Executive Summary

Background

The Natural Environment and Ecology Technical Report collates existing information on the ecological values of indigenous biotic communities and natural coastal processes along the Wairarapa coastline. The report defines a coastal zone for ecological purposes and identifies the relative significance of indigenous ecological sites within this area. The report identifies their location, and present and future pressures or threats to ecological values. General statements are made about the degree to which indigenous ecological values are represented in each of the ecodomains (refer to WRC Ecodomain Delineation for the Wellington Region 2001, Section 3.3) and their quality. The report also makes recommendations as to what sorts of responses are available to protect or enhance these values.

Assessment

A coastal zone was determined on ecological grounds. This varied from the draft inland study boundary proposed by Wairarapa Coastal Strategy Group (WCSG), with the ecological inland boundary in many places being closer to the coast and at lower altitude in many places.

Based on field reconnaissance, 101 individual sites were designated as being “sites of ecological significance”. Excluded from assessment were sites comprising a primary successional sere, which might include vegetation up to 4 metres tall (unless the context was a naturally dynamic environment which would be expected to continually recolonise).

Sites were mapped within a framework of Ecodomains in order to compare sites being influenced by similar environmental factors. Each site was ranked extreme, high or moderate significance according to significance criteria for four aspects: ‘old’ (continuum) vegetation associations, ‘new’ (recolonising) vegetation associations, wildlife habitat and physical coastal process (such as dune building). Significance Rankings are recorded in Schedule 1.

Sites were cross-referenced with the Department of Conservation ECOLSITES database for further information and tenure information.

Results

The best represented indigenous habitats are those of foreshore (duneland, soft cliffs, hard rock cliffs), or perched wetlands which, although generally degraded, retain valuable biotic communities and hydrological processes. These are also the best protected sites.

Almost absent beyond the boundaries of Rimutaka and Aorangi Forest Parks, are primary coastal forest or scrub remnants on coastal terraces or foothills.

Estuarine environments including sand bars, are in poor condition due to grazing, vehicular access and/or are associated with settlements that place great pressures on wildlife.

A qualitative summary of the distribution and quality of significant sites (shown in the table below) shows the uneven distribution of indigenous character along the Coastal Zone (refer to full version of this table in section 3.5). The degree to which indigenous character is expressed along the Wairarapa coastal zone is generally only low to moderate.

All sites ranked extreme and high significance require action to sustain or improve their ecological quality. Sites ranked moderate should not be allowed to deteriorate. Priority should be given to those sites which are threatened by immediate activities or land use changes, or which are the most intrinsically vulnerable sites.

	Parent Ecodomain	Extent of significant areas 0 - 10% LOW 11 - 20% MODERATE 21 - 50% HIGH 51 - 100% EXTREME	Indigenous Character: takes into account how well the ecodomain's landform classes are represented, the significance ranking of the site and the percentage of the ecodomain with significant sites
TH	Turakirae Head (part of a discontinuous domain including CPE)	HIGH (38%)	**HIGH**
OB	Ocean Beach	HIGH (50%)	**MODERATE**
LF	Lake Ferry	HIGH (22%)	**HIGH**
WH	Whatarangi	MODERATE (20%)	**MODERATE**
TH-NG	Te Humenga – Ngawi	LOW (9%)	**LOW**
CPE	Cape Palliser (part of a discontinuous domain including TH)	HIGH (37%)	**EXTREME**
WR	White Rock	MODERATE (15%)	**LOW**
WR-HR	White Rk - Honeycomb Rk	MODERATE (14%)	WR-HR (a) **LOW-MODERATE** WR-HR (b) **MODERATE overall (HIGH between Tokorau Reef and Glendhu Rocks)** WR-HR (c) **LOW-MODERATE**
GL-FP	Glenburn - Flat Point	LOW (10%)	**LOW-MODERATE**
KA	Karaka Bay	LOW (3.6%)	**LOW**
KW-RV	Kaiwhata-Riversdale	HIGH (22%)	**MODERATE**
RV-CP	Riversdale-Castlepoint	LOW (7.5%)	**LOW**
CP	Castlepoint	HIGH (28%)	**EXTREME**
CP-MK	Castlepoint - Mataikona	LOW (9%)	CP-MK (a) **LOW** CP-MK (b) **LOW** CP-MK (c) **LOW**

Assessment of the vulnerabilities of sites and an understanding of the local communities emphasizes the need to:

Take into account the influence of surrounding land uses, structures and vegetation;

Determine the most appropriate form of buffering for the site rather than make generalised policies;

Change some long-term patterns of behaviour in particular with respect to vehicular access to the foreshore, and do this in ways that control the activities of visitors as well as locals;

Determine whether there is a community of interest that can take stewardship of sites rather than rely on individuals or on planning controls to achieve protection; and

Undertake research into, and monitoring of, the obvious threats facing fragmented populations and populations close to human habitation to contribute to guidance for planning controls.

Other summaries in the report identify that most of the unprotected sites are privately owned but many of them include esplanade reserve and road reserve, so the responsibility of site protection is often shared between landowners and the local authority.

As well as sites, a number of large areas were identified as being of great enough ecological interest to warrant integrated management that would benefit their indigenous ecosystem values. These are:

- Pahaoa (from Rerewhakaaitu River to Glendhu Rocks)
- Duneland between Waiorongo and Riversdale (including Uruti Point).

Acknowledgements

Boffa Miskell would like to acknowledge the assistance of the Wairarapa Coastal Strategy Group and in particular the staff who support the Group: Steve Blakemore, the Project Manager, Karen Williams and Helen Marr.

We would also like to express our appreciation and thanks to the landowners who allowed us to visit their properties and who provided assistance and hospitality whilst we were in the field. We also appreciate the informal and frank stakeholder comments and observations passed on to us with respect to coastal issues and opportunities.

Isobel Gabites of Boffa Miskell was responsible for the preparation of this report. Paul Hughes of Wellington Conservancy, Department of Conservation was particularly helpful with providing access to existing databases.

Boffa Miskell have enjoyed working with the Coastal Strategy Group and the key stakeholders on this interesting and challenging project. We hope our work assists the Coastal Strategy Group achieve its Vision for the Wairarapa Coast.

Table of contents

Chapter 1

Introduction

The purpose of the Wairarapa Coastal Strategy is to enable the community to establish a long-term integrated strategy to protect, manage and develop the coastal environment. The strategy has a long term planning horizon (looking towards our grandchildren's future), and the recommendations and outcomes of the strategy are intended to go beyond the scope of the Resource Management Act to encompass wider Council and community goals.

It is intended that this technical report will feed into subsequent documents such as the Issues and Options Paper, and the draft and final versions of the Coastal Strategy, as well as assist with various community consultation forums. This report is one of a series aimed at addressing key technical issues for the Strategy. Other technical reports include:

- Planning Context & Methods
- Landscape
- Heritage
- Built Environment & Infrastructure
- Access & Recreation
- Hazards
- Land Use & Development

The Coastal Strategy process is being undertaken by the Wairarapa Coastal Strategy Group, comprising the Masterton, Carterton, and South Wairarapa District Councils, the Wellington Regional Council, and local Iwi. This group formed after concerns that development was proceeding along the Wairarapa coast in an ad hoc and fragmented way. The development of the Wairarapa Coastal Strategy will span three calendar years, with most of the work occurring in 2002 and 2003 (refer Figure 1.1).

