2005
Grid reference	Q09 248 454
Area	1.6 ha
Altitude	0–20 m asl

Ecological unit

(a) Pohutukawa treeland on steep coastal margin (100%)





Landform/geology

Steep-sided islet formed of Miocene hyaloclastite tuff (Waitakere Group), connected to the mainland by a spit at low tide.

Vegetation

Moturoa is a small, steep, elongated island stretching north–west to south–east, approximately 250 m offshore of the Puketotara Peninsula, but connected to the mainland by tidally exposed sandflats. Scattered pohutukawa cling to the southwest-facing slope. None are healthy and perhaps >50% appear to be dead or moribund. Frequent harakeke, kowharawhara, mapou houpara and manuka are present, with occasional akepiro and ti kouka. A solitary radiata pine stands on the island's crest. A plant species list compiled by DOC in 1993, records 33 indigenous and 8 exotic species (SSBI Q09/H020). The condition of the treeland appears to have deteriorated since then, as no mention was made at that time of severe pohutukawa dieback.

Fauna

The 1993 survey recorded pied shag (Sparse), kingfisher, welcome swallow and silvereye. Four landsnail species were also found in 1993: *Thalassohelix ziczag, Mocella eta, Delos coresia* and *Austroiotula arewa* (SSBI Q09/H020).

Significance

The effects of possum browse on pohutukawa are more extreme here than on the nearby peninsular coast, and without timely intervention in the form of possum control they are likely to die off rapidly. In such a state of decline this ecological unit cannot be considered a good example of its type, though it is one of only a few island-based pohutukawa stands remaining in Otamatea ED Northland. If possums have access to the island, no doubt other invasive mammalian pests are also present, which reduces the potential habitat value of the island to indigenous fauna, such as nesting sea birds. Pied shag (Sparse) was recorded, elevating this site to Level 1 significance.

MOTUOUHI ISLAND

Survey no.	Q09/014
Survey date	9 December 2005
Grid reference	Q09 249 450
Area	0.9 ha (0.5 ha forest, 0.2 ha shrubland, 0.2 ha other vegetation)
Altitude	0–20 m asl

Ecological units

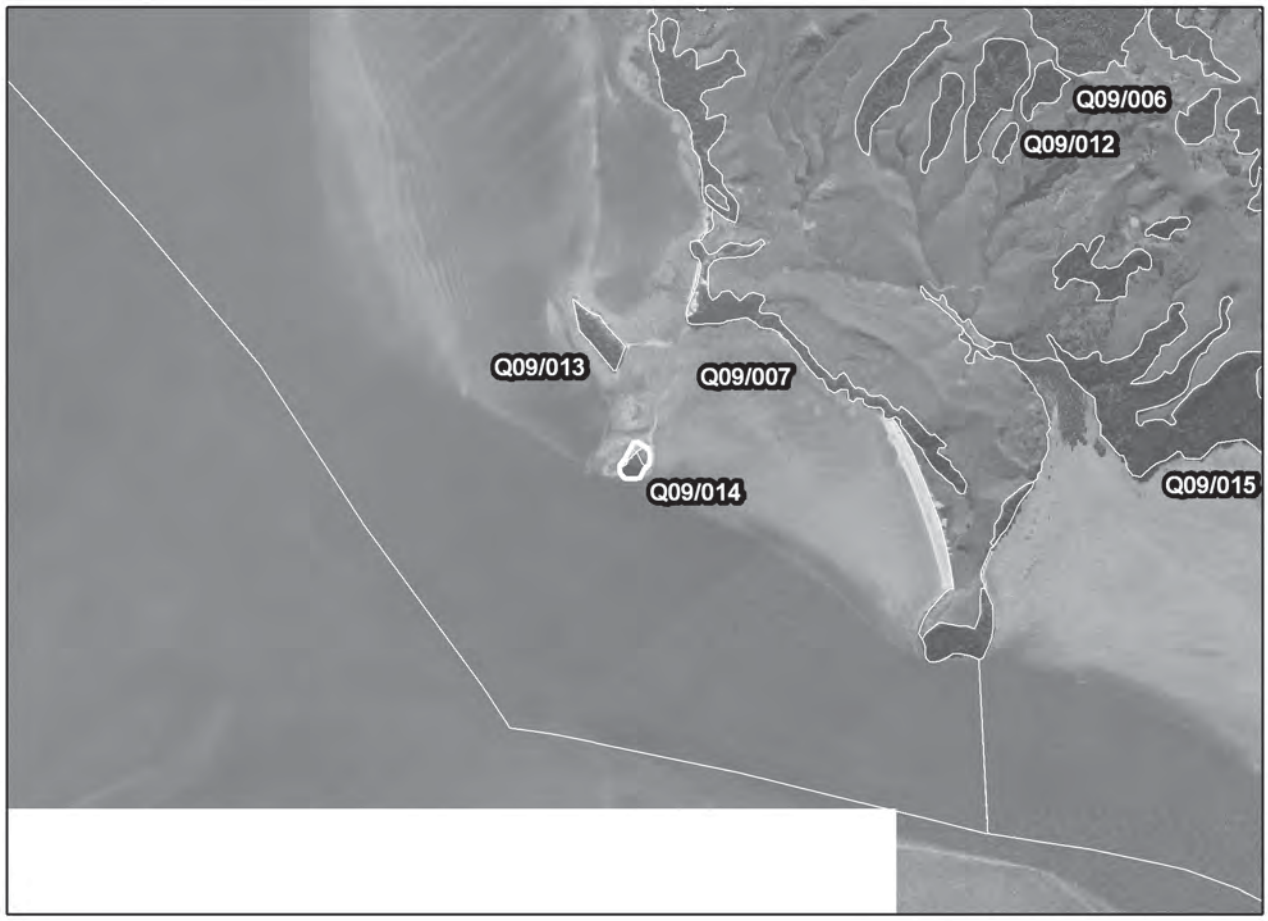
(a) Pohutukawa forest on coastal cliff (50%)

(b) Exotic grassland on coastal cliff (30%)

(c) Gorse and mixed indigenous scrub on steep coastal margin (20%)

Landform/geology

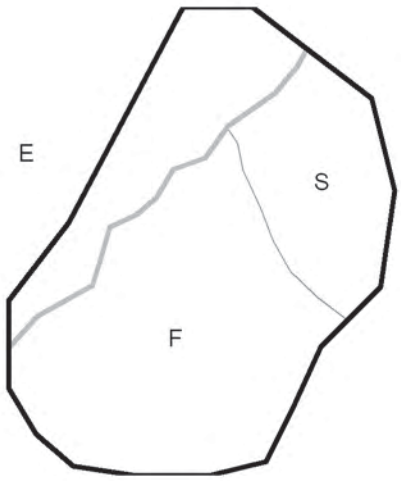
Steep-sided islet formed of Miocene hyaloclastite tuff (Waitakere Group), connected to the mainland by a spit at low tide.



Q09/014 Motuouhi Island

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Vegetation

Motuouhi is a small, steep island approximately 400 m off the southwest coast of Puketotara Peninsula, connected to the mainland by estuarine sandflats and shellbanks which are exposed at low tide.

(a) The south-facing cliff has a good canopy of healthy, mature pohutukawa with frequent kowharawhara and *Coprosma macrocarpa*, and occasional mapou and houpara.

(b) Exotic grassland with scattered gorse bushes occurs on the northwest-facing cliff.

(c) Gorse is the most common plant in the scrub on the eastern side of the island, but other frequent components of this community are *Coprosma macrocarpa*, mamangi and mapou, and there are occasional ti kouka, hangehange and mingimingi.

A survey in 1993 recorded 24 indigenous and 14 exotic plant species, and observed that the island was recovering from past clearance (SSBI Q09/H019).

Fauna

Not surveyed during the present study. Little shag, kingfisher and silvereye were recorded here in 1993. Five landsnail species were also recorded: *Mocella* sp., *Austroiotula arewa, Phenacohelix pilula, Delos coresia* and an indeterminate Punctidae sp. (SSBI Q09/H019).

Significance

The difference in pohutukawa condition between this site and neighbouring Moturoa Island (Q09/013) is striking, with most pohutukawa trees on Motouhi Island showing new growth throughout their crowns. This may be because this site is further from the mainland and less accessible to terrestrial pest animals at low tide (though it still has a shallow sandbar leading out to it). This site is representative for pohutukawa forest on coastal cliff (a), as it is the best example of such vegetation on an island in Otamatea ED Northland, though small in extent.

PUKETOTARA FOREST REMNANT 9

Survey no.	Q09/016
Survey date	30 November 2005
Grid reference	Q09 281 458
Area	19.8 ha
Altitude	20–120 m asl

Ecological units

(a) Kanuka forest on moderate hillslope (50%)

(b) Puriri–taraire forest on moderate to steep hillslope (35%)

(c) Kauri–kanuka–tanekaha forest on moderate hillslope (15%)

Landform/geology

Hillslopes and gully underlain by Miocene polymict igneous conglomerate and gravelly sandstone (Waitemata Group).

Vegetation

This site comprises a medium-sized, relatively compact indigenous forest remnant with a good edge to centre ratio. It skirts the steep head of a gully draining southwest into the wetland of Puketotara Forest Remnants 3 (Q09/006).

(a) Kanuka forest occurs throughout half the area, particularly on edges and at the lower end. There is frequent mamaku, and occasional tanekaha, mamangi, puriri, lancewood and ti kouka in the canopy.

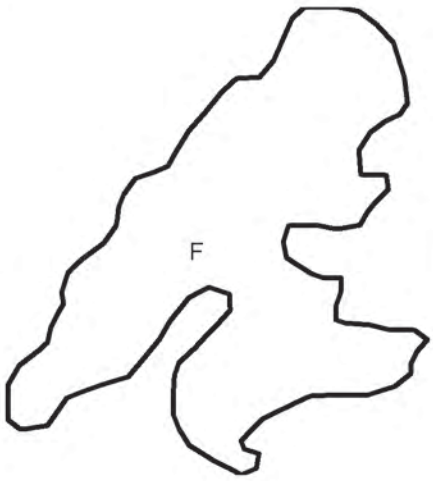
(b) On the steep southeast-facing slope there is a mixture of puriri and taraire with frequent pukatea, rewarewa and kanuka, and occasional titoki, kohekohe and kahikatea.



Q09/016 Puketotara Forest Remnant 9

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(c) Kauri rickers emerge above a canopy of kanuka and tanekaha on a well-drained slope facing northwest, with frequent kahikatea and puriri.

Fauna

Grey warbler.

Significance

This site is representative for (b) puriri–taraire forest on moderate to steep hillslope. It is in relatively healthy condition, compared to other remnants of its size on Puketotara Peninsula, and also has high canopy species richness and a high diversity of habitat types for its size.

PUKETOTARA FOREST REMNANTS 10

Survey no.	Q09/017
Survey date	30 November 2005
Grid reference	Q09 288 477 (3 remnants)
Area	14.6 ha (14.5 ha forest, 0.1 ha wetland)
Altitude	0–40 m asl

Ecological units

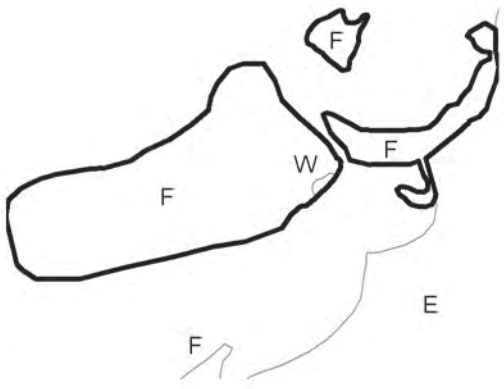
(a) Totara–kanuka forest in gully (98%)



Q09/017 Puketotara Forest Remnants 10

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(b) Open water (constructed freshwater farm pond) (1%)

(c) *Carex virgata*–pampas tussockland on constructed pond fringe (1%)

Landform/geology

Hillslopes and gully underlain by Miocene thinly interbedded sandstone and mudstone (Waitemata Group).

Vegetation

This site encompasses a relatively large, rectangular block and two smaller remnants of forest and wetland in a stream gully flowing eastwards from Timber Bay Forest (Q09/001). The riparian forest is adjacent to mangrove forest in the Whakaki River, however it is dissected by a major farm track near the coastal end. The biggest remnant appears fenced to exclude livestock.

(a) Totara–kanuka forest extends along the small stream. The conical spars of young kahikatea are frequently emergent above the canopy near the stream banks. There is a relatively diverse group of associated canopy species, none of which exceed 5% overall cover, including kowhai, mahoe, kauri, mamangi, puriri, tarata, tanekaha, ti kouka, karaka, kohekohe and heketara. Mapou and rangiora occur on edges.

(b) A small farm pond occurs at the farm track edge, probably induced by a culvert, and is bordered by luxuriant, tall forest on its the western side.

(c) The forest edge of the pond supports a marginal vegetation community of isolated *Carex virgata* and pampas tussocks.

Fauna

Tui.

Significance

This is one of the more diverse examples of totara–kanuka gully forest (a) in Otamatea ED Northland, and is therefore considered representative. The site is small, but it is obviously habitat for some common forest birds and provides a partial corridor from Timber Bay Forest (Q09/001) to the coast (it is separated by at least 100 m from the former, however). Although this is the only site where *Carex virgata* was recorded with a high amount of cover, the total vegetation cover it is not sufficiently extensive or intact to be a representative community.

ORUAWHARO RIVER NORTH COAST

Survey no.	Q09/020
Survey date	Various (December 2005 – January 2006)
Grid reference	Q09 338 453
Area	1984.1 ha
Altitude	sea level

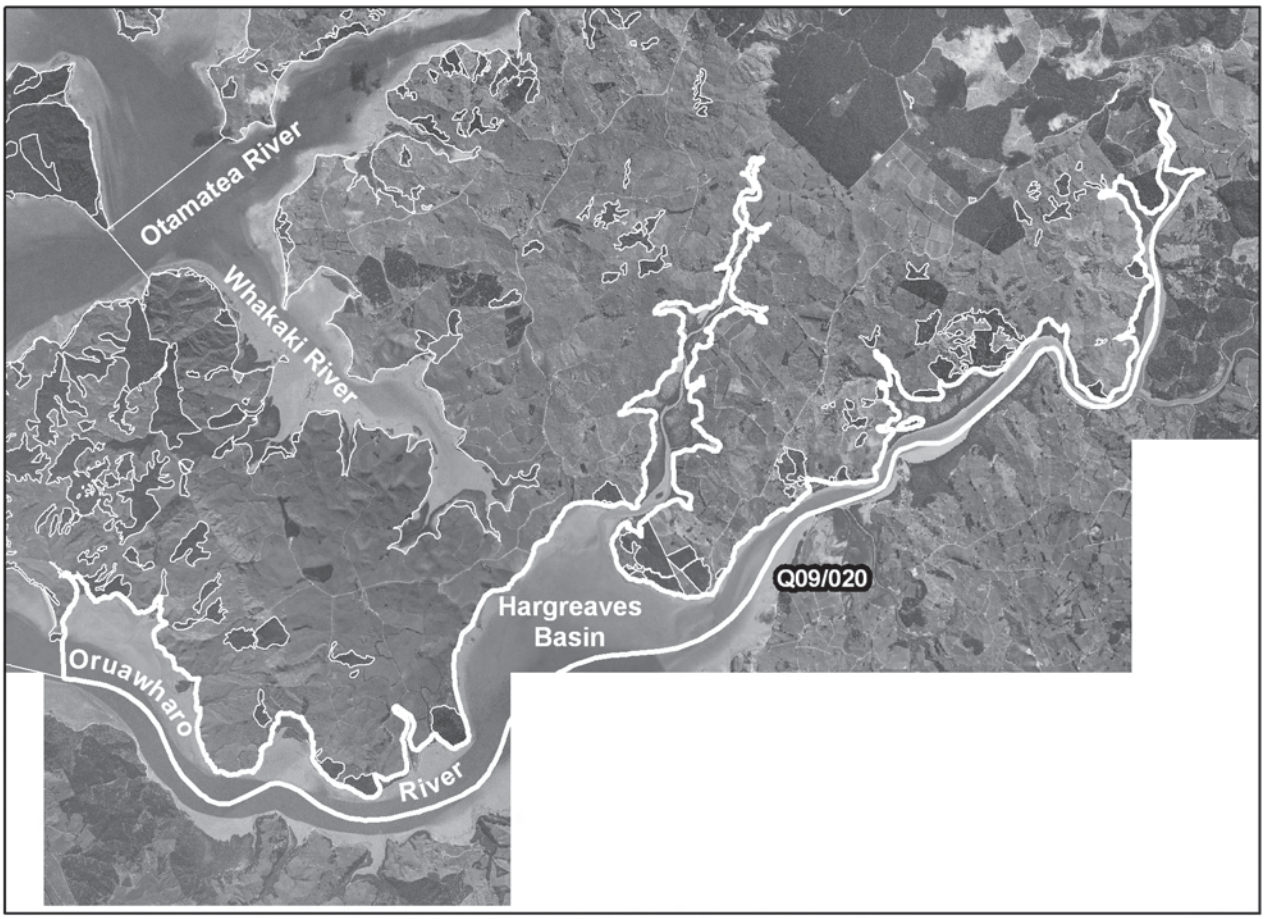
Ecological units

(a) Mangrove shrubland and forest in estuary

(b) Sea rush rushland in estuary

(c) Mangrove–sea rush shrubland in estuary

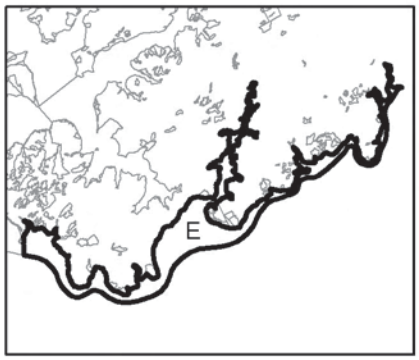
(d) Oioi–sea rush rushland in estuary



Q09/020 Oruawharo River North Coast

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 1,250 2,500 5,000 Metres



(e) Glasswort–*Suaeda novae-zelandiae*–sharp rush herbfield on shellbank

(f) Sea primrose–remuremu–saltwater paspalum–sharp rush herbfield in estuary

(g) Saltmarsh ribbonwood shrubland in estuary

(h) Saltwater paspalum grassland in estuary

(i) *Spartina alterniflora* grassland in estuary

(j) Mudflats and sandflats in estuary

Landform/geology

Holocene estuaries, beaches, and intertidal rock flats.

Vegetation/habitats

(a) Mangrove shrubland and forest is common in the Kaira Creek and from approximately Oruawharo School Forest (Q09/033) northwards, in the more

sheltered regions of the river, occupying approximately 349 ha (18% of the site).

(b) Stands of pure sea rush are the most common type of saltmarsh. Kaira Creek contains the largest examples of this type.

(c) Where mangrove shrubland and sea rushland meet there is often a mingling of the two over several metres of upper-tidal mudflat, creating habitat with cover for species such as banded rail (which may be present in the estuarine margins).

(d) In some places oioi and sea rush are equally common. This is generally at freshwater outflows (e.g. next to Oruawharo Road Forest Q09/033) or above the pure sea rush rushlands.

(e) At the southern side of Gittos Point Forest and Shrubland (Q09/032) there are shellbanks holding tidepools which are populated with scattered glasswort, *Suaeda novae-zelandiae* and sharp rush around their edges.

(f) Tiny areas of indigenous salt meadow are present. The main indigenous herbs are sea primrose and remuremu, and occasionally bachelor's button. However, the invasive saltwater paspalum and sharp rush are also quite common.

(g) Saltmarsh ribbonwood occurs at the extreme upper tidal limit, with various mixtures of indigenous and exotic species. The following were recorded as occasional associates in this type: *Coprosma propinqua,* harakeke, ngaio, mapou, periwinkle, Japanese honeysuckle, gorse, woolly nightshade. Tiny scattered examples of this type are present.

(h) Saltwater paspalum is present in most saltmarsh areas of Oruawharo River North Coast, and can form extensive grasslands, through which indigenous salt meadow herbs often grow, e.g. sea primrose, bachelor's button, remuremu. It does not tend to occur on more exposed, sandy beaches. This type generally occurs in quiet tidal inlets above mangrove forests and shrublands.

(i) Two sites of *Spartina alterniflora* grassland are present on this coast, both on the southern side of Puketotara Peninsula. Both infestations are in the process of being eradicated by the Northland Regional Council (Peter Joynt, pers. comm.).

(j) Mudflats and sandlflats are somewhat less extensive on the north coast of the Oruawharo River than they are on the Otamatea River (Q08/062) or the Arapaoa River (Q08/084) (695 ha). The river is narrower than either of the aforementioned sites, and only the north coast is within Otamatea ED Northland. The largest area of shallow wading habitat is present on the southern side of the Puketotara Peninsula, especially in the bay behind Schnapper Point.

Significant flora

Suaeda novae-zelandiae (regionally significant) occurs in this site (AK 294744).

Fauna

This site is important to several bird species. Some are listed below, based on records appearing in Crockett (1992–2004), in which counts for 'Oneriri' roughly equate to the Puketotara Peninsula coast (lower Oruawharo River). Counts were often 'nil' at this site (no birds present, or not counted), so all records are sporadic, therefore the species below are listed simply as present.

- Pied shag, black shag (both Sparse)
- Pied stilt, pied oystercatcher, white-faced heron, black-backed gull (all not threatened)

In addition to these records, white-faced heron were abundant in January 2006; 20–30 observed on shellbanks in the bay behind Schnapper Point. Bar-tailed godwits (Migrant) were also observed flying up and down the Oruawharo River.

Significance

A recent review of shorebird habitat networks deemed the Kaipara Harbour to be a 'site of particular importance' for NZ shorebirds, as it is within the top five non-breeding sites for seven species of indigenous-breeding shorebirds, and is also used by 1000+ Arctic migrants during summer months (Dowding & Moore 2006). This site contains 14% of the wading habitat in Otamatea ED Northland.

This is a representative site for ecological unit (e), glasswort–*Suaeda novae-zelandiae*–sharp rush herbfield on shellbank, which is particularly unique as it contains a regionally significant plant species (*Suaeda novae-zelandiae*). This species was only recorded at one other site in this survey (Tinopai foreshore on Otamatea River Confluence (Q09/021)).

The Kaira Creek Marginal Strip covers small areas of ecological unit (b) at the upper tidal limit. The Oruawharo River Marginal Strip covers the edge of a reclaimed mudflat. In total, 10.1 ha of Marginal Strip overlap with the estuarine habitats in this site. These are administered by DOC.

OTAMATEA RIVER CONFLUENCE

Survey no.	Q09/021
Survey date	Various (December 2005–January 2006; Wildland Consultants 2002)
Grid reference	Q09 243 479
Area	1878.0 ha
Altitude	sea level

Ecological units

(a) Mangrove shrubland and forest in estuary

(b) Oioi–sea rush rushland in estuary

(c) Sea primrose–remuremu–saltwater paspalum–sharp rush herbfield in estuary

(d) Saltmarsh ribbonwood shrubland in estuary

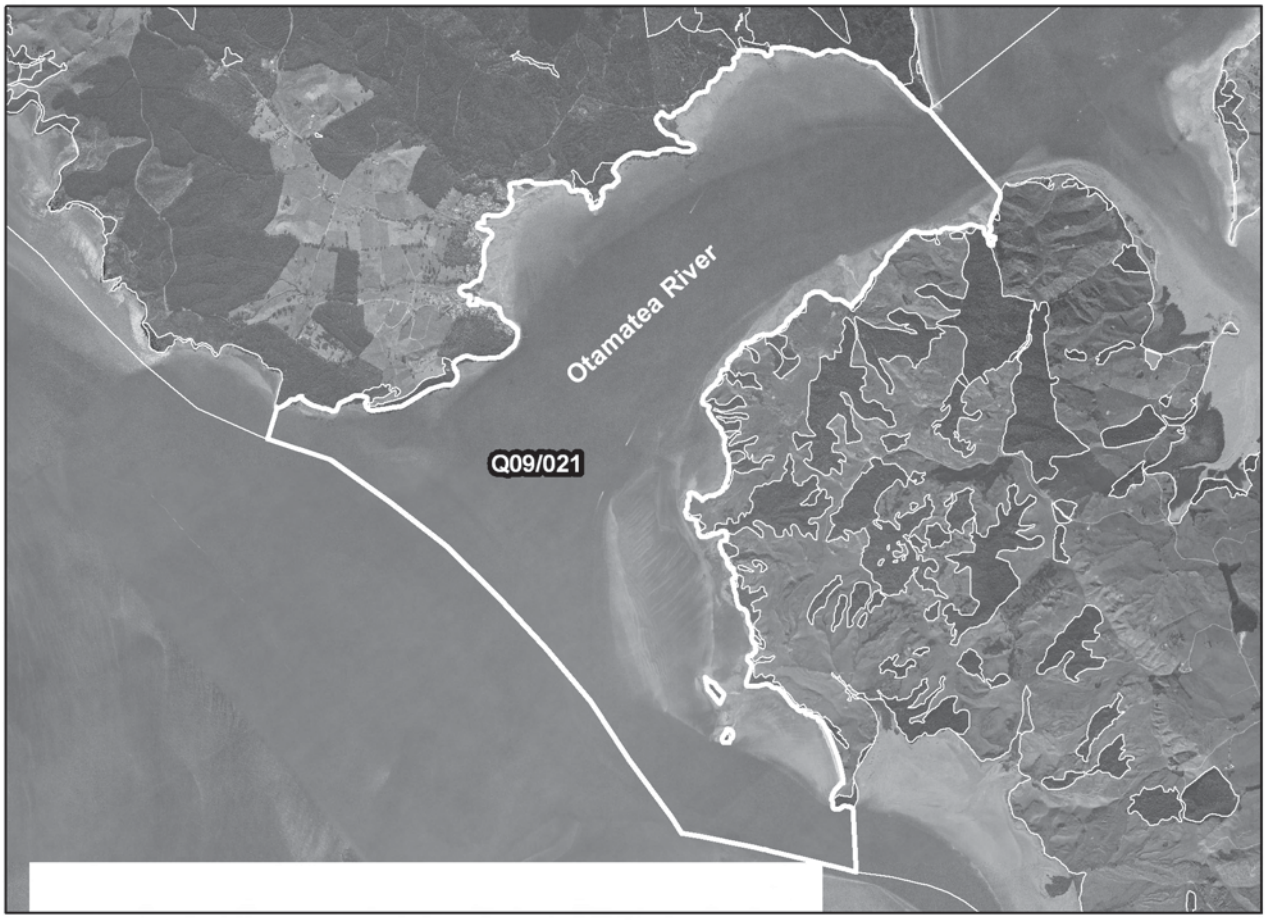
(e) Mudflats and sandflats in estuary

Landform/geology

Holocene estuaries, beaches, and intertidal rock flats. On both sides of the site there are geologically significant Miocene shore platforms (Kenny & Hayward 1996).

Vegetation/habitats

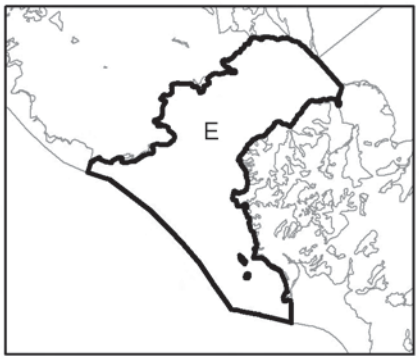
The Otamatea River Confluence area is a zone of fast water movement with extensive sandy beaches, mudflats and rock platforms (some of which are human-modified), and very little marginal vegetation.



Q09/021 Otamatea River Confluence

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 750 1,500 3,000 Metres



(a) A small amount of mangrove shrubland occurs in sheltered tidal areas of Komiti Bay and Hollands Bay, near Tinopai on the Hukatere peninsula. *Suaeda novae-zelandiae* (a regionally significant plant species) was found under the shrubland, along with several other more common species such as glasswort, *Baumea juncea*, shore bindweed and the invasive saltwater paspalum. The latter tends to be ubiquitous in saltmarshes of this site, but does not form large swards of its own community as in the other more sheltered estuarine sites.

(b) Mixtures of oioi and sea rush are also present in the two above-mentioned bays. It was in this community that a banded rail (Sparse) was seen and two fernbirds (Sparse) were heard in 2002 (Wildland Consultants Ltd 2004).

(c) Around the Tinopai foreshore (southern Komiti Bay), a salt meadow community of sea primrose, remuremu, saltwater paspalum and sharp rush

occurs. Minor components of the salt meadow recorded were NZ celery, *Aira caryophyllea, Austrostipa stipoides*, *Isolepis cernua* and bachelor's button.

(d) Scattered patches of saltmarsh ribbonwood occur in the extreme upper tidal fringes of Hollands and Komiti Bays.

(e) The vast majority of the intertidal areas of this site are occupied by open, tidal mudflats and sandflats often underlain by rock platforms. A lot of the rock platforms in evidence today were constructed or modified by people attempting to enhance rock oyster beds between the early 1900s and the 1950s (Hay & Grant 2004).

Significant flora

Suaeda novae-zelandiae (regionally significant) occurs in this site (AK 294674).

Fauna

A wide variety of bird species uses this site. Some are listed below, based on records from Crockett (1992–2004), in which counts for 'Tinopai' roughly apply to the coast around Tinopai and the open waters of the confluence. Frequency of encounter and the range of numbers of individuals over the period are stated in brackets.

- Reef heron (1995 – 1 recorded) (Nationally Endangered)
- Caspian tern (regular, 1–16) (Nationally Vulnerable)
- White-fronted tern (sporadic 2–56) (Gradual Decline)
- Pied shag (sporadic, 1–8), little black shag (1993 – 1 recorded), black shag (1995 – 1 recorded) (all Sparse)
- Royal spoonbill (1996 – 3 recorded) (Coloniser)
- Variable oystercatcher (regular 1–9) (regionally significant)
- Pied oystercatcher (regular, up to 736 in winter), pied stilt (regular, 1–72), black-backed gull (sporadic, 2–6), red-billed gull (regular, 1–65), white-faced heron (regular, 2–22), spur-winged plover (sporadic, 2–3) (all not threatened)

In addition to these records, a banded rail (Sparse) and two North Island fernbirds (Sparse) were recorded in and around saltmarsh areas of Hollands Bay in 2002 (Wildland Consultants Ltd. 2004). Also, Australasian gannets and an Arctic skua (Migrant) were observed over the open water in January 2006.

Significance

A recent review of indigenous shorebird habitat networks deemed the Kaipara Harbour to be a 'site of particular importance' for NZ shorebirds, as it is within the top five non-breeding sites for seven species of indigenous-breeding shorebirds, and is also used by 1000+ Arctic migrants during summer months (Dowding & Moore 2006). This site contains only 7% of the wading habitat in Otamatea ED Northland, but it seems to be a disproportionately important site for oystercatchers.

Though they are limited to small areas in Komiti and Hollands Bays, the saltmarsh and mangrove habitats in this site support a regionally significant plant species (*Suaeda novae-zelandiae*) and two threatened bird species (banded rail and NI fernbird) which were not recorded at any of the other saltmarsh ecological units in any of the other estuarine sites. Therefore this site is considered representative for four ecological units: (a) mangrove shrubland

and forest in estuary, (b) oioi–sea rushland in estuary, (c) sea primrose–remuremu–saltwater paspalum–sharp rush herbfield in estuary and (d) saltmarsh ribbonwood shrubland in estuary.

Shore platforms belonging to two sites of national geological significance occur within the Otamatea River Confluence site; these are the Puketotara Peninsula Miocene sediments and the Pakaurangi–Puketi shelf sediments on the Hukatere peninsula side (Kenny & Hayward 1996).

ONERIRI STATION HOMESTEAD FOREST REMNANTS

Survey no.	Q09/022
Survey date	30 November 2005
Grid reference	Q09 291 444 (2 remnants)
Area	28.7 ha (28.5 ha forest, 0.2 ha wetland)
Altitude	40–120 m asl

Ecological units

(a) Kahikatea–kanuka forest on moderate hillslope (48%)

(b) Kanuka–kahikatea forest on local very steep hillslope (35%)

(c) Tanekaha–tarata–mamangi forest on ridge top (10%)

(d) Taraire–puriri–karaka forest in gully (5%)

(e) Kauri forest on ridge top (1%)

(f) Open water (constructed freshwater farm pond) (1%)

Landform/geology

Hillslopes and gully underlain by Miocene thinly interbedded sandstone and mudstone, and gravelly sandstone (Waitemata Group).

Vegetation

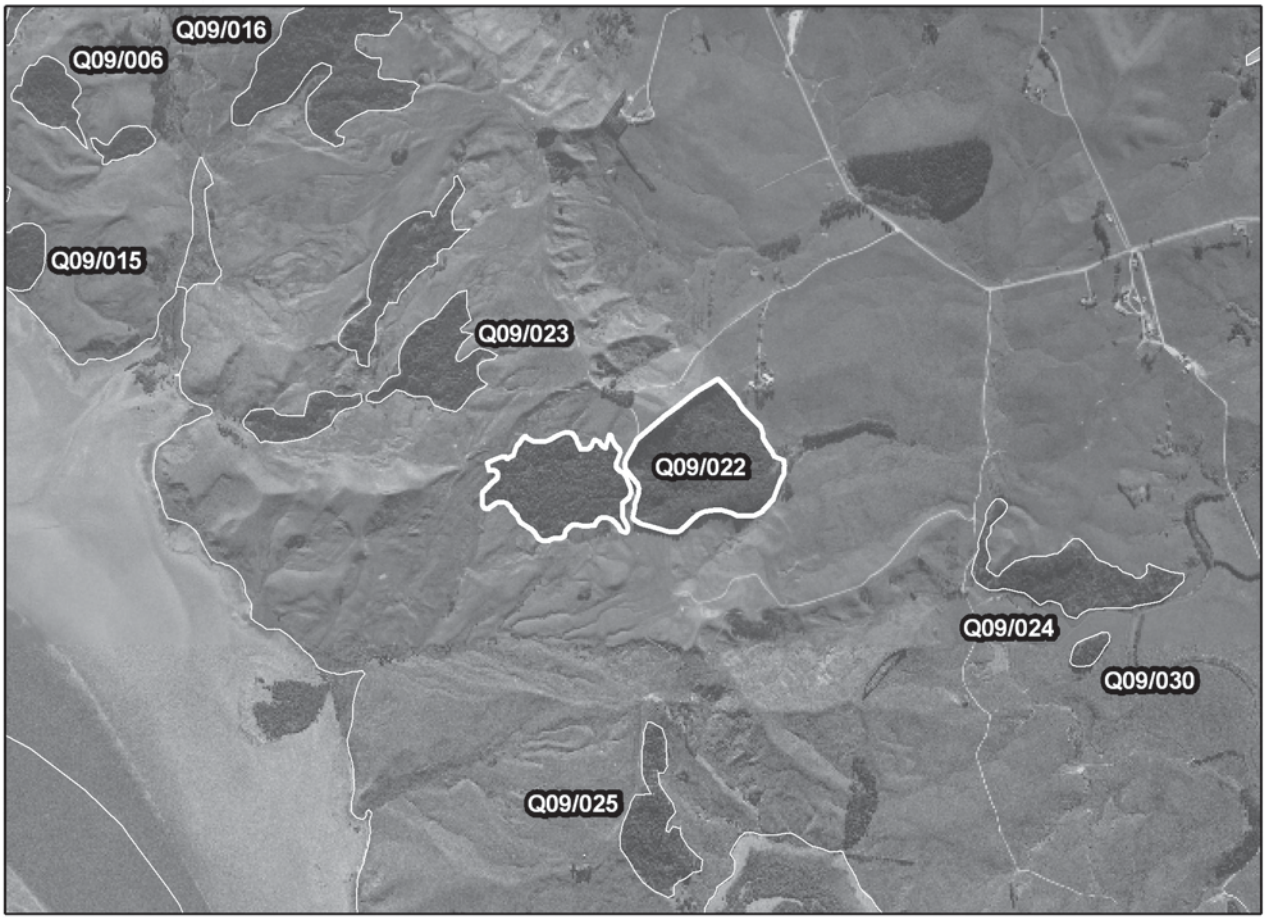
This forest remnant is in two blocks, divided by a farm track. The eastern block is very steep and fully fenced, however the western block is moderately sloping and open to grazing animals. Pines along the southern edge of the eastern block have been felled recently. At the top edge of the eastern block, a row of tall pines along the crest of the steep scarp remains, otherwise both remnants are surrounded by pasture.

(a) The most extensive forest type is kahikatea–kanuka forest, which is entirely within the unfenced western block. Puriri, kohekohe, rewarewa, taraire and emergent kauri rickers are frequent components of the canopy here. Also present are scattered tanekaha, rimu, totara, mamaku and epiphytic puka.

(b) The major forest cover in the eastern block is similar to type (a), however kanuka is more abundant than kahikatea. Tanekaha is a frequent and rather unusual associate of kahikatea in this forest type. Also frequent are rewarewa, taraire, mamangi and tarata. Ti kouka is occasional.

(c) Dry ridges extending down from the scarp support young tanekaha–tarata–mamangi forest, with associated frequent kanuka, rewarewa, ti kouka, lancewood, mapou and mamaku.

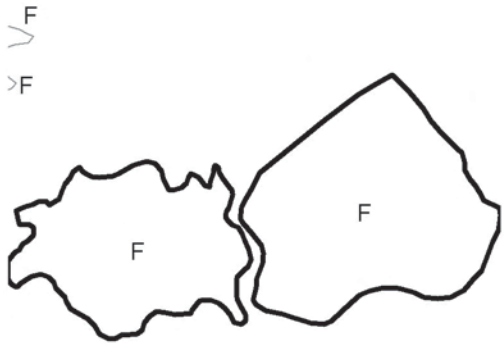
(d) A small gully running eastwards along the southern edge of the eastern block is forested with taraire, puriri and karaka, associated with frequent kahikatea and occasional mapou, ti kouka, titoki, rewarewa, pukatea and puka.



Q09/022 Oneriri Station Homestead Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(e) A small area of kauri forest occurs within the eastern block on a prominent knoll above the gully. This appears to have one mature tree and numerous rickers.

(f) A small farm pond is present in the western block. It is surrounded by pasture.

Fauna

Paradise shelduck, shining cuckoo.

Significance

Mature kauri forest (e) is extremely rare in Otamatea ED Northland, hence even one mature tree surrounded by younger kauri is a representative unit. This site

is also representative for three other ecological units: (a) kahikatea–kanuka forest on moderate hillslope, (b) kanuka–kahikatea forest on local very steep hillslope and (c) tanekaha–tarata–mamangi forest on ridge top. The forest in this site serves some important slope stability and riparian protection functions.

PUKETOTARA FOREST REMNANT 13

Survey no.	Q09/024
Survey date	30 November 2005
Grid reference	Q09 304 440
Area	9.7 ha
Altitude	20–40 m asl

Ecological units

(a) Taraire–kowhai–kahikatea forest on moderate hillslope (60%)

(b) Kowhai–kanuka–kahikatea forest on moderate hillslope (20%)

(c) Kauri forest on ridge top (15%)

(d) Kanuka treeland on moderate hillslope (5%)

Landform/geology

Coastal hillside of melange (undifferentiated Mangakahia & Motatau Complex lithologies), and Miocene thinly interbedded sandstone and mudstone (Waitemata Group).

Vegetation

This site comprises a single indigenous forest remnant on a south-facing slope surrounded by pastoral farmland. Before mudflats on its southern side were reclaimed from the sea, this forest would have been directly adjacent to the harbour. The slope rises moderately from the former coastal margin, and a small creek now tracks the edge of the old mudflat before turning out into a canal heading for the floodgates.

(a) The major forest type is a diverse community where taraire, kowhai and kahikatea are common, with puriri, kauri and kanuka also noticeably frequent components of the canopy. Occasional rewarewa, titoki, ti kouka and lancewood are present.

(b) Kowhai–kanuka–kahikatea forest occurs down on the former coastal fringes.

(c) On the highest point, kauri ricker forest with occasional kahikatea is present.

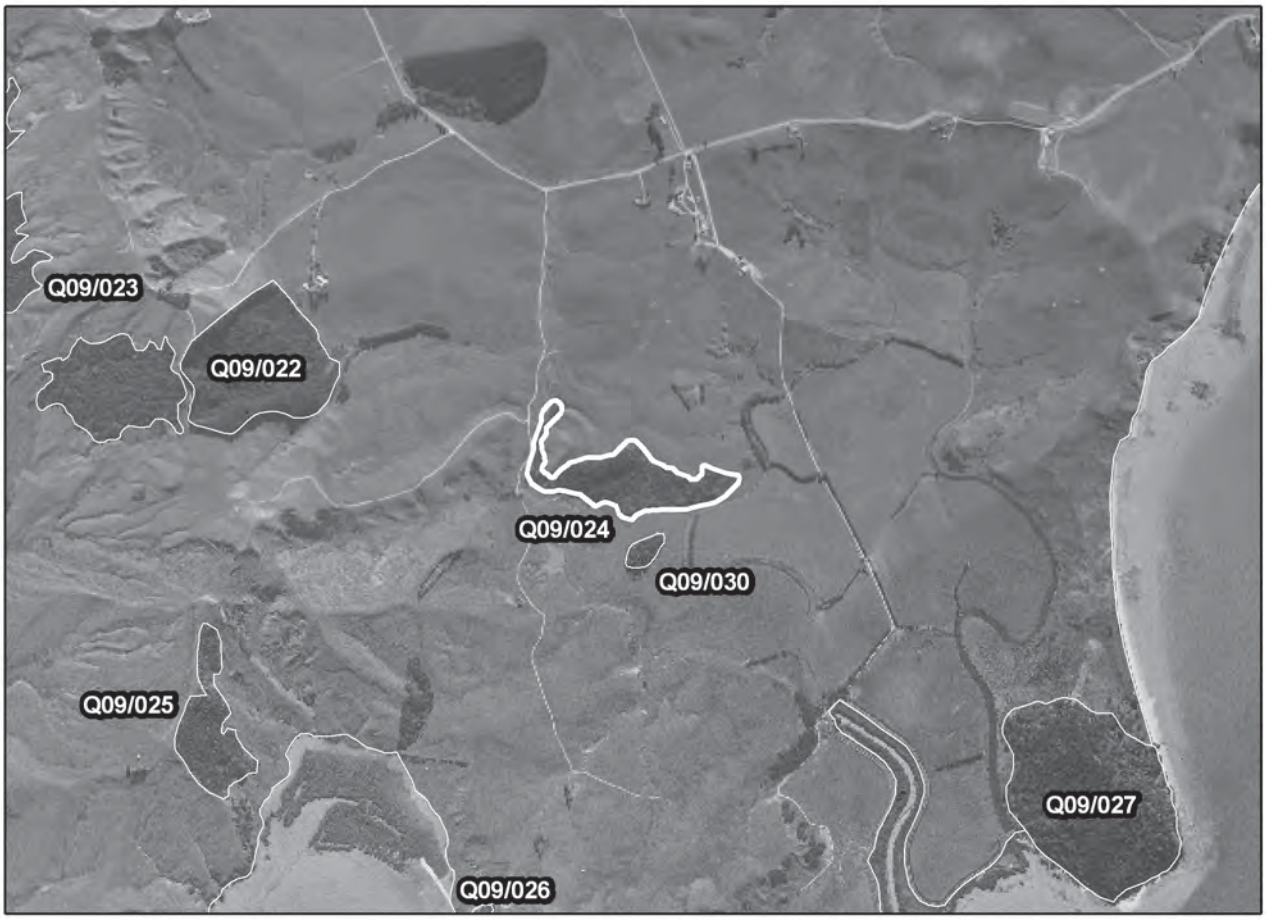
(d) A finger of kanuka treeland extends around the slope to the north.

Fauna

Kukupa (Gradual Decline).

Significance

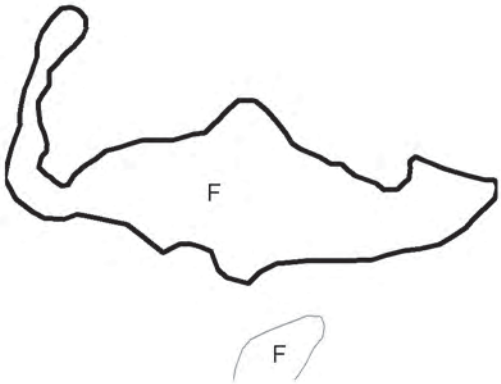
This site is significant as habitat for a threatened bird species (kukupa) and because it is near Ruataniwha Forest Remnant (Q09/030), a former small island which is now a hillock in the paddock to the south, which would otherwise be relatively isolated without it. Taraire–kowhai–kahikatea forest on moderate hillslope (a) and kowhai–kanuka–kahikatea forest on moderate hillslope (b) are both unique and representative examples of their types in Otamatea ED Northland.



Q09/024 Puketotara Forest Remnant 13

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



KAIPARA FOREST, PUKETOTARA

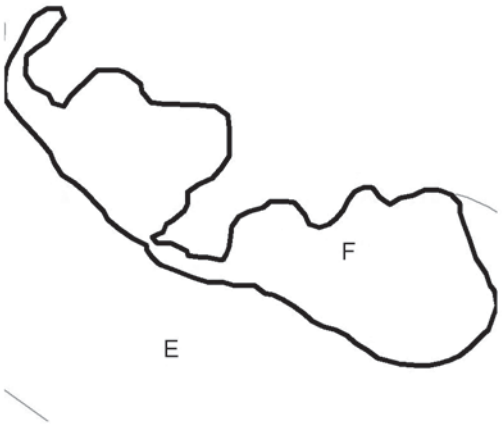
Survey no.	Q09/026
Survey date	30 November 2005
Grid reference	Q09 305 422
Area	25.1 ha
Altitude	0–80 m asl



Q09/026 Kaipara Forest, Puketotara

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Kauri–kanuka forest on moderate to steep hillslope (40%)

(b) Kanuka forest on moderate to steep hillslope (30%)

(c) Taraire–puriri forest on steep coastal margin (20%)

(d) Pohutukawa forest on steep coastal margin (10%)

Landform/geology

Coastal headland underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies) and Miocene thinly interbedded sandstone and mudstone (Waitemata Group).

Vegetation

This natural area comprises two compact groves of indigenous forest joined by a narrow strip of kanuka trees, both groves on very steep coastal hillslopes sloping southwest towards sandy beaches of the Oruawharo River North Coast (Q09/020). The northern edges of the remnant abut grazed pasture. Stock access appears to be unrestricted, resulting in little understorey regeneration, at least on the upper slopes.

(a) The most extensive forest type comprises common kauri rickers and kanuka, and is restricted to upper slopes and ridge tops. Rimu is a frequent component, and tarata, mamaku and karaka are occasional. Manuka is present on paddock edges.

(b) Kanuka forest is distributed throughout upper- and mid-slopes, linking kauri ricker forest at the upper edge with taraire–puriri and pohutukawa forest on the coastal margin.

(c) The type and extent of coastal forest was interpreted from 2002 aerial photography only, and appears to occupy lower slope positions just above a fringe of pohutukawa. It is likely to be similar to taraire–puriri forest on Oneriri Pa Forest (Q09/027).

(d) Pohutukawa forest extent was also interpreted from aerial photography (flown in 2002), which clearly show a continuous belt of very large trees overhanging beaches and extending only 5–10 metres up the slopes, merging with type (c).

Fauna

Not surveyed.

Significance

Though it was not possible to fully survey the coastal margins of the site, its compact shape and apparent habitat diversity contribute to its significance as a Level 1 site. The sequence from kauri–kanuka forest (a) to kanuka forest (b) to taraire–puriri forest (c) to pohutukawa forest (d) is a representative vegetation sequence from ridge top to coastal fringe on Northland Allochthon melange geology. The forest also stabilises the steep coastal slope and provides a protective vegetation buffer to the Oruawharo River North Coast site (Q09/020), in which only 16% of the land margin has coastal indigenous vegetation (the lowest percentage of all the estuarine sites surveyed in this study).

ONERIRI PA FOREST

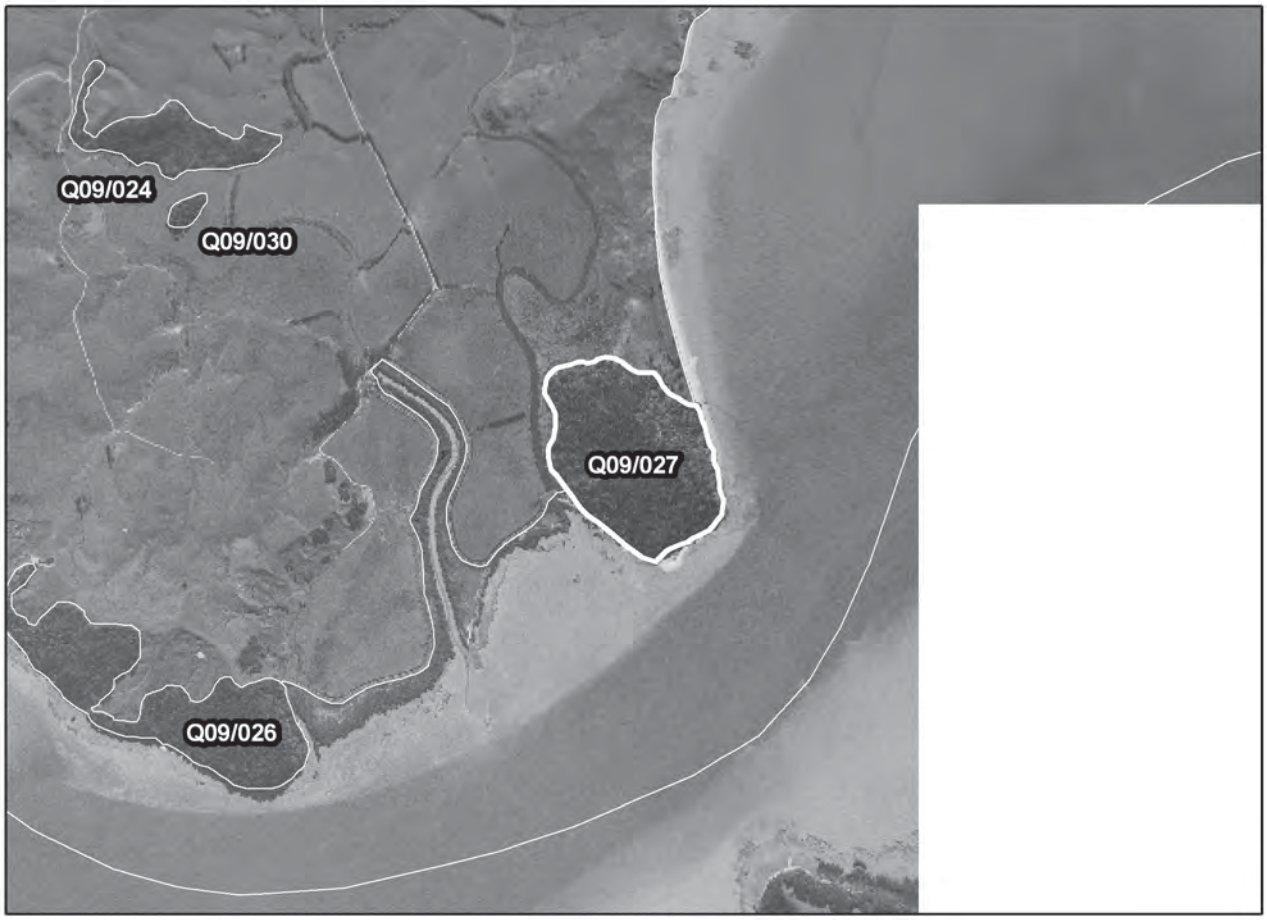
Survey no.	Q09/027
Survey date	30 November 2005
Grid reference	Q09 320 430
Area	27.3 ha
Altitude	0–60 m asl

Ecological units

(a) Pohutukawa–kanuka forest on steep coastal margin (70%)

(b) Taraire–puriri forest on steep coastal margin (20%)

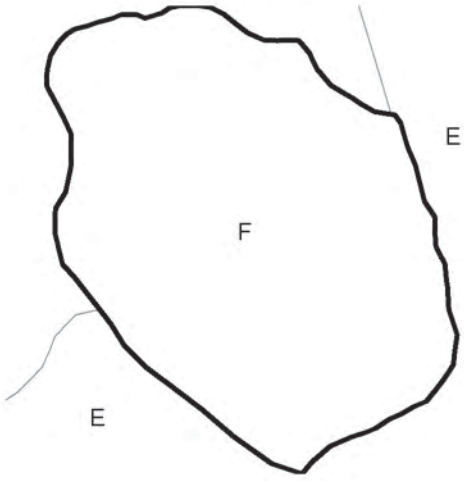
(c) Kanuka forest on ridge top (10%)



Q09/027 Oneriri Pa Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Coastal headland underlain by Miocene thinly interbedded sandstone and mudstone (Waitemata Group).

Vegetation

Oneriri Pa is a prominent headland on the southeastern tip of Puketotara Peninsula. It is entirely forested, and is surrounded by sandy beaches, mudflats and mangroves on its seaward side, and reclaimed mudflat on its northern side.

The pasture on the former mudflats appears to be prone to flooding and seems to contain high cover of exotic rushes and pampas (this area was not surveyed further; though a closer inspection of these flooded pastures may reveal higher wetland habitat values). The situation with fencing is not clear; livestock may have access to the understorey of the forest, which would reduce its natural function and character.

(a) Pohutukawa and kanuka are equally common in the canopy over west- and east-facing slopes of Oneriri Pa, and frequent mamaku and occasional kowhai, puriri, ti kouka and nikau occur.

(b) Taraire–puriri forest occupies the south-facing slope. In this type kahikatea and karaka are frequent, with occasional ti kouka, kohekohe, nikau and kowhai.

(c) Kanuka forest occupies the ridge top, and may have developed following more recent clearance associated with the pa.

Fauna

Not surveyed.

Significance

Ecological unit (a) is considered to be the best and most extensive example of pohutukawa–kanuka forest on steep coastal margin in Otamatea ED Northland. It provides a protective vegetation buffer to the estuarine habitats of the Oruawharo River North Coast (Q09/020), which has the lowest percentage of indigenous coastal vegetation on its land margin (16%) out of the five estuarine sites identified. This site has cultural and archaeological significance as well as ecological significance.

UPPER WHAKAKI RIVER FOREST REMNANTS

Survey no.	Q09/028
Survey date	13 December 2005
Grid reference	Q09 328 466 (2 remnants)
Area	6.7 ha
Altitude	0–40 m asl

Ecological units

(a) Totara–kanuka–puriri forest on gentle coastal margin (55%)

(b) Totara forest on gentle coastal margin (45%)

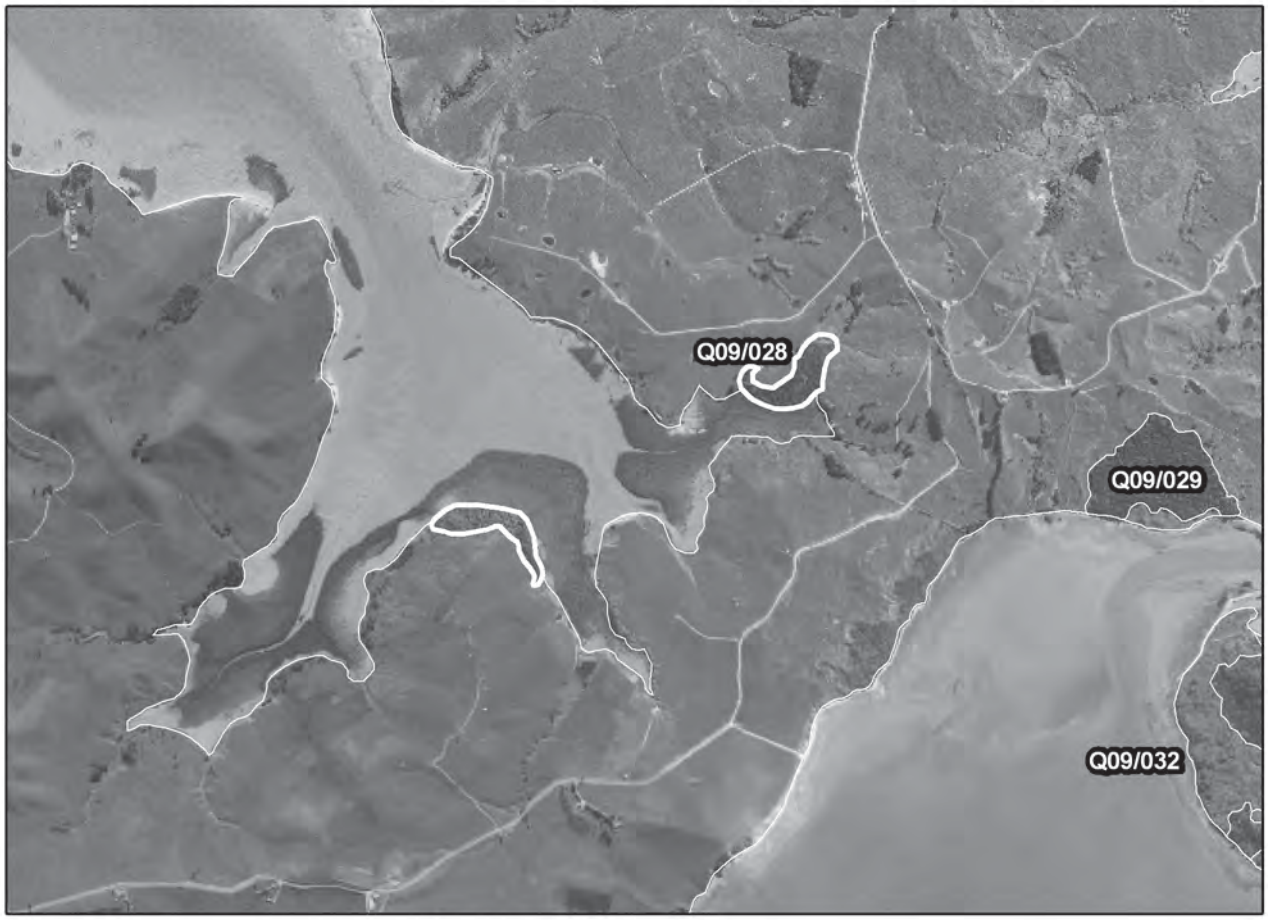
Landform/geology

Coastal hillsides underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex) and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

Two small remnants of coastal forest are linked by their common borders with mangrove forest at the upper reaches of the Whakaki River, although they are physically separate by approximately 700 m.

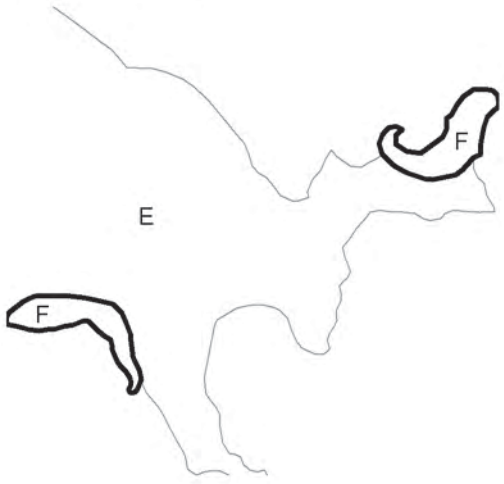
(a) The eastern patch extends along the north coast of a small inlet with mangrove shrubland. The most abundant canopy tree is totara, followed closely by kanuka and puriri which are both common. Kowhai and ti kouka are



Q09/028 Upper Whakaki River Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



frequent, with occasional rimu, rewarewa, kauri, karaka, mamaku, nikau and mamangi. Several mature radiata pine trees are present at the upper edge and on the western end by the creek.

(b) The western patch is less diverse and also less dense (verging on becoming treeland), with only totara as an abundant canopy tree. Other species present include ti kouka, karaka, puriri, kowhai and hawthorn.

Fauna
Kingfisher.

Significance
Totara–kanuka–puriri forest on gentle coastal margin (a) is unique and representative, despite being relatively small and isolated. These are the only two areas of forest remaining on the upper Whakaki River and as there is no other forest (indigenous or exotic) within a 1 km radius, these remnants are likely to be important as 'stepping stones' for forest birds moving between the extensively forested areas of Puketotara Peninsula and the large area of forest and shrubland on Gittos Point Forest and Shrubland (Q09/032).

KAIRA CREEK FOREST

Survey no.	Q09/029
Survey date	15 December 2005
Grid reference	Q09 345 465
Area	11.1 ha
Altitude	3–70 m asl

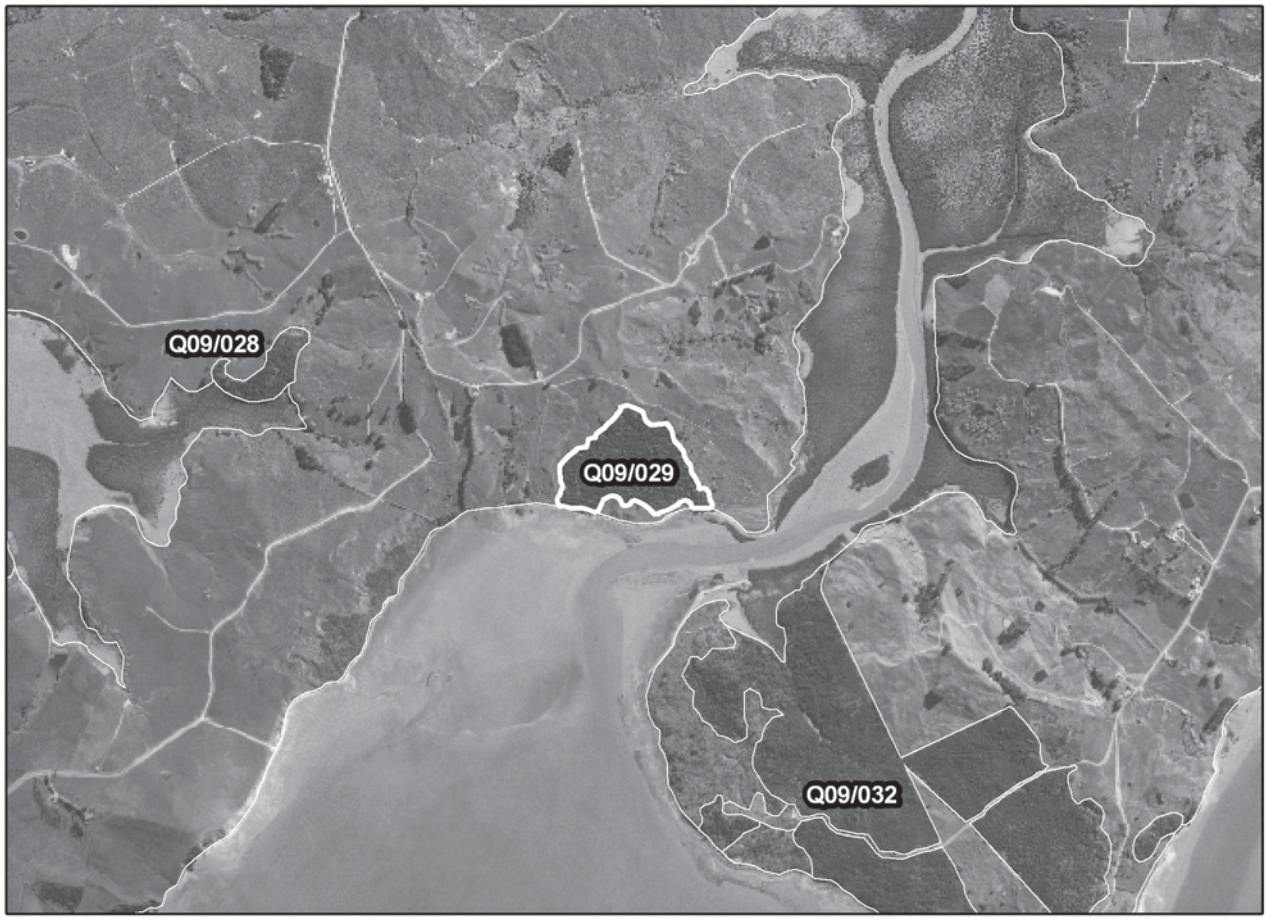
Ecological unit
(a) Kahikatea–puriri–taraire–kanuka forest on gentle coastal margin (100%)

Landform/geology
Coastal hillside underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation
This site comprises a compact indigenous forest remnant on the northern shore of the lower Kaira Creek (part of the Oruawharo River North Coast Q09/020). The remnant is surrounded by pasture, and most of the coastal strip has been cleared, leaving the forest to extend to the coastal margin at only two places. The site appears to be partially fenced, but may still be grazed and trampled by livestock. The canopy is particularly diverse and species evenly distributed within it, with none of the four major canopy species exceeding 20% cover over the entire area. Young kahikatea are emergent over puriri, taraire and kanuka (the latter perhaps more common on edges), and rewarewa frequently pokes above the surrounding canopy. Karaka is only slightly less common than other canopy species. Pukatea, nikau, kohekohe and ti kouka are present in small amounts. Two mature kahikatea on the western side are probably survivors from past land clearance.

Fauna
Not surveyed.

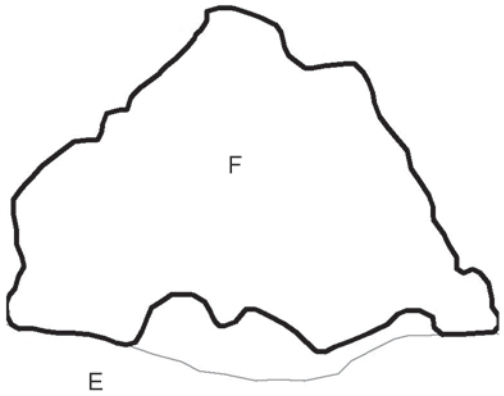
Significance
This is a unique and diverse coastal forest type with occasional mature emergent podocarps, which are now very rare in Otamatea ED Northland. All of these attributes render it a representative ecological unit. Grazing and trampling are probably affecting regeneration in the remnant, and there will be other mammalian threats to its natural values.



Q09/029 Kaira Creek Forest

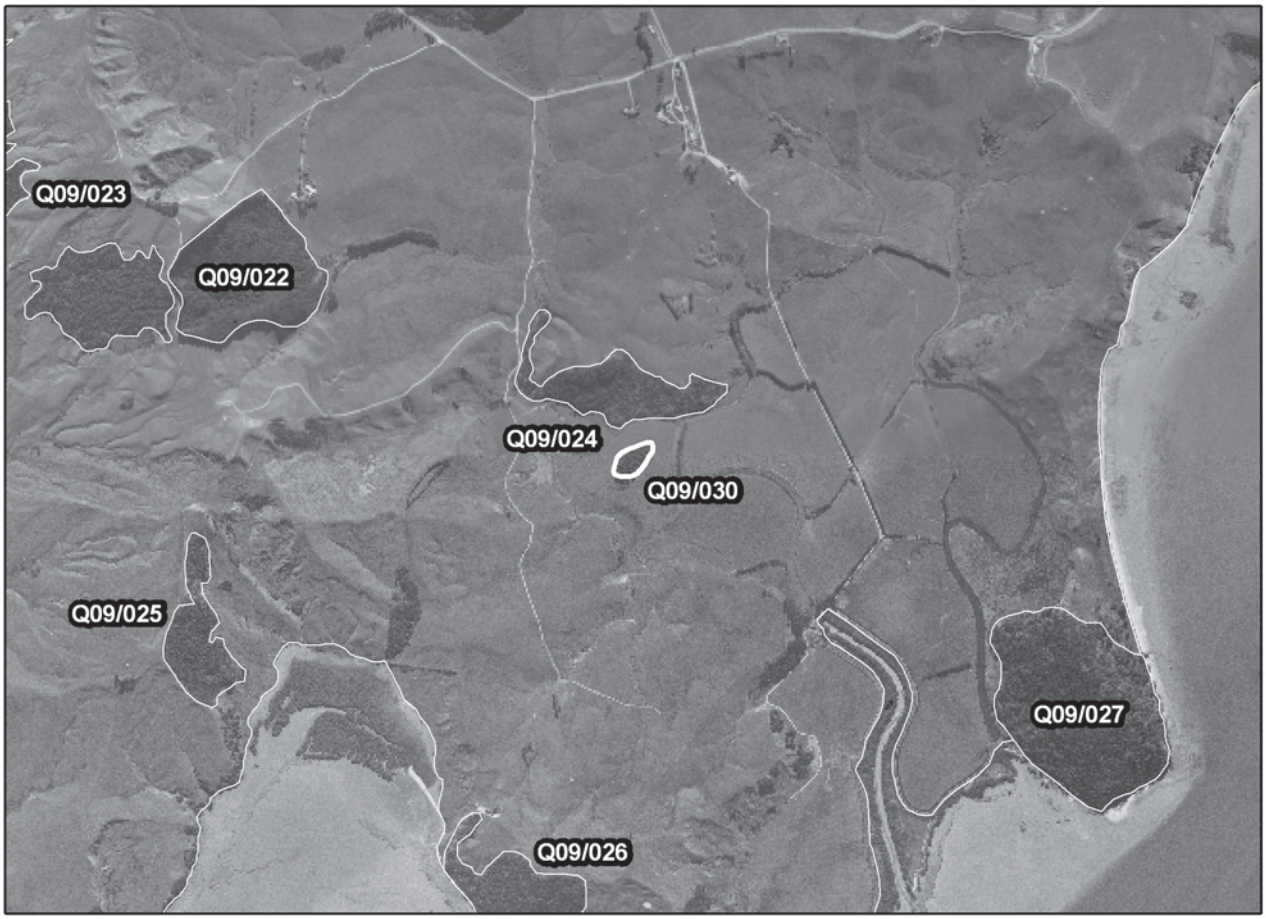
S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



RUATANIWHA FOREST REMNANT

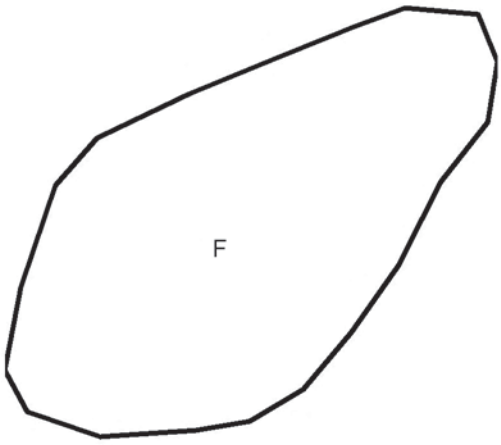
Survey no.	Q09/030
Survey date	30 November 2005
Grid reference	Q09 305 438
Area	0.9 ha
Altitude	20–20 m asl



Q09/030 Ruataniwha Forest Remnant

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological unit

(a) Kauri–karaka–puriri forest on gentle hillslope (100%)

Landform/geology

Pleistocene alluvial and/or estuarine sediments underlying low constructional terrace remnant.

Vegetation

This little knoll used to be an island in a tidal inlet of the Oruawharo River, but since land reclamation in the bay between Kaipara Forest (Q09/026) and

Oneriri Pa Forest (Q09/027), it has become engulfed by dry pastoral land drained by various canals and ditches. The main canopy species on the site are kauri, karaka and puriri, followed by frequent kowhai, tarata and kanuka. Also found here are scattered individuals of titoki, matai, white maire, ti kouka, nikau and *Coprosma macrocarpa*. The understorey mostly comprises exotic grasses, but the indigenous grasses *Oplismenus hirtellus* subsp. *imbecilis* and *Microlaena stipoides* are common on leaf litter in shady patches. Few seedlings or saplings are present, however occasional karaka seedlings were noted. This site was fenced > 12 years ago (Tony Walden pers. comm.), but little regeneration has occurred in that time, suggesting that fences may have been breached at times by livestock grazing in surrounding paddocks.

Fauna

Kingfisher.

Significance

This site contains a unique and representative ecological unit in Otamatea ED Northland. It is an anomaly as it is somewhat disconnected from its original formative influences (i.e. tidal waters flowing around it). Ruataniwha is believed to be culturally significant to Te Uri o Hau (Tony Walden, pers. comm.).

GITTOS POINT FOREST AND SHRUBLAND

Survey no.	Q09/032
Survey date	14 December 2005
Grid reference	Q09 352 455 (3 remnants)
Area	92.4 ha (74.5 ha forest, 17.9 ha shrubland)
Altitude	0–60 m asl

Ecological units

(a) Kanuka forest on moderate to steep hillslope (50%)

(b) Woolly nightshade–mapou shrubland on gentle coastal margin (25%)

(c) Kanuka–puriri forest on gentle coastal margin (15%)

(d) Kanuka forest on gentle coastal margin (10%)

Landform/geology

Coastal headland underlain by Cretaceous sandstone and mudstone (Mangakahia Complex) and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

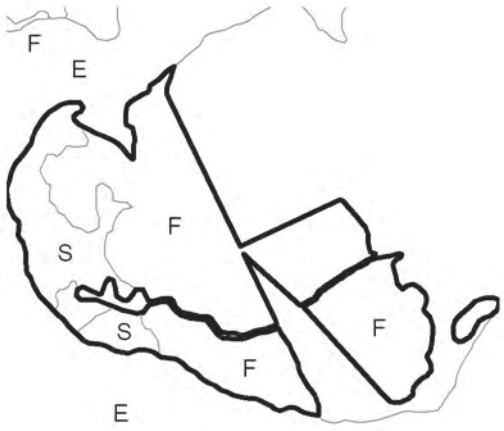
This site comprises regenerating forest and shrubland covering the end of Gittos Point on the Oruawharo River, which was named after a late 1800s Wesleyan missionary called William Gittos (Scott 1987). A large part of the headland is covered with forest and shrubland (some of it with a substantial exotic component), but it is dissected by a wedge-shaped paddock, and a private road with some clearance at the end of it. There appear to be one or two buildings in the forest at the end of the road. Fencing along the paddock margin of the main areas appears to be complete. The thickness of the undergrowth suggests that stock have not been into these areas for a number of years and



Q09/032 Gittos Point Forest and Shrubland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



regeneration is proceeding well. An additional small forest remnant on the southern coast of the headland is included in the site. There is a cemetery on a small grassy hill by the coast nearby.

(a) Dense, young kanuka forest covers much of the higher, western parts of the remnant. A great diversity of other indigenous species occur occasionally, including mapou, ti kouka, mamaku, ponga, kahikatea, totara, hangehange, mahoe, mamangi, mingimingi and putaputaweta. Gorse is present, particularly on edges. Sparse radiata pine and maritime pine are emergent above the kanuka in small areas.

(b) The bulk of the lower, western part of the remnant bordering the Oruawharo River North Coast (Q09/020) is covered in woolly nightshade–mapou shrubland. These two species are equally common and have frequent ti kouka and totara saplings associated with them. Scattered large puriri, radiata pine and maritime pine are present.

(c) Kanuka is dominant and puriri is common in the vegetation of the northern coast, which is nestled in a protected gully mouth. Here, woolly nightshade and brush wattle appear frequent, and there are occasional indigenous species including mamaku, ti kouka and kahikatea. Both species of the aforementioned wilding pine are occasionally emergent here also.

(d) In the small, southern coastal remnant, abundant kanuka is associated with frequent karaka, puriri, kowhai, totara and kahikatea. Occasional species include taraire, ti kouka, mamangi, manuka, *Coprosma rhamnoides*, *C. macrocarpa*, mapou, pohuehue, small-leaved milk tree, pohutukawa, gorse, woolly nightshade, blackberry, macrocarpa and hawthorn.

A specimen of carmine rata (regionally significant) was collected from here (referred to as 'Stephen's Bush') in 1935 (AK 211359), but its continued presence is not confirmed.

Fauna

Kingfisher.

Significance

Pest plants such as woolly nightshade, gorse and wilding pines alter the natural character of this site, which is otherwise a good example of successional coastal forest. All ecological units except (b), which is the most affected by weed invasion, are considered representative of their types. Due to its large extent, this site forms an important protective buffer to the fringes of the Oruawharo River North Coast site (Q09/020), which is otherwise relatively denuded, with only 16% indigenous coastal vegetation.

ORUAWHARO SCHOOL FOREST

Survey no.	Q09/033
Survey date	6 December 2005
Grid reference	Q09 373 469 (2 remnants)
Area	21.8 ha (9.5 ha forest, 12.3 ha shrubland)
Altitude	7–60 m asl

Ecological units

(a) Totara–mapou shrubland on moderate hillslope (55%)

(b) Totara–kanuka forest on moderate hillslope (35%)

(c) Kowhai–totara–puriri–pukatea forest in gully (10%)

Landform/geology

Coastal hillside underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

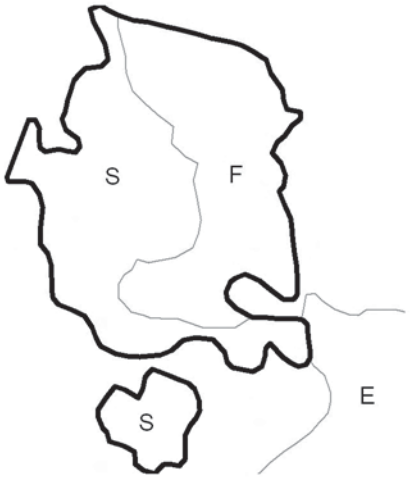
This site is on the southwest-facing slope of a gentle gully draining into saltmarsh; the upper reaches are covered in shrubland and the lower reaches in forest.



Q09/033 Oruawharo School Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(a) Totara and mapou are most common species in the diverse mixture of shrubland next to Oruawharo Road and Oruawharo School Road. Species which frequently occur in this community are mamaku, bracken, ti kouka, mahoe, manuka and kanuka. Also present are occasional kahikatea (emergent), tarata, karamu, harakeke, and several weeds, notably pampas, dally pine, giant reed grass, blackberry, gorse, radiata pine and hawthorn. Weeds appear confined to edges and some of these may be escapes from nearby gardens.

(b) The totara–kanuka forest covering the north–western corner of the site is a more mature stage of vegetation similar to type (a). Kahikatea, pukatea and kowhai are present, along with several large exotic trees (radiata pine and eucalyptus).

(c) A small area in the bottom of the gully supports forest dominated by kowhai, where puriri, totara and pukatea are also common. Rewarewa and karaka are frequent.

Fauna

Fantail, kingfisher, welcome swallow, tui.

Significance

This site contains two representative ecological units: (a) totara–mapou shrubland on moderate hillslope, which is a diverse and unique shrubland type, and (c) kowhai–totara–puriri–pukatea forest in gully, which is also unique in Otamatea ED Northland. The character of the shrubland (a) is altered by several exotic invasive plants, which have the potential to alter its natural character, though some of them are on edges and will become less important as succession proceeds (e.g. blackberry, gorse and pampas). The occurrence of giant reed grass is of particular concern, as this was not seen elsewhere in Otamatea ED Northland during the present survey, and has the potential to choke water ways.

KOAREARE CREEK FOREST REMNANTS

Survey no.	Q09/036
Survey date	6 December 2005
Grid reference	Q09 399 487 (8 remnants)
Area	90.0 ha
Altitude	0–100 m asl

Ecological units

(a) Kowhai–puriri forest on steep coastal margin (20%)

(b) Kanuka forest on moderate hillslope (20%)

(c) Kahikatea–kowhai forest on gentle coastal margin (15%)

(d) Taraire–puriri forest on moderate to steep hillslope (15%)

(e) Kanuka forest on gentle coastal margin (10%)

(f) Totara–kowhai–puriri forest on gentle coastal margin (10%)

(g) Totara–puriri–kahikatea forest on gentle coastal margin (5%)

(h) Totara forest on ridge top (3%)

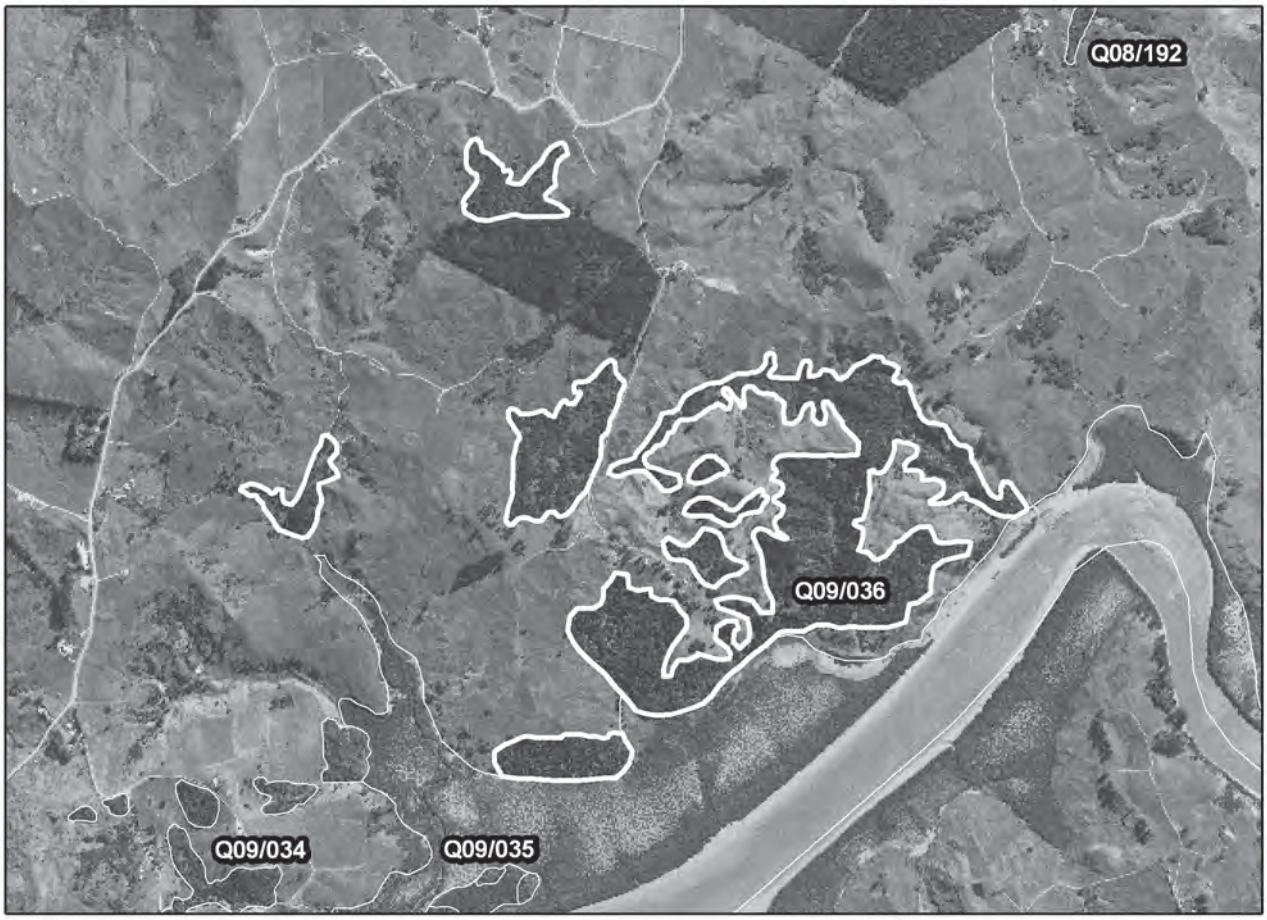
(i) Kanuka–kowhai forest on steep coastal margin (2%)

Landform/geology

Coastal hills of melange (undifferentiated Mangakahia & Motatau Complex lithologies), Eocene glauconitic sandstone (Pahi Greensand, Te Kuiti Group), and Oligocene micritic limestone (Mahuarangi Limestone, Motatau Complex).

Vegetation

This site covers a complex mosaic of forest types divided into many separate areas spread across the upper catchment of the Koareare Creek and its



Q09/036 Koareare Creek Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



associated coastal margin. Many of the semi-coastal forest remnants in the upper catchment comprise only one type, while the coastal forest remnants are highly variable and there may be up to three distinct types in a short stretch of coast. The surrounding and intervening land use is principally pastoral, though one small area of pine forestry links two of the indigenous forest remnants in the upper catchment.

(a) The largest and most dense area of coastal forest contains abundant kowhai (>50%) and with expansive, healthy crowns of puriri covering greater than 30% of the canopy. Kahikatea, totara and rewarewa are frequent.

(b) Kanuka forest is the most common type in the upper catchment. Associated with this type are frequent ti kouka and totara, and occasional kahikatea, manuka and mamaku. The understorey at the margin of the kanuka remnants tends to be sparsely vegetated; a sign of the effects of heavy grazing.

(c) Kahikatea and kowhai dominate the forest canopy on the coastal slope directly opposite the unnamed island in the Oruawharo River (Q09/035). Puriri, totara and kanuka are frequent members of this community.

(d) Taraire–puriri forest covers a steep slope in the head of the catchment, which is also in close proximity to the coast. Kahikatea and kanuka are frequent here, with occasional kohekohe, karaka, rewarewa and emergent rimu.

(e) Heavily degraded kanuka forest occurs on the northern coastal margin of the site. Frequent examples of kowhai, puriri and totara are dotted through the kanuka, with occasional ti kouka and radiata pine.

(f) Totara–kowhai–puriri forest occurs in the middle of the coastal margin of this site. Kahikatea is frequent, with occasional titoki and kohekohe.

(g) A small area on the coast is dominated by totara, in association with puriri and kahikatea.

(h) A prominent high point above type (a) on the coast is covered with a stand comprising mainly totara.

(i) The canopy of small stretches of the coastal forest is dominated by kanuka and kowhai. Here there are rich textures of frequent puriri and karaka with occasional titoki, kohekohe and ti kouka.

Fauna

Australasian harrier.

Significance

This is one of the most diverse natural areas on the northern coastal margins of the Oruawharo River, though it comprises many separate areas which detracts markedly from its robustness. Lack of fencing around the remnants allows stock access and consequently suppresses regeneration, further threatening the long-term survival and health of these remnants. Some of the forest in the upper catchment is becoming very degraded and is bordering on becoming treeland due to the effects of grazing. Ecological units (a) kowhai–puriri forest on steep coastal margin, and (c) kahikatea–kowhai forest on gentle coastal margin, are considered to be the best representative examples of their type in Otamatea ED Northland. The site provides a protective vegetation buffer to the land margin of the Oruawharo River North Coast (Q09/020), which currently has only 16% indigenous vegetation, the lowest percentage of the five estuarine natural areas in Otamatea ED Northland.

TOPUNI RIVER FOREST REMNANT 1

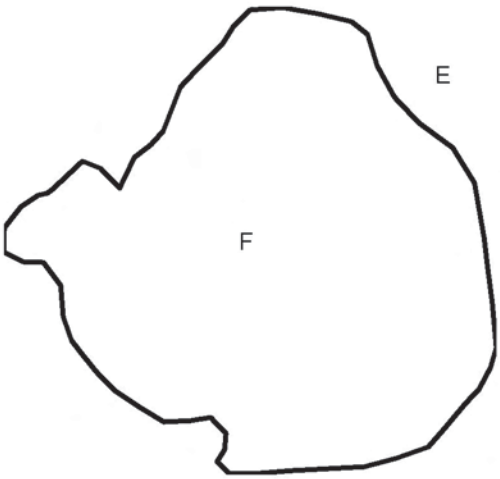
Survey no.	Q09/037
Survey date	6 December 2005
Grid reference	Q09 427 500
Area	6.0 ha
Altitude	0–40 m asl



Q09/037 Topuni River Forest Remnant 1

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological unit

(a) Kauri–kanuka forest on steep coastal margin (100%)

Landform/geology

Not surveyed.

Vegetation

This site includes some fine stands of kauri rickers and kanuka in a compact remnant on the coastal margin of the upper Oruawharo River North Coast

(Q09/020). Tanekaha and totara are frequent members of the canopy, with scattered rimu, rewarewa, kowhai and karaka. The remnant appears to be fenced and the understorey looks relatively intact. A small maimai is nestled in the northern edge of the forest next to mangroves.

Fauna

Pied shag (Sparse).

Significance

This site is significant as a habitat for a threatened bird species (pied shag) as well as being one of the best representative examples of coastal kauri–kanuka forest. The site provides a protective vegetation buffer to the Oruawharo River North Coast (Q09/020). Only 16% of the land margin of this estuarine natural area is covered in indigenous vegetation, the lowest percentage of the five estuarine natural areas in this survey.

TOPUNI RIVER CONFLUENCE FOREST

Survey no.	Q09/038
Survey date	6 December 2005
Grid reference	Q09 420 481
Area	6.1 ha
Altitude	0–60 m asl

Ecological unit

(a) Kanuka forest on steep coastal margin (100%)

Landform/geology

Not surveyed.

Vegetation

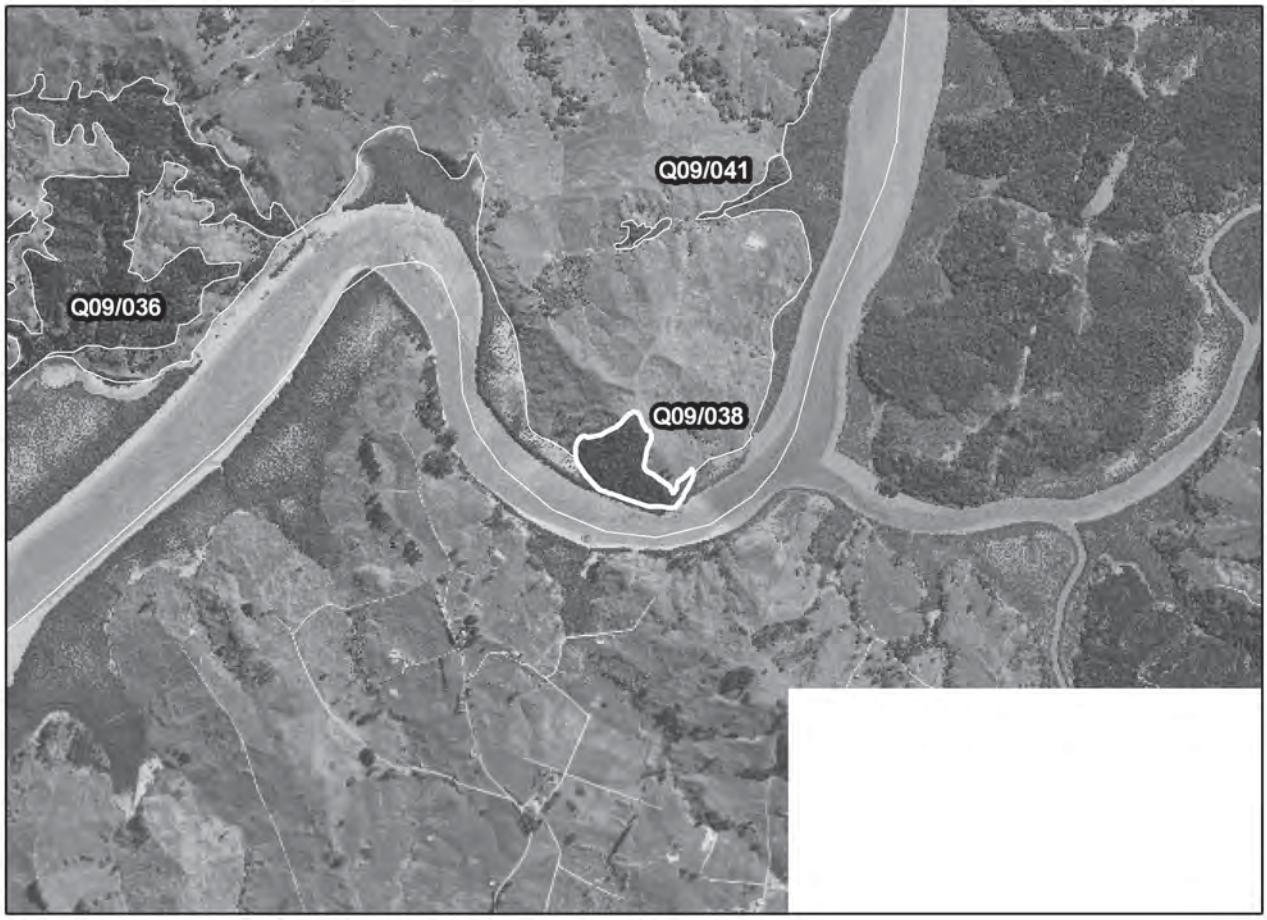
This site comprises a coastal indigenous forest remnant on the inside of a bend in the Topuni River, where it reaches a confluence with the Oruawharo River. The forest is surrounded by exotic grassland and it is not clear whether it is fenced; it may or may be used to shelter. Kanuka is the most abundant canopy species, however there is local occurrence of kauri rickers and patches of coastal broadleaved trees spread throughout. Frequent species include tanekaha, kauri, rewarewa, kowhai, puriri, karaka, kohekohe and kahikatea, with occasional totara and pukatea. There is a large radiata pine on the eastern tip which is seeding and establishing wild progeny on the coastal fringe.

Fauna

Not surveyed.

Significance

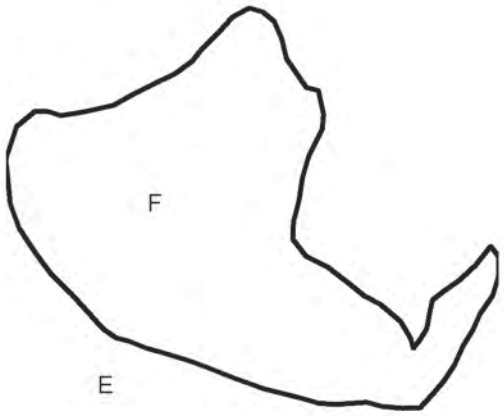
This site is considered to be one of the best representative examples of coastal kanuka forest in Otamatea ED Northland. It provides a valuable protective buffer to the estuarine habitats of the Oruawharo River North Coast (Q09/020), which has only 16% indigenous vegetation remaining on its adjacent land margin.



Q09/038 Topuni River Confluence Forest

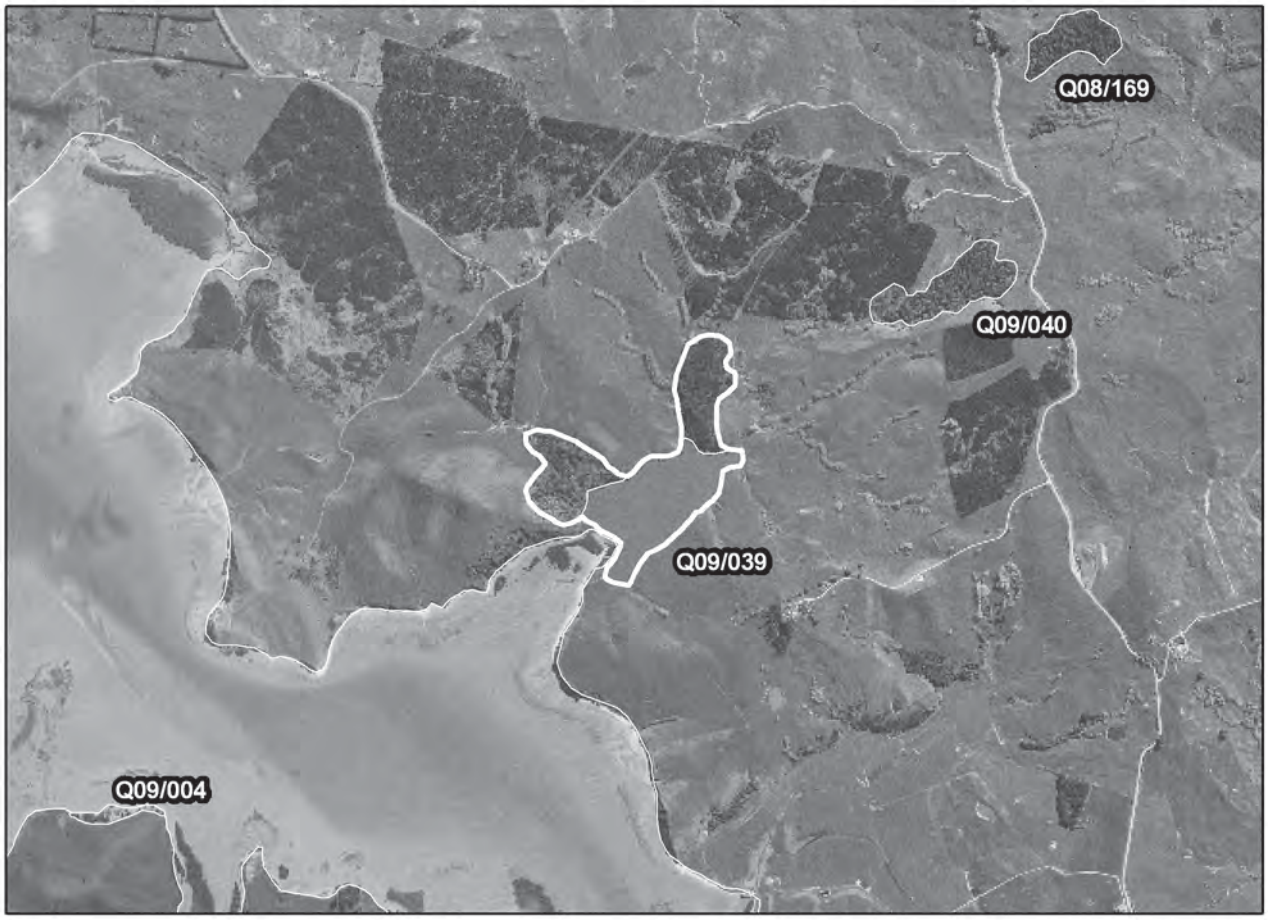
S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



WAINONORORO CONSTRUCTED LAKE

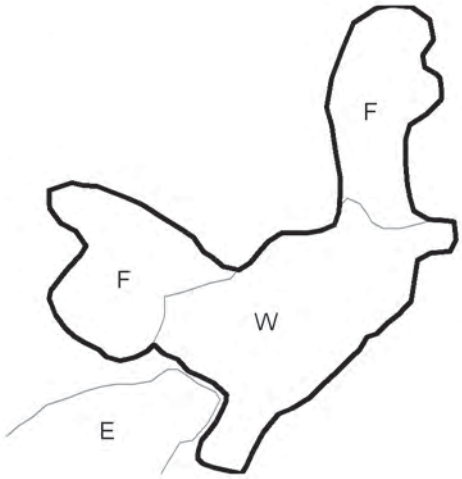
Survey no.	Q09/039
Survey date	13 December 2005
Grid reference	Q09 319 489
Area	22.7 ha (11.2 ha forest, 11.5 ha wetland)
Altitude	2–41 m asl



Q09/039 Wainonororo Constructed Lake

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Open water (constructed lake) (51%)

(b) Kanuka treeland on moderate to steep hillslope (49%)

Landform/geology

Coastal hillslopes underlain by Oligocene micritic limestone (Mahurangi Lmst, Motatau Complex) and melange (undifferentiated Mangakahia & Motatau Complex lithologies); man-made lake in former estuary.

Vegetation

The upper tidal mudflats of Wainonororo Creek on the Whakaki River has been blocked off from the sea to create an artificial lake stretching 550 m inland. The lake has no visible aquatic marginal vegetation and appears to have high levels of suspended solids. Most of the catchment is in pasture, however several small pine plantations do occur in the upper catchment. Two separate stands of indigenous treeland occur on the western and northern sides of the lake, which are composed principally of kanuka. Occasional examples of karaka, kowhai, ti kouka and macrocarpa are scattered throughout, with the western stand tending to be more species rich, though the trees in trees in this area are further apart.

Fauna

Not surveyed.

Significance

The treeland areas are very badly affected by stock grazing and trampling, however the lake is valuable as the third largest freshwater wetland habitat in Otamatea ED Northland. Although it is a constructed lake, it has the capacity to support good populations of indigenous waterbirds, as do the two larger constructed lakes further north, for which field surveys of bird populations have been undertaken (Takahoa Government Purpose Wildlife Management Reserve (Q08/164) and Kaitara Constructed Lake (Q08/159)).

THE FUNNEL POHUTUKAWA FRINGE

Survey no.	Q09/043
Survey date	9 December 2005
Grid reference	Q09 267 493 (7 remnants)
Area	12.1 ha
Altitude	0–60 m asl

Ecological unit

(a) Pohutukawa treeland on steep coastal margin and coastal cliff (100%)

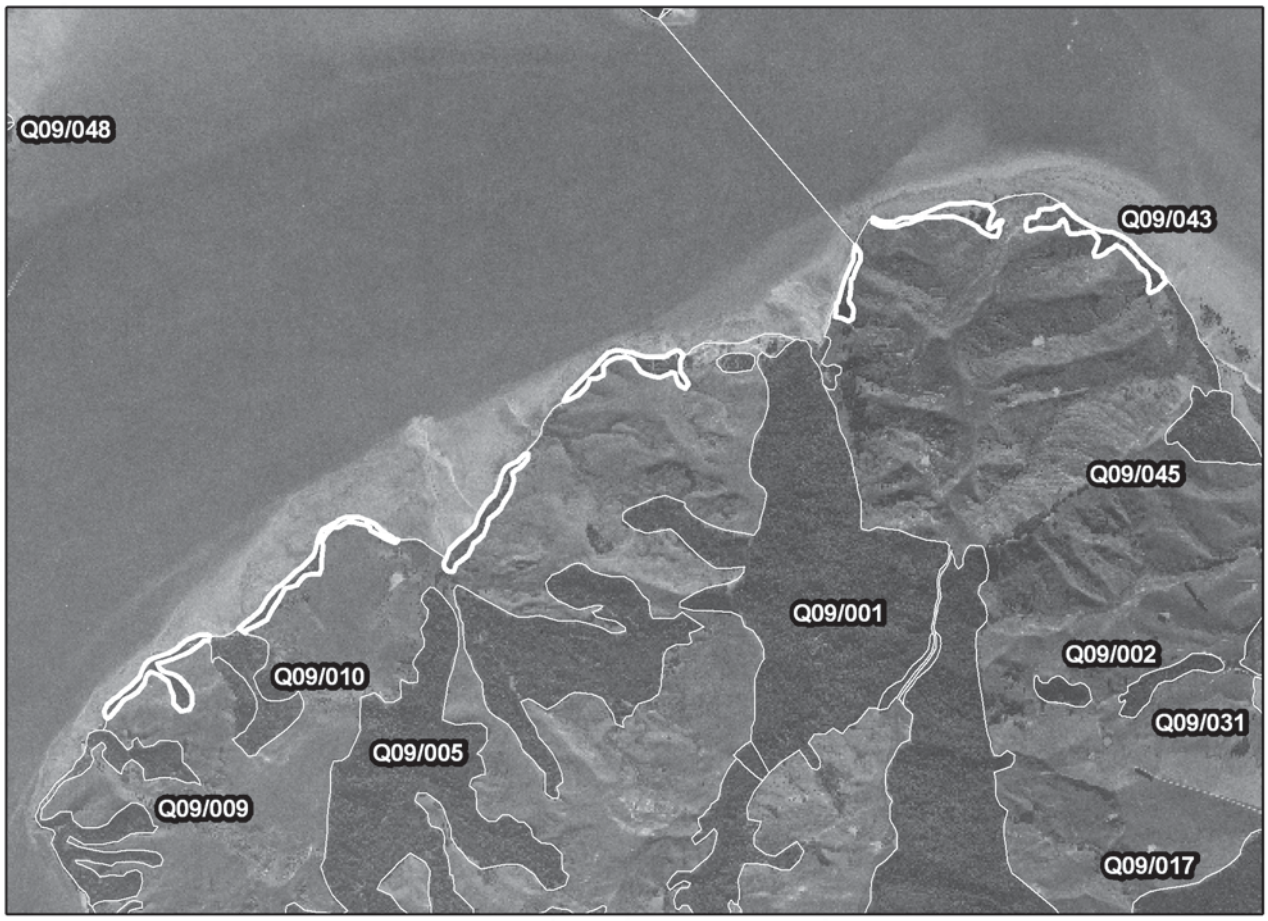
Landform/geology

Coastal cliffs and banks of Miocene thinly interbedded sandstone and mudstone, and polymict igneous conglomerate (Waitemata Group), and Miocene volcaniclastic gravelly sandstone (Waitakere Group).

The cliffs and neighbouring shore platforms (in Otamatea River Confluence site (Q09/021)) have an almost complete exposure from Timber Bay distal flysch through Matapoura Conglomerate, large slump horizon, and into Pakaurangi Formation. Erionite occurs in a 90 cm tuff bed of the Timber Bay Formation with lesser amounts of chabazite, clinoptilolite and andesine (Kenny & Hayward 1996).

Vegetation

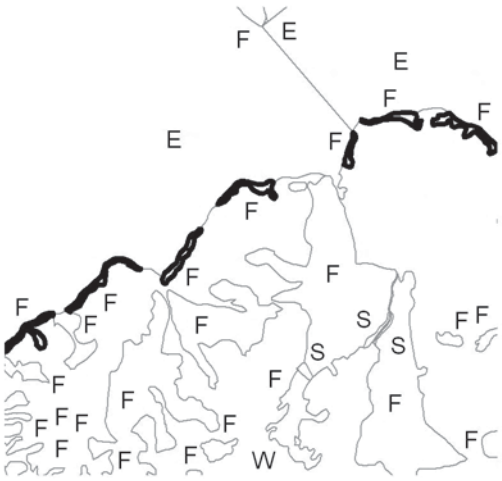
This site encompasses a set of narrow treeland remnants which are dispersed along the northwest coast of the Puketotara Peninsula, also known as 'The Funnel'. The site is defined by the presence of large pohutukawa, with frequent totara, puriri and kanuka, often overhanging the coast of a large estuarine



Q09/043 The Funnel Pohutukawa Fringe

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



natural area, the Otamatea River Confluence (Q09/021). A recognisable 5–20 m wide fringe of this ecological unit occurs in broken stretches along approximately 4 km of coastline. Bare cliffs, pasture or gorse scrub occur in most of the intervening stretches. The remnants in this site sometimes connect the vegetation in other sites along their coastal margins, e.g. Timber Bay Forest (Q09/001) to Puketotara Forest Remnant 2 (Q09/005).

Fauna

Not surveyed.

Significance

Although these pohutukawa remnants are very narrow and are missing several palatable canopy species missing (e.g. houpara and tawapou), they occur on coastal cliffs of national geological importance, and are therefore representative. These cliffs have the most complete sequence through Waitematea Group and lower Waitakere Group formation in the Kaipara region (Kenny & Hayward 1996). Puketotara erionite in the north of the site is the most silica-poor erionite variety reported in the world, and is therefore of international geological significance (Kenny & Hayward 1996). In terms of ecological function, this site provides a protective vegetation buffer to the coastal fringe and is possibly a roosting site for sea birds.

MOHINUI FOREST REMNANTS 4

Survey no.	Q09/044
Survey date	13 December 2005
Grid reference	Q09 350 500 (3 remnants)
Area	13.4 ha
Altitude	42–80 m asl

Ecological units

(a) Totara forest on moderate hillslope (50%)

(b) Taraire–kahikatea–puriri forest on moderate hillslope (50%)

Landform/geology

Hillslopes and gullies underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

The site comprises three forest remnants amongst pasture on south-facing slopes in the upper catchment of the Kaireia Stream, Oneriri Peninsula. Mohinui Peak lies to the northwest and Mohinui Forest Remnant 3 (Q08/190) lies nearby to the north. Large numbers of sheep were observed sheltering from midday sun underneath the forest and none of the remnants appear to be fully fenced.

(a) Dense totara covers about half the site, mainly in the smaller remnants or the on edges of the large remnant. Totara is associated with frequent karaka, kanuka and kahikatea, and occasional manuka and ti kouka.

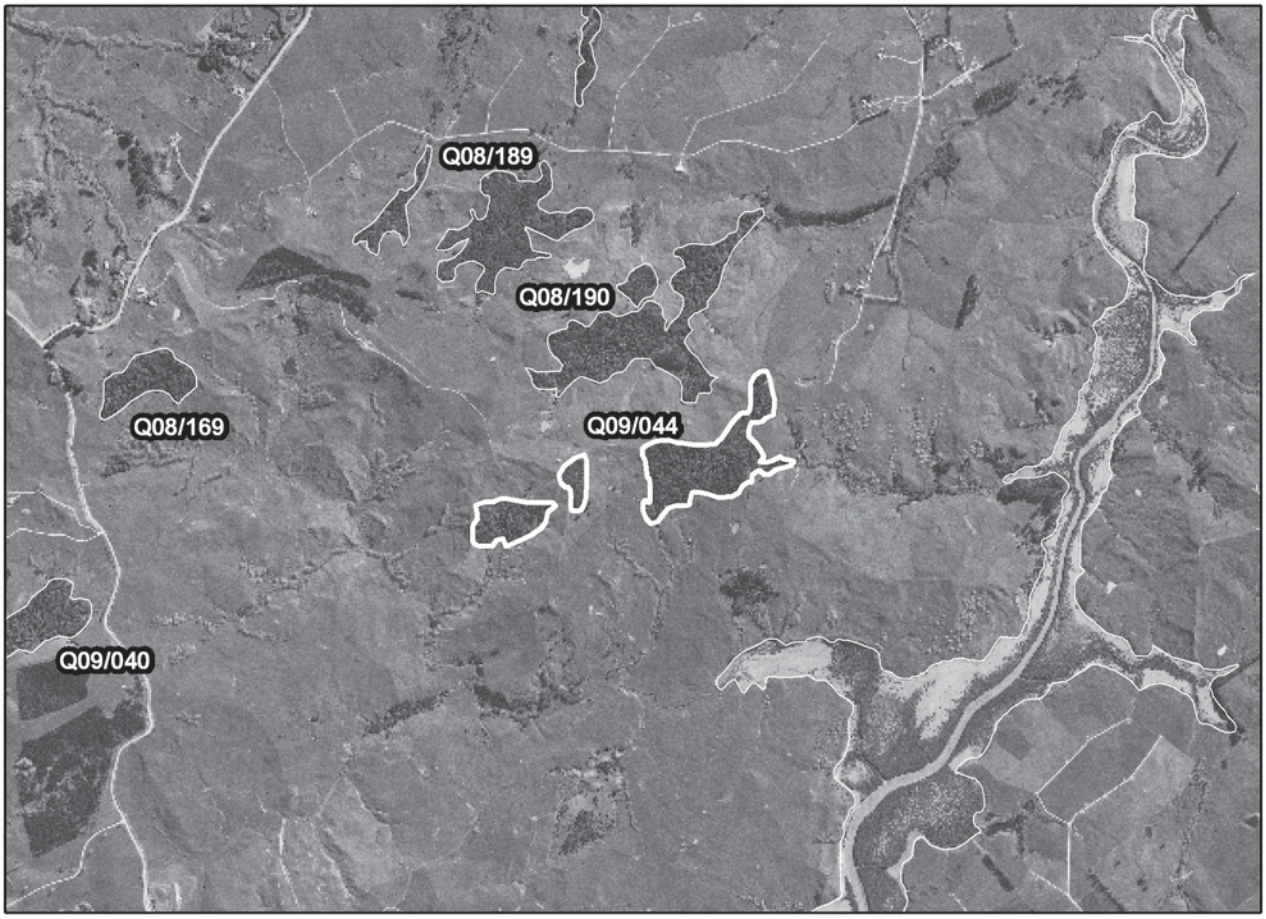
(b) A diverse mixture of taraire, kahikatea and puriri with frequent pukatea and rewarewa, and occasional nikau covers the other half of the site, often in the centre of the forest remnants, surrounded by totara forest.

Fauna

Grey warbler.

Significance

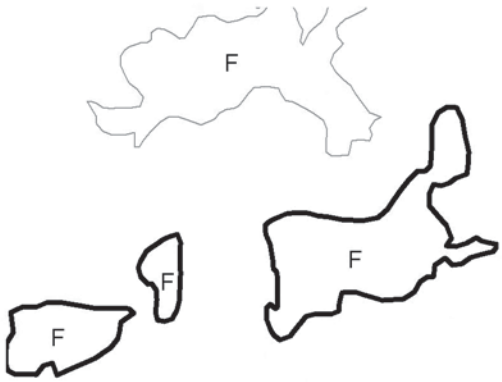
Ecological unit (b) taraire–kahikatea–puriri forest on moderate hillslope, is a unique, representative and relatively diverse forest type, and raises the significance of this site to Level 1, despite its obvious lack of condition due to grazing and trampling effects.



Q09/044 Mohinui Forest Remnant 4

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres

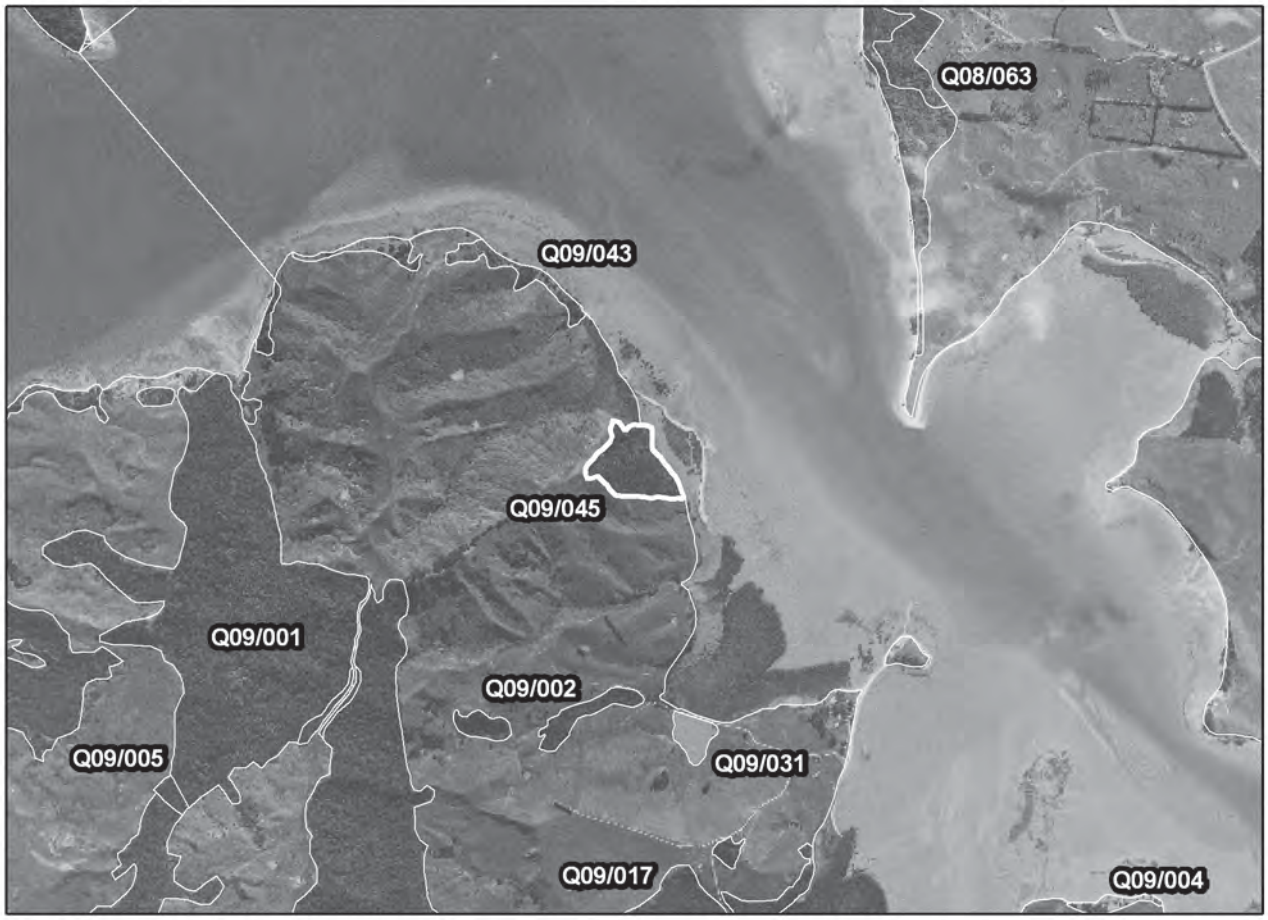


PUKETOTARA FOREST REMNANT 15

Survey no.	Q09/045
Survey date	13 December 2005
Grid reference	Q09 286 493
Area	5.0 ha
Altitude	0–60 m asl

Ecological unit

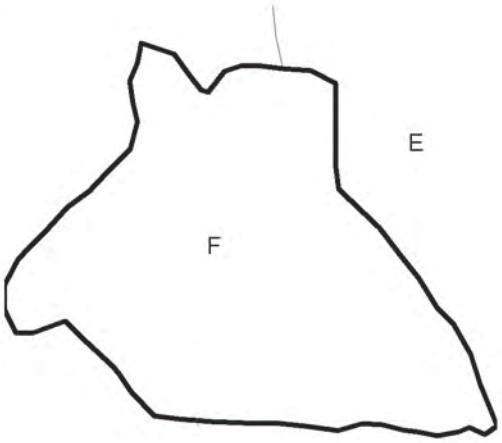
(a) Karaka–kanuka–kahikatea forest on steep coastal margin (100%)



Q09/045 Puketotara Forest Remnant 15

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Coastal hillside underlain by Miocene thinly interbedded sandstone and mudstone (Waitemata Group).

Vegetation

This site comprises a compact and diverse stand of coastal broadleaved–podocarp forest on the steeply sloping northeastern coast of Puketotara Peninsula, facing the mouth of the Whakaki River. The surrounding landscape is grazed pasture, and it is likely that stock have access to this forest. The forest

comprises abundant karaka in association with puriri and kanuka. Kowhai and kahikatea are frequent, and kauri and ti kouka occur in local patches.

Fauna

Not surveyed.

Significance

This ecological unit is unique and representative in Otamatea ED Northland. Its most striking feature is the high abundance of karaka, which is quite unusual in Otamatea ED Northland. The health of the remnant is under threat from grazing animals, which reduce regeneration and trample tree roots and soil.

BUSHY POINT FOREST REMNANT

Survey no.	Q09/046
Survey date	12 January 2006
Grid reference	Q09 198 485
Area	4.7 ha
Altitude	0–56 m asl

Ecological units

(a) Houpara–kowhai–tawapou forest on steep coastal margin (50%)

(b) Pohutukawa forest on steep coastal margin (25%)

(c) Kanuka forest on steep coastal margin (25%)

Landform/geology

Coastal hillsides underlain by Miocene andesitic tuff breccia and pumiceous pyroclastic flow deposits (Waitakere Group). Clinoptilolite occurs as fossil replacement in sandstone (Kenny & Hayward 1996).

Vegetation

Bushy Point is a prominent headland on the southwest coast of Hukatere peninsula. It faces the prevailing winds coming from the southwest through the Kaipara Harbour mouth; hence the vegetation is very exposed to weather. This site also includes cliffs and steep slopes extending eastwards from the point. The landward side of the site is bordered by an extensive radiata pine plantation.

(a) The western side of the main headland is covered by a low stature, lush mixture of houpara, kowhai and tawapou with frequent puriri (some showing dieback), pohutukawa and kohekohe. Titoki, ti kouka, karaka and rewarewa are dotted occasionally throughout the forest, while harakeke and kowharawhara occur sporadically along the forest edges by the water.

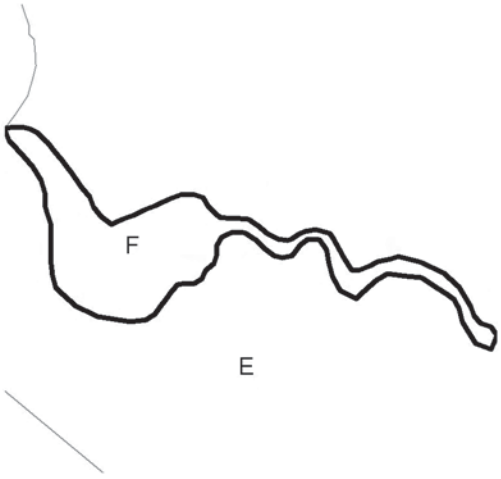
(b) On the eastern steep slopes there is pohutukawa forest with frequent emergent mature radiata pine, which have probably seeded in from the pine plantations directly behind. Emergent, mature maritime pine also occur sporadically. A large diversity of species is present under the sparse pohutukawa canopy in including harakeke, turutu, kowharawhara, kiokio, toetoe, tangle fern, houpara, hangehange, mapou and one patch of willow-leaved hakea.



Q09/046 Bushy Point Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(c) On the eastern side of the point there is kanuka forest with frequent mamangi, mapou and houpara, and occasional ti kouka, rewarewa and emergent radiata pine.

Significant flora

Tawapou (regionally significant).

Fauna

Little shag, white-faced heron.

Significance

This site supports two forest types containing tawapou (regionally significant) and is considered representative for houpara–kowhai–tawapou forest on steep coastal margin which is a unique forest type in Otamatea ED Northland, and is a very rare forest type in the Northland Region (Wendy Holland, pers. comm.). The forest and headland provide roosting habitat for seabirds and is an important protective buffer to the Kaipara Harbour. The presence of clinoptilolite replacing fossil shells in the sandstone renders this site regionally important as a geological site (Kenny & Hayward 1996).

KUMETE BLUFF FOREST REMNANT

Survey no.	Q09/047
Survey date	12 January 2006
Grid reference	Q09 220 481
Area	10.9 ha
Altitude	0–80 m asl

Ecological units

(a) Kanuka forest on steep coastal margin (60%)

(b) Pohutukawa–houpara–kowhai treeland on coastal cliff (40%)

Landform/geology

Coastal cliffs of Miocene volcaniclastic gravelly sandstone and pumiceous pyroclastic flow deposits (Waitakere Group).

Vegetation

Kumete Bluff is a 1 km long near-vertical coastal cliff of approximately 80 m height, located on the southernmost point of the Hukatere peninsula. Strong marine currents stream past the site at high and low tide, as water surges in and out of the Arapaoa and Otamatea Rivers. The site is very exposed to prevailing southwesterly winds coming through the Kaipara Harbour mouth. Above the bluff there are grazed paddocks, which are apparently fenced off from the forest on the bluff. This site also includes a small forested gully on the western side of the bluff.

(a) The top of the bluff and the western gully are covered in kanuka forest with frequent *Coprosma macrocarpa,* houpara, mapou and radiata pine (wilding pines from neighbouring pine plantations). Also found here are occasional pohutukawa, heketara and maritime pine.

(b) The vegetation cascading down the cliffs is a distinctive mixture of pohutukawa, kowhai and houpara with frequent examples of *Coprosma macrocarpa,* karamu and kanuka. 30% of the pohutukawa appear dead, perhaps as a result of possum browse. A variety of species occur in scattered populations in the various microhabitats of the cliffs. Slip faces are mostly covered in pampas, while toetoe grows on small ledges and shelves, as do *Austrostipa stipoides*, harakeke, rengarenga and kowharawhara. New Zealand spinach sprawls and dangles over steep edges, while rangiora, akepiro, karaka, mahoe and ti kouka are present on flatter areas with more soil.

Fauna

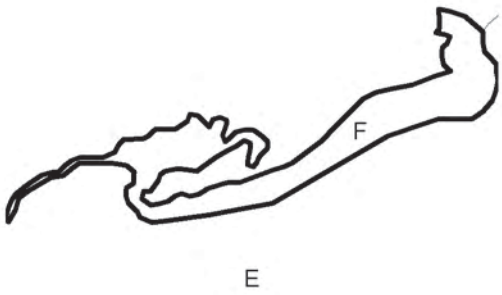
Fantail, kingfisher, little shag.



Q09/047 Kumete Bluff Forest Remnant

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Significance

Pohutukawa–houpara–kowhai treeland on coastal cliff (b) is a representative type, despite exhibiting poor condition, as this is the only site where pohutukawa, houpara and kowhai occur on coastal cliffs in the Northland part of the ED. It is also the only site where New Zealand spinach was noted. The site provides roosting sites for sea birds. The vegetation is valuable as a slope stabiliser and buffer between pasture and coast.

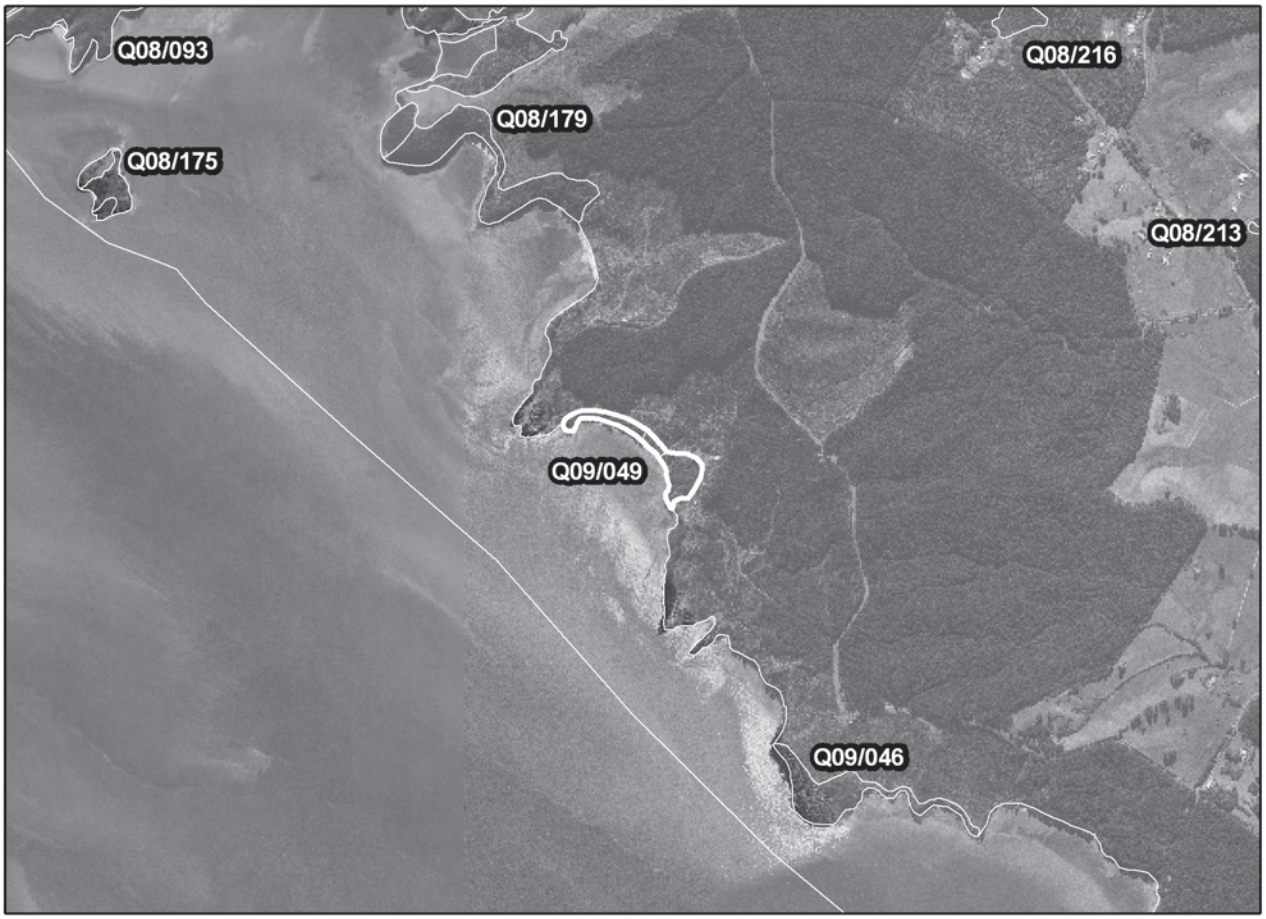
OTAIWHATA BAY FOREST AND SHRUBLAND

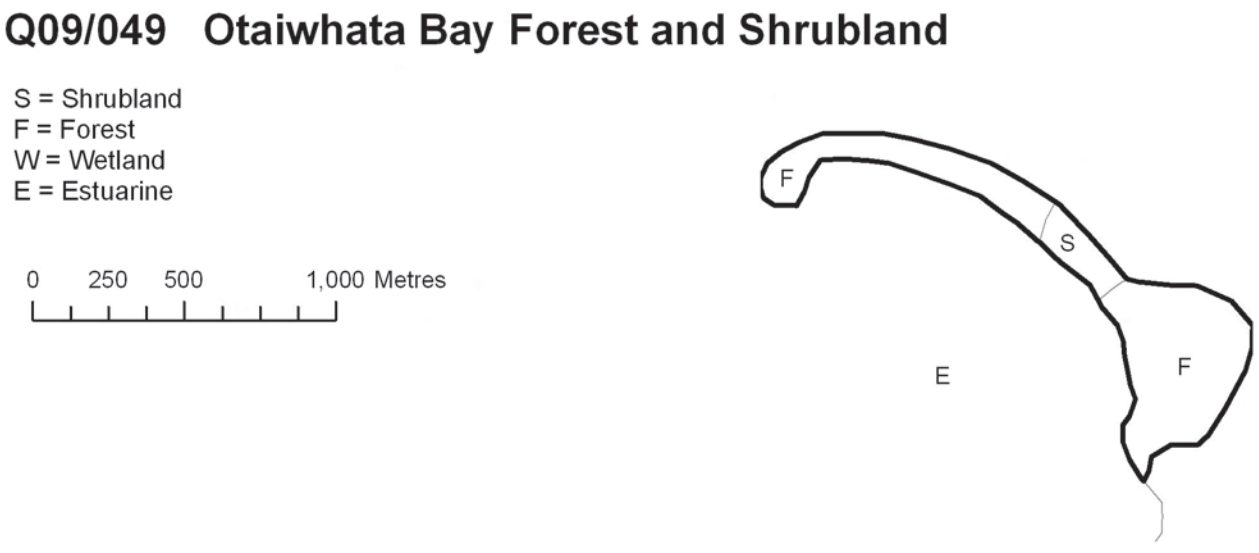
Survey no.	Q09/049
Survey date	12 January 2006
Grid reference	Q09 192 497
Area	2.9 ha (2.6 ha forest, 0.3 ha shrubland)
Altitude	0–35 m asl

Ecological units

(a) Pohutukawa–houpara forest on gentle coastal margin (90%)

(b) Harakeke–manuka–pampas shrubland on gentle coastal margin (10%)





Landform/geology

Coastal hillsides underlain by Miocene volcaniclastic gravelly sandstone (Waitakere Group).

Vegetation

This site comprises a continuous indigenous forest and shrubland remnant behind Otaiwhata Bay on the west coast of the Hukatere peninsula. Forest covers most of the site, with a small patch of shrubland in the middle of the bay where there appears to be a private camping ground. The site backs onto extensive radiata pine plantations.

(a) Pohutukawa is abundant in the forest canopy in association with common houpara, frequent harakeke and radiata pine (emergent), and occasional examples of manuka, pampas, kowharawhara, mapou, toetoe, kowhai and *Coprosma macrocarpa*.

(b) Harakeke is the most abundant plant in the shrubland, followed by manuka and pampas which are common. Gorse occurs frequently throughout the shrubland and there are occasional pohutukawa, houpara and ti kouka.

Fauna

Not surveyed.

Significance

This is a representative site for ecological unit (a), which is the only example of pohutukawa–houpara forest in Otamatea ED Northland.

4.2 LEVEL 2 SITES

The following were assessed to be Level 2 sites. These are listed in Table D, and described and mapped in the ensuing sections.

TABLE D: LIST OF LEVEL 2 SITES.

SITE NAME	SURVEY NO.	GRID REF.
Maungaturoto Marginal Strip and Surrounds	Q08/068	Q08 343 658
Doctor Hill Road Forest Remnants	Q08/070	Q08 335 670
Piroa Road Forest Remnant 1	Q08/071	Q08 345 678
Piroa Farm Pond	Q08/073	Q08 346 686
Upper Ahuroa River Forest Remnants 2	Q08/074	Q08 338 684
Dodd Road Forest Remnants	Q08/075	Q08 329 691
Upper Ahuroa River Forest Remnants 1	Q08/076	Q08 337 696
Kirk Road Forest Remnants	Q08/077	Q08 329 679
Matakohe West Forest Remnants	Q08/080	Q08 146 634
Kowhai Road Kanuka Forest	Q08/082	Q08 120 608
Waihungaru Stream Forest	Q08/083	Q08 123 586
Te Taumataka Creek Forest Remnants	Q08/085	Q08 168 600
Hautakima East Forest	Q08/086	Q08 145 579
Chadwick Road Forest Remnants	Q08/097	Q08 221 528
Matakohe River Bridge Forest Remnants	Q08/101	Q08 184 641
Hartles QEII Covenant and Surrounds	Q08/104	Q08 216 632
East Pahi Forest Remnants	Q08/106	Q08 210 612
Upper Pahi River Scenic Reserve, Rabbit and Goat Islands and Surrounds	Q08/109	Q08 241 638
Mooney Road Forest Remnant	Q08/112	Q08 243 617
Awakino Creek Forest and Wetland	Q08/113	Q08 229 616
Ford Road Forest	Q08/114	Q08 273 609
Te Opi Road Forest Remnants	Q08/118	Q08 236 583
Hook Road Forest Remnants	Q08/123	Q08 227 664
Huarau Airstrip Forest	Q08/125	Q08 281 652
Massey Road Corner Forest	Q08/133	Q08 263 560
Hokorako Creek Forest Remnants	Q08/136	Q08 287 555
Te Kowhai Creek Forest Remnant	Q08/139	Q08 272 553
Ngaupiko Point Forest Remnant	Q08/141	Q08 286 528
Batley Road Coastal Forest Remnants	Q08/142	Q08 302 536
South Hokorako Creek Forest Remnant	Q08/143	Q08 290 544
Bickerstaffe Road Forest 1	Q08/150	Q08 331 611
Bickerstaffe Airstrip Forest	Q08/154	Q08 317 567
Batley Road Riparian Forest Remnants	Q08/155	Q08 306 542
Upper Raepare Creek Forest Remnants	Q08/160	Q08 371 580
Awaroa Creek Coastal Forest Remnants	Q08/162	Q08 350 559
Waiarohia Creek Forest and Wetland	Q08/165	Q08 349 537
Owhei Creek Forest Remnants	Q08/168	Q08 324 522
Griffin Road Forest Remnants	Q08/172	Q08 299 651
Piroa Peak Forest Remnants	Q08/174	Q08 362 681
Titipu Island	Q08/176	Q08 152 523
Pupuia Island	Q08/177	Q08 154 526
Chadwick Road Wetland	Q08/180	Q08 226 532
Beatson Road Forest Remnant	Q08/181	Q08 222 580
Massey Road Point Forest Remnants	Q08/184	Q08 247 567
Tahupo Creek Coastal Forest Remnants	Q08/186	Q08 225 551

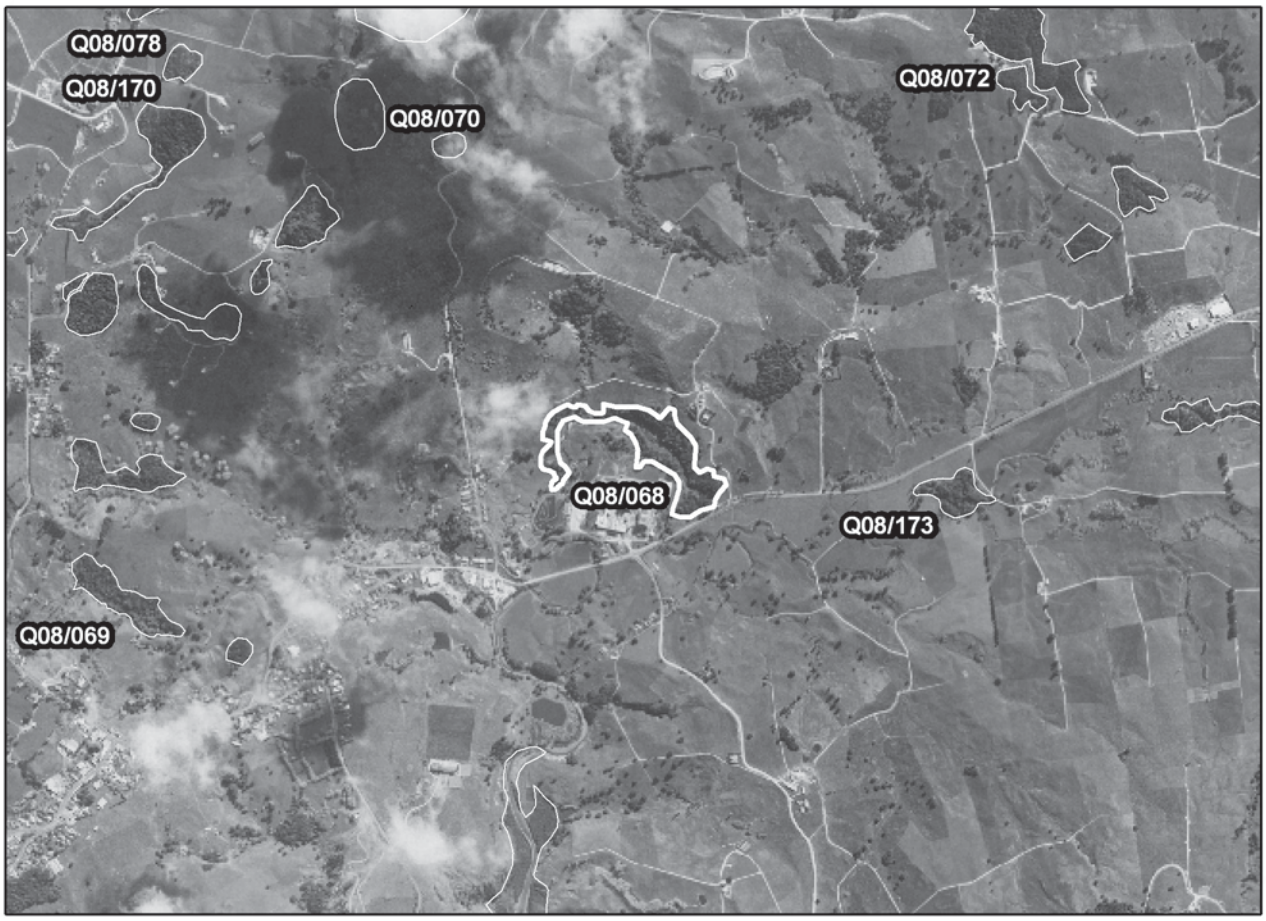
SITE NAME	SURVEY NO.	GRID REF.
MKarakanui Road Forest Remnants	Q08/187	Q08 198 578
Mohinui Forest Remnant 2	Q08/189	Q08 345 510
Otairi Creek Forest and Wetland	Q08/191	Q08 316 511
Kaira Creek Pond 1	Q08/193	Q08 359 528
Tana Road Forest Remnant	Q08/195	Q08 116 635
Kaira Creek Pond 2	Q08/197	Q08 373 559
Maungaturoto Town Forest	Q08/199	Q08 320 649
Marohemo Road Forest Remnants 1	Q08/201	Q08 298 647
Marohemo Road Forest Remnants 2	Q08/202	Q08 302 607
Bickerstaffe Road Forest 3	Q08/203	Q08 309 602
Hillstone Road Forest Remnants 1	Q08/204	Q08 302 596
Upper Whakapirau Creek	Q08/205	Q08 310 589
Marohemo Road Forest Remnant 3	Q08/206	Q08 286 609
Hillstone Road Forest Remnant 2	Q08/207	Q08 303 583
Oruawharo Road Wetland	Q08/210	Q08 401 511
Mud Alley Road Wetland	Q08/213	Q08 212 504
Paparoa Creek Marginal Strip No. 1 and surrounds	Q08/217	Q08 192 623
Upper Kaitara Creek Pond	Q08/219	Q08 386 548
Puketotara Forest Remnant 1	Q09/002	Q09 283 484
Stony Creek Forest Remnants	Q09/003	Q09 294 472
Stony Creek Headland	Q09/004	Q09 301 478
Motukumara Point Forest Remnants	Q09/007	Q09 253 457
Puketotara Forest Remnant 5	Q09/009	Q09 250 478
Puketotara Forest Remnant 6	Q09/010	Q09 254 484
Puketotara Forest Remnants 7	Q09/011	Q09 279 468
Puketotara Forest Remnants 8	Q09/012	Q09 260 461
Frenchman's Bay Forest and Wetland	Q09/015	Q09 264 453
Puketotara Forest Remnant 11	Q09/018	Q09 285 473
Tinopai Coastal Margin	Q09/019	Q09 229 487
Puketotara Forest Remnant 12	Q09/023	Q09 283 448
Puketotara Forest Remnant 14	Q09/025	Q09 291 432
Ngamotu Farm Pond	Q09/031	Q09 287 484
Wiki Brown Road Forest Remnants	Q09/034	Q09 384 478
Un-named Island in Oruawharo River	Q09/035	Q09 391 476
Oneriri Road Forest Remnant 1	Q09/040	Q09 329 495
Topuni River Forest Remnant 2	Q09/041	Q09 422 489
Oruawharo River Forest Remnant 1	Q09/042	Q09 381 468
Komiti Bay Forest Remnant	Q09/048	Q09 238 500

MAUNGATUROTO MARGINAL STRIP AND SURROUNDS

Survey no.	Q08/068
Survey date	14 November 2005
Grid reference	Q08 343 658
Area	7.5 ha
Altitude	20–36 m asl

Ecological unit

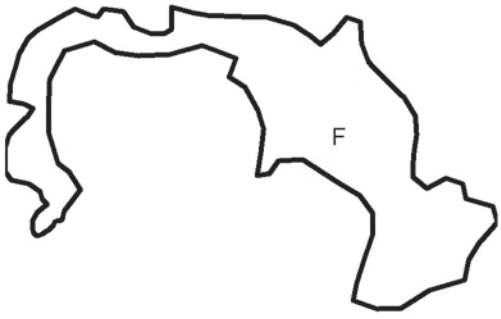
(a) Kahikatea–totara–titoki–crack willow treeland on alluvium (100%)



Q08/068 Maungaturoto Marginal Strip and Surrounds

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Hillside of Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex), and river flats on Holocene alluvium.

Vegetation

This site comprises riparian treeland on a horse-shoe bend of the lower Wairau River, near the town of Maungaturoto. The treeland curves around the back of a large dairy factory, varying in width from 5–100 m. Four main tree species are equally abundant in the canopy: kahikatea, totara, titoki and crack willow. Tawa is frequent, with ti kouka, pukatea, karaka, houhere and rewarewa occasional components of the canopy. Bush lawyer is very common in the understorey with *Coprosma areolata*, *C. rhamnoides*, *C. propinqua* × *C. robusta*, *Haloragis erecta* and pigeonwood also recorded. Karo has been planted on one edge. Many environmental weeds carpet the ground including periwinkle, tradescantia, three-cornered garlic, nasturtium, cleavers, montbretia and pink bindweed.

Fauna

Fantail, grey warbler, pukeko.

Significance

The canopy and forest edges are very open. With the added natural disturbance of river flood cycles, this remnant is one of the most highly weed infested in Otamatea ED Northland. Canopy and lower levels of the riparian treeland are severely impaired in their natural character and function by weeds such as crack willow and the many exotic groundcover species. 0.3 ha of the identified natural area is within a Marginal Strip (administered by DOC), and the vegetation in this area is mainly weed-infested river bank with little tree cover.

DOCTOR HILL ROAD FOREST REMNANTS

Survey no.	Q08/070
Survey date	14 November 2005
Grid reference	Q08 335 670 (4 remnants)
Area	23.6 ha (22.9 ha forest, 0.7 ha wetland)
Altitude	40–120 m asl

Ecological units

(a) Taraire–kahikatea forest on moderate hillslope (85%)

(b) Kauri forest on ridge top (10%)

(c) Totara–kahikatea forest on moderate hillslope (3%)

(d) Open water (constructed freshwater farm pond) (1%)

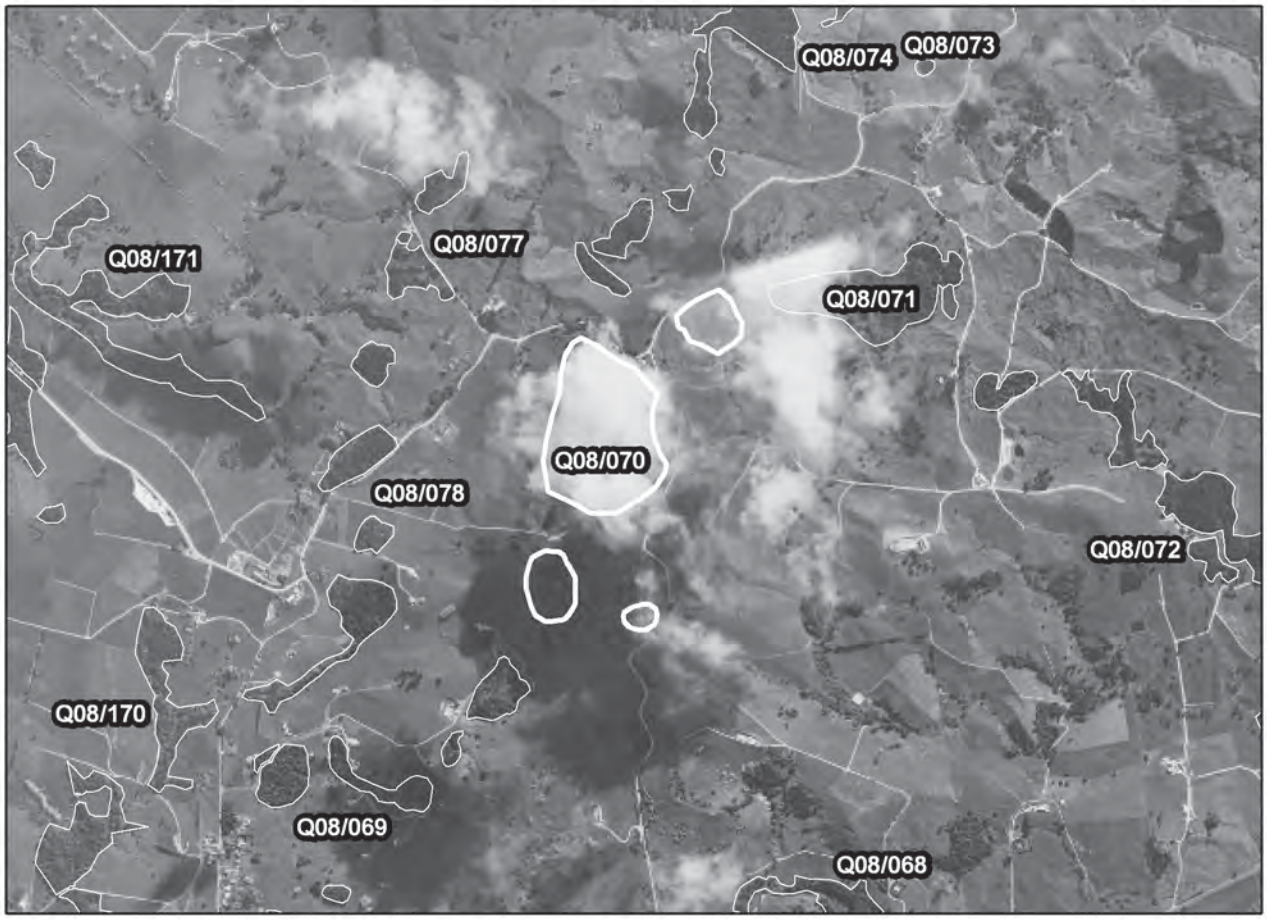
(e) *Juncus sarophorus* rushland on constructed pond fringe (1%)

Landform/geology

Hillslopes and gullies underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

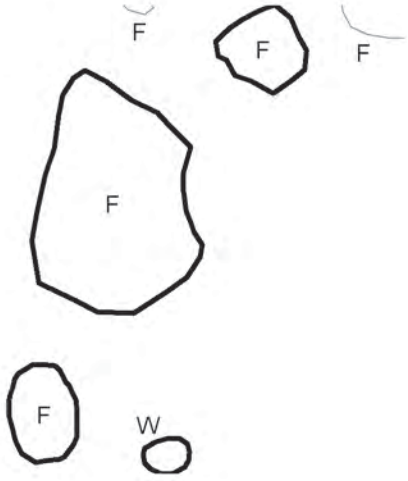
These indigenous forest remnants are clustered around the intersection of Doctor Hill Road with Gorge Road at the top of the Wairau River catchment.



Q08/070 Doctor Hill Road Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(a) The canopy of the largest remnant comprises mainly taraire, though kahikatea is also common. Totara and rimu are frequent, and puriri, nikau, kohekohe, lancewood, mamangi, pukatea and maire[14] are sparse and locally distributed.

[14] This species is most likely white maire (*Nestegis lanceolata*), but this was not able to be confirmed. It could possibly be black maire (*Nestegis cunninghamii*), which is regionally significant. Black maire has not been recorded in Otamatea ED Northland.

(b) A magnificent but small stand of dense, tall kauri rickers occurs east of Doctor Hill Road and just south of Gorge Road. The stand is slightly buffered around its edges by equal amounts of totara and kanuka.

(c) A small remnant of totara–kahikatea forest is separated from type (a) taraire–kahikatea forest by a farm track and approximately 200 m of pasture. Kanuka is frequent here and kohekohe is occasional.

(d) Two farm ponds are associated with this natural area, one nestled into the top of type (a) and one not connected directly to forest remnants.

(e) The main rush species around the ponds is *Juncus sarophorus*, while *Azolla pinnata* and willow weed are common on the water's edge.

Fauna

Paradise shelduck, pukeko, welcome swallow.

Significance

None of the ecological units present are representative of their types, because the remnants are small, and often grazed. However, this site does provide habitat for indigenous waterbirds (e.g. paradise shelduck, pukeko). It also provides a catchment protection function, in a landscape where very little riparian vegetation remains.

PIROA ROAD FOREST REMNANTS 1

Survey no.	Q08/071
Survey date	14 November 2005
Grid reference	Q08 345 678
Area	11.0 ha (10.6 ha forest, 0.4 ha wetland)
Altitude	80–120 m asl

Ecological units

(a) Taraire forest on moderate hillslope (70%)

(b) Kahikatea–totara forest on moderate hillslope (25%)

(c) Open water (constructed freshwater farm pond) (4%)

(d) *Juncus sarophorus* rushland on constructed pond fringe (1%)

Landform/geology

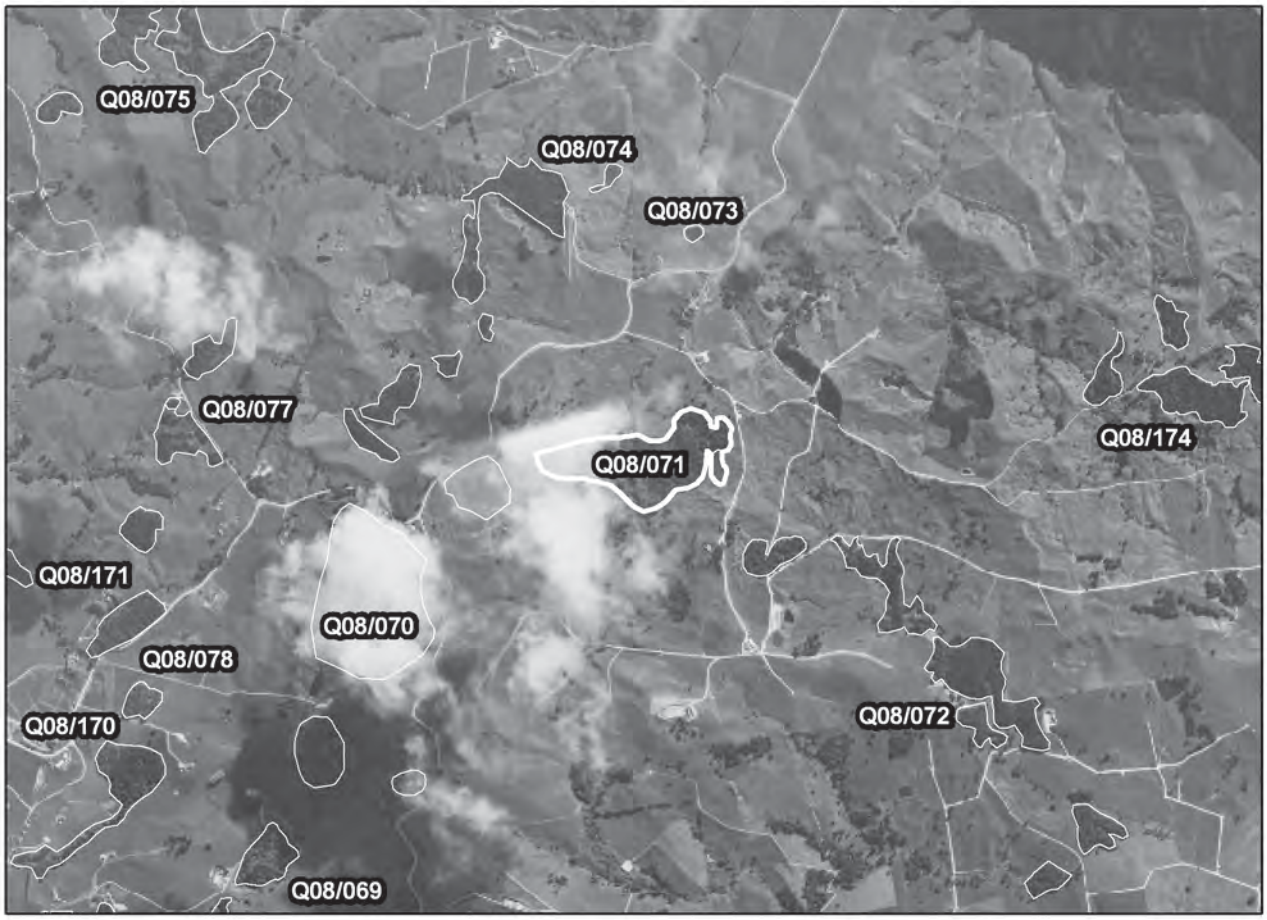
Hillslopes and gullies underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site comprises an indigenous forest remnant next to a constructed farm pond in the upper catchment of the Wairau River. The surrounding landscape is farmed, and the forest remnant appears to be at least partially fenced to exclude livestock.

(a) The main forest type is distinctive for the abundance of taraire trees in the canopy, and in particular for their large size and maturity. Frequent associates are puriri and nikau, while scattered individuals of pukatea, tarata, rewarewa and rimu also occur.

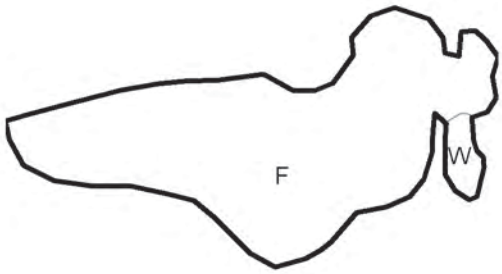
(b) Abundant kahikatea with common occurrence of totara in the canopy is present in distinct areas within type (a) taraire forest. Puriri is frequent here also.



Q08/071 Piroa Road Forest Remnant 1

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(c) A large farm pond is present on the eastern side of the forest.

(d) The only marginal indigenous vegetation on the pond is scattered *Juncus sarophorus.*

Fauna

Not surveyed.

Significance

This site does not contain representative examples of any of its ecological units, but provides habitat for forest and waterbirds, and fulfils a catchment protection function.

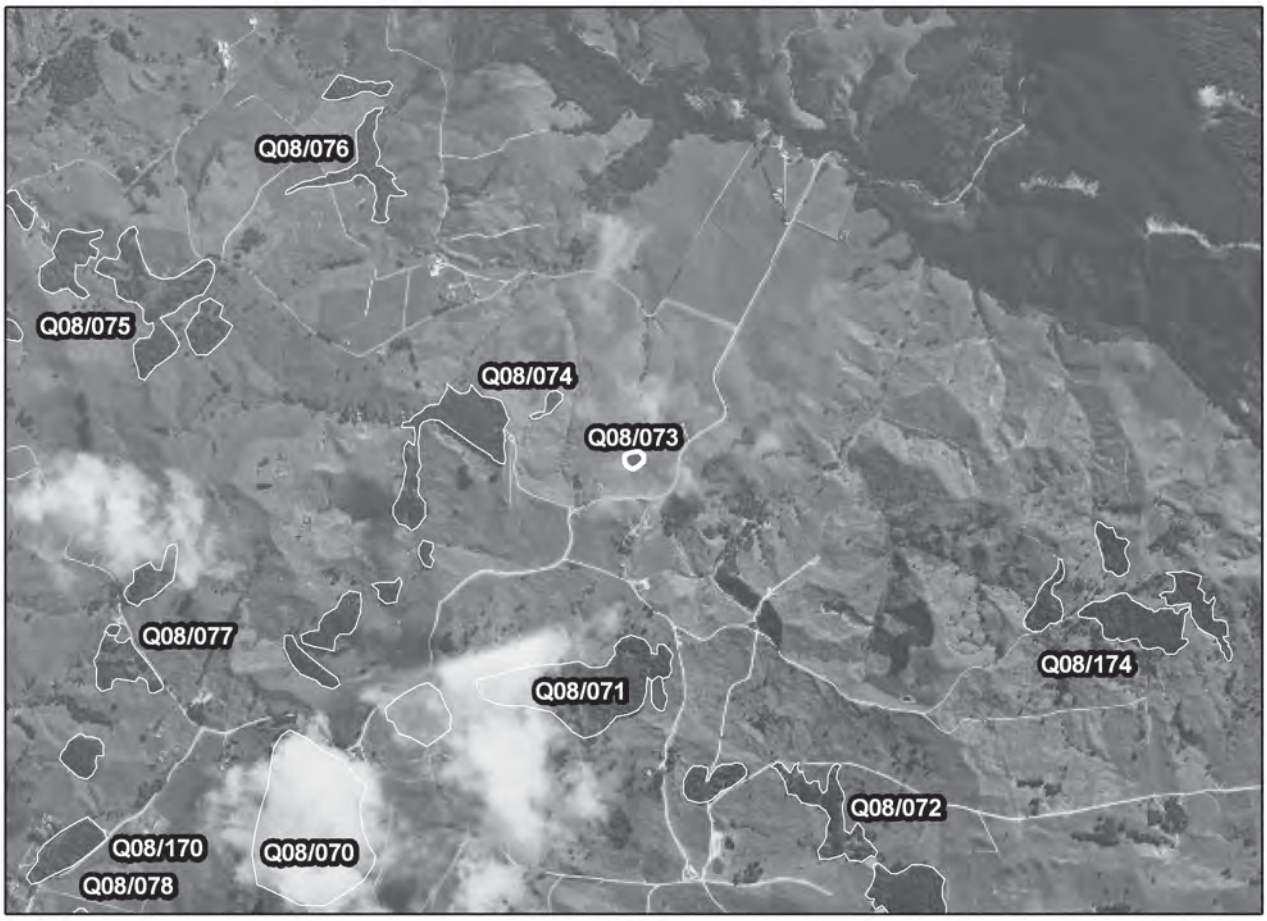
PIROA FARM POND

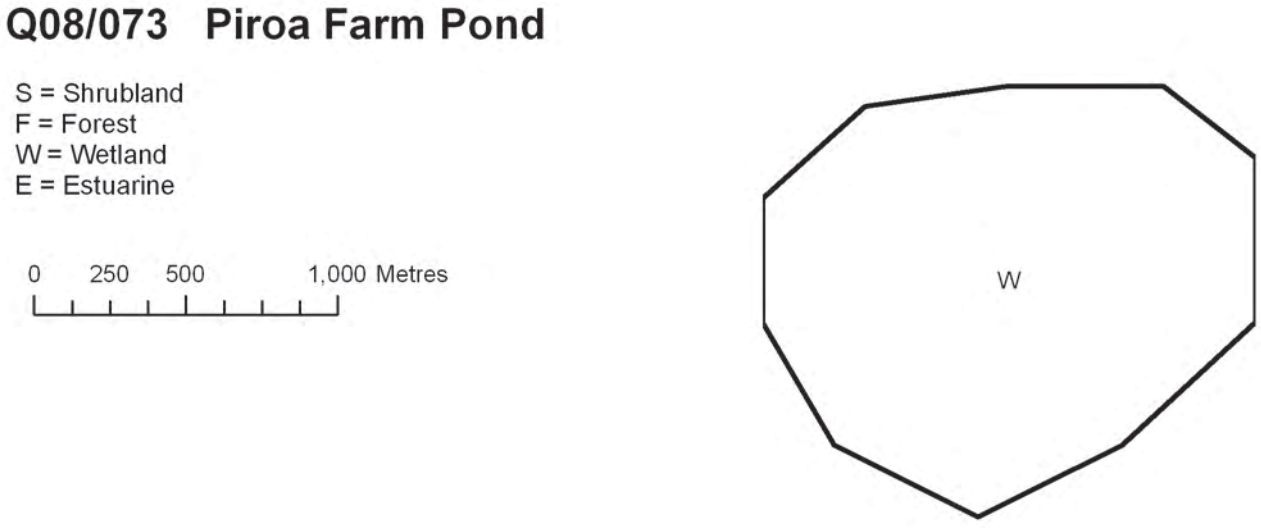
Survey no.	Q08/073
Survey date	14 November 2005
Grid reference	Q08 346 686
Area	0.3 ha
Altitude	135 m asl

Ecological units

(a) Open water (constructed freshwater farm pond) (95%)

(b) Raupo reedland on constructed pond fringe (5%)





Landform/geology
Man-made pond/lake.

Vegetation
A small area of raupo fringes a constructed farm pond in an upper catchment area within 1 km of the nearest indigenous forested areas (i.e. Q08/071 Piroa Road Forest Remnant 1 and Q08/074 Upper Ahuroa River Forest Remnants 2).

Fauna
Pukeko.

Significance
Though small, this site was identified as a natural area due to the presence of wetland habitat suitable for indigenous waterbird species (i.e. raupo). These habitats are extremely reduced in Otamatea ED Northland and are now mainly represented by constructed lakes and ponds.

UPPER AHUROA RIVER FOREST REMNANTS 2

Survey no.	Q08/074
Survey date	14 November 2005
Grid reference	Q08 338 684 (6 remnants)
Area	10.1 ha
Altitude	100–160 m asl

Ecological units
(a) Totara–kanuka forest on moderate to steep hillslope (70%)

(b) Kauri forest on ridge top and moderate hillslope (30%)

Landform/geology
Hillslopes and gullies underlain by Cretaceous sandstone and mudstone (E59 Mangakahia Complex).

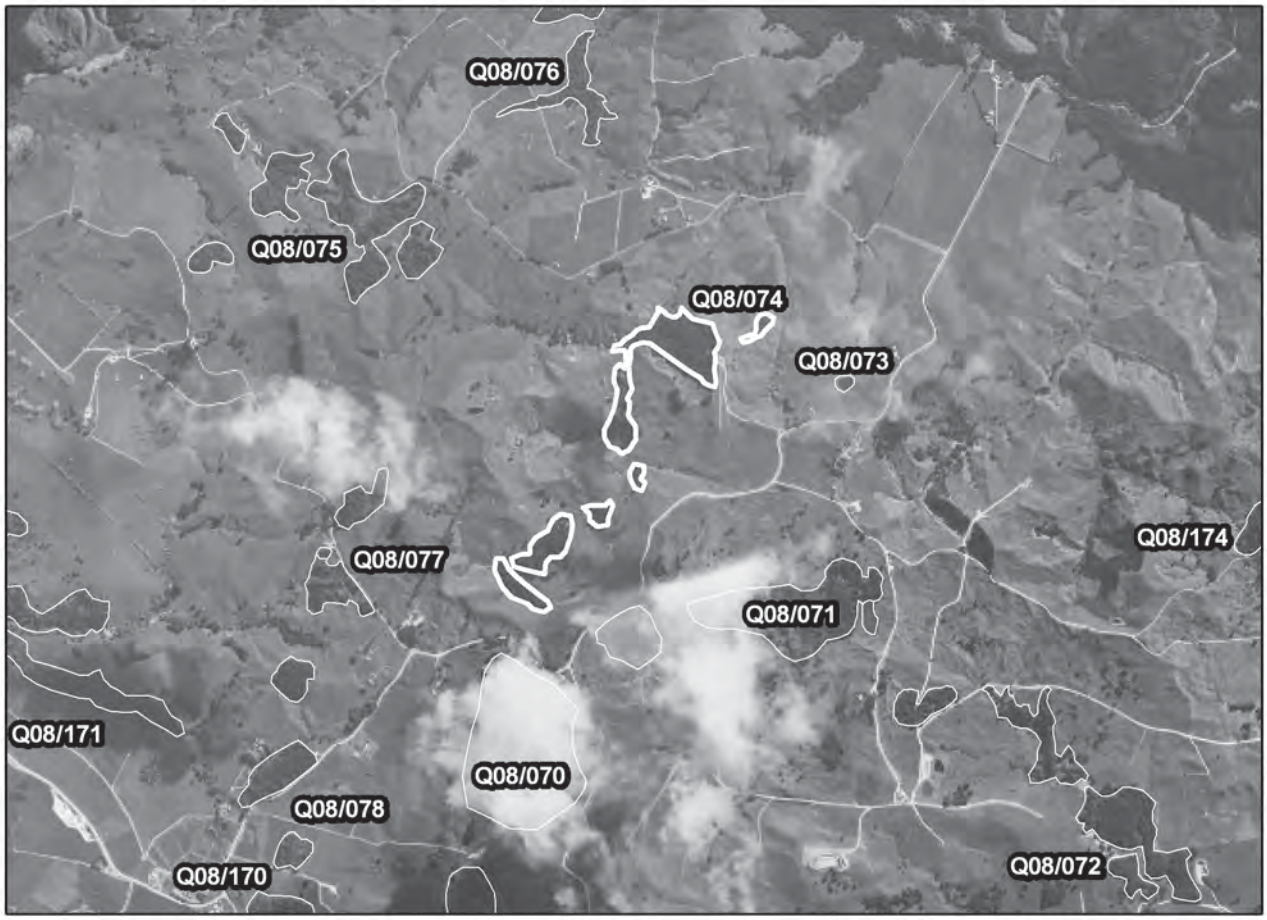
Vegetation
This site encompasses scattered forest remnants on the steeper parts of the upper Ahuroa River catchment comprising two main vegetation types:

(a) Forest with abundant totara and subdominant kanuka, and frequent occurrence of rimu, kauri and taraire. Local tanekaha also occur.

(b) Dense stands of kauri rickers on the highest points. Rimu of a similar age and growth form also occur frequently amongst the kauri.

Fauna
Not surveyed.

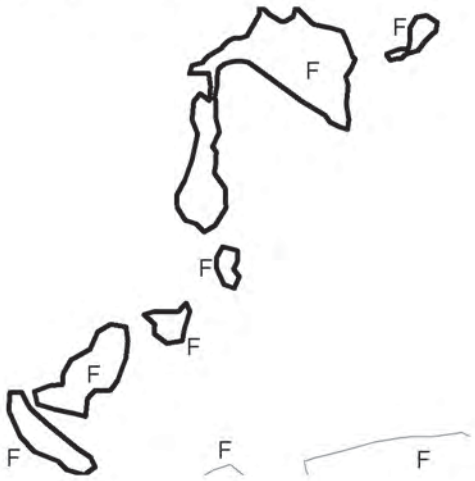
Significance
Neither of these ecological units is the best representative example of its type. The level of clearance and grazing disturbance limits this site's significance.



Q08/074 Upper Ahuroa River Forest Remnants 2

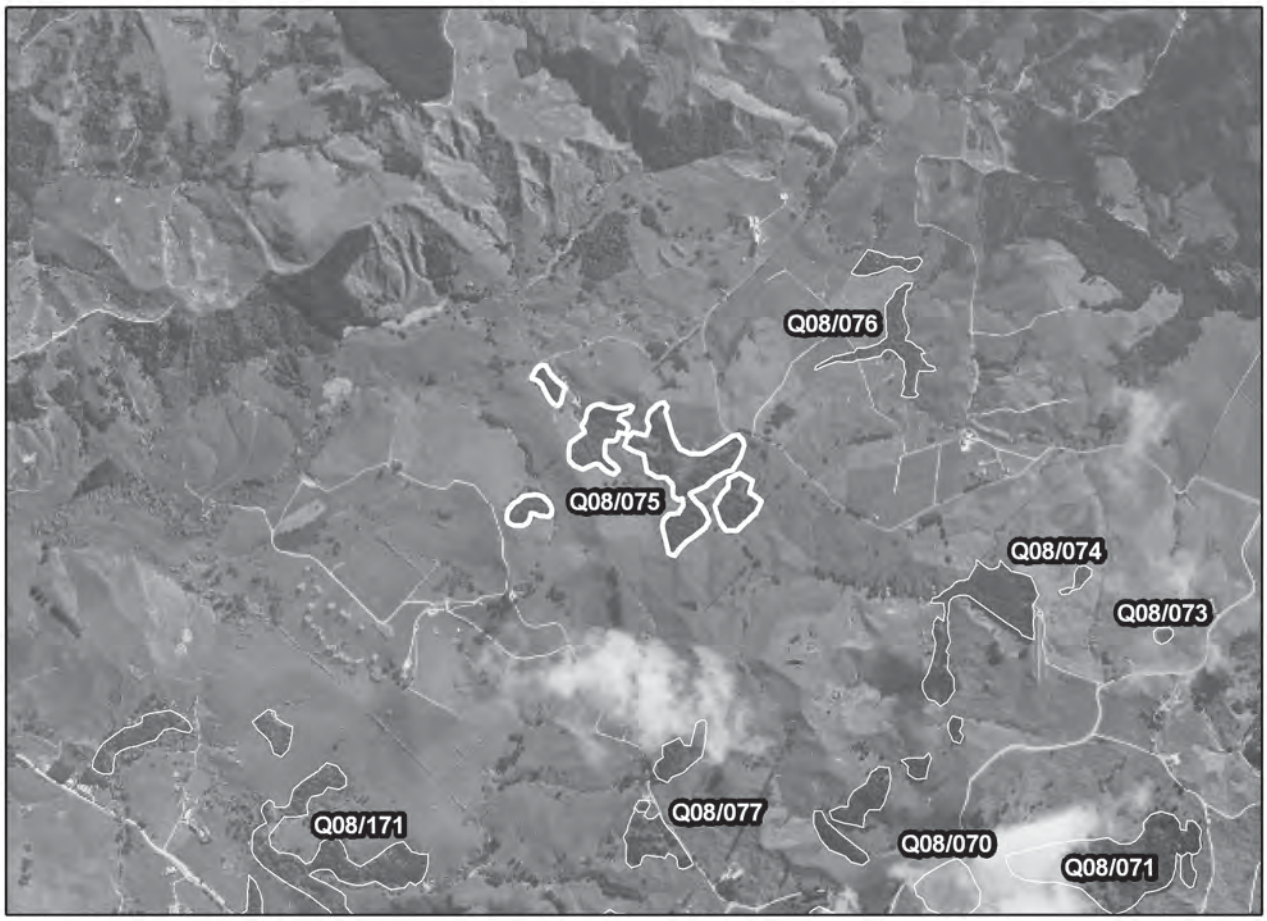
S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



DODD ROAD FOREST REMNANTS

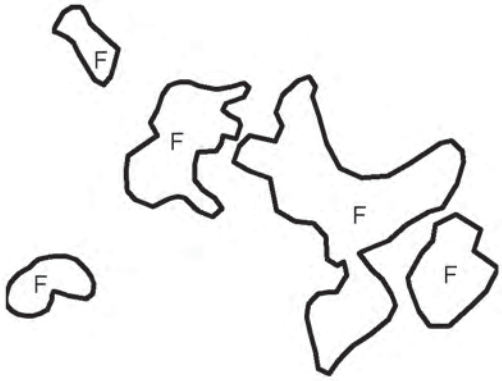
Survey no.	Q08/075
Survey date	14 November 2005
Grid reference	Q08 329 691 (5 remnants)
Area	12.8 ha
Altitude	80–140 m asl



Q08/075 Dodd Road Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Kahikatea–totara forest on gentle hillslope (50%)

(b) Totara treeland on gentle hillslope (50%)

Landform/geology

Hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex), and Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex).

Vegetation

This site is at the very northern end of the ED and is near areas of indigenous forest in Waipu ED. It encompasses scattered indigenous forest remnants on the

western side of Dodd Road, in the upper catchment of the Ahuroa River. Many of these were not clearly visible from the road, hence their composition has been interpreted using recent aerial photography (flown in 2002).

(a) Half of the remnants appear to have a continuous canopy of totara and kahikatea with occasional kauri and ti kouka.

(b) The other half of the site appears to comprise patchily distributed totara treeland.

Fauna

Not surveyed.

Significance

Both ecological units appear to contain common species and are not representative examples of their types. The site is heavily grazed and reduced to small remnants, which limits its significance. This site does, however, provide some riparian protection for the upper Ahuroa River.

UPPER AHUROA RIVER FOREST REMANTS 1

Survey no.	Q08/076
Survey date	14 November 2005
Grid reference	Q08 337 696 (2 remnants)
Area	4.2 ha
Altitude	120–134 m asl

Ecological unit

(a) Kanuka–kahikatea forest in gully (100%)

Landform/geology

Hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

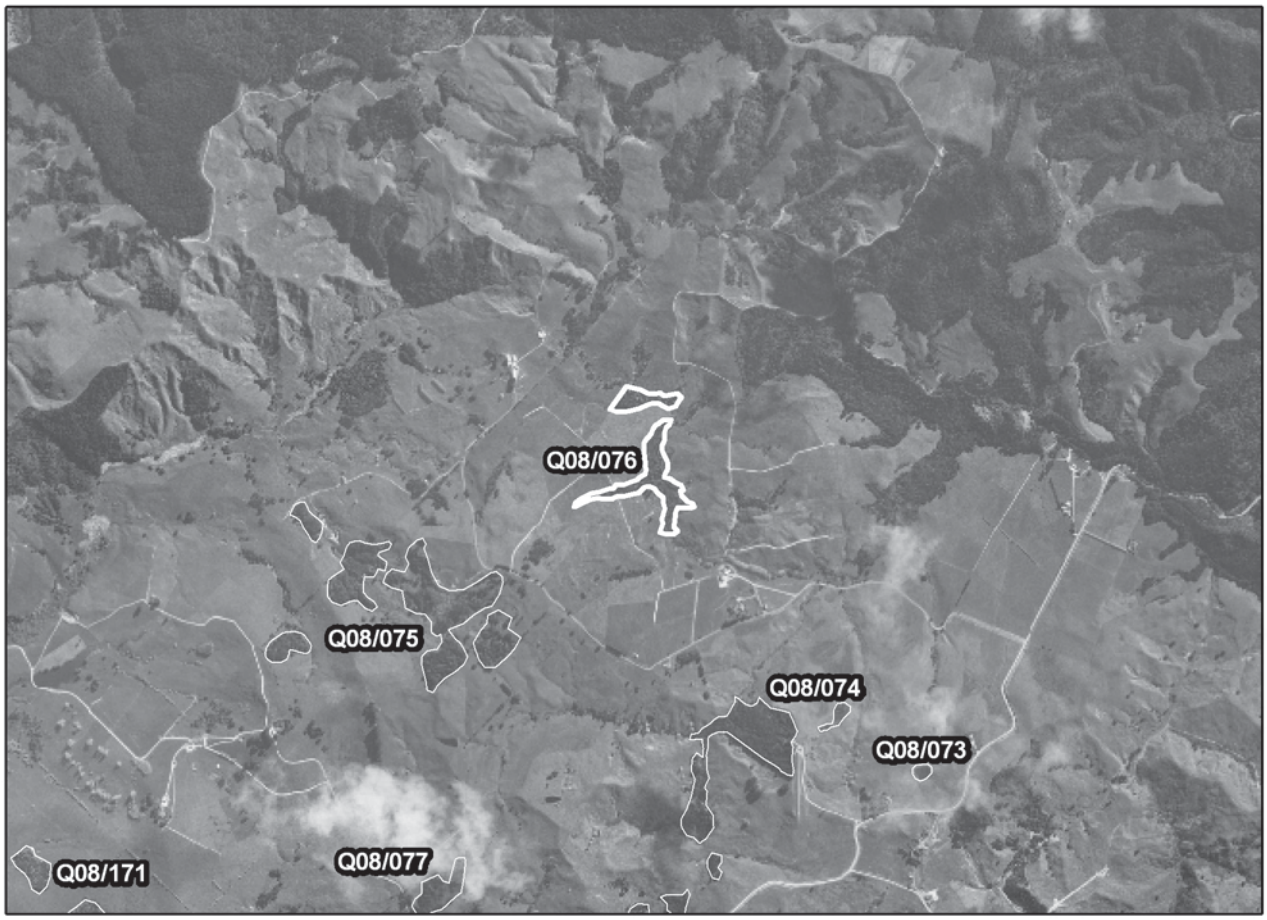
This site encompasses two small areas of sparse riparian forest on the upper Ahuroa River, set in a landscape of pastoral farming. Kanuka and kahikatea are common in the canopy with frequent kauri, rimu and mamaku and occasional totara. The remnants are not fenced and consequently have grazed understoreys.

Fauna

Not surveyed.

Significance

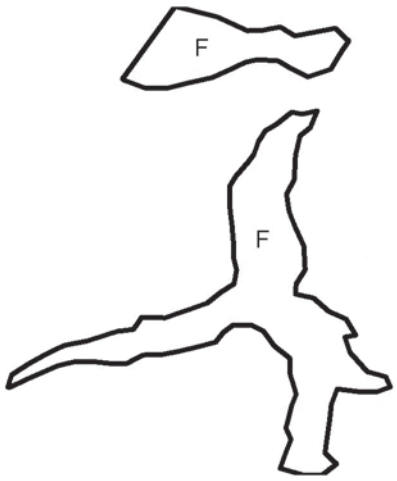
Visibility of this site was limited. There is insufficient current information to classify this remnant above Level 2. A 1977 New Zealand Wildlife Service survey recorded a much greater area of secondary forest here, some of which was contiguous with larger forest areas in Waipu ED (SSBI Q08/H050). The site was assessed as having potential as indigenous frog habitat (Hochstetter's frogs are known to occur in streams in the nearby Brynderwyn Range), however the current extent of forest is obviously much reduced, and any direct links across the ED boundary have since been cleared.



Q08/076 Upper Ahuroa River Forest Remnants 1

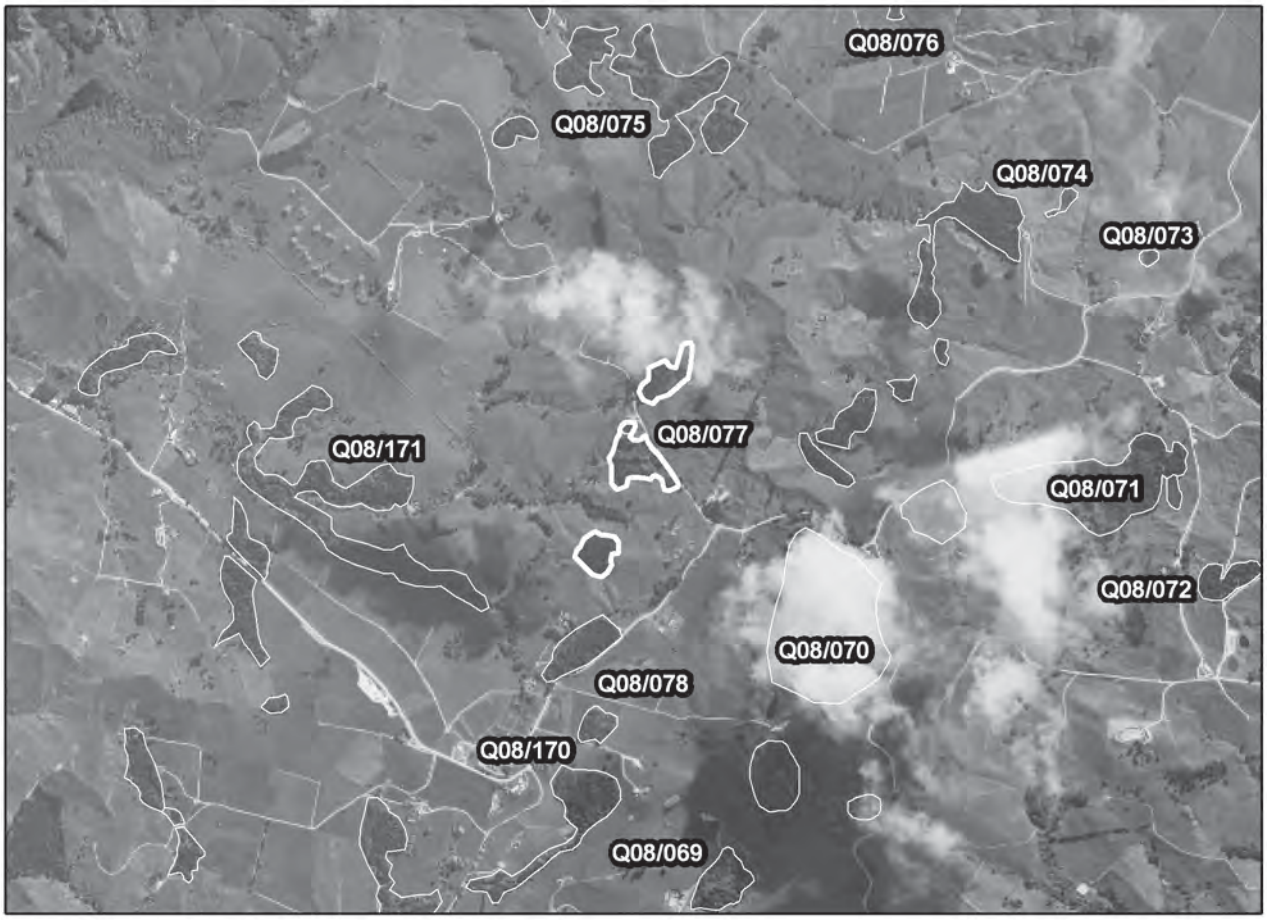
S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



KIRK ROAD FOREST REMNANTS

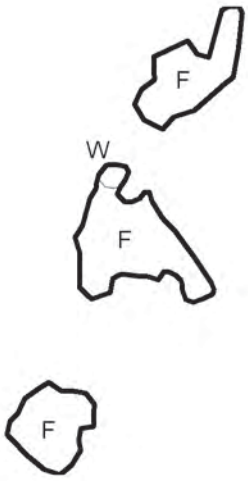
Survey no.	Q08/077
Survey date	14 November 2005
Grid reference	Q08 329 679
Area	5.7 ha (2.5 ha forest, 3.2 ha wetland)
Altitude	88–147 m asl



Q08/077 Kirk Road Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Taraire–rimu–totara forest on moderate hillslope (50%)

(b) Kanuka–totara treeland on moderate hillslope (45%)

(c) Open water (constructed freshwater farm pond) (4%)

(d) *Juncus sarophorus* rushland on constructed pond edge (1%)

Landform/geology

Hillslopes and gullies underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies), and river flats on Holocene alluvium.

Vegetation

This site encompasses three small indigenous forest remnants and a farm pond in the upper Waipikopiko Stream catchment.

(a) Taraire, rimu and totara share approximately equal proportions of the canopy, while kahikatea and kanuka are slightly less common, and there are occasional rewarewa, tanekaha and totara.

(b) Kanuka–totara treeland adjoins a small constructed freshwater farm pond (c), which has been created by damming a rivulet in the upper catchment of the Waipikopiko Stream.

(d) *Juncus sarophorus* is scattered around the edges of the pond.

Fauna

Paradise shelduck.

Significance

This site contains no representative ecological units, mainly due to its fragmented nature and small size. Despite this, it provides habitat for waterbirds and contains some healthy indigenous trees. Grazing is limiting regeneration.

MATAKOHE WEST FOREST REMNANTS

Survey no.	Q08/080
Survey date	15 November 2005
Grid reference	Q08 148 634 (4 remnants)
Area	18.2 ha
Altitude	38–80 m asl

Ecological unit

(a) Totara–kanuka–kahikatea forest in gully and on gentle hillslope (100%)

Landform/geology

Valley flats on Pleistocene alluvium.

Vegetation

There are scattered remnants of totara–kanuka forest with kahikatea common in the canopy. distributed along 2 km of the upper reaches of an un-named tributary to the Arapaoa River (Q08/084). Kauri or puriri are locally frequent, while occasional ti kouka, mapou, radiata pine and macrocarpa are scattered throughout. Some sections of the stream bank have been planted in willow (these areas have been excluded from the site).

Fauna

Not surveyed.

Significance

The uppermost remnant in the catchment appears to be adequately fenced in order to exclude stock, though regeneration is not evident. Much of the rest of the forest is verging on becoming treeland due to prolonged stock damage. Despite this, the vegetation serves a riparian protection function to the un-named tributary of the Arapaoa River.