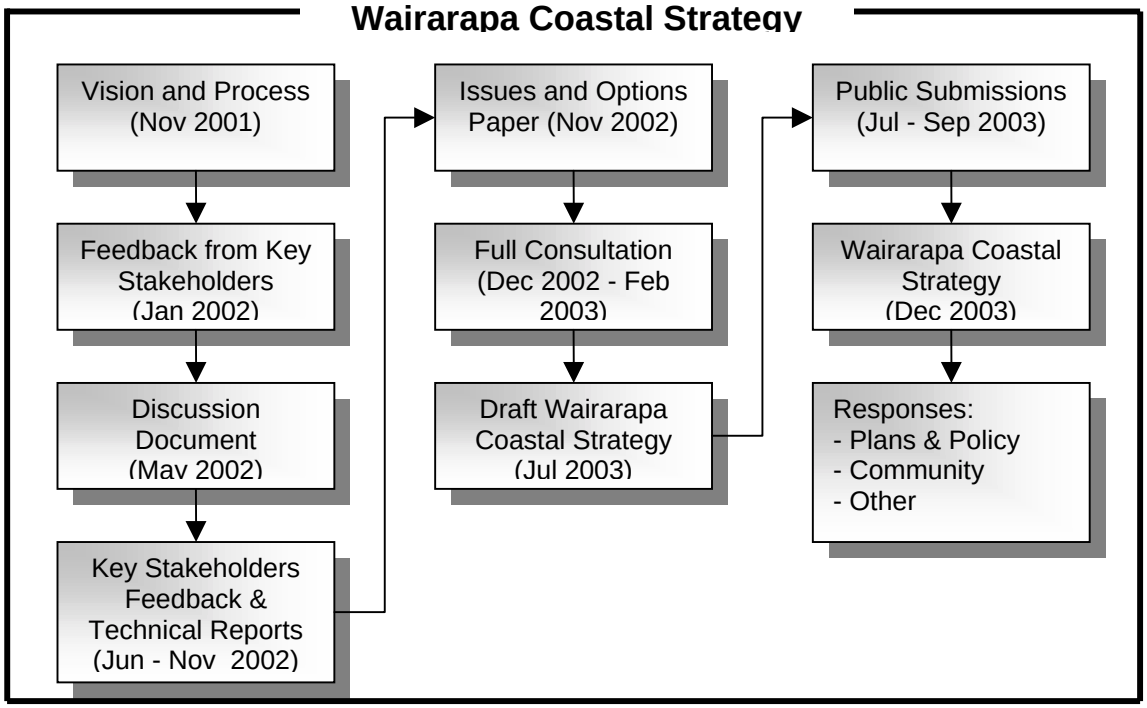


Figure 1.1: Wairarapa Coastal Strategy Process

A key issue for sustainable and integrated management is to minimise potential conflict between land uses and values on the coast such as natural character, landscape, natural ecosystems, cultural heritage and recreation. Likewise coastal land uses and values can be impacted upon by factors such as natural hazards (particularly erosion) and infrastructural constraints.

The purpose of this technical report is to collate existing information and undertake field assessments of the ecological values of indigenous biotic communities and natural coastal processes along the Wairarapa coastline. The report prescribes a coastal zone and identifies the relative significance of indigenous ecological sites within this area. The report identifies their location, present and future pressures or threats to ecological values, and makes recommendations as to what sorts of responses are available to protect these values.

General statements are made about the degree to which indigenous ecological values are represented in each of the ecodomains (refer to WRC Ecodomain Delineation 2001) within the coastal zone.

The assessment was undertaken by Boffa Miskell Limited and included rapid field reconnaissance during June to establish an understanding of context and condition of the identified sites, followed by correlation with existing information. Stretches of the coastline not visited were

- from Te Awaiti Station homestead north to Rerewhakaaiti Stream, and
- two kilometres south of Waiuru Stream, below Cattle peak.

Otherwise sites were either visited or sighted.

Chapter 2

Statutory Framework

2.1 Overview

Wairarapa's coastal environment is managed under a number of resource management planning instruments, ranging from broad level policy documents through to detailed prescriptive management controls.

This section provides a brief overview of the principal policy instruments, focusing on the policies for the management of coastal ecology.

2.2 Hierarchy of Policy Statements and Plans

While it is not strictly correct to describe the levels of policy statements and plans as a hierarchy, in that one document is not necessarily 'superior' to another, generally the more localised documents are required to be "not inconsistent" with the provisions of those documents that cover a larger area under the national-regional-district framework of the RMA.

For the Wairarapa, the policy framework is as follows:

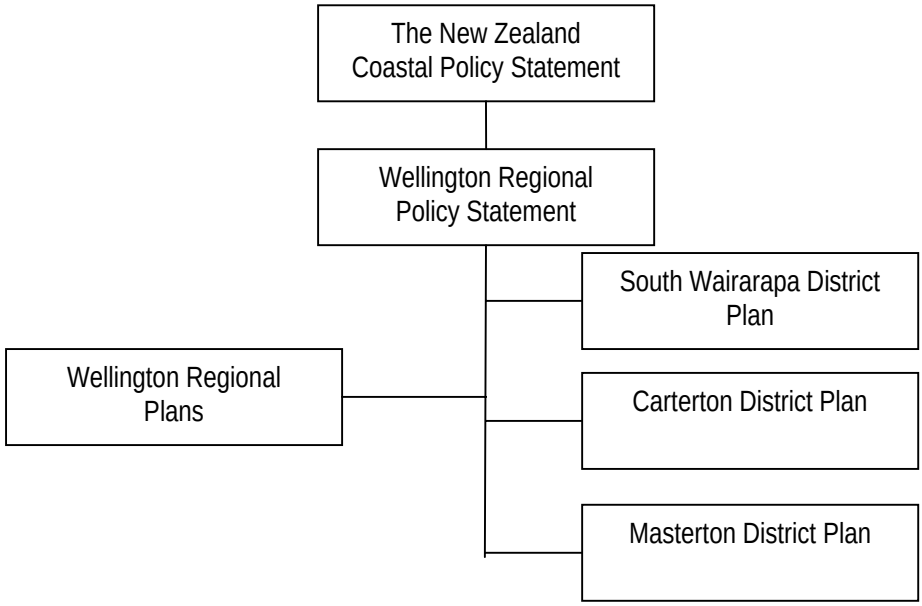


Figure 2.1 Policy framework

2.3 New Zealand Coastal Policy Statement

The New Zealand Coastal Policy Statement (NZCPS) was made operative in 1994, and is due for review in 2004, at which time the Minister of Conservation has to determine whether any changes will be made to the Policy Statement. To that end it is proposed to have the NZCPS independently reviewed in 2003, most likely by a review panel. The Department of Conservation has commenced a preliminary scoping process through consultation with local authorities to identify any deficiencies with the NZCPS. Thus, it would be opportune to raise any gaps or concerns with the implementation of the NZCPS within the Wairarapa during the review.

The Statement contains a number of policies that are of relevance for ecological management. These are generic in nature and apply to New Zealand's entire coastal environment, and are not targeted to any specific geographic area such as the Wairarapa.

The NZCPS directs that local authorities should identify those areas of significant values in a region or district and seek to protect them.

The Department of Conservation is responsible for ensuring that all policy statements and plans are not inconsistent with the NZCPS. Although there does not appear to be any specific inconsistency between the local District Plans since the implementation of the NZCPS, the recent approval of the proposed development of a small coastal development near Flat Point does raise some questions as to the actual implementation of the NZCPS at the district level.

2.4 Wellington Regional Policy Statement

The Wellington Regional Policy Statement (RPS) sets out the broad objectives and policies for the Wellington region, with which both regional and district plans must not be inconsistent. The provisions are relatively broad-based, and cover the coastal environment of the entire Wellington region.

(1) Coastal Management

Key principles underpinning the management of the coast under the RPS include:

Preserving the natural character of the coast;

Maintaining and enhancing public access to and along the coastal marine area;

Ensuring that coastal water quality is of a high standard; and

Providing opportunities for the aspirations of the tangata whenua to be met.

The RPS contains a number of key policies designed to provide guidance for district and regional plans for resource consent decisions to ensure that important aspects of the coastal environment are recognised and potential adverse effects are avoided, remedied or mitigated. Key coastal management policies relate to:

The protection of nationally or regionally significant indigenous vegetation and significant habitats for indigenous fauna;

The protection of the values associated with nationally or regionally outstanding landscapes, seascapes, geological features, landforms, sand dunes and beach systems and sites of historical or cultural significance;

Protection of sensitive, rare or unusual natural and physical resources, habitats, amenity values and ecosystems, which are unique to the coastal environment;

Protection of the integrity, functioning and resilience of the coastal environment.

It is noticeable that the Regional Policy Statement does not set out any specific policies for the Wairarapa coastline. Given that there is no regional plan for the landward side of the CMA in terms of regional landscape or ecological issues, the Regional Policy Statement would be the logical place for any specific policies managing the area's coastal environment, when it is next reviewed.

2.5 Wellington Regional Coastal Plan

The Wellington Regional Council has management responsibility for the coastal marine area below mean high water springs (MHWS). The management policies and controls are set out in the Regional Coastal Plan (RCP).

There are many objectives, policies and rules in the RCP that apply to the development and use of the coastal environment in the Wellington Region. Particular planning rules and controls relate to:

Reclamation and draining of foreshore and seabed

Structures

Destruction, damage or disturbance of foreshore or seabed

Deposition of substances on foreshore or seabed

Exotic or introduced plants

Discharges to land and water

Discharges to air

Taking, use, damming or diversion of water

Surface water and foreshore activities

The Plan identifies significant areas – an additional layer of controls come into play for these areas – see Policy 4.2.10 in the RCP.

While this report focuses on the landward side of the Coastal Marine Area (CMA), the management of activities within the CMA under the RCP needs to be adequately

coordinated with those for the land. For example, new structures within the CMA such as jetties can have a wider effect on the coastal landscape. Similarly, there is a strong inter-relationship between land and marine ecosystems.

2.6 District Plans

The district plan is the principal means of managing activities on the landward side of mean high water spring. The RPS must ensure that the management policies of the district plans for the coastal environment are coordinated through an integrated framework for the Wellington Region.

(1) South Wairarapa District

The South Wairarapa District has a coastline from the western end of Palliser Bay in Cook Strait to Honeycomb Rock, east of Martinborough, a distance of 124 kilometres.