Q08/080 Matakohe West Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres

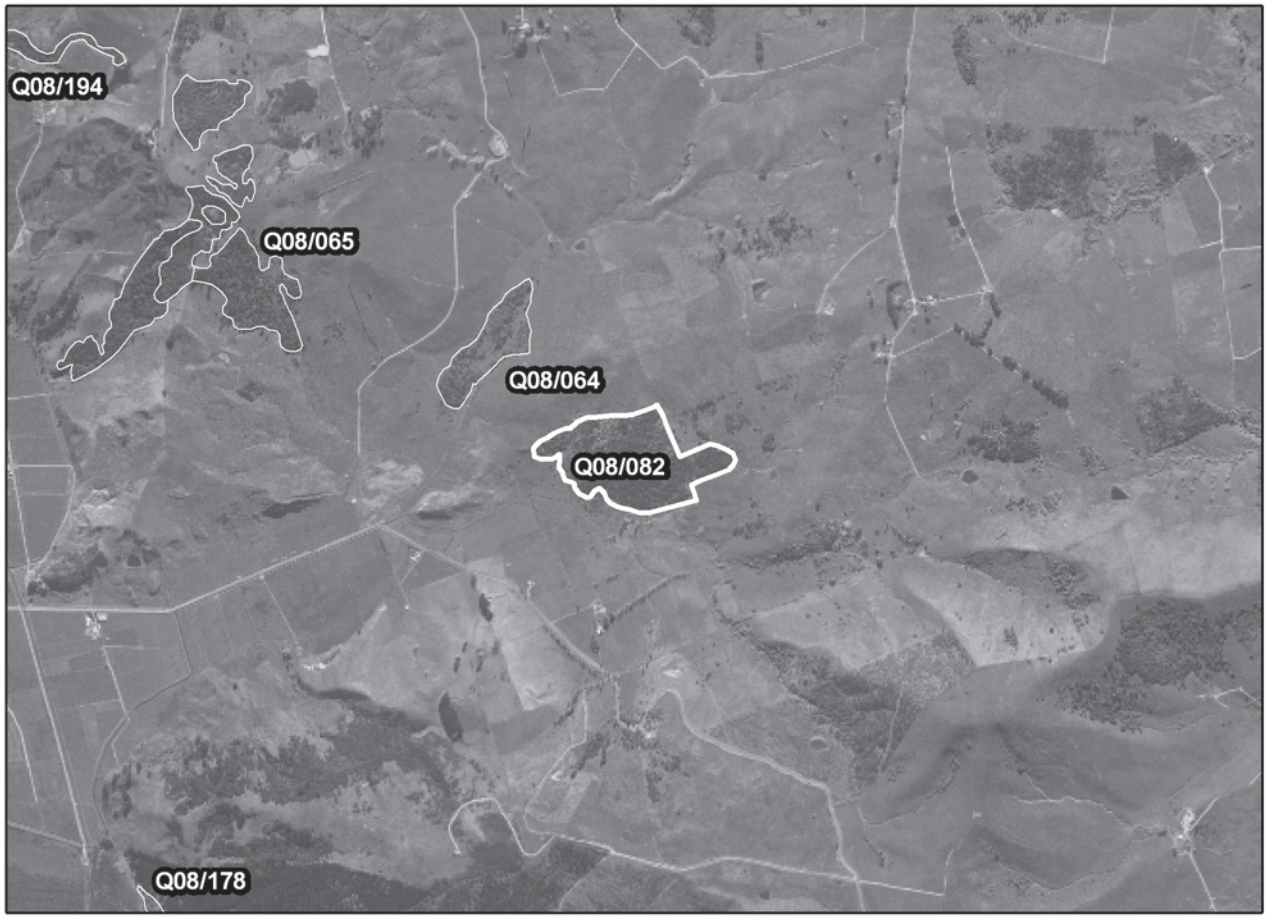


KOWHAI ROAD KANUKA FOREST

Survey no.	Q08 082
Survey date	15 November 2005
Grid reference	Q08 120 608
Area	13.2 ha
Altitude	20–52 m asl

Ecological unit

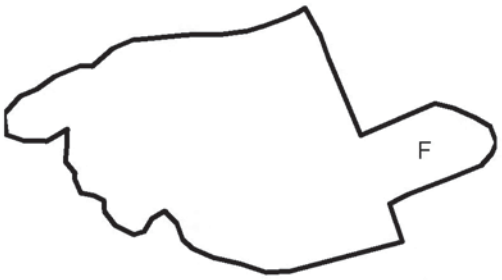
(a) Kanuka forest on moderate hillslope (100%)



Q08/082 Kowhai Road Kanuka Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Hillslope underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex) and melange (undifferentiated Mangakahia & Motatau Complexes).

Vegetation

This is a sparse kanuka forest remnant which appears to be at an earlier stage of regeneration than surrounding kanuka forest remnants. It may have resulted from a period of reduced grazing 60–80 years ago, as the kanuka are middle-aged, forming an even canopy, with frequent young kahikatea just becoming

emergent. A cluster of emergent maritime pine occurs in the centre of the remnant. Totara is frequent in the canopy, and there are occasional kowhai and ti kouka. A small fringe of manuka occurs on the western side. There is little undergrowth, other than exotic pasture grasses.

Fauna

Not surveyed.

Significance

The site appears to be heavily grazed, and is not a representative example of its type.

WAIHUNGARU STREAM FOREST

Survey no.	Q08/083
Survey date	15 November 2005
Grid reference	Q08 123 586
Area	16.2 ha
Altitude	6–80 m asl

Ecological units

(a) Kanuka–kowhai forest on moderate hillslope (70%)

(b) Kahikatea–kowhai forest in gully (25%)

(c) Kahikatea–kowhai forest on moderate hillslope (5%)

Landform/geology

Hillslope and gullies underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex).

Vegetation

This site encompasses forest in the lower Waihungaru Stream gully, which opens outs onto the western Hukatere peninsula coast.

(a) Most of the forest canopy comprises a mixture of abundant kanuka with common occurrence of kowhai. Ti kouka is frequent throughout and puriri is occasional.

(b) The deep parts of the gully support kahikatea–kowhai forest, in which karaka and puriri also occur frequently.

(c) In the upper catchment there is a small area of dense kahikatea forest with kowhai common,and kanuka and puriri frequent in the canopy. Ti kouka, pukatea and totara occur occasionally.

Fauna

Not surveyed.

Significance

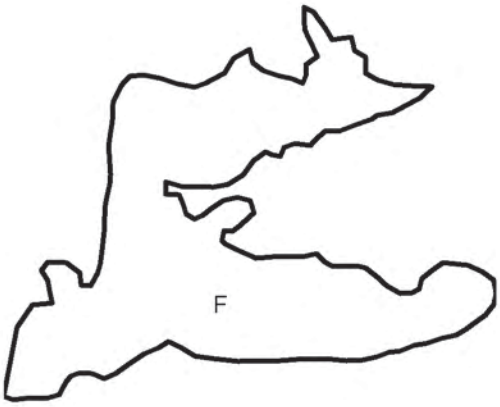
None of the ecological units present are representative examples of their type. The site is apparently unfenced, and shows evidence of grazing. Better quality examples of forest are present in valleys further south (e.g. Waitieke Creek Forest (Q08/092) and Te Kiakia Bay Forest Remnants (Q08/093)). The forest provides an important buffer to the small tributary to the Kaipara Harbour.



Q08/083 Waihungaru Stream Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres

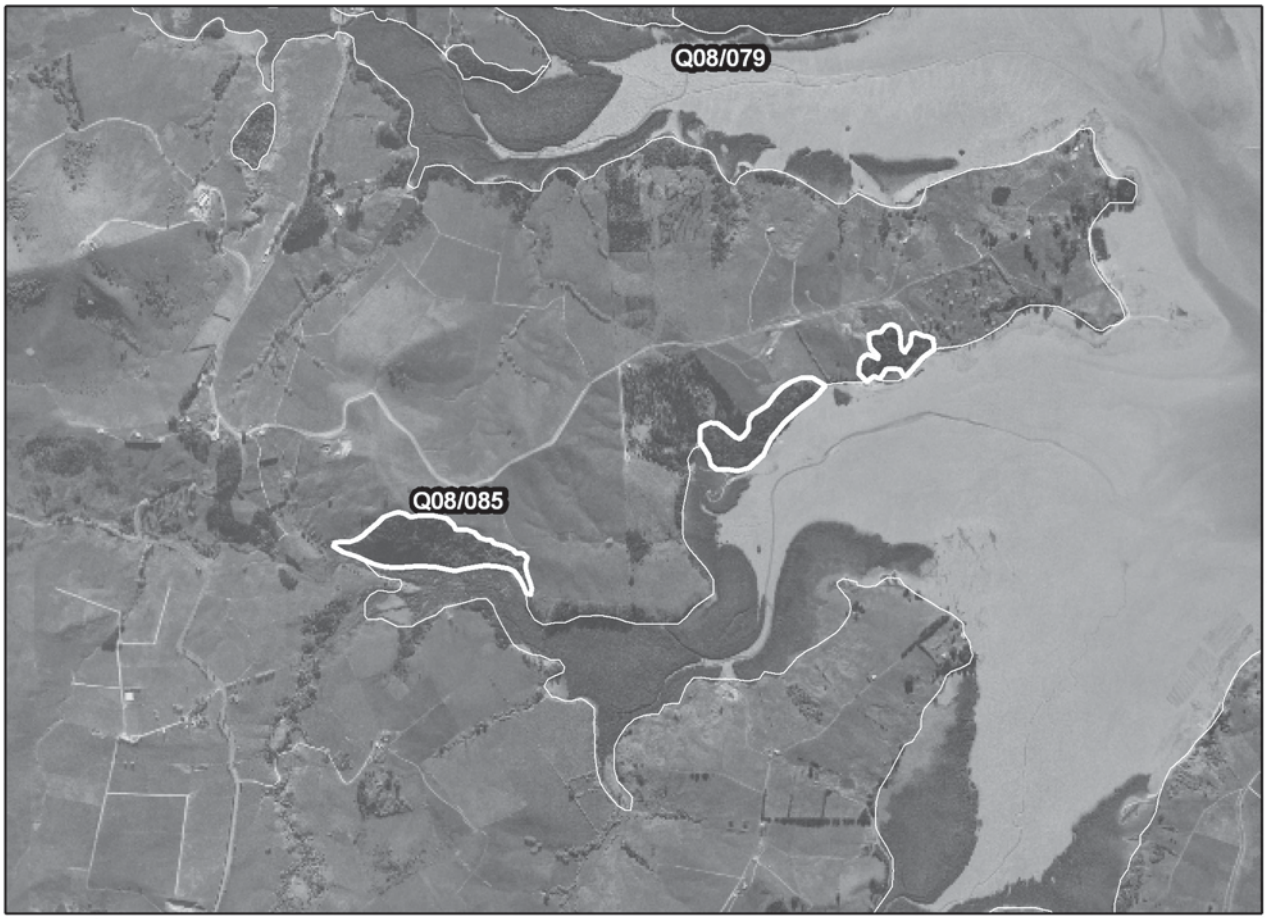


TE TAUMATAKA CREEK FOREST REMNANTS

Survey no.	Q08/085
Survey date	16 November 2005
Grid reference	Q08 168 600 (3 remnants)
Area	14.8 ha
Altitude	0–100 m asl

Ecological unit

(a) Totara–kowhai–puriri forest on gentle coastal margin (100%)



Q08/085 Te Taumataka Creek Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Steep coastal hillside underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex)

Vegetation

The site comprises three forest remnants spread along the south-facing, sheltered coastline of a tidal inlet named Te Taumataka Creek, which is part of the Arapaoa River (Q08/084). The westernmost remnant is adjacent to mangrove shrubland, while the two eastern remnants are adjacent to mudflats. The forest canopy is composed of a mixture of totara, kowhai and puriri, the

former slightly more common than the latter two. Karaka is frequent in the canopy, as is hawthorn, which impinges on the natural character of the site, both on pasture edges and on the coastal fringe. Species occasionally present include ti kouka, nikau, kohekohe, *Coprosma macrocarpa* and matai.

Fauna

Not surveyed.

Significance

None of the remnants are fenced and appear to be suffering from the pressure of stock grazing. Hawthorn is a big weed problem in the local area. However, these remnants do provide protection to the banks of the Arapaoa River.

HAUTAKIMA EAST FOREST

Survey no.	Q08/086
Survey date	16 November 2005
Grid reference	Q08 145 579
Area	24.4 ha (23.6 ha forest, 0.8 ha shrubland)
Altitude	49–160 m asl

Ecological units

(a) Kanuka forest on moderate to steep hillslope (97%)

(b) Kanuka–manuka shrubland on moderate to steep hillslope (3%)

Landform/geology

Hillslopes and gullies underlain by Miocene volcaniclastic gravelly sandstone (Waitakere Group).

Vegetation

This site comprises a relatively large unfenced remnant of indigenous forest and shrubland to the west of Tinopai Road, on the eastern slopes of the peak known as Hautakima.

(a) The majority of the site is covered in an even-canopied forest of mature kanuka, with frequent even-aged emergent kahikatea poles. Mamangi is also frequent, and there are occasional rewarewa, puriri, ti kouka, mamaku, karaka, kohekohe and kauri. Radiata pine is emergent above the kanuka canopy on some margins, though most of the large pines in the area are excluded from the site.

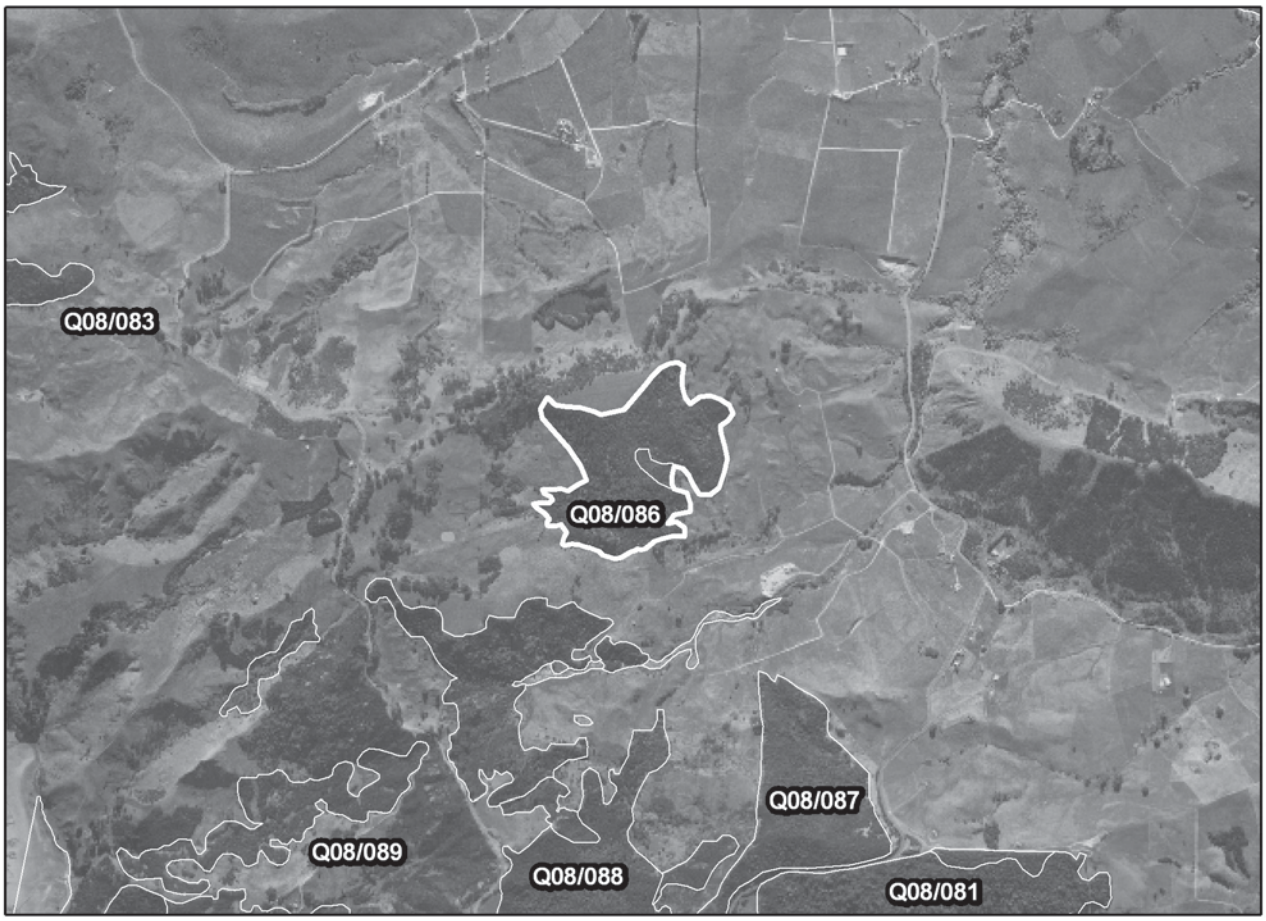
(b) A small area of kanuka–manuka shrubland occurs on a central ridge that may have been retired from grazing recently.

Fauna

Not surveyed.

Significance

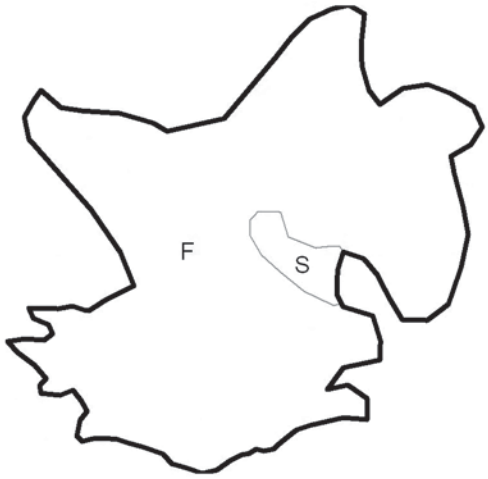
A lot of the forest, particularly on the margins, is rather battered and sparse, most likely due to the effects of cattle grazing as well as general edge effects. Neither of the ecological units is a good representative example of is type. However, the site is quite near to a Level 1 site, Hautakima South Forest (Q08/088), which is connected to other large forested areas further south, hence it serves a function as a habitat linkage/corridor.



Q08/086 Hautakima East Forest

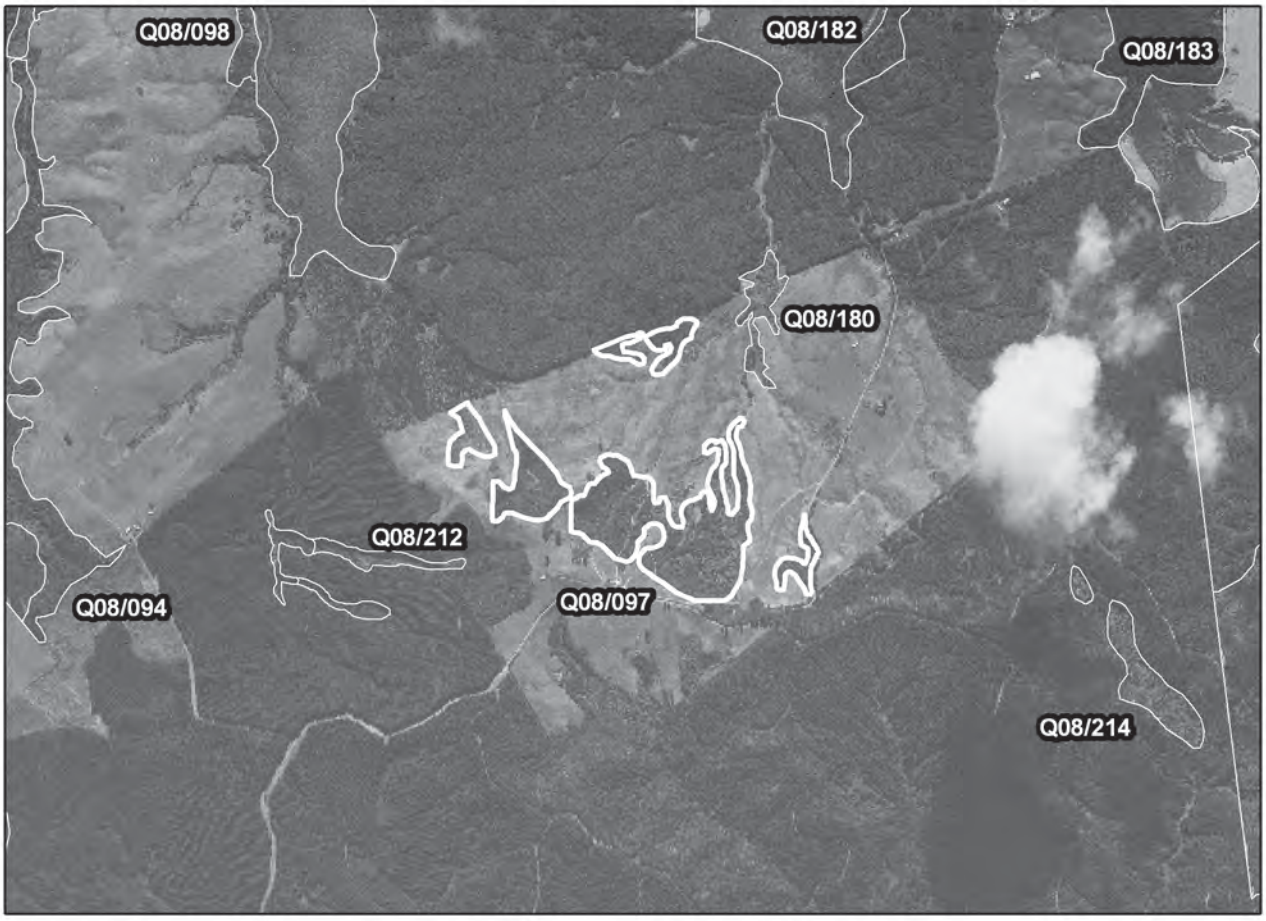
S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



CHADWICK ROAD FOREST REMNANTS

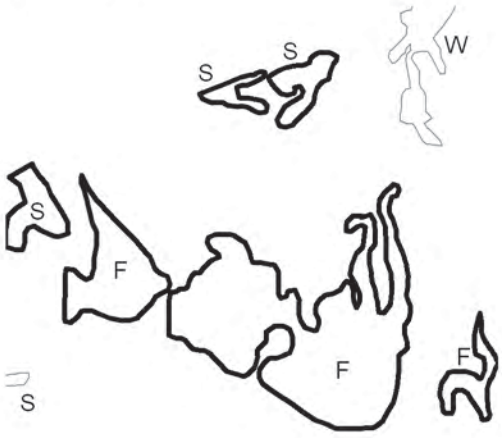
Survey no.	Q08/097
Survey date	16 November 2005
Grid reference	Q08 221 528 (6 remnants)
Area	26.5 ha (22.6 ha forest, 3.9 ha shrubland)
Altitude	31–115 m asl



Q08/097 Chadwick Road Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Kanuka forest on moderate to steep hillslope (85%)

(b) Manuka shrubland on moderate hillslope (15%)

Landform/geology

Hillslopes and gullies underlain by Miocene volcaniclastic gravelly sandstone (Waitakere Group).

Vegetation

This site comprises six remnants of indigenous forest and shrubland on a predominantly northeast-facing slope. The immediate surrounding land is

pasture, but it is set within a landscape of exotic plantation forest (radiata pine and Tasmanian blackwood), with a coastal inlet (Tahupo Creek) nearby. Several farm tracks and patches of rough pasture and exotic scrub are interspersed between the remnants. Tasmanian blackwood, planted extensively on the northern and eastern sides of the remnants, was observed regenerating on open ground at the edges of the site, as was radiata pine.

(a) The predominant ecological unit is kanuka forest with frequent associates of kahikatea, ti kouka, emergent radiata pine and occasional mamangi, kauri, mapou, totara, *Coprosma macrocarpa*, mamaku, mahoe and akepiro.

(b) There are scattered remnants of manuka shrubland with frequent associates of ti kouka and young kanuka.

Fauna

Not surveyed.

Significance

The site is compromised by grazing and stock trampling, but this is not uniform throughout, as indicated by the uneven regeneration, first as manuka shrubland and later as kanuka forest. Because of the disturbed nature of the vegetation, neither of these ecological units are representative examples of their type in the Northland Conservancy part of the ED. Invasion of the natural communities by wilding plantation species (Tasmanian blackwood and radiata pine) is a problem.

MATAKOHE RIVER BRIDGE FOREST REMNANTS

Survey no.	Q08/101
Survey date	17 November 2005
Grid reference	Q08 184 641 (2 remnants)
Area	2.4 ha
Altitude	0–20 m asl

Ecological units

(a) Totara–kanuka forest on moderate hillslope (70%)

(b) Puriri–kowhai–karaka forest on moderate to steep hillslope (20%)

(c) Kauri forest on moderate hillslope (10%)

Landform/geology

Coastal flats of Pleistocene alluvium.

Vegetation

This site comprises two tiny remnants of forest next to the bridge over the Matakohe River on State Highway 12.

(a) On the true right bank totara–kanuka forest occurs, with occasional tarata and kowhai.

(b) On the true left bank there is a mixture of abundant puriri with common occurrence of karaka and kowhai. Totara and kanuka are frequent, in the canopy and ti kouka and large emergent radiata pine occur occasionally.

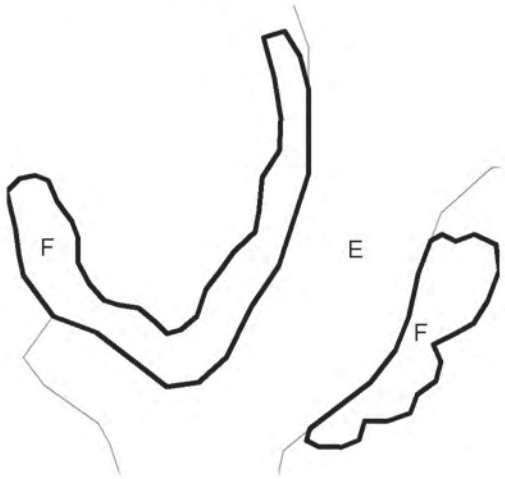
(c) A small, dense stand of kauri rickers occurs on a knoll on the true right bank. Tanekaha and kanuka are also present.



Q08/101 Matakohe River Bridge Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Fauna

Australasian harrier.

Significance

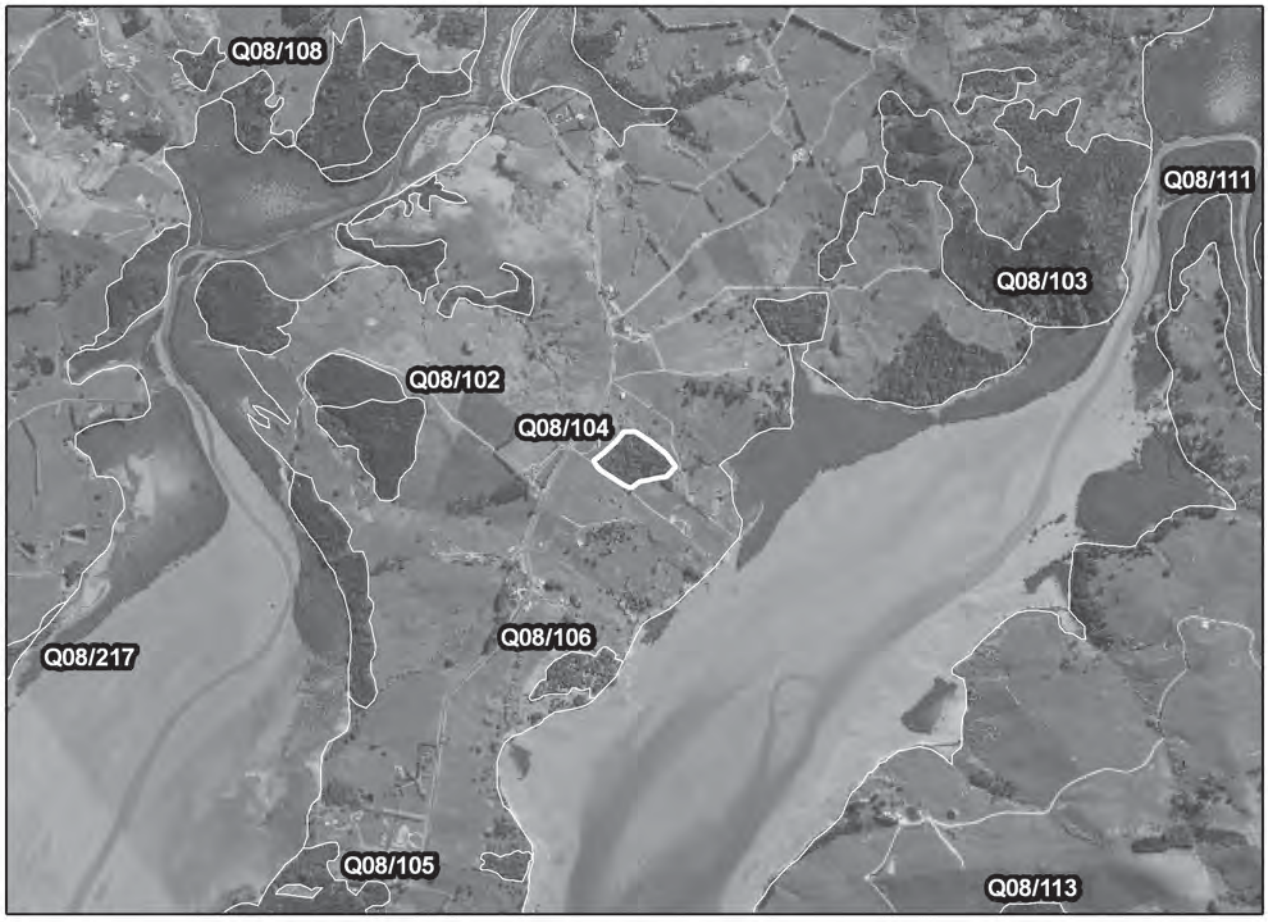
This is a very small site, open to edge effects. On the true right bank, grazing is a threat to the sustainability of the forest, and on the true left bank, which is steeper, dumping of refuse and weeds is a problem.

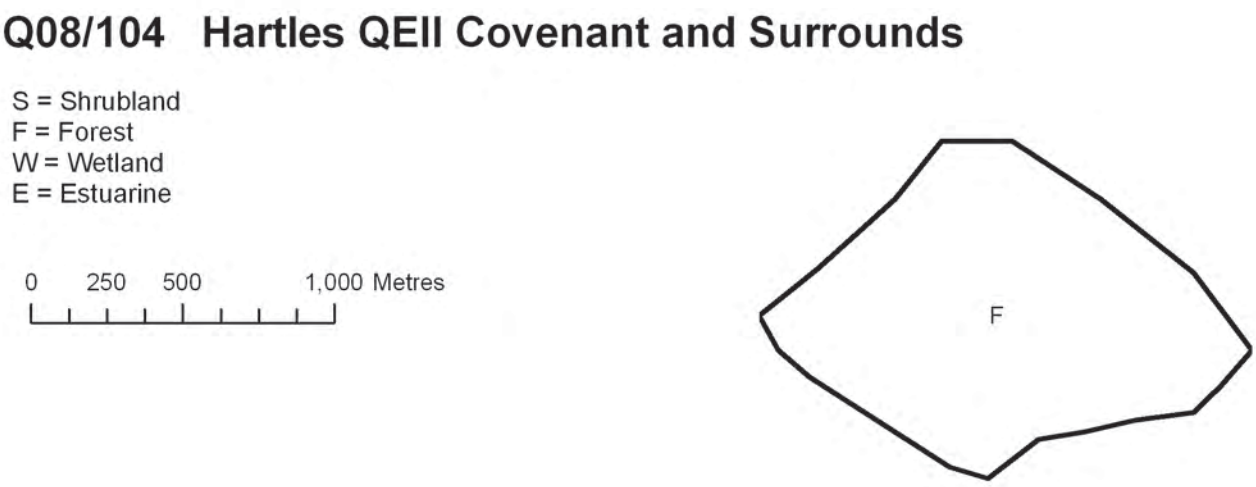
HARTLES QEII COVENANT AND SURROUNDS

Survey no.	Q08/104
Survey date	17 November 2005
Grid reference	Q08 216 632
Area	2.9 ha
Altitude	19–46 m asl

Ecological unit

(a) Totara–kahikatea forest on moderate hillslope (100%)





Landform/geology

Hillslope underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This is a small, compact forest remnant with a canopy of totara and emergent kahikatea. Kauri rickers are frequent emergents and there are occasional kowhai, puriri and manuka in the canopy (especially around edges).

Fauna

Not surveyed.

Significance

The site is partially encompassed by a QEII Open Space Covenant (1.2 ha) and is at least partially fenced. The fenced areas are likely to have a healthier understorey than other similar remnants of its size and type. The small size of the site is a limiting factor to its long term viability; however it is still important at the landscape scale as a 'stepping stone' for mobile wildlife which may use several forest remnants as habitat.

EAST PAHI FOREST REMNANTS

Survey no.	Q08/106
Survey date	17 November 2005
Grid reference	Q08 210 612 (6 remnants)
Area	23.0 ha
Altitude	0–58 m asl

Ecological units

(a) Totara–kowhai forest on steep coastal margin (60%)

(b) Kanuka–totara forest on moderate hillslope (25%)

(c) Totara–kahikatea forest on gentle coastal margin (15%)

Landform/geology

Coastal hillslopes underlain by Eocene glauconitic sandstone (Pahi Greensand, Te Kuiti Group); Eocene thickly bedded glauconitic sandstone (Omahuta Sst, Motatau Complex); Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex); melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site comprises a string of forest remnants up to 500 m apart distributed along the east coast of the Pahi peninsula. These would once have been part of a continuous area of forest on the sheltered side of the peninsula. Pasture, groves of exotic trees (e.g. eucalyptus, Douglas fir, radiata pine, maritime pine and various other conifers) and residential developments are now present in the intervening landscape.

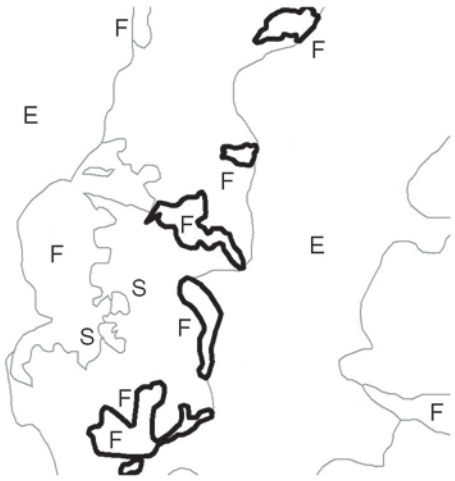
(a) In the south of the remnant and particularly near the coast, totara and kowhai are the main canopy trees. There are frequent kanuka, kahikatea, karaka and puriri, and occasional ti kouka, rewarewa, kauri, ngaio, matai, kohekohe, rimu, radiata pine and other unidentified conifers. Elaeagnus forms



Q08/106 East Pahi Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



impenetrable 10 m high hedges along the southern coastal portion, often excluding all other species. Hawthorn is also present.

(b) Further inland some areas are dominated by kanuka with associated totara and occasional taraire, puriri, macrocarpa and maritime pine.

(c) In the northern part, next to Aute Bay, a forest type of totara and kahikatea occurs which is similar to other sites further upstream (e.g. Lower Pahi River Scenic Reserve and Surrounds Q08/103), but more impoverished. The forest is sparse due to grazing. Occasional puriri, ti kouka and hawthorn are present.

Fauna
Grey warbler, kingfisher, pukeko.

Significance
This site is highly disturbed and appears to be grazed. Weed infestations have reduced the site's natural character. Despite this degradation, the site still has value as a protective vegetation buffer to the harbour, and acts as a habitat corridor in a landscape with recently increased development pressures. An area of 3.5 ha, corresponding to part of (a), totara–kowhai forest on steep coastal margin, is within a QEII Open Space Covenant.

UPPER PAHI RIVER SCENIC RESERVE, RABBIT AND GOAT ISLANDS AND SURROUNDS

Survey no.	Q08/109
Survey date	18 November 2005
Grid reference	Q08 241 638 (4 remnants)
Area	7.7 ha
Altitude	0–40 m asl

Ecological unit
(a) Totara–kanuka forest on steep coastal margin (100%)

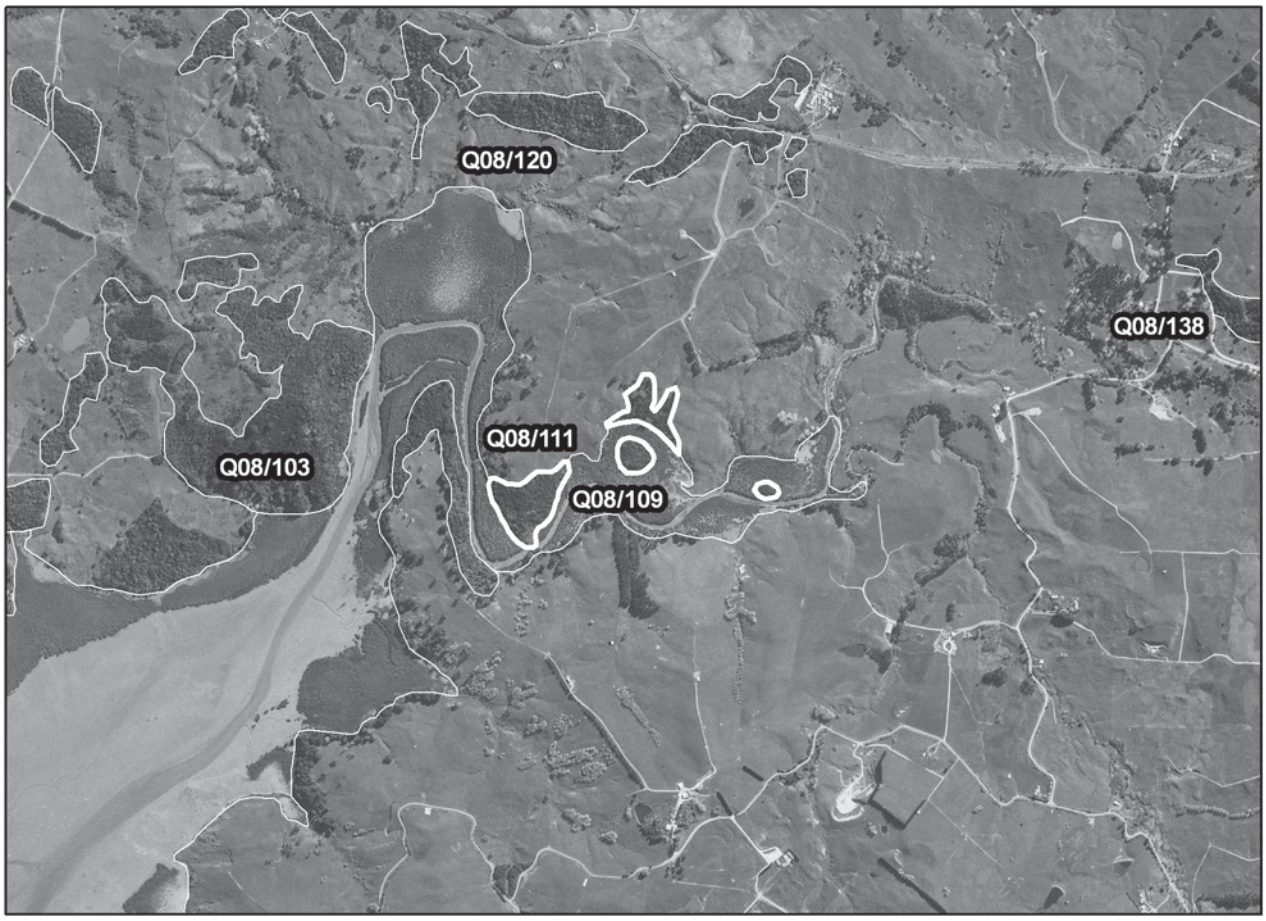
Landform/geology
Coastal hillsides and islets of undifferentiated Eocene–Oligocene mudstone, sandstone and bioclastic limestone (Motatau Complex); [note: islands not visited but presumed to be Motatau Complex].

Vegetation
This site contains two small forested islands in the upper saline reaches of the Pahi River, surrounded by mangrove forest/shrubland, and two nearby forest remnants on the northern banks. The canopy is formed primarily of totara, followed by kanuka. Kowhai is frequent, with occasional tanekaha, ti kouka and emergent matai. Matai is present in the Upper Pahi Scenic Reserve, which is the westernmost forest remnant on the shore.

A 1996 survey found Goat Island to have a canopy of kanuka with emergent tanekaha, totara and kauri, while Rabbit Island had kanuka mixed with totara, kauri and rimu. Species lists for each of the islands are provided, showing there to be reasonable diversity, despite their small size (SSBI Q08/H064). No rare or threatened plants were recorded. The site was found to be impacted by possums and stock, i.e. the islands are not inaccessible to land animals.

Fauna
Not surveyed.

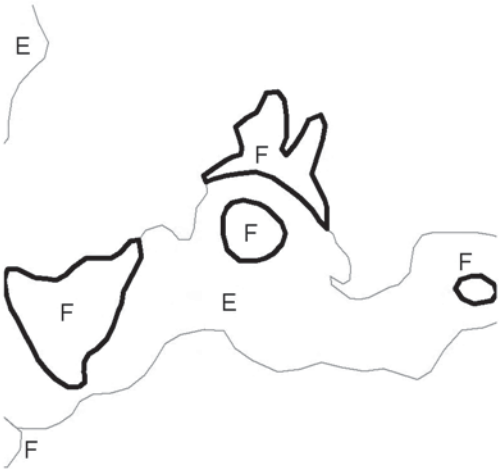
Significance
The ecological unit present in this site is better represented in other parts of the ED in Northland Conservancy, in sites that are less fragmented and impacted by mammals. However, it provides a valuable natural vegetation buffer for Pahi River, and may be important as a habitat 'stepping stone' for mobile wildlife that make use of many forest remnants. 3.5 ha of this site is within Scenic Reserve administered by DOC.



Q08/109 Upper Pahi River Scenic Reserve, Rabbit and Goat Islands and Surrounds

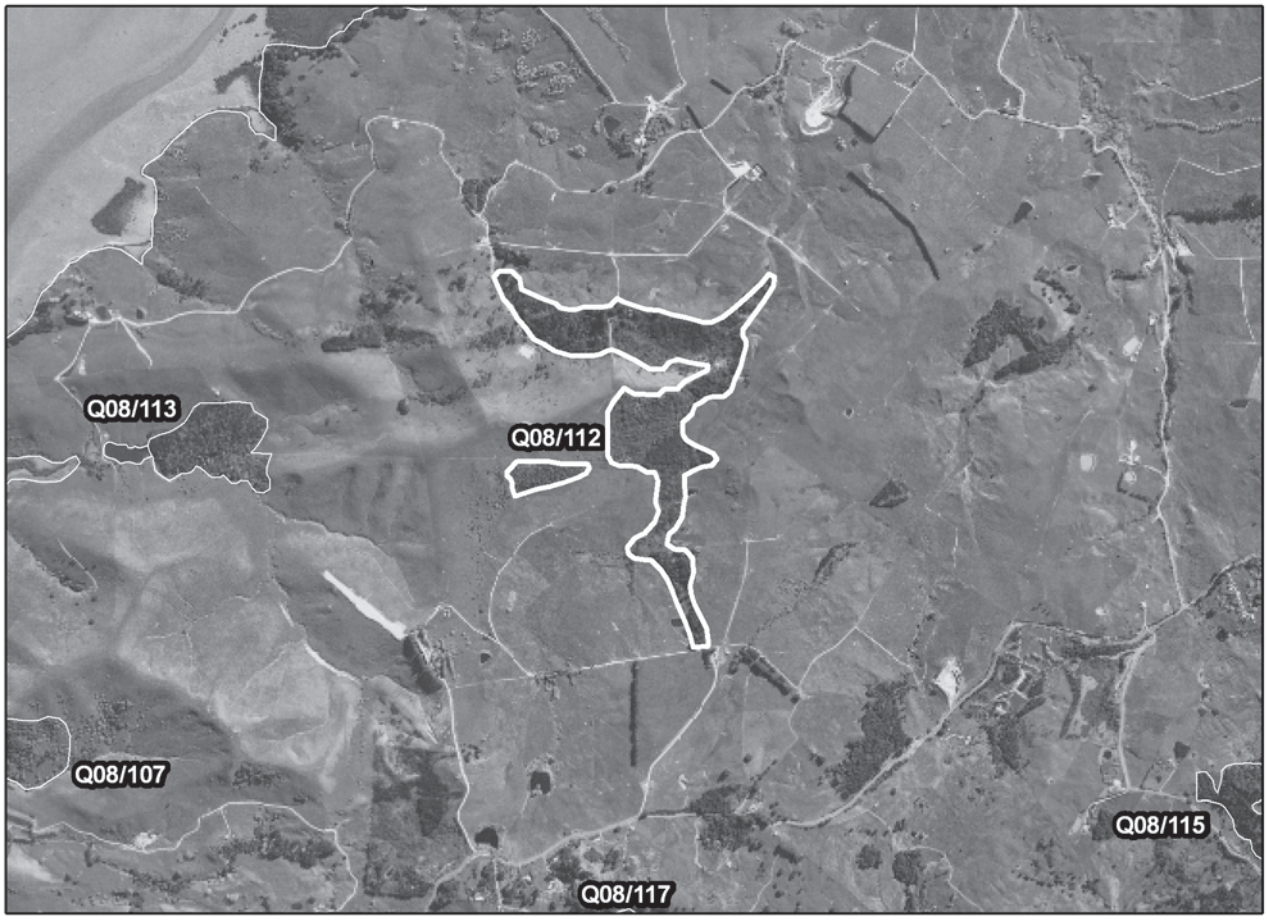
S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



MOONEY ROAD FOREST REMNANT

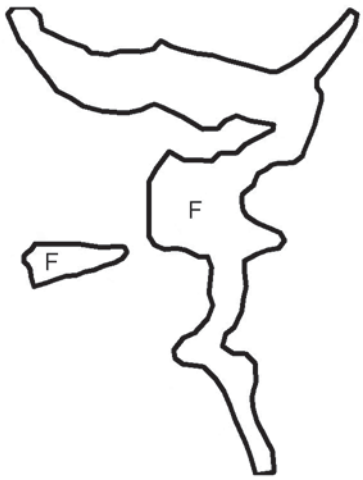
Survey no.	Q08/112
Survey date	Not surveyed
Grid reference	Q08 243 617 (2 remnants)
Area	29.3 ha
Altitude	40–120 m asl



Q08/112 Mooney Road Forest Remnant

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological unit

(a) Totara–kanuka forest in gully (100%)

Landform/geology

Hillslopes and gullies underlain by Eocene glauconitic sandstone (Pahi Greensand, Te Kuiti Group), Oligocene micritic limestone (Mahurangi Limetsone, Motatau Complex), and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

The site was not visible from public roads, therefore an estimate of the vegetation cover was made from inspection of recent aerial photography (flown in 2002). The vegetation cover appears to be totara–kanuka forest. The forest does not appear to be fenced on all sides. It covers two stream gullies, therefore it would be likely to contain wetland species, or perhaps entire wetland or gully vegetation types, dominated by species such as kahikatea, kowhai, karaka, puriri and ti kouka.

Fauna

Not surveyed.

Significance

There is insufficient information to assess the full significance of this site. However, this vegetation type is relatively common in Otamatea ED Northland. The forest provides valuable riparian protection in this largely pastoral landscape.

AWAKINO CREEK FOREST AND WETLAND

Survey no.	Q08/113
Survey date	Not surveyed
Grid reference	Q08 229 616
Area	8.9 ha (8.1 ha forest, 0.8 ha wetland)
Altitude	16–37 m asl

Ecological unit

(a) Kanuka–totara–kowhai forest on gentle hillslope (91%)

(b) Open water (constructed freshwater farm pond) (9%)

Landform/geology

Hillslopes underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex).

Vegetation

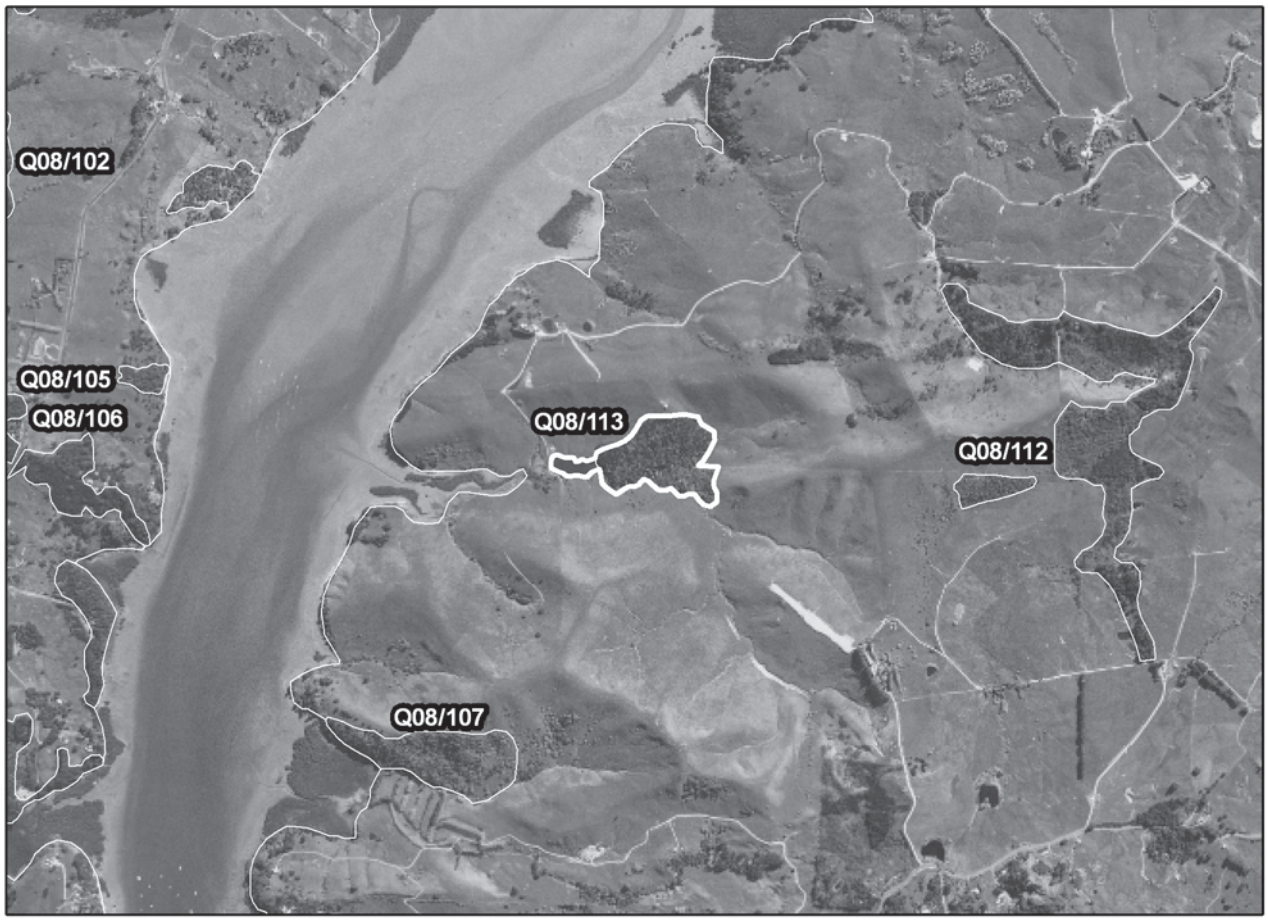
The site was not easily visible from public roads or from the harbour, therefore recent aerial photography (flown in 2002) was studied to estimate the vegetation type, which appears to be kanuka–totara–kowhai forest. The pond is obviously a constructed farm pond, created by damming the Awakino Creek, and does not appear to have much marginal wetland vegetation.

Fauna

Not surveyed.

Significance

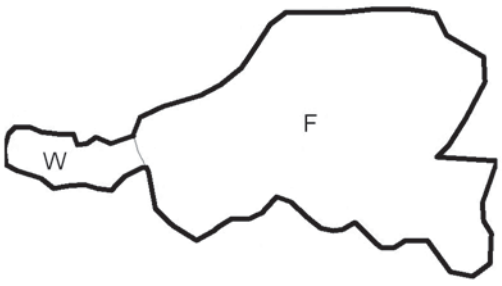
There is insufficient information to assess the full significance of this site. As a relatively large freshwater pond in close proximity to the harbour and to a forest remnant, it would be expected to have habitat value for waders and waterbirds. Constructed ponds currently provide the majority of habitat for indigenous waterbirds in Otamatea ED Northland.



Q08/113 Awakino Creek Forest and Wetland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



FORD ROAD FOREST

Survey no.	Q08/114
Survey date	28 November 2005
Grid reference	Q08 273 609 (3 remnants)
Area	12.5 ha (9.8 ha forest, 2.8 ha shrubland)
Altitude	56–116 m asl

Ecological units

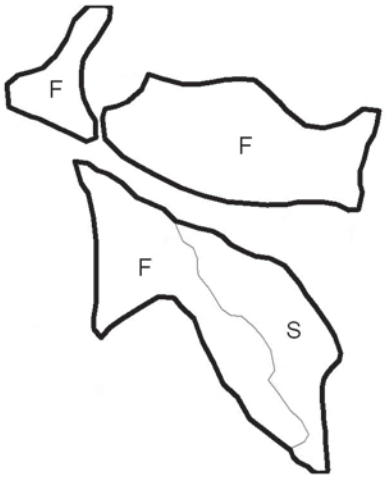
(a) Taraire–puriri forest on moderate to steep hillslope (65%)



Q08/114 Ford Road Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(b) Kanuka treeland on moderate hillslope (10%)

(c) Manuka–kanuka shrubland on moderate to steep hillslope (25%)

Landform/geology

Gullies underlain by Miocene thinly interbedded sandstone and mudstone (Waitemata Group).

Vegetation

This site comprises three indigenous vegetation remnants at the intersection of Ford Road with Whakapirau Road. 75% of the site is either forest or treeland

which is visible from the road, but 25% of the site is not visible from the road (behind a hill and radiata pine plantation). Interpretation of recent aerial photography (flown in 2002) suggests that this is indigenous shrubland.

(a) The biggest forest remnants (northeast and southwest) are very diverse, with a slight majority of taraire and puriri in the canopy, though totara, kanuka, rimu and kahikatea are also frequent. Other species recorded at lower abundances include nikau, tanekaha, rewarewa, pukatea, tarata, pate and mapou. The invasive banana passionfruit vine was observed in the forest at the southern road edge.

(b) The rest of the forest habitat (northwest remnant) is kanuka treeland with frequent karaka, ti kouka, mahoe and totara, and occasional mamaku and harakeke.

(c) The unknown shrubland type is likely to be young manuka–kanuka shrubland.

Fauna

Not surveyed.

Significance

None of the ecological units are representative examples of their type, as they are relatively small and appear to be partially grazed. Taraire–puriri forest on moderate to steep hillslope (a) appears to be relatively protected from grazing by a stock fence, and contains some quite diverse broadleaved forest, which could be important as a feeding site for kukupa (though they were not seen at the time of the survey).

TE OPI ROAD FOREST REMNANTS

Survey no.	Q08/118
Survey date	18 November 2005
Grid reference	Q08 236 583 (5 remnants)
Area	14.6 ha (14.1 ha forest, 0.5 ha wetland)
Altitude	0–60 m asl

Ecological units

(a) Totara–kahikatea forest on moderate hillslope (45%)

(b) Kanuka forest on moderate hillslope (20%)

(c) Totara–puriri–kowhai forest on gentle coastal margin (20%)

(d) Totara–puriri–kanuka forest on steep coastal margin (11%)

(e) Open water (constructed freshwater farm pond) (3%)

(f) Raupo reedland on constructed pond fringe (1%)

Landform/geology

Coastal hillslopes underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

This site comprises four forest remnants and a small constructed wetland on a sheltered peninsula in the Whakapirau Creek. More than three-quarters of the peninsula has been cleared for pastoral farming, and these are the remnants of a



Q08/118 Te Opi Road Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



once continuous secondary coastal forest tract which developed following logging in the 19th century. The site is contiguous with mangrove forest and shrubland in the estuary, except for at the very tip of the peninsula.

(a) The largest, central forest remnant comprises totara and kahikatea with frequent kanuka and puriri, and occasional nikau, rimu and matai.

(b) Kanuka forest with frequent totara and occasional mahoe, mamangi, ti kouka, puriri and kahikatea occupies the northernmost remnant next to the wetlands.

(c) Two smaller forest remnants on the southwestern coast have an even mixture of totara, puriri and kowhai in the canopy, with frequent taraire and rewarewa.

(d) On the point there is a small patch of totara-dominant forest with abundant kanuka and puriri and frequent karaka.

(e) The northern wetland is a dammed farm pond with open water (and plentiful mallard ducks).

(f) The main vegetation around or in the ponds is raupo, though the introduced water fern *Azolla pinnata* occurs frequently as a floating macrophyte on the upper pond. The southern wetland appears to be a constructed wetland which is entirely vegetated in raupo.

Fauna

Not surveyed.

Significance

Due to the high level of small size none of these ecological units are representative examples of their type. However, they are still important as a protective vegetation buffer to the Kaipara Harbour and as habitat 'stepping stones' for mobile wildlife moving around the various natural areas in the Whakapirau Creek.

HOOK ROAD FOREST REMNANTS

Survey no.	Q08/123
Survey date	24 November 2005
Grid reference	Q08 228 664 (2 remnants)
Area	7.4 ha (7.2 ha forest, 0.2 ha wetland)
Altitude	20–50 m asl

Ecological units

(a) Totara–tree privet forest on moderate hillslope (98%)

(b) Open water (constructed freshwater farm pond) (1.5%)

(c) *Juncus sarophorus* rushland on constructed pond fringe (0.5%)

Landform/geology

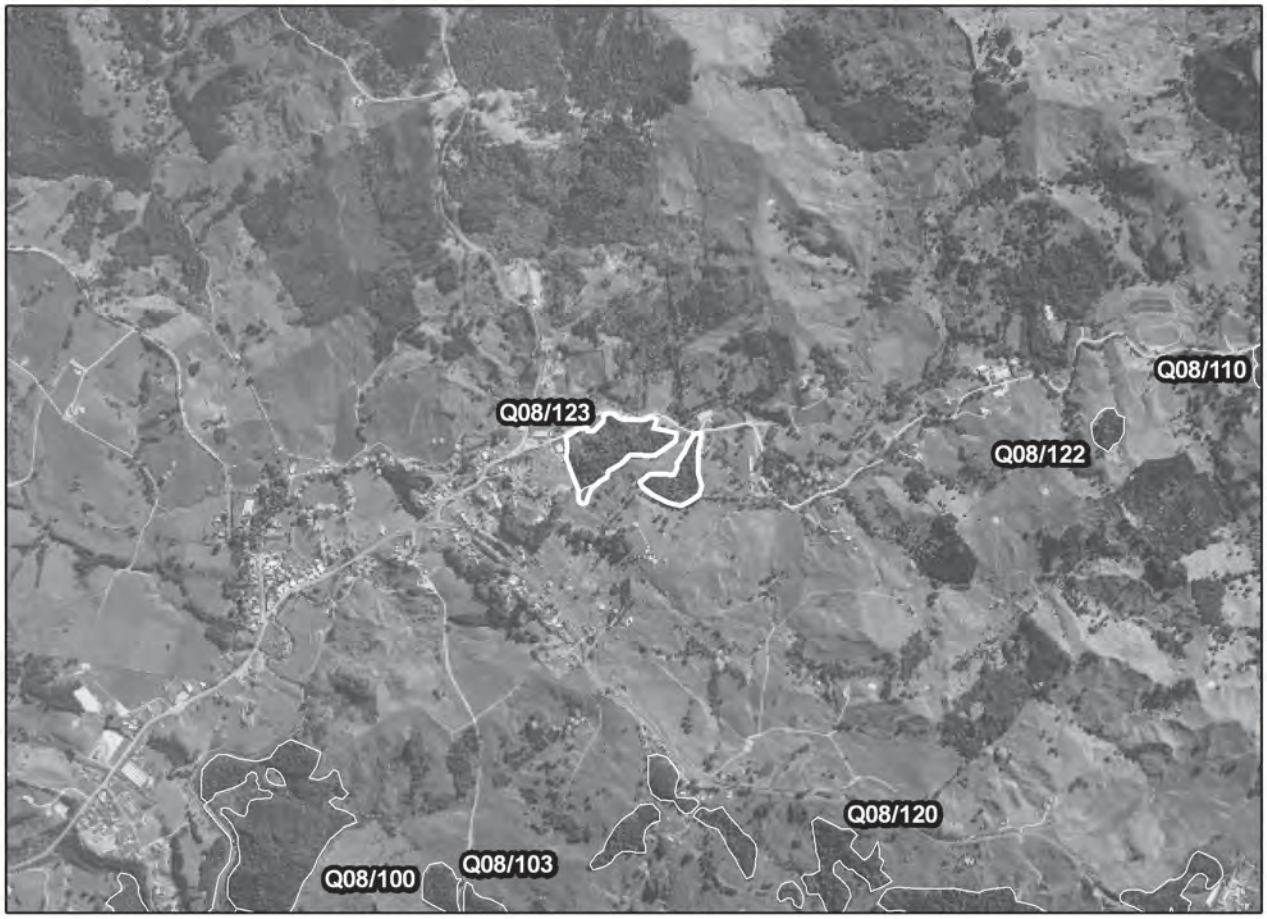
Hillslope on Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

This site comprises two forest remnants, one of which is adjacent to a constructed farm pond surrounded by *Juncus sarophorus* rushland. The forest canopy is a mixture of totara (abundant) and tree privet (common) with frequent kanuka, and occasional titoki, mamaku, mahoe, gorse and radiata pine. *Myriophyllum propinquum* (an endemic plant species), was collected in one of the ponds here in 1987 (AK 243 770).

Fauna

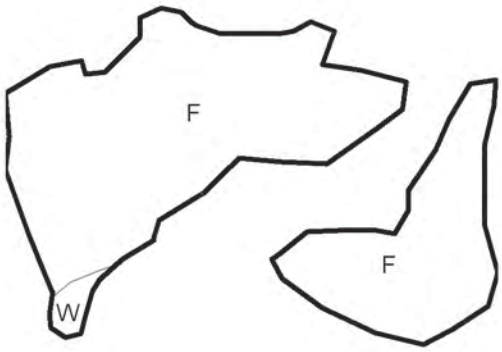
Grey warbler, little shag, shining cuckoo, welcome swallow.



Q08/123 Hook Road Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Significance

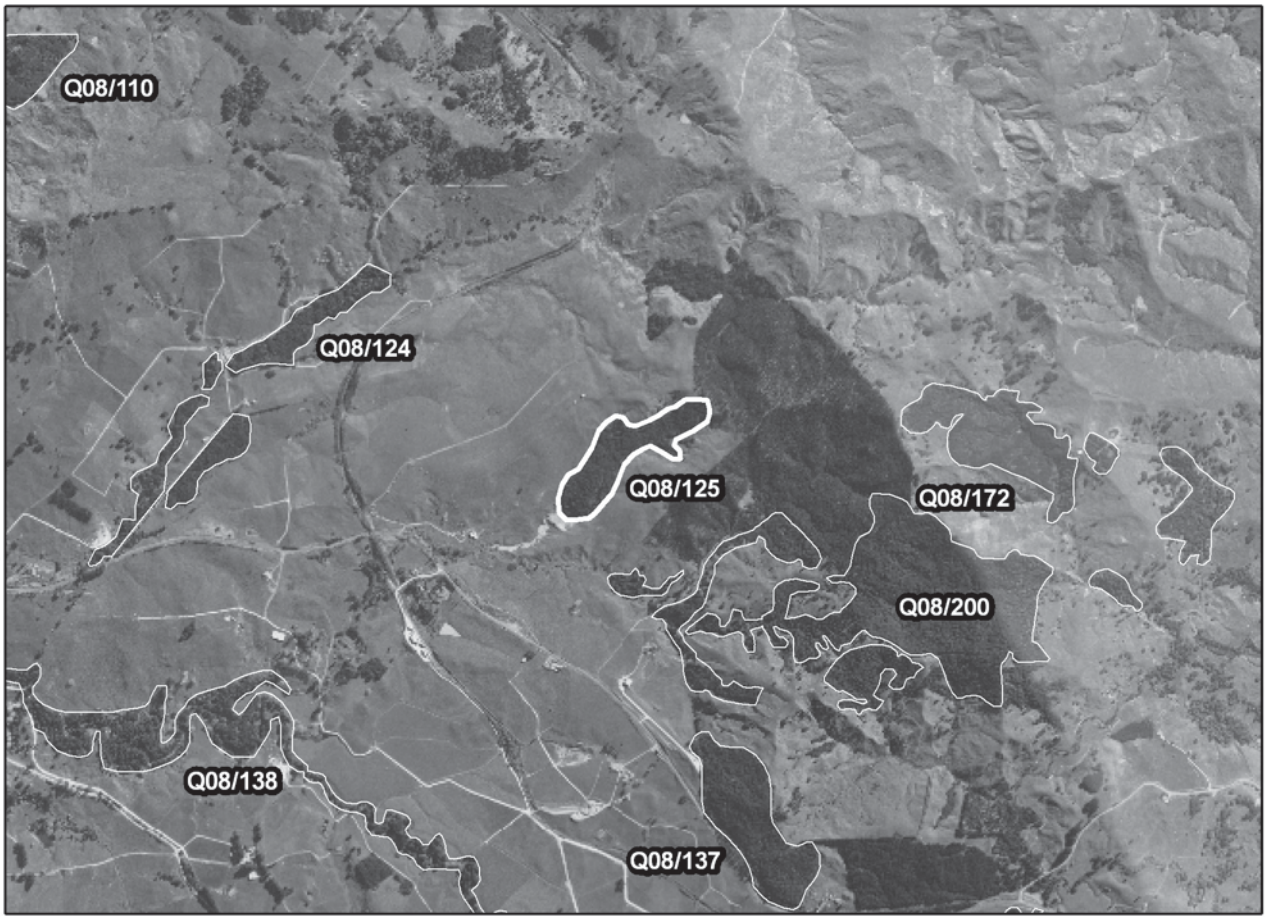
The natural character of the forest is compromised by tree privet achieving greater than 20% canopy cover, although it is mainly concentrated on the northwestern side of the site. However the forest remnants have value as habitat for common forest birds, and the pond is also utilised by birds (e.g. little shag).

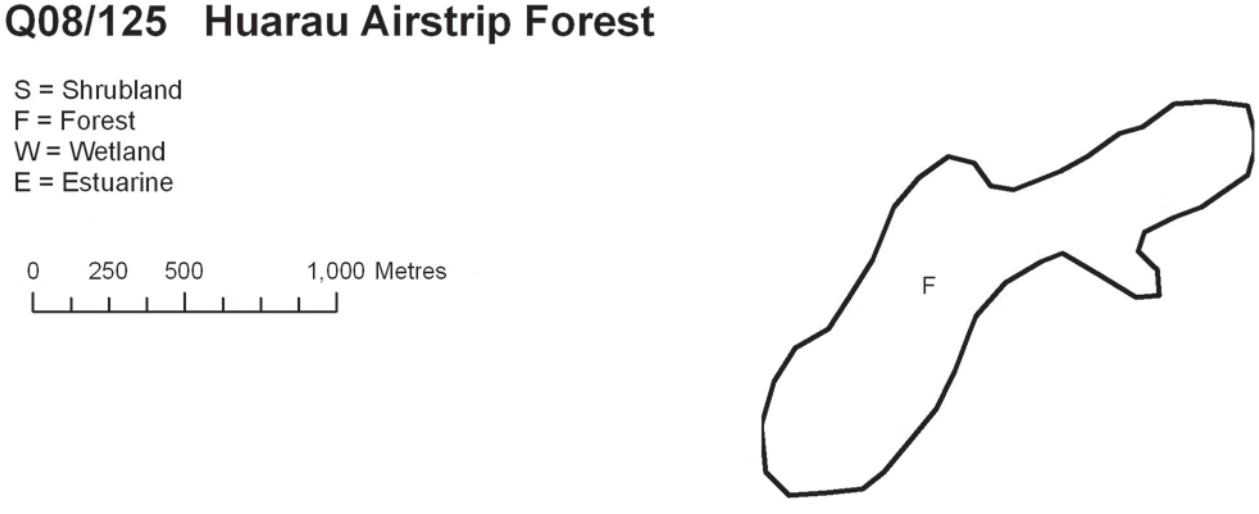
HUARAU AIRSTRIP FOREST

Survey no.	Q08/125
Survey date	25 November 2005
Grid reference	Q08 281 652
Area	7.4 ha
Altitude	40–78 m asl

Ecological unit

(a) Kanuka–totara forest on moderate to steep hillslope (100%)





Landform/geology
Gully underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation
This site comprises a single oblong remnant of indigenous forest to the southwest of Huarau Airstrip. The main canopy species is kanuka in association with totara and frequently emergent rimu and kahikatea. Occasional canopy species include taraire, karaka, kauri, nikau and puriri.

Fauna
Paradise shelduck, shining cuckoo.

Significance
The ecological unit in this site is not representative, as it shows severe grazing impacts and is a relatively small remnant. It has value as a habitat 'stepping stone' for fauna using multiple forest patches in a primarily pastoral landscape.

MASSEY ROAD CORNER FOREST

Survey no.	Q08/133
Survey date	28 November 2005
Grid reference	Q08 263 560
Area	3.6 ha
Altitude	34–80 m asl

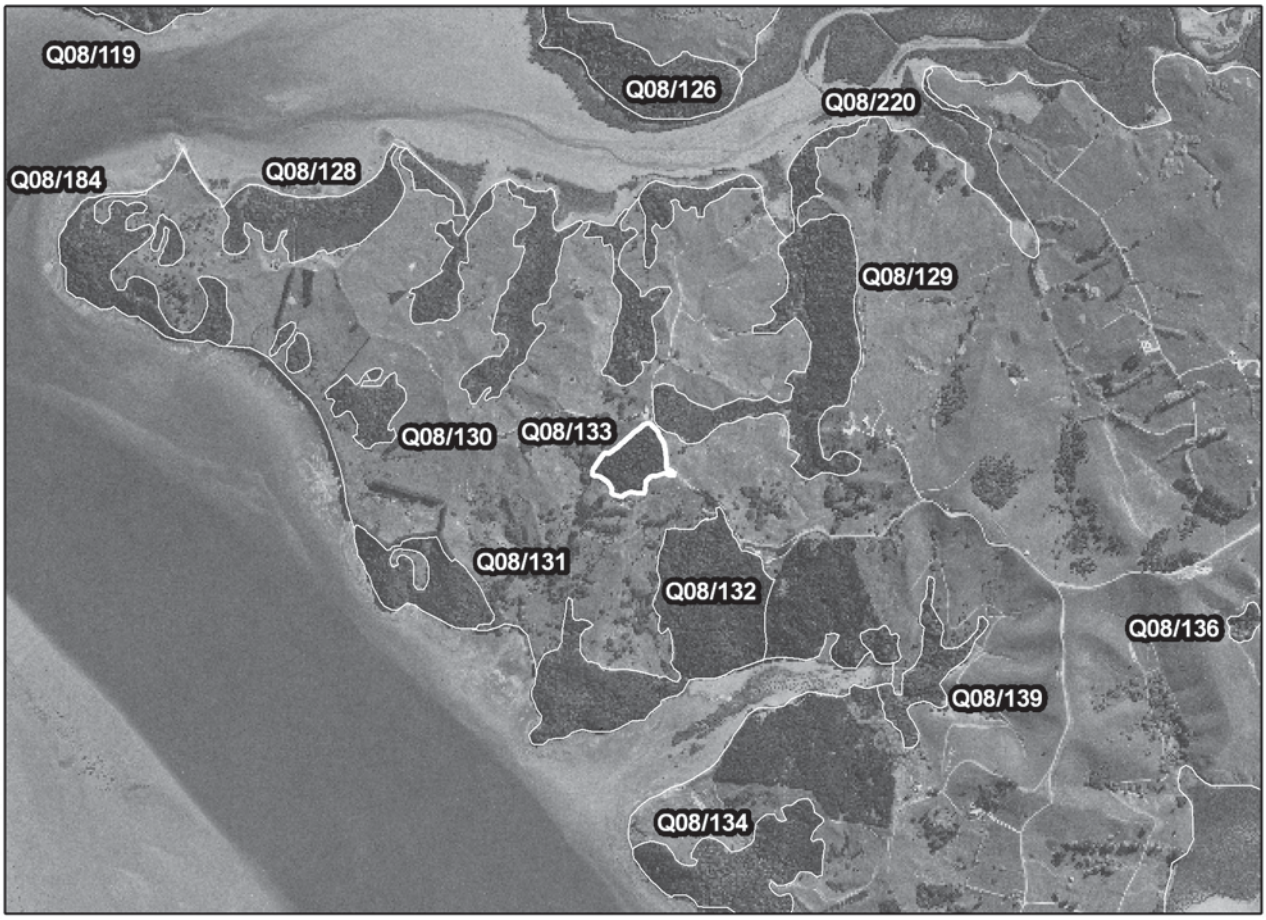
Ecological unit
(a) Totara forest on moderate to steep hillslope (100%)

Landform/geology
Hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation
This is a small forest remnant near the crest of the peninsula on the southern side of a corner in Massey Road. The main component of the canopy is totara. The only other species which reaches greater than 5% cover is puriri. Otherwise there are many occasional species including kanuka, kauri, rimu, kahikatea, tanekaha, manuka, putaputaweta, lancewood, brush lawyer and *Coprosma areolata*.

Fauna
Not surveyed.

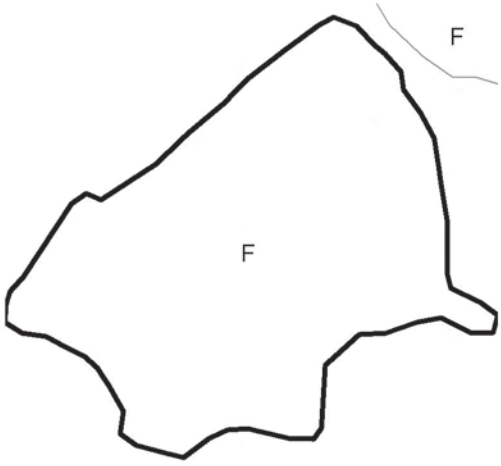
Significance
This site provides a link between three other natural areas in the immediate vicinity: Te Kowhai Creek Scenic Reserve and Surrounds (Q08/132), Arapaoa River Scenic Reserve and Surrounds (Q08/131) and Massey Creek Forest (Q08/129). It is not fenced, and shows the effects of prolonged stock grazing and trampling.



Q08/133 Massey Road Corner Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres

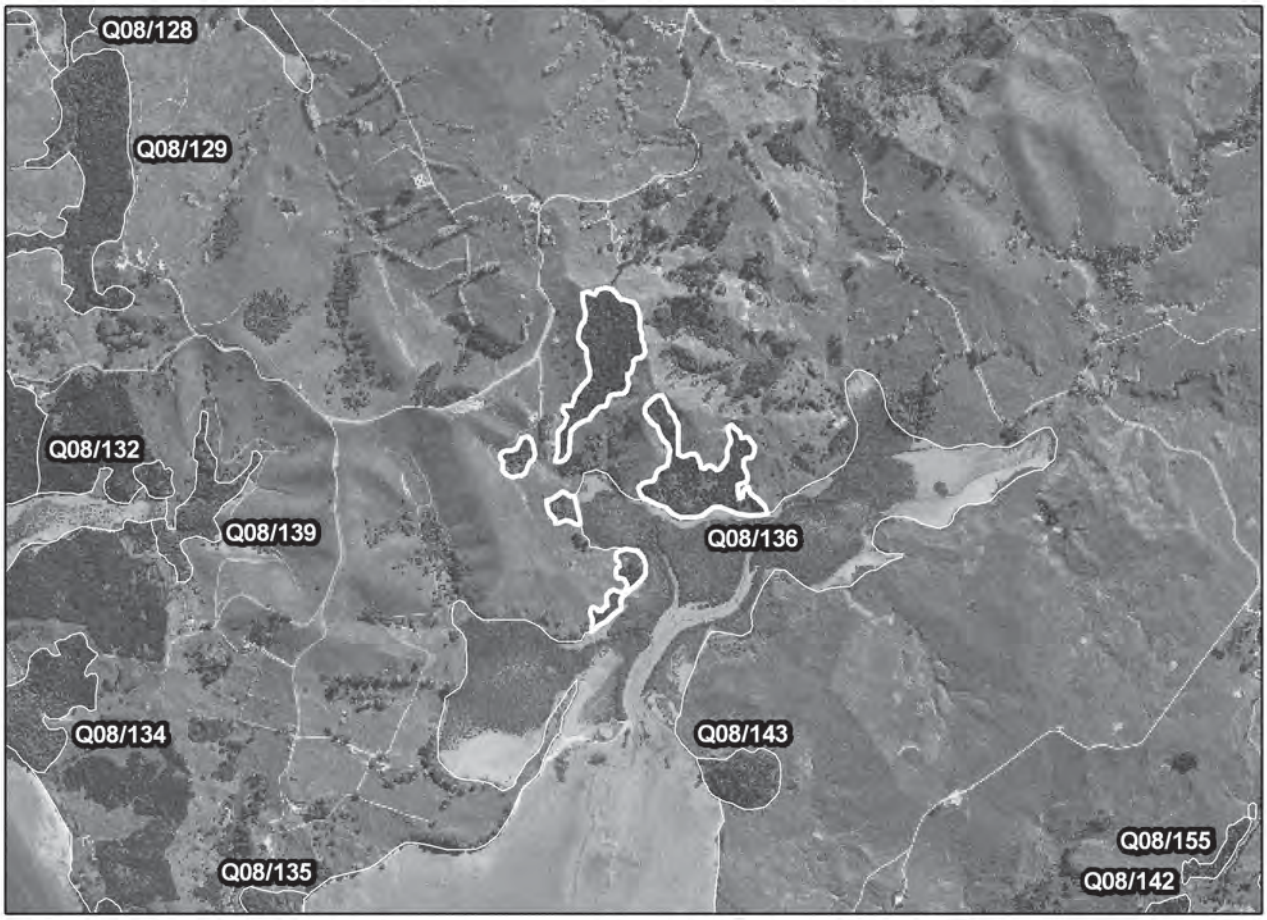


HOKORAKO CREEK FOREST REMNANTS

Survey no.	Q08/136
Survey date	28 November 2005
Grid reference	Q08 287 555 (5 remnants)
Area	18.1 ha
Altitude	0–100 m asl

Ecological units

(a) Kanuka forest on moderate to steep hillslope (35%)



Q08/136 Hokorako Creek Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(b) Totara–puriri forest on gentle coastal margin (35%)

(c) Taraire–puriri–kanuka forest in gully (20%)

(d) Puriri–karaka forest on gentle coastal margin (10%)

Landform/geology

Coastal hillslopes and gullies underlain by Cretaceous siliceous mudstone (Whangai Fmn, Mangakahia Complex), Oligocene micritic limestone

(Mahurangi Limestone, Motatau Complex), and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site contains the fragmented remains of a once continuous coastal forest on the shores of an upper tidal inlet of the Kaipara Harbour. Five separate remnants are present today, interspersed with pasture. Mudflats and mangrove shrubland lie directly adjacent in the Hokorako Creek, which is part of the Arapaoa River site (Q08/084).

(a) A finger of forest extends up the valley from the edge of the inlet, comprising primarily kanuka with occasional totara, rimu, kowhai and woolly nightshade.

(b) The easternmost remnant supports totara–puriri forest with frequent kanuka and karaka, and occasional kowhai and kahikatea.

(c) Sheltered parts of the valley have taraire–puriri–kanuka forest with frequent nikau and totara, and occasional pukatea and puka (epiphytic).

(d) The series of three small remnants on the western side comprise puriri–karaka forest with frequent kowhai and occasional ti kouka and kanuka.

Fauna

Not surveyed.

Significance

Many of the puriri trees are showing dieback and all of the remnants are grazed by livestock, causing them to lack understorey. The canopy is fairly open in many parts and there is a high ratio of edge to centre in the forest remnants, increasing edge effects. The increased light and disturbance exacerbates weed problems, e.g. woolly nightshade.

TE KOWHAI CREEK FOREST REMNANT

Survey no.	Q08/139
Survey date	28 November 2005
Grid reference	Q08 272 553 (2 remnants)
Area	6.6 ha
Altitude	3–60 m asl

Ecological unit

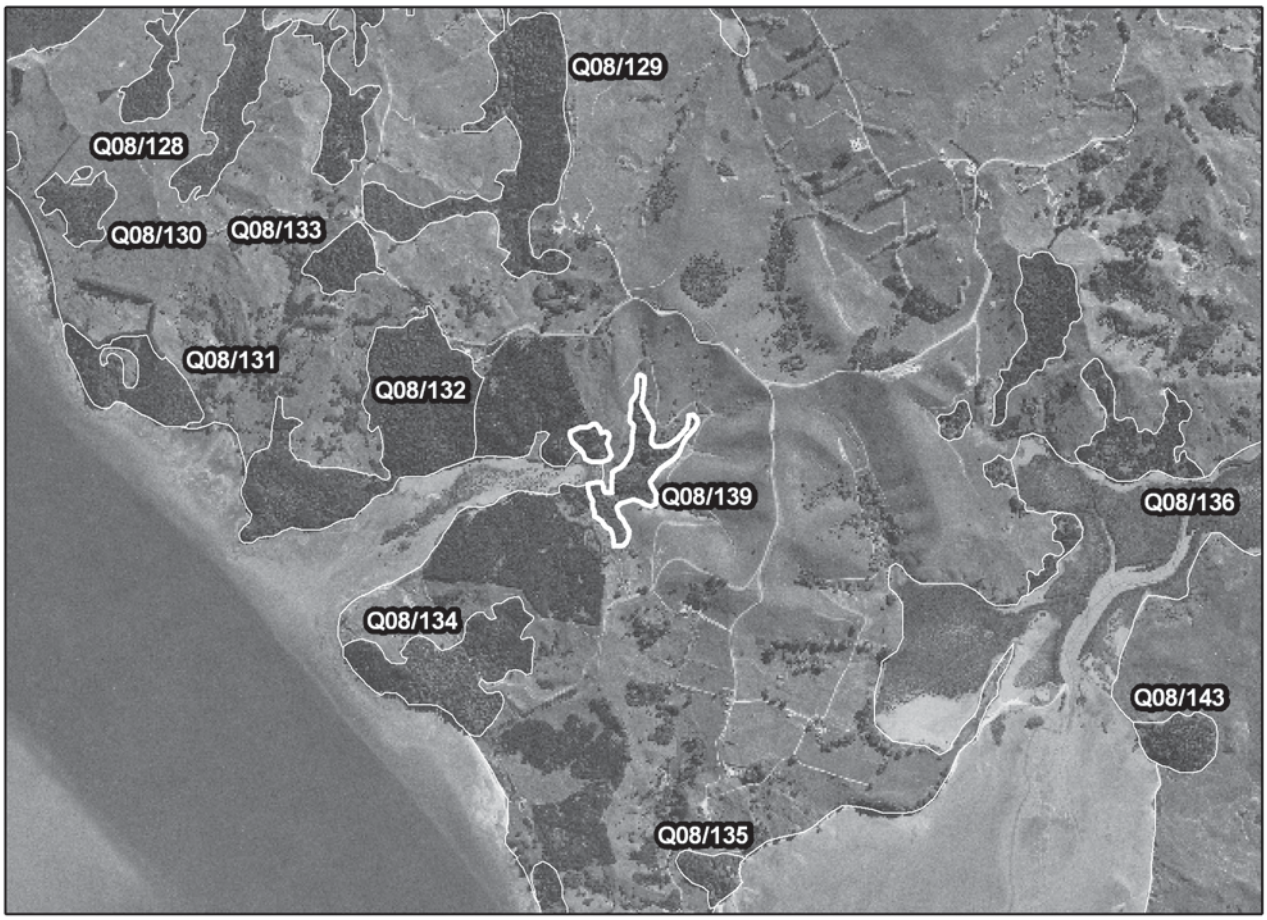
(a) Totara–puriri forest on steep coastal margin (100%)

Landform/geology

Hillslopes and gullies underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex).

Vegetation

This site comprises two small remnants of indigenous coastal forest on the steep slopes around the narrow head of Te Kowhai Creek. The canopy is dominated by totara with puriri a common associate. Most of the puriri trees are barely alive. Two or three large, spreading pohutukawa are present on a ridge just above salt marsh in the creek head, apparently quite healthy. Frequent kowhai and karaka, and occasional ti kouka are present. There appears to be unrestricted access by stock into the forest and out to the mudflats/saltmarsh.



Q08/139 Te Kowhai Creek Forest Remnant

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Fauna

Not surveyed.

Significance

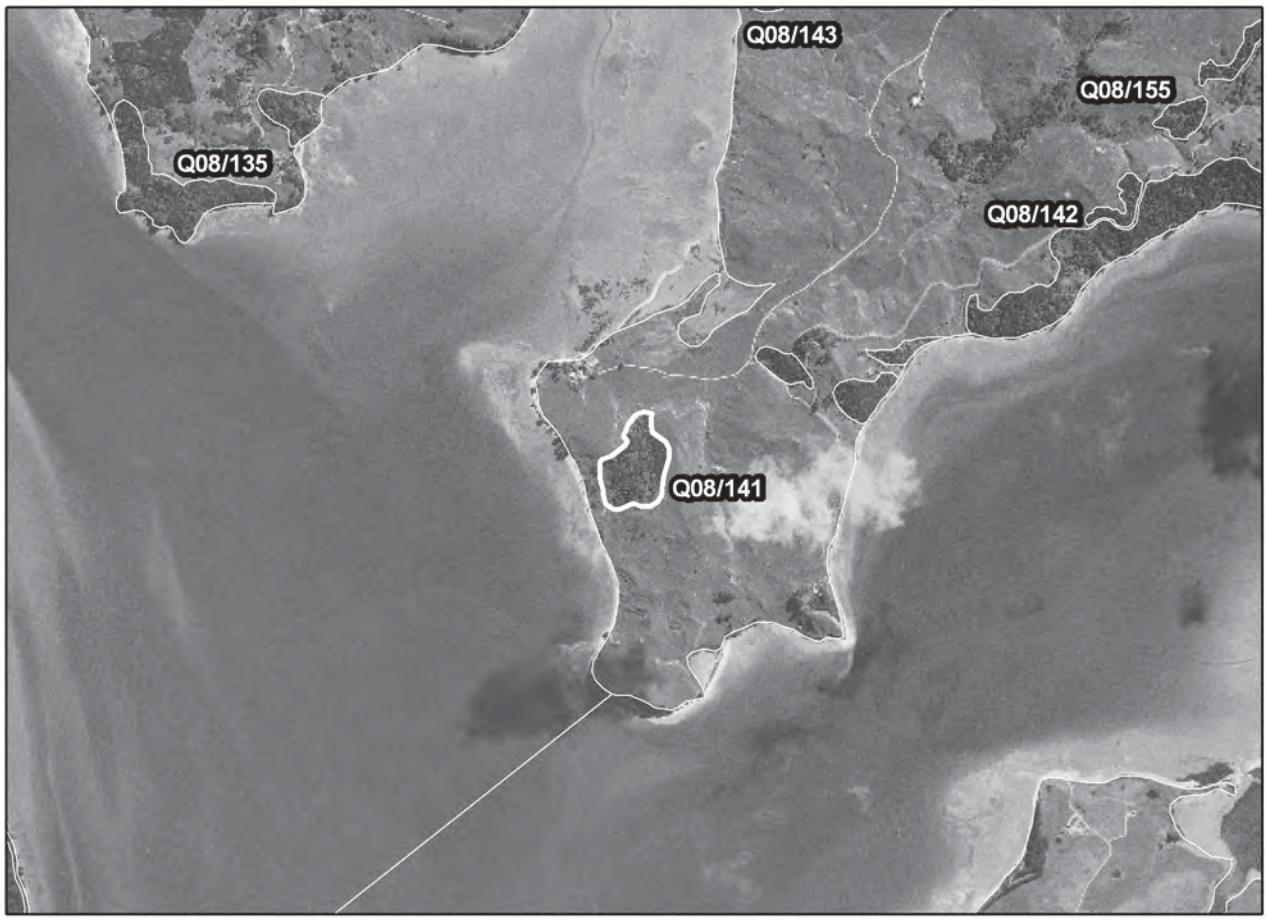
This is small and extremely fragmented site, which includes large, mature pohutukawa trees (an uncommon feature on the inner harbour coastal fringe) amongst a rather degraded example of totara–puriri forest.

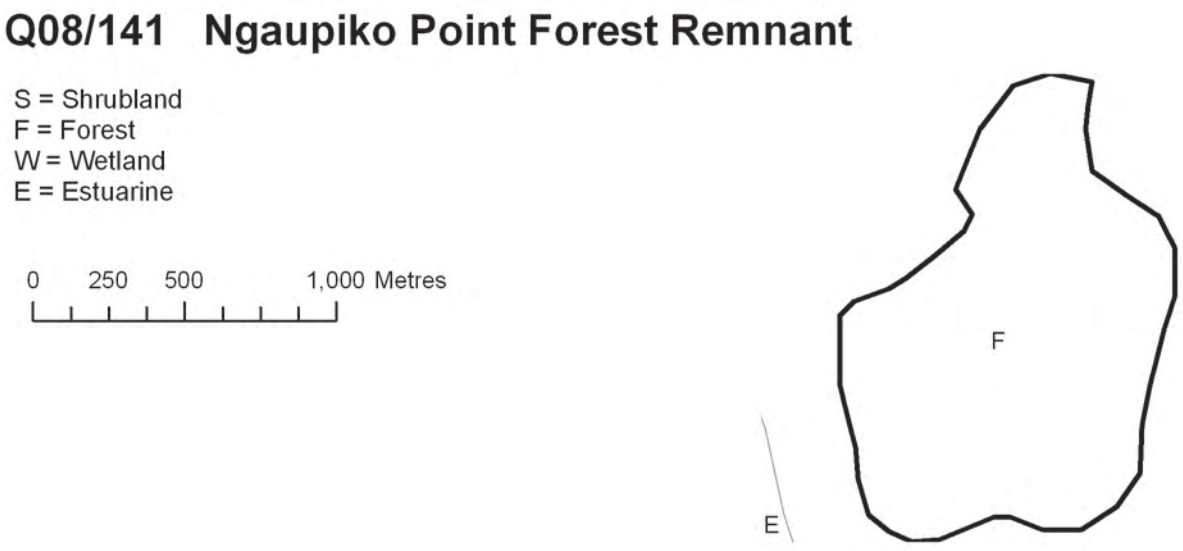
NGAUPIKO POINT FOREST REMNANT

Survey no.	Q08/141
Survey date	13 January 2006
Grid reference	Q08 286 528
Area	4.9 ha
Altitude	18–36 m asl

Ecological unit

(a) Kanuka forest on gentle coastal margin (100%)





Landform/geology

Coastal hillside underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies), and Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex).

Vegetation

This is a small forest remnant on the western side of Ngaupiko Point which has many canopy gaps as result of prolonged stock trampling and grazing. Kanuka is dominant, but the site is notable for its frequent stands of kauri rickers. Ti kouka is also frequent with occasional kahikatea.

Fauna

Not surveyed.

Significance

This remnant is small, in poor condition due to grazing/trampling effects, and therefore is not a good example of its type.

BATLEY ROAD COASTAL FOREST REMNANTS

Survey no.	Q08/142
Survey date	29 November 2005
Grid reference	Q08 302 536 (7 remnants)
Area	25.4 ha
Altitude	5–60 m asl

Ecological units

(a) Taraire–puriri forest on steep coastal margin (65%)

(b) Kanuka forest on gentle hillslope (15%)

(c) Totara–kanuka forest on gentle coastal margin (10%)

(d) Kanuka–tree privet forest on gentle coastal margin (5%)

(e) Taraire–totara–kanuka forest on gentle coastal margin (5%)

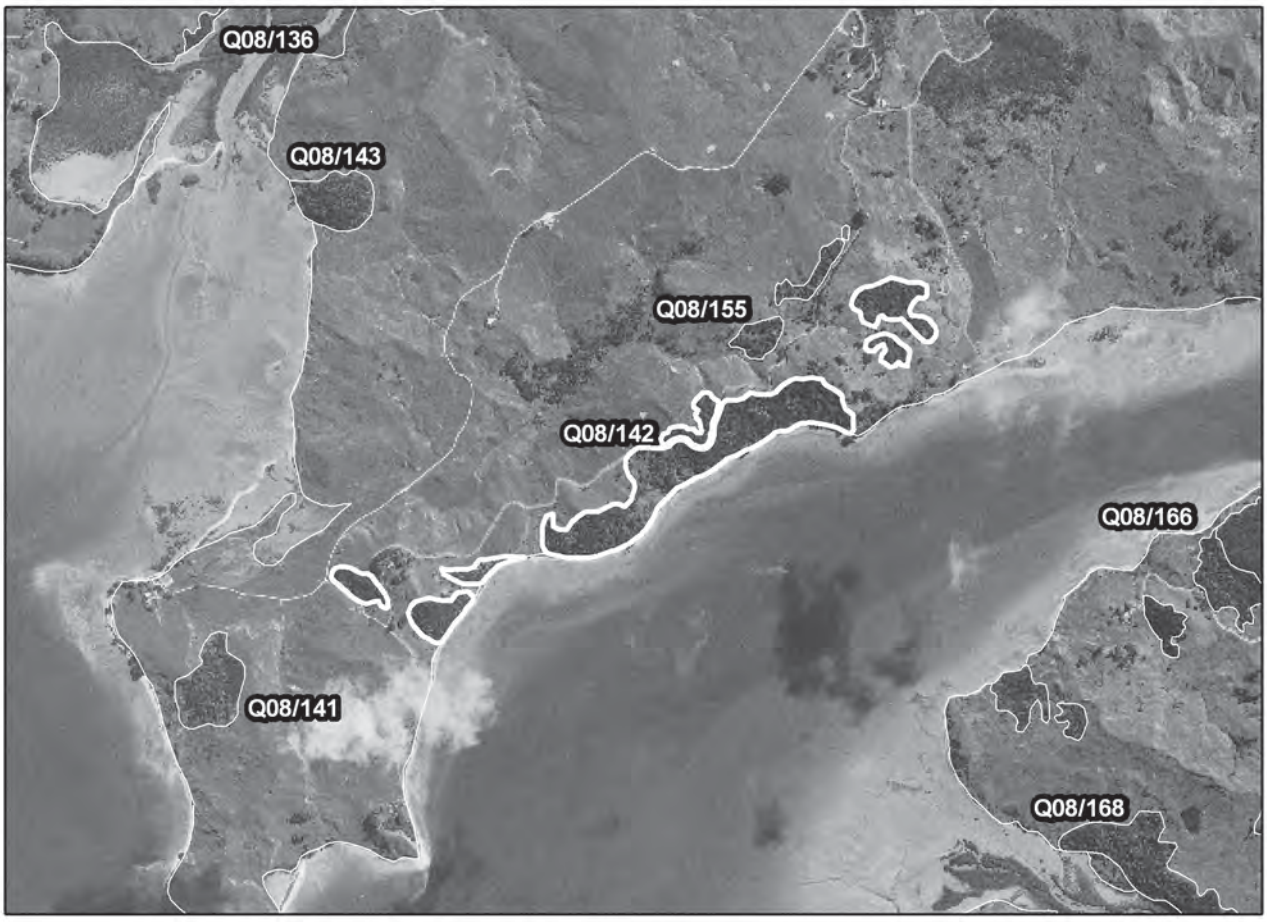
Landform/geology

Coastal hillsides and gullies in melange (undifferentiated Mangakahia & Motatau Complex lithologies), and Cretaceous thinly bedded mudstone (Whangai Fmn, Mangakahia Complex).