The management of the District's coastal area and the protection of its natural areas are identified as key resource management issues under the District Plan.

The Plan contains five general coastal management objectives, which relate to the requirements of the RMA, with ten associated policies. The policies are primarily implemented by rules relating to the preservation of the natural character of the coastal environment and to the avoidance, remedy or mitigation of adverse effects from subdivision and land use activities.

The landward coastal margin of the District has been identified as a Coastal Protection Policy Area (*exclusive of coastal settlements*). The Plan states that parts of the coastline that fall within this area require specific planning control because of their intrinsic qualities of natural beauty, the land and water interface and the presence of natural resources. The Council's policy is to reserve control by way of discretionary activity status over most activities in the Coastal Protection Policy Area and to prohibit land uses that have potentially harmful effects.

The District Plan also identifies by schedule the significant indigenous vegetation, habitats and other features of the coastal environment to be protected and/or recognised.

The Plan provides a building restriction control where no building shall be erected within 30 metres of the MHWS (and margins of lakes, rivers, streams etc).

The District Plan requires esplanade strips wherever land adjoining the coast is subdivided. The Plan requires esplanade reserves for all new allotments, whether more or less than 4 hectares in area.

The District Plan also recognizes the importance of the natural environment and landscapes within the District. The Plan defines 'Natural Areas' of the District where land uses will be restricted and special provision will apply to removal of vegetation, land drainage and recontouring. The Plan contains a list of coastal landscapes of regional significance (as guided by the RPS) and establishes Policy Areas (Coastal, River, Corridors, Lake Wairarapa Wetlands and Natural Areas) where subdivision, use and development, which could have adverse effects, are discretionary activities.

(2) Carterton District

Key relevant management issues addressed by the Carterton District Plan include:

The effects of development on rural amenity.

The impacts of development on significant natural features and areas.

Recognising and protecting the Important Natural Areas and Features within the District.

Chapter 13, Natural Environment, addresses coastal, ecological and landscape issues. There is one key objective - *'Recognition and protection of important natural areas and features'* - and thirteen associated policies to achieve that objective.

In particular, the Plan provides a list of those natural features and areas of importance (contained in Appendix 13A). In the identified areas, different rules apply to the development and use of the land and associated resources. Activities to be undertaken within any area or feature identified are a discretionary activity except where listed as permitted or limited discretionary. Council's consideration of discretionary activities will be guided by the assessment criteria in the Plan.

The Plan also recognises a Coastal Management Area in which certain effects will need to be controlled to help reduce the effects of natural hazards on activities. In particular, development within 60 metres of MHWS is controlled.

Chapter 13 provides for the modification, damage, removal or destruction of up to 1000m^2 of indigenous vegetation within a five-year period. Any activity that does not meet that condition becomes a limited discretionary activity.

The assessment criteria for discretionary activities within the Rural Environment include "*whether any adverse effects on natural environment features and areas, the coastal environment, heritage features and areas of indigenous vegetation can be avoided…*".

Subdivision controls seek, inter alia, to "ensure any subdivision and development protects any identified heritage feature or natural environment feature as identified in Appendix 12A or 13A".

The Plan requires esplanade reserves for all new allotments along the coastal margins.

Under the Rural Environment rules, the Plan sets a building restriction of 60 metres from MHWS, and 20 metres from the margins of waterways.

(3) Masterton District

Key issues identified by the District Plan include access to resources of significant value, natural character of the coast, important landscapes, and significant natural resources.

The District is generally managed under two principal management areas – Urban and Rural – where subdivision, land use and development is managed according to an overall system of controls. However, in areas of the district in which there are specific environmental issues to address, *special management areas* have been developed to control the adverse effects of activities in those areas. These 'overlay' the general rules that apply to the area.

In addition, the Plan has identified natural resources and landscapes of significance, which are listed in the Schedule of Conservation Areas. Any activity that has the potential to cause adverse effects on a conservation area requires resource consent.

The coastal environment comes with a *special management area*, the Coastal Management Area, which is defined as being generally 1km inland from mean high water springs. The coastal resort areas of Castlepoint and Riversdale Beach are excluded from the Coastal Management Area, and are managed as urban management areas, with the same controls as for any other urban area.

The Coastal Management Area is encompassed within the Rural Management Area, but with special controls relating to coastal environmental issues relating to land use and subdivision. Activities in this area must comply with the general *and* with the rural environmental standards to be a permitted activity. Activities that do not comply require consent as a Discretionary Activity and would be considered against specific assessment criteria.

Under the Plan, controls (general development standard) on the removal of indigenous vegetation have been included within the Code to manage the removal or modification of stands of native forests and wetlands. These controls provide for, as a permitted activity, a limited amount of logging or clearance up to a certain threshold ($1000m^2$) within a 5-year period.

The Plan defines an area 20 metres wide required for esplanade reserves for new allotments under 4 hectares, and the requirement of an esplanade reserve for allotments in excess of 4 hectares.

A building restriction of 30 metres from MHWS is required in Castlepoint, with 60 metres required along the rest of coast except for Riversdale where there is a defined hazard line shown on planning maps.

The plan has no specific ecology or landscape sections.

Fig. 2.2 Summary of District Plan Provisions:

	Significant Resource Management Issues	Special Management Areas / Zone	Schedules / List of Significant Features	Relevant controls / development standards	Comments
South Wairarapa District Plan	~ The coastal area and the margins of rivers and lakes ~ Protection of the Natural Environment	~ Coastal Protection Policy Area - exclusive of Coastal Settlements ~ Landscape Policy Areas, including: River Corridors Lake Wairarapa Wetlands Natural Areas	~Plan also identifies the significant indigenous vegetation, habitats and other features of the coastal environment to be protected/and or recognized ~Districts ecology has been defined in four separate ecological regions. ~ List of coastal landscapes of regional significance contained in Appendix 10.	~ Council's policy is to reserve control by way of discretionary activity status over most activities in the Coastal Policy Area and to prohibit land uses, which have potentially harmful effects. ~ Rules in plan define 'Natural Areas' where land uses will be restricted and special provision will apply to removal of vegetation, land drainage and recontouring – most activities are either Controlled or Discretionary. ~ Rules will also be used to control these activities outside 'Natural Areas'. District Plan Rules – where subdivision, use and development that could have effects on the landscape are discretionary activities. ~ Outside Policy Areas, District Plan rules will be used to require resource consent for activities that have a potential to cause adverse effects. ~ Building Restrictions ~ Esplanade Reserves	~ Specific coastal management, natural environment, landscape protection, objectives and policies. ~ No specific controls relating to the removal of vegetation etc.
Carterton District Plan	~ Recognising and Protecting the Important Natural Areas and Features within the District	~ Coastal Management Area	~ Appendix 13A provides a list of natural features and areas of importance.	~ Activities to be undertaken within any area or feature identified in Appendix 13A are a discretionary activity except where listed as permitted or limited activity. ~ In Coastal Management Area certain effects will be controlled to help reduce the effects of natural hazards. ~ Building Restrictions ~ Esplanade Reserves	~ Groups all natural features (the coast and associated dunes rivers and associated corridors and wetlands, native vegetation) in the one section.
Masterton District Plan	~ Land Resources ~ Access to Resources of Significant Value ~ Natural Character of the Coastal Environment ~ Important Landscapes ~ Significant Natural Resources	~ General Management Area – 'urban' and 'rural'. Urban includes coastal resorts at Castlepoint and Riversdale. ~ Coastal Management Area Conservation Areas	~ Conservation ~ Coastal Marine Areas ~ Notable Trees ~ Protected Trees ~ Significant Plant Species	~ General Management Areas All activities subject to controls and general development standards (general standards include control on the removal of indigenous vegetation). More specific controls relate to subdivision, water resource, natural hazards, heritage, and conservation areas. ~ Coastal Management Area Any activity shall comply with general and rural environmental standards !~ Building Restrictions ~ Esplanade Reserves	~ No explicit section of rules / standards relating to the coast, landscape or ecology.

Chapter 3

Resource Inventory

3.1 Coastal Character

Coastal Character can be said to comprise a number of components. Heritage values, social values, built character, natural character, tangata whenua values all contribute to a sense of 'place' but what is it that makes it particularly *coastal* in character? In landscape terms it is primarily the visual sense of 'being by the sea', in social and tangata whenua terms it is probably the activities associated with harvest and recreation that cannot be achieved anywhere but at the beach and in terms of the built environment there are likely to be jetties, boat ramps and Ngawi's unique tractor assembly that impart a distinctive coastal character to the area. Particularly strong contributors are the distinctive ecological elements (the processes and species that are unique to and reliant upon this environment). Even more distinctive in imparting a 'sense of place' or coastal character are the *indigenous* ecological elements.

The term 'natural character' (as used in landscape assessments) can be quantified to determine how modified landforms, waterforms, indigenous vegetation, vegetation patterns, and settlements have become, and give a landscape a score, using a sliding scale from pristine to built. This can be used as guidance for preserving natural character (RMA Section 6(a)) as it gives us objectives and the RMA gives us the wherewithal to attain them.

This technical report has been commissioned in recognition of the importance of knowing how best to protect the *indigenous* elements (RMA Section 6(c)) that contribute to natural character. There is the danger that too broad an interpretation of natural character can diminish the urgency and site-specific needs of *indigenous* coastal character as it dwindles, or is replaced by exotic species (which may bestow equally 'natural' patterns and processes to the landscape). Conversely, it is not enough to say that the presence of indigenous vegetation indicates a *lack* of modification, as this can overlook the ecological frailty of, say, groves of karaka which are neither

local nor contributing ecologically, or a dominance of scattered cabbage trees when all other indigenous life has been lost, or the recolonisation of hillsides in native scrub following catastrophic disturbance of all native ecosystems. Such vegetation contributes more to visual landscape than to ecological process.

For this reason this technical report focuses on indigenous habitats, communities and processes rather than isolated occurrences of indigenous species or monocultures of indigenous plant species.

3.2 Defining the Coastal Zone

The coastal zone has been defined for this technical report as the area

- where there is a strong interaction between marine wildlife habitat and terrestrial wildlife habitat, and
- where vegetation is adapted to, or tolerant of, the combination of salt and physical damage associated with onshore storms, and
- including the extent of salt water influence in estuaries.

The coastal zone can be described in indigenous (pre-settlement) vegetation terms as a transition through foreshore herbfield or grassland to grassland-shrubland to scrub to single-tier coastal forest dominated by akiraho, ngaio, taupata, kanuka, mapou, titoki and mahoe. Typically there would be wetlands through this zone created by dune slacks (areas of scouring to water-table level) or raised beach ridges damming stream outlets. Some coastal environments are more extreme for biotic life than others: dunelands are particularly lacking in fertility and moisture retention capability – at the other extreme are sites rich in loess deposits.

It is stressed that this is not a zone with well-defined boundaries; rather a gradient. On humid coastlines (such as southern Wairarapa) the coastal zone would merge into a humid, temperate zone dominated by broadleaf kohekohe forest, or a frost-dominated zone where small-leaved frost-tolerant forest species dominate. On the drier eastern Wairarapa Coast the transition is usually to drought-tolerant beech or titoki-kowhai-totara dominated forest.

There are fewer clues in the pastoral environment which dominates the coast. Experience shows that an inland coastal boundary can be extrapolated as being:

Up to one kilometre from the foreshore on flat or terraced land (less where low-lying bars or reefs break the flow of salt-laden winds); or

At approximately 100 – 120 metres altitude where hillslopes emerge closer to the coast but the prevailing wind is off-shore and 120-130 metres altitude where on-shore winds are both prevalent and strong; or

Up to 200 metres altitude in the Cook Strait region where stronger onshore winds combine with steep topography close to the foreshore.

The inland coastal zone boundary (Ecological) is shown on **Sheet Series 1** (Appendix 3). Compared with the boundary drafted by WCSG as a guide to this study we find that where the two boundaries differ it is most often the Ecological Boundary which is closer to the coast or at lower altitudes than the WCSG boundary. This occurs along the eastern edge of Lake Onoke, between Kawakawa and Waiwharo Stream, behind Ngawi, around Cape Palliser, from Te Kaukau Point north to Te Awaiti station, at Pahaoa, Cattle Peak, behind Glenburn Station, behind Waimoana Station, behind Riversdale beach, at Whareama and between Castlepoint and Whakataki. In just a couple of places the WCSG boundary is closer to the sea (along Whatarangi Road and along the White Rock Station coastline). Elsewhere there is good agreement in between the two zones.

3.3 Environmental Factors

Understanding the regional ecological context of the coastal zone helps us recognize the significance of indigenous remnants or natural processes, both in terms of how well they represent the diversity possible, and for guidance in managing their values successfully.

In general this is a windy region. Westerlies result in hot, dry weather; southerlies and easterlies are wet, with the entire coastline windy throughout the year.

In the southernmost areas, through Cook Strait, northwesterlies dominate both in strength and frequency; southwesterlies to a lesser extent, and easterlies are relatively calm. When northwesterlies are strong across Palliser Bay, the Mukamuka coastline

and the coastline east of Cape Palliser are relatively sheltered, although strong 'dumpers' funnel through valleys and bounce over the higher peaks having a significant effect just off-shore.

The Whatarangi and Ngawi coastlines, on the other hand, take the brunt of salt-laden strong northwest winds. These are often dry winds so salt damage is more significant further inland than elsewhere.

Winds from the south sector, although less frequent, play a significant role as so much of the coastline is exposed to southerly weather. Only the Whatarangi-Ngawi stretch escapes the full force of southerlies.

Although weather from the south sector is often accompanied by rain, swells can continue to hit steep beaches for some time, raising a salt spray that can provide humidity and salt deposits during fair weather further inland than on other coastlines.

There is a relatively small amount of sand accumulation (due probably to the steepness of the foreshore) and most active coastal processes involve the redistribution of shingle supplied by erosion of greywacke steeplands.

As we move *further north* from Cape Palliser the ferocity of the winds decreases but the frequency of southerlies and northerlies increases to nearly match the frequency of northwesterlies. The frequency of southerlies peaks in winter. This is of interest for several reasons. The combination of more southerlies along a coastline exposed to this sector and shallower beaches results in more areas of active sand accumulation. But dune dynamics, and the distribution of wind-borne seeds are also influenced by off-shore north sector winds. And in many areas offshore reefs dissipate much of the wave energy so the influence of salt spray onshore during and following southerlies is less than in Cook Strait.

Northwesterlies prevail during spring and summer and these are often hot, dry winds, making this stretch of coastline particularly challenging for vegetative growth. With fewer onshore winds humidity is also very low during the summer months.

Frost is not a significant limiting factor along this coast (unlike the Kapiti-Horowhenua Coast for example).

Mean annual rainfall, as already intimated, is least from Flat Point northwards but also low in the center of Palliser Bay around Lake Ferry - Whangaimoana. Elsewhere mean annual rainfall is relatively constant at 1100 - 1150mm except under the high mountains along the Mukamuka coastline and between Cape Palliser and White Rock, where it increases significantly to 1200-1300mm.

Ecodomains Framework

The Ecodomains Delineation framework developed by Wellington Regional Council in 2001 (Figure 3.1) assists in describing the main environmental factors that imbue parts of the coastline with particular characteristics. At this level of mapping (1:100,000), boundaries generally reflect broad patterns of similar climatic factors and how they are intercepted by the land (and therefore influence biotic life). The maps represent a correlation between climatic extremes (seasonality, maximum and minimum temperatures, incident solar radiation, windiness), physical features (toprock, topography, altitude, salt loading), fertility and physical processes (uplift, erosion etc) truthed by considering soil types and vegetation associations. A boundary on such as map is expressed by a biological boundary on the ground, although there a very few sharp boundaries: most are gradients.

What the WRC Ecodomain maps are unable to show is that the original mapping extended into the ocean, reflecting the significant interaction of foreshore and near-shore environments, the one often influencing the other through action of water temperature, currents, wave energy, seabird or marine mammal interactions.

The coastal zone identified for this report in some cases is a subset of a larger ecodomain but is often distinctive enough to be an ecodomain in its entirety. This intersection between Ecodomains and the coastal zone boundary is shown on Appendix 4 **Sheet Series 2**. Titles are taken from the master Ecodomains map (Figure 3.1). In some instances an ecodomain is further delineated into subzones ((a), (b) etc) which occurs where one or more environmental factor exerts a noticeable influence but not enough to warrant ecodomain delineation.

In the course of this study the original boundaries of the Ecodomains Delineation map were further refined and the master map will be updated accordingly.