Vegetation

This site comprises seven remnants of coastal forest along the east coast of the peninsula culminating in Ngaupiko Point. Batley Road winds its way down the peninsula towards the former settlement and canning factory of Batley, skirting coastal forest on its lower side and pasture on the upper (two small forest remnants are on the upper side). The site is relatively sheltered from the predominant westerly winds, but it can be open to occasional gales and strong southwesterly winds coming through the Kaipara Harbour mouth and up the Otamatea River.

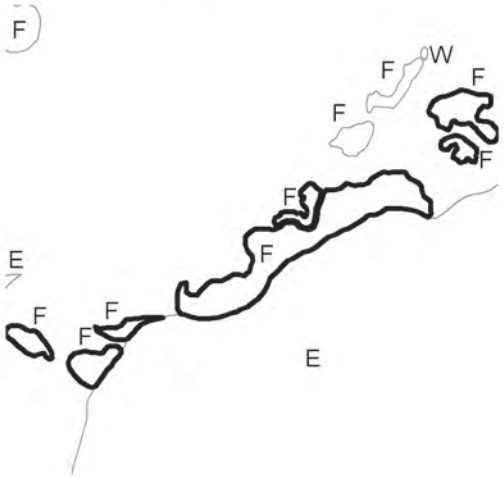
(a) Most of the remnants have taraire–puriri forest with frequent totara, karaka, kahikatea, kowhai and kanuka, and occasional small-leaved milk tree, pate, kohekohe and ngaio.



Q08/142 Batley Road Coastal Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(b) In the northeast, near Tanoa, the forest is dominated by kanuka, with frequent puriri and kahikatea, and occasional kohekohe and karaka.

(c) In several places there are degraded examples of totara and kanuka forest with frequent hawthorn.

(d) The most disturbed areas are dominated by a mixture of kanuka and tree privet with frequent hawthorn.

(e) On the western side, a short way up from the coast and on the far side of the road, the forest comprises equal quantities of taraire, totara and kanuka, with frequent kahikatea, and occasional nikau, ti kouka, mamangi, tree privet, hawthorn, woolly nightshade and loquat.

Fauna

Southern black-backed gull, pied stilt, kingfisher.

Significance

Clearance, grazing and weed invasion are strong negative pressures on these remnants and they are declining in condition. Possum browse was noted in the canopy. There is some fencing but it is not known whether these are stock-proof. A considerable diversity of habitat types is present, but none are good examples of their types, primarily for the reasons outlined above. This site is important as a protective vegetation buffer to the fringes of the Otamatea River (Q08/062).

SOUTH HOKORAKO CREEK FOREST REMNANT

Survey no.	Q08/143
Survey date	13 January 2006
Grid reference	Q08 290 544
Area	4.1 ha
Altitude	5–60 m asl

Ecological unit

(a) Taraire–puriri forest on steep coastal margin (100%)

Landform/geology

Coastal hillside underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

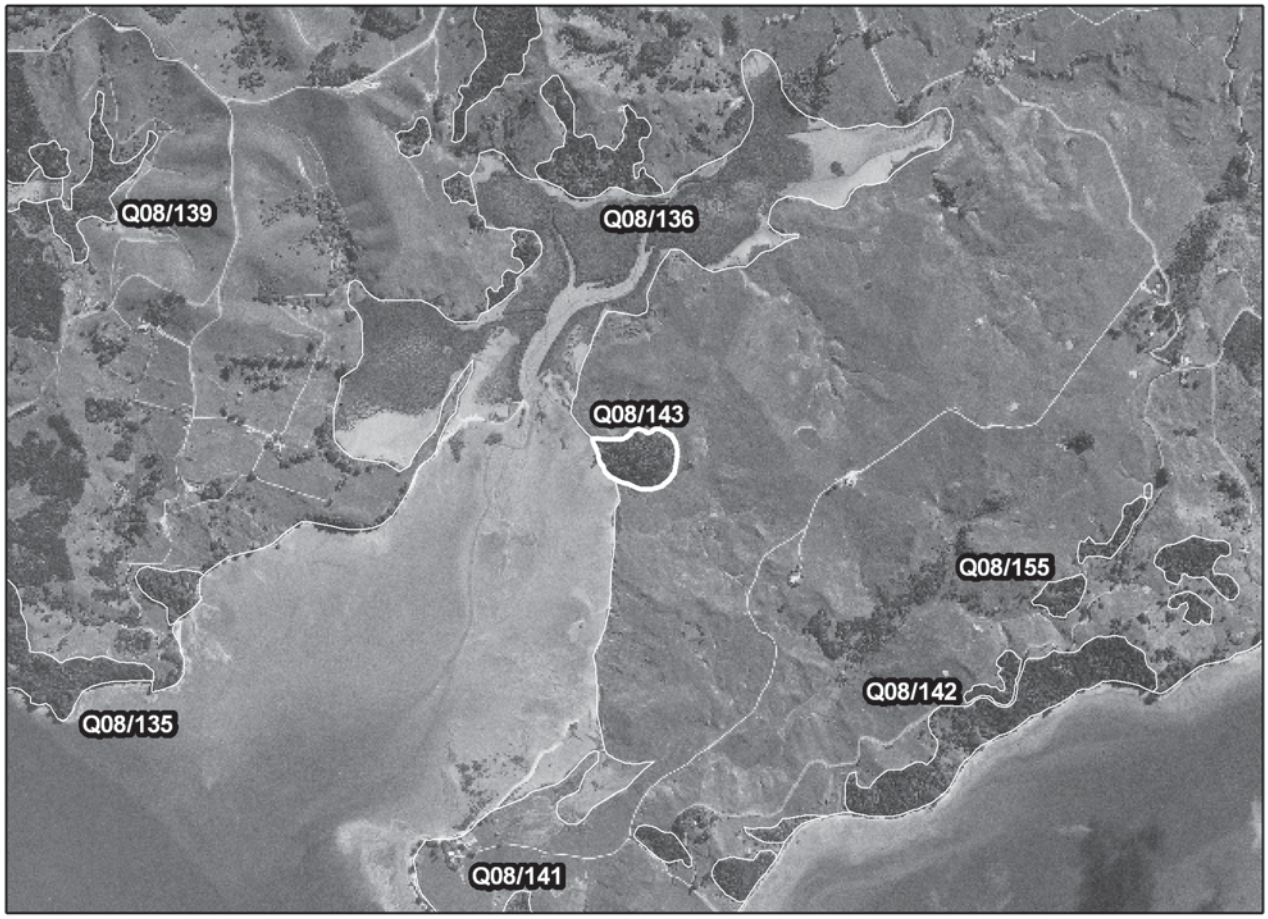
This site comprises a small, compact area of coastal forest on the southeast bank of the Hokorako Creek. On the seaward side it abuts extensive mudflats and shallow wading areas of the inner Kaipara Harbour, and on the landward side it is surrounded by grazed pasture. The forest comprises taraire and puriri, with frequent karaka and kanuka, and occasional ti kouka and kohekohe.

Fauna

Not surveyed.

Significance

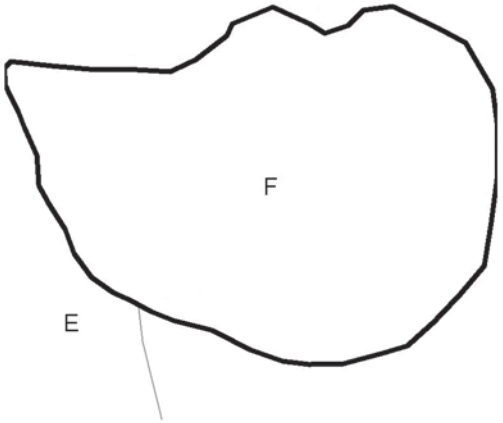
This site is relatively small and isolated, and appears to be accessible to livestock, which would reduce the quality of the understorey. Whilst not a representative example of its type, it is still important as a habitat 'stepping stone' for mobile wildlife (e.g. birds), which use a number of forest remnants to meet their habitat needs.



Q08/143 South Hokorako Creek Forest Remnant

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres

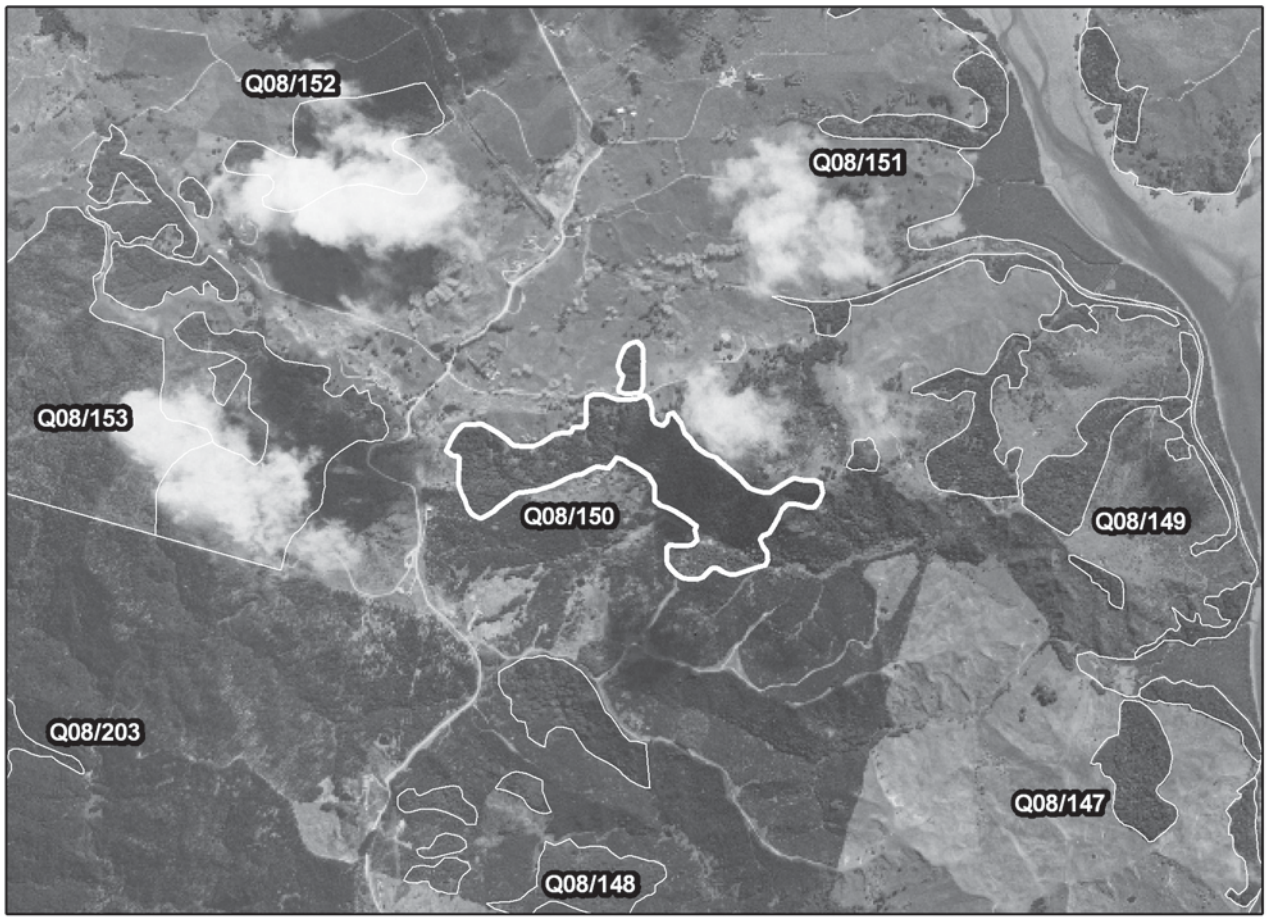


BICKERSTAFFE ROAD FOREST 1

Survey no.	Q08/150
Survey date	29 November 2005
Grid reference	Q08 331 611 (2 remnants)
Area	29.1 ha
Altitude	20–104 m asl

Ecological units

(a) Totara forest on moderate to steep hillslope (80%)



Q08/150 Bickerstaffe Road Forest 1

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(b) Taraire–puriri forest on moderate to steep hillslope (15%)

(c) Totara–kahikatea forest on moderate to steep hillslope (5%)

Landform/geology

Steep hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

This forest remnant follows the true left bank of a small creek flowing out to the Otamatea River (Q08/062). It extends almost to the top of the catchment (at Bickerstaffe Road) and is *c.* 80 m wide on a moderate to steep south-facing slope. Radiata pine plantations are present on the south side of the remnant, but

otherwise it is surrounded by pasture, and occasional willows and poplars. There was some difficulty viewing all areas from public roads and coastal areas, therefore there has been some extrapolation through study of recent aerial photography (flown in 2002).

(a) The majority of the site is covered by totara forest.

(b) Near to the watercourse, clearly visible in the upper catchment from Bickerstaffe Road, there is taraire–puriri forest with frequent rewarewa, and occasional kohekohe and pukatea. This type probably continues down the watercourse in more humid, shady, sheltered areas.

(c) In the upper catchment hillslope there are stands of totara with common emergent kahikatea, frequent nikau and puriri, and occasional kanuka.

Fauna

Not surveyed.

Significance

There is insufficient information to determine whether this site merits a higher significance level. None of the ecological units appear to be representative, using current information.

BICKERSTAFFE AIRSTRIP FOREST

Survey no.	Q08/154
Survey date	29 November 2005
Grid reference	Q08 317 567 (2 remnants)
Area	5.5 ha
Altitude	40–62 m asl

Ecological unit

(a) Taraire–puriri forest on moderate to steep hillslope (100%)

Landform/geology

Hillslopes and gullies underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

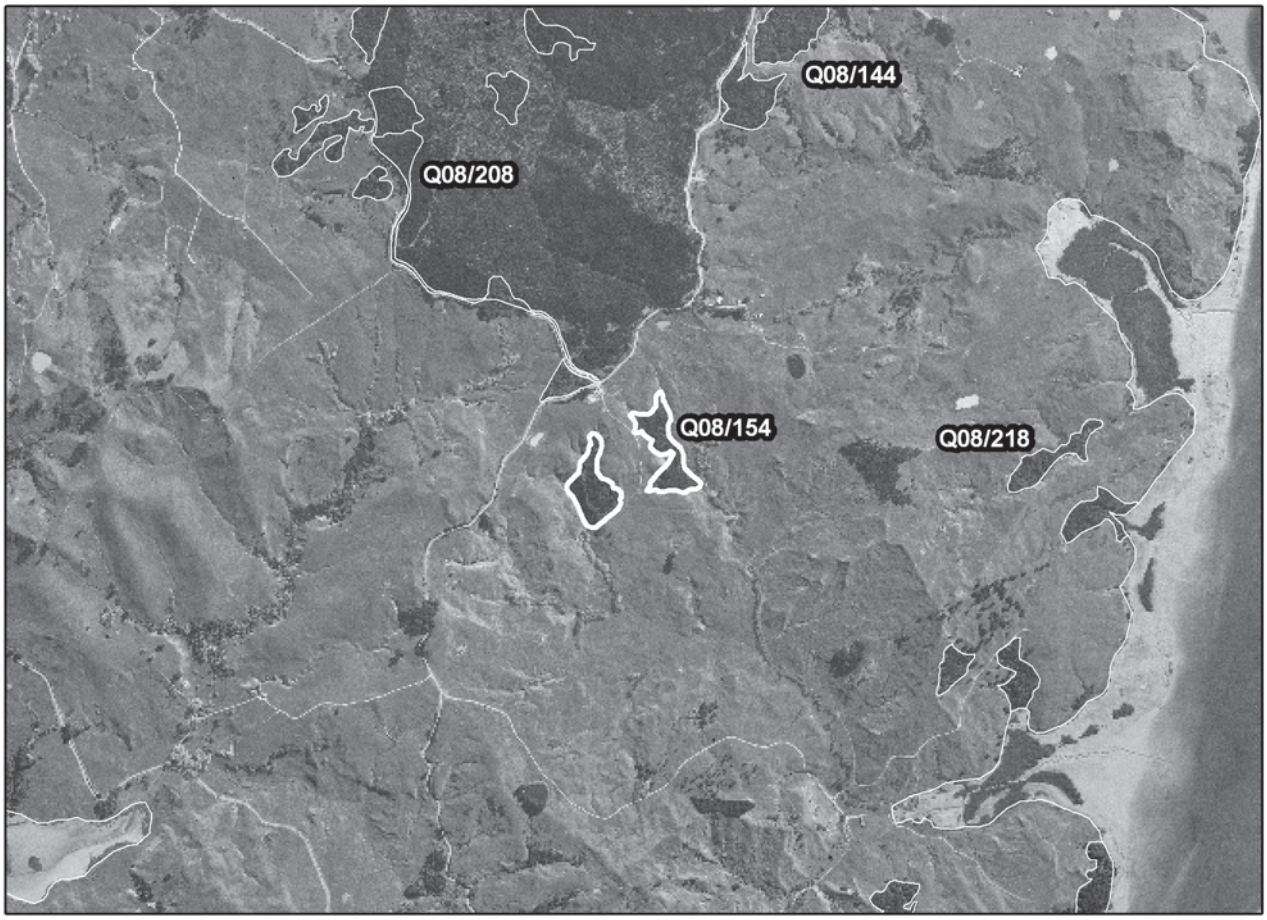
This site comprises two small remnants of forest on both sides of an airstrip near Bickerstaffe Road. The westernmost remnant is sheltered by a row of tall macrocarpas on its western side. A few constructed ponds with breeding paradise shelducks are present in the surrounding landscape of pasture. The forest is dominated by taraire and puriri, with frequent karaka and rewarewa, and occasional ti kouka, mamaku, nikau, kohekohe and emergent kahikatea. Parts of the site are fenced.

Fauna

Paradise shelduck.

Significance

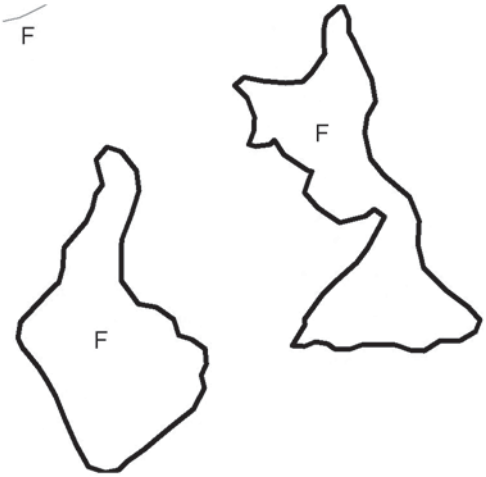
These remnants are quite small, and are not representative examples of their types, but they are locally important as habitat ‘stepping stones’ for wildlife in a landscape where indigenous forest is now much reduced.



Q08/154 Bickerstaffe Airstrip Forest

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



BATLEY ROAD RIPARIAN FOREST REMNANTS

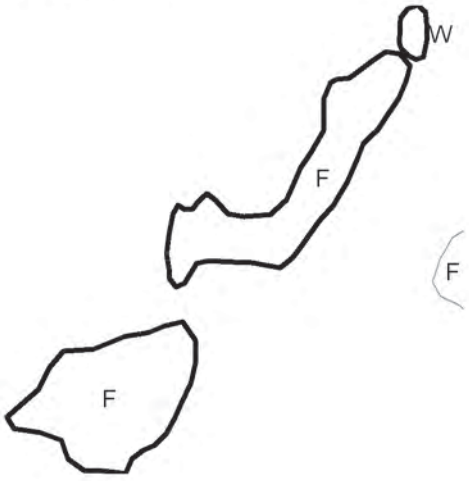
Survey no.	Q08/155
Survey date	29 November 2005
Grid reference	Q08 306 542 (3 remnants)
Area	3.1 ha (3.0 ha forest, 0.1 ha wetland)
Altitude	40–60 m asl



Q08/155 Batley Road Riparian Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Kahikatea–kanuka–taraire–totara forest in gully (96%)

(b) Raupo reedland in small depression (4%)

Landform/geology

Gully in Cretaceous siliceous mudstone (Whangai Fmn, Mangakahia Complex).

Vegetation

This site comprises two forest remnants and a small raupo-dominant wetland along the riparian margin of a small creek parallel with Batley Road. The four

main species in the canopy are kahikatea (some relatively old), taraire, kanuka and totara. Frequent species include mahoe, mapou, ti kouka, karaka, nikau, mamaku and kawakawa. Occasional species include matai, tarata, karamu, titoki, rimu, rewarewa, mamangi, *Coprosma areolata* and woolly nightshade.

Fauna

A spotless crake tape was played in close proximity to the wetland, but elicited no response.

Significance

The site shows evidence of prolonged grazing and trampling in its general poor condition, lack of understorey and sparseness of canopy trees. It is not a good example of riparian forest, but does provide a small amount of riparian protection.

UPPER RAEPARE CREEK FOREST REMNANTS

Survey no.	Q08/160
Survey date	2 December 2005
Grid reference	Q08 371 580 (6 remnants)
Area	25.6 ha
Altitude	0–67 m asl

Ecological units

(a) Kanuka–totara–kowhai forest on gentle coastal margin (45%)

(b) Taraire forest in gully (20%)

(c) Totara–kowhai forest in gully (20%)

(d) Totara–kanuka–kahikatea forest on moderate hillslope (10%)

(e) Kahikatea–pukatea forest in gully (5%)

Landform/geology

Coastal hillslopes underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex), melange (undifferentiated Mangakahia & Motatau Complex lithologies), and Miocene thinly interbedded sandstone and mudstone (Waitemata Group).

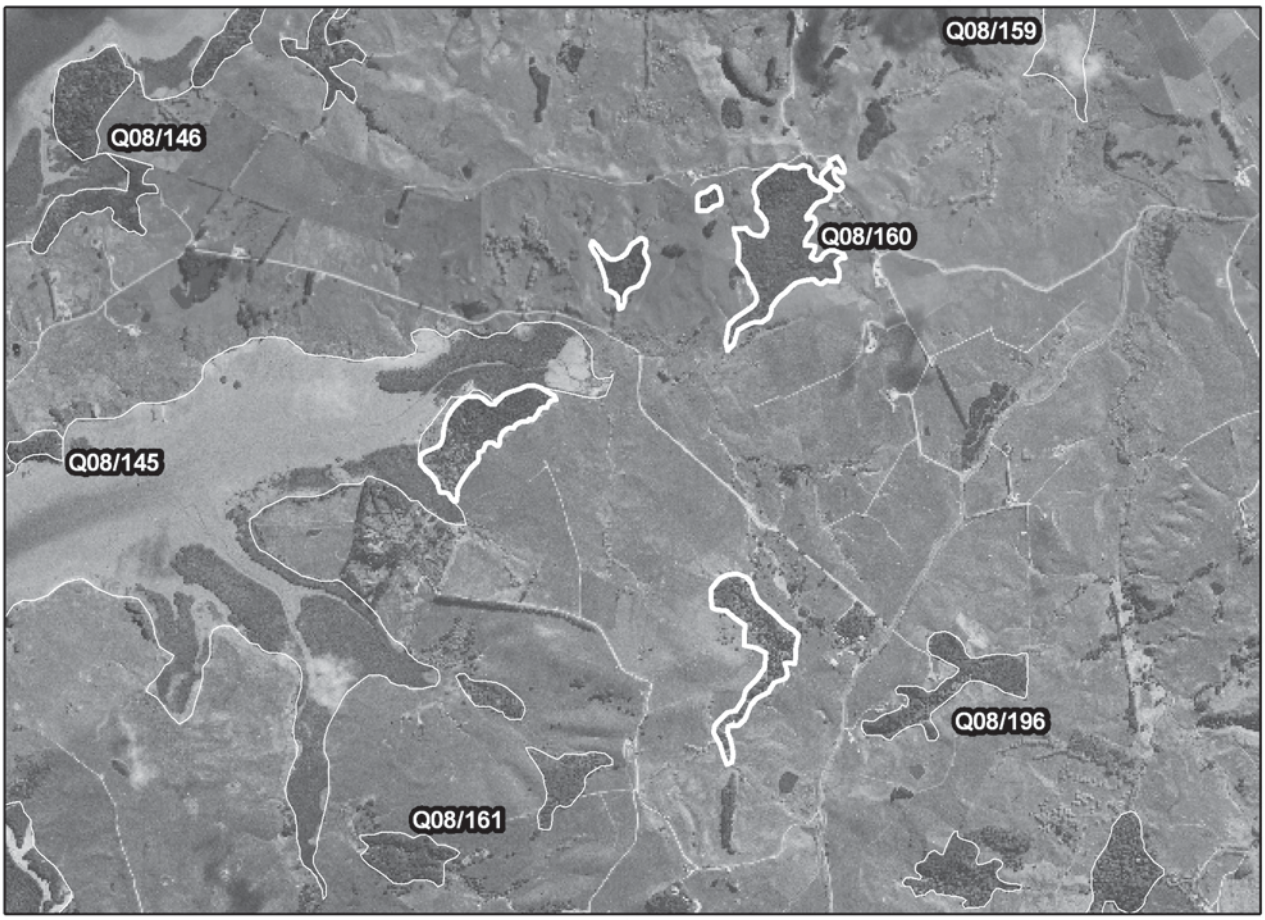
Vegetation

This site comprises six remnants of indigenous forest spread across the exotic pastoral landscape of the upper Raepare Creek, from the creek margin up to Ranganui Road. Though one remnant is 700 m distant from the rest, these remnants would all once have formed continuous forest cover, hence they have been united in one site.

(a) The largest forest remnant, directly on the coastal margin, has a canopy composed of equal proportions of kanuka, totara and kowhai, with frequent ti kouka and occasional kahikatea, kauri, mamaku, harakeke, woolly nightshade and hawthorn. The edges of this particular remnant are quite sparse and open, and exotic grassland is present underneath the canopy.

(b) In the gully of the northeastern remnant, the forest is dominated by taraire, with frequent karaka and rewarewa, and occasional nikau and kanuka.

(c) The gully of the southernmost remnant has a canopy of totara and subdominant kowhai with frequent kahikatea.



Q08/160 Upper Raepare Creek Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(d) Some of the small remnants and edges of larger remnants in the upper catchment (near Ranganui Road) comprise totara, kanuka and emergent kahikatea. Mamaku, pukatea and rewarewa are frequent, and a range of species are occasionally present, including emergent rimu and kauri, nikau, titoki, tawa, mamangi, puriri and Tasmanian blackwood.

(e) Small parts of the gully in the north are dominated by dense kahikatea and pukatea.

Fauna

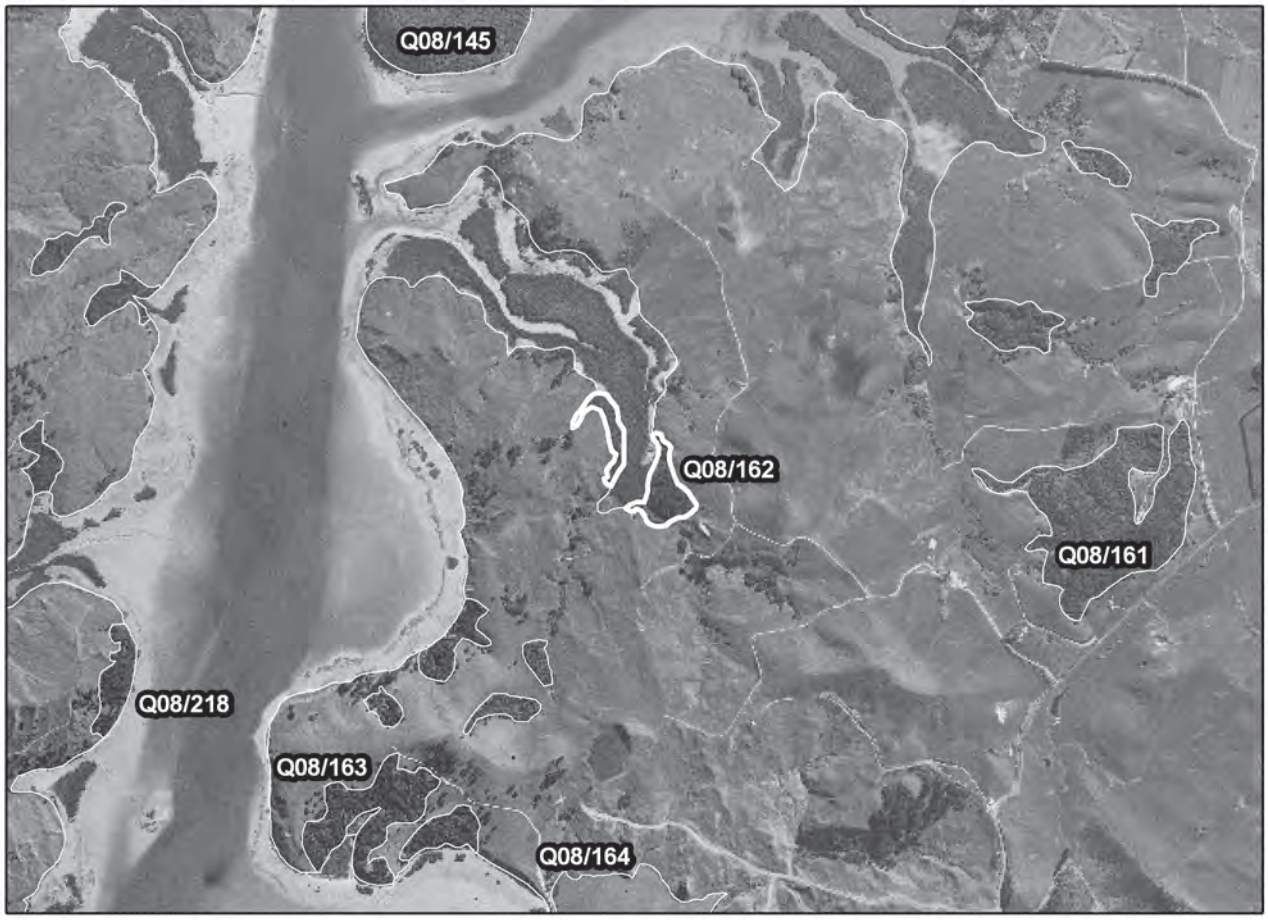
Not surveyed.

Significance

This site is quite heavily degraded (grazing, trampling, clearance), but it provides a partial protective buffer to the estuarine habitats of the Raepare Creek.

AWAROA CREEK COASTAL FOREST REMNANTS

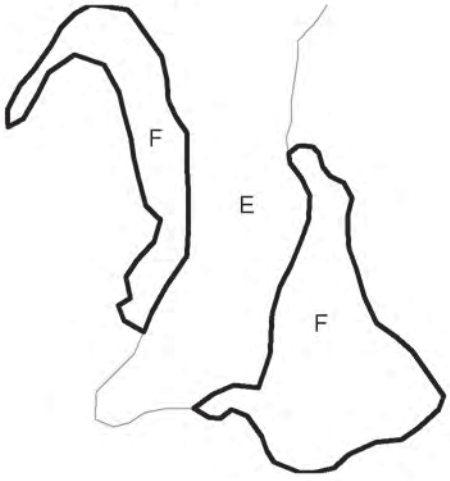
Survey no.	Q08/162
Survey date	Not surveyed
Grid reference	Q08 350 559 (2 remnants)



Q08/162 Awaroa Creek Coastal Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Area	4.5 ha
Altitude	0–30 m asl

Ecological unit

(a) Totara–kanuka–kowhai forest on gentle coastal margin (100%)

Landform/geology

Coastal hillslopes underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site was not visible from public roads or from a boat on the harbour waters and so the vegetation type was extrapolated through study of a recent aerial photograph (flown in 2002). The texture of the canopy suggests that the forest type is probably mainly totara and kanuka, while the location on a gentle coastal margin next to a mangrove-filled inlet, suggests that kowhai may be common.

Fauna

Not surveyed.

Significance

There is insufficient information about the site to assign a higher significance than Level 2 particularly given its small size. 1.4 ha of forest in this site is within the Otamatea River Marginal Strip No. 2 (administered by DOC).

WAIAROHIA CREEK FOREST AND WETLAND

Survey no.	Q08/165
Survey date	7 December 2005
Grid reference	Q08 349 537 (4 remnants)
Area	7.2 ha (6.6 ha forest, 0.6 ha wetland)
Altitude	0–50 m asl

Ecological units

(a) Kanuka–totara treeland on moderate hillslope (32%)

(b) Totara–kowhai forest on gentle coastal margin (30%)

(c) Totara–kahikatea forest on moderate hillslope (30%)

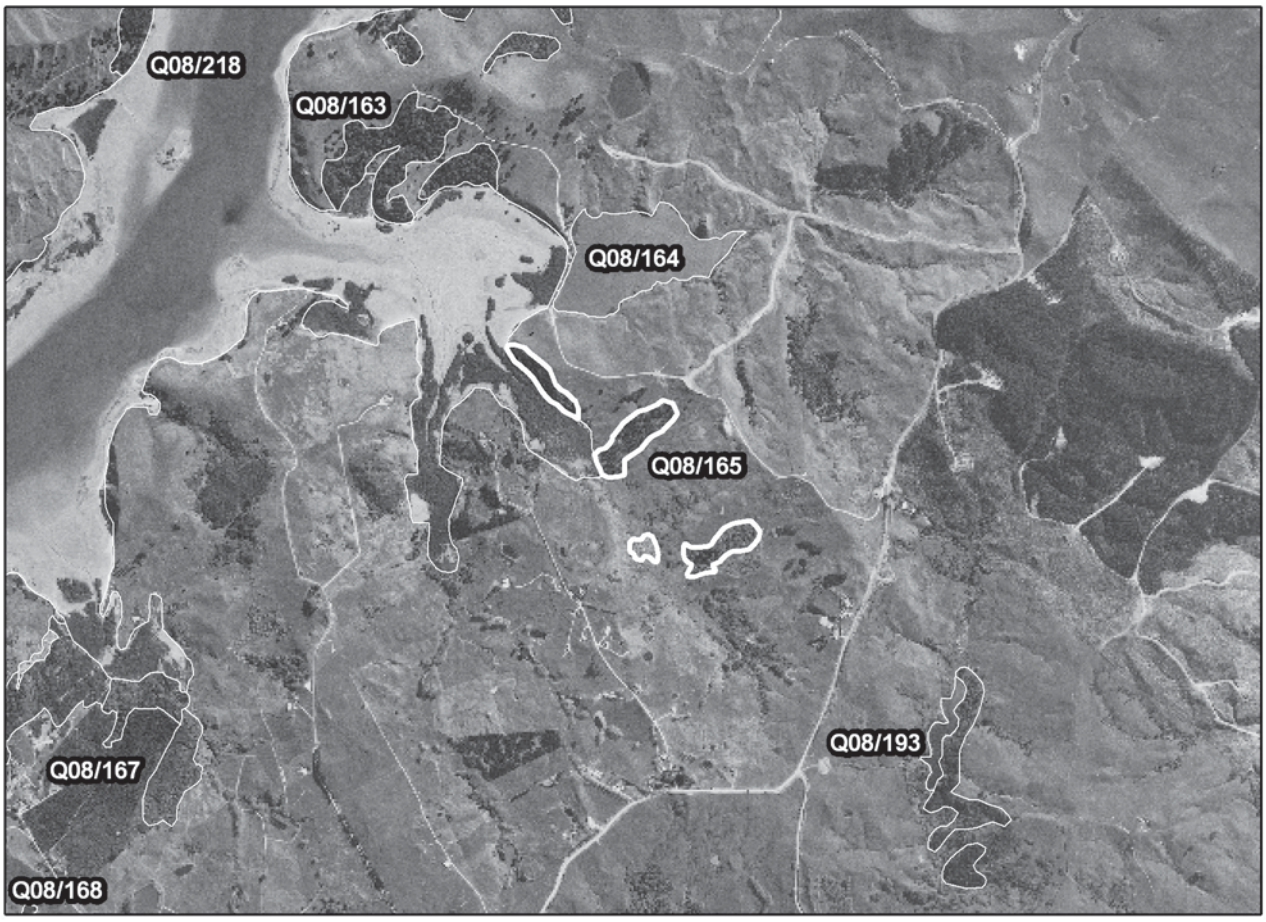
(d) Raupo reedland in small depression (8%)

Landform/geology

Coastal hillslope underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex); gullies underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies); and valley wetland on Holocene alluvium.

Vegetation

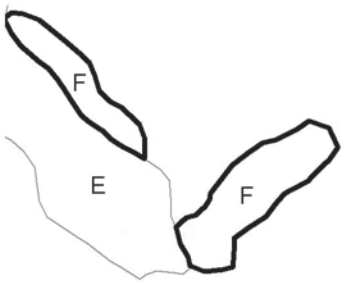
This site comprises two forest remnants, a treeland remnant and a wetland remnant, all within the valley of Waiarohia Creek on the eastern shore of the Otamatea River. The remnants are interspersed with gorse and woolly nightshade, or mixtures of these with occasional regenerating indigenous species including mahoe, manuka, ti kouka, mamaku and totara. Some of these sparse and recent shrublands (mostly dominated by weeds) have been killed in the last year or so (possibly by spraying).



Q08/165 Waiarohia Creek Forest and Wetland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres





(a) Kanuka–totara treeland with occasional ti kouka occupies the largest remnant (in the centre), and appears to be heavily grazed and lacking regeneration underneath.

(b) The forest remnant on the coastal margin is a high quality, but small, patch of totara–kowhai forest with frequent karaka. It abuts tall mangroves in the upper tidal inlet.

(c) The southeastern forest remnant was not easily visible from public roads or from a boat on the river, hence its vegetation type has been extrapolated using

recent aerial photography (flown in 2002). The forest canopy appears to be a mixture of totara and kahikatea.

(d) A small area of raupo reedland fills part of the lower freshwater creek. The site would probably support a larger indigenous wetland if not grazed, as surrounding vegetation in the channels appears to be largely grazing-induced exotic rushland.

Fauna

Not surveyed.

Significance

This site contains small, poorly connected remnants and none of the ecological units present are the best examples of their type. The remnants have potential value as habitat for forest birds using a number of forest patches in the landscape, and may contain waterbirds such as the spotless crake, marsh crake or banded rail (due to the wetland's proximity to the coast), however there is currently no information known about the fauna of the site. The Otamatea Marginal Strip No. 2 (administered by DOC) covers 0.6 ha of (b) totara–kowhai forest on gentle coastal margin.

OWHEI CREEK FOREST REMNANTS

Survey no.	Q08/168
Survey date	13 December 2005
Grid reference	Q08 324 522 (7 remnants)
Area	26.1 ha (25.9 ha forest, 0.2 ha wetland)
Altitude	0–100 m asl

Ecological units

(a) Taraire–puriri–kowhai–kanuka forest on gentle coastal margin (40%)

(b) Kanuka forest on gentle hillslope (40%)

(c) Totara–kowhai forest on gentle hillslope (10%)

(d) Kanuka–totara forest on gentle coastal margin (9%)

(e) Open water (constructed freshwater farm pond) (1%)

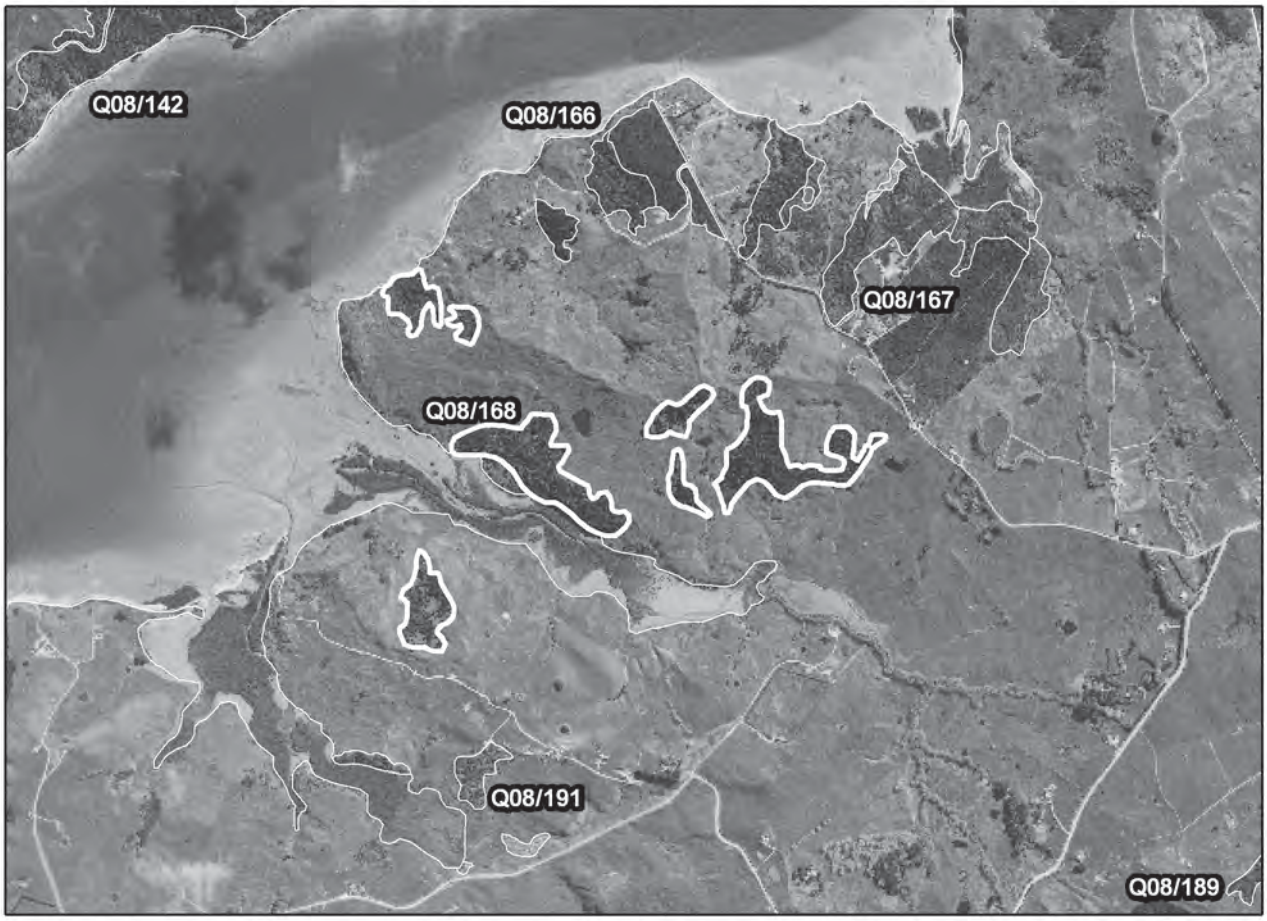
Landform/geology

Coastal hillslopes underlain by Cretaceous–Paleocene thinly bedded calcareous mudstone (Whangai Fmn, Mangakahia Complex), Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex), and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site comprises seven indigenous forest remnants in the catchment of Owhei Creek, a small tidal inlet of the Otamatea River (Q08/062). Most of the creek catchment is vegetated in pasture, though frequent infestations of gorse and woolly nightshade are present.

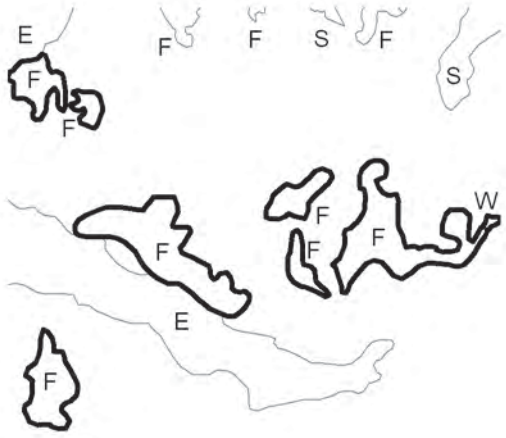
(a) The largest remnant of forest is directly on the northern coastal margin of Owhei Creek. This has a species rich canopy, dominated by four species (taraire, puriri, kowhai and kanuka) accompanied by frequent kahikatea, ti kouka and karaka. Occasional manuka and matai are also present.



Q08/168 Owhei Creek Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(b) Remnants in the eastern catchment are dominated by kanuka. Kahikatea, puriri and totara are frequent, and ti kouka is occasional.

(c) On the southern side of the creek, the main forest trees are totara and kowhai in particular. Frequent puriri are also present.

(d) The small remnant on Te Hoanga Point comprises kanuka and totara with occasional ti kouka.

(e) A small farm pond lies adjacent to an area of indigenous forest in the eastern catchment.

Fauna
Not surveyed.

Significance
This site contains no representative ecological units, and is not known to support any threatened or unusual species of any sort. The site is highly fragmented and grazed, which reduces its natural values, and also increases its vulnerability to weed invasion. The northern shore remnant is the highest quality part of the area, and serves as a protective vegetation buffer to the estuarine habitats of the Owhei Creek.

GRIFFIN ROAD FOREST REMNANTS

Survey no.	Q08/172
Survey date	16 December 2005
Grid reference	Q08 299 651 (10 remnants)
Area	31.0 ha
Altitude	40–114 m asl

Ecological units
(a) Taraire–totara forest on moderate hillslope (40%)

(b) Totara–kahikatea forest in gully (40%)

(c) Kanuka–totara forest on moderate hillslope (20%)

Landform/geology
Hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex) and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

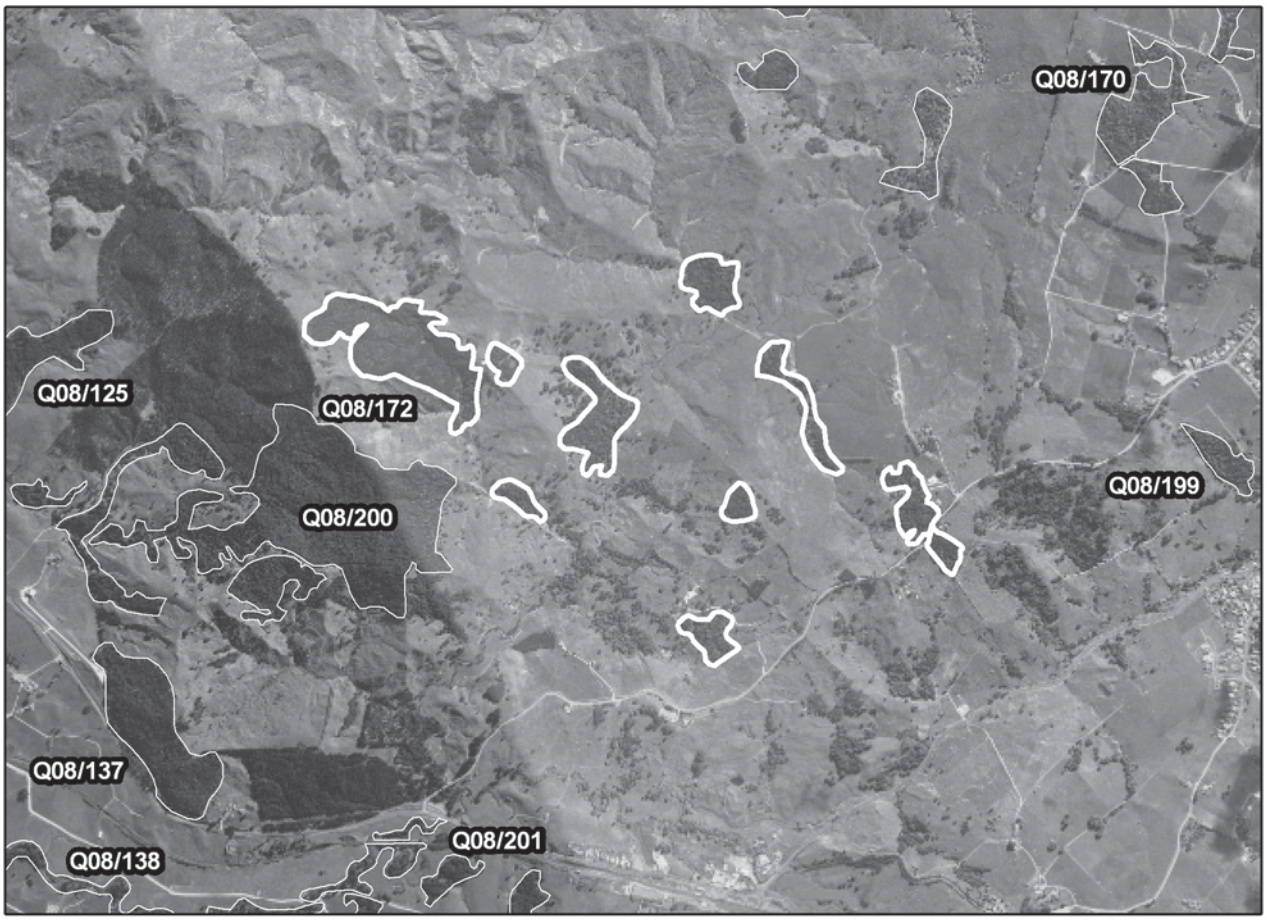
Vegetation
On the northern side of Griffin Road, in part of the headwaters of the Pahi River, there are ten small indigenous forest remnants scattered across pastoral land. Some of these, in particular the largest on the western side, are not visible from Griffin Road, therefore the vegetation description of this site is extrapolated from those parts which are visible combined with study of recent aerial photography (flown in 2002). It was determined that at least three main forest types are present:

(a) On hillslopes the main forest type is abundant taraire associated with common totara. Rewarewa, nikau and kahikatea are frequent, with occasional pukatea and kohekohe. One particular patch which spans the road and abuts a residential property has several weed infestations, including velvet groundsel, kahili ginger, elaeagnus, agapanthus and busy lizzie.

(b) In gullies, the main forest type is dominated by totara and kahikatea. Kanuka occurs frequently, with occasional kowhai and nikau.

(c) The large (obscured) western remnant appears to comprise a substantial amount of even-canopied kanuka–totara forest on the outside of the remnant, with gullies most likely comprising type (b) totara–kahikatea forest.

Fauna
Not surveyed.



Q08/172 Griffin Road Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Significance

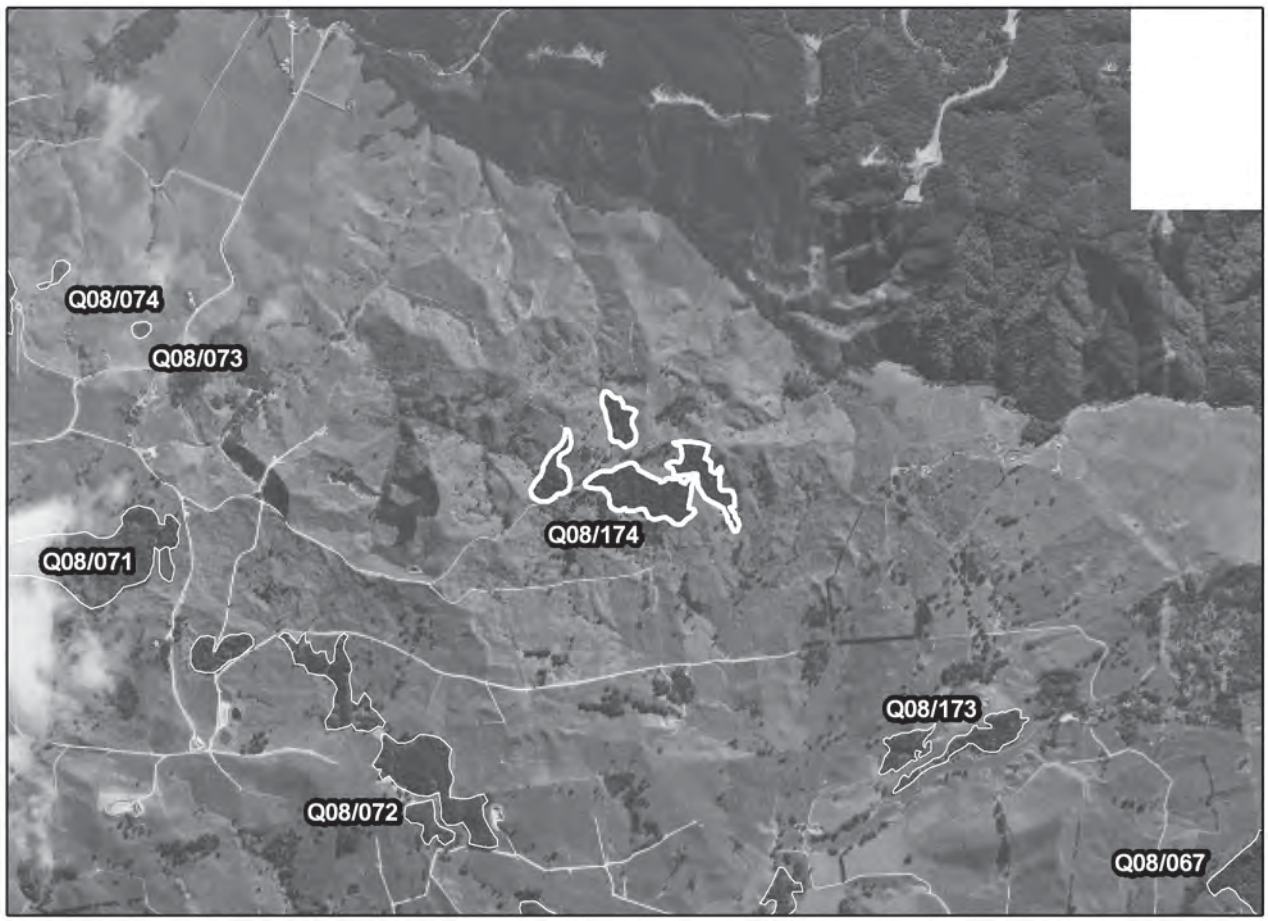
This site does not contain any representative ecological units and there is insufficient information on enough of the remnants to fully assess the significance of the site. The presence of environmentally damaging weed species in one of the remnants along Griffin Road is of concern. In particular velvet groundsel, kahili ginger and elaeagnus threaten to spread and further impair natural character and function in the roadside remnant. Velvet groundsel was not recorded anywhere else in Otamatea ED Northland.

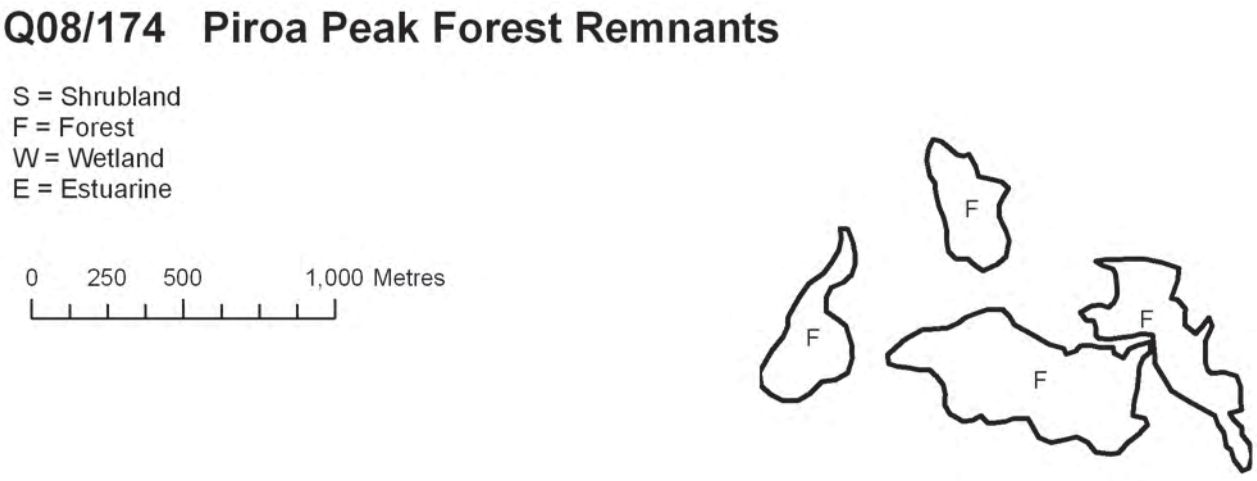
PIROA PEAK FOREST REMNANTS

Survey no.	Q08/174
Survey date	Not surveyed
Grid reference	Q08 362 681 (4 remnants)
Area	9.1 ha
Altitude	74–140 m asl

Ecological unit

(a) Totara–kahikatea forest on moderate to steep hillslope (100%)





Landform/geology

Hillslopes underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

This site comprises four indigenous forest remnants on a hill top to the east of Piroa Road, southwest of the Piroa Stream valley. The site was not visible from public roads, therefore the forest type was interpreted from recent aerial photography (flown in 2002) by comparing it with a nearby surveyed site showing similar characteristics (Piroa Road Forest Remnants 2, Q08/072).

Fauna

Not surveyed.

Significance

There is insufficient information to assign a higher significance to this site than Level 2.

TITIPU ISLAND

Survey no.	Q08/176
Survey date	12 January 2006
Grid reference	Q08 152 523
Area	1.9 ha (0.7 ha forest, 1.2 ha shrubland)
Altitude	0–20 m asl

Ecological units

(a) Manuka shrubland on gentle hillslope (63%)

(b) Pohutukawa–radiata pine treeland on steep coastal margin (37%)

Landform/geology

Steep-sided islet formed of Miocene volcaniclastic gravelly sandstone (Waitakere Group).

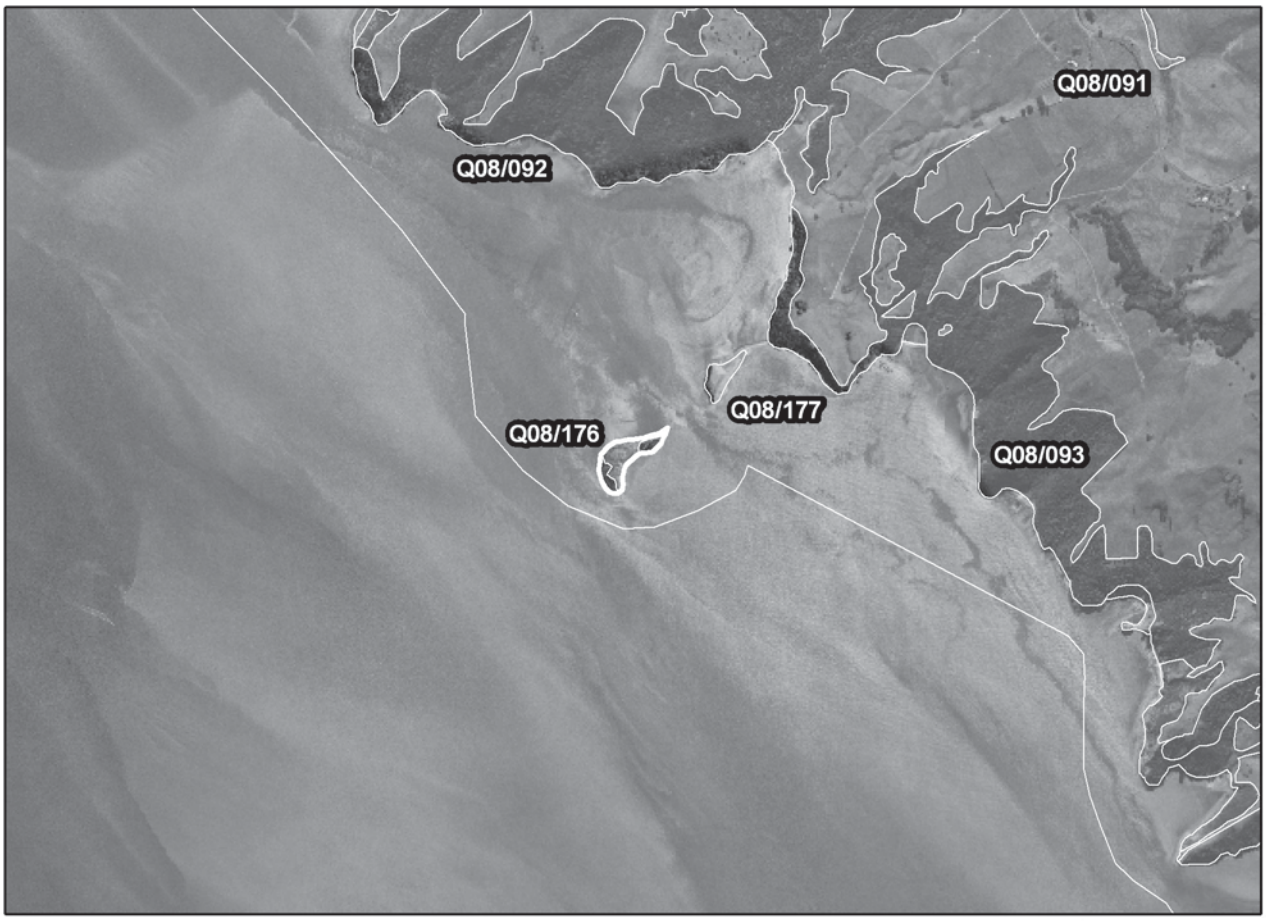
Vegetation

Titipu Island lies in the inner Kaipara Harbour, approximately 160 m southwest of Pupuia Island, and within 450 m of the nearest point on the mainland (Hukatere peninsula). It is separated from Pupuia Island by a relatively deep channel, which cannot be crossed by foot at low tide. The island is steep and is covered by mixed indigenous and exotic vegetation.

(a) The island's highest parts have manuka shrubland with frequent harakeke and ti kouka, and occasional mingimingi, kowharawhara, *Coprosma macrocarpa*, karamu and mapou. The shrubland is divided into patches interspersed with exotic grasses.

(b) On the less steep northeastern end there is a treeland of large pohutukawa and radiata pine with frequent karaka and occasional kowharawhara.

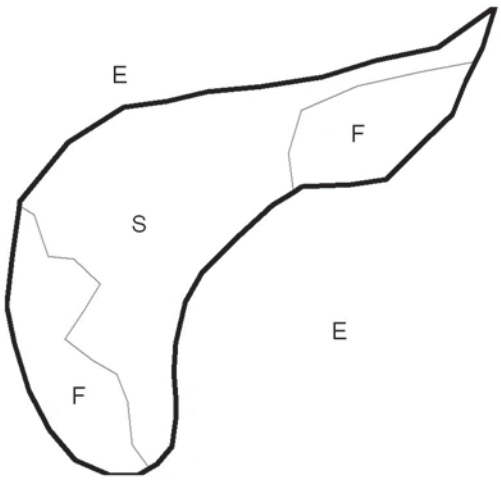
A 1993 plant species list includes some interesting species rarely recorded in Otamatea ED Northland such as *Cheilanthes sieberi*, *Drosera auriculata* and *Pimelea prostrata* (SSBI Q08/H057). These are probably all relatively common in the ED, however.



Q08/176 Titipu Island

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Fauna

For a long time, Titipu Island was a breeding place for reef herons (Nationally Endangered), but none have been recorded there since 1965 (Veitch 1979). Three species of indigenous landsnail were recorded by in 1993: *Delos coresia, Phenacohelix giveni* and *Phenacohelix* 'golden' (indeterminate). None of these are threatened species. Several indigenous and exotic wasps and bees were also present (SSBI Q08/H057).

Significance

None of the ecological units present are considered to be particularly good examples of their type, but they are healthier than nearby Pupuia Island. Titipu Island is a Recreation Reserve[15] administered by DOC.

PUPUIA ISLAND

Survey no.	Q08/177
Survey date	12 January 2006
Grid reference	Q08 154 526
Area	1.0 ha
Altitude	0–20 m asl

Ecological unit

(a) Exotic grassland with occasional ti kouka and kowharawhara on steep coastal margin (100%)

Landform/geology

Steep-sided islet connected to mainland at low tide; formed of Miocene volcaniclastic gravelly sandstones and basaltic lava flows (Waitakere Group). The island contains part of the Strawberry Bay pillow lava flows (Kenny and Hayward 1996).

Vegetation

Pupuia Island lies less than 80 m from the Hukatere peninsula coast, in shallow waters of the Kaipara Harbour (Q08/096). At low tide the island is accessible to terrestrial animals across exposed sandflats. Exotic grasses (mainly kikuyu, buffalo grass and saltwater paspalum) dominate the vegetation on the island (SSBI Q08/H072), with occasional indigenous species dotted around, e.g. ti kouka, harakeke and kowharawhara. Occasional gorse bushes are also present. Dead remains of pohutukawa hint at the previous vegetation cover.

Fauna

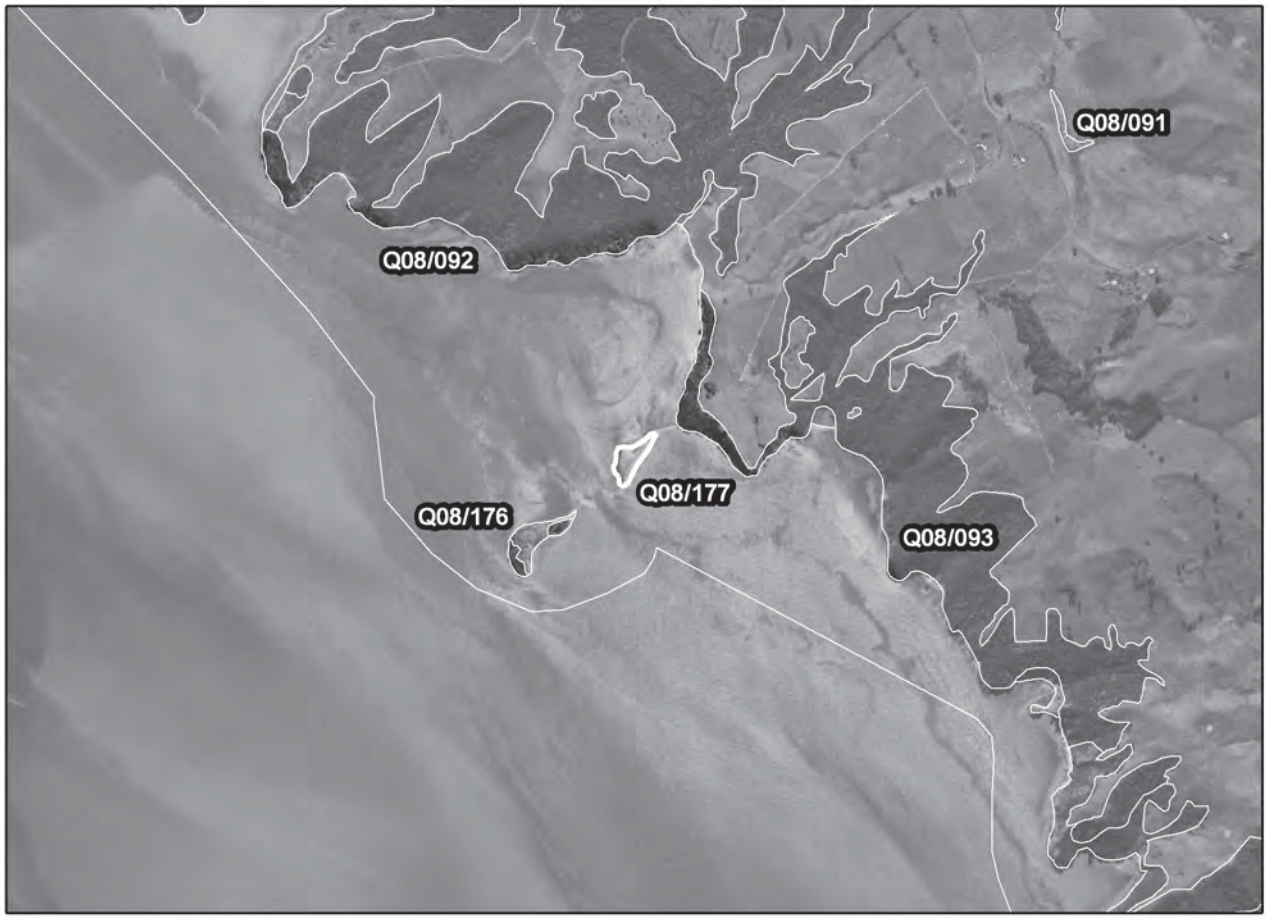
The fauna of the island were not surveyed during the present survey. A survey in 1993 recorded no birds, but did note an indigenous shore earwig (SSBI Q08/H072).

Significance

Present knowledge suggests the island is little different from mainland coastal exotic grassland, and is probably still often visited by grazing animals (e.g. sheep) and feral mammals (e.g. possums, rabbits, stoats, cats, rats, etc.). The Strawberry Bay pillow lava is a nationally important geological site (Kenny & Hayward 1996), however its representative value is recognised as part of an ecological unit with indigenous vegetation at neighbouring Te Kiakia Bay Forest Remnants (Q08/093).

---

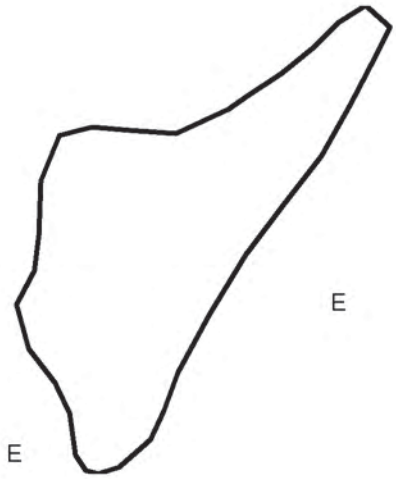
[15] Note that the primary purpose of a Recreation Reserve is not biodiversity protection, but recreation, and that, with the exception of animals protected by the Wildlife Act 1953, recreation over-rides biodiversity protection (Reserves Act 1997).



Q08/177 Pupuia Island

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Significance

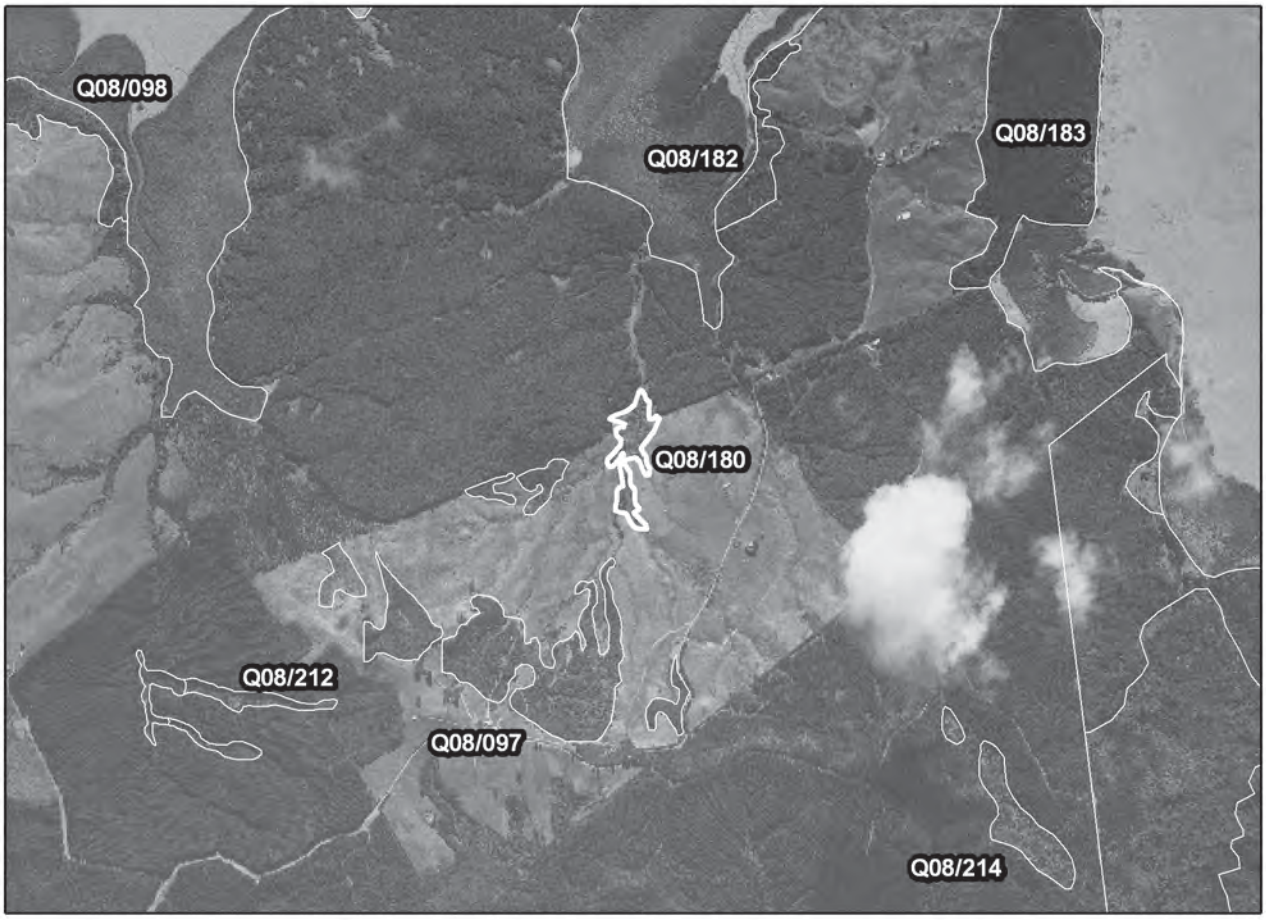
This area is very small, but is potential habitat for threatened wetland birds, such as the NI fernbird and spotless crake, though none were detected here at the time of the survey. It is vulnerable to increased exposure following the felling of pines around it. It is also highly weed infested, with Mexican devil in particular affecting its natural character and function.

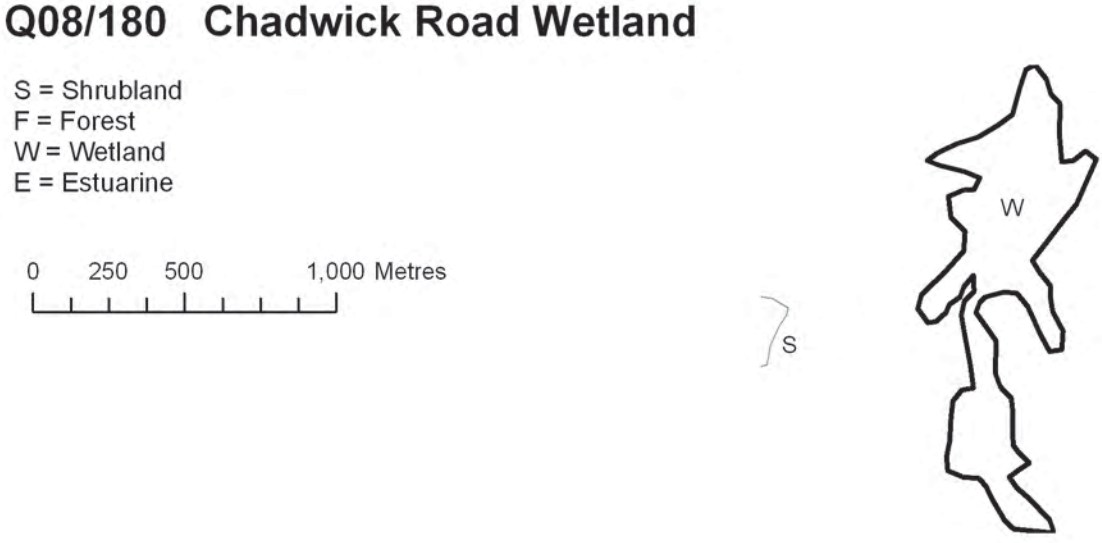
CHADWICK ROAD WETLAND

Survey no.	Q08/180
Survey date	Not surveyed
Grid reference	Q08 226 532
Area	3.1 ha
Altitude	20–31 m asl

Ecological unit

Not known





Landform/geology
Hillside underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies), and valley wetland on Holocene alluvium.

Vegetation
This site was not visible from public roads and its vegetation type could not be interpreted from aerial photography (flown in 2002). The freshwater wetland on Chadwick Road was last surveyed in 1977 by the NZ Wildlife Service (SSBI Q08/H045). At this time it was a 'long, narrow, branching swamp, no open water' and contained 'cabbage tree/raupo–flax, border of totara–cabbage tree scrub', which was regarded as excellent habitat for spotless crake and Australasian bittern. 2002 aerial photography (flown in 2002) suggests that raupo is no longer present, and what remains may be either indigenous shrubland or gorse scrub. The wetland may have been drained. Another ground-based survey is required.

Fauna
Not surveyed. Spotless crake (Sparse) and Australasian bittern (Nationally Endangered) were recorded in 1977.

Significance
At present there is insufficient information about the nature of the current vegetation and the fauna that inhabit it to raise the significance of this site. If either of the above bird species were currently known to use the area this site would certainly be elevated to Level 1.

BEATSON ROAD FOREST REMNANT

Survey no.	Q08/181
Survey date	8 December 2005
Grid reference	Q08 222 580
Area	7.8 ha
Altitude	11–60 m asl

Ecological unit
(a) Totara–kahikatea forest on moderate hillslope (100%)

Landform/geology
Coastal hillslope underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation
This site comprises an indigenous forest remnant on the southwestern side of Beatson Road, on the west coast of a small peninsula in the Arapaoa River (Q08/084). It is surrounded by grazed pasture. Livestock have access to the forest, and consequently there is a general lack of undergrowth. The forest comprises tall, young totara and kahikatea with frequent puriri, kanuka and tree privet. There are occasional ti kouka, nikau, kohekohe, mamangi, five finger, rewarewa, karaka and kowhai.

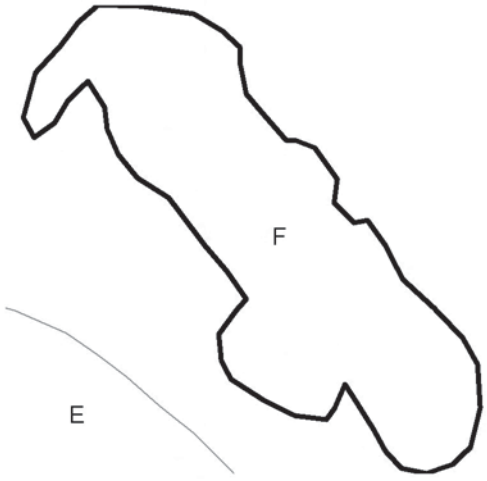
Fauna
Grey warbler.



Q08/181 Beatson Road Forest Remnant

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Significance

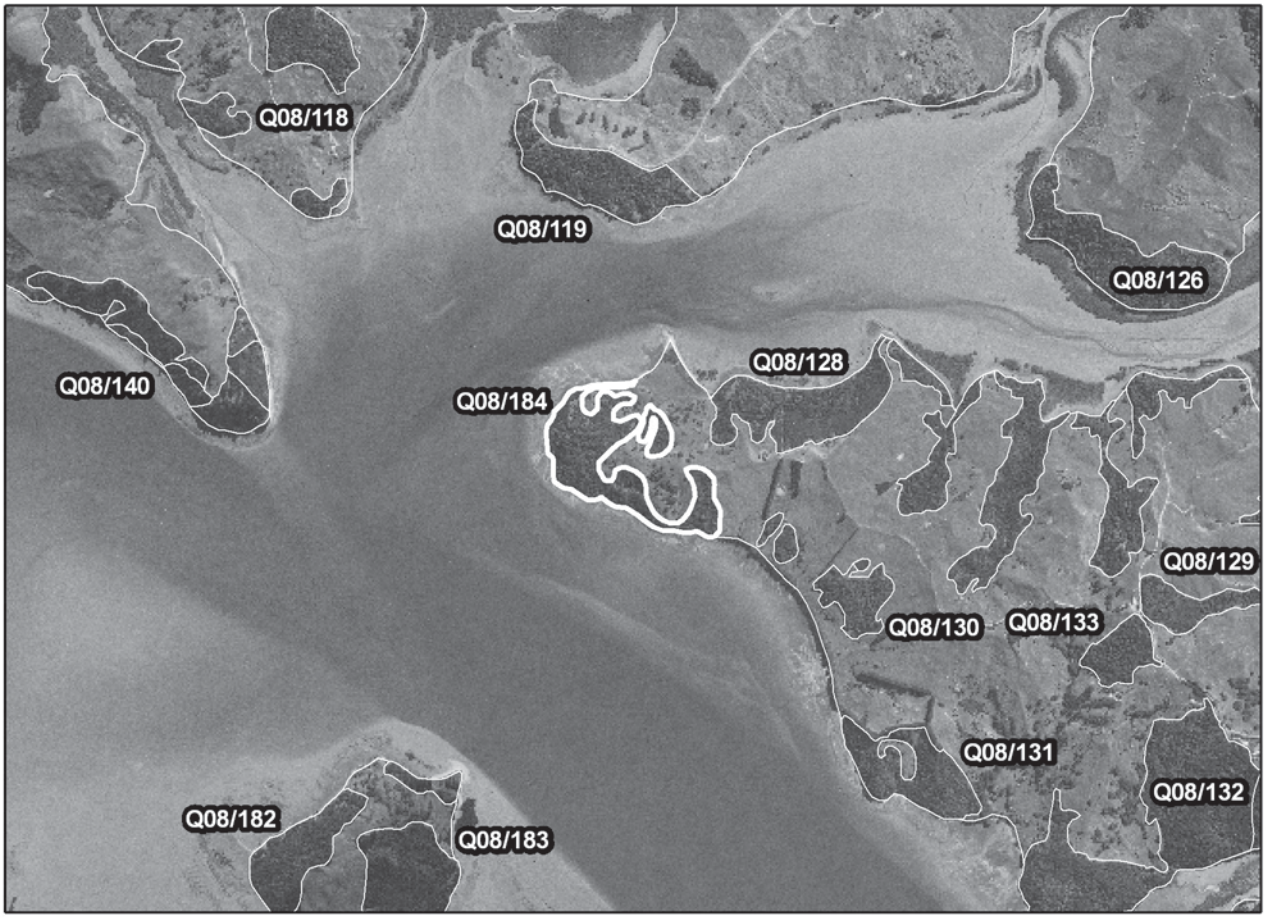
This site is not a good example of its ecological unit, which is better represented at other sites in Otamatea ED Northland. It suffers from strong edge effects, grazing, and weed infestation.

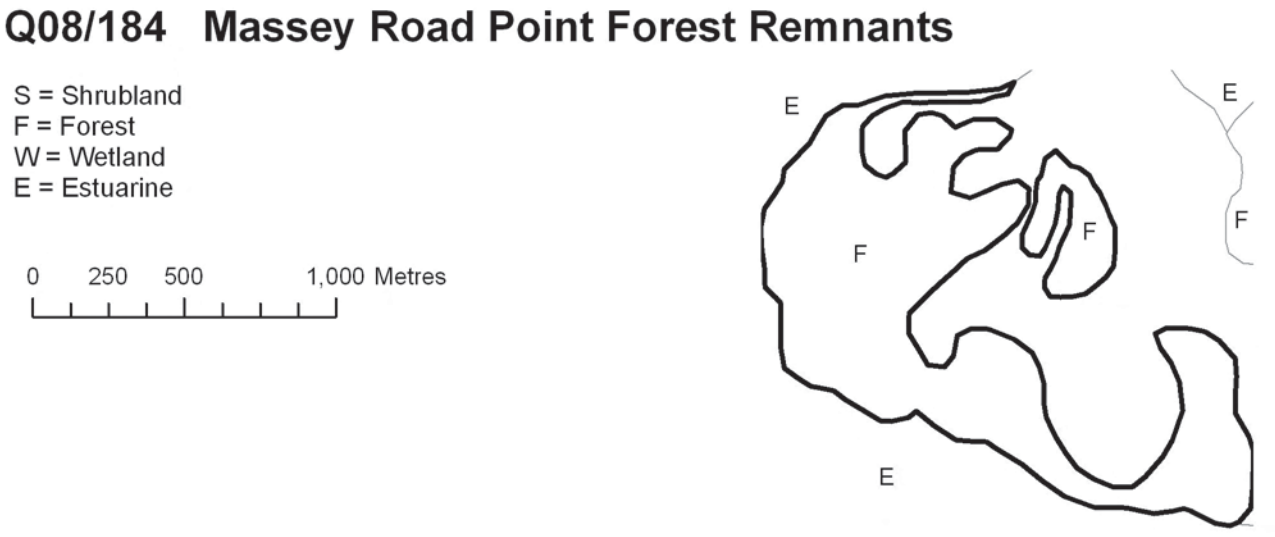
MASSEY ROAD POINT FOREST REMNANTS

Survey no.	Q08/184
Survey date	9 December 2005
Grid reference	Q08 247 567 (4 remnants)
Area	8.7 ha
Altitude	0–60 m asl

Ecological units

(a) Totara–puriri forest on steep coastal margin (60%)





(b) Kanuka–totara forest on gentle coastal margin (40%)

Landform/geology

Coastal headland underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

This site comprises a stand of indigenous forest on the point forming the southern edge of Whakapirau Creek (which is opposite Page Point Forest and Shrubland (Q08/140) on the northern edge). Massey Road extends part way along the point. This site was surveyed from the water, though views were often obscured by several rows of radiata pine planted immediately adjacent to the coastline. These pines shield the indigenous forest from northwest winds blowing down the Arapaoa River (Q08/084). The forest remnants are intermingled with patches of pasture and scattered indigenous trees. The whole point, including the forest, appears to be grazed.

(a) The main remnant on the end of the point is dominated by totara and puriri. Kowhai, taraire and kanuka are frequent, and emergent kahikatea are scattered throughout.

(b) The outlying remnants and edges contain an impoverished kanuka–totara forest.

Fauna

Australasian harrier.

Significance

Neither of the ecological units present is a particularly good example of its type, and no threatened or significant species are known to occur here. The existing forest is threatened by degradation from grazing and trampling by livestock.

TAHUPO CREEK COASTAL FOREST REMNANTS

Survey no.	Q08/186
Survey date	9 December 2005
Grid reference	Q08 225 551 (2 remnants)
Area	4.4 ha
Altitude	0–26 m asl

Ecological unit

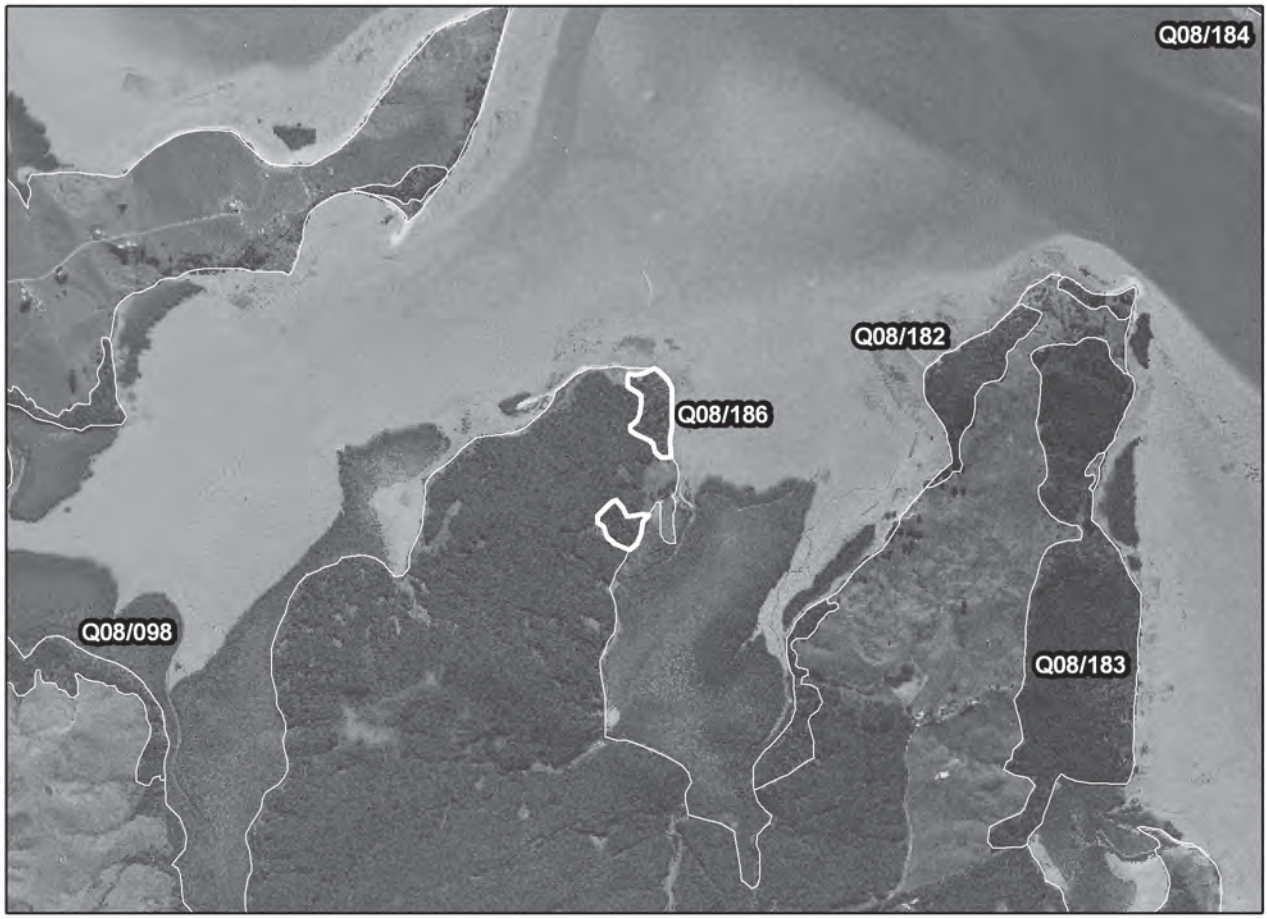
(a) Puriri–kanuka forest on gentle coastal margin (100%)

Landform/geology

Coastal hillsides underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

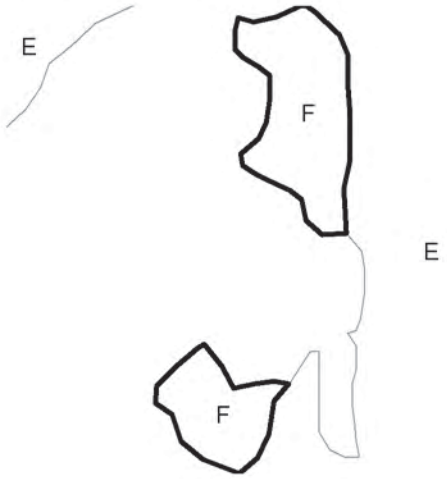
This site comprises two small, indigenous forest remnants on the banks of a tidal inlet named Tahupo Creek, which is a small indentation of the Arapaoa River (Q08/084) coastline. The remnants are surrounded by a tall Tasmanian blackwood plantation. The northern remnant lies opposite shallow mudflats, and the southern remnant lies next to mangrove shrubland and forest. Puriri is abundant and kanuka is common in the forest canopy. Several species occur



Q08/186 Tahupo Creek Coastal Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



frequently, including kahikatea, kowhai, ti kouka and totara. Pukatea and matai are scattered throughout.

Fauna

White-faced heron, kingfisher, grey warbler.

Significance

This site contains small remnants dominated by common coastal trees and is not considered representative of its type. However, it provides habitat for indigenous birds, and may be important as part of their habitat network.

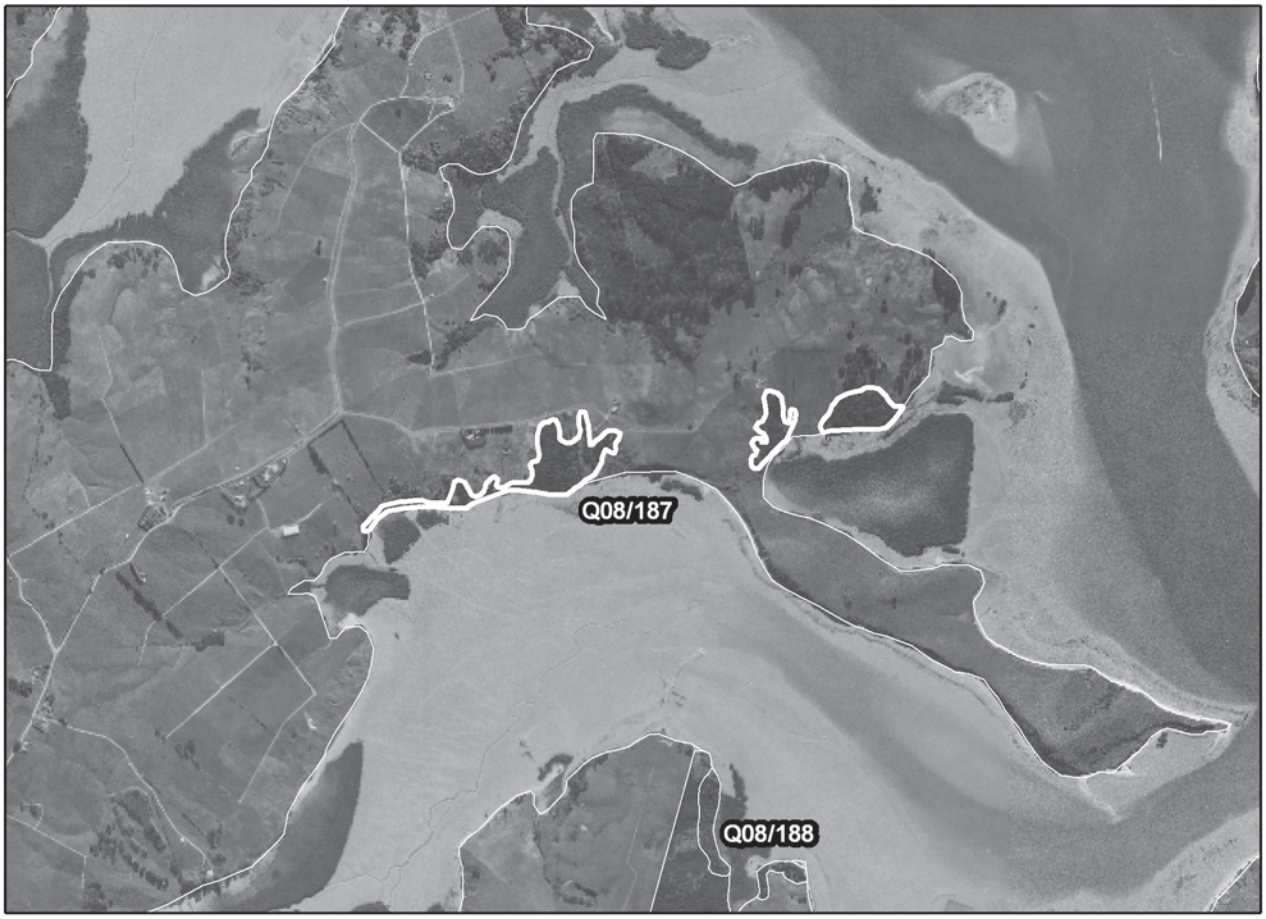
KARAKANUI ROAD FOREST REMNANTS

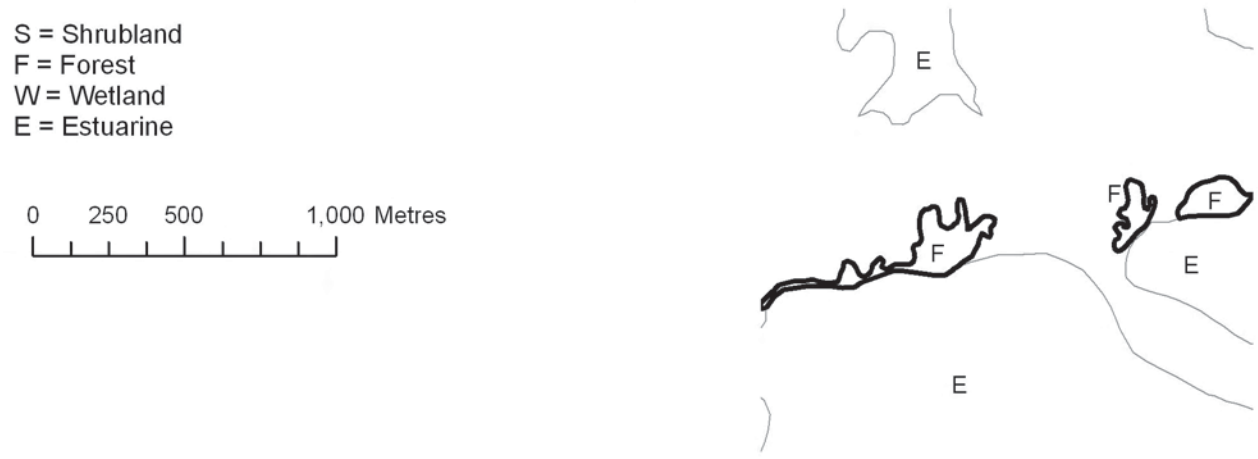
Survey no.	Q08/187
Survey date	9 December 2005
Grid reference	Q08 198 578 (3 remnants)
Area	10.7 ha
Altitude	0–40 m asl

Ecological units

(a) Kahikatea–totara forest on gentle coastal margin (35%)

(b) Kanuka–kowhai–puriri forest on gentle coastal margin (35%)





(c) Totara–puriri forest on gentle coastal margin (15%)

(d) Kanuka forest on gentle coastal margin (15%)

Landform/geology

Coastal hillside underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site comprises three remnants of indigenous forest on the coast below Karakanui Road. One is inside the Kirikiri Inlet next to open mudflats, and two are on a small mangrove-filled indentation of the Arapaoa River (Q08/084).

(a) Tall kahikatea are emergent over totara in the main remnant, which extends right to the coastline. Kowhai, karaka, ti kouka, puriri and hawthorn occur frequently, with occasional kohekohe.

(b) The easternmost remnant comprises kanuka–kowhai–puriri forest with frequent karaka and occasional emergent kauri and kahikatea.

(c) To the west of type (a) kahikatea–totara forest, there is a treeland extending along a narrow margin of the coast comprising puriri and totara, with frequent kowhai, kahikatea and hawthorn, and occasional ti kouka.

(d) Sparse kanuka forest is present in the smallest remnant.

Fauna

Kingfisher.

Significance

None of the ecological units present are good or extensive examples of their types. The natural character of this site is negatively impacted by the hawthorn infestation. However, this site is one of the only indigenous forest remnants left on the fringes of Kirikiri Inlet, and as habitat for indigenous flora and fauna and buffer to the estuary it merits inclusion as a Level 2 site.

MOHINUI FOREST REMNANT 2

Survey no.	Q08/189
Survey date	13 December 2005
Grid reference	Q08 345 510 (3 remnants)
Area	13.4 ha
Altitude	20–100 m asl

Ecological unit

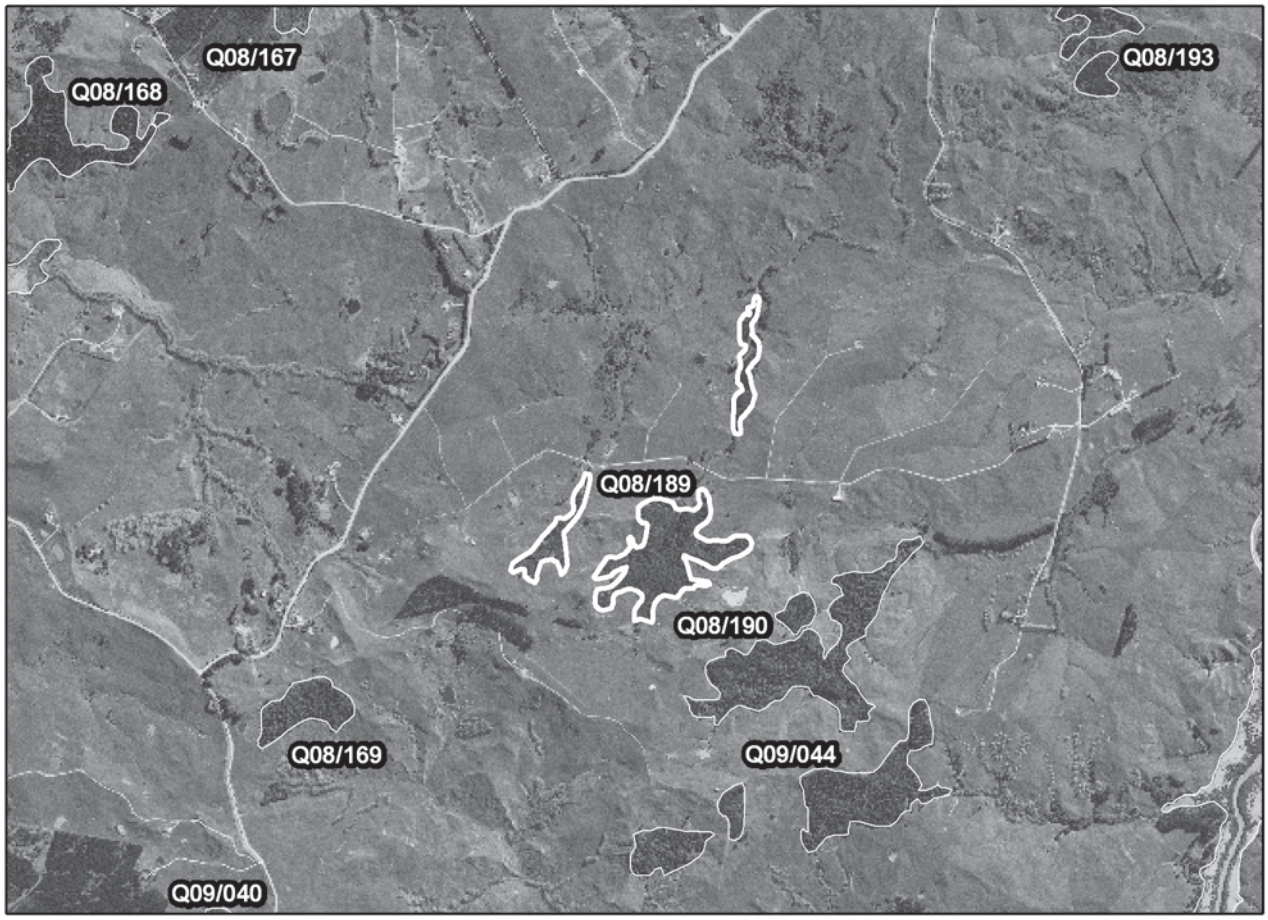
(a) Totara forest on moderate hillslope (100%)

Landform/geology

Hillslopes and gullies underlain by Cretaceous siliceous mudstone (Whangai Fmn, Mangakahia Complex) and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

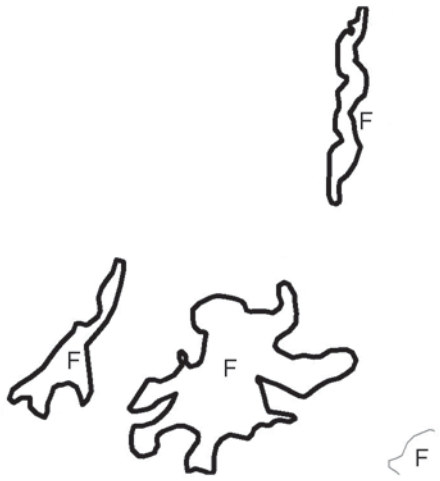
The Mohinui Peak (119 m asl) lies approximately in the middle of the Oneriri Peninsula, to the east of the road. This site comprises remnant indigenous vegetation in two of its northern valleys, which carry northeast-draining tributaries of the Kaira Creek. Totara is overwhelmingly abundant, and the only



Q08/189 Mohinui Forest Remnant 2

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



other tree which is present at greater than 5% canopy cover is kanuka. Occasional ti kouka, puriri, kahikatea and woolly nightshade are present, however more diversity may be present. The condition of the forest appears to be poor, it does not appear to have much vegetation in the understorey, and its shape and composition indicate a prolonged history of grazing in which only the hardiest species have been able to survive (i.e. totara and kanuka).

Fauna

Not surveyed.

Significance

This site provides some riparian protection for streams in the Kaira Creek catchment, however it does not warrant a higher significance level due to its poor condition. There are better examples of totara forest elsewhere in Otamatea ED Northland.

OTAIRI CREEK FOREST AND WETLAND

Survey no.	Q08/191
Survey date	13 December 2005
Grid reference	Q08 316 511 (4 remnants)
Area	3.8 ha (3.0 ha forest, 0.8 ha wetland)
Altitude	0–48 m asl

Ecological units

(a) Kowhai–ti kouka forest on moderate hillslope (59%)

(b) Raupo reedland in small depression (21%)

(c) Totara–kowhai–karaka forest on gentle coastal margin (20%)

Landform/geology

Hillslope and gully underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex), and valley flat on Holocene alluvium.

Vegetation

Otairi Creek is a small, convoluted inlet on the eastern side of the Otamatea River (Q08/062) which is filled with tall mangrove forest and saltmarsh rushes and sedges. This site comprises two wetlands at the very upper end of the inlet in the freshwater zone, and forest remnants on the coastal fringe next to the inlet.

(a) The largest forest remnant comprises sparse kowhai–ti kouka forest with occasional puriri, karaka, titoki and woolly nightshade.

(b) The wetlands are dominated by raupo, with occasional emergent ti kouka.

(c) The smaller forest remnant has equal proportions of totara, kowhai and karaka with occasional titoki and ti kouka.

Fauna

Australasian harrier. A spotless crake and fernbird call tape was played in fine, calm weather but no response was elicited.

Significance

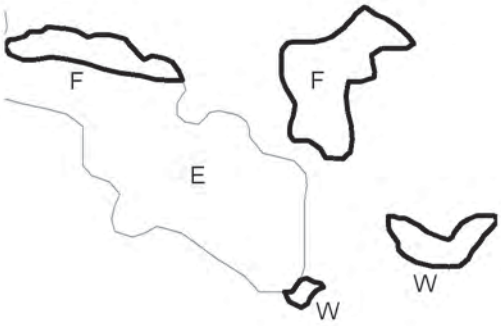
These remnants are very small and represent the last vestiges of what would once have been a continuous ecological sequence from forest to freshwater wetland to saltmarsh to mangrove. The current freshwater wetlands identified are probably on land reclaimed from tidal mudflats, whether through natural infilling and succession, or through human intervention (this is not clear). They may provide habitat for wetland birds such as rails and Australasian bittern. At present these remnants do not provide much of a buffer to the inlet due to their small size and degraded state.



Q08/191 Otairi Creek Forest and Wetland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres

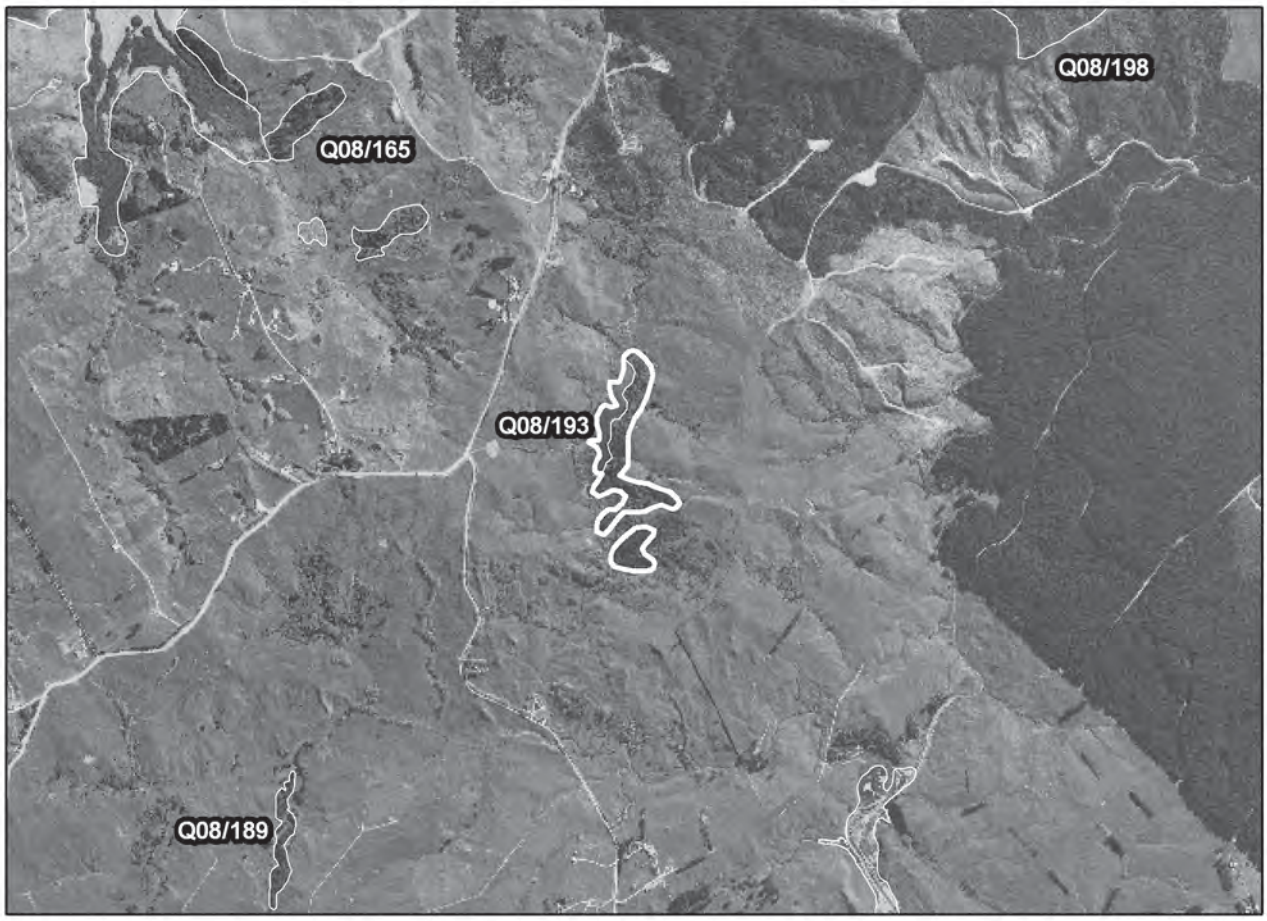


KAIRA CREEK POND 1

Survey no.	Q08/193
Survey date	13 December 2005
Grid reference	Q08 359 528 (2 remnants)
Area	7.8 ha (6.4 ha forest, 1.4 ha wetland)
Altitude	20–58 m asl

Ecological units

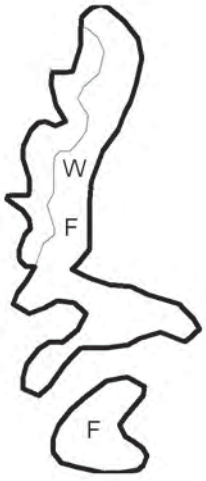
(a) Kanuka–totara forest on moderate hillslope (82%)



Q08/193 Kaira Creek Pond 1

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(b) Open water (constructed freshwater farm pond) (18%)

Landform/geology

Hillslopes and gullies underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site encompasses indigenous forest and aquatic habitat associated with a constructed pond on the upper Kaira Creek. The pond follows the natural

contours of the stream valley for approximately 400 m and is approximately 40 m wide in most places. Forest extends up the eastern slopes above the river, interspersed by serious infestations of woolly nightshade and gorse.

(a) The forest is composed of equal amounts of kanuka and totara with frequent kahikatea, manuka, ti kouka, gorse and woolly nightshade, and occasional kohekohe, karaka, nikau, ponga, mamaku and puriri.

(b) The pond was not easily visible from the road, but recent aerial photography (flown in 2002) suggests that there is no emergent vegetation, such as raupo or other reed-like species. Some floating *Azolla pinnata*, an invasive water fern, was seen.

Fauna

Spur-winged plover.

Significance

Sheep and cattle graze down to the water's edge, as well as through forest areas. These are also heavily impacted by weed invasion. However, despite the apparent poor condition, this wetland is one of the largest in Otamatea ED Northland, and may provide valuable habitat to indigenous waterbirds.

TANA ROAD FOREST REMNANTS

Survey no.	Q08/195
Survey date	19 December 2005
Grid reference	Q08 116 635
Area	3.6 ha
Altitude	69–80 m asl

Ecological unit

(a) Kahikatea–kanuka forest on gentle hillslope (100%)

Landform/geology

Gentle hillslope underlain by melange (undifferentiated Mangakahia & Motatau Complexes).

Vegetation

This site comprises one small remnant of forest on a gently undulating paddock north of State Highway 12. The remnant appears entirely fenced, but cattle can still gain access. Some parts have a dense shrubby understorey, and some seem bare. The main canopy is formed of very tall, conical kahikatea with associated kanuka. Totara, ti kouka and kauri occur frequently, with occasional nikau, ti kouka, rimu, mapou and manuka.

Fauna

Not surveyed.

Significance

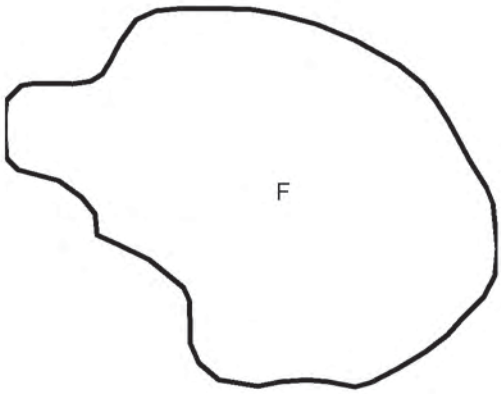
Due to its small size, this site is not considered to be a representative example of its type in the Northland Conservancy part of Otamatea ED. Despite this, it is still a valuable habitat patch for mobile wildlife use a number of small forest remnants to meet their habitat needs, in a landscape where extensive forest no longer exists.



Q08/195 Tana Road Forest Remnant

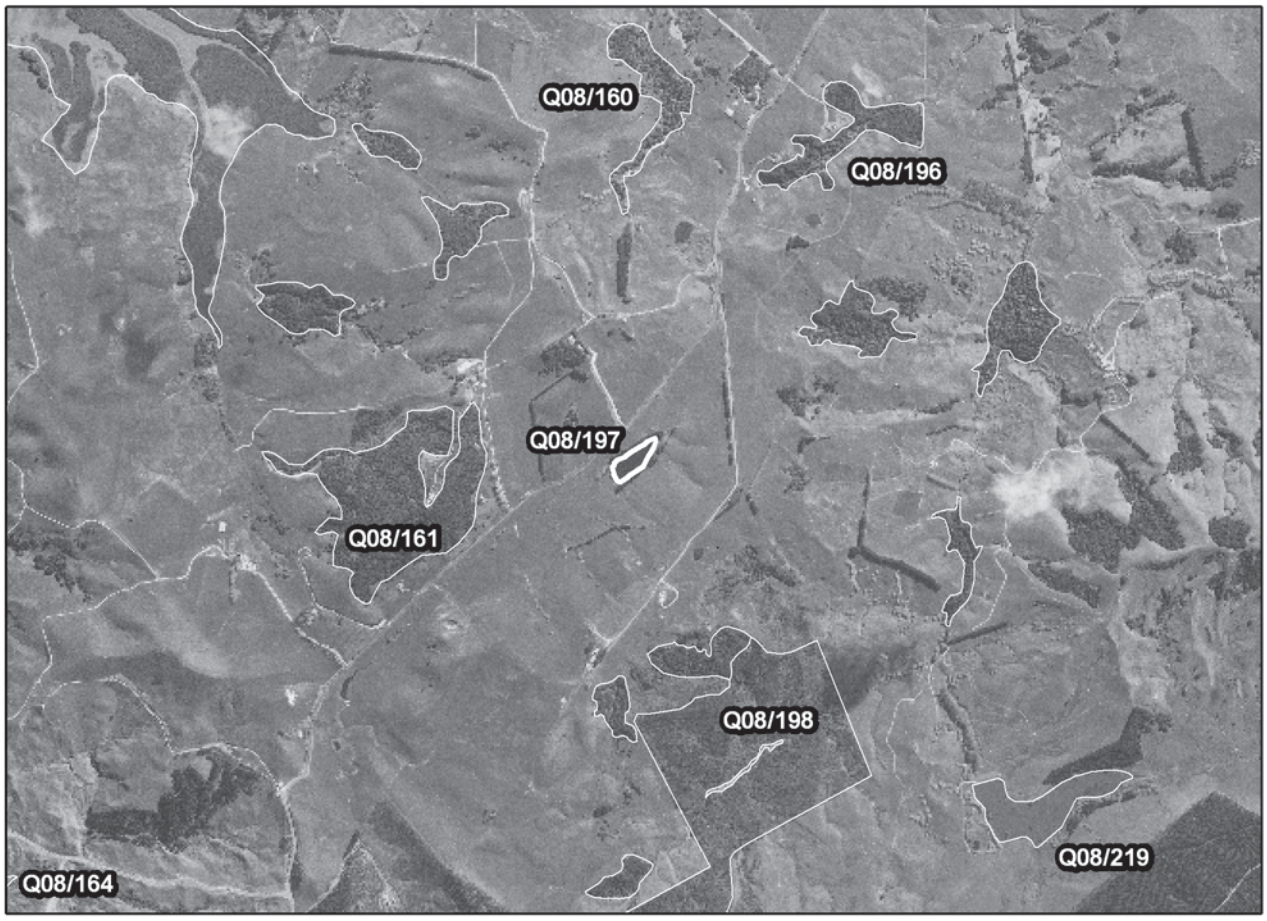
S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



KAIRA CREEK POND 2

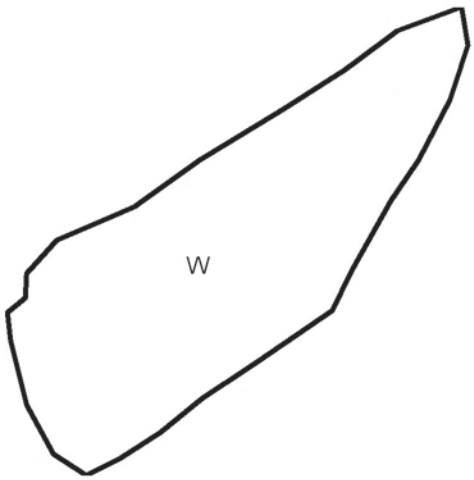
Survey no.	Q08/197
Survey date	15 December 2005
Grid reference	Q08 373 559
Area	0.9 ha
Altitude	73–80 m asl



Q08/197 Kaira Creek Pond 2

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Open water (constructed freshwater farm pond) (80%)

(b) Raupo–willow weed reedland on constructed pond margin (20%)

Landform/geology

Man-made pond/lake.

Vegetation

This site comprises a small constructed pond with a margin of emergent raupo reedland at the very upper extreme of one of the Kaira Creek tributaries. Willow

weed is common amongst the raupo, but it could not be determined whether this was the indigenous species (*Persicaria decipiens*) or one of the introduced willow weeds. Harakeke occurs frequently and ti kouka is occasional. The pond is surrounded by a 2–3 rows of young radiata pine with occasional crack willow and Tasmanian blackwood, but otherwise the main surrounding land use is pastoral farming.

Fauna

Pukeko. A spotless crake tape was played by the road (50 m from the wetland), but no response was heard.

Significance

This site is relatively small, but it serves as a habitat for common indigenous waterbirds in the absence of any natural wetlands in the area.

MAUNGATUROTO TOWN FOREST

Survey no.	Q08/199
Survey date	16 December 2005
Grid reference	Q08 320 649
Area	2.2 ha
Altitude	69–91 m asl

Ecological unit

(a) Kahikatea–totara forest in gully (100%)

Landform/geology

Gully underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

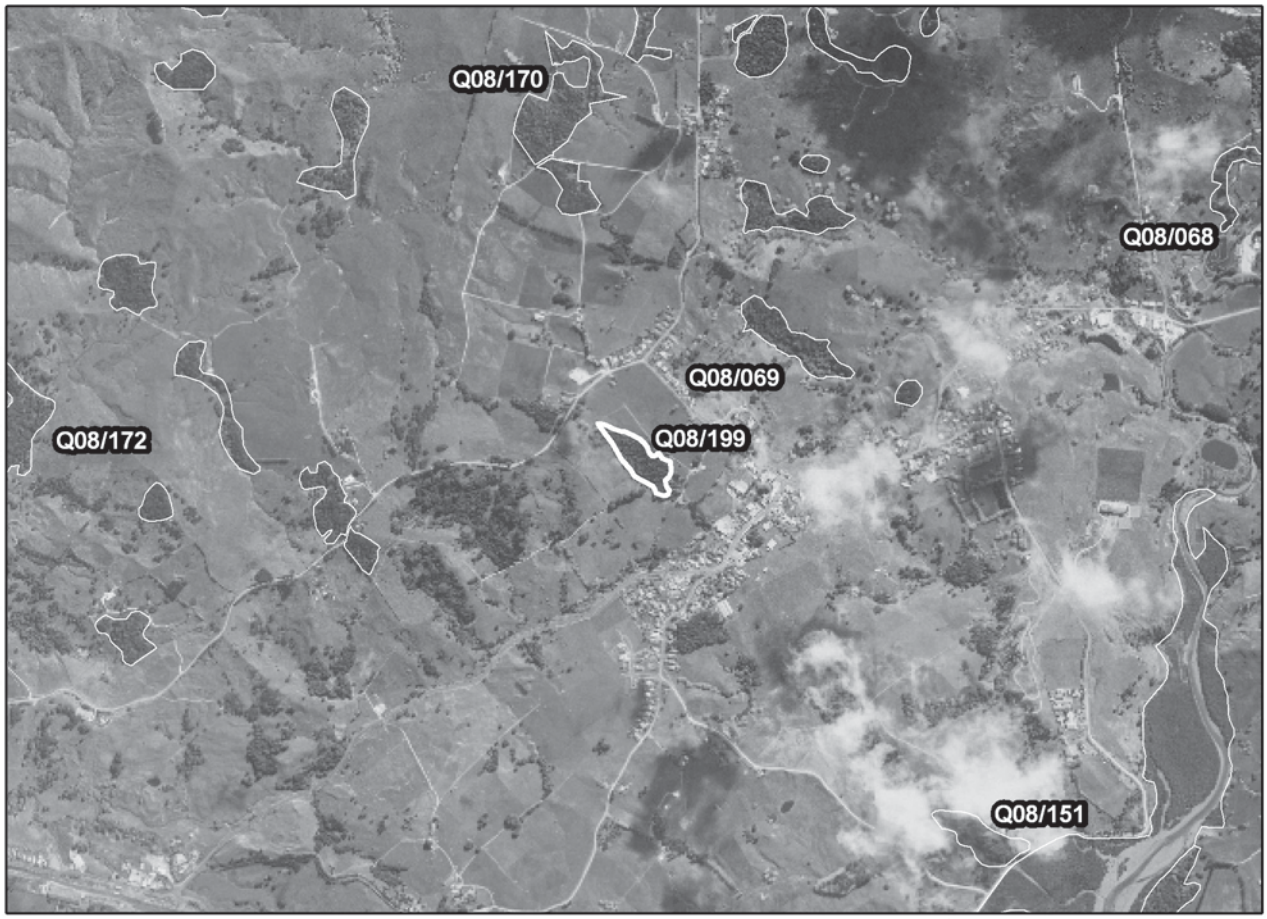
Behind the town of Maungaturoto, only 250 m north of the main street, there is a small remnant of indigenous forest surrounded by pasture. The forest comprises very dense secondary kahikatea spars mixed with totara of a similar age (probably no older than 120 years). Pukatea occurs frequently, and small amounts of ti kouka, kauri and rimu are scattered throughout. The forest protects the beginnings of a stream gully, which becomes a tributary of the Pahi River. Elaeagnus is a serious weed problem, both within the site, and in the surrounding landscape.

Fauna

Not surveyed.

Significance

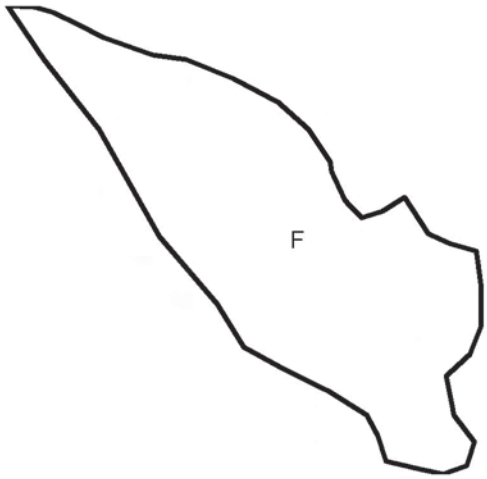
This site's small size and its elaeagnus infestation affect its natural character and function. Therefore, it is not considered to be a representative example of kahikatea–totara forest in Otamatea ED Northland. However, it is still an important area of habitat for mobile wildlife, such as forest birds, which often use one or more of such remnants to meet their habitat needs. The site also has a limited riparian protection function, as the forest shelters part of a small stream.



Q08/199 Maungaturoto Town Forest

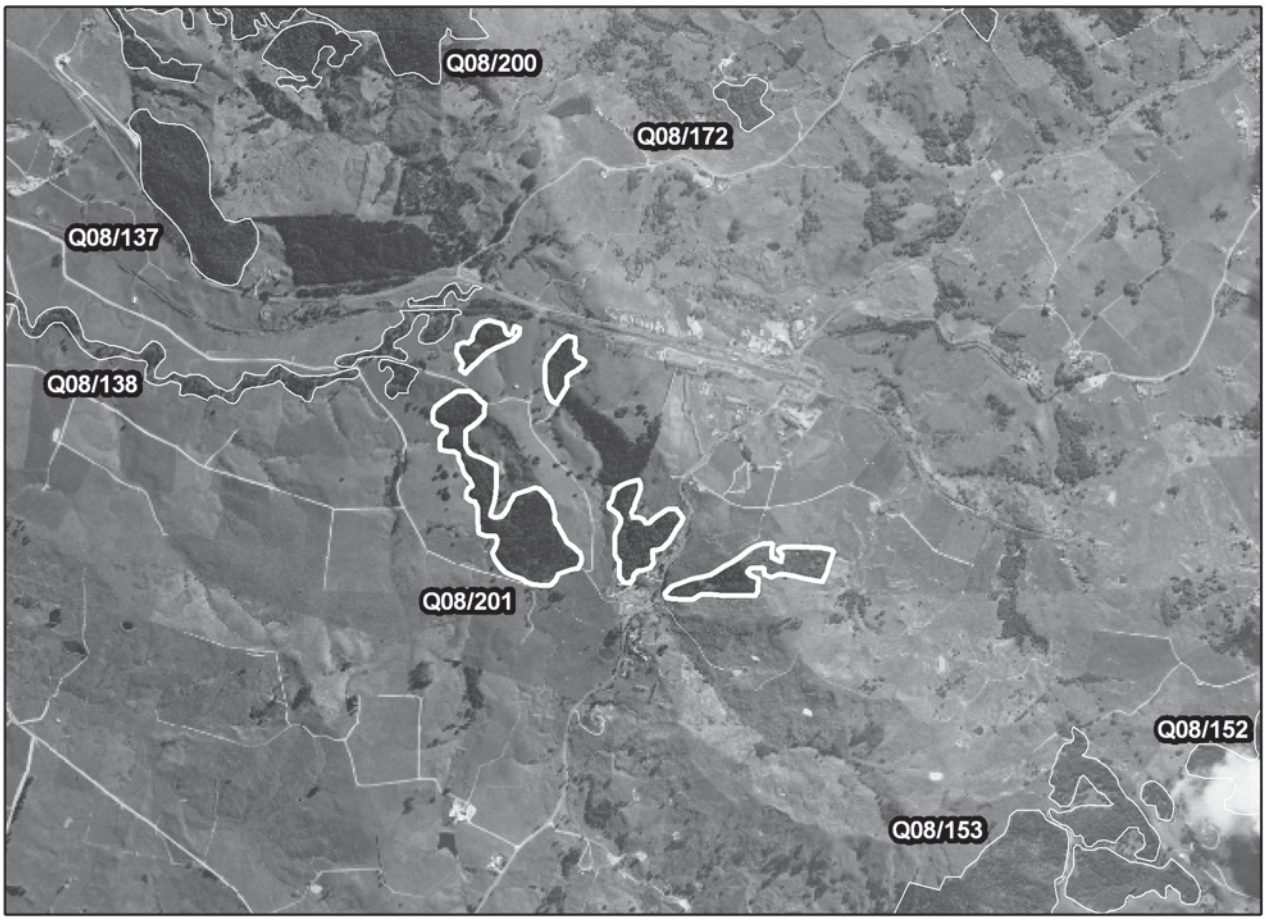
S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



MAROHEMO ROAD FOREST REMNANTS

Survey no.	Q08/201
Survey date	20 December 2005
Grid reference	Q08 298 647 (5 remnants)
Area	20.4 ha
Altitude	40–93 m asl



Q08/201 Marohemo Road Forest Remnants 1

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Totara forest on moderate hillslope (50%)

(b) Kahikatea forest in gully (40%)

(c) Totara–puriri forest on moderate hillslope (10%)

Landform/geology

Hillslopes underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies), and valley floors of Holocene alluvium.

Vegetation

This site encompasses five indigenous forest remnants on hillslopes at the top of Marohemo Road, near the turnoff from State Highway 12. Some of the

remnants have small radiata pine plantations on their edges or connecting them. Most of the remnants appear to be grazed. Tree privet and silver birch are common in surrounding pastoral land.

(a) The most common forest type is dominated by totara with frequent puriri, kahikatea, taraire and kanuka, and occasional ti kouka, karaka and kohekohe.

(b) Kahikatea dominant forest is present in gullies. Nikau and totara are frequent, with occasional mamangi, puriri, pukatea, titoki, matai, kanuka and tanekaha.

(c) The very eastern edge of the remnants is not visible from Marohemo Road, therefore the forest type was interpreted from recent aerial photography (flown in 2002). This area appears to comprise totara–puriri forest, judging by the broad-crowned even canopy, quite similar to a forest type in nearby Bickerstaffe Forest and Shrubland (Q08/153).

Fauna

Not surveyed.

Significance

The forest types present in this site are better represented elsewhere in the Northland part of Otamatea ED Northland, where they are in larger remnants which are less disturbed by grazing. Despite this, these remnants still serve as habitat patches for forest birds and other mobile fauna in a landscape with few large tracts of indigenous vegetation.

MAROHEMO ROAD FOREST REMNANTS 2

Survey no.	Q08/202
Survey date	20 December 2005
Grid reference	Q08 302 607 (4 remnants)
Area	28.9 ha
Altitude	40–120 m asl

Ecological units

(a) Totara–kanuka forest on moderate hillslope (50%)

(b) Taraire–totara forest on moderate hillslope (50%)

Landform/geology

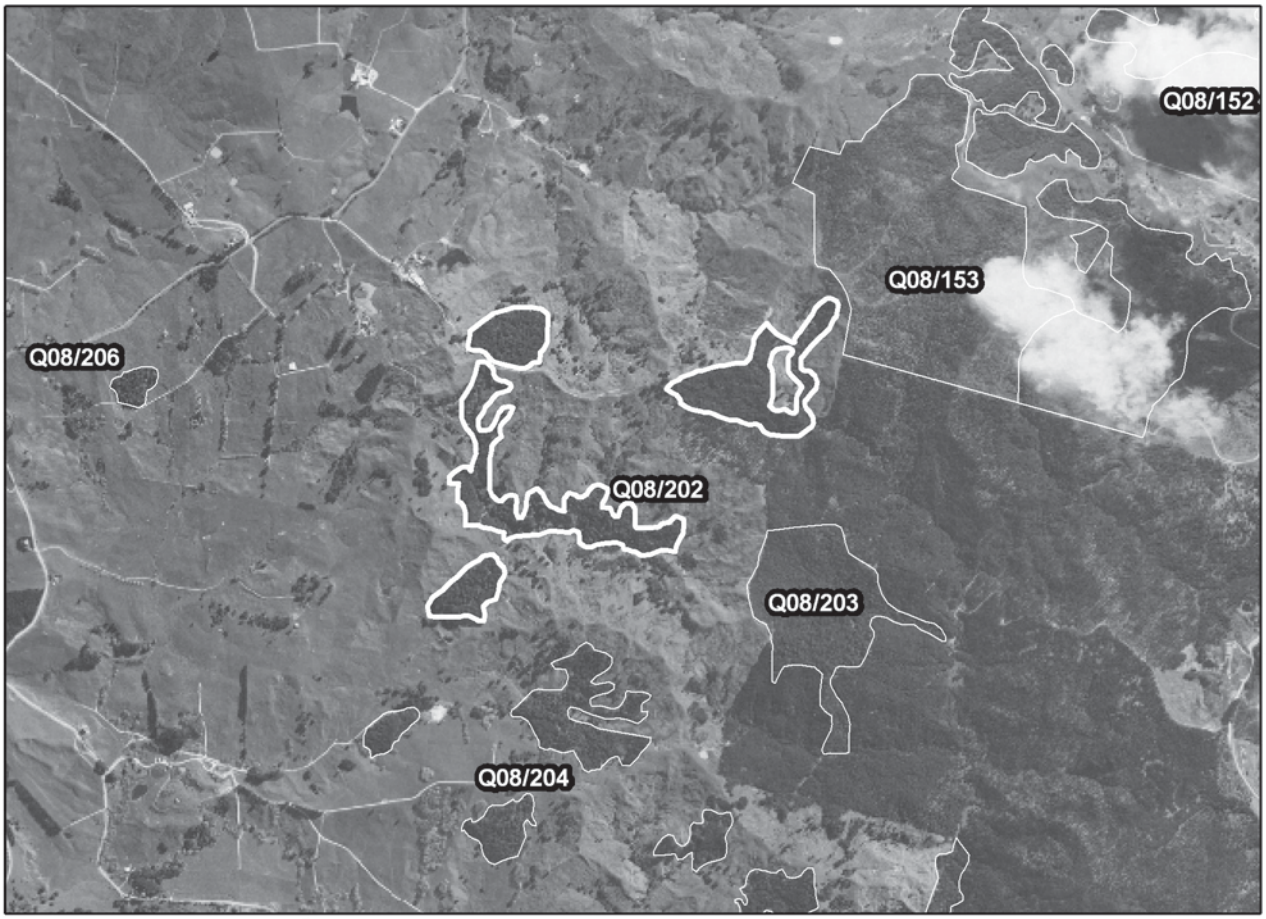
Hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

This site comprises four indigenous forest remnants scattered across pastoral farmland to the east of Marohemo Road. The composition of the remnants appears to be divided into two clear types with totara being the common component. Not all of the areas were visible from the public road, therefore aerial photography (flown in 2002) has been used to assist in describing the remnants.

(a) Half of the remnants contain totara–kanuka forest with occasional kahikatea and ti kouka.

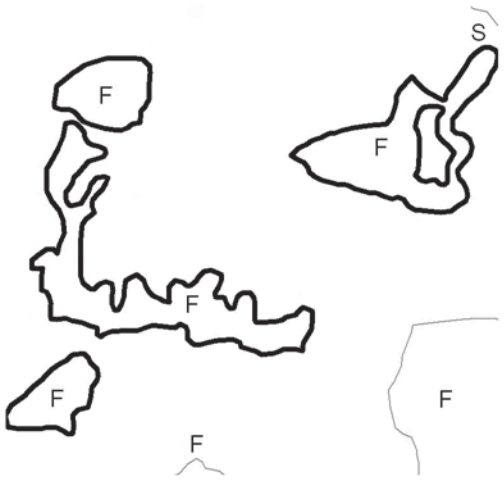
(b) The other half is composed of totara and taraire with frequent karaka and kohekohe, and occasional kahikatea and kanuka.



Q08/202 Marohemo Road Forest Remnants 2

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Fauna

Not surveyed.

Significance

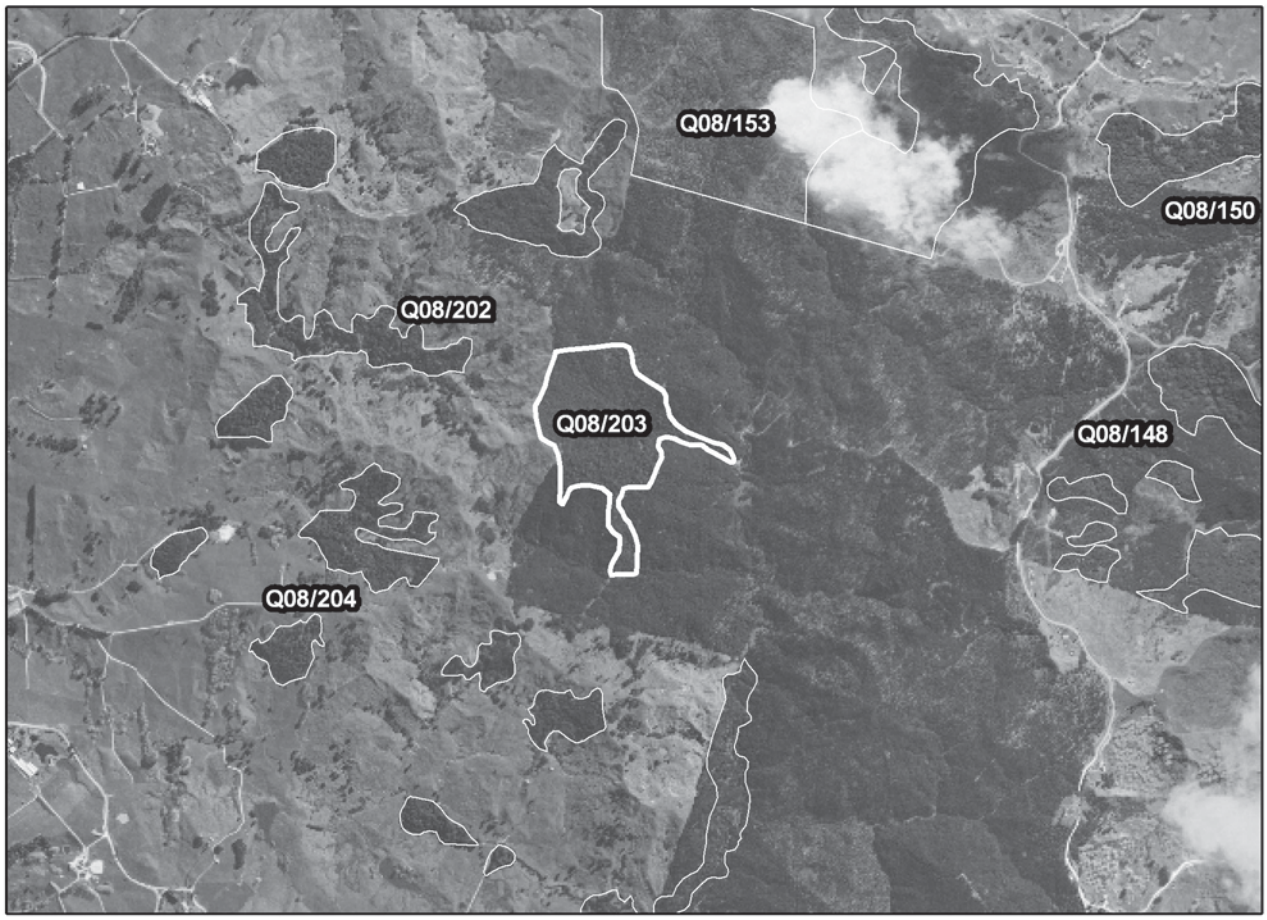
Insufficient information exists to fully assess the significance of the forest in this site. Three of the forest remnants at this site, including examples of both ecological units, are within a QEII Open Space Covenant covering 11.9 ha or 41 % of the site.

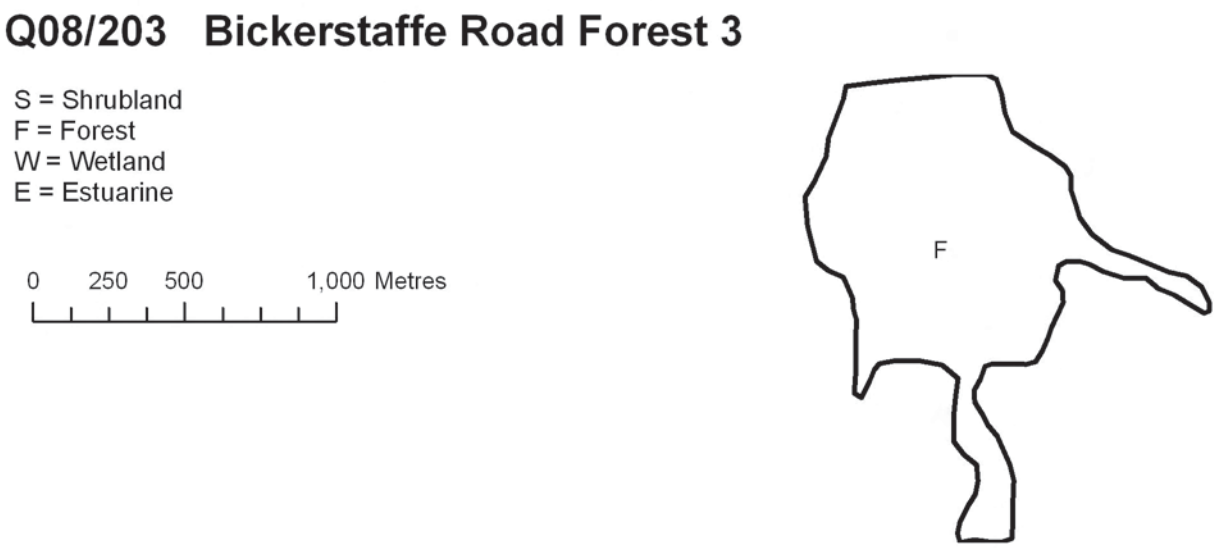
BICKERSTAFFE ROAD FOREST 3

Survey no.	Q08/203
Survey date	Not surveyed
Grid reference	Q08 309 602
Area	19.0 ha
Altitude	60–120 m asl

Ecological unit

(a) Kanuka–totara forest on moderate hillslope (100%)





Landform/geology

Hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex).

Vegetation

This site was not able to be surveyed using the present methods, as it is at least 2 km from any public road, and is hidden from view by hilly topography and radiata pine forest. Recent aerial photography (flown in 2002) suggests that the main forest type in the area is relatively young, secondary kanuka–totara forest. Valleys within the site appear to contain a more diverse mixture of species, perhaps with kahikatea as a main component; but this could not be determined with confidence.

Fauna

Not surveyed.

Significance

Insufficient information exists to assign a higher significance; a field survey would be required to complete the assessment. However, this site is a relatively large area of indigenous forest, and is buffered on several sides by pine plantations, which provide temporary protection from wind exposure and an extension of habitat for some forest bird species and indigenous understorey plants.

HILLSTONE ROAD FOREST REMNANTS 1

Survey no.	Q08/204
Survey date	20 December 2005
Grid reference	Q08 302 596 (5 remnants)
Area	20.1 ha
Altitude	40–120 m asl

Ecological units

(a) Kanuka–totara forest on moderate to steep hillslope (75%)

(b) Taraire–puriri–totara forest on moderate to steep hillslope (25%)

Landform/geology

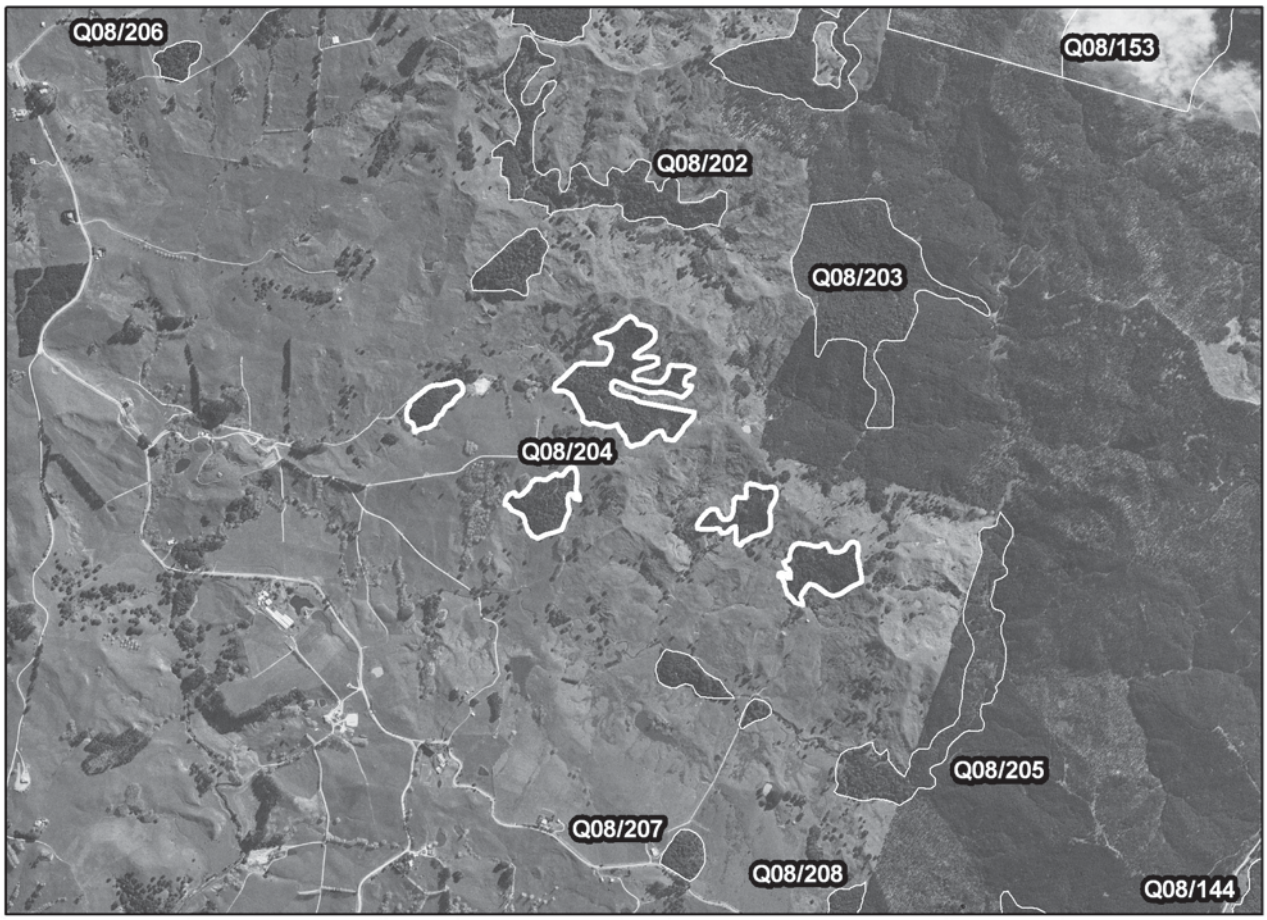
Hillslopes and gullies underlain by Cretaceous sandstone and mudstone (Mangakahia Complex), and melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site comprises five forest remnants scattered across a pastoral farming landscape to the north of Hillstone Road and to the east of Batley Road. These remnants bear a strong resemblance to Marohemo Road Forest Remnants 2 (Q08/202) in the next sub-catchment further north. They are also dispersed, grazed remnants with a predominance of totara.

(a) Kanuka–totara forest occupies a majority of the area. Species recorded occasionally include rimu, kahikatea, matai, ti kouka, pukatea and karaka.

(b) On the eastern side, two of the remnants contain a more lush forest of taraire, puriri and totara with frequent karaka and occasional matai, rewarewa, kahikatea and pukatea.



Q08/204 Hillstone Road Forest Remnants 1

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Fauna

Not surveyed.

Significance

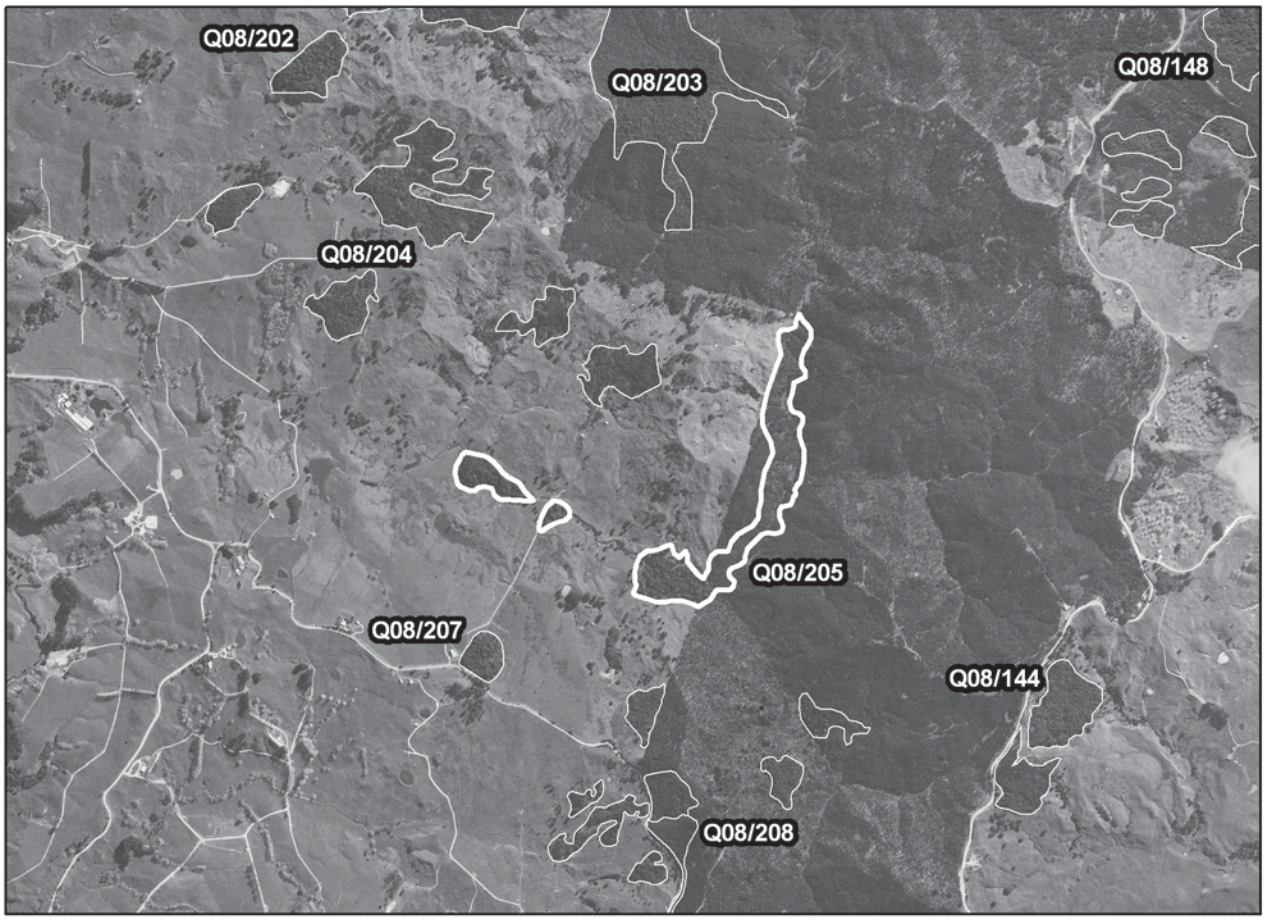
This site shows the effects of severe and prolonged grazing. The natural 'climax' forest type in the area would probably be type (b), which has more broadleaved species such as taraire and puriri as well as the ubiquitous totara, which is resistant to grazing. Neither of the ecological units is considered representative.

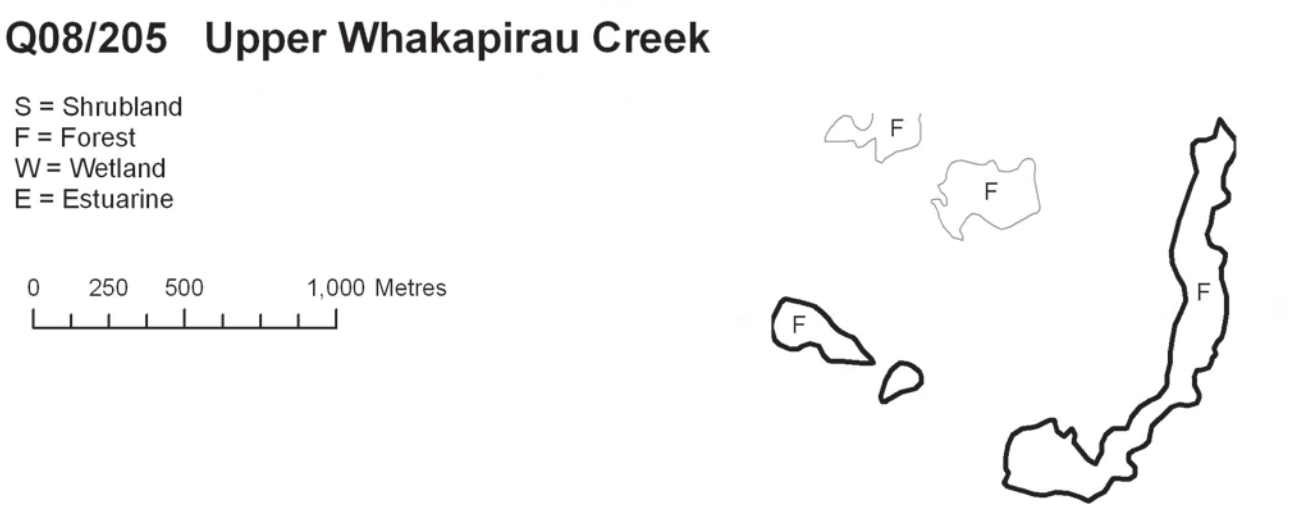
UPPER WHAKAPIRAU CREEK

Survey no.	Q08/205
Survey date	20 December 2005
Grid reference	Q08 310 589 (3 remnants)
Area	14.8 ha
Altitude	20–66 m asl

Ecological units

(a) Kanuka forest in gully (45%)





(b) Totara–kahikatea forest in gully (35%)

(c) Totara forest in gully (20%)

Landform/geology
Valley flats on Holocene alluvium.

Vegetation
A tributary of the Whakapirau Creek originates in Bickerstaffe Forest and Shrubland (Q08/153), flows south through extensive radiata pine plantations and then turns west down a valley parallel to Hillstone Road (after which it turns south under a bridge on Batley Road and spills into the sea). This site encompasses riparian vegetation at that western bend in the stream, which is mostly surrounded by pines, but also includes two small remnants exposed to view in an open paddock. The indigenous vegetation behind the pines was not easily seen from any publicly accessible vantage point, therefore the type had to be interpreted from recent aerial photography (flown in 2002), by comparing it with known sites with similar characteristics.

(a) Within the pine shelter, the main forest type appears to be kanuka forest, which probably has frequent totara.

(b) At the point where the indigenous forest extends out of the pine forest, the type comprises totara and kahikatea with frequent matai, and occasional titoki, rewarewa, pukatea and karaka.

(c) The westernmost remnant is heavily dominated by totara, but has frequent kahikatea and kanuka, and occasional ti kouka.

Fauna
Not surveyed.

Significance
Areas within the pine plantation are buffered from exposure, whereas those in the open paddock situation suffer greater edge effects and well as grazing and trampling by livestock. None of the ecological units are considered representative.

MAROHEMO ROAD FOREST REMNANTS 3

Survey no.	Q08/206
Survey date	20 December 2005
Grid reference	Q08 286 609
Area	1.4 ha
Altitude	58–74 m asl

Ecological unit
(a) Totara–kahikatea forest on moderate hillslope (100%)

Landform/geology
Hillslope underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

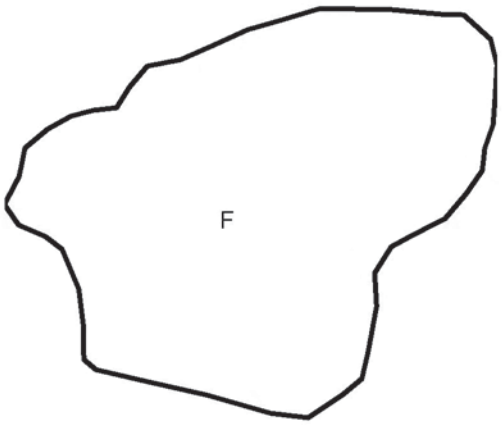
Vegetation
This site comprises a small, isolated remnant of totara–kahikatea forest on a southeast-facing slope below Marohemo Road, surrounded by pasture. One



Q08/206 Marohemo Road Forest Remnant 3

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



large emergent kahikatea tree stands out from the rest, and is probably a survivor from an earlier time. Nikau, kanuka and puriri are frequent with occasional pukatea.

Fauna

Not surveyed.

Significance

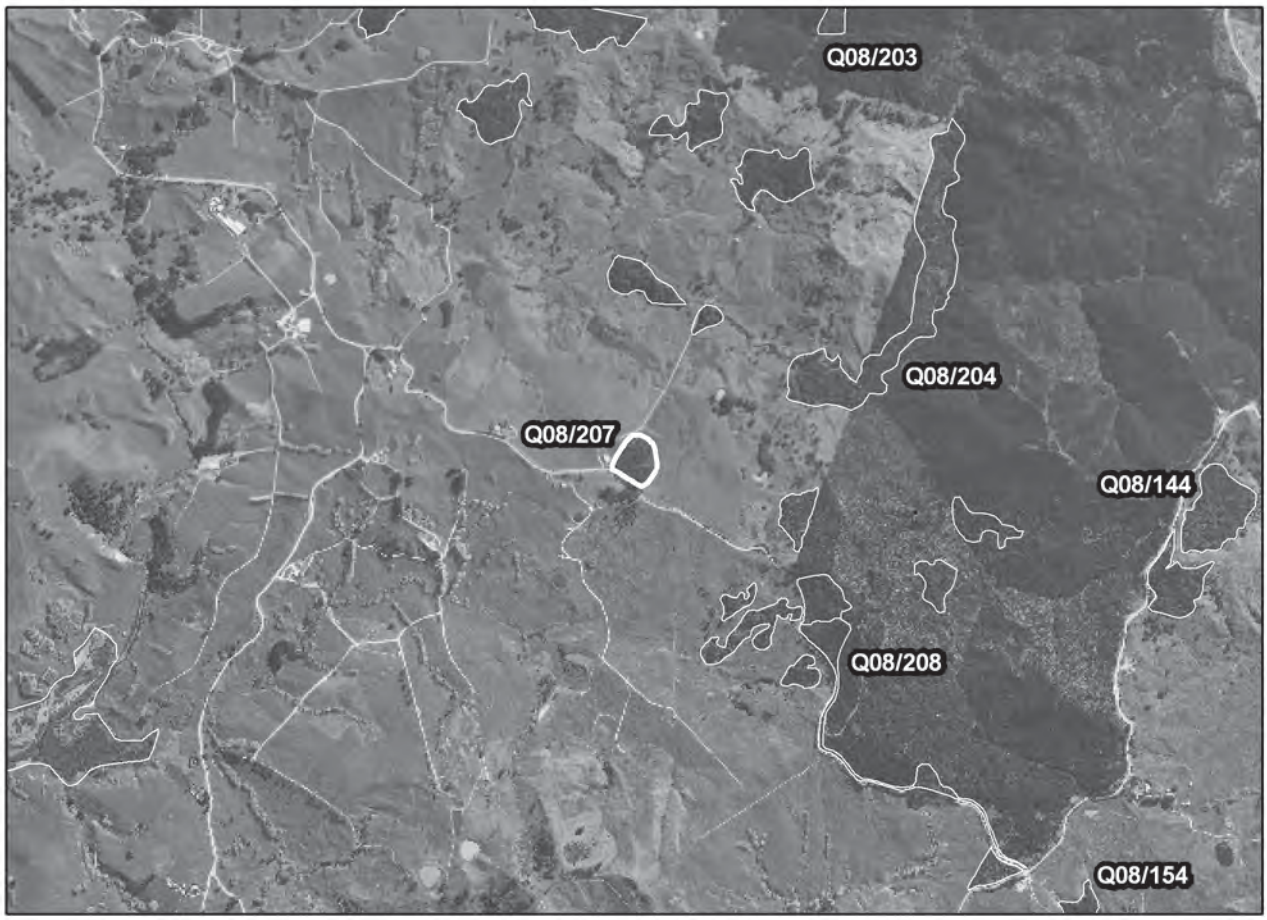
Small size, isolation and lack of fencing reduces the value of this natural area, but it is still notable for the single mature kahikatea and the regenerating forest which surrounds and buffers it.

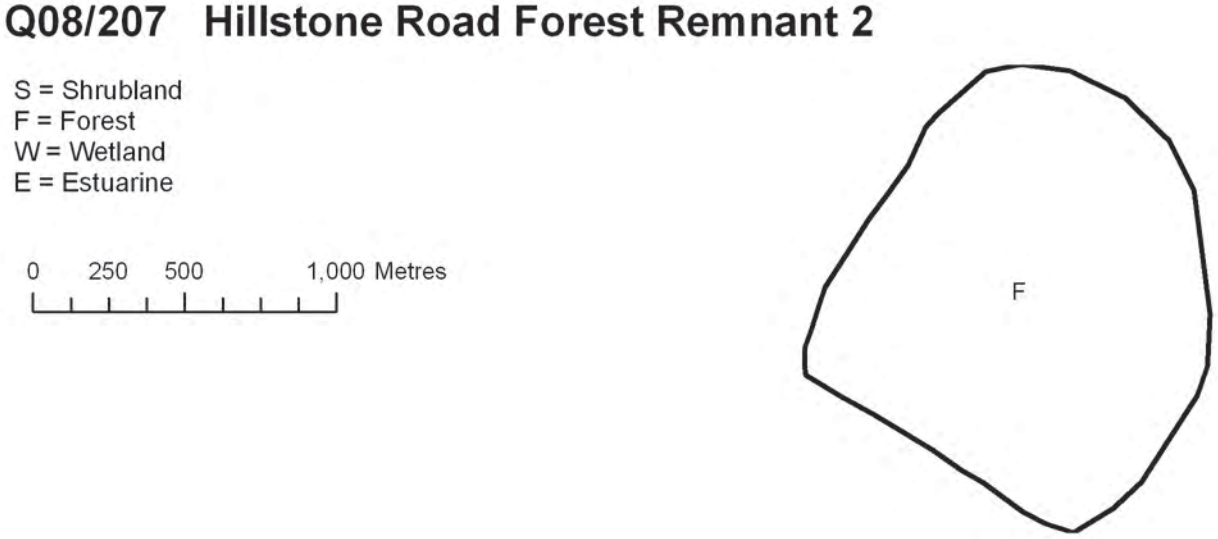
HILLSTONE ROAD FOREST REMNANT 2

Survey no.	Q08/207
Survey date	20 December 2005
Grid reference	Q08 303 583
Area	1.7 ha
Altitude	51–60 m asl

Ecological unit

(a) Puriri–kahikatea forest on moderate hillslope (100%)





Landform/geology
Hillslope underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation
This site comprises a small, isolated remnant of indigenous forest on the northern edge of Hillstone Road. The main canopy is formed of rounded puriri crowns pierced by tall conical kahikatea spars. The darker gloss of karaka and the olive tones of totara are frequent canopy associates, while kauri rickers are frequent emergents. A few species were recorded as occasional: kanuka, matai, pukatea, nikau and titoki. The forest is currently grazed, despite there being at least some fencing, so the understorey is quite bare.

Fauna
Not surveyed.

Significance
Small size, isolation and grazing disturbance count against this otherwise species-rich and lush forest remnant.

ORUAWHARO ROAD WETLAND

Survey no.	Q08/210
Survey date	20 January 2003 (Wildland Consultants Ltd 2004)
Grid reference	Q08 401 511
Area	0.7 ha
Altitude	60–64 m asl

Ecological unit
(a) Raupo reedland in small depression (100%)

Landform/geology
Valley wetland on Holocene alluvium.

Vegetation
This site comprises a small, compact raupo reedland in a gully head adjacent to Oruawharo Road. The wetland is bounded to the south by the road and on all other sides by a radiata pine plantation. Ti kouka, manuka, wheki and karamu are scattered emergent species throughout the site. Kiokio and bracken are frequent, and harakeke, putaputaweta, *Baumea articulata*, gorse, blackberry and tutsan occur occasionally. The narrow margins of the wetland are vegetated in manuka, ti kouka and pampas.

Fauna
Fantail, shining cuckoo, tui.

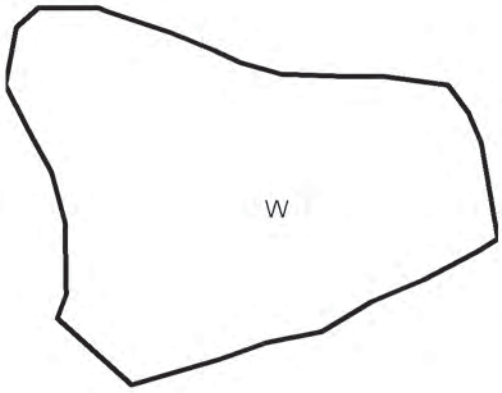
Significance
This site has potential habitat value for threatened avifauna associated with freshwater reedland, such as the NI fernbird and spotless crake, though none were detected here at the time of the survey. The wetland is quite exposed to edge effects, and may become more exposed when surrounding pine forest is felled. It lies directly below a road, which is also a constant source of disturbance.



Q08/210 Oruawharo Road Wetland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



MUD ALLEY ROAD WETLAND

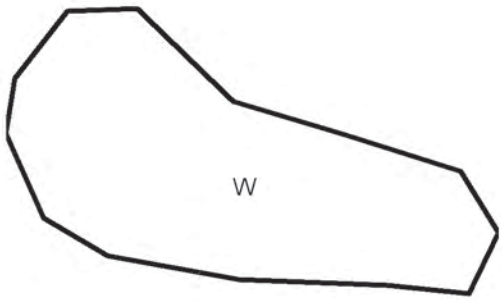
Survey no.	Q08/213
Survey date	30 October 2002 (Wildland Consultants Ltd 2004)
Grid reference	Q08 212 504
Area	0.2 ha
Altitude	35–40 m asl



Q08/213 Mud Alley Road Wetland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological unit

(a) Raupo reedland in small depression (100%)

Landform/geology

Valley wetland on Holocene alluvium.

Vegetation

This site comprises a tiny wetland set in a plantation of radiata pine, which is dominated by raupo, with frequent ti kouka, harakeke and mahoe, and occasional hangehange, kiokio, *Muehlenbeckia australis*, pampas and Mexican

devil. Above the wetland is a narrow shallow gully with a canopy of brush wattle and a predominantly indigenous understorey which is dominated by mahoe (this area was excluded from the site due to dominance by exotic species).

Fauna

Fantail, kingfisher, grey warbler.

Significance

This area is very small, but is potential habitat for threatened wetland birds, such as the NI fernbird and spotless crake, though none were detected here at the time of the survey. It is vulnerable to increased exposure following the felling of pines around it. It is also highly weed infested, with Mexican devil in particular affecting its natural character and function.

PAPAROA CREEK MARGINAL STRIP NO. 1 AND SURROUNDS

Survey no.	Q08/217
Survey date	12 January 2006
Grid reference	Q08 192 623 (2 remnants)
Area	8.7 ha
Altitude	0–40 m asl

Ecological unit

(a) Totara forest on gentle coastal margin (100%)

Landform/geology

Coastal hillsides of melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

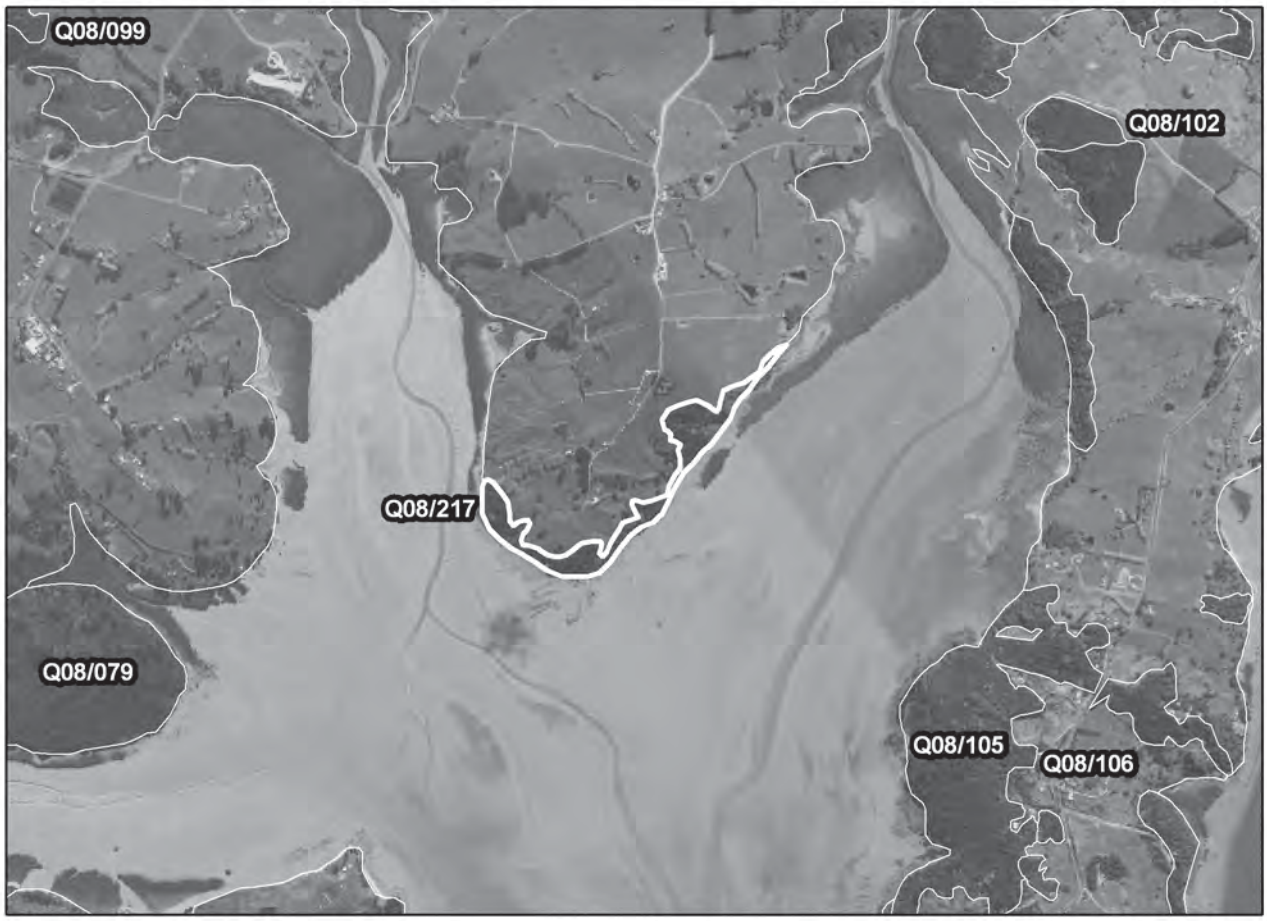
This site encompasses a narrow strip of indigenous forest on the end of a peninsula to the west of the Paparoa Creek on the upper Arapaoa River (Q08/084). Totara is overwhelmingly abundant, however puriri, karaka and kowhai also occur frequently. Occasional species recorded include manuka, kohekohe, ti kouka, nikau and pohutukawa. This is a rather unusual location for pohutukawa, which normally occurs on more exposed coasts. Pasture surrounds the remnants, and there appears to be little restriction to grazing animals entering the forest. On the seaward side there are extensive shallow mudflats.

Fauna

Not surveyed.

Significance

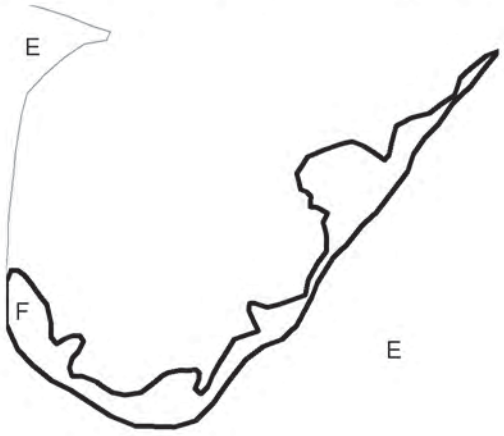
The site is relatively small, with a high degree of fragmentation and associated edge effects. It provides a protective vegetation buffer to the fringes of the Arapaoa River (Q08/084). The example of coastal totara forest present is not considered to be representative, though it is slightly unusual for the occurrence of scattered pohutukawa. Paparoa Creek Marginal Strip No. 1 (administered by DOC) covers 0.9 ha (approximately 10 %) of the forest at this site.



Q08/217 Paparoa Creek Marginal Strip No. 1 and Surrounds

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres

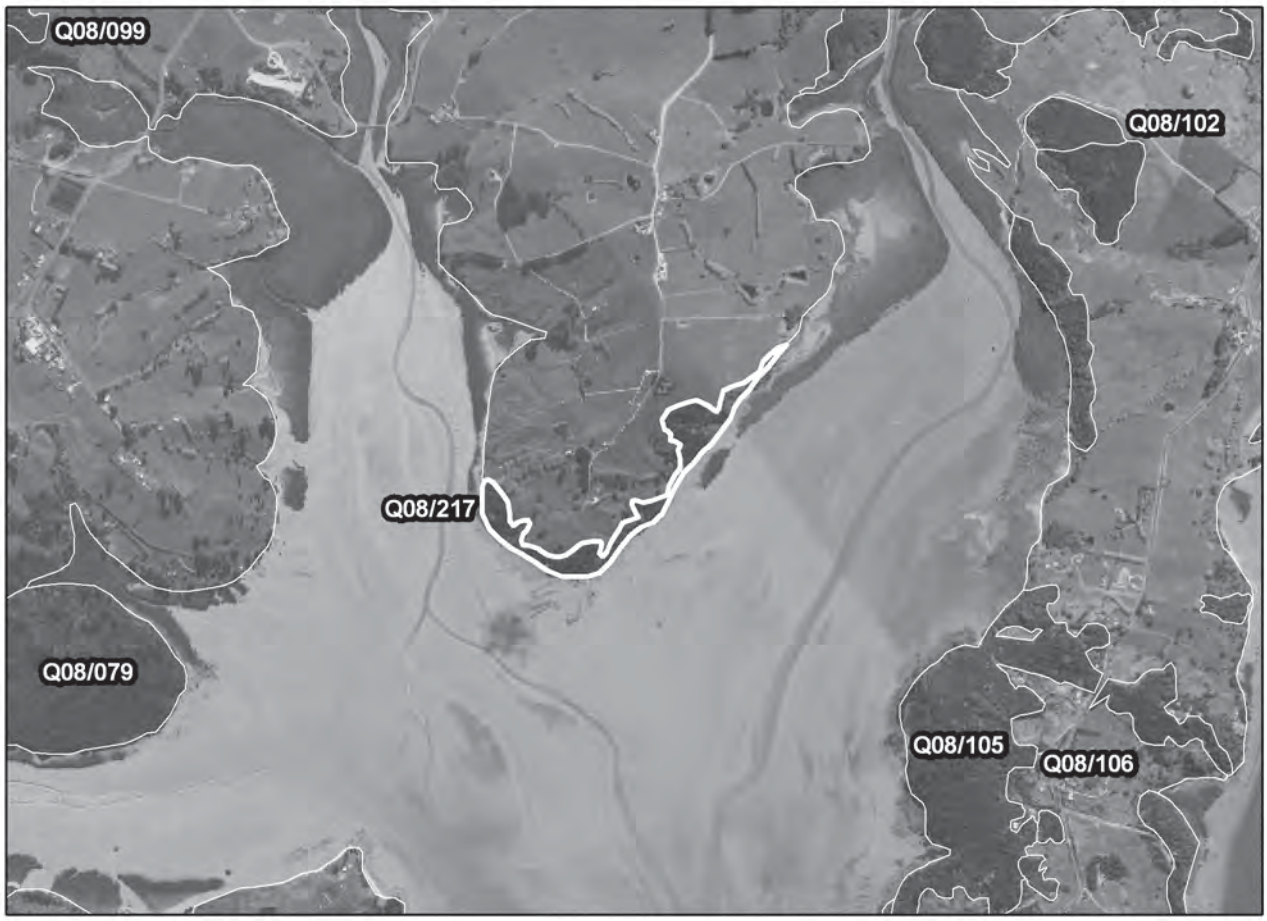


UPPER KAITARA CREEK POND

Survey no.	Q08/219
Survey date	Not surveyed
Grid reference	Q08
Area	5.8 ha
Altitude	55 m asl

Ecological unit

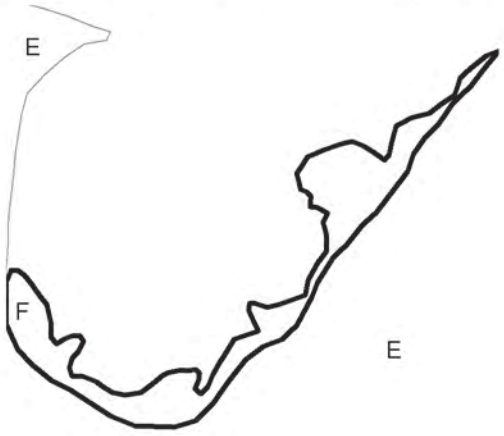
(a) Open water (constructed freshwater farm pond) (100%)



Q08/217 Paparoa Creek Marginal Strip No. 1 and Surrounds

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres

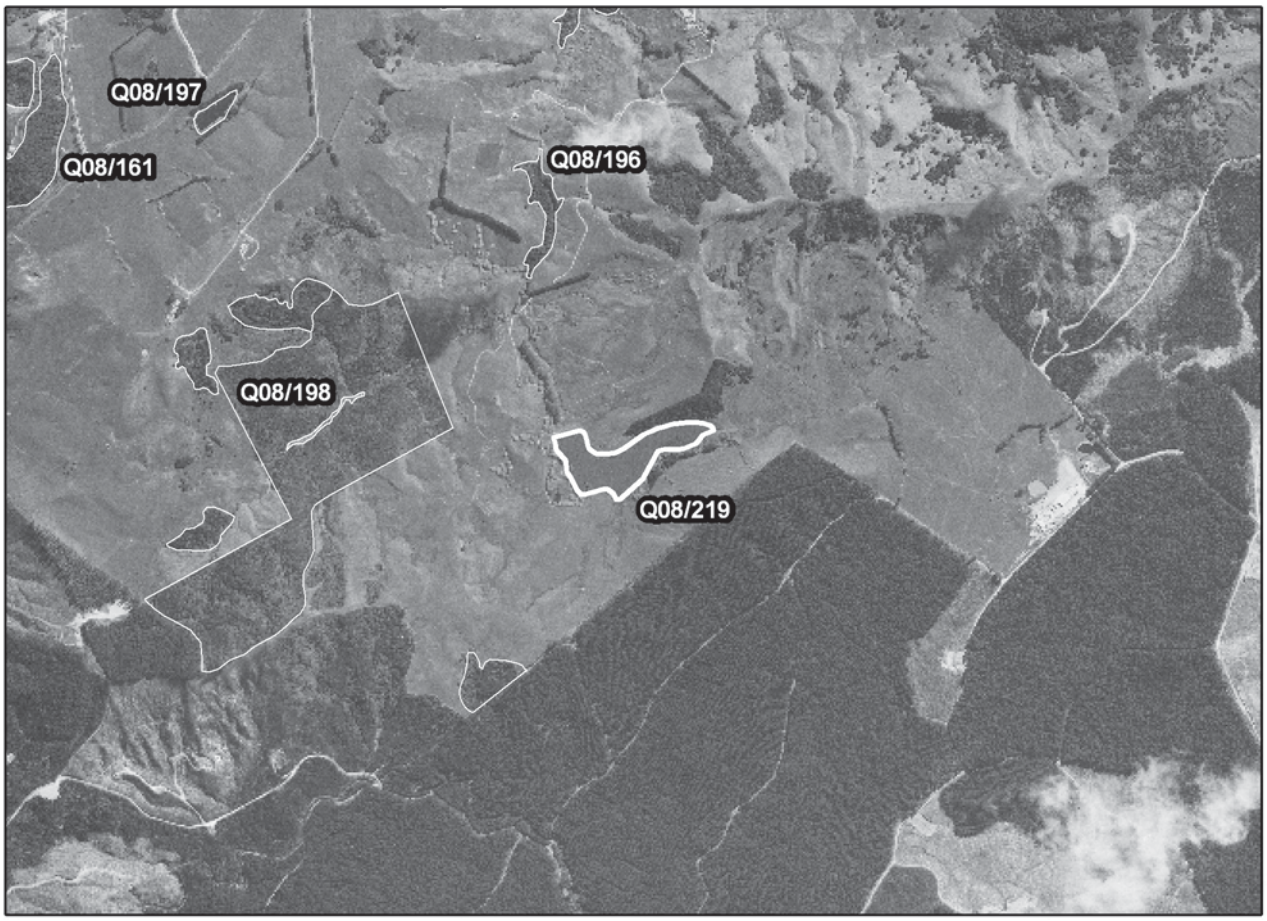


UPPER KAITARA CREEK POND

Survey no.	Q08/219
Survey date	Not surveyed
Grid reference	Q08
Area	5.8 ha
Altitude	55 m asl

Ecological unit

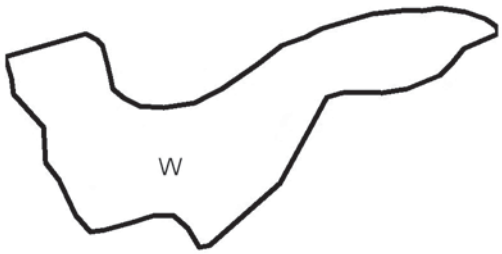
(a) Open water (constructed freshwater farm pond) (100%)



Q08/219 Upper Kaitara Creek Pond

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Man-made pond/lake.

Vegetation

As the site was not surveyed on the ground (due to lack of visibility/ accessibility), recent aerial photography (flown in 2002) was used to determine certain characteristics. It appears to be a constructed farm pond without emergent aquatic vegetation, which has poplars or willows on the southern bank and pines (probably a radiata pine plantation) on part of the northern bank.

Fauna

Not surveyed.

Significance

As one of the few relatively large, open, freshwater ponds in Otamatea ED Northland, this site probably has habitat value for indigenous waterbirds. At present there is insufficient information to assess the site's significance.

PUKETOTARA FOREST REMNANT 1

Survey no.	Q09/002
Survey date	30 November 2005
Grid reference	Q09 283 484 (2 remnants)
Area	3.5 ha
Altitude	10–66 m asl



Q09/002 Puketotara Forest Remnant 1

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological unit
(a) Totara–kanuka forest in gully (100%)

Landform/geology
Gully underlain by Miocene thinly interbedded sandstone and mudstone (Waitemata Group).

Vegetation
The composition of this remnant reflects its secondary, disturbed character, with kanuka and totara being the dominant canopy species. Puriri and kahikatea are frequent throughout and there are occasional individuals of kohekohe, karaka, kauri, mahoe and ti kouka in the canopy. Mapou is common on the edges, as are some environmental weeds such as garden nasturtium and woolly nightshade. The understorey appears to be grazed and the site is only partially fenced.

Fauna
Not surveyed.

Significance
This degraded block of riparian forest provides some protection to the lower reaches of a small stream leading down to the estuarine habitats of the Whakaki Creek. It forms a discontinuous corridor linking Timber Bay Forest (Q09/001) to Ngamotu Farm Pond (Q09/031), and to the mangrove forests on the fringe of the estuary. This is not considered to be one of the best representative examples of its type in the Northland part of the ED.