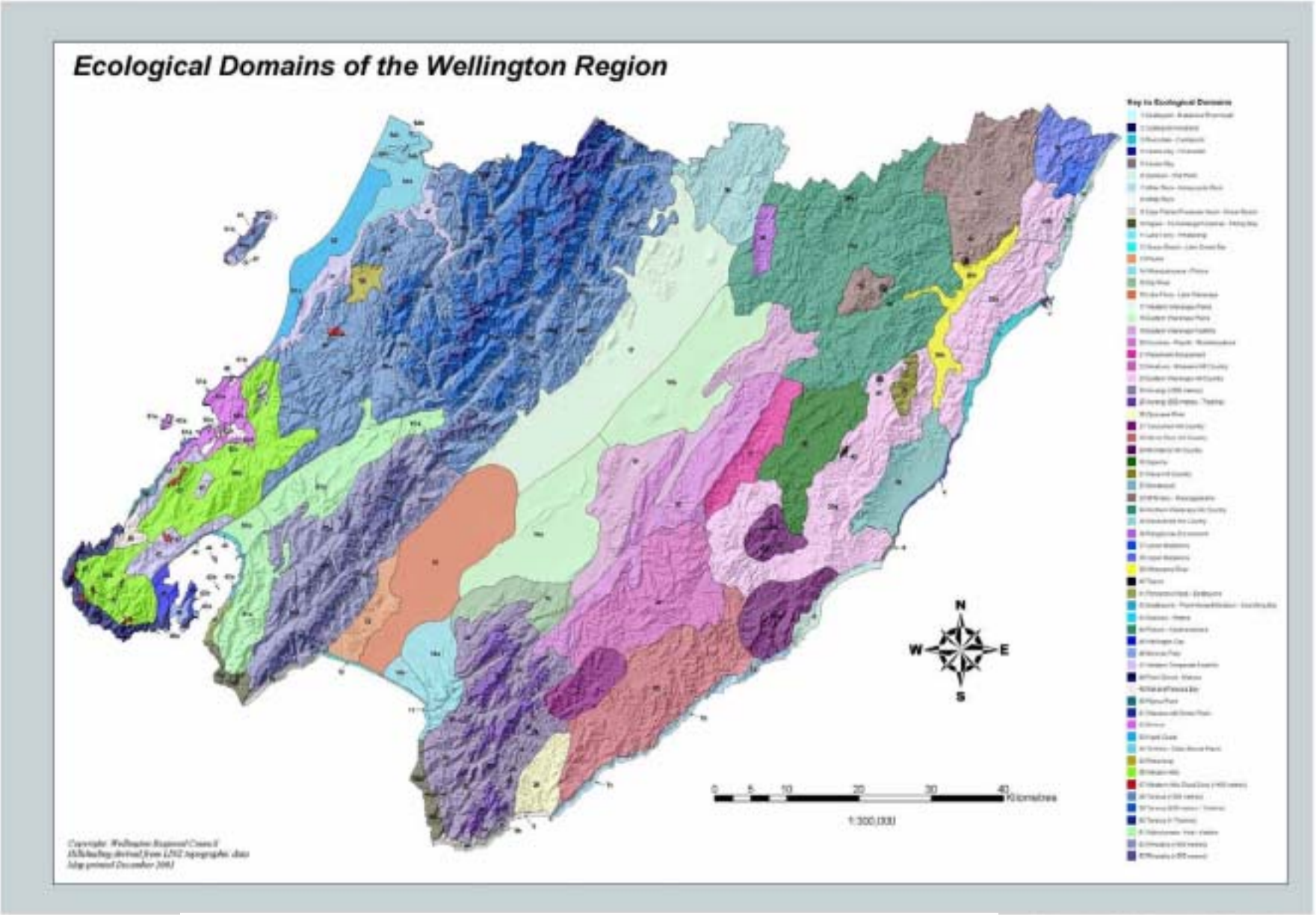


Figure 3.1: Wellington Regional Council Ecodomains Delineation 2001

Figure 3.1. WRC Ecodomains Delineation 2001

Maps in Appendix 3 show only the part of the ecodomain that is within the coastal zone.
A brief summary of the environmental character of delineated Ecodomains follows.

TH Turakirae Head / CPE Cape Palliser

Mean annual rainfall 1042mm, average January rainfall 81-160mm, average July rainfall > 160mm. Average maximum January temperature 22^0C, average minimum July temperature 3^0C. Low incident solar radiation at summer solstice in this area of steep, high altitude hills with scree, shingle toeslopes, shaded gravel flats and steep gravel beaches. A relatively wet coastline with low seasonality.

OB Ocean Beach

This area experiences low rainfall (mean annual rainfall approximately 1000mm), moderate to high incident solar radiation at summer solstice and very mild winters (average minimum July temperature 13^0C). The steep gravel beaches and shingle bars are fed by greywacke eroding from the Rimutaka greywacke hills.

LF Lake Ferry

This area is cool and wet during winter (average July rainfall 165mm and average minimum July temperature 8^0C) but has an early spring and mild summers (average maximum January temperature 21^0C). Windspeeds are high and incident solar radiation at summer solstice is high to very high across this homogeneous landscape.

WH Whatarangi

Soft eroding strata are deeply incised along the foreshore creating a diversity of microclimates. Narrow, steep gravel beaches are supplied by long-shore drift and sand accumulation is only minor. Stream-mouths are barred and tend to form brackish backswamps under the escarpments. Mean annual rainfall is 1000 – 1150mm with average January rainfall 41-80mm and average July rainfall 80-160mm. Temperatures range from average maximum January temperature of 22^0C to average minimum July temperature of 4^0C.

TH-NG Te Humenga-Ngawi

Rainfall is relatively constant year round in this domain and sea fogs increase humidity. Soils are thin and depleted and the coastline is dominated by gravel terraces and rocky outcrops, with few areas of sand accumulation. Mean annual rainfall is 1100 – 1200mm and temperatures range from average maximum January 22^0C to average minimum July 4^0C.

The domain is subdivided into two areas (this occurs where conditions are not different enough to warrant ecodomain status, but one aspect of the environmental factors may be noticeably influential).

TH-NG (a) the Ngawi area is slightly cooler and moister than the rest of the domain.

TH-NG (b) as described above

WR White Rock

This small domain is characterized by a sandy beach with gravel flats behind and a seasonal climate with dry summers and wet winters (featuring wet SE storms).

WR-HR White Rock – Honeycomb Rock

This narrow coastal flat with steepland behind and rocky foreshore experiences hot, dry summers (average maximum January temperature 24^0C and average January rainfall 41-80mm) and cool winters (average minimum July temperature 4^0C). Mean annual rainfall is 1100mm. Deeper and cooler water offshore than further north may influence interface biota here. Incident solar radiation at summer solstice is high on the flats. The domain is divided into smaller areas on the basis of toprock and soils, although differences between these areas are not great enough to warrant ecodomain status.

WR-HR (a) diverse geology and predominantly yellow brown earth soils

WR-HR (b) richer soils and recent soils (gravels) on flats

WR-HR (c) steep beaches and greywacke geology

GL-FP Glenburn – Flat Point

This area is characterized by duneland and gravel fans spilling out of stream-mouths. Deeper and cooler water offshore than northern Wairarapa may influence interface biota here. High incident solar radiation at summer solstice is accompanied by higher summer maximum (January average maximum 24^0C); July average minimum is 4^0C. A slightly higher rainfall than further north (1134mm mean annual rainfall) has slight seasonality (dry summers, wetter winters).

KA Karaka Bay

This relatively small area seems to experience hot summers and cool winters and low incident solar radiation at summer solstice. Temperatures range from average maximum in January of 23^0C to average minimum July temperature of 4^0C. Mean annual temperature is 13^0C. Seasonality is relatively low: mean annual rainfall 1100mm.

KW-RV Kaiwhata – Riversdale

This area experiences highly seasonal rainfall with wet SW storms in winter and dry summers. Mean annual rainfall is 900-1100mm and average January rainfall 21-40mm, average July rainfall 81-160mm. Summers are hot and winters slightly warmer than domains to the south, with average maximum January temperature 23^0C and average minimum July temperature 5^0C. Mean annual temperature is 13^0C.

RV-CP Riversdale – Castlepoint

This area has low seasonality with relatively dry conditions year round (average January rainfall 41-80mm and average July rainfall 81-160mm). Temperatures vary from average maximum January temperatures of 22^0C to average minimum July temperatures of 8^oC. Incident solar radiation at summer solstice is moderate to high and the area is largely frost free. Dominant, strong NW winds have very localised effects.

CP Castlepoint

A diverse area of duneland, reefs, lagoon, cliffs and steep headland which experiences a dry year-round climate with early spring warming. It is very gusty around the headland and bay and exposed to NW winds. Mean annual rainfall is only 903mm with average January rainfall 41-80mm and average July rainfall 81-160mm. Temperatures range from average maximum January temperatures of 22^{o}C and average minimum July temperature of 6^{o}C. Mean annual temperature is 13^{o}C. Mean annual windspeed is 13 knots. The area is frost free with moderate to high incident solar radiation at summer solstice.

CP-MK Castlepoint – Mataikona

An area with a mild, dry climate with moderate seasonality (summer drought, winter rainfall) and a long growing season. Mean annual rainfall is low, at 971mm. Average January rainfall is 41-80mm and average July rainfall is >160mm. Mean summer air temperature is the highest in the region. The mean annual temperature is 13^{0}C; average maximum January temperature 22^{o}C and average minimum July temperate is 5^{0}C. The coastal strip is narrow and rivers carry large sediment loads contributing to sand deposition. Incident solar radiation at summer solstice is moderate to low. The domain is subdivided into smaller areas (this occurs where conditions are not different enough to warrant ecodomain status, but one aspect of the environmental factors may be noticeably influential).