STONY CREEK FOREST REMNANTS

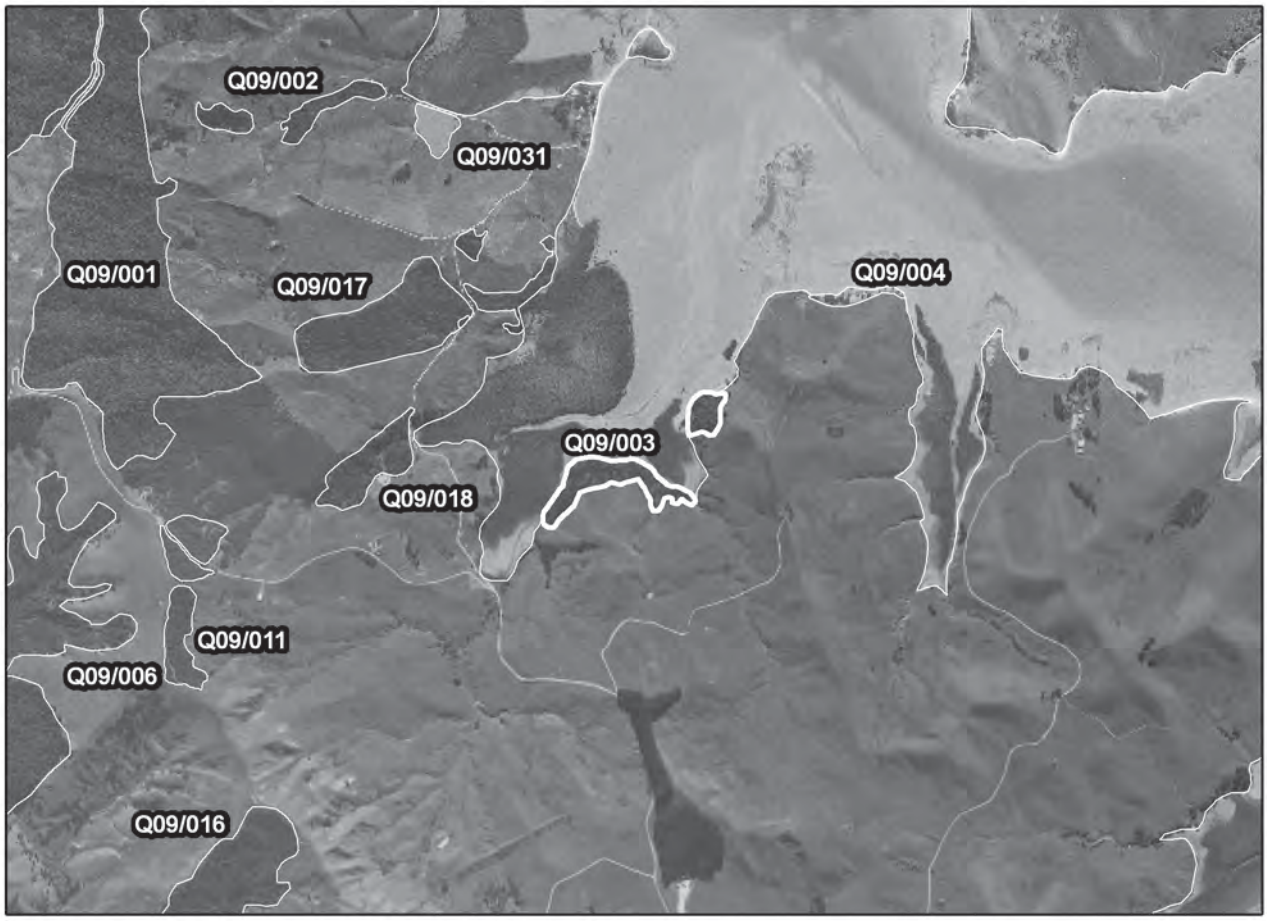
Survey no.	Q09/003
Survey date	9 November 2005
Grid reference	Q09 294 472 (2 remnants)
Area	5.6 ha
Altitude	0–34 m asl

Ecological unit
(a) Totara–kanuka forest on gentle coastal margin (100%)

Landform/geology
Coastal hillsides underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex); Miocene thinly interbedded sandstone and mudstone (Waitemata Group).

Vegetation
This site comprises two coastal indigenous forest remnants on the shores of Stony Creek, on the eastern, sheltered coast of Puketotara Peninsula. Both remnants have a relatively open canopy dominated by totara and kanuka with frequent kowhai, and occasional tarata and ti kouka. The site is not fenced and is very sparsely vegetated underneath as a result of grazing.

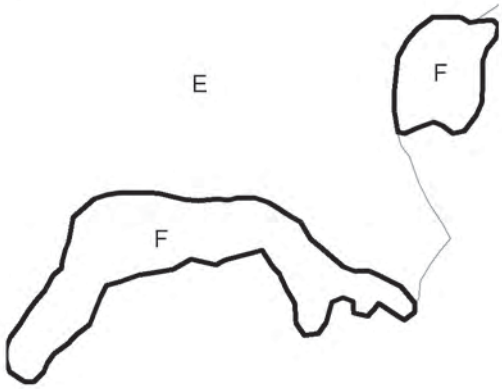
Fauna
Not surveyed.



Q09/003 Stony Creek Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Significance

Though degraded, the forest here provides a protective vegetation buffer to Stony Creek, partially assisting in control of sediment runoff from farmland into the Kaipara Harbour. A history of grazing is evident in the lack of palatable coastal broadleaved species making up the canopy. This is not a particularly good example of this ecological unit, therefore it is not considered to be representative.

STONY CREEK HEADLAND

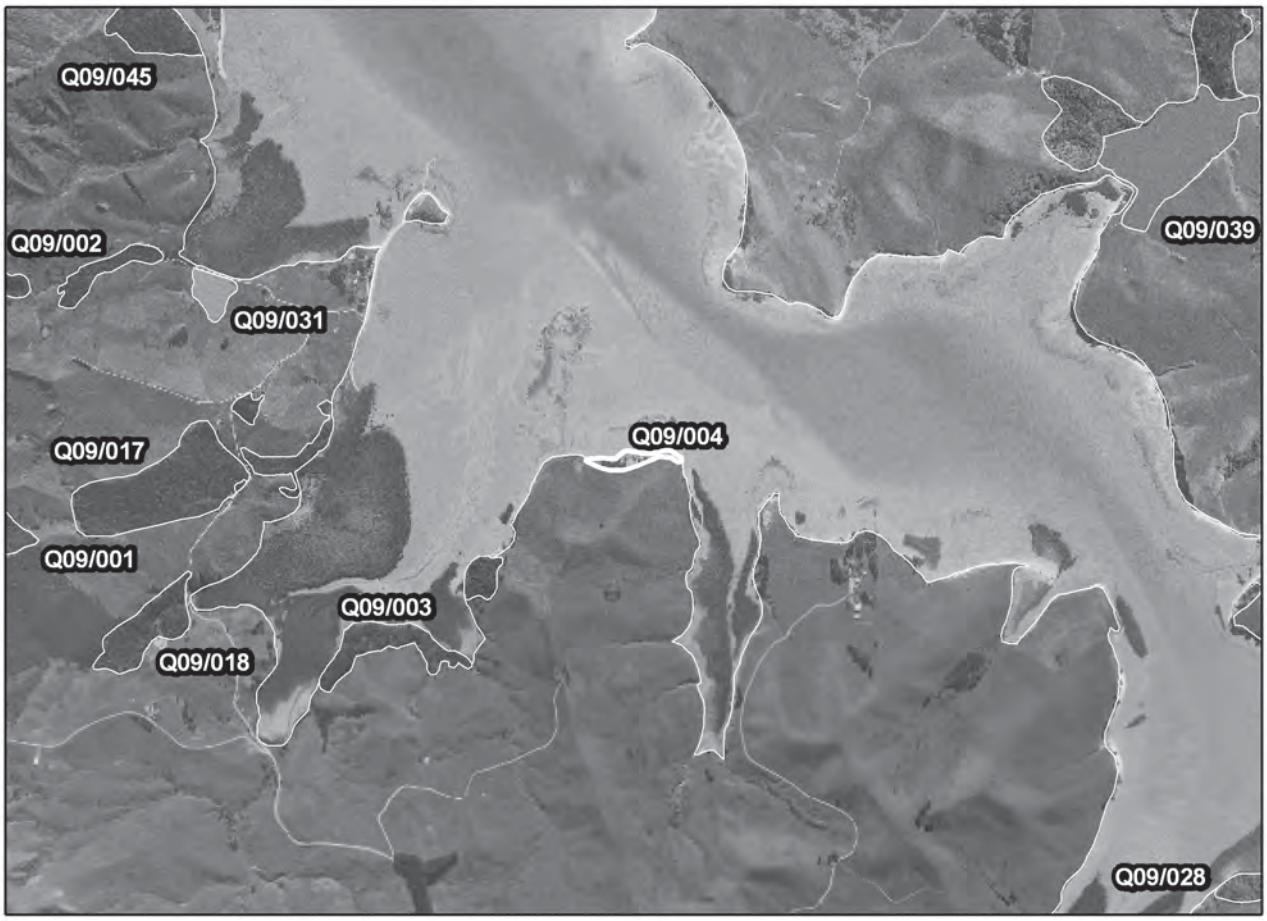
Survey no.	Q09/004
Survey date	9 November 2005
Grid reference	Q09 261 481 (3 remnants)
Area	1.0 ha
Altitude	0–28 m asl

Ecological unit

(a) Totara treeland on coastal cliff (100%)

Landform/geology

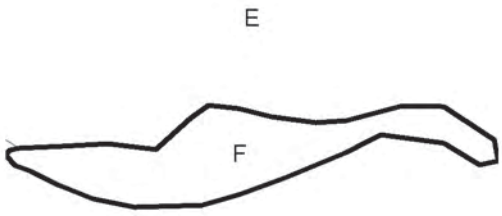
Coastal hillside underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex).



Q09/004 Stony Creek Headland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Vegetation

Scattered totara occur on a limestone cliff above the Whakaki River. On the landward side there is grazed pasture, and on the seaward side there is a narrow beach and extensive shallow mudflats and sandflats used by waders (e.g. northern NZ dotterel, banded dotterel, pied oystercatcher, pied stilt). These wading areas are part of the Otamatea River site (Q08/062).

Fauna

Not surveyed.

Significance

This site is very isolated and small, but is one of the only headlands in the Whakaki River with some indigenous vegetation remaining. It is quite degraded and not representative of its type.

MOTUKUMARA POINT FOREST REMNANTS

Survey no.	Q09/007
Survey date	9 December 2005
Grid reference	Q09 253 457 (6 remnants)
Area	20.7 ha
Altitude	0–71 m asl

Ecological units

(a) Pohutukawa–kanuka forest on steep coastal margin (45%)

(b) Puriri–kanuka forest on steep coastal margin (25%)

(c) Pohutukawa–kanuka–gorse treeland on steep coastal margin (20%)

(d) Pohutukawa–kanuka treeland on steep coastal margin (10%)

Landform/geology

Coastal hillsides underlain by Miocene muddy sandstone, volcaniclastic gravelly sandstone and hyaloclastite breccia (Waitakere Group).

Vegetation

This site comprises vegetation on the fringes of a prominent headland in the southwest of Puketotara Peninsula, as well as vegetation extending around its western side to a point opposite Motuouhi and Moturoa Islands. Most of the ecological units have pohutukawa as a main component. Many of the pohutukawa are showing evidence of dieback, perhaps due to possum browse, which is obvious at a number of sites in the vicinity.

(a) Much of the site is very steep and supports large pohutukawa trees and kanuka as the main cover. Puriri, karaka, harakeke, manuka and ti kouka are frequent, with occasional bracken, kowharawhara, mingimingi, ngaio and kowhai.

(b) A small west-draining seepage has abundant puriri mixed with lesser amounts of kanuka and ti kouka, and occasional emergent kauri rickers and rewarewa.

(c) The northernmost part of the remnant is a similar type to (a) except that the indigenous vegetation is sparse, and gorse is common.

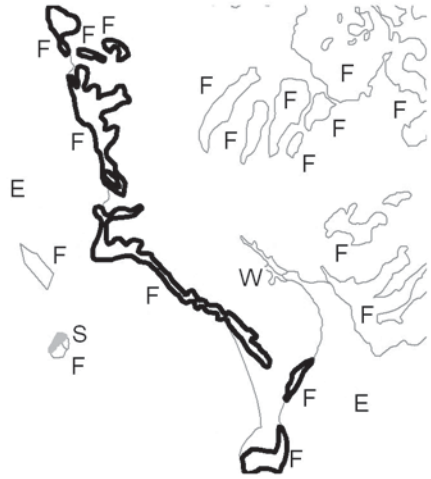
(d) While sharing the common components of pohutukawa and kanuka with type (a) pohutukawa–kanuka forest, the narrowest stretches of coastal forest



Q09/007 Motukumara Point Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



are only 20–25 m wide and now comprise 'treeland' due to extensive edge effects, frequent gaps in the canopy and their mainly bare ground or exotic grassland ground layers.

Fauna

Pied oystercatcher.

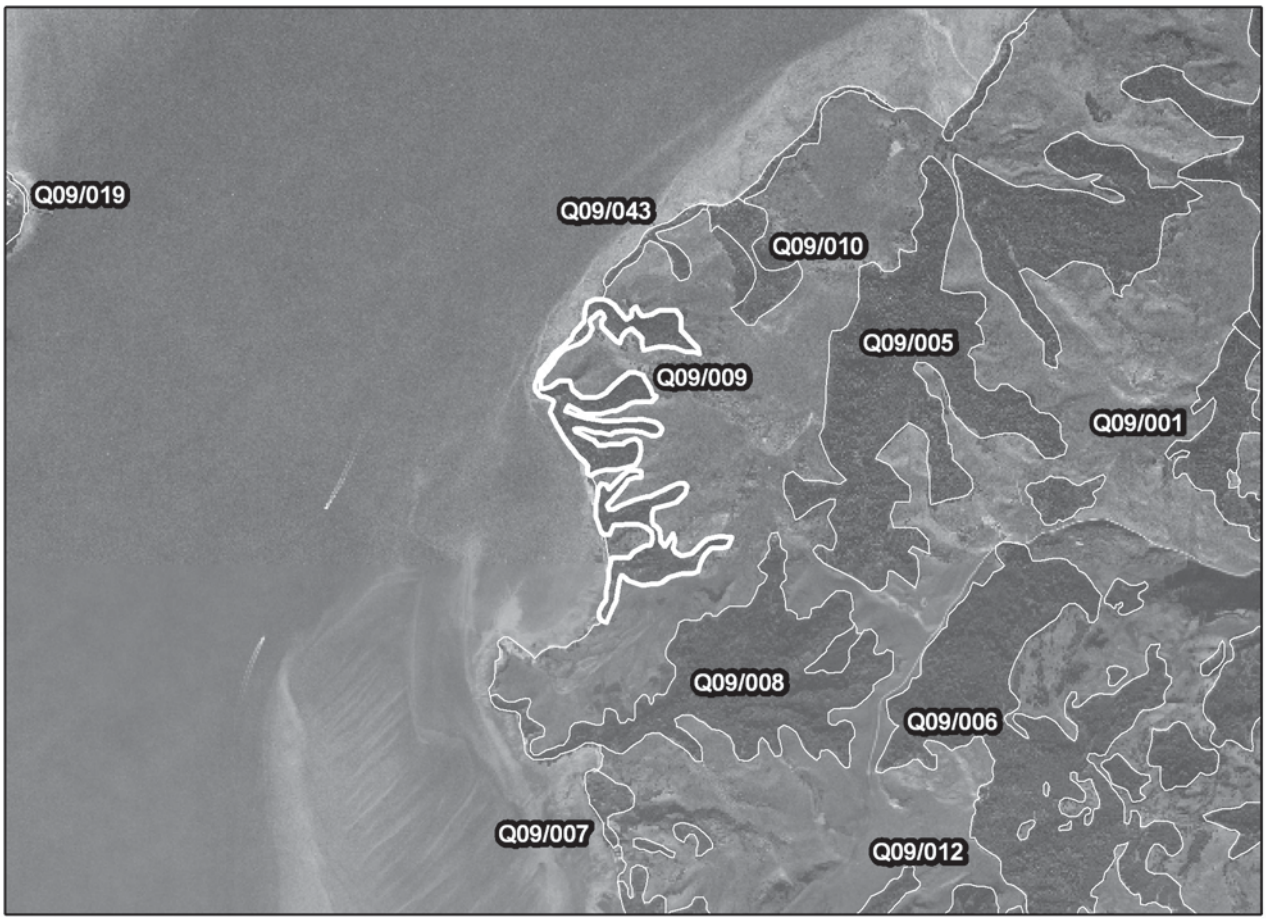
Significance

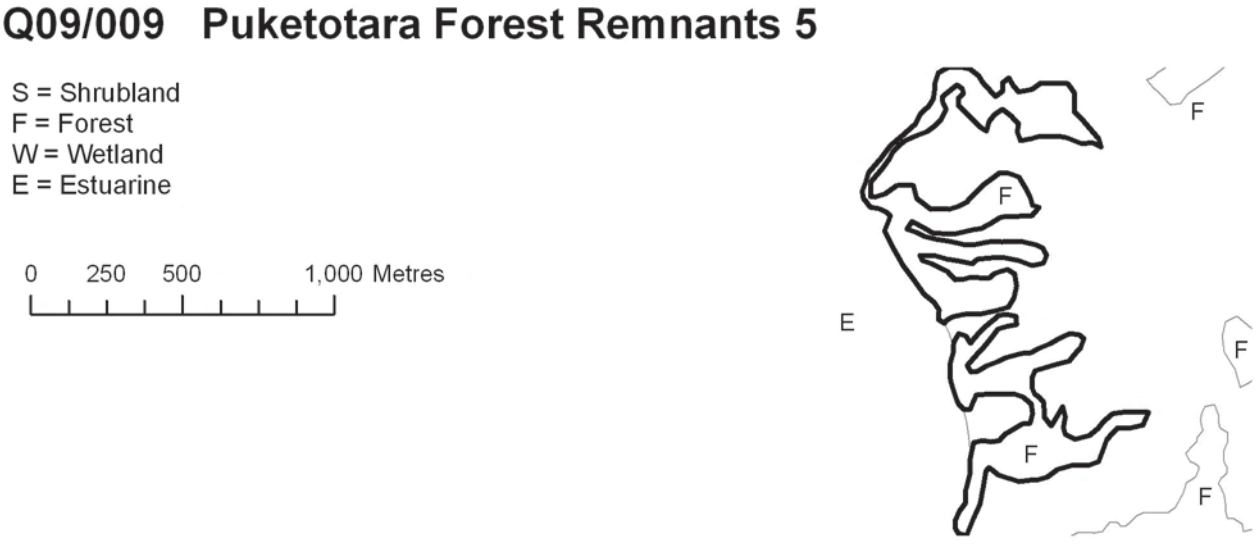
This site includes a very narrow band of coastal forest where only the most inaccessible trees have not been cleared for farming. For this reason the site is

relatively isolated, fragmented and poorly buffered. None of the ecological units are considered to be particularly good examples of their type. They do, however, play a role in stabilising the steep coastal margins.

PUKETOTARA FOREST REMNANTS 5

Survey no.	Q09/009
Survey date	9 December 2005
Grid reference	Q09 250 478 (2 remnants)
Area	15.5 ha





Altitude	0–100 m asl

Ecological units

(a) Kanuka forest in gully (80%)

(b) Pohutukawa forest on steep coastal margin (15%)

(c) Taraire–puriri–kanuka forest on moderate to steep hillslope (5%)

Landform/geology

Coastal hillsides underlain by Miocene muddy sandstone and volcaniclastic gravelly sandstone (Waitakere Group).

Vegetation

This site encompasses six fingers of forest in small gullies flowing westwards towards the Otamatea River Confluence (Q09/021), as well as the forest on the coastal margin which connects them. In the surrounding landscape there is grazed pasture, from which livestock have free access to the indigenous forest.

(a) The majority of the area is covered by relatively depauperate, fragmented kanuka forest with frequent puriri and pohutukawa, and occasional tanekaha, ti kouka and mapou.

(b) The forest on the steep coastal margins contains >80% pohutukawa with frequent individuals of puriri, kanuka and karaka scattered throughout. Gorse is frequent and there are occasional ti kouka and pampas.

(c) One small area of taraire–puriri–kanuka forest is nestled at the head of the deepest gully in the northern part of the remnant.

Fauna

Not surveyed.

Significance

Though the condition of the forest is relatively poor, and the ecological units are not good representative examples of their type, this site provides a relatively long protective vegetation buffer between the harbour and the pasture. It also provides some riparian protection to the ephemeral streams in the gullies.

PUKETOTARA FOREST REMNANT 6

Survey no.	Q09/010
Survey date	9 November 2005
Grid reference	Q09 254 484
Area	4.6 ha
Altitude	0–83 m asl

Ecological unit

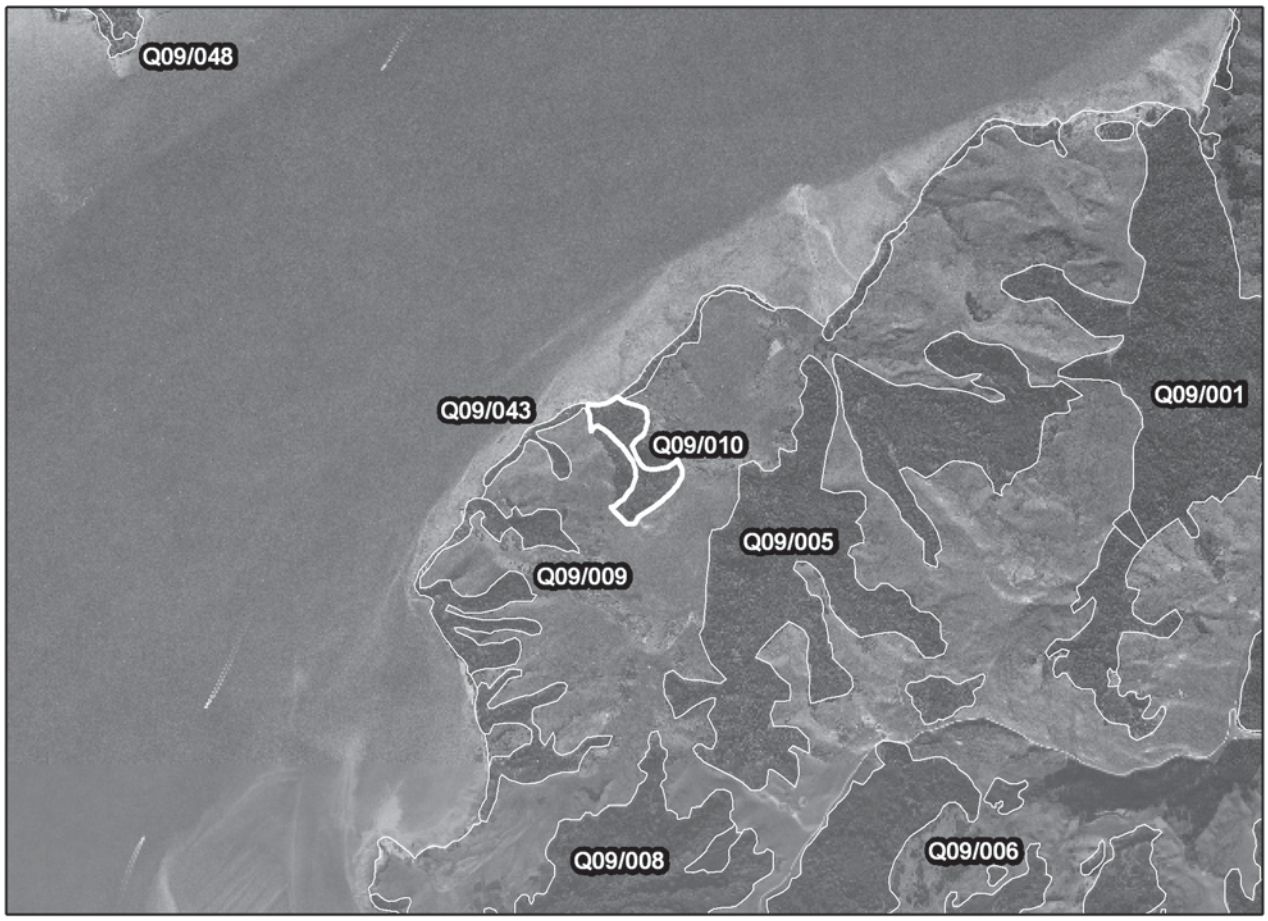
(a) Kanuka forest on moderate to steep hillslope (100%)

Landform/geology

Coastal gully underlain by Miocene muddy sandstone and volcaniclastic gravelly sandstone (Waitakere Group).

Vegetation

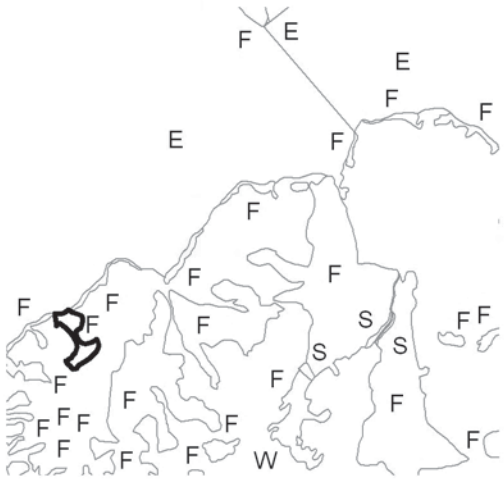
This site comprises a stand of kanuka forest on a steep hillslope with an area of tall radiata pine and maritime pine (excluded from site) on its western side,



Q09/010 Puketotara Forest Remnant 6

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



which is otherwise surrounded by grazed pasture. Livestock have access throughout and gorse is prevalent on all edges.

Fauna

Not surveyed.

Significance

This site is of low quality compared to other comparable forest remnants nearby, though it does have some catchment protection functions, such as controlling sediment runoff from the local area into the Kaipara Harbour.

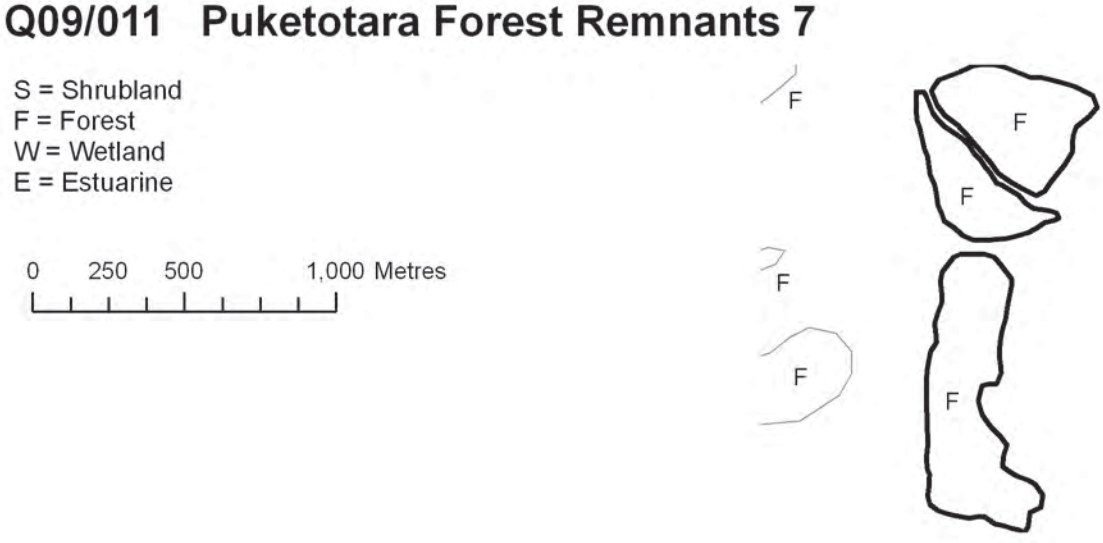
PUKETOTARA FOREST REMNANTS 7

Survey no.	Q09/011
Survey date	30 November 2005
Grid reference	Q09 279 468 (3 remnants)
Area	6.1 ha
Altitude	66–140 m asl

Ecological unit

(a) Kanuka–totara–tanekaha forest on moderate to steep hillslope (100%)





Landform/geology

Escarpment underlain by Miocene polymict igneous conglomerate (Waitemata Group).

Vegetation

This site comprises three patches of forest on east-facing slopes in landscape of pasture. All remnants contain more than 60% kanuka with common totara and tanekaha. Scattered individuals of tarata, kahikatea, ti kouka, kauri, rewarewa and mamangi occur. A major farm track passes through the northern section of the site dividing the northern patch from the southern two patches. Some tall manuka shrubland on the northern side, which links the site with Timber Bay Forest (Q09/001) and Puketotara Forest Remnant 11 (Q08/018), is in the process of being cleared, and there are domesticated goats kept in that area. Grazing animals have free access to the understorey, leaving it relatively bare of any vegetation other than unpalatable species.

Fauna

Not surveyed.

Significance

As a relatively small site with only one vegetation type, which is in relatively poor in condition and is becoming increasingly isolated from other forest patches, this natural area is not representative. Its primary value is as a habitat 'stepping stone' for mobile wildlife, which reduces the overall distance crossing pasture between other nearby natural areas of higher ecological value, e.g. Timber Bay Forest (Q09/001) to the north, Puketotara Forest Remnants 3 (Q09/006) to the west and Puketotara Forest Remnant 9 (Q09/016) to the southeast.

PUKETOTARA FOREST REMNANT 8

Survey no.	Q09/012
Survey date	9 November 2005
Grid reference	Q09 260 461 (5 remnants)
Area	12.6 ha
Altitude	39–140 m asl

Ecological units

(a) Kanuka forest on moderate to steep hillslope (95%)

(b) Kauri–kanuka forest on local very steep slope (5%)

Landform/geology

Hillslopes and gullies underlain by Miocene muddy sandstone and volcaniclastic gravelly sandstone (Waitakere Group).

Vegetation

This site comprises five indigenous forest remnants in small, steep, southwest–flowing gullies in the southwestern corner of Puketotara Peninsula.

(a) The main canopy tree is kanuka. Puriri are scattered throughout, and one or two appear to be dead and heavily laden with perching lily.

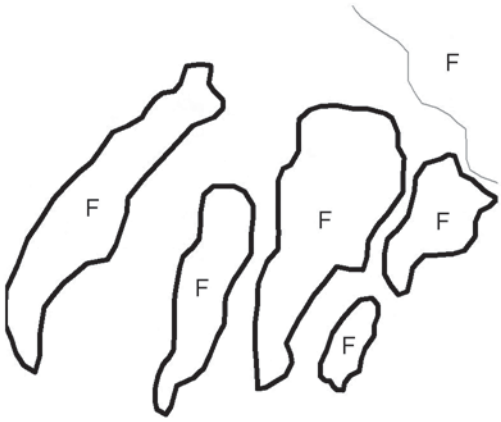
(b) Stands of dense kauri rickers mixed with kanuka occur at the gully heads.



Q09/012 Puketotara Forest Remnants 8

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Fauna

Welcome swallow.

Significance

The poor condition of puriri trees and the grazing pressure in the understorey all reduce this site's natural character and function. Neither of the ecological units is a good representative example of its type. Despite this, the forest cover in these five remnants provides some erosion protection for slopes of very steep gradient, which form the upper catchment of the raupo wetland at Frenchman's Bay Forest and Wetland (Q09/015).

FRENCHMAN'S BAY FOREST AND WETLAND

Survey no.	Q09/015
Survey date	9 November 2005
Grid reference	Q09 264 453 (4 remnants)
Area	25.7 ha (25.0 ha forest, 0.7 ha wetland)
Altitude	0–100 m asl

Ecological units

(a) Kanuka forest on gentle coastal margin (60%)

(b) Puriri forest on gentle coastal margin (20%)

(c) Kauri–kanuka forest on ridge top (10%)

(d) Pohutukawa forest on steep coastal margin (5%)

(e) Raupo reedland in small depression (5%)

Landform/geology

Coastal hillsides and gullies underlain by Miocene thinly interbedded sandstone and mudstone (Waitemata Group) and Miocene muddy sandstone and volcaniclastic gravelly sandstone (Waitakere Group).

Vegetation

This site comprises one large and three small remnants of indigenous forest and wetland on the southern coast of Puketotara Peninsula. The main remnant covers a gently sloping headland and extends up a series of narrow gullies flowing southwestwards. The ridge tops between the gullies are covered in pasture with scattered gorse. The westernmost remnant contains mainly wetland and is located at the mouth of the small basin behind Frenchman's Bay. The remaining two forest remnants are in the same catchment slightly higher on the slope.

(a) Kanuka forest with few associated species covers most of the area.

(b) A more diverse grove of coastal forest occurs on the sheltered eastern side of the headland with abundant puriri and frequent kowhai and kahikatea.

(c) On the edge of one of the cleared ridges, and above type (b), there is a stand of kauri rickers mixed with kanuka. This is the most prominent feature on the skyline when viewing the remnant from land or water.

(d) The most exposed western side of the headland has pohutukawa forest with frequent kanuka and occasional puriri. Pohutukawa extends up the creek some way, opposite mangrove shrubland on the Oruawharo River North Coast (Q09/020).

(e) At the westernmost gully's junction with the saltmarsh, there is a raupo reedland extending approximately 250 m inland from the coast. It has scattered kanuka trees around it.

Fauna

The landowner has provided unconfirmed, anecdotal reports of Australasian bittern (Nationally Endangered) occurring here (Tony Walden pers. comm.).

Significance

The presence of Australasian bittern would certainly elevate this site's significance to Level 1, but there are no confirmed records of this bird in



Q09/015 Frenchman's Bay Forest and Wetland

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Otamatea ED Northland from recent times. Both wetland and forest habitats are in mediocre condition, as they continue to be grazed and are poorly connected, therefore the ecological units present cannot be considered particularly good or extensive examples of their types. The pohutukawa appear heavily browsed, which is an indicator of the presence of possums at high density.

PUKETOTARA FOREST REMNANT 11

Survey no.	Q09/018
Survey date	30 November 2005
Grid reference	Q09 285 473
Area	4.6 ha
Altitude	5–27 m asl

Ecological unit

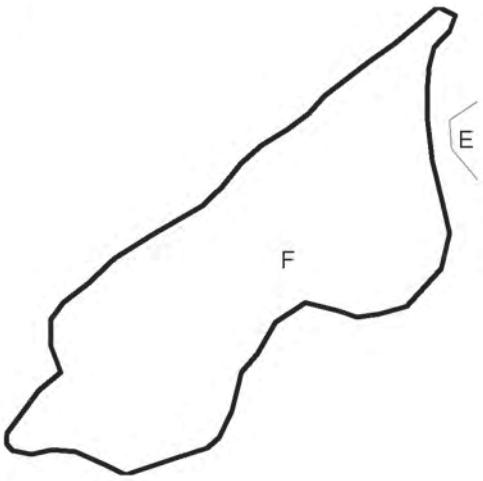
(a) Totara–kanuka forest in gully (100%)



Q09/018 Puketotara Forest Remnant 11

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Landform/geology

Gully underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex) and Miocene thinly interbedded sandstone and mudstone (Waitemata Group).

Vegetation

This small forest remnant is dominated by totara and kanuka which are frequently associated with matai, puriri, kowhai, rewarewa, kahikatea, titoki and nikau, and occasional karaka and ti kouka. The site is mainly surrounded by pasture, though to the west, an area of tall manuka shrubland is currently under clearance and being grazed by free-roaming domestic goats. Stock access is unrestricted (goats and cattle mainly), and the forest edges are somewhat degraded. Ongoing clearance of manuka shrubland in contiguous paddocks is likely to cause some exposure damage to the western forest edge.

Fauna

Not surveyed.

Significance

This site contains a common ecological unit which is better represented at other sites in Otamatea ED Northland with fewer pressures on them. Grazing and edge effects are the main obvious detractors of condition at this location. It still has some value as a habitat patch for mobile wildlife, such as forest birds moving between the different forest remnants in the landscape.

TINOPAI COASTAL MARGIN

Survey no.	Q09/019
Survey date	10 November 2005
Grid reference	Q09 229 487 (2 remnants)
Area	0.9 ha
Altitude	0–20 m asl

Ecological unit

(a) Pohutukawa–brush wattle treeland on steep coastal margin (100%)

Landform/geology

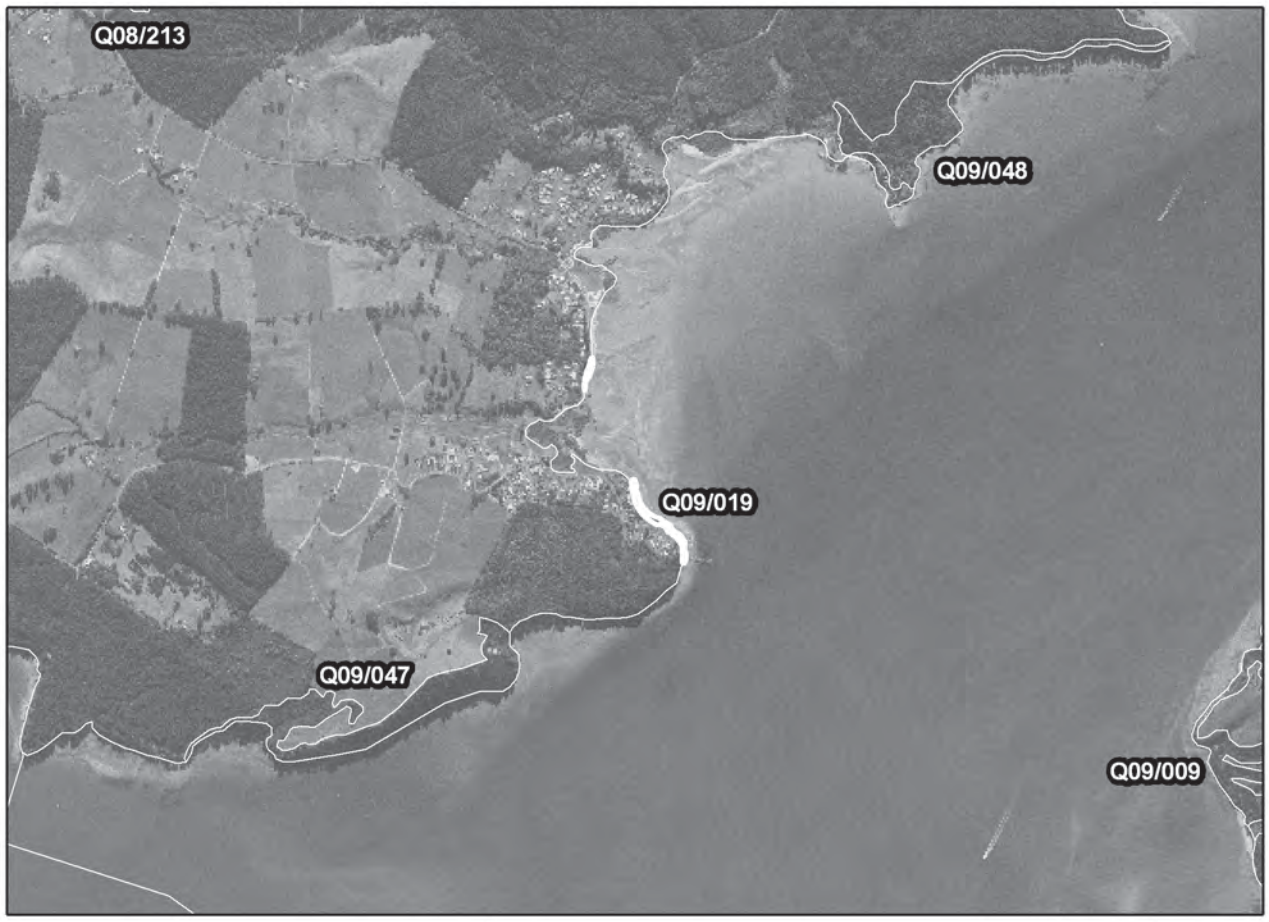
Coastal banks of Miocene andesitic tuff breccia and pumiceous pyroclastic flow deposits (Waitakere Group).

Vegetation

Pohutukawa treeland occupies a very narrow fringe below the road at the shoreline of Komiti Bay and between pine forest at the beach at Te Whau Point. Mature pohutukawa are interspersed with large brush wattle, over tall a understorey of houpara, *Gahnia lacera*, kowharawhara, cotoneaster, kahili ginger and watsonia, as well as many other weedy shrubs and herbs. Bamboo and several other weeds naturalised from surrounding gardens threaten the natural character of the pohutukawa treeland.

Fauna

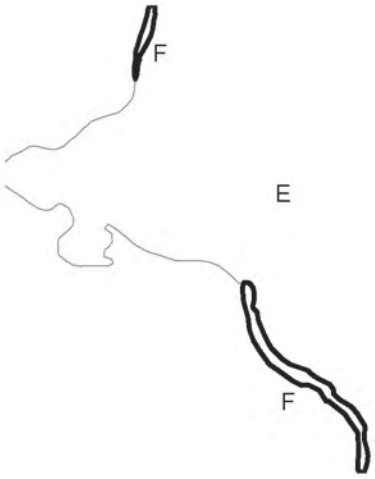
Not surveyed.



Q09/019 Tinopai Coastal Margin

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Significance

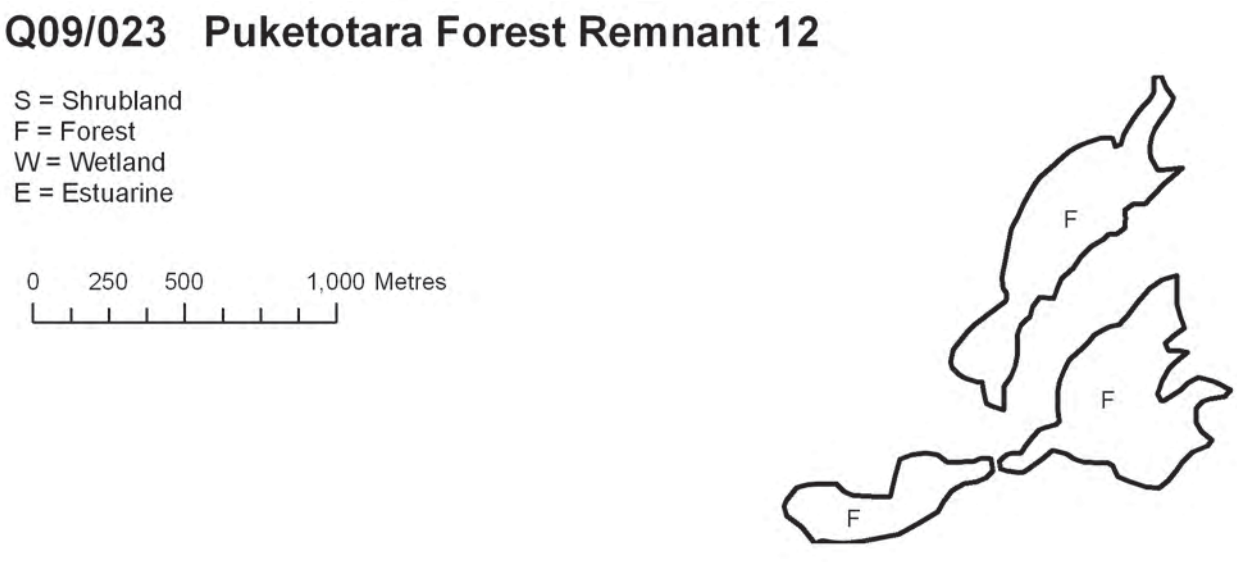
Weeds are a serious issue at this site, particularly as they compete with the typical indigenous understorey of pohutukawa forest as well as attaining the canopy. Also, the site is extremely narrow and extends along the coast, road and pine forest, with limited options for expansion. Its proximity to residential housing means that domestic cats and dogs may impact wildlife trying to settle or breed there. Other animal pests are probably present. Overall this site is too small, poorly buffered, weed infested and vulnerable to predation to be considered ecologically significant. The trees do, however, play a role in

stabilising the coastline and in beautifying the landscape around the settlement, as long as they remain healthy.

PUKETOTARA FOREST REMNANT 12

Survey no.	Q09/023
Survey date	30 November 2005
Grid reference	Q09 283 3448 (3 remnants)
Area	18.2 ha
Altitude	20–100 m asl





Ecological units

(a) Kanuka forest on moderate hillslope (70%)

(b) Puriri forest on moderate hillslope (30%)

Landform/geology

Gullies underlain by Miocene polymict igneous conglomerate and gravelly sandstone (Waitemata Group).

Vegetation

Most of this indigenous forest remnant is around a small stream draining southwest from the main axis of Puketotara Peninsula. An additional forested slope in the upper catchment is included. The latter is joined with the stream remnant at its lower end via a narrow stand of kanuka. The remnant is not fenced and there is evidence of heavy stock trampling and grazing under the forest.

(a) Degraded kanuka forest with frequent tarata, tanekaha and mamangi, and occasional mamaku and rewarewa covers most areas.

(b) Puriri forest with frequent taraire and pukatea, and occasional nikau, titoki and karaka occurs on the slope to the south of the stream.

Fauna

Not surveyed.

Significance

Neither of the ecological units here is representative, but this site is still valuable as a habitat 'stepping stone' for mobile fauna, such as birds, which use a number of such forest remnants to meet their habitat needs. It also serves as riparian protection to the stream.

PUKETOTARA FOREST REMNANT 14

Survey no.	Q09/025
Survey date	30 November 2005
Grid reference	Q09 291 432
Area	7.2 ha
Altitude	15–91 m asl

Ecological units

(a) Kanuka–kauri forest on local very steep hillslope (75%)

(b) Kanuka treeland on local very steep hillslope (25%)

Landform/geology

Coastal hillslope underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies) and Miocene thinly interbedded sandstone and mudstone, and gravelly sandstone (Waitemata Group).

Vegetation

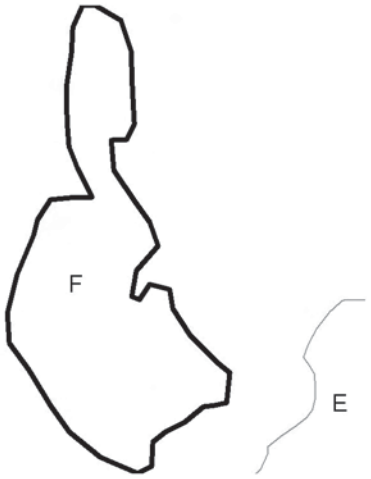
This site constitutes the only remaining stand of indigenous forest in the small basin behind Schnapper Point, which has otherwise been cleared for pastoral farming. It covers a very steep, east-facing slope above gently sloping pasture leading down to mudflats and mangroves which are part of the Oruawharo River North Coast (Q09/020).



Q09/025 Puketotara Forest Remnant 14

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(a) Kanuka forest with common kauri rickers covers the majority of the area. Also present are kahikatea, puriri and two emergent mature pine species (radiata pine and maritime pine).

(b) The rest of the area is covered in much degraded kanuka treeland.

Fauna

Not surveyed.

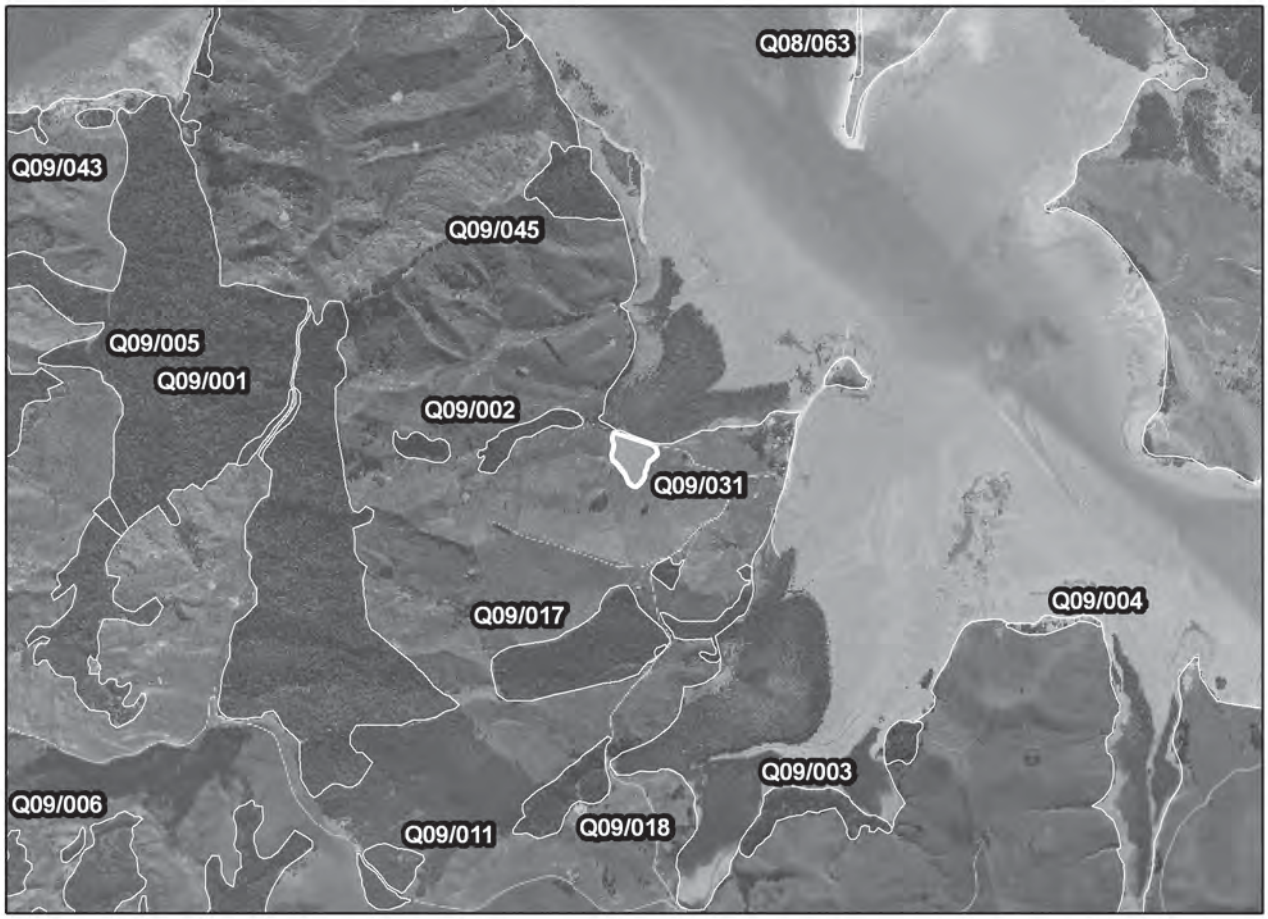
Significance

The forest here provides stability to a local steep slope which would otherwise erode onto an area of beach, mudflat and mangrove on the Oruawharo River

North Coast (Q09/020). The canopy in this site is relative low density and the understorey is grazed, therefore neither ecological unit is a good representative example of its type.

NGAMOTU FARM POND

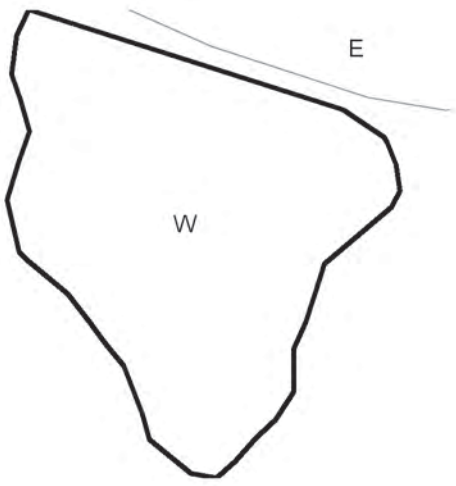
Survey no.	Q09/031
Survey date	30 November 2005
Grid reference	Q09 287 484
Area	1.6 ha



Q09/031 Ngamotu Farm Pond

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Altitude	4–18 m asl

Ecological units

(a) Open water (constructed freshwater farm pond) (99%)

(b) Lake clubrush reedland on constructed pond fringe (1%)

Landform/geology

Man-made pond/lake.

Vegetation

This site constitutes a large freshwater farm pond, created through the construction of an embankment and road across the upper end of a tidal inlet. Across the road there is a mangrove shrubland which is part of the Whakaki River estuary. The site is surrounded by pasture and has a small area of planted indigenous shrubland on its western side comprising abundant tarata and frequent ti kouka, taupata, mapou, karamu, harakeke and karaka. The elongated, elliptical shape of the tarata leaves in the planting does not match the character of local tarata trees (which are pale yellow and have wider, more rounded leaves) and it seems the plant stock may not have been sourced locally. The taupata is almost definitely not local because this species was not found growing naturally in Otamatea ED Northland during the present survey and has never been recorded previously. These plantings have been excluded from the site. Scattered kauri rickers are present in the paddocks around the site.

(a) The open water is entirely unshaded and water quality appears to be poor judging by the abundance of suspended particles and the nutrient-rich runoff from the pastoral land in the immediate catchment.

(b) A small lake clubrush reedland with occasional harakeke and taupata occupies the western corner of the pond. Lake clubrush may have established naturally or may be planted.

Fauna

Many common indigenous waterbirds were observed using this pond and its surrounds, including paradise shelduck, spur-winged plover, pied stilt and pukeko.

Significance

As a habitat for common waterbirds this site has some ecological value, despite being a constructed pond with very little natural vegetation around it. The establishment of plants which are not locally sourced could be a threat to the genetic adaptations of the same species found in nearby high value forest remnants, such as Timber Bay Forest (Q09/001) and Puketotara Forest Remnant 10 (Q09/017), if these plants reproduce with them and produce viable offspring.

WIKI BROWN ROAD FOREST REMNANTS

Survey no.	Q09/034
Survey date	6 December 2005
Grid reference	Q09 384 478 (7 remnants)
Area	14.1 ha
Altitude	0–80 m asl



Q09/034 Wiki Brown Road Forest Remnants

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Ecological units

(a) Totara forest on moderate to steep hillslope (60%)

(b) Totara–kowhai–puriri forest on moderate to steep hillslope (40%)

Landform/geology

Hillslopes and gullies underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex).

Vegetation

This site comprises seven small forest remnants scattered across an exotic pastoral landscape on the eastern Oneriri Peninsula. Gorse scrub is establishing in some of the intervening areas. Livestock roam freely between pasture and forest remnants, trampling undergrowth and grazing on palatable forest plants. There is a small stream flowing through the middle of the site toward the Oruawharo River North Coast (Q09/020). Two distinct forest types are present:

(a) Totara dominates the canopy is the majority of the remnants, with frequent lancewood, bush lawyer, and occasional kahikatea, tarata, ti kouka and mingimingi. This type tends to occur on the drier, upper slopes.

(b) Wetter areas also have abundant totara, though it is associated commonly with kowhai and puriri in these areas.

Fauna

Not surveyed.

Significance

Fragmentation and grazing effects are very pronounced in these remnants, and neither of the ecological units present is considered a representative example of its type. The forest provides minimal catchment and riparian protection.

UNNAMED ISLAND IN ORUAWHARO RIVER

Survey no.	Q09/035
Survey date	6 December 2005
Grid reference	Q09 391 476
Area	4.0 ha (1.4 ha forest, 2.6 ha shrubland)
Altitude	sea level

Ecological units

(a) Manuka–mapou shrubland on gentle coastal margin (75%)

(b) Kanuka–kowhai forest on gentle coastal margin (20%)

(c) Black wattle forest on gentle coastal margin (5%)

Landform/geology

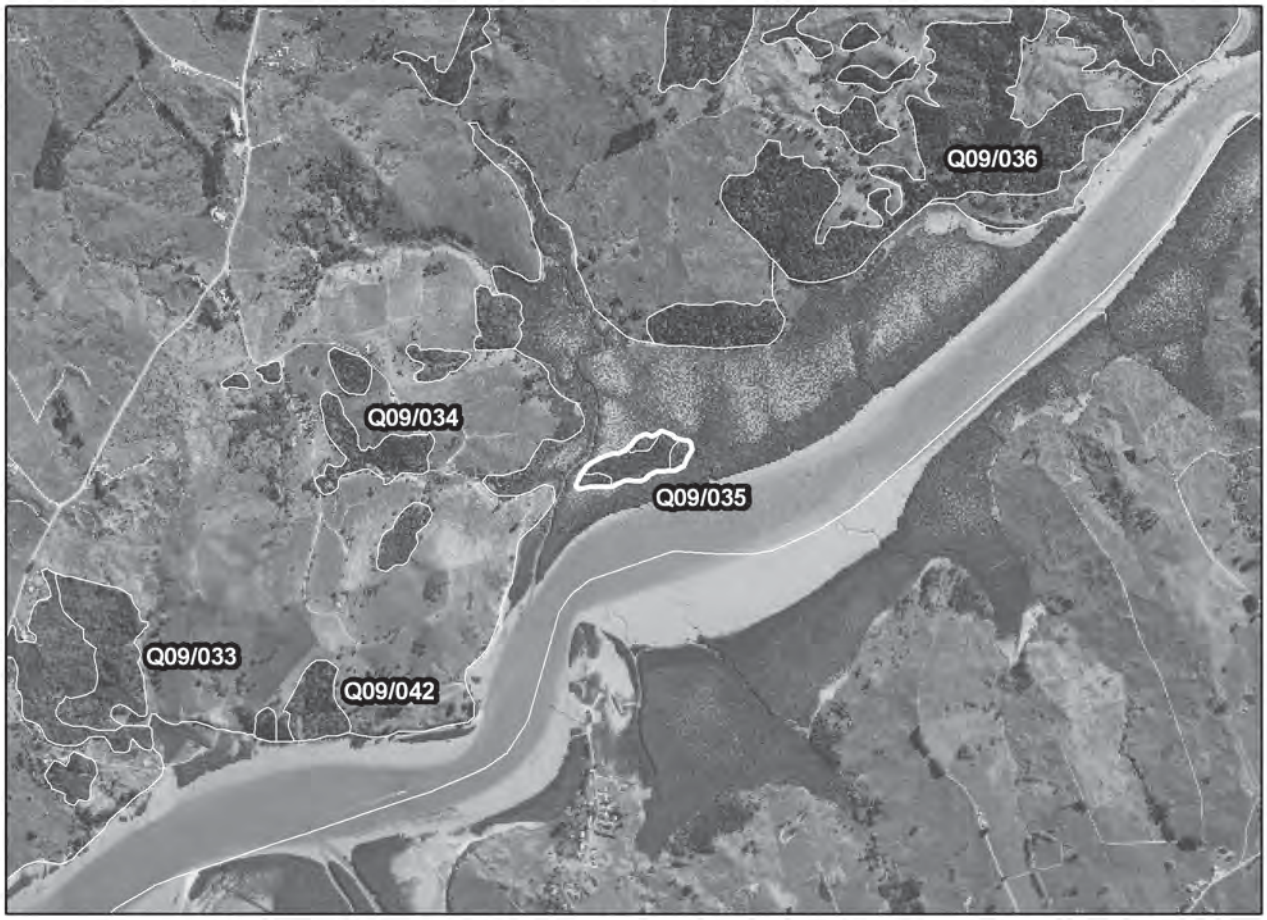
Not surveyed.

Vegetation

Surrounded by extensive mangrove forest on the western side of the Oruawharo River, there is a low, elongated, unnamed island less than 100 m from the nearest point on the Oneriri Peninsula coast. Visibility of this site was poor due to restricted views from public roads and tall mangroves blocking views from the river (by boat). Vegetation types and cover have been estimated using the limited information gathered in the field, combined with interpretation of recent aerial photography (flown in 2002).

(a) Shrubland with abundant manuka and common mapou covers the centre of the island. Mahoe and kanuka are frequent, with occasional kowhai and ponga.

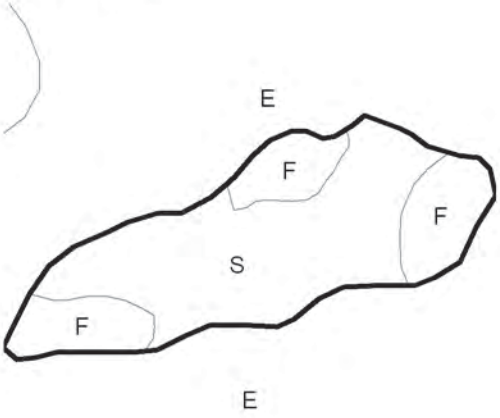
(b) The western and eastern ends of the island support small stands of kanuka–kowhai forest with frequent totara and tarata.



Q09/035 Unnamed Island in Oruawharo River

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(c) On the northern side of the island a grove of black wattle trees extends approximately 10 m above the surrounding shrubland. These are the most prominent feature of the island's vegetation.

Fauna

Not surveyed.

Significance

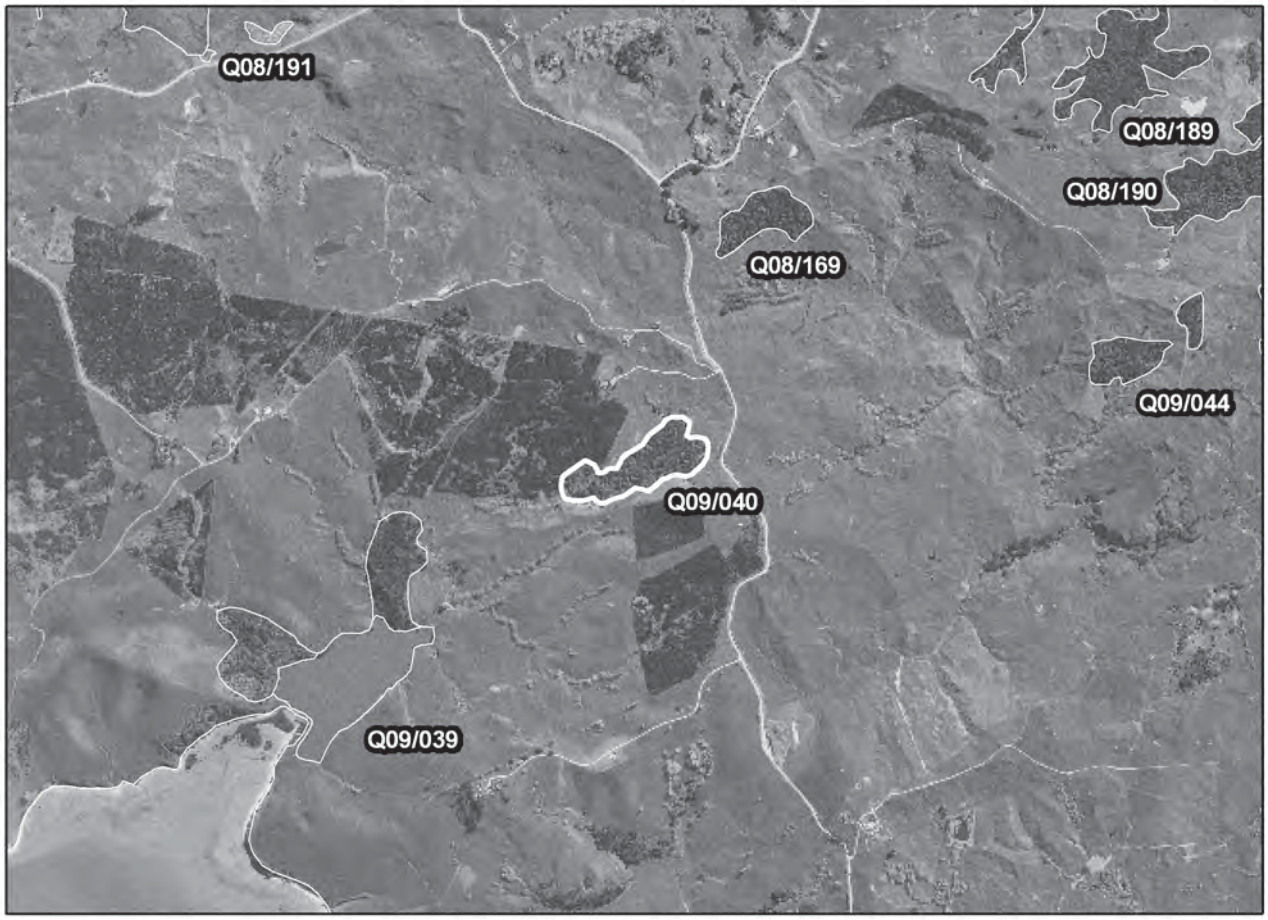
None of the ecological units appear representative, but information is insufficient to fully assess the significance of this site.

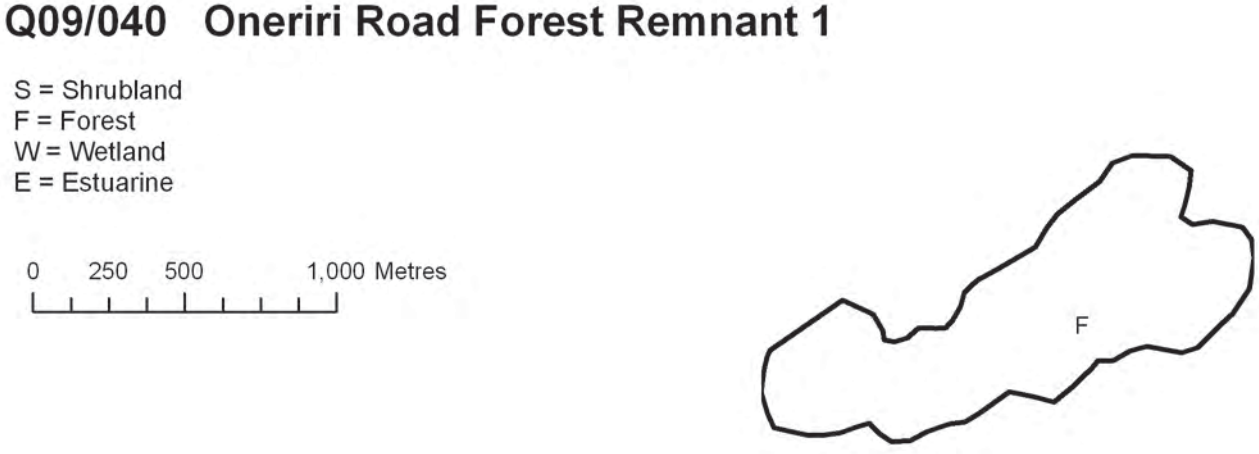
ONERIRI ROAD FOREST REMNANT 1

Survey no.	Q09/040
Survey date	13 December 2005
Grid reference	Q09 329 495
Area	6.4 ha
Altitude	40–84 m asl

Ecological unit

(a) Totara–kahikatea forest in gully (100%)





Landform/geology

Gully underlain by melange (undifferentiated Mangakahia & Motatau Complex lithologies).

Vegetation

This site comprises a small indigenous forest remnant in the head of a gully to the west of Oneriri Road, directly upstream of Wainonororo Constructed Lake (Q09/039). The site is surrounded by pasture and is probably grazed. Totara is more abundant than kahikatea in the canopy, and the next most common species (under 20% cover) are kanuka and puriri. Totara tends to occur on paddock edges, while occasional kahikatea is emergent above the canopy along the margins of the ephemeral stream which flows southwest through the site. There is also occasional mamangi, titoki, ti kouka, mapou, kowhai and karaka.

Fauna

Kingfisher.

Significance

Though not a representative example of totara–kahikatea gully forest, this site provides protection to the riparian margins of the stream and serves to stabilise soil in the catchment. It also serves as a habitat 'stepping stone' for mobile wildlife, such as kingfishers and other forest birds, which move between a number of forest remnants to meet their habitat needs in this mainly pastoral landscape.

TOPUNI RIVER FOREST REMNANT 2

Survey no.	Q09/041
Survey date	6 December 2005
Grid reference	Q09 422 489 (2 remnants)
Area	2.2 ha (1.9 ha forest, 0.3 ha wetland)
Altitude	0–39 m asl

Ecological units

(a) Kauri–kanuka forest on gentle coastal margin (60%)

(b) Totara–puriri forest on moderate to steep hillslope (20%)

(c) Open water (constructed freshwater farm pond) (20%)

Landform/geology

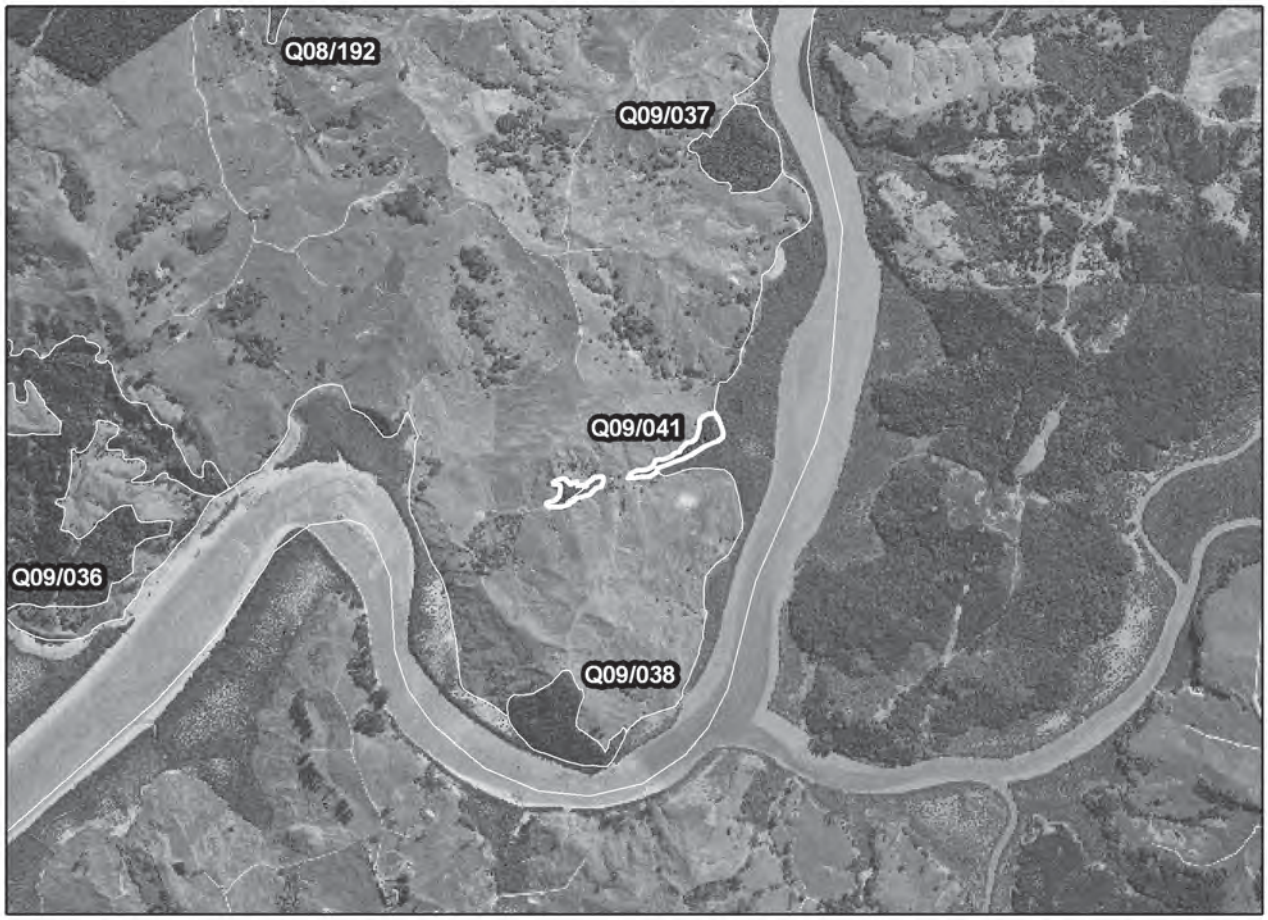
Not surveyed.

Vegetation

The site is comprises two very small forest remnants and a dammed pond on a small creek running down to the mangroves of the Oruawharo River North Coast (Q09/020). The surrounding landscape is pasture which is grazed.

(a) Kauri rickers and kanuka are common in the remnant contiguous with the coast. Kowhai and puriri are frequent, with occasional totara, tanekaha and kahikatea.

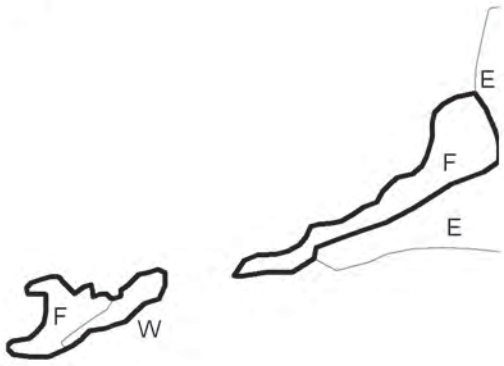
(b) Common totara and puriri with frequent kanuka grow in a small patch next to the farm pond.



Q09/041 Topuni River Forest Remnant 2

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



Fauna

Australasian harrier.

Significance

This site is very degraded, though it provides limited riparian protection and habitat for waterbirds.

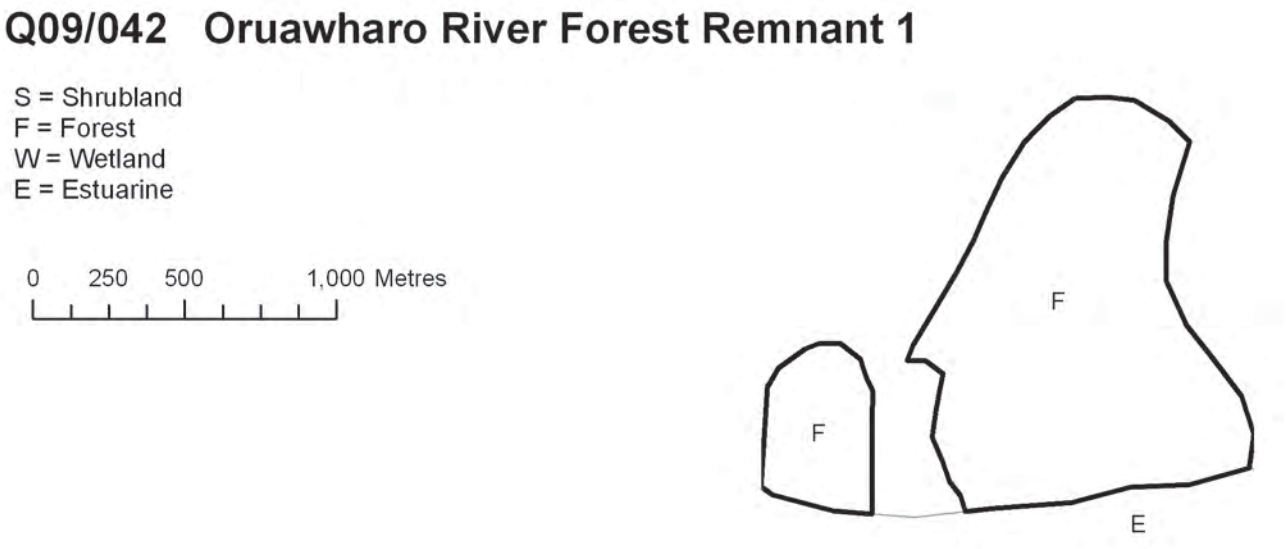
ORUAWHARO RIVER FOREST REMNANT 1

Survey no.	Q09/042
Survey date	6 December 2005
Grid reference	Q09 381 468 (2 remnants)
Area	4.5 ha
Altitude	0–80 m asl

Ecological unit

(a) Karaka–puriri–totara forest on steep coastal margin (100%)





Landform/geology

Coastal hillside underlain by Oligocene micritic limestone (Mahurangi Limestone, Motatau Complex).

Vegetation

This site encompasses a small coastal broadleaved–podocarp forest remnant on a steep northern slope above the Oruawharo River which is surrounded by grazed pasture. The canopy is open in several places and there appears to be stock access throughout. Weed threats in the surrounding landscape include elaeagnus, blackberry and woolly nightshade. Karaka and puriri are particularly dense in the canopy, and totara is also common. Kohekohe and kowhai are frequent with occasional ti kouka.

Fauna

Not surveyed.

Significance

Because it is small and disturbed by livestock, the ecological unit present is not considered to be a good example of coastal forest. Its value is primarily as an indigenous vegetation buffer to the estuarine habitats of the Oruawharo River North Coast (Q09/020).

KOMITI BAY FOREST REMNANT

Survey no.	Q09/048
Survey date	12 January 2006
Grid reference	Q09 238 500
Area	8.2 ha
Altitude	0–60 m asl

Ecological units

(a) Kanuka–pohutukawa forest on gentle coastal margin (90%)

(b) Pohutukawa–radiata pine treeland on coastal cliff (10%)

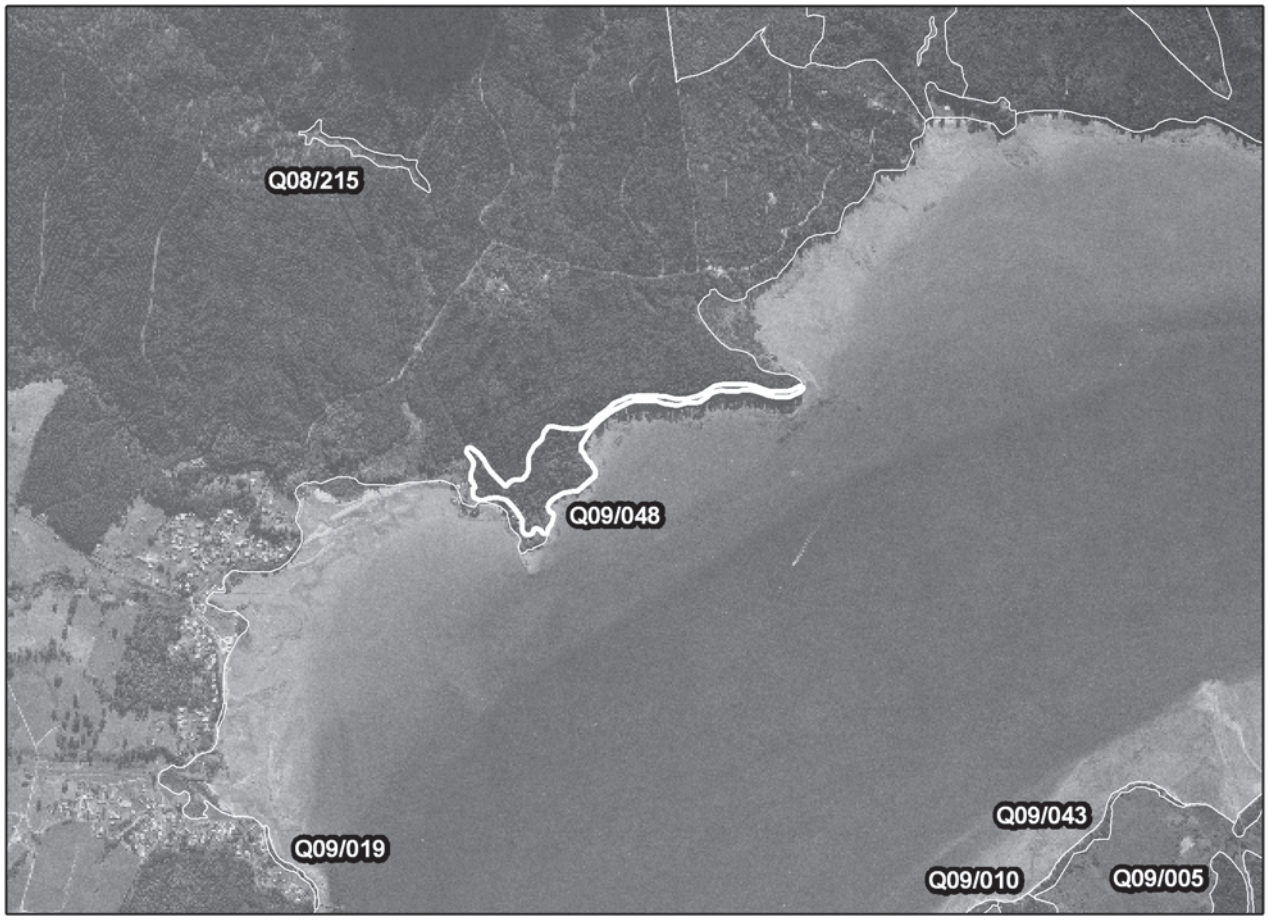
Landform/geology

Coastal hillsides underlain by Miocene andesitic tuff breccia, pumiceous pyroclastic flow deposits and a basalt flow (Waitakere Group).

Vegetation

This site comprises indigenous coastal forest on a small headland which forms the northern boundary of Komiti Bay on the Hukatere peninsula. On the seaward side of the remnant there are mudflats and sandflats which drop off steeply into deeper water of the Otamatea River Confluence (Q09/021). On the landward side, the indigenous forest is buffered by extensive radiata pine plantations. The western and southern coastal edges of the remnant have houses nestled within them. These have been excluded from the site. This site also includes coastal cliffs extending eastwards as far as Puketi Point (approximately 1 km).

(a) Kanuka is abundant and pohutukawa is common in the canopy of the main forest block on the point. Mamangi is frequent and ti kouka is occasional.



Q09/048 Komiti Bay Forest Remnant

S = Shrubland
F = Forest
W = Wetland
E = Estuarine

0 250 500 1,000 Metres



(b) Pohutukawa and radiata pine are common along the cliff margins. The understorey comprises frequent wind-stunted mapou, harakeke, koromiko, kowharawhara and scattered manuka, turutu, pigeonwood and pampas.

Fauna

Not surveyed.

Significance

Neither of the ecological units present is considered a good example of its type. Proximity of this remnant to residential housing potentially puts it at risk from domestic cats and dogs, as well as exposes it to weed invasion, as is happening in nearby Tinopai. Despite these concerns, the vegetation in the site is still a valuable buffer to the coastal fringe.

5. Summary and conclusions

5.1 ANALYSIS OF EXISTING PROTECTED AREAS

5.1.1 Overview

The Protected Natural Areas network in the Northland part of the Otamatea Ecological District is summarised in Table 1.

Otamatea Ecological District covers 57,950 ha in the Northland Conservancy.[16] The total extent covered by natural areas in Otamatea ED Northland is 16,792 ha (29% of the ED in Northland Conservancy), of which approximately 12,346 ha falls within the estuarine habitats of the Kaipara Harbour.[17] Therefore, natural areas on land amount to a total of 4,445 ha (3827 ha forest, 539 ha shrubland, 77 ha freshwater wetland and 1.8 ha grassland on islands) or 9.8% of the total land extent (45,604 ha).

Approximately 1.6% (or 270.9 ha) of the natural areas of Otamatea ED Northland are formally protected (as in Table 1) which is equivalent to about 0.5% of the total extent of the ED in Northland Conservancy. The percentage of land-based natural areas protected is higher than the overall average with the study area (5.4% or 242 ha protected), and the estuarine natural areas are much less protected than average (0.2% or 28.7 ha protected, all of which falls within the extreme upper intertidal zone that overlaps with various protected land statuses).

A list of ecological units recorded in Otamatea ED Northland and their current protection status is set out in Table 2 (page 430) and a summary of the site evaluations is given in Table 3 (page 464).

[16] The Auckland Conservancy part of Otamatea ED covers approximately 46,842 ha.

[17] Note that all of the estuary and harbour is considered 'natural area'.

TABLE 1. PROTECTED NATURAL AREAS NETWORK IN THE NORTHLAND CONSERVANCY PART OF OTAMATEA ECOLOGICAL DISTRICT.[18]

Areas given in ha. The extent (ha) and type of protection status within each site is identified. SL = Stewardship Land; SR = Scenic Reserve; GP = Government Purpose Reserve; RR = Recreation Reserve; MS = Marginal Strip; QEII = Queen Elizabeth National Trust Covenant.

SITE	SURVEY NO.	STATUS						TOTAL AREA PROT-ECTED	TOTAL SITE AREA
		SL	SR	GP	RR	MS	QEII		
Terrestrial									
Maungaturoto Marginal Strip and Surrounds	Q08/068					0.3		0.3	7.5
Collins Scenic Reserve and Surrounds	Q08/078		1.4					1.4	2.7
Hukatere Scenic Reserve and Surrounds	Q08/081		31.0				1.9	32.9	35.9
Te Kiakia Bay Forest Remnants	Q08/093					36.6		36.6	111.0
Raepere Creek Forest	Q08/094					0.1		0.1	116.1
Raepere Creek Coastal Forest	Q08/098					2.3		2.3	28.2
Upper Paparoa Creek Scenic Reserve and Sherwin QEII Covenant	Q08/100		1.6				9.8	11.4	16.1
Paparoa Creek Marginal Strip No. 2 and Surrounds	Q08/102					1.0		1.0	38.0
Lower Pahi River Forest Remnants	Q08/103		0.5					0.5	49.4
Hartles QEII Covenant and Surrounds	Q08/104						1.2	1.2	2.9
East Pahi Forest Remnants	Q08/106						3.5	3.5	23.0
Paparoa Creek Scenic Reserve and Surrounds	Q08/108		0.9					0.9	20.6
Upper Pahi River Scenic Reserve, Rabbit and Goat Islands and Surrounds	Q08/109		3.5					3.5	7.7
Paparoa Stream Headwaters	Q08/110						13.7	13.7	52.5
Mooney QEII Covenant	Q08/111						4.7	4.7	7.2
Paparoa Stream Riparian Forest	Q08/121						3.2	3.2	42.0
Te Opu Scenic Reserve	Q08/126		10.9					10.9	12.4
Whakapirau River Scenic Reserve and North Massey Road Forest Remnants	Q08/128		4.0					4.0	33.9
Arapaoa River Scenic Reserve and Surrounds	Q08/131		0.7					0.7	9.3
Te Kowhai Creek Scenic Reserve and Surrounds	Q08/132		0.5					0.5	26.3
Raepare Creek Headland Forest	Q08/145						43.2	43.2	46.3
Wahiwaka Creek Forest Remnants	Q08/146						2.2	2.2	44.2
Upper Wairau River Coastal Forest Remnants	Q08/151					0.7		0.7	29.0
Bickerstaffe Rail Station Forest	Q08/152						10.1	10.1	21.7
Bickerstaffe Forest and Shrubland	Q08/153						6.3	6.3	98.0
Awaroa Creek Coastal Forest Remnants	Q08/162					1.4		1.4	4.5
Takahoa Creek Forest	Q08/163					2.0		2.0	17.3
Takahoa Government Purpose Wildlife Management Reserve	Q08/164			13.0				13.0	13.0
Waiarohia Creek Forest and Wetland	Q08/165					0.6		0.6	7.2
Pahi River Headwaters	Q08/170						4.0	4.0	31.0
Titipu Island	Q08/176				1.6			1.6	1.9
Kohatutahi Forest and Wetland	Q08/178	0.6				0.6		1.2	3.8
Pukehau QEII Open Space Covenant	Q08/182						9.6	9.6	12.4
Marohemo Road Forest Remnants 2	Q08/202						11.9	11.9	28.9
Paparoa Creek Marginal Strip No. 1 and Surrounds	Q08/217					0.9		0.9	8.7
Whakapirau Creek Conservation Area and Surrounds	Q08/220	0.2						0.2	0.5

[18] No information was able to be obtained on Conservation Covenants administered by Kaipara District Council under the Reserves Act (1977), though a number of these are known to exist within Otamatea ED Northland.

TABLE 1 (*continued*).

SITE	SURVEY NO.	STATUS SL	SR	GP	RR	MS	QEII	TOTAL AREA PROT-ECTED	TOTAL SITE AREA
Estuarine									
Otamatea River	Q08/062			0.2		11.4	0.8	12.4	2790.9
Arapaoa River	Q08/084	0.2	1.3			1.7	1.0	4.2	4957.5
Hukatere Peninsula West Coast	Q08/096				0.1	1.8		2.0	736.5
Oruawharo River North Coast	Q09/020					10.1		10.1	1984.1
TOTAL		1.0	56.4	13.2	1.7	71.4	127.2	270.9	11479.9

5.1.2 Ecological units protected

A summary of the protected vegetation types within protected areas (as per Table 1) is presented in the following Table 1A. Figure 1 shows the approximate proportions of different habitat types represented in the protected natural areas network, while Figure 2 shows the distribution of the same habitat types over the entire study area.

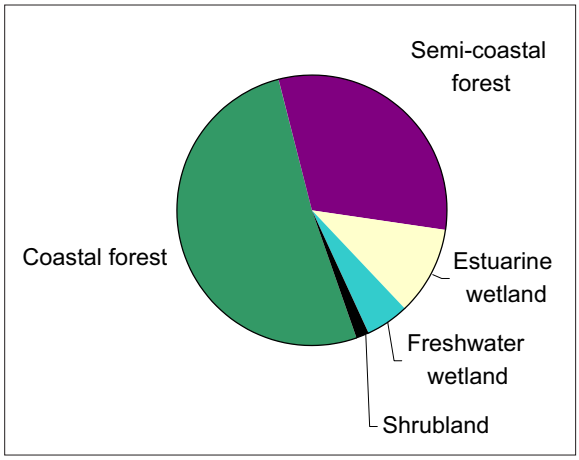


Figure 1. Approximate proportions of the main habitat types represented in the protected natural areas network of Otamatea ED Northland.

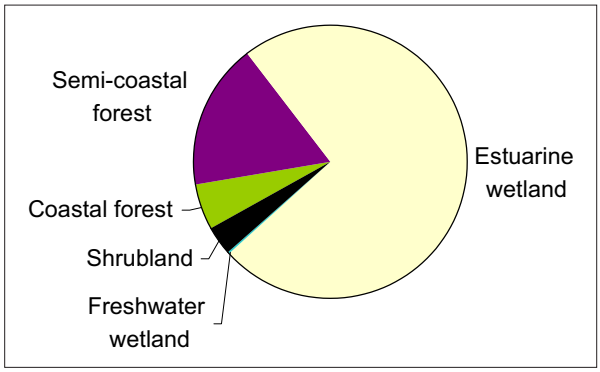


Figure 2: Approximate proportions of the main habitat types in all natural areas of Otamatea ED Northland.

TABLE 1A: LIST OF VEGETATION TYPES WITHIN PROTECTED AREAS IN OTAMATEA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY).

SITE	SURVEY NO.	VEGETATION TYPES WITHIN PROTECTED LAND STATUS
Terrestrial		
Maungaturoto Marginal Strip and Surrounds	Q08/068	Mainly weed-infested river banks
Collins Scenic Reserve and Surrounds	Q08/078	Semi-mature kauri-rimu forest
Hukatere Scenic Reserve and Surrounds	Q08/081	Mature kauri-kahikatea forest
Te Kiakia Bay Forest Remnants	Q08/093	Pohutukawa and kanuka-totara-kauri forest (coastal); kanuka shrubland (coastal)
Raepere Creek Forest	Q08/094	Totara-kanuka forest (semi-coastal)
Raepere Creek Coastal Forest	Q08/098	Puriri-kowhai-kanuka forest (coastal)
Upper Paparoa Creek Scenic Reserve and Sherwin QEII Covenant	Q08/100	Totara-kanuka, kanuka-rimu and mature totara-kahikatea forest (coastal); kauri forest (semi-coastal)
Paparoa Creek Marginal Strip No. 2 and Surrounds	Q08/102	Totara-kanuka forest (coastal)
Lower Pahi River Forest Remnants	Q08/103	Karaka-kowhai-tree privet forest (coastal)
Hartles QEII Covenant and Surrounds	Q08/104	Totara-kahikatea forest (semi-coastal)
East Pahi Forest Remnants	Q08/106	Totara-kowhai forest (coastal)
Paparoa Creek Scenic Reserve and Surrounds	Q08/108	Totara-kanuka forest with mature emergent kahikatea and rimu (coastal)
Upper Pahi River Scenic Reserve, Rabbit and Goat Islands and Surrounds	Q08/109	Totara-kanuka forest (coastal)
Paparoa Stream Headwaters	Q08/110	Taraire-totara forest (semi-coastal)
Mooney QEII Covenant	Q08/111	Totara-kanuka forest (coastal)
Paparoa Stream Riparian Forest	Q08/121	Totara-titoki forest (semi-coastal; alluvial)
Te Opu Scenic Reserve	Q08/126	Taraire-puriri, puriri-kowhai, totara-puriri and kauri-kanuka forest (coastal)
Whakapirau River Scenic Reserve and North Massey Road Forest Remnants	Q08/128	Kanuka-kahikatea forest with mature emergent kahikatea and totara-kanuka forest (coastal)
Arapaoa River Scenic Reserve and Surrounds	Q08/131	Totara-kowhai forest (coastal)
Te Kowhai Creek Scenic Reserve and Surrounds	Q08/132	Totara-puriri forest (coastal)
Raepare Creek Headland Forest	Q08/145	Taraire-puriri-totara, kanuka and kanuka-rimu forest (semi-coastal); totara-puriri-kahikatea and kauri-totara forest (coastal)
Wahiwaka Creek Forest Remnants	Q08/146	Totara forest (coastal) and totara-kahikatea forest (semi-coastal)
Upper Wairau River Coastal Forest Remnants	Q08/151	Totara-kowhai forest (coastal)
Bickerstaffe Rail Station Forest	Q08/152	Totara-kahikatea and totara-rimu forest (semi-coastal)
Bickerstaffe Forest and Shrubland	Q08/153	Taraire forest (semi-coastal)
Awaroa Creek Coastal Forest Remnants	Q08/162	Totara-kanuka-kowhai forest (coastal)
Takahoa Creek Forest	Q08/163	Totara-kowhai-karaka-puriri forest (coastal)
Takahoa Government Purpose Wildlife Management Reserve	Q08/164	Constructed freshwater lake with lake clubrush reedland
Waiarohia Creek Forest and Wetland	Q08/165	Totara-kowhai forest (coastal)
Pahi River Headwaters	Q08/170	Kahikatea forest (semi-coastal; alluvial)
Titipu Island	Q08/176	Pohutukawa-*Pinus radiata* treeland and manuka shrubland (coastal)
Kohatutahi Forest and Wetland	Q08/178	Kowhai-*Coprosma areolata*-ti kouka and kanuka-mamaku forest (coastal); puriri treeland (coastal); raupo-*Baumea articulata*-pink bindweed reedland
Pukehau QEII Open Space Covenant	Q08/182	Totara-kowhai-kahikatea-puriri and totara-puriri forest (coastal)
Marohemo Road Forest Remnants 2	Q08/202	Totara-kanuka and taraire-totara forest (semi-coastal)
Paparoa Creek Marginal Strip No. 1 and Surrounds	Q08/217	Totara forest (coastal)
Whakapirau Creek Conservation Area and Surrounds	Q08/220	Kowhai-karaka forest (coastal)

TABLE 1A (*continued*).