CP-MK (a) as described above

CP-MK (b) Higher rainfall and stronger funnelling NW winds in the vicinity of Mt Percy

CP-MK (c) A drier area and softer mudstone strata contribute to extensive areas of sand deposition

3.4 Site Identification

A number of District Councils are undertaking surveys of Sites of Ecological Significance (SES) which ideally detail all information about indigenous flora, fauna, ecosystems and geological features; undertake field survey where information is scarce; prioritise the significance of sites in order to recommend sustainable management practices. Given the area involved and the timeframe available, this survey was not undertaken in as much detail as would be expected for a thorough district-based assessment. Fortunately there are recent Department of Conservation PNAP surveys and inventory of ecological sites for much of the area. A recent report "The Wairarapa Rocky Shore", Massey University August 2001 can be used to correlate with the terrestrial information and should be referred to by local authorities. However, it is recommended that a comprehensive SES survey and analysis of landscape ecology is undertaken in the future which can provide benchmark data for future monitoring, including, for example, GPS located boundaries.

Sheet Series 1 (Appendix 3) locates known sites of ecological significance. Schedule 1 (Appendix 2) provides a general description of the key values of the site. To be recorded a site needed to demonstrate:

> *That it comprises vegetation communities dominated by indigenous species or contains a matrix of indigenous plants that provides a framework that other indigenous species or ecosystems can be supported by. In a duneland setting, for example, a great many sites have had their indigenous grass component (spinifex) replaced by marram yet other indigenous species have continued to thrive or at least survive. Many such sites warranted being assessed. This vegetative assessment is strongly biased towards* communities. *Groves of karaka, hillsides of scattered cabbage trees, isolated individuals of rare or threatened plant species will not be listed (unless they contribute substantively to a nearby indigenous ecosystem), as their indigenous community is too fragmented and impoverished to be considered a viable indigenous ecosystem.*
>
> *That the indigenous community has advanced beyond its initial pioneering stage, unless it is in the context of a dynamic coastal or erosional process which constantly provides opportunity for colonization (such as shingle fans of foredunes). In areas where succession would be expected to progress to scrub or coastal forest the vegetation needed to have advanced beyond its initial successional stage and either be taller than 4 metres or contain substantial juvenile populations of shade-tolerant species.*

That they have provided a long-term habitat (roosting, nesting, resting, feeding) for populations of indigenous fauna. Their significance is reduced if the indigenous flora or natural processes associated with the site are greatly degraded. This applies to both terrestrial and estuarine locations.

That natural coastal processes such as duneland systems or estuary – bar – longshore drift were evident and predominantly unimpeded.

Given the extent of depletion of indigenous habitat in the Wairarapa, the presumption is made that sites meeting all or some of the criteria above are significant. Further assessment ranks their *relative* ecological significance in terms of their quality, naturalness, intactness, viability and potential. Although a quantitative assessment of rarity of habitat represented within an ecodomain framework was not undertaken, qualitative comments are recorded (refer Figure 3.2).

Sites were mapped at a scale of 1:50,000 and care should be taken that no greater accuracy than this should be expected when using GIS layers. The mapping does not offer guidance about the myriad of small swamps, creeks, patches of foreshore vegetation scattered through pastoral country that warrant attention at, say, the level of detail required for subdivision lot development plans or culvert consents. Nor do they itemise sites of individuals of rare species: these are issues that would be addressed through consent processes or through direct negotiations between Department of Conservation and landowners.

3.5 Significance

Method

Field checklists have been developed to assist in quick reconnaissance descriptions of relative ecological significance of sites (refer Appendix 1). They provide a shorthand for assessing the viability, context, intactness and habitat value of both vegetation which appears to have formed a continuum through time on that site and of vegetation that has colonized a bare site. They assess the degree of naturalness of a physical process or of the value of a site to an indigenous wildlife population. Importantly, they assess the potential of a site which may be in a poor state now, but which, by virtue of its context or type of modifying pressures, could readily improve.

These assessments are not quantitative and are reliant largely on the experience of botanists and ecologists who can appreciate what species diversity might be expected in different circumstances, and who can recognize the history of modification of a site and its potential resilience to further modification. Future research may assist with quantifying elements of such assessments.

The terminology used for ranking is Extreme Significance, High Significance and Moderate Significance. By default, all other sites (not listed) are of LOW Significance. The site rankings are annotated on Sheet Series 1 (Appendix 3) and listed in Schedule 1 (Appendix 2).

Field survey was undertaken before reference to existing survey information to ensure an independent appraisal. Listed sites were then correlated with Department of Conservation ECOLSITES database entries. Schedule 1 summarises the key features of a site, however, it is recommended that Department of Conservation ECOLSITES inventory is referred to for detailed records of flora and fauna.

Significance within ecodomains

Figure 3.2 summarises the extent of indigenous ecosystems and processes within each Ecodomain. A full analysis of vegetation classes compared with pre-settlement vegetation classes has not been undertaken, nor has an estimate of the differences in wildlife populations between pre-settlement and present day, but the extent of listed sites clearly shows the main areas of loss and modification of key vegetation classes.

It is suggested in biodiversity reviews by horizons.mw that when ecosystems lose over 75% of their original extent, their populations decline towards extinction exponentially. Halting the decline in native biodiversity, therefore, requires that we aim for at least a 20% minimum threshold line for every ecosystem class. In some cases that would mean ensuring vegetation class areas are not further reduced; in other cases it might mean restoration to reach that threshold. Even without undergoing this analysis it is immediately clear that, whether the framework is the Wairarapa Region or individual Ecodomains, coastal forest is well below the threshold line.

It is recommended that a review of ecosystem classes is undertaken using the latest Land Cover Database (late 2002) to assist with identifying biodiversity targets.

Figure 3.2 Extent and quality of indigenous character in ecodomains

	Ecodomains	Extent of significant areas 0 - 10% LOW 11 - 20% MODERATE 21 - 50% HIGH 51 - 100% EXTREME	Indigenous Character: takes into account how well the ecodomain's landform classes are represented, the significance ranking of the site and the percentage of the ecodomain with significant sites
TH	Turakirae Head (NB equates to CPE)	HIGH (38%)	Vegetation quality is generally high to extreme, with all landforms represented. Wildlife and coastal process high to extreme. **Indigenous character HIGH**
OB	Ocean Beach	HIGH (50%)	There is little old vegetation and regenerating vegetation is in poor condition. Wildlife habitat quality is high on the foreshore only, due partly to isolation of sand bar. **Indigenous character MODERATE**
LF	Lake Ferry	HIGH (22%)	Vegetation is in good condition (albeit vulnerable to lake level controls). Wildlife habitat quality high. **Indigenous character HIGH**
WH	Whatarangi	MODERATE (20%)	Vegetation quality is generally high to extreme along the foreshore and the DOC managed hillslopes of WH (a), but the coastal terrace in WH (b) is not represented at all. Coastal process is uninhibited except for groynes at To Kopi. **Indigenous character MODERATE**
TH-NG	Te Humenga - Ngawi	LOW (9%)	Where it occurs, vegetation quality is high to extreme but only the foreshore is represented. The coastal terraces and hillslopes are not represented at all. Coastal process is uninhibited. Wildlife habitat is compromised by land use. **Indigenous character LOW**
CPE	Cape Palliser (NB equates to TH)	HIGH (37%)	High to extreme vegetation quality with all landform zones represented. Wildlife habitats receive seasonal pressure but their significance remains high. **Indigenous character EXTREME**
WR	White Rock	MODERATE (15%)	Small sites of moderate quality vegetation on raised terrace but hillslopes and foreshore not represented. Wildlife habitat compromised by seasonal pressures. **Indigenous character LOW**
WR-HR	White Rk - Honeycomb Rk	MODERATE (14%)	WR-HR (a) the only substantive areas of high quality vegetation are in one site which spans all landform zones. WR-HR (a) the small areas of dynamic coastal process are compromised by land uses **Indigenous character LOW-MODERATE**