SITE	SURVEY NO.	VEGETATION TYPES WITHIN PROTECTED LAND STATUS
Estuarine		
Otamatea River	Q08/062	Extreme upper intertidal mangroves, saltmarshes, mudflats and sandflats
Arapaoa River	Q08/084	Extreme upper intertidal mangroves, saltmarshes, mudflats and sandflats
Hukatere Peninsula West Coast	Q08/096	Extreme upper intertidal sandflats
Oruawharo River North Coast	Q09/020	Extreme upper intertidal saltmarsh and mudflats

FORESTS

Most of the forest remnants in the protected natural areas network are coastal, amounting to approximately 140 ha.[19] Protected semi-coastal forest remnants cover approximately 85 ha. Note that the proportion of coastal to semi-coastal forest remaining in Otamatea ED Northland is about 1:3 (see Fig. 2), so protection is currently skewed to favour coastal forest. Despite this, very little of either is protected; only 6% of indigenous forest in the study area is under some form of protected land status.

Of the coastal forest types:

- totara–kowhai forest associations are protected at seven sites (three representative: Q08/151, Q08/163 and Q08/182)
- totara–kanuka forest associations are protected at six sites (one representative: Q08/128)
- totara–puriri forest associations are protected at four sites (one representative: Q08/132)
- pohutukawa forest associations are protected at two sites
- and a range of other coastal forest types are protected, twelve of which are considered representative (see Q08/093, Q08/100, Q08/103, Q08/128, Q08/145, Q08/178 and Q08/220)

Of the semi-coastal forest types:

- two alluvial forest types are protected (at one site each) (both representative: Q08/121 and Q08/170)
- taraire or taraire–totara forest is protected at three sites (two representative: Q08/110 and Q08/153)
- totara–kanuka forest is protected at two sites (one representative: Q08/094)
- totara–kahikatea forest is protected at three sites
- totara–rimu forest is protected at one site (representative: Q08/152)
- semi-mature kauri–rimu forest is protected at one site (representative: Q08/078)
- mature kauri–kahikatea forest is protected at one site (representative: Q08/081)

[19] Note that, according to the rapid methods used, individual vegetation types were not mapped, therefore the exact area of these vegetation types is not known.

SHRUBLANDS

Only two areas of coastal shrubland fall within protected land status. Approximately 7 ha of coastal kanuka shrubland falls within a Marginal Strip at Te Kiakia Bay Forest Remnants (Q08/093). Approximately 1 ha of manuka shrubland is within the Recreation Reserve[20] on Titipu Island (Q08/176). This amounts to 8 ha or 11% of coastal shrubland.

No semi-coastal shrublands are within protected lands.

FRESHWATER WETLANDS

Only two freshwater wetland areas are under protected land status. The raupo-*Baumea articulata*-pink bindweed reedland at Kohatutahi Forest and Wetland (Q08/178) is only partially within the Conservation Area (0.3 ha) which leaves most of this unique and representative wetland (a further 0.8 ha) unprotected. The 13 ha constructed lake at Takahoa Creek Government Purpose Wildlife Reserve (Q08/164) is entirely within protected land status.

ESTUARINE WETLANDS

A total of 28.7 ha of estuarine habitat is within protected areas (see Table 1), all within extreme upper intertidal habitats. In all cases, the overlap of the identified estuarine habitat with protected areas has probably more to do with boundary error (i.e. different estimations of where land ends and sea begins) than intentional protection of the estuarine environment.

What is evident is that approximately 12,318 ha of the estuary and harbour (99.8% of it) do not have any sort of special legal protection status. Although no protection status exists, it is not true that the estuary and harbour area is entirely unprotected. Most (but not all) of the land below the mean high water springs (MHWS) is owned by the Crown on behalf of all New Zealanders (Foreshore and Seabed Act 2004), and is administered by various Crown agencies which apply various protections to marine biodiversity under different laws. District Council jurisdictions end at MHWS, while Regional Councils administer both below and above MHWS (Resource Management Act 1991). The Department of Conservation administers the Marine Mammals Protection Act 1978, which provides for the conservation, protection and management of marine mammals. Under the Wildlife Act 1953 (administered by DOC) some other marine fauna are also protected. The Ministry of Fisheries is responsible for policing commercial fishing quotas, as well as non-commercial allowable take limits, which are both protection mechanisms for marine life (Fisheries Act 1996).

---

[20] Note that the primary purpose of a Recreation Reserve is not biodiversity protection, but recreation, and that, with the exception of animals protected by the Wildlife Act 1953, recreation over-rides biodiversity protection (Reserves Act 1997).

5.2 PRIORITY NATURAL AREAS FOR PROTECTION IN THE NORTHLAND CONSERVANCY PART OF OTAMATEA ECOLOGICAL DISTRICT

The purpose of this section is to identify the unprotected natural areas documented in this report that best supplement the existing protected areas network, to make it more fully representative of Otamatea ED Northland's ecological diversity and character.

The Northland part of the ED is characterised by a paucity of habitats. Remaining natural areas are relatively small and fragmented, making the Northland Conservancy part of this ED one of the most modified in the Northland Region. It can be argued that all of the most important natural areas identified in this study (i.e. Level 1 sites) are worthy of protection (Level 1 sites cover only 7.8% of the total land area).

Immediate protection of all these natural areas is not a realistic expectation, so priorities for protection have been identifed which would provide the greatest benefits for indigenous biodiversity. These include the following Level 1 sites:

1. Sites containing representative sequences of ecological units;
2. Natural freshwater wetlands;
3. Terrestrial sites with over 30 ha of forest habitat or over 5 ha of shrubland habitat, *and comprising three or fewer separate remnants*;
4. Sites containing representative ecological units not found at any other site in Otamatea ED Northland;
5. Sites containing forest with mature, emergent podocarps or kauri;
6. Sites with a coastal margin contiguous with estuarine natural areas;
7. **All representative ecological units within estuarine natural areas.**

Table E contains a summary of the sites which meet one or more of the above criteria.

However, whilst these are the priorities, it is important to remember that less than 10% of the land in the study area is covered by indigenous vegetation, so all remaining natural areas in Otamatea ED Northland documented in this report (and there may be others) are worthy of protection.

Any strategy to create an integrated protected areas network in Otamatea ED Northland would have to consider not only protection of remaining natural areas, but also the ecological restoration of additional corridors, linkages, and buffers to provide better connectivity between them.

TABLE E: SUMMARY OF LEVEL 1 SITES WITH IMMEDIATE PRIORITY FOR PROTECTION.

1. Representative sequence of ecological units. 2. Natural freshwater wetland. 3. Site on land with >30 ha forest or >5 ha shrubland 4. Representative ecological unit not found elsewhere in study area.[21] 5. Mature, emergent podocarps or kauri. 6. Site on coastal margin. 7. Representative estuarine ecological units

LEVEL 1 SITES (PARTLY OR FULLY UNPROTECTED)	1.	2.	3.	4.	5.	6.	7.
Arapaoa River (Q08/084)							✓
Arapaoa River Scenic Reserve and Surrounds (Q08/131)						✓	
Ararua Road Forest Remnants (Q08/099)			✓				
Bayer Road Shrubland (Q08/211)				✓			
Bickerstaffe Road Forest 2 (Q08/148)					✓		
Bushy Point Forest Remnants (Q09/046)				✓		✓	
Donaldson's Forest (Q08/157)						✓	
Eastern Boundary Forest (Q08/214)				✓			
Gittos Point Forest and Shrubland (Q09/032)			✓			✓	
Hamlin Road Shrubland (Q08/188)			✓			✓	
Hanerau Stream Forest Remnants (Q08/218)				✓		✓	
Hautakima South Forest (Q08/088)		✓	✓	✓			
Hillstone Road Forest Remnants 3 (Q08/208)				✓			
James Road Forest (Q08/147)				✓		✓	
Kaipara Forest, Puketotara (Q09/026)	✓					✓	
Linton Road West Forest (Q08/134)						✓	
Kaira Creek Forest (Q09/029)				✓	✓	✓	
Kaitara Constructed Lake (Q08/159)[22]		✓		✓		✓	
Kaiwhitu Island (Q08/175)				✓		✓	
Koareare Creek Forest Remnants (Q09/036)						✓	
Kohatutahi Forest and Wetland (Q08/178)		✓		✓		✓	
Kowhai Road Matai-Kahikatea Remnant (Q08/064)				✓	✓		
Kumete Bluff Forest Remnants (Q09/047)						✓	
Lower Pahi River Forest Remnants (Q08/103)						✓	
Mangaiti Creek Forest Remnants (Q08/167)		✓	✓			✓	
Mohinui Forest Remnant 1 (Q08/169)					✓		
Motuouhi Island (Q09/014)						✓	
Moturoa Island (Q09/013)						✓	
Oneriri Pa Forest (Q09/027)						✓	
Oneriri Station Homestead Forest (Q09/022)				✓	✓		
Oruawharo River North Coast (Q09/020)							✓
Oruawharo Road Stream (Q08/209)		✓		✓			
Oruawharo School Forest (Q09/033)			✓	✓		✓	
Otaiwhata Bay Forest and Shrubland (Q09/049)						✓	
Otamatea River (Q08/062)							✓
Otamatea River Confluence (Q09/021)							✓
Otara Head Forest and Shrubland (Q08/063)			✓	✓		✓	
Otuhianga Hill Forest (Q08/065)			✓	✓			
Owhareao Point Remnants (Q08/179)		✓		✓		✓	
Page Point Forest and Shrubland (Q08/140)						✓	
Pahi Coastal Strip (Q08/105)			✓			✓	
Pakaurangi Forest and Shrubland (Q08/185)			✓			✓	
Paparoa Creek Marginal Strip No. 2 and Surrounds (Q08/102)						✓	
Paparoa Creek Scenic Reserve and Surrounds (Q08/108)			✓	✓		✓	
Paparoa Mature Kauri Stand (Q08/122)					✓		
Paparoa Stream Headwaters (Q08/110)			✓	✓			

[21] See site descriptions for details on the representative ecological units present.

[22] Although originally constructed, this lake has become a major wildlife habitat and has developed extensive natural reedlands around its margins which are important to protect.

TABLE E (*continued*).

1. Representative sequence of ecological units. 2. Natural freshwater wetland. 3. Site on land with >30 ha forest or >5 ha shrubland 4. Representative ecological unit not found elsewhere in study area. 5. Mature, emergent podocarps or kauri. 6. Site on coastal margin. 7. Representative estuarine ecological units

LEVEL 1 SITES (PARTLY OR FULLY UNPROTECTED)	1.	2.	3.	4.	5.	6.	7.
Paparoa Stream Riparian Forest (Q08/121)				✓			
Parry Road Wetland (Q08/215)		✓					
Payne Road Forest Remnants (Q08/192)				✓			
Point Curtis Road Coastal Forest Remnants (Q08/156)						✓	
Puketotara Forest Remnant 4 (Q09/008)	✓		✓			✓	
Puketotara Forest Remnants 2 (Q09/005)			✓				
Puketotara Forest Remnants 3 (Q09/006)				✓		✓	
Puketotara Forest Remnants 10 (Q09/017)						✓	
Puketotara Forest Remnant 15 (Q09/045)				✓		✓	
Puriri Point Forest and Shrubland (Q08/183)			✓	✓		✓	
Raepere Creek Coastal Forest (Q08/098)						✓	
Raepere Creek Forest (Q08/094)				✓			
Rangiora Road Forest Remnants (Q08/166)			✓			✓	
Ruataniwha Forest Remnant (Q09/030)				✓			
Smith's Point and Mateotetawa Creek Forest Remnants (Q08/079)						✓	
Takahoa Creek Forest (Q08/163)						✓	
Te Kiakia Bay Forest Remnants (Q08/093)						✓	
Te Kowhai Creek Scenic Reserve and Surrounds (Q08/132)						✓	
Te Mira Road Wetland (Q08/212)		✓					
Te Ope Headland Forest (Q08/119)				✓		✓	
Te Ope Stream Remnants (Q08/116)		✓					
Te Ruruku Bay Forest Remnants (Q08/089)						✓	
Te Tawhiti Forest Remnants (Q08/144)					✓		
The Funnel Pohutukawa Fringe (Q09/043)						✓	
Timber Bay Forest (Q09/001)	✓		✓	✓		✓	
Tinopai Road Wetland (Q08/216)		✓					
Topuni River Confluence Forest (Q09/038)						✓	
Topuni River Forest Remnant 1 (Q09/037)						✓	
Totara Creek Forest Remnant (Q08/095)			✓	✓			
Un-named Island in Kaiwaka River (Q08/158)						✓	
Upper Pahi River Riparian Forest (Q08/138)					✓		
Upper Wairau River Coastal Forest Remnants (Q08/151)						✓	
Upper Whakaki River Forest Remnants (Q09/028)						✓	
Wahiwaka Creek Forest Remnants (Q08/146)						✓	
Waipikopiko Stream Headwaters (Q08/171)				✓	✓		
Wairau River Riparian Forest (Q08/173)					✓		
Waitieke Creek Forest (Q08/092)						✓	
Whakapirau Creek Coastal Forest (Q08/127)						✓	
Whakapirau Creek Conservation Area and Surrounds (Q08/220)						✓	
Whakapirau North Forest (Q08/107)				✓		✓	
Whakapirau River Scenic Reserve and North Massey Road Forest Remnants (Q08/128)						✓	
Whakapirau/Rocky Point Forest and Shrubland (Q08/135)						✓	

TABLE 2: ECOLOGICAL UNITS RECORDED IN OTAMATEA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY) AND PROTECTION STATUS.

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

GEOL. GROUP:†	A	B	C	D	E	F	G	H	I
COASTAL FOREST									
Coastal early successional forest									
Black wattle									
Kanuka					Q08/089 (part of)		Q08/089 (part of)		Q09/036 (part of)
					*Q09/015 (part of)		*Q09/015 (part of)		
					Q09/046				
Kanuka–mamaku			**Q08/178** (ptSL,MS)						
Kanuka–tree privet									
Coastal broadleaved forest									
Houpara–kowhai					**Q08/179**				
Houpara–kowhai–tawapou					**Q09/046**				
Kanuka–kowhai									Q09/036 (part of)
Kanuka–kowhai–puriri									
Kanuka–pohutukawa					*Q09/048				
Kanuka–puriri									
Karaka–kowhai–tree privet								**Q08/103** (part of, ptSR)	
Karaka–tawapou–harakeke					**Q08/175**				
Kowhai–*Coprosma areolata*–ti kouka			**Q08/178** (ptSL,MS)						
Kowhai–karaka									
Kowhai–puriri					Q08/089 (part of)		Q08/089 (part of)		**Q09/036** (part of)
Kowhai–ti kouka	*Q08/191 (part of)								*Q08/191 (part of)

† **A:** Holocene alluvium and freshwater wetlands
B: Pleistocene alluvial and/or estuarine sediments
C: Pleistocene colluvium of basalt boulders
D: Miocene dacite (Waitakere Group)
E: Miocene volcaniclastic sedimentary rocks and lava flows (Waitakere Group)
F: Miocene igneous conglomerate (Waitemata Group)
G: Miocene sandstone and mudstone (Waitemata Group)
H: Undifferentiated Eocene–Oligocene sedimentary rocks (Motatau Complex)
I: Oligocene micritic limestone and calcareous siltstone (Motatau Complex)

GEOL. GROUP:†	J	K	L	M	N	O	P	NOT SURVEYED
COASTAL FOREST								
Coastal early successional forest								
Black wattle								*Q09/035
Kanuka		Q09/036 (part of)		Q08/140 (part of)	Q08/128 (ptSR)	*Q08/141 (part of)		**Q09/038**
					Q08/140 (part of)	*Q08/187		Q09/047
					Q09/032 (part of)	**Q09/032** (part of)		
						Q09/036 (part of)		
Kanuka–mamaku								
Kanuka–tree privet				*Q08/142 (part of)		*Q08/142 (part of)		
Coastal broadleaved forest								
Houpara–kowhai								
Houpara–kowhai–tawapou								
Kanuka–kowhai		Q09/036 (part of)				Q09/036 (part of)		*Q09/035
Kanuka–kowhai–puriri						*Q08/187		
Kanuka–pohutukawa								
Kanuka–puriri					**Q09/032** (part of)	**Q09/032** (part of)		
Karaka–kowhai–tree privet						**Q08/103** (part of, ptSR)		
Karaka–tawapou–harakeke								
Kowhai–*Coprosma areolata*–ti kouka								
Kowhai–karaka								Q08/220
Kowhai–puriri		**Q09/036**(part of)					**Q09/036**(part of)	
Kowhai–ti kouka								

† **J:** Holocene estuaries, beaches, and intertidal rock flats
K: Eocene glauconitic sandstone
L: Cretaceous-Paleocene thinly bedded calcareous mudstone (Whangai Fmn, Mangakahia Complex)
M: Cretaceous siliceous mudstone (Whangai Fmn, Mangakahia Complex)
N: Cretaceous sandstone and mudstone (Punakitere & Motukaraka formations, Mangakahia Complex)
O: Northland Allochthon melange (undifferentiated Mangakahia & Motatau Complex lithologies)
P: Man-made pond or lake

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
COASTAL FOREST									
Coastal broadleaved forest									
Pohutukawa					**Q08/092** (part of)		**Q08/092** (part of)		Q08/063 (part of)
					Q08/093 (ptMS)		*Q09/015 (part of)		
					Q08/185 (part of)		**Q09/026** (part of)		
					*Q09/009		Q09/043 (part of)		
					Q09/013				
					Q09/014				
					*Q09/015 (part of)				
					Q09/043 (part of)				
					Q09/046				
Pohutukawa–akepiro–kowharawhara					**Q08/185** (part of)				
Pohutukawa–brush wattle					*Q09/019				
Pohutukawa–houpara					**Q09/049**				
Pohutukawa–houpara–kowhai									
Pohutukawa–kanuka					Q08/093 (ptMS)		**Q09/027**		
					*Q09/007				
					Q09/008				
Pohutukawa–kanuka–gorse					*Q09/007				
Pohutukawa–kowhai					**Q08/175**				
Pohutukawa–kowhai–puriri–taraire									**Q08/063** (part of)
Pohutukawa–radiata pine					*Q09/048				
					*Q08/176(ptRR)				
					Q08/179				
Pohutukawa–radiata pine–kanuka					Q08/185 (part of)				
Puriri			Q08/178 (ptSL,MS)		*Q09/015 (part of)		*Q09/015 (part of)		
Puriri–kanuka					Q08/185 (part of)				
					*Q09/007				
Puriri–karaka							**Q08/183** (part of)		*Q08/136 (part of)
Puriri–kowhai						**Q09/001** (part of)	**Q09/001** (part of)		

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
COASTAL FOREST								
Coastal broadleaved forest								
Pohutukawa				**Q08/185** (part of)	Q08/134	Q08/063 (part of)		
					Q08/135	**Q08/185** (part of)		
						Q09/026 (part of)		
Pohutukawa–akepiro–kowharawhara				**Q08/185** (part of)		**Q08/185** (part of)		
Pohutukawa–brush wattle								
Pohutukawa–houpara								
Pohutukawa–houpara–kowhai								**Q09/047**
Pohutukawa–kanuka								
Pohutukawa–kanuka–gorse								
Pohutukawa–kowhai								
Pohutukawa–kowhai–puriri–taraire						**Q08/063** (part of)		
Pohutukawa–radiata pine								
Pohutukawa–radiata pine–kanuka				Q08/185 (part of)		Q08/185 (part of)		
Puriri					Q08/135			
Puriri–kanuka				Q08/185 (part of)		*Q08/186		
						Q08/185 (part of)		
Puriri–karaka				*Q08/136 (part of)		*Q08/136 (part of)		
						Q08/183 (part of)		
Puriri–kowhai					**Q08/134**			
					Q08/126 (ptSR)			

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
COASTAL FOREST									
Coastal broadleaved forest									
Puriri–kowhai–kanuka						**Q08/098** (part of, ptMS)	**Q08/098** (part of, ptMS)		**Q08/098** (part of, ptMS)
Puriri–pohutukawa					**Q08/093**(ptMS)				
Puriri–pohutukawa–kanuka					**Q09/008**				
Puriri–taraire									
Puriri–ti kouka						Q08/098 (part of, ptMS)	Q08/098 (part of, ptMS)		Q08/098 (part of, ptMS)
Taraire					**Q08/179**				
Taraire–karaka									
Taraire–puriri							**Q09/026** (part of)		
							Q09/027		
Taraire–puriri–kowhai–kanuka									*Q08/168 (part of)
Coastal broadleaved–podocarp forest									
Kanuka–totara–kowhai							*Q08/160 (part of)		*Q08/160 (part of)
Kahikatea–kowhai									**Q09/036** (part of)
Kahikatea–puriri–taraire–kanuka									
Karaka–kanuka–kahikatea							**Q09/045**		
Karaka–puriri–totara									*Q09/042
Kowhai–puriri–kahikatea							Q08/183 (part of)		
Kowhai–totara									Q08/079 (part of)
Kowhai–totara–kahikatea						**Q08/098** (part of, ptMS)	**Q08/098** (part of, ptMS)		**Q08/098** (part of, ptMS)
Puriri–taraire–kahikatea–kauri									
Taraire–kahikatea									
Taraire–totara–kanuka									
Totara–kahikatea–karaka									
Totara–kanuka–kowhai		**Q08/157**							
Totara–kanuka–puriri									**Q09/028** (part of)
Totara–kohekohe–puriri									**Q08/107**
Totara–kowhai									Q08/102 (part of, ptMS)

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
COASTAL FOREST								
Coastal broadleaved forest								
Puriri–kowhai–kanuka						**Q08/098** (part of, ptMS)		
Puriri–pohutukawa								
Puriri–pohutukawa–kanuka								
Puriri–taraire					Q08/135			
Puriri–ti kouka						Q08/098 (part of, ptMS)		
Taraire								
Taraire–karaka						**Q08/146** (ptQEII)		
Taraire–puriri				Q08/140 (part of)	Q08/140 (part of)	*Q08/142 (part of)		
				*Q08/142 (part of)	**Q08/126** (ptSR)	*Q08/143		
						Q09/026 (part of)		
Taraire–puriri–kowhai–kanuka			*Q08/168 (part of)			*Q08/168 (part of)		
Coastal broadleaved–podocarp forest								
Kanuka–totara–kowhai						*Q08/160 (part of)		
Kahikatea–kowhai		**Q09/036** (part of)				**Q09/036** (part of)		
Kahikatea–puriri–taraire–kanuka						**Q09/029**		
Karaka–kanuka–kahikatea								
Karaka–puriri–totara								
Kowhai–puriri–kahikatea						Q08/183 (part of)		
Kowhai–totara						Q08/079 (part of)		
Kowhai–totara–kahikatea						**Q08/098** (part of, ptMS)		
Puriri–taraire–kahikatea–kauri					**Q08/119**			
Taraire–kahikatea					Q08/147			
Taraire–totara–kanuka				*Q08/142 (part of)		*Q08/142 (part of)		
Totara–kahikatea–karaka								**Q08/218**
Totara–kanuka–kowhai								*Q08/162
Totara–kanuka–puriri						**Q09/028** (part of)		
Totara–kohekohe–puriri								
Totara–kowhai		*Q08/106 (part of, ptQEII)			Q08/131 (ptSR)	Q08/102 (part of, ptMS)		Q08/158

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
COASTAL FOREST									
Coastal broadleaved–podocarp forest									
Totara–kowhai									*Q08/106 (part of, ptQEII)
									Q08/151 (ptMS)
									*Q08/165 (part of, ptMS)
Totara–kowhai–kahikatea									**Q08/079** (part of)
Totara–kowhai–kahikatea–puriri							**Q08/182** (part of, ptQEII)		
Totara–kowhai–karaka	*Q08/191 (part of)								*Q08/191 (part of)
									Q08/127
Totara–kowhai–karaka–puriri									**Q08/163** (ptQEII)
Totara–kowhai–puriri					**Q08/185** (part of)				*Q08/085
									Q09/036 (part of)
Totara–puriri							Q08/182 (part of, ptQEII)		*Q08/136 (part of)
Totara–puriri–kahikatea									Q09/036 (part of)
Totara–puriri–kanuka						**Q09/001** (part of)	**Q09/001** (part of)		
Totara–puriri–kowhai								**Q08/103** (part of, ptSR)	
Totara–taraire–puriri									
Totara–ti kouka									
Coastal podocarp-dominant forest									
Kahikatea–totara									
Kanuka–kahikatea									

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
COASTAL FOREST								
Coastal broadleaved–podocarp forest								
Totara–kowhai						*Q08/106 (part of, ptQEII)		
						*Q08/165 (part of, ptMS)		
Totara–kowhai–kahikatea						**Q08/079** (part of)		
Totara–kowhai–kahikatea–puriri						**Q08/182** (part of, ptQEII)		
Totara–kowhai–karaka								
Totara–kowhai–karaka–puriri								
Totara–kowhai–puriri		Q09/036 (part of)		**Q08/185** (part of)		Q09/036 (part of)		
						Q08/185 (part of)		
Totara–puriri				*Q08/136 (part of)	Q08/126 (ptSR)	*Q08/136 (part of)		
				Q08/140 (part of)	**Q08/132** (ptSR)	Q08/182 (part of, ptQEII)		
					Q08/140 (part of)	*Q08/187		
					*Q08/184			
Totara–puriri–kahikatea		Q09/036 (part of)			Q08/145 (ptQEII)	Q09/036 (part of)		
						Q08/146 (ptQEII)		
Totara–puriri–kanuka					*Q08/118			
					Q08/128 (ptSR)			
Totara–puriri–kowhai					*Q08/118	**Q08/103** (part of, ptSR)		
Totara–taraire–puriri					**Q08/131** (ptSR)			
Totara–ti kouka						Q08/188		
Coastal podocarp-dominant forest								
Kahikatea–totara						*Q08/187		
Kanuka–kahikatea					**Q08/128** (ptSR)			

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
COASTAL FOREST									
Coastal podocarp-dominant forest									
Kanuka–totara									**Q08/151** (ptMS)
									*Q08/168 (part of)
Totara									**Q08/151** (ptMS)
									*Q09/004
									Q09/028 (part of)
Totara–kahikatea									**Q08/151** (ptMS)
									*Q08/106 (part of, ptQEII)
									Q08/156 (part of)
Totara–kanuka							Q08/183 (part of)	*Q08/109 (ptSR)	Q08/102 (part of, ptMS)
							*Q09/003 (part of)	Q08/111 (part of)	*Q09/003 (ptQEII)
Coastal kauri-dominant forest									
Kanuka–totara–kauri					**Q08/093** (ptMS)				
Kauri–kanuka									
Kauri–kanuka–tanekaha									
Kauri–totara									Q08/156 (part of)
Totara–kauri–kahikatea									**Q08/156** (part of)
SEMI-COASTAL FOREST									
Semi-coastal early successional forest									
Kanuka	*Q08/205	**Q08/099** (part of)			*Q08/086	Q09/006 (part of)	Q08/081 (part of, ptSR,QEII)		Q08/063 (part of)
					Q08/088 (part of)	Q09/016	**Q08/087** (part of)		**Q08/079** (part of)
					Q08/089 (part of)	*Q09/023	Q08/088 (part of)		*Q08/082 (part of)
					Q08/090 (part of)		Q08/089 (part of)		**Q08/087** (part of)

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
COASTAL FOREST								
Coastal podocarp-dominant forest								
Kanuka–totara			*Q08/168 (part of)		Q08/131 (ptSR)	*Q08/168 (part of)		
					*Q08/184			
Totara					Q08/147	Q08/146 (ptQEII)		
					Q08/149	Q08/188		
						*Q08/217 (ptMS)		
						Q09/028 (part of)		
Totara–kahikatea		*Q08/106 (part of, ptQEII)			Q08/156 (part of,)	*Q08/106 (part of, ptQEII)		
					Q08/147			
Totara–kanuka		**Q08/105**	Q08/166 (part of)	*Q08/142	Q08/108 (ptSR)	Q08/102 (part of, ptMS)		
					Q08/128 (ptSR)	*Q08/142 (part of)		
					Q08/135	Q08/183 (part of)		
Coastal kauri-dominant forest								
Kanuka–totara–kauri					Q08/149			
Kauri–kanuka						**Q08/146** (ptQEII)		*Q09/041
								Q09/037
Kauri–kanuka–tanekaha					Q08/147			
Kauri–totara					**Q08/145** (ptQEII)			
					Q08/156 (part of)			
Totara–kauri–kahikatea					**Q08/156** (part of)			
SEMI-COASTAL FOREST								
Semi-coastal early successional forest								
Kanuka		Q09/036 (part of)	*Q08/168 (part of)	*Q08/136	**Q08/099** (part of)	Q08/063 (part of)		Q08/116 (part of)
				*Q08/142 (part of)	*Q08/118	**Q08/079** (part of)		
				Q08/185 (part of)	**Q08/145** (ptQEII)	*Q08/082 (part of)		
				Q08/190 (part of)	Q08/147	*Q08/136 (part of)		

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
SEMI-COASTAL FOREST									
Semi-coastal early successional forest									
Kanuka					**Q08/092** (part of)		Q08/090 (part of)		*Q08/136 (part of)
					Q08/092 (part of)		**Q08/092** (part of)		*Q08/168 (part of)
					Q08/093 (ptMS)		Q08/092 (part of)		Q09/036 (part of)
					Q08/095 (part of)		Q08/095 (part of)		Q09/039 (part of)
					*Q08/097		*Q08/114		
					Q08/179		Q08/183 (part of)		
					Q08/185 (part of)		Q09/024 (part of)		
					Q09/006 (part of)		*Q09/025 (part of)		
					Q09/008		**Q09/026** (part of)		
					*Q09/009		Q09/027 (part of)		
					*Q09/010				
					*Q09/012				
					Q09/027 (part of)				
Kanuka–manuka		Q08/091 (part of)			Q08/091 (part of)		Q08/091 (part of)		
Mamaku–manuka					**Q08/065** (part of)		**Q08/065** (part of)		**Q08/065** (part of)
Semi-coastal broadleaved forest									
Kanuka–kowhai									*Q08/083
Kowhai–puriri					Q08/088 (part of)		Q08/088 (part of)		
Mamaku–nikau–pukatea						**Q09/001** (part of)	**Q09/001** (part of)		
Nikau	**Q08/171** (part of)	**Q08/171** (part of)							**Q08/171** (part of)
Puriri						*Q09/023			**Q08/161** (ptMS)
Puriri–kowhai–karaka		*Q08/101							
Puriri–kowhai–kanuka					Q08/179				
Puriri–nikau					**Q09/008**				
Puriri–nikau–taraire					**Q09/005** (part of)	**Q09/005** (part of)			
Puriri–taraire					Q08/089 (part of)	**Q09/016**		Q08/089 (part of)	
Puriri–taraire–karaka									
Taraire					Q08/088 (part of)		Q08/088 (part of)		*Q08/160 (part of)

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
SEMI-COASTAL FOREST								
Semi-coastal early successional forest								
Kanuka					**Q09/032** (part of)	*Q08/142 (part of)		
						*Q08/168 (part of)		
						Q08/183 (part of)		
						Q08/185 (part of)		
						Q08/190 (part of)		
						Q09/024 (part of)		
						*Q09/025 (part of)		
						Q09/026 (part of)		
						Q09/032 (part of)		
						Q09/036 (part of)		
						Q09/039 (part of)		
Kanuka–manuka								
Mamaku–manuka								
Semi-coastal broadleaved forest								
Kanuka–kowhai								
Kowhai–puriri								
Mamaku–nikau–pukatea								
Nikau						**Q08/171** (part of)		
Puriri								
Puriri–kowhai–karaka								
Puriri–kowhai–kanuka								
Puriri–nikau								
Puriri–nikau–taraire								
Puriri–taraire								
Puriri–taraire–karaka					Q08/208			
Taraire					Q08/170 (part of, ptQEII)	*Q08/160 (part of)		

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
SEMI-COASTAL FOREST									
Semi-coastal broadleaved forest									
Taraire					**Q08/090** (part of)		**Q08/090** (part of)		Q08/170 (part of, ptQEII)
							*Q08/160 (part of)		
Taraire–pukatea									
Taraire–puriri		Q08/091 (part of)			Q08/091 (part of)		Q08/091 (part of)		Q09/036 (part of)
							*Q08/114		
Taraire–puriri–kanuka					*Q09/009				*Q08/136 (part of)
Taraire–puriri–karaka							Q09/022		
Semi-coastal broadleaved–podocarp forest									
Kahikatea–kanuka–taraire–totara									
Kahikatea–kowhai									*Q08/083
Kahikatea–pukatea							*Q08/160 (part of)		*Q08/160 (part of)
Kahikatea–puriri									
Kahikatea–puriri–totara					Q08/065 (part of)		Q08/065 (part of)		Q08/065 (part of)
Kahikatea–ti kouka	Q08/064								
Kahikatea–totara–titoki–crack willow	*Q08/068 (part of, ptMS)							*Q08/068 (part of, ptMS)	
Kanuka–kowhai–totara									
Kanuka–totara–kowhai									*Q08/113
Kowhai–kahikatea					**Q08/092** (part of)		**Q08/092** (part of)		
Kowhai–kanuka–kahikatea							**Q09/024** (part of)		
Kowhai–totara–puriri–pukatea									
Mature matai over secondary kahikatea–ti kouka	**Q08/064**								
Nikau–kahikatea	**Q08/171** (part of)	**Q08/171** (part of)							**Q08/171** (part of)
Puriri–kahikatea					**Q09/005** (part of)	**Q09/005** (part of)			
Puriri–nikau–totara					**Q08/094** (part of, ptMS)	**Q08/094** (part of, ptMS)			

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
SEMI-COASTAL FOREST								
Semi-coastal broadleaved forest								
Taraire					**Q08/144**	Q08/170 (part of, ptQEII)		
					Q08/148	*Q08/071 (part of)		
					Q08/153 (ptQEII)			
					Q08/137			
Taraire–pukatea					**Q08/153** (part of, ptQEII)			
Taraire–puriri		Q09/036 (part of)			*Q08/150	Q09/036 (part of)		**Q08/116**
						Q08/167		
						*Q08/154		
Taraire–puriri–kanuka				*Q08/136		*Q08/136 (part of)		
Taraire–puriri–karaka								
Semi-coastal broadleaved–podocarp forest								
Kahikatea–kanuka–taraire–totara				*Q08/155				
Kahikatea–kowhai								
Kahikatea–pukatea				**Q08/190** (part of)		*Q08/160 (part of)		
						Q08/190 (part of)		
Kahikatea–puriri								
Kahikatea–puriri–totara								
Kahikatea–ti kouka								
Kahikatea–totara–titoki–crack willow								
Kanuka–kowhai–totara					**Q08/129**			
Kanuka–totara–kowhai								
Kowhai–kahikatea								
Kowhai–kanuka–kahikatea						**Q09/024** (part of)		
Kowhai–totara–puriri–pukatea						**Q09/033**		
Mature matai over secondary kahikatea–ti kouka								
Nikau–kahikatea						**Q08/171** (part of)		
Puriri–kahikatea						*Q08/207		
Puriri–nikau–totara								

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
SEMI-COASTAL FOREST									
Semi-coastal broadleaved–podocarp forest									
Tanekaha–tarata–mamangi							**Q09/022**		
Tanekaha–rewarewa–kanuka					**Q08/088** (part of)		**Q08/088** (part of)		
Taraire–kahikatea									
Taraire–kahikatea–nikau	**Q08/171** (part of)	**Q08/171** (part of)							**Q08/171** (part of)
Taraire–kahikatea–puriri									
Taraire–karaka–totara									
Taraire–kowhai–kahikatea							**Q09/024** (part of)		
Taraire–puriri–kahikatea					**Q09/006**(part of)		**Q09/006**(part of)		
Taraire–puriri–kahikatea–totara								Q08/120	
Taraire–puriri–totara									
Taraire–rimu–totara									
Taraire–totara									
Totara–kahikatea–kowhai	**Q08/124** (part of)								
Totara–kahikatea–puriri					**Q08/094** (part of, ptMS)		**Q08/094** (part of, ptMS)		
Totara–kahikatea–ti kouka							**Q08/183** (part of)		
Totara–karaka									
Totara–karaka–kowhai	**Q08/171** (part of)	**Q08/171** (part of)							**Q08/171** (part of)
Totara–kowhai							*Q08/160 (part of)		*Q08/160 (part of)
									*Q08/168 (part of)
Totara–kowhai–puriri									*Q09/034
Totara–puriri	*Q08/201 (part of)	Q08/099 (part of)							*Q08/139

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
SEMI-COASTAL FOREST								
Semi-coastal broadleaved–podocarp forest								
Tanekaha–tarata–mamangi								
Tanekaha–rewarewa–kanuka								
Taraire–kahikatea				Q08/190 (part of)	**Q08/200** (part of)	*Q08/070		
						Q08/190 (part of)		
						Q08/200 (part of)		
Taraire–kahikatea–nikau						**Q08/171** (part of)		
Taraire–kahikatea–puriri						**Q09/044**		
Taraire–karaka–totara								Q08/218
Taraire–kowhai–kahikatea						**Q09/024** (part of)		
Taraire–puriri–kahikatea								
Taraire–puriri–kahikatea–totara								
Taraire–puriri–totara					**Q08/145** (ptQEII)			Q08/117
					*Q08/204 (part of)	*Q08/204 (part of)		
Taraire–rimu–totara						*Q08/077		
Taraire–totara					**Q08/110** (part of, ptQEII)	Q08/069		
					*Q08/172 (part of)	**Q08/110** (part of, ptQEII)		
					*Q08/202 (part of)	*Q08/172 (ptQEII)		
Totara–kahikatea–kowhai						**Q08/124** (part of)		
						Q08/167		
Totara–kahikatea–puriri								
Totara–kahikatea–ti kouka						**Q08/183** (part of)		
Totara–karaka						**Q08/069**		
Totara–karaka–kowhai						**Q08/171** (part of)		
Totara–kowhai			*Q08/168 (part of)			*Q08/160 (part of)		**Q08/116**
						*Q08/168 (part of)		
Totara–kowhai–puriri								
Totara–puriri					Q08/099 (part of)	*Q08/201 (part of)		Q09/041

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
SEMI-COASTAL FOREST									
Semi-coastal broadleaved–podocarp forest									
Totara–puriri									**Q08/194**
Totara–puriri–kahikatea									
Totara–puriri–kanuka									
Totara–taraire–puriri									
Totara–titoki	**Q08/121** (part of, ptQEII)								
Totara–tree privet									
Semi-coastal podocarp-dominant forest									
Kahikatea	**Q08/072** (part of) ptQEII)								**Q08/170** (part of,
Kahikatea–kanuka							**Q09/022**		
Kahikatea–totara									*Q08/075 (part of)
Kanuka–kahikatea					Q09/005 (part of)	Q09/005 (part of)	**Q09/022**		
Kanuka–manuka–rimu									
Kanuka–rimu									
Kanuka–totara					**Q08/092** (part of)		**Q08/092** (part of)		*Q08/106 (part of, ptQEII)
									*Q08/165 (part of, ptMS)

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
SEMI-COASTAL FOREST								
Semi-coastal broadleaved–podocarp forest								
Totara–puriri					Q08/130	Q08/169		
					Q08/153 (ptQEII)			
Totara–puriri–kahikatea					**Q08/192**			
Totara–puriri–kanuka					**Q08/129**			
Totara–taraire–puriri					**Q08/149**			
Totara–titoki					**Q08/121** (part of, ptQEII)			
Totara–tree privet					*Q08/123			
Semi-coastal podocarp-dominant forest								
Kahikatea					**Q08/170** (part of)	**Q08/072** (part of, ptQEII)		
					Q08/134	Q08/167		
						Q08/170 (part of, ptQEII)		
						Q08/173 (part of)		
						*Q08/201 (part of)		
Kahikatea–kanuka						*Q08/195		
Kahikatea–totara					*Q08/075 (part of)	Q08/069		
					Q08/110 (part of, ptQEII)	*Q08/071		
					Q08/200 (part of)	**Q08/110** (part of, ptQEII)		
						*Q08/199		
						Q08/200 (part of)		
Kanuka–kahikatea					*Q08/076			
Kanuka–manuka–rimu					**Q08/208**			
Kanuka–rimu					Q08/100 (part of, ptSR,QEII)			
					Q08/145 (ptQEII)			
Kanuka–totara		*Q08/106 (part of, ptQEII)			*Q08/172 (part of)	*Q08/106 (part of, ptQEII)		
					*Q08/203	*Q08/125		
					*Q08/204 (part of)	*Q08/172 (part of)		

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
SEMI-COASTAL FOREST									
Semi-coastal podocarp-dominant forest									
Kanuka–totara									
Kanuka–totara–kahikatea						**Q09/001** (part of)	**Q09/001** (part of)		
Kanuka–totara–tanekaha						*Q09/011			
Mamaku–totara									
Mature totara–kahikatea	**Q08/100** (part of, ptSR,QEII)								
Rimu–kanuka									
Tanekaha									
Tanekaha–totara		**Q08/095** (part of)			**Q08/095** (part of)		**Q08/095** (part of)		
Totara	Q08/121 (part of, ptQEII)	Q08/159 (part of, ptMS)			Q08/094		Q08/094 (part of, ptMS)	*Q08/075 (part of)	
	Q08/138						**Q08/115**		Q08/161 (ptMS)
	*Q08/201 (part of)						Q08/196 (part of)		Q08/170 (part of, ptQEII)
	*Q08/205						Q08/198		*Q09/034
									Q09/036 (part of)

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
SEMI-COASTAL FOREST								
Semi-coastal podocarp-dominant forest								
Kanuka–totara					Q08/208	*Q08/193 (part of)		
						*Q08/204 (part of)		
						*Q08/077		
						*Q08/165 (part of, ptMS)		
Kanuka–totara–kahikatea								
Kanuka–totara–tanekaha					**Q08/192**			
Mamaku–totara					**Q08/110** (part of, ptQEII)	**Q08/110** (part of, ptQEII)		
Mature totara–kahikatea					**Q08/100** (part of, ptSR,QEII)			
Rimu–kanuka					**Q08/110** (part of, ptQEII)	**Q08/110** (part of, ptQEII)		
Tanekaha					**Q08/192**			
Tanekaha–totara								
Totara		Q09/036 (part of)		*Q08/189 (part of)	*Q08/075 (part of)	Q08/069		Q08/116
				Q08/190 (part of)	Q08/121 (part of, ptQEII)	**Q08/115** (part of)		
					*Q08/133	**Q08/152** (ptQEII)		
					Q08/134	Q08/170 (part of, ptQEII)		
					Q08/137	*Q08/189 (part of)		
					Q08/148	Q08/190 (part of)		
					*Q08/150	Q08/196 (part of)		
					Q08/153 (ptQEII)	Q08/200 (part of)		
					Q08/170pt (part of, QEII)	*Q08/201 (part of)		
					Q08/200 (part of)	Q09/036 (part of)		
						Q09/044		

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
SEMI-COASTAL FOREST									
Semi-coastal podocarp-dominant forest									
Totara–kahikatea	Q08/072 (part of)	**Q08/171** (part of)		**Q08/067** (part of)	Q08/065 (part of)		Q08/065 (part of)		**Q08/061** (part of)
	Q08/138						**Q08/067** (part of)		Q08/065 (part of)
	Q08/171 (part of)						Q08/196 (part of)		Q08/079 (part of)
	Q08/173 (part of)								*Q08/165 (part of, ptMS)
	*Q08/205								Q08/170 (part of, ptQEII)
									Q08/171 (part of)
									Q08/194
Totara–kanuka	Q08/100 (part of, ptSR,QEII)	Q08/095 (part of)		Q08/067 (part of)	Q08/090 (part of)		Q08/090 (part of)	Q08/103 (part of, ptSR)	Q08/061 (part of)
	Q08/124 (part of)	*Q08/101			**Q08/094** (part of, ptMS)		Q08/067 (part of)		
					Q08/095 (part of)		**Q08/094** (part of, ptMS)		*Q08/112 (part of)
							Q08/095 (part of)		Q08/156 (part of)
							*Q08/160 (part of)	**Q08/103** (part of, ptSR)	*Q08/160 (part of)

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
SEMI-COASTAL FOREST								
Semi-coastal podocarp-dominant forest								
Totara–kahikatea					*Q08/118	**Q08/061** (part of)		
					*Q08/150	Q08/069		
					Q08/170 (part of, ptQEII)	*Q08/070		
					*Q08/172 (part of)	Q08/072 (part of)		
					*Q08/174	Q08/079 (part of)		
					Q08/192	*Q08/104 (ptQEII)		
					Q08/208	Q08/146 (ptQEII)		
						Q08/152 (ptQEII)		
						*Q08/165 (part of, ptMS)		
						Q08/170 (part of, ptQEII)		
						Q08/171 (part of)		
						*Q08/172 (part of)		
						Q08/173 (part of)		
						*Q08/181		
						Q08/196 (part of)		
						*Q08/206		
						*Q09/040		
Totara–kanuka		*Q08/112 (part of)			*Q08/074	Q08/061 (part of)		
					Q08/100 (part of, ptSR,QEII)	Q08/103 (part of, ptSR)		
					Q08/156 (part of)	*Q08/112 (part of)		
					Q08/200 (part of)	Q08/124 (part of)		
					*Q08/202 (ptQEII)	Q08/196 (part of)		

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
SEMI-COASTAL FOREST									
Semi-coastal podocarp-dominant forest									
Totara–kanuka							Q08/196 (part of)		Q08/170 (part of, ptQEII)
							*Q09/002		*Q09/018 (part of)
							Q09/017		
Totara–kanuka–kahikatea		*Q08/080					*Q09/018 (part of)		
Totara–mamaku	**Q08/214**								
Totara–rimu									Q08/061 (part of)
Semi-coastal kauri-dominant forest									
Kanuka–kauri					**Q08/093** (ptMS)		*Q09/025 (part of)		
Kauri	**Q08/100** (part of, ptSR,QEII)	*Q08/101				**Q09/001** (part of)	Q08/067 (part of)		
							Q08/090 (part of)		
							Q08/196 (part of)		
							Q09/001 (part of)		
							Q09/024 (part of)		
Kauri–kanuka		Q08/095 (part of)			Q08/088 (part of)	Q09/005 (part of)	Q08/088 (part of)		
					Q08/092 (part of)	**Q09/006** (part of)	Q08/092 (part of)		
					Q08/094 (part of, ptMS)	**Q08/094** (part of, ptMS)			
					Q08/095 (part of)		Q08/095 (part of)		
					Q08/179		*Q09/015 (part of)		
					Q08/185 (part of)		**Q09/026** (part of)		
					Q09/005 (part of)				
					Q09/006 (part of)				
					Q09/008				

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
SEMI-COASTAL FOREST								
Semi-coastal podocarp-dominant forest								
Totara–kanuka					Q08/170 (part of, ptQEII)	Q08/200 (part of)		
						Q09/033		
						Q08/170 (part of, ptQEII)		
Totara–kanuka–kahikatea						*Q08/160 (part of)		Q08/117
						Q08/103 (part of, ptSR)		
Totara–mamaku								
Totara–rimu						Q08/061 (part of)		
						Q08/152 (ptQEII)		
Semi-coastal kauri-dominant forest								
Kanuka–kauri						*Q09/025 (part of)		
Kauri					**Q08/100** (part of, ptSR,QEII)	*Q08/070		
					*Q08/074	**Q08/196** (part of)		
						Q09/024 (part of)		
Kauri–kanuka				Q08/185 (part of)	Q08/126 (ptSR)	Q08/185 (part of)		
						Q09/026 (part of)		

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
SEMI-COASTAL FOREST									
Semi-coastal kauri-dominant forest									
Kauri–kanuka					*Q09/012				
					*Q09/015 (part of)				
Kauri–kanuka–rimu									
Kauri–kanuka–tanekaha						Q09/016			
Kauri–karaka–puriri		**Q09/030**							
Kauri–tanekaha						**Q09/001** (part of)	**Q09/001** (part of)		
Kauri–totara–kanuka		Q08/091 (part of)			Q08/091 (part of)		Q08/091 (part of)		
Kauri–kahikatea–totara									
Kauri–rimu		**Q08/078** (ptSR)							
Kauri–totara–tanekaha	Q08/214								
Mature kauri–kahikatea							**Q08/081** (ptSR,QEII)		
Mature kauri							**Q09/022**		
Totara–mature kauri									
Semi-coastal unknown forest type									
Unknown type							Q08/115 (part of)		
COASTAL SHRUBLAND									
Gorse–mixed native					Q09/014				
Harakeke–manuka–pampas					Q09/049				
Kanuka					**Q08/089** (part of)		**Q08/089** (part of)		
					Q08/092 (part of)		Q08/092 (part of)		
					Q08/093 (ptMS)				
Kanuka–manuka					Q08/179				
Mahoe									
Manuka					*Q08/176 (ptRR)				
Manuka–kanuka									
Manuka–mapou									
Manuka–ti kouka–mapou									
Mapou–karamu–hangehange									
Mapou–manuka–harakeke					**Q08/175**				
Ti kouka							**Q08/183** (part of)		
Ti kouka–kanuka									**Q08/063** (part of)
Tutu									**Q08/063** (part of)
Woolly nightshade–mapou									

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
SEMI-COASTAL FOREST								
Semi-coastal kauri-dominant forest								
Kauri–kanuka								
Kauri–kanuka–rimu					**Q08/147**			
Kauri–kanuka–tanekaha								
Kauri–karaka–puriri								
Kauri–tanekaha								
Kauri–totara–kanuka								
Kauri–kahikatea–totara						Q08/146 (ptQEII)		
Kauri–rimu								
Kauri–totara–tanekaha								
Mature kauri–kahikatea								
Mature kauri								
Totara–mature kauri					**Q08/122**			
Semi-coastal unknown forest type								
Unknown type						Q08/115 (part of)		
COASTAL SHRUBLAND								
Gorse–mixed native								
Harakeke–manuka–pampas								
Kanuka				Q08/140 (part of)	Q08/140 (part of)			
					Q08/149			
Kanuka–manuka					Q08/134			
Mahoe					**Q08/108** (ptSR)			
Manuka				Q08/140 (part of)	Q08/140 (part of)	Q08/167		
Manuka–kanuka			**Q08/166**					
Manuka–mapou						**Q08/167**		*Q09/035
Manuka–ti kouka–mapou						**Q08/167**		
Mapou–karamu–hangehange					**Q08/135**			
Mapou–manuka–harakeke								
Ti kouka						**Q08/183** (part of)		
Ti kouka–kanuka						**Q08/063** (part of)		
Tutu						**Q08/063** (part of)		
Woolly nightshade–mapou					Q09/032 (part of)	Q09/032 (part of)		

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
SEMI-COASTAL SHRUBLAND									
Coprosma propinqua	**Q08/209**								
Harakeke–manuka									
Kanuka–mamaku							**Q08/198**		
Kanuka–manuka					*Q08/086	**Q09/001** (part of)	Q08/094 (part of, ptMS)		
					Q08/094 (part of, ptMS)		**Q08/088** (part of)		
					Q08/088 (part of)		**Q09/001** (part of)		
Kanuka–radiata pine					Q08/185 (part of)				
Mahoe	Q08/212								
Manuka	Q08/212				**Q09/008** (ptSR,QEII)		Q08/081		Q08/065 (part of)
					*Q08/097		Q08/065 (part of)		**Q08/102** (part of, ptMS)
					Q08/065 (part of)				
Manuka–kanuka							*Q08/114		
Manuka–kanuka–mahoe									
Putaputaweta		**Q08/211**							
Totara–mapou									
FRESHWATER WETLAND									
Carex virgata–pampas									
Open water (constructed freshwater farm pond)									

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
SEMI-COASTAL SHRUBLAND								
Coprosma propinqua								
Harakeke–manuka					**Q08/208**			
Kanuka–mamaku								
Kanuka–manuka		Q08/105						
Kanuka–radiata pine				Q08/185 (part of)		Q08/185 (part of)		
Mahoe								
Manuka					Q08/128 (ptSR)	**Q08/102** (part of, ptMS)		
					Q08/208	**Q08/188**		
Manuka–kanuka					Q08/144			
					Q08/108 (ptSR)			
Manuka–kanuka–mahoe					Q08/153 (ptQEII)			
Putaputaweta								
Totara–mapou						**Q09/033**		
FRESHWATER WETLAND								
Carex virgata–pampas							Q09/017 (part of)	
Open water (constructed freshwater farm pond)							Q08/066	
							*Q08/070 (part of)	
							*Q08/071 (part of)	
							*Q08/073	
							*Q08/077 (part of)	
							*Q08/113 (part of)	
							Q08/115 (part of)	
							*Q08/118 (part of)	
							*Q08/123 (part of)	
							Q08/130 (part of)	

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
FRESHWATER WETLAND									
Open water (constructed freshwater farm pond)									
Open water (constructed lake)									
Baumea articulata									
Soft rush									
Juncus sarophorus									
Lake clubrush									
Raupo	**Q08/088** (part of)	Q08/095 (part of)							
	Q08/092 (part of)	Q08/091 (part of)							
	*Q08/165 (part of, ptMS)								
	Q08/167 (part of)								
	*Q08/191 (part of)								

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
FRESHWATER WETLAND								
Open water (constructed freshwater farm pond)							*Q08/168 (part of)	
							Q08/170 (part of, ptQEII)	
							*Q08/193 (part of)	
							*Q08/197	
							*Q08/219	
							Q09/017 (part of)	
							Q09/022 (part of)	
							*Q09/031	
							*Q09/041 (part of)	
Open water (constructed lake)							Q08/159	
							Q08/164 (ptGP,MS)	
							Q09/039 (part of)	
Baumea articulata							**Q08/159**	
Soft rush							Q08/115 (part of)	
Juncus sarophorus							Q08/066	
							*Q08/070 (part of)	
							*Q08/071 (part of)	
							*Q08/077 (part of)	
							*Q08/123 (part of)	
Lake clubrush							**Q08/164** (ptGP,MS)	
							*Q09/031	
Raupo							*Q08/073	
							Q08/081 (part of, ptSR,QEII)	
							Q08/115 (part of)	
							*Q08/118 (part of)	
							*Q08/155 (part of)	

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
FRESHWATER WETLAND									
Raupo	Q08/198 (part of)								
	Q08/209								
	*Q08/210								
	Q08/212								
	*Q08/213								
	Q08/216								
	Q09/006 (part of)								
	*Q09/015 (part of)								
Raupo–*Baumea articulata*–pink bindweed			**Q08/178** (ptSL,MS)						
Raupo–*Baumea articulata*–marsh clubrush					**Q08/179**				
Raupo–bracken	**Q08/215**								
Raupo–lake clubrush	**Q08/089** (part of)								
Raupo–ti kouka	**Q08/116** (part of)								
Raupo–willow weed									
Unknown freshwater wetland type	*Q08/180								
ESTUARINE WETLAND									
Baumea articulata									
Glasswort–*Suaeda novae-zelandiae*–sharp rush									
Mangrove									
Mangrove–sea rush									
Mudflats and sandflats									
Oioi–sea rush									
Saltmarsh ribbonwood									

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
FRESHWATER WETLAND								
Raupo							**Q09/001** (part of)	
Raupo–*Baumea articulata*–pink bindweed								
Raupo–*Baumea articulata*–marsh clubrush								
Raupo–bracken								
Raupo–lake clubrush								
Raupo–ti kouka								
Raupo–willow weed							*Q08/197	
							Q08/159	
Unknown freshwater wetland type								
ESTUARINE WETLAND								
Baumea articulata	**Q08/062**							
Glasswort–*Suaeda novae-zelandiae*–sharp rush			**Q09/020**					
Mangrove	Q08/062							
	Q08/084							
	Q08/096							
	Q09/020							
	Q09/021							
Mangrove–sea rush	Q08/062							
	Q08/084							
	Q09/020							
Mudflats and sandflats	Q08/062							
	Q08/084							
	Q08/096							
	Q09/020							
	Q09/021							
Oioi–sea rush	Q08/062							
	Q08/084							
	Q09/020							
	Q09/021							
Saltmarsh ribbonwood	Q08/062							
	Q08/084							

GEOL. GROUP:	A	B	C	D	E	F	G	H	I
ESTUARINE WETLAND									
Saltmarsh ribbonwood									
Saltwater paspalum									
Sea primrose–arrow grass–saltwater paspalum									
Sea primrose–remuremu–saltwater paspalum–sharp rush									
Sea rush									
Sharp rush									
Spartina alterniflora									
OTHER									
Exotic grassland on islands					Q08/175				
					*Q08/177				
					Q09/014				

GEOL. GROUP:	J	K	L	M	N	O	P	NOT SURVEYED
ESTUARINE WETLAND								
Saltmarsh ribbonwood	Q09/020							
	Q09/021							
Saltwater paspalum	Q08/062							
	Q08/084							
	Q09/020							
Sea primrose–arrow grass–saltwater paspalum	**Q08/062**							
Sea primrose–remuremu–saltwater paspalum–sharp rush	Q08/084							
	Q09/020							
	Q09/021							
Sea rush	Q08/062							
	Q08/084							
	Q09/020							
Sharp rush	Q08/084							
Spartina alterniflora	Q08/062							
	Q08/084							
	Q09/020							
OTHER								
Exotic grassland on islands								

TABLE 3: SUMMARY OF SITE EVALUATIONS.

e.u.=ecological unit, reg.sign.=regionally significant, loc.unc.=locally uncommon.

LEVEL 1 SITES Survey no.	REPRESENT-ATIVENESS*	RARITY†/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE‡
Lower Pukeareinga Forest Remnants Q08/061	Rep.site for 1 e.u.	Fauna: 1 threatened	3 e.u.s	Grazed and disturbed, but relatively healthy canopy	Adjacent to large forest block on Pukearenga in Rodney ED	16.9 ha 3 remnants
Otamatea River Q08/062	Rep.site for 2 e.u.s	Extensive mangroves and wading habitat. Flora: 1 reg.sign. Fauna: 9 threatened, 1 reg.sign.	10 e.u.s	Many natural functions, but human-modified (increased sedimentation, mudflat reclamation, *Spartina alterniflora* and saltwater paspalum infestations, Pacific oyster infestation, rockwork and oyster farms)	Important migratory bird habitat/corridor	2790.9 ha
Otara Head Forest and Shrubland Q08/063	Rep.site for 3 e.u.s	Limestone coastal cliff; fauna not surveyed	5 e.u.s	Diverse and regenerating	Protective buffer to coastal fringe	14.5 ha compact area
Kowhai Road Matai–Kahikatea Remnant Q08/064	Rep.site for 1 e.u.	Very tall, mature matai; fauna not surveyed	2 e.u.s.	Heavily grazed and disturbed	Relatively isolated	5.4 ha
Otuhianga Hill Forest Q08/065	Rep.site for 1 e.u.		4 e.u.s	Grazed and disturbed, but regenerating in parts		21.9 ha, 3 convoluted remnants
Brynderwyn Farm Pond Q08/066		Large freshwater pond. Fauna: 1 threatened	2 e.u.s	Constructed pond, but fulfils bird habitat function	Very close to large indigenous forest areas in Waipu ED	1.2 ha
Brynderwyn Road Forest Remnants Q08/067	Rep.site for 1 e.u.		3 e.u.s	Grazed and disturbed in parts	Catchment protection	26.4 ha 2 remnants
North Maungaturoto Forest Remnants Q08/069	Rep.site for 1 e.u.	Flora: 1 loc.unc.; fauna not surveyed	5 e.u.s	Highly disturbed and grazed	Catchment protection	16.6 ha 9 dispersed remnants
Piroa Road Forest Remnants 2 Q08/072	Rep.site for 1 e.u.	Forest on alluvium	2 e.u.s	Grazed and disturbed	Catchment protection	15.4 ha 6 remnants
Collins Scenic Reserve and Surrounds Q08/078	Rep.site	Flora: 2 loc.unc.	1 e.u.	Very small, but fenced; diverse undergrowth, some weeds		2.7 ha
Smith's Point and Mateotetawa Creek Forest Remnants Q08/079	Rep.site for 2 e.u.s	Flora: 1 reg.sign. Fauna: 1 threatened	4 e.u.s	Diverse forest, regenerating, but disturbed	Protective buffer to coastal fringe	42.7 ha 1 large and 3 small remnants
Hukatere Scenic Reserve and Surrounds Q08/081	Rep.site for 1 e.u.	Largest remnant of mature forest. Flora: 1 threatened, 2 reg.sign., 2 loc.unc. Fauna: 1 threatened	4 e.u.s	Mature, diverse forest with good regeneration, though edges and riparian margins are modified	Contiguous with other large forest areas Q08/087 and Q08/088	35.9 ha

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

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

‡ 'Remnants' in this column refers to the number of separate areas of habitat within the site.

LEVEL 1 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Arapaoa River Q08/084	Rep.site for 1 e.u.	Extensive mangroves and wading habitat. Flora: 1 threatened, 1 reg.sign. Fauna: 5 threatened, 1 reg.sign.	10 e.u.s	Many natural functions, but human-modified (increased sedimentation, mudflat reclamation, *Spartina alterniflora* and saltwater paspalum infestations, Pacific oyster infestation, rockwork and oyster farms)	Important migratory bird habitat/corridor	4957.5 ha
Hukatere North Forest Q08/087	Rep.site		1 e.u.	Diverse forest, regenerating, but suffers edge effects	Important buffer and habitat corridor to Q08/081 and Q08/088	21.7 ha compact area
Hautakima South Forest Q08/088	Rep.site for 3 e.u.s	Fauna: 1 threatened	7 e.u.s	Mosaic with good habitat and species diversity; grazed and disturbed	Near Q08/087 and Q08/081	55.6 ha
Te Ruruku Bay Forest Remnants Q08/089	Rep.site for 2 e.u.s	Flora: 1 reg.sign. Fauna: 1 threatened	6 e.u.s	Grazed and disturbed	Protective buffer to coastal fringe	46.5 ha 8 remnants
Quarry Forest Q08/090	Rep.site for 1 e.u.	Flora: 1 loc.unc.	4 e.u.s	Diverse, probably regenerating (fenced), but dieback from possum browse		28.3 ha compact area
Kirikiri Creek Forest and Wetlands Q08/091		Flora: 1 reg.sign. Fauna: 1 threatened	4 e.u.s	Highly disturbed and grazed	Catchment protection	40.9 ha 7 dispersed remnants
Waitieke Creek Forest Q08/092	Rep.site for 4 e.u.s	Large continuous area of coastal forest and shrubland. Flora: 2 reg.sign.	8 e.u.s	Grazed and disturbed	Protective buffer to coastal fringe	104.8 ha 4 remnants
Te Kiakia Bay Forest Remnants Q08/093	Rep.site for 4 e.u.s	Large continuous area of coastal forest and shrubland	7 e.u.s	Grazed and disturbed	Protective buffer to coastal fringe	111 ha 10 remnants
Raepere Creek Forest Q08/094	Rep.site for 4 e.u.s	Flora: 1 loc.unc. Fauna: 1 threatened	6 e.u.s	Grazed and disturbed	Catchment protection	116.1 ha 1 large and 6 sm remnants
Totara Creek Forest Remnant Q08/095	Rep.site for 1 e.u.	Fauna: 1 threatened	5 e.u.s	Grazed and disturbed	Catchment protection	34.9 ha
Hukatere Peninsula West Coast Q08/096		Fauna: 2 threatened	2 e.u.s	Many natural functions, but human-modified (increased sedimentation, mudflat reclamation, Pacific oyster infestation)	60% coastline in indigenous vegetation	736.5 ha
Raepere Creek Coastal Forest Q08/098	Rep.site for 2 e.u.s	Fauna not surveyed	3 e.u.s	Possum browse evident, may be grazed	Adjacent to Q08/094; protective buffer to coastal fringe	28.2 ha 2 narrow remnants
Ararua Road Forest Remnants Q08/099	Rep.site for 1 e.u.		2 e.u.s	Black wattle infestation along waterway	Riparian protection	35 ha 2 remnants
Upper Paparoa Creek Scenic Reserve and Sherwin QEII Covenant Q08/100	Rep.site for 2 e.u.s	Mature forest present. Flora: 1 threatened, 3 loc.unc. Fauna: 1 threatened	4 e.u.s	Diverse; emergent trees present; goats, possums, some weeds; possibly some grazing impact	Near Q08/108; protective buffer to coastal fringe	16.1 ha
Paparoa Creek Marginal Strip No. 2 and Surrounds Q08/102	Rep.site for 1 e.u.	Flora: 2 threatened, 1 reg.sign., 2 loc.unc.; fauna not surveyed	3 e.u.s	Grazed and disturbed	Protective buffer to coastal fringe	38 ha 7 remnants

LEVEL 1 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Lower Pahi River Forest Remnants Q08/103	Rep.site for 3 e.u.s	Rare e.u. Fauna: 1 threatened. Flora: 2 loc.unc.	4 e.u.s	Various threats to natural character and function, e.g. land clearance, grazing, weeds, goats	Protective buffer to coastal fringe	49.4 ha 6 remnants
Pahi Coastal Strip Q08/105	Rep.site for 1 e.u.	Flora: 1 reg.sign.	2 e.u.s	High level of weed infest-ation, esp. around coastal margin; grazed and disturbed	Protective buffer to coastal fringe	39.3 ha
North Whakapirau Forest Remnant Q08/107	Rep.site	Rare e.u. Fauna not surveyed	1 e.u.	Grazed by livestock and browsed by possums; likely to have other mammalian threats	Protective buffer to coastal fringe	5.9 ha
Paparoa Creek Scenic Reserve and Surrounds Q08/108	Rep.site for 1 e.u.	Fauna not surveyed	3 e.u.s	Extensive shrubland with emergent pines; grazed and disturbed	Near Q08/100 and Q08/102; protective buffer to coastal fringe	20.6 ha 3 remnants
Paparoa Stream Headwaters Q08/110	Rep.site for 4 e.u.s	Pa site on high point. Flora: 1 reg.sign., 2 loc.unc. Fauna: 1 threatened	4 e.u.s	Diverse forest with parts regenerating and parts heavily grazed	Catchment protection	52.5 ha 1 large and 1 small remnant
Mooney QEII Covenant Q08/111		Fauna: 1 threatened	1 e.u.	Small and narrow; some emergent exotic trees	Near Q08/103 and Q08/109	7.2 ha narrow remnant
Pukehuia Forest Remnants Q08/115	Rep.site for 1 e.u.	Fauna not surveyed	5 e.u.s	Heavily grazed and disturbed	Water bird habitat	36 ha 4 remnants
Te Ope Stream Remnants Q08/116	Rep.site for 3 e.u.s		5 e.u.s	Highly disturbed and grazed; crack willow infestation in adjoining wetland	Protective buffer to coastal fringe	61.6 ha 11 remnants, some tiny
Whakapirau Airstrip Forest, Q08/117		Flora: 1 loc.unc.	2 e.u.s	Highly disturbed and grazed	Protective buffer to coastal fringe	49.3 ha 10 remnants
Te Ope Headland Forest Q08/119	Rep.site	Rare e.u.	1 e.u.	Diverse, healthy forest, fenced (probably regenerating)	Protective buffer to coastal fringe	9.8 ha compact area
Te Pahi River Road Forest Remnants Q08/120		Flora: 1 loc.unc. Fauna: 1 threatened	1 e.u.	Highly disturbed and grazed	Relatively isolated	24.9 ha 10 small remnants
Paparoa Stream Riparian Forest Q08/121	Rep.site for 1 e.u.	Forest on alluvium. Fauna: 1 threatened	2 e.u.s	Narrow; grazed and dis-turbed; many weed and animal pest problems	Riparian protection	42 ha 5 very narrow remnants
Paparoa Mature Kauri Stand Q08/122	Rep.site	Fauna not surveyed	1 e.u.	Very small remnant (strong edge effects); grazed and disturbed	Relatively isolated	1.1 ha
Hames Road Forest Remnants Q08/124	Rep.site for 1 e.u.	Flora: 1 loc.unc.	2 e.u.s	Grazed and disturbed; weed infestation	Riparian protection	11.8 ha 4 long, narrow remnants
Te Opu Scenic Reserve Q08/126	Rep.site for 1 e.u.	Pa site on high point. Flora: 1 loc.unc. Fauna: 1 threatened	4 e.u.s	Diverse canopy; dense undergrowth in parts; tall forest to water's edge	Protective buffer to coastal fringe	12.4 ha
Whakapirau Creek Coastal Forest Q08/127	Rep.site for 1 e.u.	Fauna not surveyed	1 e.u.	Grazed and disturbed; very small (strong edge effects)	Protective buffer to coastal fringe	7.1 ha

LEVEL 1 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Whakapirau River Scenic Reserve and North Massey Road Forest Remnants, Q08/128	Rep.site for 2 e.u.s	Flora: 2 reg.sign. Fauna: 1 threatened	5 e.u.s	Heavily grazed and disturbed in parts; some mature emergent trees	Protective buffer to coastal fringe	33.9 ha 6 remnants
Massey Creek Forest Q08/129	Rep.site for 2 e.u.s	Fauna not surveyed	2 e.u.s	Probably grazed in parts	Riparian protection; protective buffer to coastal fringe; links various other high-value forest remnants	23.1 ha
South Massey Road Forest Remnants Q08/130		Fauna: 1 threatened	2 e.u.s	Grazed and disturbed; small	Links various other high-value forest remnants	5.2 ha
Arapaoa River Scenic Reserve and Surrounds Q08/131	Rep.site for 1 e.u.	Fauna: 1 threatened	3 e.u.s	Small; grazed and disturbed, but good undergrowth regeneration in parts	Protective buffer to coastal fringe; links various other high-value forest remnants	9.3 ha
Te Kowhai Creek Scenic Reserve and Surrounds Q08/132	Rep.site	Flora: 1 reg.sign. Fauna: 1 threatened	1 e.u.	Relatively large coastal forest remnant; some edge effects and grazing pressure likely	Protective buffer to coastal fringe; near Q08/131 and Q08/139	26.3 ha
Linton Road West Forest, Q08/134	Rep.site for 1 e.u.	Fauna not surveyed	5 e.u.s	Grazed and disturbed	Protective buffer to coastal fringe	13.3 ha 2 remnants
Whakapirau/Rocky Point Forest and Shrubland, Q08/135	Rep.site for 1 e.u.	Flora: 1 threatened. Fauna: 1 threatened	5 e.u.s	Grazed and disturbed; emergent exotic trees	Protective buffer to coastal fringe	11.7 ha 2 narrow remnants
Barton's Hill Forest Q08/137	Rep.site for 1 e.u.	Fauna: 1 threatened	2 e.u.s	Diverse, relatively healthy canopy, apparently fenced and regenerating	Contiguous with Q08/200	11.2 ha compact area
Upper Pahi River Riparian Forest Q08/138	Rep.site for 1 e.u.	Fauna not surveyed	2 e.u.s	Highly disturbed and grazed; weed infestation	Riparian protection	31.9 ha 4 narrow remnants
Page Point Forest and Shrubland Q08/140		Fauna: 1 threatened	5 e.u.s	Highly disturbed and grazed; weed infestation (gorse)	Protective buffer to coastal fringe	12.3 ha narrow remnant
Te Tawhiti Forest Remnants Q08/144	Rep.site for 1 e.u.		2 e.u.s	Grazed and disturbed; occasional mature emergent kahikatea		7.6 ha 2 remnants
Raepare Creek Headland Forest Q08/145	Rep.site for 4 e.u.s	Fauna: 1 threatened	5 e.u.s	Diverse, compact, fenced (probably regenerating); some possum browse and other mammalian threats	Protective buffer to coastal fringe	46.3 ha 1 large compact, 1 tiny remnant
Wahiwaka Creek Forest Remnants Q08/146	Rep.site for 2 e.u.s	Pa site possibly within site. Fauna: 1 threatened	6 e.u.s	Diverse but grazed and disturbed	Protective buffer to coastal fringe	44.2 ha 5 remnants
James Road Forest Q08/147	Rep.site for 1 e.u.	Fauna: 1 threatened	7 e.u.s	Diverse but grazed and disturbed	Protective buffer to coastal fringe	22 ha 6 remnants
Bickerstaffe Road Forest 2 Q08/148	Rep.site for 1 e.u.	Fauna not surveyed	2 e.u.s	Possum browse evident, may be grazed; some emergent mature podocarps	Surrounded by pine forest	23.7 ha 6 remnants
Bickerstaffe Railbridge Forest Remnants Q08/149	Rep.site for 1 e.u.	Fauna not surveyed	4 e.u.s	Grazed and disturbed; edges infested with weeds (gorse and woolly nightshade)	Protective buffer to coastal fringe	31.8 ha 6 remnants

LEVEL 1 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Upper Wairau River Coastal Forest Remnants Q08/151	Rep.site for 4 e.u.s	Fauna: 1 threatened	4 e.u.s	Highly disturbed and partially grazed but very diverse canopy with many emergent trees; weed infestation (tree privet)	Protective buffer to coastal fringe	29 ha 8 remnants
Bickerstaffe Rail Station Forest, Q08/152	Rep.site for 2 e.u.s		3 e.u.s	Disturbed; grazed in parts		21.7 ha 2 remnants
Bickerstaffe Forest and Shrubland Q08/153	Rep.site for 2 e.u.s	Fauna not surveyed	5 e.u.s	Large continuous area of forest and shrubland; parts grazed and parts regenerating	Links various smaller indigenous forest areas; large extent of pine forest on southern border	98 ha 4 remnants
Point Curtis Road Coastal Forest Remnants Q08/156	Rep.site for 1 e.u.		4 e.u.s	Highly disturbed and grazed in parts	Protective buffer to coastal fringe	27.1 ha 9 remnants
Donaldson's Forest Q08/157	Rep.site	Fauna: 1 threatened	1 e.u.	Narrow site with strong edge effects; may be grazed	Protective buffer to coastal fringe	8.1 ha narrow, convoluted area
Unnamed Island in Kaiwaka River Q08/158		Small island surrounded by mangroves in tidal river. Flora: 1 loc.unc.	1 e.u.	Very small island, with apparently healthy vegetation	Surrounding mangroves physically link site with Q08/157	0.4 ha
Kaitara Constructed Lake Q08/159	Rep.site for 2 e.u.s	Fauna: 3 threatened	4 e.u.s	Constructed lake, but fulfils bird habitat function; extensive indigenous marginal aquatic vegetation	Next to Otamatea River (Q08/062) and near forest in Q08/0157	15.8 ha
Rotokiekie Creek Forest Remnants Q08/161	Rep.site for 1 e.u.	Fauna: 1 threatened	2 e.u.s	Disturbed; grazed in parts; regenerating in parts; pest control carried out		30.8 ha 1 large and 3 small remnants
Takahoa Creek Forest Q08/163	Rep.site	Flora: 1 reg.sign., 1 loc. unc. Fauna: 1 threatened	1 e.u.	Highly disturbed and grazed; residential development between remnants	Partial protective buffer to coastal fringe; near Q08/164	17.3 ha 6 remnants
Takahoa Government Purpose Wildlife Management Reserve Q08/164	Rep.site for 1 e.u.	Fauna: 4 threatened	2 e.u.s	Constructed lake, but fulfils bird habitat function	Next to Otamatea River (Q08/062) and near Q08/163	13 ha
Rangiora Road Forest Remnants Q08/166	Rep.site for 1 e.u.	Fauna not surveyed	2 e.u.s	Grazed and disturbed; weed infestation (dally pine)		11.7 ha 3 remnants
Mangaiti Creek Forest Remnants Q08/167	Rep.site for 2 e.u.s		7 e.u.s	Much internal disturbance (e.g. numerous tracks); residential development on fringes	Protective buffer to coastal fringe	22.7 ha 2 remnants
Mohinui Forest Remnant 1 Q08/169	Rep.site for 1 e.u.	Mature emergent podocarps	2 e.u.s	Small; probably grazed; some emergent mature podocarps	Relatively isolated	4 ha
Pahi River Headwaters Q08/170	Rep.site for 1 e.u.		6 e.u.s	Highly disturbed and grazed; weed infestation	Riparian protection	31 ha 10 dispersed remnants
Waipikopiko Stream Headwaters Q08/171	Rep.site for 5 e.u.s	Rare e.u.s	5 e.u.s	Highly disturbed and grazed; weed infestation (hawthorn)	Riparian protection	24.5 ha 7 remnants

LEVEL 1 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Wairau River Riparian Forest Remnants Q08/173	Rep.site for 2 e.u.s	Forest on alluvium; fauna not surveyed	2 e.u.s	Extremely disturbed; grazed and trampled; weed infestation (tree privet, crackwillow); some tall old trees remain	Partial riparian protection	21.3 ha 10 dispersed, convoluted remnants
Kaiwhitu Island Q08/175	Rep.site for 3 e.u.s	Nearshore volcaniclastic sandstone islet. Shell middens and rock wall. Flora: 1 reg.sign. Fauna: 1 threatened	5 e.u.s	Previously burnt or cleared (?); regenerating; appears rat-free		2.6 ha
Kohatutahi Forest and Wetland Q08/178	Rep.site for 3 e.u.s	Fauna: 1 threatened	4 e.u.s	Small and disturbed; alligator weed and salt-water paspalum infest-ations in wetlands	Freshwater wetlands contiguous with mud-flats and mangroves; some forest on coastal fringe	3.8 ha 2 remnants
Owhareao Point Remnants Q08/179	Rep.site for 3 e.u.s	Flora: 1 reg.sign.	8 e.u.s	Diverse habitat types (shrubland, wetland, forest); grazed and disturbed in parts	Protective buffer to coastal fringe	18.7 ha 2 remnants
Pukehau QEII Covenant Q08/182	Rep.site for 1 e.u.	Shell middens. Flora: 1 threatened, 2 reg.sign. Fauna: 1 threatened, 1 reg.sign.	2 e.u.s	Disturbed, but dense undergrowth in fenced areas	Protective buffer to coastal fringe; near to Q08/183	12.4 ha 2 narrow remnants
Puriri Point Forest and Shrubland Q08/183	Rep.site for 2 e.u.s	Fauna not surveyed	6 e.u.s	Large area of forest and shrubland contiguous with coastline; possum browse evident	Protective buffer to coastal fringe; near to Q08/182	46.5 ha 2 remnants
Pakaurangi Forest and Shrubland Q08/185	Rep.site for 4 e.u.s	Fauna not surveyed	8 e.u.s	Large area of forest and shrubland contiguous with coastline; many emergent wilding pines	Protective buffer to coastal fringe; adjacent to very large exotic plantations	428 ha compact area
Hamlin Road Shrubland Q08/188	Rep.site for 1 e.u.	Fauna not surveyed	3 e.u.s	Fenced and regenerating; tall emergent pines present	Protective buffer to coastal fringe	12.5 ha 3 remnants
Mohinui Forest Remnant 3 Q08/190	Rep.site for 1 e.u.		4 e.u.s	Appears to be fenced; regenerating	Riparian protection	15.1 ha 2 remnants
Payne Road Forest Remnants Q08/192	Rep.site for 3 e.u.s		4 e.u.s	Highly disturbed and grazed	Riparian protection	25.9 ha 10 dispersed remnants
Otuhianga Coastal Forest Remnants Q08/194	Rep.site for 1 e.u.	Fauna not surveyed	2 e.u.s	Grazed and disturbed; strong edge effects; isolated from original formative influences		20.9 ha 2 remnants
Kaitara Creek Forest Remnants Q08/196	Rep.site for 1 e.u.	Fauna: 1 threatened	4 e.u.s	Grazed and disturbed	Partial riparian protection	18.6 ha 4 dispersed remnants
Nathan Road Forest and Shrubland Q08/198	Rep.site for 1 e.u.	Fauna not surveyed	3 e.u.s	Large area of shrubland and forest; fenced and regenerating	Contiguous with pine plantations	57.3 ha 4 remnants
Huarau Ridge Forest Remnants Q08/200	Rep.site for 1 e.u.	Fauna not surveyed	4 e.u.s	Large continuous area of forest; somewhat disturbed; grazed	Contiguous with Q08/137	44.7 ha 1 large and 3 smaller remnants
Hillstone Road Forest Remnants 3, Q08/208 8 remnants	Rep.site for 3 e.u.s		6 e.u.s	High diversity; highly disturbed and grazed	Contiguous with large pine plantation	14.5 ha

LEVEL 1 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Oruawharo Road Stream Q08/209	Rep.site for 1 e.u.		2 e.u.s	Small area of natural vegetation (may be induced by road culvert)	In stream next to road and pine plantation; bird habitat value	0.5 ha long narrow area
Bayer Road Shrubland Q08/211	Rep.site	Rare e.u.	1 e.u.	Mostly natural, but some weed infestation (blackberry, green umbrella sedge)	In stream, surrounded by pine forest; bird habitat value	1 ha long narrow area
Te Mira Road Wetland Q08/212	Rep.site for 1 e.u.		5 e.u.s	Weed infestation (blackberry, pampas)	In stream, surrounded by pine forest; bird habitat value	4.5 ha narrow convoluted area
Eastern Boundary Forest (Carter Holt Harvey) Q08/214	Rep.site for 1 e.u.	Flora: 3 loc.unc.	2 e.u.s	Small remnant with good undergrowth due to buffering by pines	Riparian protection of stream within pine plantation	5.8 ha 2 remnants
Parry Road Wetland Q08/215	Rep.site	Rare e.u.	1 e.u.	Diverse but weed infested (Mexican devil, pampas, black wattle)	In stream, surrounded by pine forest; bird habitat value	1.6 ha long narrow remnant
Tinopai Road Wetland Q08/216	Rep.site	Fauna: 1 threatened	1 e.u.	Many environmental weeds present, especially on margins	Surrounded by pine forest; high bird habitat value	1.5 ha
Hanerau Stream Forest Remnants Q08/218	Rep.site for 1 e.u.		2 e.u.s	Highly disturbed and grazed	Partial protective buffer to coastal fringe	11.7 ha 6 small dispersed remnants
Whakapirau Creek Conservation Area and Surrounds, Q08/220		Flora: 1 threatened,	1 e.u. 1 loc.unc.	Highly disturbed and grazed	Partial protective buffer to coastal fringe	0.5 ha very narrow area
Timber Bay Forest Q09/001	Rep.site for sequence of e.u.s	Flora: 1 reg.sign., 1 loc.unc. Fauna: 1 threatened	8 e.u.s	Large, diverse forest; grazed; mammalian pests; edge effects	Riparian/catchment protection; linked with Q09/005	125.8 ha 1 large and 2 small remnants
Puketotara Forest Remnants 2 Q09/005	Rep.site for 2 e.u.s		4 e.u.s	Large, diverse forest; partially fenced; mammalian pests	Riparian/catchment protection; linked with Q09/001	75.4 ha 3 remnants
Puketotara Forest Remnants 3 Q09/006	Rep.site for 3 e.u.s		4 e.u.s	Large, diverse forest with associated wetland; heavily grazed and disturbed; mammalian pests	Riparian/catchment protection	122.4 ha 12 remnants
Puketotara Forest Remnant 4 Q09/008	Rep.site for sequence of e.u.s	Fauna not surveyed	6 e.u.s	Diverse; grazed and disturbed; mammalian pests	Riparian/catchment protection	35.4 ha compact area
Moturoa Island Q09/013		Fauna: 1 threatened	1 e.u.	Possum browse leading to severe pohutukawa dieback	Low tide link to mainland; near to Motuouhi Island (Q09/014)	1.6 ha
Motuouhi Island Q09/014	Rep.site for 1 e.u.		3 e.u.s	Good canopy condition; regeneration	Near to Moturoa Island (Q09/013)	0.9 ha
Puketotara Forest Remnant 9 Q09/016	Rep.site for 1 e.u.		3 e.u.s	Healthy canopy; probably grazed	Catchment protection	19.8 ha compact area
Puketotara Forest Remnants 10 Q09/017	Rep.site for 1 e.u.		3 e.u.s	Diverse; fenced; probably has dense undergrowth	Partially links Q09/001 to the coast; riparian protection	14.6 ha 3 remnants

LEVEL 1 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Oruawharo River North Coast Q09/020	Rep.site for 1 e.u.	Flora: 1 reg.sign. Fauna: 2 threatened	10 e.u.s	Many natural functions, but human-modified (increased sedimentation, mudflat reclamation, *Spartina alterniflora* and saltwater paspalum infestations, Pacific oyster infestation)	Important migratory bird habitat/corridor	1984.1 ha
Otamatea River Confluence Q09/021	Rep.site for 4 e.u.s	Flora: 1 reg.sign. Fauna: 8 threatened, 1 reg.sign.	5 e.u.s	Many natural functions, but human-modified (increased sedimentation, mudflat reclamation, Pacific oyster infestation, rockwork)	Important migratory bird habitat/corridor	1878 ha
Oneriri Station Home-stead Forest Remnants Q09/022	Rep.site for 4 e.u.s	One mature emergent kauri	6 e.u.s	Disturbed and partially grazed; partially regenerating	Riparian protection	28.7 ha 2 compact remnants
Puketotara Forest Remnant 13 Q09/024	Rep.site for 2 e.u.s	Fauna: 1 threatened	4 e.u.s	Grazed and disturbed; disconnected from orig-inal formative influence	Near to Ruataniwha (Q09/030)	9.7 ha
Kaipara Forest, Puketotara Q09/026	Rep.site for 4 e.u.s		4 e.u.s	Grazed and disturbed	Protective buffer to coast fringe	25.1 ha
Oneriri Pa Forest Q09/027	Rep.site for 1 e.u.	Pa site	3 e.u.s	Many large pohutukawa in good condition; diverse; possibly grazed	Protective buffer to coast fringe	27.3 ha compact area
Upper Whakaki River Forest Remnants Q09/028	Rep.site for 1 e.u.		2 e.u.s	Variable condition; tiny remnants (strong edge effects)	Relatively isolated, but may be important 'stepping stone' between larger forest remnants; protective buffer to coastal fringe	6.7 ha 2 small dispersed remnants
Kaira Creek Forest Q09/029	Rep.site		1 e.u.	Diverse; probably grazed and disturbed	Partial protective buffer to coastal fringe	11.1 ha compact area
Ruataniwha Forest Remnant, Q09/030	Rep.site	Island in reclaimed mudflat	1 e.u.	Partial regeneration; small (strong edge effects)	Near to Q09/024	0.9 ha
Gittos Point Forest and Shrubland Q09/032	Rep.site for 3 e.u.s		4 e.u.s	Large continuous area of forest and shrubland; strong regeneration; weed infestation (woolly nightshade, gorse)	Protective buffer to coastal fringe	92.4 ha 3 remnants
Oruawharo School Forest Q09/033	Rep.site for 2 e.u.s		3 e.u.s	Diverse but has several weed infestations	Contiguous with salt marsh on coastal fringe of Q09/020	21.8 ha 2 remnants
Koareare Creek Forest Remnants Q09/036	Rep.site for 2 e.u.s		8 e.u.s	Very diverse; highly disturbed and grazed	Partial protective buffer to coastal fringe	90 ha 8 remnants
Topuni River Forest Remnant 1, Q09/037	Rep.site	Fauna: 1 threatened	1 e.u.	Fenced and regenerating	Protective buffer to coastal fringe	6 ha compact area
Topuni River Confluence Forest, Q09/038	Rep.site	Fauna not surveyed	1 e.u.	Diverse; may be grazed; one emergent pine	Protective buffer to coastal fringe	6.1 ha compact area
Wainonororo Constructed Lake Q09/039	Rep.site for 1 e.u.	Fauna not surveyed	2 e.u.s	Constructed, but serves bird habitat function; grazed and trampled around margins; no shade	Could be migratory bird habitat/corridor	22.7 ha

LEVEL 1 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
The Funnel Pohutukawa Fringe Q09/043		Fauna not surveyed	1 e.u.	Grazed and disturbed	Protective buffer to coastal fringe	12.1 ha 7 very narrow remnants
Mohinui Forest Remnant 4 Q09/044	Rep.site for 1 e.u.		2 e.u.s	Grazed and disturbed	Near to Q08/190	13.4 ha 3 remnants
Puketotara Forest Remnant 15 Q09/045	Rep.site	Fauna not surveyed	1 e.u.	Probably grazed	Protective buffer to coastal fringe	5 ha compact area
Bushy Point Forest Remnants Q09/046	Rep.site for 1 e.u.	Flora: 1 reg.sign.	3 e.u.s	Relatively healthy canopy; high diversity; weed infestation (willow-leaved hakea, wilding pines)	Protective buffer to coastal fringe	4.7 ha long narrow area
Kumete Bluff Forest Remnants Q09/047	Rep.site for 1 e.u.	Coastal cliffs	2 e.u.s	Diverse community; pohutukawa dieback (possum browse?); weed infestation (pampas, pines)	Protective buffer to coastal fringe	10.9 ha long narrow area
Otaiwhata Bay Forest and Shrubland Q09/049	Rep.site for 1 e.u.	Fauna not surveyed	2 e.u.s	Disturbed; weed infestation	Protective buffer to coastal fringe	2.9 ha narrow area
Total Level 1 sites (126 sites)						**15926 ha (incl. estuary), 3579 ha (land only)**

LEVEL 2 SITES Survey no.	REPRESENT-ATIVENESS*	RARITY†/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE‡
Maungaturoto Marginal Strip and Surrounds Q08/068		Forest on alluvium	1 e.u.	Degraded, many environmental weeds	Catchment protection	7.5 ha narrow con-voluted area
Doctor Hill Road Forest Remnants Q08/070			5 e.u.s	Grazed and disturbed	Catchment protection	23.6 ha 4 remnants
Piroa Road Forest Remnant 1 Q08/071		Large taraire trees; fauna not surveyed	4 e.u.s	Grazed and disturbed	Catchment protection	11 ha compact area
Piroa Farm Pond Q08/073			2 e.u.s	Constructed pond, but fulfils bird habitat function	Relatively isolated	0.3 ha
Upper Ahuroa River Forest Remnants 2 Q08/074		Fauna not surveyed	2 e.u.s	Highly disturbed and grazed		10.1 ha 6 small remnants

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

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

‡ 'Remnants' in this column refers to the number of separate areas of habitat within the site.