			WR-HR (b) the areas of significance are concentrated in the northernmost third of this ecodomain sector, but are of extremely high quality and span the full range of landform zones WR-HR (b) this same northernmost third is where active coastal process is concentrated. Apart from an area of fishing industry roads and buildings at Kairingaringa Reef process is largely unimpeded. Wildlife habitat quality is poor. **Indigenous character MODERATE overall (HIGH between Tokorau Reef and Glendhu Rocks)** WR-HR (c) is notable for the only area of 'old' hillslope forest in the domain, and extensive wetlands on an unusual marine bench landform at the southern end; otherwise small areas of regenerating vegetation are featured over a range of landform zones. WR-HR (c) wildlife habitats are concentrated between Awhea river mouth and Te Awaiti station but due largely to access and seasonal pressures are in relatively poor condition **Natural character LOW-MODERATE**
GL-FP	Glenburn - Flat Point	LOW (10%)	Although trees are widespread (especially karaka groves and cabbage trees) through the lower hillslopes, there are no 'old' vegetation communities on the coastal terraces or hillslopes; foreshore duneland vegetation is of very high quality although the extent is rapidly decreasing. This is an important domain for coastal process, with half the coastline subject to duneland processes. However, only a narrow (albeit extensive) strip between Waikekino Stream and Flat Point remains unimpeded by land use and roading. **Indigenous character LOW-MODERATE**
KA	Karaka Bay	LOW (3.6%)	Bereft of indigenous vegetation except for one diminished (drained?) area of wetland on the coastal plain. **Indigenous character LOW**
KW-RV	Kaiwhata - Riversdale	HIGH (22%)	The northernmost half of this domain is dominated by duneland foreshore vegetation of high quality. Elsewhere vegetation sites are sparse and relatively poor quality. The coastal terraces and escarpments are not represented at all. The northernmost half of this domain is dominated by duneland process which is unimpeded except at the Riversdale settlement and to a lesser degree by erosion at Ureti Point induced by vehicular access. **Indigenous character MODERATE**

RV-CP	Riversdale - Castlepoint	LOW (7.5%)	In the southernmost third of the domain vegetation is of moderate to high quality but sites are small and predominantly foreshore. An extensive narrow band of high quality vegetation extends through the middle section and what little vegetation there is north to Castlepoint is mostly restricted to the foreshore. A section of coastline is subject to duneland processes (from Wai Ngaio to Otahome) and although narrow, is largely unimpeded. **Indigenous character LOW**

CP	Castlepoint	HIGH (28%)	Long term protection of hard substrate vegetation communities has resulted in high quality although the more sensitive duneland vegetation is more degraded. Duneland processes unimpeded. Seabird habitat of high quality. **Indigenous character EXTREME**

CP-MK	Castlepoint - Mataikona	LOW (9%)	CP-MK (a) no sites **Indigenous character LOW** CP-MK (b) no sites **Indigenous character LOW** CP-MK (c) No vegetation sites CP-MK (c) Poor quality of wildlife habitat and coastal process, with estuaries settled and sand drifts planted with pines or under settlements. **Indigenous character LOW**

The ecodomains that have high indigenous character are also ones where the Department of Conservation has most of the management responsibility for significant sites, and the quality of habitat is very high (Turakirae Head - Cape Palliser; Lake Ferry; Castlepoint). Kaiwhata - Riversdale also has a high proportion of significant habitat, much of it managed by the District Council, although overall its indigenous character is moderate because it is only the immediate foreshore duneland that has natural environments remaining.

Most ecodomains have only low to moderate indigenous character. As may be expected the ownership of their significant sites is predominantly private, however it is of concern that a high proportion also contain esplanade reserve which is clearly either inadequate to sustain indigenous habitat or is managed for other purposes. Certainly the lowest quality and the lowest occurrences of significant indigenous habitats are generally where there is no public land reserve along the foreshore,

although it is noted that the Castlepoint - Mataikona ecodomain does feature esplanade reserve and yet has a low rating.

Chapter 4

Vulnerabilities

4.1 Present and future threats

The threat of **habitat loss through land use change** continues to be significant in the Wairarapa, with recent subdivision consents at Flat Point, for example, allowing loss of duneland containing regionally threatened species in an area of natural duneland system already diminished over time by approximately 80%. Most vulnerable are the dunelands, as due to their poor productivity they have survived as a natural environment longer than the flat coastal terraces or loess and soil-covered hillslopes that have long since been 'developed'.

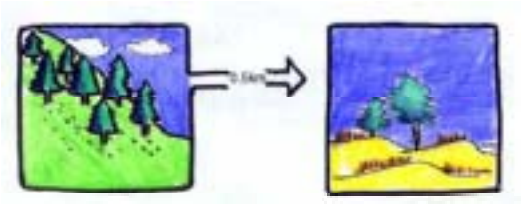
In this example of landuse change, the conversion of duneland to golf course and subsequent loss of indigenous vegetation and habitat for indigenous invertebrates and skinks will be accompanied by changes in fertility and likely competition between introduced spur-winged plovers and indigenous birds.

Incremental **habitat loss through erosion** is also prevalent in the Wairarapa. Esplanade reserves are fixed spatially, and in many localities provide the only natural coastal environments, albeit a narrow strip. Threats to this narrow strip in areas of duneland are exacerbated by the loss of a leading edge of sand-binding species. There are large extents of coast where there is no public land along the foreshore; but there are also land holdings with moveable foreshore reserve on their titles. It would be a useful exercise to identify foreshore title to assist with prioritising management actions.

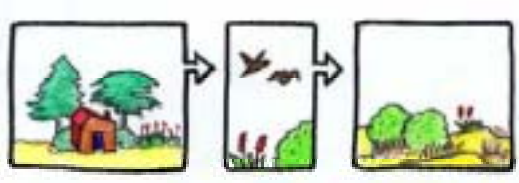
The photo on the left is typical of much of the coast where rural landuse abuts the Esplanade Reserve leaving few options for protection if the coastline erodes.

The photo on the right illustrates the ability of spinifex (on the rounded dune in the foreground) to bind sand rapidly after stroms, in contrast to marram (on the eroded dune, top left).

Habitat reduction. The main causes of vegetation reduction are weed invasion causing plant suppression. Accidental fire will also cause habitat reduction long-term if there is little indigenous seed source for recolonisation of the site, or the clearance is treated as an opportunity for pastoral production. It has been shown that ongoing use of driftwood for firewood is playing a part in reducing katipo habitat (although the problem is complicated by a competing Australian spider).



Invasion of grassland-shrubland or open scrub by pine or macrocarpa is most likely when source trees are within 0.5km upwind of the site



Invasion of grassland-shrubland or open scrub by bird-carried seed of woody shrubs such as boxthorn, boneseed seems to be most prevalent at sites close to settlements where macrocarpa or other tall, exotic trees create roosts for starlings.

Habitat deterioration is the most insidious threat and often goes unnoticed until periodic surveys reveal reduction in distribution of wildlife or of individual plant species. Some of the prevalent causes on the Wairarapa coast are:

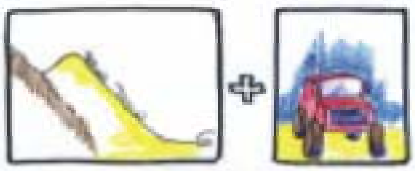
artificial increases in fertility creating a shift in species and suppression of indigenous species adapted for infertile sites (this can be due to the lack of appreciation of backswamp and slack hydrological processes during subdivision development as well as through farming practises);

unchecked predation and browsing by pests; and

physical damage to sensitive habitats in particular vehicles on shinglefields and duneland.

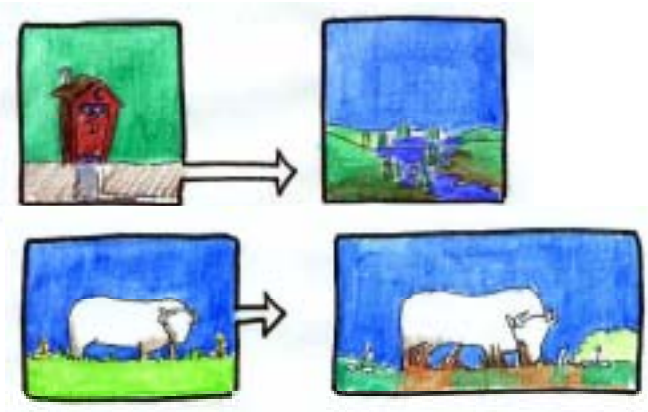
In the hillier parts of the Wairarapa the coastline offers only a narrow ribbon of flat land suitable for roading and housing, and all flat land is a valuable farm asset. The loss of wildlife habitat in these areas has been significant and human disturbances resulting from road access along these ribbons and to the bars at river mouths remain an ongoing threat to seabirds, marine mammals, vertebrates and invertebrates.

Grazing has physical impacts (pugging, trampling), changes fertility and introduces exotic weeds as well as changing the species diversity through selective browsing. *Insert:* grazing of *Coprosma acerosa* (conservation status "high").



Vehicular access has destroyed a population of pingao on these dunes (Conservation Prioirty "High", National Priority "Medium"). Heavy vehicular use does not appear to correlate with settlement: rather with the resources offered at the beach. Publicly owned land has greatest accessibility and few or no controls on use.

In a naturally infertile environment, fertility increases in soils and waterways from sewage leaks, stock effluent and topdressing are far more noticeable and detrimental than in more fertile environments.



The bars and estuaries at rivermouths are traditionally areas of great wildlife concentration; seabirds take advantage of resting areas; waders, hawkers and waterfowl use the estuary and nest on the bar; skinks and katipo utilise driftwood and sparsely vegetated beach ridges. Riparian vegetation offers aquatic wildlife shelter, food and spawning habitat. Of ten such sites on the Wairarapa coast, all are compromised either by vehicular access, settlement disturbance or grazing.