LEVEL 2 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Dodd Road Forest Remnants, Q08/075		Fauna not surveyed	2 e.u.s	Highly disturbed and grazed	Catchment protection	12.8 ha 5 remnants
Upper Ahuroa River Forest Remnants 1 Q08/076		Insufficient information; fauna not surveyed	1 e.u.	Highly disturbed and grazed	Catchment protection	4.2 ha 2 remnants
Kirk Road Forest Remnants Q08/077			4 e.u.s	Highly disturbed and grazed		5.7 ha 3 small remnants
Matakohe West Forest Remnants Q08/080		Fauna not surveyed	1 e.u.	Grazed and disturbed	Catchment protection	18.2 ha 4 remnants
Kowhai Road Kanuka Forest Q08/082		Fauna not surveyed	1 e.u.	Heavily grazed and disturbed	Relatively isolated	13.2 ha
Waihungaru Stream Forest, Q08/083			3 e.u.s	Grazed and disturbed	Catchment protection	16.2 ha
Te Taumataka Creek Forest Remnants Q08/085		Fauna not surveyed	1 e.u.	Grazed and disturbed	Protective buffer to coastal fringe	14.8 ha 3 remnants
Hautakima East Forest Q08/086		Fauna not surveyed	2 e.u.s	Grazed and disturbed	Near Q08/088, and other large forested areas	24.4 ha
Chadwick Road Forest Remnants Q08/097		Fauna not surveyed	2 e.u.s	Highly disturbed and grazed; infestation by plantation forest species		26.5 ha 6 remnants
Matakohe River Bridge Forest Remnants Q08/101			3 e.u.s	Extreme edge effects, refuse dumping and weed infestation	Protective buffer to coastal fringe	2.4 ha 2 small narrow remnants
Hartles QEII Covenant and Surrounds Q08/104		Fauna not surveyed	1 e.u.	Grazed and disturbed; very small (edge effects)	Relatively isolated	2.9 ha
East Pahi Forest Remnants Q08/106			3 e.u.s	Highly disturbed and grazed; weed infestations around coast; many emergent exotic trees	Protective buffer to coastal fringe	23 ha 6 small remnants
Upper Pahi River Scenic Reserve, Rabbit and Goat Island and Surrounds Q08/109		Small islands surrounded by mangroves in tidal river	1 e.u.	Highly disturbed and grazed	Protective buffer to coastal fringe	7.7 ha 4 small remnants
Mooney Road Forest Remnant Q08/112		Insufficient information; fauna not surveyed	1 e.u.	Appears heavily modified by grazing and trampling	Riparian protection	29.3 ha 2 remnants
Awakino Creek Forest and Wetland Q08/113		Large pond, but insuf-ficient information about it; fauna not surveyed	2 e.u.s	Appears heavily modified by grazing and trampling	Water bird habitat	8.9 ha
Ford Road Forest Q08/114		Fauna not surveyed	3 e.u.s	Partially grazed and disturbed		12.5 ha 3 small remnants
Te Opi Road Forest Remnants, Q08/118			6 e.u.s	Highly disturbed and grazed	Protective buffer to coastal fringe	14.6 ha 5 remnants
Hook Road Forest Remnants Q08/123			3 e.u.s	Grazed and disturbed; very small (strong edge effects); tree privet infestation	Relatively isolated	7.4 ha 2 small remnants

LEVEL 2 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Huarau Airstrip Forest Q08/125			1 e.u.	Heavily grazed and disturbed	Relatively isolated	7.4 ha
Massey Road Corner Forest Q08/133		Fauna not surveyed	1 e.u.	Small; heavily grazed and disturbed	Links various high-value forest remnants in the vicinity	3.6 ha
Hokorako Creek Forest Remnants Q08/136			4 e.u.s	Highly disturbed and grazed; weed problems; possum browse	Partial protective buffer to coastal fringe	18.1 ha 5 small convoluted remnants
Te Kowhai Creek Forest Remnant Q08/139		Pohutukawa on inner coastal fringe. Fauna not surveyed	1 e.u.	Highly disturbed and grazed; possum browse evident	Partial protective buffer to coastal fringe	6.6 ha 2 small remnants
Ngaupiko Point Forest Remnant Q08/141		Fauna not surveyed	1 e.u.	Small; grazed and disturbed; sparse vegetation without indigenous undergrowth		4.9 ha
Batley Road Coastal Forest Remnants Q08/142			5 e.u.s	Highly disturbed and grazed; weed infestation (tree privet and hawthorn)	Protective buffer to coastal fringe	25.4 ha 7 remnants
South Hokorako Creek Forest Remnant Q08/143		Fauna not surveyed	1 e.u.	Small; grazed and disturbed	Protective buffer to coastal fringe	4.1 ha
Bickerstaffe Road Forest 1 Q08/150		Insufficient information; fauna not surveyed	3 e.u.s	Disturbed	Pine forest on southern boundary	29.1 ha 2 remnants
Bickerstaffe Airstrip Forest Q08/154			1 e.u.	Very small remnants (strong edge effects); probably grazed		5.5 ha 2 small remnants
Batley Road Riparian Forest Remnants Q08/155			2 e.u.s	Highly disturbed and grazed	Limited riparian protection	3.1 ha 3 remnants
Upper Raepare Creek Forest Remnants Q08/160		Fauna not surveyed	5 e.u.s	Highly disturbed and grazed	Partial protective buffer to coastal fringe	25.6 ha 6 dispersed remnants
Awaroa Creek Coastal Forest Remnants Q08/162		Not surveyed; insufficient information	1 e.u.	Appears modified by grazing and trampling; small (strong edge effects)	Partial protective buffer to coastal fringe	4.5 ha 2 small remnants
Waiarohia Creek Forest and Wetland Q08/165		Fauna not surveyed	4 e.u.s	Highly disturbed and grazed		7.2 ha 4 small remnants
Owhei Creek Forest Remnants Q08/168		Fauna not surveyed	5 e.u.s	High disturbed and grazed; weed problems	Partial protective buffer to coastal fringe	26.1 ha 7 dispersed remnants
Griffin Road Forest Remnants Q08/172		Insufficient information; fauna not surveyed	3 e.u.s	Highly disturbed and grazed; weed infestation	Near Q08/200	31 ha 10 dispersed remnants
Piroa Peak Forest Remnants Q08/174		Not surveyed; insufficient information	1 e.u.	Appear grazed and disturbed		9.1 ha 4 remnants
Titipu Island Q08/176		Nearshore volcaniclastic sandstone islet	2 e.u.s	Cleared and burnt in past; partial regeneration; tall pines amongst pohutukawa	Near to Pupuia Island (Q08/177)	1.9 ha
Pupuia Island Q08/177		Intertidal volcaniclastic sandstone and basaltic islet	1 e.u.	Cleared and burnt; poor regeneration; probably has many mammalian pests	Near to Titipu Island (Q08/178); connected to mainland at low tide	1 ha

LEVEL 2 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Chadwick Road Wetland Q08/180		Not surveyed; insufficient information	?	Possibly drained?; may be exotic scrub now	Freshwater wetland bird habitat?	3.1 ha
Beatson Road Forest Remnant Q08/181			1 e.u.	Strong edge effects; weed infestation (tree privet); grazed and disturbed	Relatively isolated	7.8 ha
Massey Road Point Forest Remnants Q08/184			2 e.u.s	Highly disturbed and grazed	Near Q08/128 and Q08/130	8.7 ha 4 remnants
Tahupo Creek Coastal Forest Remnants Q08/186			1 e.u.	Disturbed	Surrounded by Tasmanian blackwood plantation; provides partial protect-ive buffer to coastal fringe	4.4 ha 2 small remnants
Karakanui Road Forest Remnants Q08/187			4 e.u.s	Highly disturbed and grazed; weed infestations around coast (hawthorn)	Partial vegetation buffer to coastal fringe	10.7 ha 3 remnants
Mohinui Forest Remnant 2 Q08/189		Fauna not surveyed	1 e.u.	Heavily grazed and disturbed	Riparian protection	13.4 ha 3 remnants
Otairi Creek Forest and Wetland Q08/191			3 e.u.s	Highly disturbed and grazed		3.8 ha 4 small dispersed remnants
Kaira Creek Pond 1 Q08/193			2 e.u.s	Constructed pond, but fulfils bird habitat function; extensive weed infestation (woolly nightshade and gorse)		7.8 ha 2 remnants
Tana Road Forest Remnant Q08/195		Fauna not surveyed	1 e.u.	Tiny remnant (strong edge effects); partially grazed, partially regenerating	Relatively isolated	3.6 ha
Kaira Creek Pond 2 Q08/197			2 e.u.s	Small constructed pond, but fulfils bird habitat function	Relatively isolated	0.9 ha
Maungaturoto Town Forest Q08/199		Fauna not surveyed	1 e.u.	Small; probably grazed; weed infestation (elaeagnus)		2.2 ha narrow remnant
Marohemo Road Forest Remnants 1 Q08/201			3 e.u.s	Grazed and disturbed; edge effects including weed threats (tree privet)		20.4 ha 5 remnants
Marohemo Road Forest Remnants 2 Q08/202		Insufficient information; fauna not surveyed	2 e.u.s grazed	Highly disturbed and	Near Q08/153	28.9 ha 4 remnants
Bickerstaffe Road Forest 3 Q08/203		Insufficient information; fauna not surveyed	1 e.u.	Large continuous area of forest; may be grazed	Contiguous with large pine plantation	19 ha
Hillstone Road Forest Remnants 1 Q08/204		Fauna not surveyed	2 e.u.s	Highly disturbed and grazed	Near Q08/203 and Q08/205	20.1 ha 5 remnants
Upper Whakapirau Creek Q08/205		Fauna not surveyed	3 e.u.s	Disturbed; grazed in parts	Riparian protection; buffered by pine forest in parts	14.8 ha 3 remnants
Marohemo Road Forest Remnant 3 Q08/206		One mature kahikatea present; fauna not surveyed	1 e.u.	Tiny remnant (strong edge effects); grazed and disturbed	Relatively isolated	1.4 ha

LEVEL 2 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Hillstone Road Forest Remnant 2 Q08/207		Fauna not surveyed	1 e.u.s	Tiny remnant (strong edge effects); grazed and disturbed	Relatively isolated	1.7 ha
Oruawharo Road Wetland Q08/210			1 e.u.	Edge effects; weed infest-ation (blackberry, pampas)	At gully head next to road and pine plantation; bird habitat value	0.7 ha compact area
Mud Alley Road Wetland Q08/213			1 e.u.	Extremely small; weed infestation (Mexican devil, pampas)	Bird habitat value	0.2 ha
Paparoa Creek Marginal Strip No. 1 and Surrounds Q08/217		Pohutukawa on inner coastal fringe. Fauna not surveyed	1 e.u.	Highly disturbed and grazed	Protective buffer to coastal fringe	8.7 ha 2 narrow remnants
Upper Kaitara Creek Pond Q08/219		Not surveyed; insufficient information	1 e.u.	Constructed pond; potential bird habitat value	Relatively isolated	5.8 ha
Puketotara Forest Remnant 1 Q09/002		Fauna not surveyed	1 e.u.	Disturbed and partially grazed	Riparian protection; corridor between Q09/001 and Q09/031	3.5 ha 2 narrow remnants
Stony Creek Forest Remnants Q09/003		Fauna not surveyed	1 e.u.	Small (strong edge effects); grazed and disturbed	Partial protective buffer to coastal fringe	5.6 ha 2 small remnants
Stony Creek Headland Q09/004		Fauna not surveyed	1 e.u.	Small (strong edge effects); grazed and disturbed	Relatively isolated	1 ha narrow steep remnant
Motukumara Point Forest Remnants Q09/007			4 e.u.s	Highly disturbed and grazed; possum browse leading to pohutukawa dieback	Partial protective buffer to coastal fringe	20.7 ha 6 narrow scattered remnants
Puketotara Forest Remnants 5 Q09/009		Fauna not surveyed	3 e.u.s	Highly disturbed and grazed; strong edge effects	Partial protective buffer to coastal fringe	15.5 ha 2 narrow convoluted remnants
Puketotara Forest Remnant 6, Q09/010		Fauna not surveyed	1 e.u.	Highly disturbed and grazed	Catchment protection	4.6 ha
Puketotara Forest Remnants 7 Q09/011		Fauna not surveyed	1 e.u.	Highly disturbed and razed; edge effects	Currently becoming more isolated through clearance of manuka shrubland link to two other sites	6.1 ha 3 remnants
Puketotara Forest Remnants 8 Q09/012			2 e.u.s	Highly disturbed and grazed; possum browse leading to puriri dieback	Catchment protection	12.6 ha 5 small remnants
Frenchman's Bay Forest and Wetland Q09/015		Anecdotal reports of Australasian bittern (Nationally Endangered), but fauna not surveyed	5 e.u.s	Possum browse leading to puriri and pohutukawa dieback; grazed and disturbed	Protective buffer to coastal fringe; raupo reedland linked with saltmarsh and mangroves	25.7 ha 4 convoluted remnants
Puketotara Forest Remnant 11 Q09/018		Fauna not surveyed	1 e.u.	Small (strong edge effects); grazed and disturbed	Becoming more isolated due to clearance of adjacent manuka shrubland	4.6 ha
Tinopai Coastal Margin Q09/019		Fauna not surveyed	1 e.u.	Weed infestation (brush wattle)	Relatively isolated	0.9 ha 2 narrow remnants

LEVEL 2 SITES Survey no.	REPRESENT-ATIVENESS	RARITY/SPECIAL FEATURES	DIVERSITY AND PATTERN	NATURALNESS	BUFFER/ LINKAGE/ CORRIDOR	SIZE AND SHAPE
Puketotara Forest Remnant 12 Q09/023		Fauna not surveyed	2 e.u.s	Highly disturbed and grazed	Riparian protection	18.2 ha 3 convoluted remnants
Puketotara Forest Remnant 14 Q09/025			2 e.u.s	Heavily grazed and disturbed	Erosion control, esp-ecially benefitting Q09/020	7.2 ha
Ngamotu Farm Pond Q09/031			3 e.u.s	Constructed pond, but serves bird habitat function	Adjacent to mangrove shrubland in Q08/062	1.8 ha
Wiki Brown Road Forest Remnants Q09/034			2 e.u.s	Highly disturbed and grazed	Minimal riparian and catchment protection	14.1 ha 7 small remnants
Unnamed Island in Oruawharo River Q09/035		Island in mangrove-filled inlet; fauna not surveyed	3 e.u.s	Some tall emergent black wattles on one side, otherwise entirely indig-enous vegetation	Surrounded by man-groves, which are linked with Q09/036	4 ha elongated island
Oneriri Road Forest Remnant 1, Q09/040			1 e.u.	Grazed and disturbed	Riparian/catchment protection	6.4 ha
Topuni River Forest Remnant 2 Q09/041			3 e.u.s	Grazed and disturbed; very small (strong edge effects)	Partial riparian protection	2.2 ha 2 small remnants
Oruawharo River Forest Remnant 1 Q09/042		Fauna not surveyed	1 e.u.	Grazed and disturbed; very small (strong edge effects)	Protective buffer to coastal fringe	4.5 ha 2 small remnants
Komiti Bay Forest Remnant Q09/048		Coastal cliffs; fauna not surveyed	2 e.u.s	Housing on edges of forest	Protective buffer to coastal fringe	8.2 ha long narrow area
Total Level 2 sites (83 sites)						**866.7 ha**

6. Acknowledgements

We thank the landowners who cooperated with this survey, in particular Tony, Wayne and Meryl Walden of Oneriri Station, who guided us around their forest remnants on the Puketotara Peninsula. The McKenzie family, Jan and John Hargreaves, David Hargreaves and Barbara Riley also assisted in viewing the natural areas on their land.

Peter Yardley of Whakapirau offered valuable advice on boating conditions in the Kaipara Harbour. Nick Ranger (Wildland Consultants Ltd) expertly piloted the small research vessel and assisted with wildlife and vegetation observations for those sites that were surveyed from the harbour waters.

Fred Brook surveyed and described the landforms and geology of the sites.

Wendy Holland of the Department of Conservation coordinated various parts of the project, including letters to landowners, press releases, project liaison between Wildland Consultants Ltd and DOC, editing of the report and communications between the authors and other peer reviewers. Peter Anderson (DOC) and Lisa Forester (Northland Regional Council) in particular provided helpful editorial comment. William Shaw (Wildland Consultants Ltd) provided useful comments on a draft of this report.

Aerial orthophotography was provided courtesy of Northland Regional Council and Kaipara District Council. Copyright reserved.

Mei Nee Lee of Auckland Museum Herbarium (AK) and Leon Perrie of Te Papa Museum Herbarium (WELT) were forthcoming with records of plant specimens from the study area. Ewen Cameron (curator of Auckland Museum Herbarium) corresponded with the author, received specimens, and provided advice on these specimens and other rare plant records in the ED. We also thank Peter de Lange (DOC) for his input in this area. Julia Walker of Waipu provided information on uncommon plants at Paparoa Creek.

The Ornithological Society of New Zealand (OSNZ) obliged us with records from the Northland Region. We thank Christopher Chapman, Adrian Riegen and Ray Pierce for making these available. Ray Pierce (Wildland Consultants Ltd) reviewed the sections on fauna in the report, and added several species records from personal observation.

Staff at the Otamatea Kauri and Pioneer Museum in Matakohe invited the author into their library, and provided a quiet space and reading material on the district's history.

Paul Greenshields, Roger Bawden, Geoff Martin and Lucy Manning (Wildland Consultants Ltd) digitised site boundaries and habitat types, and carried out various geographical analyses using ArcGIS v.9. Terry Conaghan, Loraine Wells and Craig Buchanan (DOC) prepared the maps for publication using ArcGIS v.9.

7. References

Arand, J.; Basher, L.; Wardle, R.; Wardle, K. 1993: Inventory of New Zealand Soil Sites of international, national and regional importance. Part Two - North Island and northern offshore islands (1st edition). *New Zealand Society of Soil Science Occasional Publication 2.* Lincoln University, Canterbury.

Atkinson, I.A.E. 1962: Semi-quantitative measurements of canopy composition as a basis for mapping. *Proceedings New Zealand Ecological Society 9*: 1–8.

Atkinson, I.A.E. 1985: Derivation of vegetation mapping units for an ecological survey of Tongariro National Park, North Island, New Zealand. *New Zealand Journal of Botany 23*: 361–178.

Beever, J. 1990: Mosses of Hukatere Scenic Reserve. *Auckland Botanical Society Journal 45(2)*: 50–51.

Brook, F. 1996: Classification of the Ecological Districts of Northland. Unpublished report. Department of Conservation, Northland Conservancy.

Brook, F. 2002: Uncommon and rare landsnails in the Northland region of New Zealand, and an assessment of conservation management priorities. ISBN: 0-487-22343-9. New Zealand Department of Conservation, Northland Conservancy.

Brownsey, P. J.; Smith-Dodsworth, J.C. 2000: New Zealand Ferns and Allied Plants. Revised edition. Bateman, Auckland.

Bull, P.C.; Gaze, P.D.; Robertson, C.J.R. 1985: The Atlas of Bird Distribution in New Zealand. Ornithological Society of New Zealand Inc., Wellington.

Byrne, B. 2002: The Unknown Kaipara, Five Aspects of its History 1250–1875. T.B. Byrne, Auckland.

Conning, L.; Holland, W.; Miller, N. 2004: Natural Areas of Hokianga Ecological District; Reconnaissance Survey Report for the Protected Natural Areas Programme. Department of Conservation, Northland Conservancy.

Crawley, M.J. 1997: The structure of plant communities. In Crawley, M.J. (ed.). Plant Ecology. Blackwell Science, Oxford, U.K.

Crockett, D. (comp.) 1992–2004: National Wader Census – North Kaipara; Data from 1992 to 2004 in issues of *Amokura, Bulletin of the Northland Region of the Ornithological Society of New Zealand*.

Cromarty, P.; Scott, D.A. 1996: A Directory of Wetlands in New Zealand. Department of Conservation, Wellington.

Davis, A. 2002: Otamatea Ecological District (Auckland Region): Ecological Character, Threats and Management Needs. Unpublished draft report (no. 2). Aristos Consultants Ltd.

de Lange P.; Norton D.; Heenan P.; Courtney S.; Molloy B.; Ogle C.; Rance B. 2004: Threatened and uncommon plants of New Zealand. *New Zealand Journal of Botany, 42*: 45–76.

DOC 2006: Department of Conservation Herpetofauna Database (Bioweb). Accessed April 2006.

DOC 2006 (in prep.): List of regionally significant species in the Northland Region. Department of Conservation, Northland Conservancy.

Dodson, J.R.; Enright, N.J.; McLean, R.F. 1988: A late Quaternary vegetation history for far northern New Zealand. *Journal of Biogeography 15*: 647–656.

Dowding, J.E.; Moore, S.J. 2006: Habitat networks of indigenous shorebirds in New Zealand. *Science for Conservation 261.* Science & Technical Publishing, Department of Conservation, Wellington.

Gill. B.; Whitaker. T. 1996: New Zealand Frogs and Reptiles. David Bateman, Auckland.

Hay, B.; Grant, C. 2004: Marine Resources in Tai Tokerau. Advanced release web-based version. AquaBio Consultants Ltd.
http://www.edesignz.co.nz/hosted/rakiora/Marine_Resources_Web_2004.htm#mcont

Heath, R.A. 1975: Stability of some New Zealand coastal inlets. *New Zealand Journal of Marine & Freshwater Research, 9 (4)*: 449–457.

Heather, B.D.; Robertson, H.A. 2000: The Field Guide to the Birds of New Zealand. Penguin Books (NZ) Ltd, Auckland.

Hitchmough, R. (comp.) 2002: New Zealand Threat Classification System lists – 2002. *Threatened species occasional publication 23.* Department of Conservation, Wellington.

Johnson, P.J.; Gerbeaux, P. 2004: Wetland Types in New Zealand. Department of Conservation, Wellington.

Kenny, J.A.; Hayward, B.W. 1996: Inventory and maps of important geological sites and landforms in the Northland Region (1st edition). *Geological Society of New Zealand Miscellaneous Publication 83.* Geological Society of New Zealand Inc., Lower Hutt.

Kershaw, K.A.; Looney, J.H.H. 1985: Quantitative and Dynamic Ecology. 3rd edn. Edward Arnold, London.

King, C.M. (ed.) 2005: The Handbook of New Zealand Mammals. Oxford University Press, Melbourne.

Laing R. M.; Blackwell E. W. 1906: Plants of New Zealand. First edition. Whitcombe and Tombs, Christchurch.

Leathwick, J.R.; Rogers, G.M. 1996: Modelling relationship between environment and canopy composition in secondary vegetation in central North Island, New Zealand. *New Zealand Journal of Ecology 20*: 147–162.

Mander, J. 1920: The Story of a New Zealand River. John Lane Co., New York.

McDowall, R.M. 1990: New Zealand Freshwater Fishes, a Natural History and Guide. Heinemann Reed, Auckland.

McGlone, M.S. 1983: Polynesian deforestation of New Zealand: a preliminary synthesis. *Archaeology in Oceania 18*: 11–25.

McGlone, M.S.; Wilmshurst, J.M. 1999: Dating initial Maori environmental impact in New Zealand. *Quaternary International 59*: 5–16.

McKinnon, M. (ed.); Bradley, B.; Kirkpatrick, R. 1997: New Zealand Historical Atlas, Ko Papatuanuku e Takoto Nei. David Bateman, Auckland.

Miller P.J; Pierce R.J. 1995: Distribution and decline of North Island brown kiwi (*Apteryx australis mantelli*) in Northland. *Notornis 42*: 201–211.

Moir, R.W.; Collen, B.; Thompson, C.S. 1986: The climate and weather of Northland. *New Zealand Meteorological Service Miscellaneous Publication 115 (2)*. 2nd edn. Ministry of Transport, Wellington.

Molloy J.; Bell B.; Clout M.; de Lange P.; Gibbs G.; Given D.; Norton D.; Smith N.; Stevens T. 2002: Classifying species according to threat of extinction – A system for New Zealand. *Threatened Species Occasional Publication 22*. Department of Conservation, Wellington.

Molloy J. (comp.) 1995: Bat (peka peka) recovery plan (*Mystacina, Chalinolobus*). *Threatened species recovery plan 15.* Department of Conservation, Wellington.

Mueller-Dombois, D.; Ellenberg, H. 1974: Aims and methods of vegetation ecology. John Wiley & Sons, New York.

Myers, S.; Park, G.; Overmars, F. 1987: A Guidebook for the Rapid Ecological Survey of Natural Areas. *New Zealand Biological Resources Centre. Publication No. 6.*

NIWA 2006: New Zealand Freshwater Fish Database. National Institute of Water and Atmospheric Research. http://fwdb.niwa.cri.nz Accessed March 2006.

NZPCN 2006: New Zealand Plant Conservation Network website. http://www.nzpcn.org.nz/ Accessed April 2006.

OTS 2006: Office of Treaty Settlements website. http://www.ots.govt.nz/ and http://nz01.terabyte.co.nz/ots/DocumentLibrary%5CTeUrioHau-Summary.PDF Accessed April 2006.

Park, G.N.; Walls, G.Y. 1978: Inventory of Tall Forest Stands on Lowland Plains and Terraces in Nelson and Marlborough Land Districts, New Zealand. Botany Division, Department of Scientific and Industrial Research, Lower Hutt.

Pearce, H.G.; Mullan, A.B.; Salinger, M.J.; Opperman, T.W.; Woods, D.; Moore, J.R. 2005: Impact of climate change on long-term fire danger. *New Zealand Fire Service Commission Research Report No. 50.* New Zealand Fire Service, Wellington.

Pierce R.J. 1999: Regional patterns of migration in the banded dotterel *Charadrius bicinctus*. *Notornis 46*: 101–122.

Pierce, R.J.; Sporle, W. 1998: Causes of kiwi mortality in Northland. *Conservation Advisory Science Notes No. 169.* Department of Conservation, Wellington.

Ryburn, W. 1999: Tall Spars, Steamers and Gum, a History of the Kaipara from Early European Settlement 1854–1947. Kaipara Publications, Auckland.

Sagar, P.M.; Shankar, U.; Brown, S. 1999. Distribution and numbers of waders in New Zealand 1983-1994. *Notornis 46:1-43*.

Scott, D. 1987: Seven Lives on Salt River. Reed Books, Auckland.

Technical Advisory Group (Park, G.N.; Kelly, G.C.; Wardle, J.A.; Simpson, P.G.; Dingwall, P.R.; Ogle, C.C.; Mitchell, N.D.; Myers, S.C.) 1986: The New Zealand Protected Natural Areas Programme; A Scientific Focus. *Biological Resources Centre Publication No. 4*. Department of Scientific and Industrial Research, Wellington.

Veitch, C.R. 1979: Kaipara Harbour – Easter 1978. *Notornis 26*: 289–296.

Watt J.C. 1975: The terrestrial insects. Pp. 507–535 in Kuschel, G. (ed.): Biogeography and Ecology in New Zealand. Dr W. Junk B.V. Publishers, The Hague.

Wildland Consultants Ltd 2004: A survey of selected natural areas in Carter Holt Harvey Forests, Northern Region. Wildland Consultants Ltd Contract Report No. 594. Prepared for Carter Holt Harvey Forest Resources. 144 p. plus maps and Microsoft Access database.

Wright, A.; Beever, R.B. 1990: Hukatere Scenic Reserve, 17 February 1990. *Auckland Botanical Society Journal 45(2)*: 47–49.

8. Appendices

8.1 FIELD SURVEY FORM

DEPARTMENT OF CONSERVATION
PROTECTED NATURAL AREAS PROGRAMME

NATURAL AREA NAME:……..…….. DATE: ……..……
GRID REF: ……. SSBI NO.: …… PNA NO.: ……
HABITAT TYPE(S): …….
……..
GEOMORPHOLOGICAL TYPE(S):……..
……..
VEGETATION TYPE(S):

Vegetation Type	% of Total Area	Percentage of Cover Value (Canopy)			
		Abundant (50-100)	Common (20-50)	Uncommon (5-20)	Rare (0-5)
HYD STR DYN LFU					

NATURAL AREA NAME: ..…….. PNA NO.: …….

Vegetation Type	% of Total Area	Percentage of Cover Value (Canopy)			
		Abundant (50-100)	Common (20-50)	Uncommon (5-20)	Rare (0-5)
HYD STR DYN LFU					

NOTES: (e.g. naturalness, buffering, linkages, corridors, long-term viability, landowner comments, fauna, flora, threats)

Department of Conservation
Te Papa Atawhai

20 September 2005

Dear Landowner

This notice is to advise that Wildland Consultants Ltd under contract with the Department of Conservation will soon be undertaking an updated survey of natural features such as forest, wetlands, gumlands and dunelands within the Kaipara District. The natural features have initially been identified from recent aerial photography and are viewed from roadsides or (with the permission of landowners) from other viewpoints, recording information on their vegetation type and general condition. This survey is a continuation of work first undertaken by the Department in 1994.

In some cases, if these areas are not visible from the road, you may be contacted for permission to enter your land to enable a quick survey of the natural feature to gain information on the vegetation type and key plant species present.

Why are we doing this survey? Northland's natural features make a significant contribution to the character and quality of the region. Many of these areas are habitat for some of our increasingly rare plants and animals. The Department of Conservation and Kaipara District Council have existing information on many of the natural features in the District. However some of this information is now out of date, and therefore may no longer be accurate. This survey enables us to update our information and is an important reference point for assessing habitat changes over time and to assist landowners with management of their natural features.

The information gathered in this survey will be made available to anyone interested in natural features such as landowners, iwi, environmental groups, local bodies, and professionals.

The Kaipara District Council will be provided with the results of the survey upon completion.

With an increasing awareness in the value of natural features many residents and future residents to the District will have updated information describing the District's ecological character and biodiversity values. The Governments Biodiversity Condition and Advice Fund and the Northland Regional Council's Environment Fund are examples of how this information is effectively used by the landowner. The Funds were set up to support landowners for the management and protection of natural areas, the information provided in this survey is an important tool in achieving these aims.

If you have any questions about the survey, please contact the Department of Conservation, (attention Peter Anderson or Wendy Holland) at Northland Conservancy Office in Whangarei, telephone (09) 430 2470; fax 09 430 2479 or email panderson@doc.govt.nz or wholland@doc.govt.nz.

Chris Jenkins

CONSERVATOR NORTHLAND

Department of Conservation

Rodney Times | Tuesday, November 22, 2005

Survey identifying key natural habitats

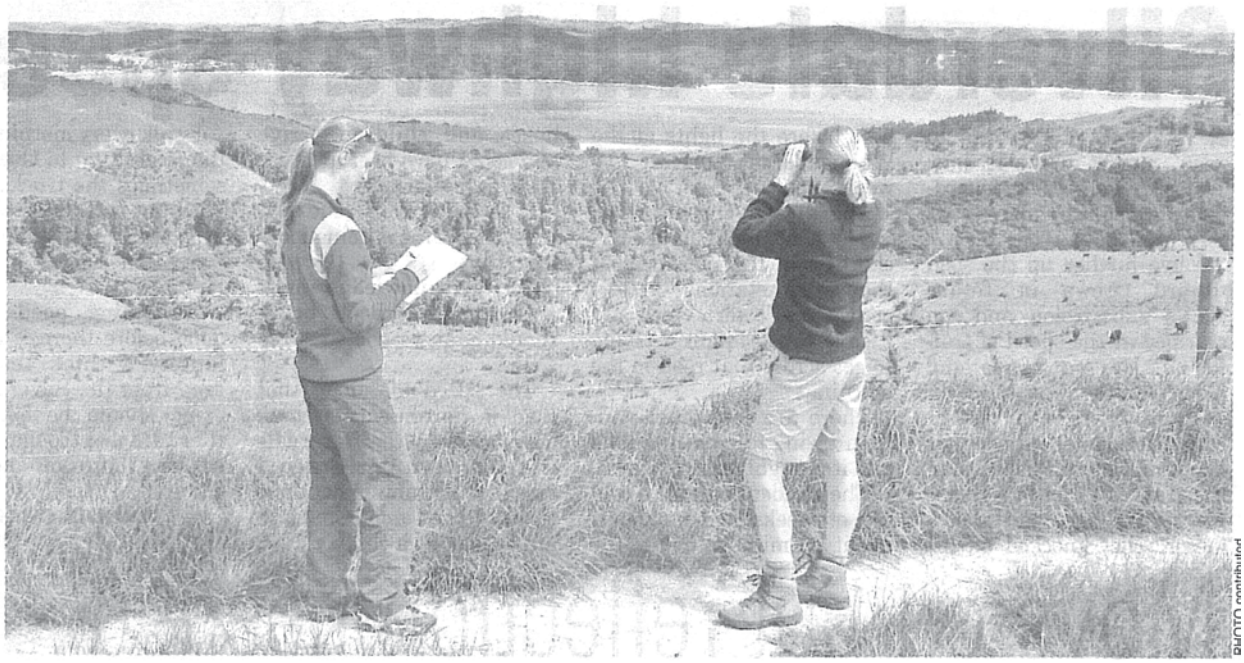
■ THE DEPARTMENT of Conservation has contracted Wildland Consultants Ltd to identify important natural habitats near Kaiwaka in the Kaipara district.

Wildland Consultants has started working on this project, which is expected to be finished in early 2006. The aim of the survey is to update existing information on the natural features of the area. The information will be available to anyone interested in natural features, including landowners, iwi, environmental groups, local bodies and professionals.

The natural features will be identified from roadsides or, with the permission of landowners, from other viewpoints. People who live or work in the area may notice the Wildlands truck at work.

Only a portion of the Kaipara district will be surveyed. This area is known as the Otamatea Ecological District which occurs around the north-eastern portion of the Kaipara Harbour.

This type of survey has been ongoing in the Northland region since 1994 and the majority of the region has been covered. After the completion of this survey DOC hopes to identify important natural areas in the Pouto and Waipu areas to complete the project.



PHOTO/ contributed

JENNY LUX and Sarah Beadel from Wildland Consultants are describing an important area of kauri regenerating bush on Oneriri Station-Puketotara Peninsula as part of a survey on the natural areas of the Otamatea Ecological District.

8.3 CATEGORIES OF THREAT

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

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

3. Classification structure and categories

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

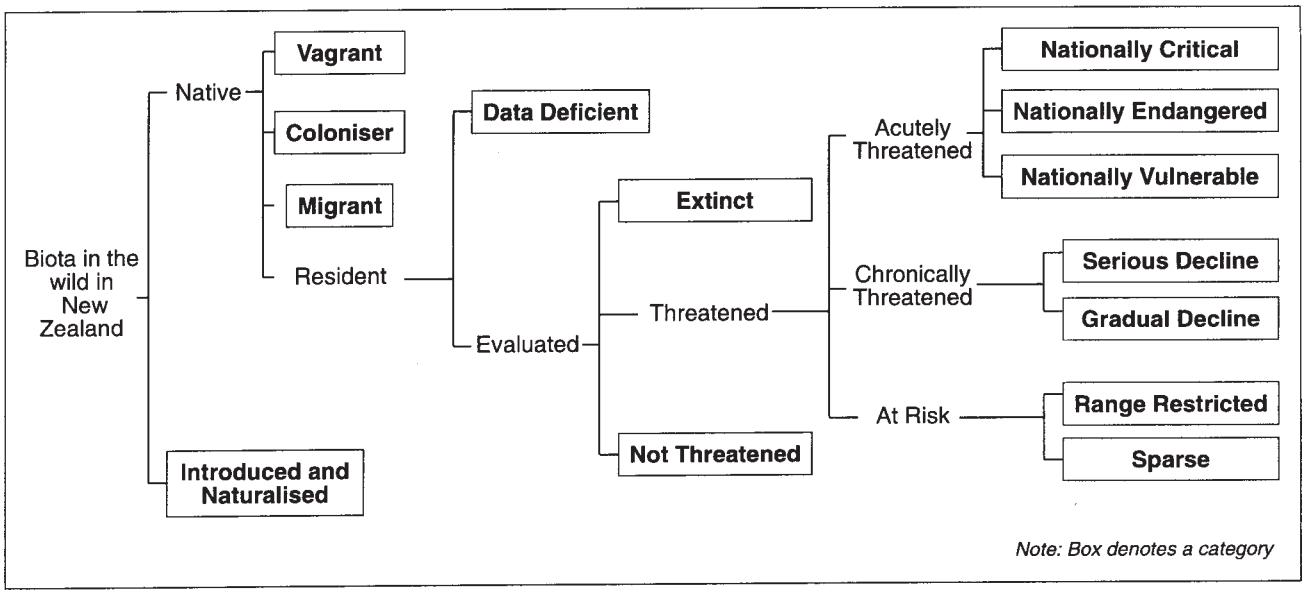


Figure 1. Structure of the New Zealand Threat Classification System.

INTRODUCED AND NATURALISED

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

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

VAGRANT

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

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

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

COLONISER

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

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

MIGRANT

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

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

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

DATA DEFICIENT

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

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

EXTINCT

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

mistletoe (*Trilepidea adamsii*). Only taxa that have become extinct since 1840 are included in the list. Taxa that are extinct in the wild but occur in captivity or cultivation are not listed in this category. These are listed as Critically Endangered and are qualified with the letters EW (Extinct in the Wild).

THREATENED

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

Acutely Threatened

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

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

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

Chronically Threatened

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

At Risk

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

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

NOT THREATENED

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

7. Criteria for the Acutely Threatened and Chronically Threatened categories

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

NATIONALLY CRITICAL

Very small population *or* a very high predicted decline

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

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

NATIONALLY ENDANGERED

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

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

Status criteria

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

Trend criteria

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

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

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

Status criteria

1. The total population size is 1000–5000 mature individuals.
2. There are < 15 sub-populations *and either*:

   a. 300–500 mature individuals in the largest sub-population, *or*

   b. the total area of occupancy is 10–100 ha (0.1–1 km^2).

Trend criteria

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

NATIONALLY VULNERABLE

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

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

Status criteria

1. The total population size is 1000–5000 mature individuals.
2. There are < 15 sub-populations *and either*:

   a. 300–500 mature individuals in the largest sub-population, *or*

   b. the total area of occupancy is 10–100 ha (0.1–1 km^2).

Trend criteria

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

SERIOUS DECLINE

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

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

Status criteria

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

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

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

Trend criterion

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

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

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

Status criteria

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

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

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

Trend criterion

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

GRADUAL DECLINE

Moderate to large population *and* small to moderate decline

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

Status criteria

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

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

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

Trend criterion

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

8.4 CATEGORIES OF IMPORTANCE FOR GEOLOGICAL SITES

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

Sites are listed under three levels of importance:

(a) International – site of international scientific importance.

(b) National – site of national scientific, educational or aesthetic importance.

(c) Regional – site of regional scientific, educational or aesthetic importance.

The importance given to each site was assessed by those informants of Kenny & Hayward (1996) who were familiar with the site.

8.5 CHECKLIST OF PLANT SPECIES IN OTAMATEA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

This species list was compiled by the authors during a reconnaissance survey in the summer of 2005/2006. Other records, including those from Department of Conservation Sites of Specific Biological Interest (SSBI) information system, Auckland Museum Herbarium (AK) and Te Papa Herbarium (WELT), have been referenced following the Latin species name.

1. INDIGENOUS SPECIES

Gymnosperms	
Agathis australis	kauri
Dacrycarpus dacrydioides	kahikatea
Dacrydium cupressinum	rimu
Libocedrus plumosa (Julia Walker pers. comm.)	kawaka
Phyllocladus trichomanoides var. *trichomanoides*	tanekaha
Podocarpus totara	totara
Prumnopitys taxifolia	matai
Stachypitys ferruginea (SSBI Q08/H015 & Q08/H037)	miro
Monocot. trees and shrubs	
Cordyline australis	ti kouka, cabbage tree
Cordyline banksii (Wildland Consultants 2004)	ti ngahere, forest cabbage tree
Phormium tenax	harakeke, flax
Rhopalostylis sapida	nikau
Dicot. trees and shrubs	
Alectryon excelsus var. *excelsus*	titoki
Alseuosmia macrophylla	karapapa
Alseuosmia quercifolia	
Androstoma empetrifolia	
Avicennia marina subsp. *australasica*	mangrove, manawa
Beilschmiedia tarairi	taraire
Beilschmiedia tawa	tawa
Brachyglottis repanda	rangiora
Carmichaelia australis	
Carpodetus serratus (AK 296537)	putaputaweta
Coprosma arborea	mamangi
Coprosma areolata	
Coprosma grandifolia	kanono
Coprosma macrocarpa	
Coprosma propinqua subsp. *propinqua* (Wildland Consultants 2004)	
Coprosma propinqua subsp. *propinqua* × *C. robusta*	
Coprosma rhamnoides	
Coprosma robusta	karamu
Coprosma spathulata (Wright & Beever 1990)	
Coprosma tenuicaulis (Julia Walker, pers. comm.)	
Coriaria arborea var. *arborea*	tutu
Corynocarpus laevigatus	karaka
Dracophyllum latifolium (Wright & Beever 1990)	neinei
Dysoxylum spectabile	kohekohe
Elaeocarpus dentatus	hinau
Entelea arborescens	whau
Fuchsia excorticata	kotukutuku
Gaultheria antipoda	snowberry
Geniostoma rupestre var. *ligustrifolium*	hangehange
Griselinia lucida	puka
Hebe macrocarpa var. *macrocarpa* (SSBI Q08/H070)	kokomuka
Hebe stricta var. *stricta*	koromiko
Hedycarya arborea	pigeonwood, porokaiwhiri
Hoheria populnea	houhere
Ileostylus micranthus (AK 11264)[1]	green mistletoe
Knightia excelsa	rewarewa
Kunzea ericoides	kanuka
Laurelia novae-zelandiae	pukatea
Leptecophylla juniperina subsp. *juniperina*	prickly mingimingi
Leptospermum scoparium	manuka
Leucopogon fasciculatus	mingimingi
Leucopogon fraseri	patotara
Litsea calicaris	mangeao
Macropiper excelsum var. *excelsum*	kawakawa
Melicope simplex	poataniwha
Melicytus macrophyllus (Wright & Beever 1990)	large leaved mahoe
Melicytus micranthus (Wright & Beever 1990)	
Melicytus ramiflorus subsp. *ramiflorus*	mahoe
Metrosideros carminea (AK 11444)[2]	carmine rata
Metrosideros excelsa	pohutukawa

[1] Not recorded in Otamatea ED Northland since 1867.

[2] Not recorded in Otamatea ED Northland since 1867.

Metrosideros excelsa × *M. robusta*	pohutukawa × northern rata hybrid
Metrosideros robusta	northern rata
Mida salicifolia (Wright & Beever 1990)	mida
Myoporum laetum	ngaio
Myrsine australis	mapou
Myrsine salicina	toro
Nestegis lanceolata	white maire
Olearia furfuracea	akepiro
Olearia rani	heketara
Olearia solandri (AK 233985)	
Pennantia corymbosa (SSBI Q08/H038 & Q08/H015)	kaikomako
Pimelea prostrata (SSBI Q08/H057)	pinatoro
Pittosporum cornifolium (Wright & Beever 1990)	perching pittosporum
Pittosporum eugenioides	tarata, lemonwood
Pittosporum tenuifolium [3] (WELT SP031346)	kohuhu
Plagianthus divaricatus	saltmarsh ribbonwood, makaka
Pomaderris kumerahou	kumarahou
Pomaderris ericifolia	
Pouteria costata	tawapou
Pseudopanax arboreus var. *arboreus*	five finger, whauwhaupaku
Pseudopanax crassifolius	lancewood, horoeka
Pseudopanax lessonii	houpara
Rhabdothamnus solandri	taurepo
Schefflera digitata	pate
Sophora chathamica	kowhai
Streblus banksii	large-leaved milk tree
Streblus heterophyllus (AK 296539)	small-leaved milk tree
Syzygium maire (Wright & Beever 1990)	swamp maire, maire tawake
Toronia toru	toru
Trilepidea adamsii (WELT SP031299)[4]	Adam's mistletoe
Tupeia antarctica (AK 11268) (WELT SP031346)[5]	
Vitex lucens	puriri

Monocot. lianes

Freycinetia banksii	kiekie
Ripogonum scandens	supplejack, kareao

Dicot. lianes

Calystegia marginata (WELT SP004696)	
Calystegia sepium	pink bindweed, pohue
Calystegia soldanella	shore bindweed, panahi
Clematis paniculata	puawananga
Metrosideros diffusa	
Metrosideros fulgens	
Metrosideros perforata	aka
Muehlenbeckia australis	
Muehlenbeckia complexa	pohuehue
Parsonsia capsularis	NZ jasmine, akakiore
Parsonsia heterophylla	NZ jasmine
Passiflora tetrandra	NZ passionfruit, kohia
Rubus australis	bush lawyer, tataramoa
Rubus cissoides	bush lawyer, tataramoa
Rubus squarrosus (AK 252397)	leafless lawyer
Tetragonia implexicoma	NZ spinach

Lycopods and psilopsids

Huperzia varia (Wright & Beever 1990)
Lycopodiella cernua
Tmesipteris elongata

Mosses[6]

Breutelia pendula
Calomnion complanatum
Camptochaete arbuscula
Camptochaete pulvinata
Campylopus clavatus
Campylopus introflexus
Campylopus pyriformis
Cyathophorum bulbosum
Cyrtopus setosus
Dicranoloma fasciatum
Dicranoloma menziesii
Distichophyllum microcarpum
Distichophyllum pulchellum
Echinodium bispidum
Eurhynchium muriculatum
Fissidens asplenioides
Fissidens humilis
Fissidens leptocladus
Fissidens pallidus
Fissidens pungens
Fissidens rigidulus
Fissidens tenellus
Fissidens sp.
Holomitrium perichaetiale
Homalia falcifolia
Homalia punctata
Hymenodon pilifer
Hypnodendron arcuatum
Hypnodendron colensoi
Hypnodendron kerrii
Hypnum chrysogaster
Leptostomum macrocarpum
Leucobryum candidum

[3] Kohuhu was noted as the host plant for *Tupeia antartica* by T. Kirk in 1867.

[4] Not recorded in Otamatea ED Northland since 1867, now presumed extinct.

[5] Not recorded in Otamatea ED Northland since 1867.

[6] All moss records are from Beever (1990).

Lopidium concinnum	
Macrocoma tenue	
Macromitrium gracile	
Macromitrium ligulare	
Orthorrhynchium elegans	
Philonotis tenuis	
Porotrichum oblongifolium	
Ptychomnion aciculare	
Racopilum convolutaceum	
Rhizogonium novae-hollandiae	
Rhynchostegium tenuifolium	
Sematophyllum amoenum	
Thamnobryum pandum	
Thuidium furfurosum	
Thuidium laeviusculum	
Thuidium sparsum	
Weymouthia cochlearifolia	
Wijkia extenuata	
Zygodon gracillimus	
Zygodon intermedius	

Ferns

Adiantum cunninghamii	common maidenhair
Adiantum viridescens	
Anarthropteris lanceolata	
Arthropteris tenella	
Asplenium bulbiferum	hen and chicken fern
Asplenium flaccidum	hanging spleenwort
Asplenium gracillimum	
Asplenium oblongifolium	shining spleenwort, huruhuruwhenua
Asplenium polyodon	sickle spleenwort, petako
Blechnum chambersii	rereti
Blechnum discolor	crown fern
Blechnum filiforme	thread fern, panako
Blechnum fraseri	
Blechnum membranaceum	
Blechnum novae-zelandiae	kiokio
Cheilanthes sieberi (SSBI Q08/H057)	
Cyathea cunninghamii	gully tree fern
Cyathea dealbata	ponga, silver fern
Cyathea medullaris	mamaku, black tree fern
Deparia petersenii	
Dicksonia lanata	
Dicksonia squarrosa	wheki
Diplazium australe	
Doodia australis	rasp fern, pukupuku
Doodia mollis (SSBI Q08/H047)	
Gleichenia dicarpa	tangle fern
Grammitis sp.	
Histiopteris incisa	water fern, matata
Hymenophyllum demissum (Wright & Beever 1990)	filmy fern, irirangi
Hymenophyllum dilatatum (Wright & Beever 1990)	filmy fern
Hymenophyllum revolutum (Wright & Beever 1990)	filmy fern
Hymenophyllum sanguinolentum (Wright & Beever 1990)	filmy fern, piripiri
Hypolepis distans[7]	
Lastreopsis glabella (Wright & Beever 1990)	smooth shield fern
Lastreopsis hispida	hairy shield fern
Lastreopsis microsora subsp. *petangularis* (Wright & Beever 1990)	
Lygodium articulatum	mangemange
Microsorum pustulatum	hound's tongue fern, kowaowao
Microsorum scandens	mokimoki, fragrant fern
Ophioglossum petiolatum[8] (DOC Bioweb)	stalked adder's tongue
Paesia scaberula	matata
Pellaea rotundifolia	tarawera, button fern
Pneumatopteris pennigera	gully fern
Pteridium esculentum	bracken, rarahu
Pteris macilenta (of NZ authors)	
Pteris tremula	shaking brake, turawera
Pyrrosia eleagnifolia	leather-leaf fern

Orchids

Acianthus sinclairii	
Bulbophyllum pygmaeum (Wright & Beever 1990)	piripiri
Corybas oblongus (Wright & Beever 1990)	
Earina mucronata	peka-a-waka
Microtis unifolia	maikaika
Pterostylis banksii	tutukiwi, greenhood orchid
Thelymitra sp.	

Grasses

Austrostipa stipoides	
Bromus arenarius (WELT SP076361)[9]	sand brome
Cortaderia fulvida	toetoe
Dichelachne crinita	long-hair plume grass
Dichelachne inaequiglumis (WELT SP067113)[10]	short-hair plume grass
Isachne globosa	swamp millet
Lachnagrostis littoralis[11]	coastal wind grass
Microlaena avenacea	bush rice grass
Microlaena stipoides	patiti
Oplismenus hirtellus subsp. *imbecillis*	
Poa pusilla[12]	

[7] Not recorded in Otamatea ED Northland since 1867.

[8] Supposed T. Kirk collection from 1867, but no herbarium specimen noted.

[9] Not recorded in Otamatea ED Northland since 1867.

[10] Not recorded in Otamatea ED Northland since 1903.

[11] Not recorded in Otamatea ED Northland since 1867.

[12] Not recorded in Otamatea ED Northland since 1867.

Rytidosperma biannulare (Wright & Beever 1990)	
Trisetum arduanum[13]	

Sedges

Baumea juncea	
Baumea tenax	
Baumea teretifolia	
Bolboschoenus fluviatilis	marsh clubrush
Carex breviculmis	
Carex dissita (Wright & Beever 1990)	
Carex flagellifera	manaia
Carex lambertiana (Wright & Beever 1990)	
Carex ochrosaccus (Wright & Beever 1990)	
Carex secta	purei
Carex virgata	purei
Cyperus ustulatus	giant umbrella sedge, upokotangata
Ficinia nodosa	knobby clubrush
Gahnia lacera	cutty grass, tarangarara
Gahnia pauciflora	takahikahi
Gahnia setifolia	mapere
Gahnia xanthocarpa	toikiwi
Isolepis cernua	
Isolepis inundata	
Lepidosperma laterale	sword sedge
Schoenoplectus tabernaemontani	lake clubrush, kuta
Schoenus maschalinus	
Schoenus apogon	
Schoenus tendo	wiwi
Uncinia banksii	hook sedge
Uncinia uncinata	hook sedge
Uncinia zotovii (Wright & Beever 1990)	hook sedge

Rushes

Juncus kraussii subsp. *australiensis*	sea rush
Juncus edgariae	
Juncus planifolius	
Juncus sarophorus	
Luzula picta var. *picta* (Wright & Beever 1990)	painted woodrush

Monocot. herbs (other than orchids, grasses, sedges and rushes)

Apodasmia similis	oioi
Arthropodium cirratum	rengarenga
Astelia banksii	kowharawhara
Collospermum hastatum	perching lily, kahakaha
Collospermum microspermum	
Cordyline pumilio	ti rauriki
Dianella nigra	turutu
Triglochin striata	arrow grass
Typha orientalis	raupo

[13] Not recorded in Otamatea ED Northland since 1867.

Composite herbs

Cotula coronopifolia	bachelor's button
Leptinella tenella (AK 233971)	
Picris burbidgeae (AK 11814)[14]	
Pseudognaphalium luteoalbum agg.	jersey cudweed
Senecio hispidulum	fireweed
Senecio lautus	shore groundsel

Dicot. herbs (other than composites)

Apium prostratum	NZ celery
Callitriche muelleri	starwort
Centella uniflora	centella
Dichondra repens	Mercury Bay weed
Disphyma australe (SSBI Q08/H056)	native iceplant, horokaka
Drosera auriculata (SSBI Q08/H057)	sundew
Epilobium hirtigerum (WELT SP042470)[15]	hairy willowherb
Epilobium rotundifolium	
Geranium solanderi	
Gonocarpus incanus	piripiri
Haloragis erecta subsp. *erecta*	
Hydrocotyle dissecta	
Leptostigma setulosa	
Lobelia anceps	punakuru
Myriophyllum propinquum (AK 243770)	
Nertera dichondrifolia	
Peperomia urvilleana (SSBI Q08/H056)	
Persicaria decipiens	native willow weed
Ranunculus reflexus	maruru
Samolus repens	sea primrose
Sarcocornia quinqueflora	glasswort
Selliera radicans	remuremu
Suaeda novae-zelandiae (AK 294674 and AK 294744)	
Solanum americanum	
Spergularia media	

Unconfirmed records

Coprosma rigida[16] (SSBI Q08/H038 & Q08/H063)	
Deparia tenuifolia[17] (Wright & Beever 1990)	
Libertia ixioides[18] (SSBI Q08/H056)	
Nephrolepis flexuosa[19] (DOC Bioweb)	native ladder fern

[14] Not recorded in Otamatea ED Northland since 1867.

[15] Not recorded in Otamatea ED Northland since 1924.

[16] Recorded in 1996 at two locations, Whakapirau River Scenic Reserve (Q08/128) and Kohatutahi Forest and Wetland (Q08/178), but no herbarium specimen collected. During the current survey *C. rigida* was not found amongst the coprosmas growing at Kohatuahi.

[17] Otherwise not recorded in Northland; only confirmed records are from Waikato, Bay of Plenty and Nelson area (Brownsey and Smith-Dodsworth 2000).

[18] Unconfirmed 1993 record from Kaiwhitu Island (Q08/175).

[19] Unconfirmed 2001 record from Hukatere Hall Recreation Reserve (grid ref: Q08 156 575); unlikely to be a natural population.

Plagianthus regius[20] (SSBI Q08/H074 & Q08/H062)	manatu, ribbonwood

2. EXOTIC SPECIES

Gymnosperms	
Cupressus macrocarpa	macrocarpa
Pinus pinaster	maritime pine
Pinus radiata	radiata pine

Dicot. trees and shrubs	
Acacia mearnsii	black wattle
Acacia melanoxylon	Tasmanian blackwood
Banksia sp.	banksia
Berberis glaucocarpa	barberry
Betula pendula	silver birch
Cotoneaster glaucophyllus	cotoneaster
Crataegus monogyna	hawthorn
Cytisus scoparius (AK 296480)	broom
Elaeagnus ´ reflexa	elaeagnus
Eriobotrya japonica	loquat
Erythrina ´ sykesii	coral tree
Hakea salicifolia	willow-leaved hakea
Hakea sericea	prickly hakea
Impatiens sodenii	shrub balsam
Ligustrum lucidum	tree privet
Ligustrum sinense	Chinese privet
Paraserianthes lophantha	brush wattle
Populus sp.	poplar
Psoralea pinnata	dally pine, cut-leaf psoralea
Robinia pseudacacia	false acacia
Rubus sp. (*R. fruticosus* agg.)	blackberry
Salix fragilis	crack willow
Senecio petasitis	velvet groundsel
Senna multiglandulosa	buttercup bush
Solanum mauritianum	woolly nightshade
Solanum pseudocapsicum	Jerusalem cherry
Ulex europaeus	gorse

Ferns	
Azolla pinnata	

Dicot. lianes	
Jasminum polyanthum	jasmine
Lonicera japonica	Japanese honeysuckle
Passiflora tarminiana (AK 296544)	
Passiflora tripartita var. *mollissima*	banana passionfruit
Senecio mikanioides	German ivy
Vitis vinifera	grape
Wisteria sinensis	wisteria

Lycopods and psilopsids	
Sellaginella kraussiana	selaginella

[20] Unconfirmed 2003 record from Donaldson's Forest (Q08/157).

Grasses	
(not named)	bamboo
Agrostis capillaris	browntop
Aira caryophyllea	silvery hairy grass
Alopecurus pratensis (WELT SP062659)	meadow foxtail
Anthoxanthum odoratum	sweet vernal
Arundo donax	giant reed grass
Avena barbata	slender oat
Axonopus fissifolius (Wright & Beever 1990)	narrow-leaved carpet grass
Briza maxima	large quaking grass
Cortaderia selloana	pampas
Dactylis glomerata	cocksfoot
Holcus lanatus	Yorkshire fog
Lolium perenne	rye grass
Paspalum dilatatum	paspalum
Paspalum vaginatum	saltwater paspalum
Pennisetum clandestinum	kikuyu
Poa annua	annual poa
Schedonorus phoenix	tall fescue
Spartina alterniflora	spartina
Sporobolus africanus	ratstail
Stenotaphrum secundatum	buffalo grass
Vulpia sp.	hair grass

Sedges	
Carex divulsa	
Cyperus eragrostis	umbrella sedge
Isolepis sepulcralis	

Rushes	
Juncus acutus	sharp rush
Juncus articulatus (Wright & Beever 1990)	jointed rush
Juncus bufonius	toad rush
Juncus effusus	soft rush

Monocot. herbs (other than orchids, grasses, sedges and rushes)	
Agapanthus praecox	agapanthus
Allium triquetrum	three-cornered garlic
Aristea ecklonii	aristea
Asparagus asparagoides	smilax
Asparagus scandens	climbing asparagus
Canna indica	canna lily
Crocosmia ´ crocosmiiflora	montbretia
Hedychium gardnerianum	kahili ginger; wild ginger
Kniphofia uvaria	red hot poker
Tradescantia fluminensis	tradescantia
Watsonia meriana	watsonia
Zantedeschia aethiopica	arum lily

Composite herbs	
Achillea millefolium	yarrow
Aster subulatus	sea aster
Cirsium arvense	California thistle

Cirsium vulgare	Scotch thistle
Conyza albida	fleabane
Dimorphotheca pluvialis	rain daisy
Erigeron karvinskianus	Mexican daisy
Hypochoeris radicata	catsear
Lapsana communis	nipplewort
Leontodon taraxacoides	hawkbit
Picris echioides	oxtongue
Senecio jacobaea	ragwort
Sonchus asper	prickly sow thistle
Sonchus oleraceus	sow thistle, puha
Taraxacum officinale	dandelion

Dicot. herbs (other than composites)

Ageratina adenophora	Mexican devil
Alternanthera philoxeroides	alligator weed
Anagallis arvensis	scarlet pimpernel
Apium nodiflorum	water celery
Atriplex sp.	
Callitriche stagnalis	starwort
Cardamine sp.	bitter cress
Carpobrotus edulis	ice plant
Conium maculatum	hemlock
Daucus carota	wild carrot
Duchesnea indica	Indian strawberry
Epilobium sp.	
Euphorbia peplus	milkweed
Foeniculum vulgare	fennel
Galium aparine	cleavers
Geranium molle	dove's foot
Hypericum androsaemum	tutsan
Impatiens walleriana	busy lizzie
Lotus pedunculatus	lotus
Lotus suaveolens	hairy birdsfoot trefoil
Myosotis laxa var. *caespitosa*	forget-me-not
Nasturtium officinale	watercress
Orobanche minor	broomrape
Oxalis sp.	oxalis
Parentucellia viscosa	tarweed
Plantago coronopus	buck's-horn plantain
Plantago lanceolata	narrow-leaved plantain
Plantago major	broad-leaved plantain
Polygonum sp.	willow weed
Prunella vulgaris	selfheal
Ranunculus repens	creeping buttercup
Rumex conglomeratus	clustered dock
Rumex obtusifolius	dock
Solanum nigrum	black nightshade
Trifolium repens	white clover
Tropaeolum majus	garden nasturtium
Verbena officinalis	vervain
Veronica arvensis	field speedwell
Vicia sativa	vetch
Vinca major	periwinkle

8.6 COMMON PLANT NAMES USED IN TEXT

Note: Some of these species *are not* native to or naturalised in Otamatea ED Northland, but are referred to in the text for other reasons.

INDIGENOUS SPECIES

Adam's mistletoe	*Trilepidea adamsii*
akepiro	*Olearia furfuracea*
arrow grass	*Triglochin striata*
bachelor's button	*Cotula coronopifolia*
bracken	*Pteridium esculentum*
bush lawyer	*Rubus cissoides*
carmine rata	*Metrosideros carminea*
five finger	*Pseudopanax arboreus* var. *arboreus*
glasswort	*Sarcocornia quinqueflora*
green mistletoe	*Ileostylus micranthus*
gully fern	*Pneumatopteris pennigera*
gully tree fern	*Cyathea cunninghamii*
hairy willowherb	*Epilobium hirtigerum*
hangehange	*Geniostoma rupestre* var. *ligustrifolium*
hanging spleenwort	*Asplenium flaccidum*
harakeke	*Phormium tenax*
heketara	*Olearia rani*
hinau	*Elaeocarpus dentatus*
hook sedge	*Uncinia uncinata*
houhere	*Hoheria populnea*
hound's tongue fern	*Microsorum pustulatum*
houpara	*Pseudopanax lessonii*
kahikatea	*Dacrycarpus dacrydioides*
kaikomako	*Pennantia corymbosa*
kanono	*Coprosma grandifolia*
kanuka	*Kunzea ericoides*
karaka	*Corynocarpus laevigatus*
karamu	*Coprosma robusta*
kauri	*Agathis australis*
kawaka	*Libocedrus plumosa*
kawakawa	*Macropiper excelsum* var. *excelsum*
kiekie	*Freycinetia banksii*
kiokio	*Blechnum novae-zelandiae*
knobby clubrush	*Ficinia nodosa*
kohekohe	*Dysoxylum spectabile*
kohuhu	*Pittosporum tenuifolium*
koromiko	*Hebe stricta* var. *stricta*
kowhai	*Sophora chathamica*
kowharawhara	*Astelia banksii*
lake clubrush	*Schoenoplectus tabernaemontani*
lancewood	*Pseudopanax crassifolius*
large-leaved milk tree	*Streblus banksii*
leafless lawyer	*Rubus squarrosus*
leather-leaf fern	*Pyrrosia eleagnifolia*
mahoe	*Melicytus ramiflorus* subsp. *ramiflorus*
mamaku	*Cyathea medullaris*
mamangi	*Coprosma arborea*
manatu	*Plagianthus regius*
mangeao	*Litsea calicaris*
mangemange	*Lygodium articulatum*
mangrove	*Avicennia marina* subsp. *australasica*
manuka	*Leptospermum scoparium*
mapou	*Myrsine australis*
marsh clubrush	*Bolboschoenus fluviatilis*
matai	*Prumnopitys taxifolia*
mida	*Mida salicifolia*
mingimingi	*Leucopogon fasciculatus*
miro	*Stachypitys ferruginea*
native iceplant	*Disphyma australe*
native willow weed	*Persicaria decipiens*
ngaio	*Myoporum laetum*
nikau	*Rhopalostylis sapida*
northern rata	*Metrosideros robusta*
NZ celery	*Apium prostratum*
NZ jasmine	*Parsonsia heterophylla*
NZ passionfruit	*Passiflora tetrandra*
NZ spinach	*Tetragonia implexicoma*
oioi	*Apodasmia similis*
painted woodrush	*Luzula picta* var. *picta*
pate	*Schefflera digitata*
perching lily	*Collospermum hastatum*
pigeonwood	*Hedycarya arborea*
pink bindweed	*Calystegia sepium*
pohuehue	*Muehlenbeckia complexa*
pohutukawa	*Metrosideros excelsa*
pohutukawa × northern rata hybrid	*Metrosideros excelsa* × *M. robusta*
ponga	*Cyathea dealbata*
prickly mingimingi	*Leptecophylla juniperina* subsp. *juniperina*
puka	*Griselinia lucida*
pukatea	*Laurelia novae-zelandiae*
puriri	*Vitex lucens*
putaputaweta	*Carpodetus serratus*
rangiora	*Brachyglottis repanda*
rasp fern	*Doodia australis*
raupo	*Typha orientalis*
remuremu	*Selliera radicans*
rengarenga	*Arthropodium cirratum*
rewarewa	*Knightia excelsa*
rimu	*Dacrydium cupressinum*
saltmarsh ribbonwood	*Plagianthus divaricatus*
sand brome	*Bromus arenarius*
sea primrose	*Samolus repens*
sea rush	*Juncus kraussii* subsp. *australiensis*
shaking brake	*Pteris tremula*

shining spleenwort	*Asplenium oblongifolium*
shore bindweed	*Calystegia soldanella*
short-hair plume grass	*Dichelachne inaequiglumis*
sickle spleenwort	*Asplenium polyodon*
small-leaved milk tree	*Streblus heterophyllus*
stalked adder's tongue	*Ophioglossum petiolatum*
supplejack	*Ripogonum scandens*
swamp maire	*Syzygium maire*
tanekaha	*Phyllocladus trichomanoides* var. *trichomanoides*
tangle fern	*Gleichenia dicarpa*
taraire	*Beilschmiedia tarairi*
tarata, lemonwood	*Pittosporum eugenioides*
taurepo	*Rhabdothamnus solandri*
tawa	*Beilschmiedia tawa*
tawapou	*Pouteria costata*
thread fern	*Blechnum filiforme*
ti kouka	*Cordyline australis*
ti ngahere	*Cordyline banksii*
titoki	*Alectryon excelsus* var. *excelsus*
toetoe	*Cortaderia fulvida*
toro	*Myrsine salicina*
toru	*Toronia toru*
totara	*Podocarpus totara*
towai	*Weinmannia silvicola*
turutu	*Dianella nigra*
tutu	*Coriaria arborea* var. *arborea*
wharangi	*Melicope ternata*
whararíki	*Phormium cookianum*
wheki	*Dicksonia squarrosa*
white maire	*Nestegis lanceolata*

EXOTIC SPECIES

agapanthus	*Agapanthus praecox*
alligator weed	*Alternanthera philoxeroides*
aristea	*Aristea ecklonii*
arum lily	*Zantedeschia aethiopica*
bamboo (not named)	
banana passionfruit	*Passiflora tripartita* var. *mollissima*
barberry	*Berberis glaucocarpa*
black wattle	*Acacia mearnsii*
blackberry	*Rubus* sp. (*R. fruticosus* agg.)
brush wattle	*Paraserianthes lophantha*
buffalo grass	*Stenotaphrum secundatum*
busy lizzie	*Impatiens walleriana*
Chinese privet	*Ligustrum sinense*
cleavers	*Galium aparine*
climbing asparagus	*Asparagus scandens*
cotoneaster	*Cotoneaster glaucophyllus*
crack willow	*Salix fragilis*
dally pine, cut-leaf psoralea	*Psoralea pinnata*
Douglas fir	*Pseudotsuga menziesii*
elaeagnus	*Elaeagnus* x *reflexa*
false acacia	*Robinia pseudacacia*
garden nasturtium	*Tropaeolum majus*
German ivy	*Senecio mikanioides*
giant reed grass	*Arundo donax*
gorse	*Ulex europaeus*
hawthorn	*Crataegus monogyna*
Japanese honeysuckle	*Lonicera japonica*
jasmine	*Jasminum polyanthum*
kahili ginger; wild ginger	*Hedychium gardnerianum*
kikuyu	*Pennisetum clandestinum*
loquat	*Eriobotrya japonica*
lotus	*Lotus pedunculatus*
macrocarpa	*Cupressus macrocarpa*
maritime pine	*Pinus pinaster*
Mexican daisy	*Erigeron karvinskianus*
Mexican devil	*Ageratina adenophora*
montbretia	*Crocosmia* x *crocosmiiflora*
narrow-leaved plantain	*Plantago lanceolata*
Norfolk pine	*Araucaria heterophylla*
pampas	*Cortaderia selloana*
paspalum	*Paspalum dilatatum*
periwinkle	*Vinca major*
poplar	*Populus* sp.
radiata pine	*Pinus radiata*
saltwater paspalum	*Paspalum vaginatum*
selaginella	*Sellaginella kraussiana*
sharp rush	*Juncus acutus*
silver birch	*Betula pendula*
soft rush	*Juncus effusus*
spartina	*Spartina alterniflora*
Tasmanian blackwood	*Acacia melanoxylon*
three-cornered garlic	*Allium triquetrum*
tradescantia	*Tradescantia fluminensis*
tree privet	*Ligustrum lucidum*
tutsan	*Hypericum androsaemum*
umbrella sedge	*Cyperus eragrostis*
velvet groundsel	*Senecio petasitis*
willow	*Salix* spp.
willow weed	*Polygonum* sp.
willow-leaved hakea	*Hakea salicifolia*
woolly nightshade	*Solanum mauritianum*
Yorkshire fog	*Holcus lanatus*

8.7 CHECKLIST OF FAUNA SPECIES IN OTAMATEA ECOLOGICAL DISTRICT (NORTHLAND CONSERVANCY)

Checklist compiled by the authors and Ray Pierce (Wildland Consultants Ltd). Ornithological Society of New Zealand (OSNZ) records are from Crockett (comp.) (1992–2004). Department of Conservation Sites of Special Biological Interest (SSBI) database records are cited using the SSBI site number.

PL = Present in large numbers (>100 present in study area at one time in last 15 years)

P = Present in small numbers (<100 present in study area at one time in last 15 years)

R = Recorded (<10 present in study area at one time in last 15 years)

E = Not recorded in last 15 years, though previous records exist; presumed locally extinct

MAMMALS		HARBOUR/ ESTUARY	MAINLAND
Native			
Arctocephalus forsteri	kekeno; New Zealand fur seal	P	
Introduced (feral)			
Capra hircus	goat		PL
Erinaceus europaeus	European hedgehog		PL
Felis catus	cat		PL
Lepus europaeus	brown hare		P
Mus musculus	kiore-iti; house mouse		PL
Mustela erminea	stoat		PL
Mustela furo	ferret		P
Mustela nivalis	weasel		P
Oryctolagus cuniculus	European rabbit		P
Rattus norvegicus	Norway rat		PL
Rattus rattus	ship rat		PL
Sus scrofa	pig		P
Trichosurus vulpecula	brushtail possum		PL
BIRDS			
Native			
Anarhynchus frontalis (OSNZ)	wrybill; ngutuparore	P	
Anas gracilis	grey teal; tete		P
Anas rhynchotis (SSBI Q08/H031)	Australasian shoveler; kuruwhengi		R
Anas superciliosa ssp. *superciliosa*	grey duck; parera		P
Anthus novaeseelandiae	New Zealand pipit		P
Apteryx mantelli	North Island brown kiwi		E?
Ardea novaehollandiae	white-faced heron	P	PL
Arenaria interpres (OSNZ)	turnstone	P	
Botaurus poiciloptilus	Australasian bittern; matuku		E
Bowdleria punctata ssp. *vealeae*	North Island fernbird; matata		R
Bubulcus ibis	cattle egret		R
Calidris canutus	lesser knot; huahou	PL	
Charadrius bicinctus ssp. *bicinctus*	banded dotterel; tuturiwhatu	P	
Charadrius obscurus ssp. *aquilonius*	northern New Zealand dotterel; tuturiwhatu	P	

BIRDS		HARBOUR/ ESTUARY	MAINLAND
Native			
Chrysococcyx lucidus ssp. *lucidus*	shining cuckoo; pipiwharauroa		PL
Circus approximans	Australasian harrier; kahu		PL
Egretta alba ssp. *modesta* (Veitch 1979)	white heron; kotuku		E?
Egretta garzetta (Veitch 1979)	little egret		E?
Egretta sacra ssp. *sacra* (OSNZ)	reef heron; matuku-moana	R	R
Eudyptula minor ssp. *iredalei*	northern little blue penguin; korora	P	
Gallirallus philippensis ssp. *assimilis* (Wildland Consultants Ltd 2004)	banded rail; moho-pereru	R	
Gerygone igata	grey warbler; riroriro		PL
Haematopus ostralegus	pied oystercatcher; torea	PL	
Haematopus unicolor (OSNZ)	variable oystercatcher; torea; toreapango	P	
Hemiphaga novaeseelandiae	kukupa; New Zealand pigeon		PL
Himantopus himantopus ssp. *leucocephalus*	pied stilt; poaka	PL	PL
Himantopus novaezelandiae (OSNZ)	black stilt; kaki	R	
Hirundo tahitica ssp. *neoxena*	welcome swallow		PL
Larus dominicanus ssp. *dominicanus*	black-backed gull; karoro	PL	P
Larus novaehollandiae ssp. *scopulinus*	red-billed gull; tarapunga	P	P
Limosa lapponica	bar-tailed godwit	PL	
Morus serrator	Australasian gannet; takapu	P	
Nestor meridionalis ssp. *septentrionalis* (Richard Gillies, pers. comm.)	North Island kaka		R
Ninox novaeseelandiae	morepork; ruru		P
Phalacrocorax carbo ssp. *novaehollandiae*	black shag; kawau	P	P
Phalacrocorax melanoleucos ssp. *brevirostris*	little shag; kawaupaka	PL	PL
Phalacrocorax sulcirostris (OSNZ)	little black shag	R	
Phalacrocorax varius ssp. *varius*	pied shag; karuhiruhi	PL	PL
Platalea regia	royal spoonbill; kotuku-ngutupapa		R
Porphyrio porphyrio ssp. *melanotus*	pukeko		PL
Porzana pusilla ssp. *affinis*	marsh crake; koitareke	E	E
Porzana tabuensis ssp. *plumbea*	spotless crake; puweto	E	E
Prosthemadera novaeseelandiae ssp. *novaeseelandiae*	tui		P
Rhipidura fuliginosa ssp. *placabilis*	North Island fantail; piwakawaka		PL
Stercorarius parasiticus	Arctic skua	R	
Sterna albostriata	black-fronted tern; tarapiroe	R	
Sterna caspia	Caspian tern; taranui	P	
Sterna nereis ssp. *davisae*	New Zealand fairy tern	R	
Sterna striata ssp. *striata*	white-fronted tern; tara	P	
Tadorna variegata	paradise shelduck; putangitangi		PL
Todiramphus sanctus	kingfisher; kotare		PL
Vanellus miles	spur-winged plover	P	PL
Zosterops lateralis	silvereye; tauhou		P
Introduced			
Acridotheres tristis	myna		PL
Alauda arvensis	skylark		P
Anas platyrhynchos	mallard		PL
Callipepla californica	California quail		PL

BIRDS		HARBOUR/ ESTUARY	MAINLAND
Introduced			
Carduelis carduelis	goldfinch		P
Carduelis chloris	greenfinch		P
Carduelis flammea	redpoll		P
Cygnus atratus	black swan		PL
Emberiza citrinella	yellowhammer		PL
Fringilla coelebs	chaffinch		PL
Gymnorhina tibicen	Australian magpie		PL
Passer domesticus	house sparrow		PL
Pavo cristatus	peafowl		PL
Phasianus colchicus	pheasant		PL
Platycercus eximius	eastern rosella		P
Prunella modularis	dunnock; hedge sparrow		P
Sturnus vulgaris	starling		PL
Synoicus ypsilophorus	brown quail		P
Turdus merula	blackbird		PL
Turdus philomelos	song thrush		PL

REPTILES[21]		HARBOUR/ ESTUARY	MAINLAND
Native			
Cyclodina aenea	copper skink		R
Cyclodina ornata	ornate skink		R
Naultinus elegans elegans	Auckland green gecko		R

FISH[22]		HARBOUR/ ESTUARY	MAINLAND
Native			
Aldrichetta forsterii	yelloweyed mullet	PL	
Anguilla dieffenbachii	long-finned eel	P	P
Anguilla australis	short-finned eel	P	P
Galaxias fasciatus	banded kokopu	P	P
Galaxias maculatus	inanga	P	P
Gobiomorphus basalis	Cran's bully		P
Gobiomorphus cotidianus	common bully	P	P
Gobiomorphus gobioides	giant bully	P	P
Gobiomorphus huttoni	redfin bully	P	P
Mugil cephalus	grey mullet	P	
Retropinna retropinna	common smelt	P	P
Introduced			
Cyprinus carpio	European (koi) carp		P
Gambusia affinis	mosquitofish		PL
Scardinius erythrophthalmus	rudd		R

[21] All reptile records are from the DOC Bioweb Herpetofauna Database.

[22] All fish records are from NIWA (2006).

FRESHWATER INVERTEBRATES		HARBOUR/ ESTUARY	MAINLAND
Parenephrops planifrons	koura; freshwater crayfish		PL

LANDSNAILS[23]	HARBOUR/ ESTUARY	MAINLAND
Amborhytida dunniae (Brook, pers. comm.)		R
Austroiotula arewa		R
Basimocella 'Nth maculata'		R
Delos coresia		R
Egestula egesta		R
Flammulina perdita		R
Mocella eta		R
Phenacohelix giveni		R
P. pilula		R
Phrixgnathus moellendorffi		R
Paralaoma caputspinulae		R
Sinployea parva		R
Therasiella cehnde		R
Thalassohelix ziczag		R
Tornatellides subperforata		R
Tornatellinops novoseelandica		R

[23] All landsnail species, except for *Amborhytida dunniae,* were recorded in 1993 by R. Parrish on small, near-shore islands off Hukatere and Puketotara Peninsulas, (SSBI Q08/H056, Q09/H020, Q09/H019, Q08/H057).

8.8 GLOSSARY OF TERMS

Biodiversity
The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

Buffer
A zone surrounding a natural area which reduces the effects of external influences on the natural area. For example, shrubland or exotic plantations surrounding an indigenous remnant provide physical protection to it by reducing changes in wind and light, reducing the chance of weed infestation and providing a corridor for the movement of wildlife into and out of it, so that it is less isolated. Vegetation is often considered a buffer to waterways—riparian vegetation and wetlands protect both water quality and habitat from influences arising on the surrounding land.

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

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

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

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

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

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

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

Exotic
Introduced to New Zealand; not indigenous.

Forest
Woody vegetation in which the cover of trees and shrubs in the canopy is > 80% and in which tree cover exceeds that of shrubs. Trees are woody plants > 10 cm diameter at breast height (dbh) and shrubs are woody plants < 10 cm dbh. Tree ferns > 10 cm dbh are treated as trees (Atkinson 1985).

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

Hemiparasite
A parasite which lives on and derives part of its nourishment from its host, but also conducts photosynthesis, for example mistletoe species and mida.

Indigenous
Native to New Zealand. This includes species which occur naturally in New Zealand *and* other places (e.g. migratory bar-tailed godwits which return to New Zealand from Siberia every summer). Species which only occur in New Zealand are 'endemic'.

Landform
A part of the land's surface with distinctive naturally formed physical characteristics e.g. hillslope, gully, ridge top, etc.

Linkages/Corridors
An area of habitat which links two or more other habitat areas. Depending on the habitat type, this a linkage or corridor can comprise indigenous vegetation (e.g. forest, shrubland), exotic vegetation (e.g. pine forest), aquatic habitat (e.g. a farm pond) or any other feature which assists the movement of indigenous species between habitat patches. Where a linkage exists between habitats the opportunities for genetic exchange within a species are greater, which enhances the viability of that population. For many species, in particular mobile fauna such as birds, a corridor does not have to be continuous to be utilisable. Small remnants can act as stepping stones between two larger habitats.

Locally uncommon
Plants that are considered rare within Otamatea ED (Northland) which are either naturally uncommon or have become uncommon due to loss of habitat and modification.

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

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

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

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

Reedland
Reedlands comprise 20–100% cover of reeds, which are tall erect herbs emergent from shallow water, having branched leaves or stems that are either hollow or have very spongy pith, e.g. raupo, *Baumea articulata* and lake clubrush (Johnson & Gerbeaux 2004, adapted from Atkinson 1985).

Regionally significant
Assessed by the Department of Conservation (Northland Conservancy) to be either rare or threatened within the Northland Region.

Representativeness
The extent to which an area represents or exemplifies the components of the natural diversity of a larger reference area (in this case, the reference area is the part of Otamatea ED which falls within Northland Conservancy boundaries). This implies consideration of the full range of natural ecosystems and landscapes that were originally found in the reference area and how well they are represented in today's environment. The reference period for 'original' land cover used for this study was the immediate pre-human era (late Holocene).

The identification and evaluation of the key representative natural areas in all Ecological Districts is the principal objective of the PNA Programme (Myers *et al.* 1987).

Riparian protection
Riparian vegetation performs important protective functions to streams such as shading, sediment control, primary production and provision of habitat linkages/corridors. Without riparian protection water temperature can rise depleting the available oxygen and leading to the death of aquatic life. Leaf litter and woody debris enters into the nutrient cycle of the stream providing food for the first consumer in the food web, e.g. mayflies, caddisflies and stonefly. Riparian vegetation acts as a filter for non-point source water discharges.

Rushland
Rushlands comprise 20–100% cover of rushes, which are *Juncus* spp. that have stiff, erect stems or similarly non-flattened leaves (Johnson & Gerbeaux 2004, adapted from Atkinson 1985).

Scrub
Refers to early successional communities dominated by or with a > 50% component of exotic species such as gorse, woolly nightshade, hakea, wilding pine etc. This definition differs from Atkinson (1985), in which scrub is structurally defined rather than compositionally defined. In this study, scrub refers to vegetation dominated by exotic species. Low woody vegetation in which the indigenous component is > 50% is termed 'shrubland'.

Secondary vegetation
Indigenous vegetation established after destruction or disturbance of the previous vegetation and which is essentially different from the original vegetation.

Shrubland
Vegetation in which the cover of shrubs and trees in the canopy is > 80% and in which shrub cover exceeds that of trees. Trees are woody plants > 10 cm diameter at breast height (dbh) and shrubs are woody plants < 10 cm dbh. Tree ferns > 10 cm dbh are treated as trees. This definition includes both 'scrub' and

'shrubland' cf. Atkinson (1985). These had to be amalgamated, as 'scrub' adopts another meaning in this study.

Site
An area of habitat or habitats identified during the field survey phase of the PNAP. Some small habitats occurring in close geographical proximity, with similar characteristics and functions, have been grouped and addressed as one site, e.g. small forest remnants and farm ponds in the within same catchment.

Succession
Succession is the dynamic process whereby one plant community changes into another, involving the immigration and local extinction of species, coupled with changes in the relative abundance of different plants (Crawley 1997). Change may be due to natural or human-induced factors, or both. Primary succession refers to the colonisation of a bare surface by vegetation (e.g. the greening of new volcano after it erupts out of the sea). Secondary succession refers to the process of colonisation and change after original vegetation has been destroyed, e.g. by fire, human-induced land clearance etc.

Successional
Describes a plant community in the process of succession.

Survey no.
A sequential number given to each site (e.g. Q09/001). The first letter and two figures refer to the NZMS 260 topographical map sheet which covers the site.

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

Treeland
Vegetation in which the cover of trees in the canopy is 20–80%, with tree cover exceeding that of any other growth form, and in which the trees form a discontinous upper canopy above either a lower canopy of predominantly non-woody vegetation or bare ground (Atkinson 1985), e.g. 'totara treeland' refers to a common type in Otamatea ED Northland in which sparse totara trees form the canopy over an understorey of mainly exotic grasses. Treeland is mainly induced by grazing.

Vegetation type
The most detailed vegetation descriptive name, defined by the composition of dominant canopy species, in order of abundance (e.g. taraire–puriri–kahikatea) and the structure of the vegetation e.g forest, treeland, shrubland, reedland, etc.

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

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

9. Index of sites

Site	Level	Survey no.	Page
Arapaoa River	1	Q08/084	79
Arapaoa River Scenic Reserve and Surrounds	1	Q08/131	143
Ararua Road Forest Remnants	1	Q08/099	105
Awakino Creek Forest and Wetland	2	Q08/113	321
Awaroa Creek Coastal Forest Remnants	2	Q08/162	345
Barton's Hill Forest	1	Q08/137	150
Batley Road Coastal Forest Remnants	2	Q08/142	335
Batley Road Riparian Forest Remnants	2	Q08/155	341
Bayer Road Shrubland	1	Q08/211	225
Beatson Road Forest Remnant	2	Q08/181	358
Bickerstaffe Airstrip Forest	2	Q08/154	340
Bickerstaffe Forest and Shrubland	1	Q08/153	170
Bickerstaffe Rail Station Forest	1	Q08/152	169
Bickerstaffe Railbridge Forest Remnants	1	Q08/149	165
Bickerstaffe Road Forest 1	2	Q08/150	338
Bickerstaffe Road Forest 2	1	Q08/148	163
Bickerstaffe Road Forest 3	2	Q08/203	377
Brynderwyn Farm Pond	1	Q08/066	66
Brynderwyn Road Forest Remnants	1	Q08/067	68
Bushy Point Forest Remnants	1	Q09/046	284
Chadwick Road Forest Remnants	2	Q08/097	311
Chadwick Road Wetland	2	Q08/180	357
Collins Scenic Reserve and Surrounds	1	Q08/078	73
Doctor Hill Road Forest Remnants	2	Q08/070	293
Dodd Road Forest Remnants	2	Q08/075	299
Donaldson's Forest	1	Q08/157	174
East Pahi Forest Remnants	2	Q08/106	316
Eastern Boundary Forest (Carter Holt Harvey)	1	Q08/214	228
Ford Road Forest	2	Q08/114	322
Frenchman's Bay Forest and Wetland	2	Q09/015	402
Gittos Point Forest and Shrubland	1	Q09/032	268
Griffin Road Forest Remnants	2	Q08/172	350
Hames Road Forest Remnants	1	Q08/124	133
Hamlin Road Shrubland	1	Q08/188	209
Hanerau Stream Forest Remnants	1	Q08/218	232
Hartles QEII Covenant and Surrounds	2	Q08/104	315
Hautakima East Forest	2	Q08/086	310
Hautakima South Forest	1	Q08/088	84
Hillstone Road Forest Remnant 2	2	Q08/207	383
Hillstone Road Forest Remnants 1	2	Q08/204	378
Hillstone Road Forest Remnants 3	1	Q08/208	221
Hokorako Creek Forest Remnants	2	Q08/136	330
Hook Road Forest Remnants	2	Q08/123	326
Huarau Airstrip Forest	2	Q08/125	328
Huarau Ridge Forest Remnants	1	Q08/200	219
Hukatere North Forest	1	Q08/087	82
Hukatere Peninsula West Coast	1	Q08/096	101
Hukatere Scenic Reserve and Surrounds	1	Q08/081	77
James Road Forest	1	Q08/147	161
Kaipara Forest, Puketotara	1	Q09/026	259
Kaira Creek Forest	1	Q09/029	265
Kaira Creek Pond 1	2	Q08/193	367
Kaira Creek Pond 2	2	Q08/197	370
Kaitara Constructed Lake	1	Q08/159	177
Kaitara Creek Forest Remnants	1	Q08/196	216
Kaiwhitu Island	1	Q08/175	196
Karakanui Road Forest Remnants	2	Q08/187	363
Kirikiri Creek Forest and Wetlands	1	Q08/091	90

Site	Level	Survey no.	Page
Kirk Road Forest Remnants	2	Q08/077	302
Koareare Creek Forest Remnants	1	Q09/036	272
Kohatutahi Forest and Wetland	1	Q08/178	198
Komiti Bay Forest Remnant	2	Q09/048	419
Kowhai Road Kanuka Forest	2	Q08/082	305
Kowhai Road Matai–Kahikatea Remnant	1	Q08/064	63
Kumete Bluff Forest Remnants	1	Q09/047	286
Linton Road West Forest	1	Q08/134	146
Lower Pahi River Forest Remnants	1	Q08/103	110
Lower Pukeareinga Forest Remnants	1	Q08/061	56
Mangaiti Creek Forest Remnants	1	Q08/167	186
Marohemo Road Forest Remnant 3	2	Q08/206	381
Marohemo Road Forest Remnants 1	2	Q08/201	373
Marohemo Road Forest Remnants 2	2	Q08/202	375
Massey Creek Forest	1	Q08/129	140
Massey Road Corner Forest	2	Q08/133	329
Massey Road Point Forest Remnants	2	Q08/184	360
Matakohe River Bridge Forest Remnants	2	Q08/101	313
Matakohe West Forest Remnants	2	Q08/080	304
Maungaturoto Marginal Strip and Surrounds	2	Q08/068	292
Maungaturoto Town Forest	2	Q08/199	372
Mohinui Forest Remnant 1	1	Q08/169	189
Mohinui Forest Remnant 2	2	Q08/189	364
Mohinui Forest Remnant 3	1	Q08/190	211
Mohinui Forest Remnant 4	1	Q09/044	281
Mooney QEII Covenant	1	Q08/111	119
Mooney Road Forest Remnant	2	Q08/112	319
Motukumara Point Forest Remnants	2	Q09/007	394
Motuouhi Island	1	Q09/014	245
Moturoa Island	1	Q09/013	244
Mud Alley Road Wetland	2	Q08/213	385
Nathan Road Forest and Shrubland	1	Q08/198	218
Ngamotu Farm Pond	2	Q09/031	410
Ngaupiko Point Forest Remnant	2	Q08/141	334
North Maungaturoto Forest Remnants	1	Q08/069	69
North Whakapirau Forest Remnant	1	Q08/107	114
Oneriri Pa Forest	1	Q09/027	261
Oneriri Road Forest Remnant 1	2	Q09/040	415
Oneriri Station Homestead Forest Remnants	1	Q09/022	256
Oruawharo River Forest Remnant 1	2	Q09/042	418
Oruawharo River North Coast	1	Q09/020	250
Oruawharo Road Stream	1	Q08/209	223
Oruawharo Road Wetland	2	Q08/210	384
Oruawharo School Forest	1	Q09/033	270
Otairi Creek Forest and Wetland	2	Q08/191	366
Otaiwhata Bay Forest and Shrubland	1	Q09/049	288
Otamatea River	1	Q08/062	58
Otamatea River Confluence	1	Q09/021	253
Otara Head Forest and Shrubland	1	Q08/063	61
Otuhianga Coastal Forest Remnants	1	Q08/194	214
Otuhianga Hill Forest	1	Q08/065	64
Owhareao Point Remnants	1	Q08/179	200
Owhei Creek Forest Remnants	2	Q08/168	348
Page Point Forest and Shrubland	1	Q08/140	153
Pahi Coastal Strip	1	Q08/105	112
Pahi River Headwaters	1	Q08/170	190
Pakaurangi Forest and Shrubland	1	Q08/185	206
Paparoa Creek Marginal Strip No. 1 and Surrounds	2	Q08/217	387
Paparoa Creek Marginal Strip No. 2 and Surrounds	1	Q08/102	108
Paparoa Creek Scenic Reserve and Surrounds	1	Q08/108	116
Paparoa Mature Kauri Stand	1	Q08/122	131
Paparoa Stream Headwaters	1	Q08/110	117
Paparoa Stream Riparian Forest	1	Q08/121	129

Site	Level	Survey no.	Page
Parry Road Wetland	1	Q08/215	229
Payne Road Forest Remnants	1	Q08/192	212
Piroa Farm Pond	2	Q08/073	297
Piroa Peak Forest Remnants	2	Q08/174	352
Piroa Road Forest Remnant 1	2	Q08/071	295
Piroa Road Forest Remnants 2	1	Q08/072	71
Point Curtis Road Coastal Forest Remnants	1	Q08/156	172
Pukehau QEII Covenant	1	Q08/182	203
Pukehuia Forest Remnants	1	Q08/115	121
Puketotara Forest Remnant 1	2	Q09/002	390
Puketotara Forest Remnant 11	2	Q09/018	404
Puketotara Forest Remnant 12	2	Q09/023	407
Puketotara Forest Remnant 13	1	Q09/024	258
Puketotara Forest Remnant 14	2	Q09/025	408
Puketotara Forest Remnant 15	1	Q09/045	282
Puketotara Forest Remnant 4	1	Q09/008	242
Puketotara Forest Remnant 6	2	Q09/010	397
Puketotara Forest Remnant 9	1	Q09/016	247
Puketotara Forest Remnants 10	1	Q09/017	249
Puketotara Forest Remnants 2	1	Q09/005	238
Puketotara Forest Remnants 3	1	Q09/006	240
Puketotara Forest Remnants 5	2	Q09/009	396
Puketotara Forest Remnants 7	2	Q09/011	399
Puketotara Forest Remnants 8	2	Q09/012	400
Pupuia Island	2	Q08/177	355
Puriri Point Forest and Shrubland	1	Q08/183	204
Quarry Forest	1	Q08/090	88
Raepare Creek Headland Forest	1	Q08/145	157
Raepere Creek Coastal Forest	1	Q08/098	103
Raepere Creek Forest	1	Q08/094	97
Rangiora Road Forest Remnants	1	Q08/166	185
Rotokiekie Creek Forest Remnants	1	Q08/161	179
Ruataniwha Forest Remnant	1	Q09/030	266
Smith's Point and Mateotetawa Creek Forest Remnants	1	Q08/079	75
South Hokorako Creek Forest Remnant	2	Q08/143	337
South Massey Road Forest Remnants	1	Q08/130	141
Stony Creek Forest Remnants	2	Q09/003	391
Stony Creek Headland	2	Q09/004	393
Tahupo Creek Coastal Forest Remnants	2	Q08/186	361
Takahoa Creek Forest	1	Q08/163	181
Takahoa Government Purpose Wildlife Management Reserve	1	Q08/164	183
Tana Road Forest Remnant	2	Q08/195	369
Te Kiakia Bay Forest Remnants	1	Q08/093	94
Te Kowhai Creek Forest Remnant	2	Q08/139	332
Te Kowhai Creek Scenic Reserve and Surrounds	1	Q08/132	145
Te Mira Road Wetland	1	Q08/212	226
Te Ope Headland Forest	1	Q08/119	126
Te Ope Stream Remnants	1	Q08/116	123
Te Opi Road Forest Remnants	2	Q08/118	324
Te Opu Scenic Reserve	1	Q08/126	134
Te Pahi River Road Forest Remnants	1	Q08/120	128
Te Ruruku Bay Forest Remnants	1	Q08/089	86
Te Taumataka Creek Forest Remnants	2	Q08/085	308
Te Tawhiti Forest Remnants	1	Q08/144	155
The Funnel Pohutukawa Fringe	1	Q09/043	279
Timber Bay Forest	1	Q09/001	235
Tinopai Coastal Margin	2	Q09/019	405
Tinopai Road Wetland	1	Q08/216	231
Titipu Island	2	Q08/176	353
Topuni River Confluence Forest	1	Q09/038	276
Topuni River Forest Remnant 1	1	Q09/037	274
Topuni River Forest Remnant 2	2	Q09/041	416
Totara Creek Forest Remnant	1	Q08/095	99

Site	Level	Survey no.	Page
Unnamed Island in Kaiwaka River	1	Q08/158	176
Unnamed Island in Oruawharo River	2	Q09/035	413
Upper Ahuroa River Forest Remnants 1	2	Q08/076	301
Upper Ahuroa River Forest Remnants 2	2	Q08/074	298
Upper Kaitara Creek Pond	2	Q08/219	388
Upper Pahi River Riparian Forest	1	Q08/138	152
Upper Pahi River Scenic Reserve, Rabbit and Goat Island and Surrounds	2	Q08/109	318
Upper Paparoa Creek Scenic Reserve and Sherwin QEII Covenant	1	Q08/100	106
Upper Raepare Creek Forest Remnants	2	Q08/160	343
Upper Wairau River Coastal Forest Remnants	1	Q08/151	167
Upper Whakaki River Forest Remnants	1	Q09/028	263
Upper Whakapirau Creek	2	Q08/205	380
Wahiwaka Creek Forest Remnants	1	Q08/146	159
Waiarohia Creek Forest and Wetland	2	Q08/165	346
Waihungaru Stream Forest	2	Q08/083	307
Wainonororo Constructed Lake	1	Q09/039	277
Waipikopiko Stream Headwaters	1	Q08/171	192
Wairau River Riparian Forest Remnants	1	Q08/173	194
Waitieke Creek Forest	1	Q08/092	92
Whakapirau Airstrip Forest	1	Q08/117	125
Whakapirau Creek Coastal Forest	1	Q08/127	136
Whakapirau Creek Conservation Area and Surrounds	1	Q08/220	234
Whakapirau River Scenic Reserve and North Massey Road Forest Remnants	1	Q08/128	138
Whakapirau/Rocky Point Forest and Shrubland	1	Q08/135	148
Wiki Brown Road Forest Remnants	2	Q09/034	411