Predation of bird colonies results not just in loss of birds but of the associated nutrient regimes and the vegetation that has developed for these conditions.

4.2 Vulnerabilities

Appendix 5 summarises the key vulnerabilities of coastal zone habitats. The summary highlights a number of important management issues.

Creation of 'no-mans-land' buffers (through retirement of farmland) around grassland-shrubland habitats is not appropriate, as weed invasion is inevitable. This has implications for land tenure as well as adjoining land use. If buffers or habitat extensions cannot be managed (i.e. planted and maintained) then unfortunately we may not be able to successfully extend the site, or buffer it adequately from adjacent land uses, and we will have to accept the current extent of the site. The questions are what tenure is best suited to buffering or extending

the site? What adjacent land-use will have least detrimental effect on an unbuffered site?

Many coastal sites require a management zone well beyond their ecological boundaries. In particular, coastal grassland-shrublands are vulnerable to the invasion of weeds (pines, boxthorn, acacia, karo, marram) which are borne either by offshore prevailing winds (therefore requiring a wide exclusion zone of these species) or are borne by flocks of introduced birds (management would ideally exclude roosting sites for these birds). Waterways are subject to distant catchment influences.

There are key species which can mitigate effects of erosion; spinifex is one, which plays a key role in re-stabilising mobile sand. The loss of this species may lead to the loss of the dune system.

Estuaries and sand bars potentially represent the richest coastal habitats (figure 4.1). But of ten such environments on the Wairarapa Coast, only the Onoke Spit is free of the impacts of grazing or settlement – even then it is degraded by vehicular access. Many are adversely affected by vehicular access (mostly for fishing activities but sand bars near settlements are subject to casual and very destructive vehicular activity) and all but four are grazed by stock. Only three, the Patanui Stream, Motuwaireka Stream (Riversdale) and Lake Onoke, have relatively intact riparian vegetation offering habitat for terrestrial and aquatic biota.

Figure 4.1

River with estuary / bar	Riparian vegetation	Grazed	Vehicles, horses frequent visitors	Settlement in close proximity	Comments 1 = greatest habitat potential 2 = moderate habitat potential 3 = low habitat potential
Onoke	yes (but weed infestation)	no	yes	no	1 - weed control; vehicle / horse control
Motuwaireka Stm (Riversdale)	yes	no	yes	yes	2 - manage access
Patanui Stm (near Homewood)	yes	yes	no	no	1 - manage grazing (will require weed control)
Oterei R. (Te Awaiti)	no	no	no	yes	2 - enhance riparian vegetation & manage access
Whakataki R.	no	no	yes	yes	3
Rerewhakaaiti Stm. (Te Awaiti)	no	yes	no	no	2 - manage grazing
Kaiwhata R.	no	yes	no	no	2 - manage grazing
Opauaue R. (White Rock Rd)	no	yes	yes	no	3
Awhea R. (Tora Rd)	no	yes	yes	no	3
Pahaoa R.	no	yes	yes	no	3

4.3 Priority areas

Sites

All sites ranked Extreme and High significance require action to sustain or improve their ecological quality. Sites ranked moderate should not be allowed to deteriorate.

Strategic planning should be giving priority firstly to significant *sites* which are:

Threatened by immediate activities or land use changes;

The most intrinsically vulnerable of the sites (refer Appendix 5);

Due regard must then be given to other aspects such as costs, accessibility etc.

Appendix 5 indicates that the most vulnerable vegetation-based sites are:

Grassland and grassland-herbfield or grassland-shrubland – on duneland;

Reedland, rushland, flaxland including open water – in duneland slacks and terrace wetlands.

followed closely by:

Herbfield – on shingle shores and scree;

Herbfield – on rocky shores and cliffs;

Sandfield, shinglefield.

Most of the substantial areas of extreme and high significance are already in DOC management. The Coastal Strategy should be looking at promoting the most appropriate long-term measures to enhance and extend the fragile and small pockets of indigenous biota and the areas of physical process that are being compromised by settlement and access.

Buffer Zones

Sheet Series 2 (Appendix 4) depicts which areas are recommended to have 'management buffer zones'. In general terms these indicate areas in which particular activities are likely to have a detrimental effect on an adjoining ecological site. They do not necessarily have indigenous values themselves. What those detrimental

activities are will depend upon the nature of the ecological site, its vulnerabilities and its physical context (with respect to prevailing winds, proximity to access etc). Refer to notes in the Schedule in Appendix 2 for specific recommendations.

Areas of Ecological Interest

Indigenous ecosystems are not well represented in the coastal zone in the Wairarapa. There are only two locations where a full transect is legally protected (within Rimutaka Forest Park to the north and south of Mukamuka Stream, and in a patchy way in Aorangi Forest Park north of Cape Palliser – both areas in the same Ecodomain) and two locations which are not currently legally protected (WR-HR(a) 017 between Glendu Rocks and Honeycomb Rock and just south of Kairingaringa Reef at Pahaoa). *The latter should be areas of high priority for legal protection.*

Pahaoa is an area of particular interest, from Rerewhakaaitu River north to the Glendu Rocks comprising river mouth and bar, duneland, flat coastal terrace and steep hillslopes including colluvial fans. The dunelands here are remote from other (exotic infested) dunelands so are not as susceptible to the spread of marram grass and other dune weeds. Although there is a substantial boat launching area and fishing base here it is confined to one location. The duneland here is of a very high quality – a southern portion has Scientific Reserve status. The combination of regeneration and light grazing of the steep hillslopes between Kairingaringa Reef and the Rerewhakaaitu River have kept the vegetation in a state which could readily revert to a diverse and relatively weed-free indigenous vegetation. The remoteness of this road end self-limits recreational disturbances.

Managing the Pahaoa area for its conservation values would make a substantial contribution to the Wairarapa environment, in an ecodomain with an under-representation of significant sites and as dunelands are highly vulnerable it would be strongly recommended that further subdivision in this locality be avoided.

Another area that should be a high priority for management of its indigenous ecosystem values is the stretch of duneland system **between Waiorongo and Riversdale**, which includes Uruti Point (KW-RV 004). Although it does not offer a transect of indigenous habitat across the Coastal Zone, the quality and diversity of its duneland system and vegetation is extremely high, (including a number of threatened

and rare species) and such large contiguous stretches of natural environment are rare both in the Region and in this Ecodomain.

A general aim should be to achieve an improvement in indigenous habitats in those ecodomains shown to be wanting, either through protection of significant sites or other means of attracting indigenous populations back into the area such as restoration programmes or riparian protection planting. The ecodomains most depauperate are Te Humenga - Ngawi, Glenburn - Flat point, Karaka Bay, Riversdale - Castlepoint and Castlepoint - Mataikona.

Chapter 5

Responses

5.1 Existing Responses

There are a number of mechanisms available in New Zealand to achieve protection of indigenous ecosystems. These are listed below, with a comment about those most applicable to the Wairarapa Coastal Zone.

Type of Response	Evaluation	Relevance to Wairarapa Coastal Strategy
REGULATORY METHODS		
Regional Rules	There are several plans relating to activities within the Coastal Marine Area; soil conservation, discharges to water and land, and water take. The management of activities along the shoreline are controlled under the Regional Coastal Plan. There is a lack of coordination with the management of on-shore activities, and lack of area-specific criteria and values to assess proposals. Other aspects managed by regional plans can be coordinated through joint resource consent applications.	Coordinate Coastal Marine Area policies with the management of on-shore activities, and provide area-specific criteria and values to assess proposals. Given the deterioration of coastal zone ecosystems due to vehicular access, seek assurance that the RPS key principle of "maintaining and enhancing public access to and along the coastal marine area" is given a lower weighting than other key principles: "preserving the natural character of the coast" and "protection of the integrity, functioning and resilience of the coastal environment" and "the protection of significant habitats for indigenous fauna".
District Rules	The three District Plans contain a range of rules for the management of subdivision and land use along the coast. Rules can take a number of forms including simple prescriptions (permitted or prohibited activities), environmental standards and terms, and environmental audit processes (through resource consent applications). There is a lack of coordination between the three District Plans, and the effectiveness of the rules is variable in regard to protecting landscape/ecological values. However, rules can be very effective management methods if well focused on the environmental values sought to be protected.	Co-ordination of rules between the 3 District Councils will be effective ecosystem management methods if well focused on the environmental values sought to be protected.
Designations	Local authorities have the ability to designate land for public works under the Resource Management Act, including for reserves. They are most effective in situations of multiple landownership, or if protection is needed against activities that might frustrate	It is not clear that the situations warranting designations would arise.

	a future public work. They are subject to public processes under the RMA. Due to the costs of land acquisition and the designation process itself, in terms of the coastal environment, the use of designations is limited, and is probably most effective for localised features or pockets of land outside public ownership and under threat.	
Bylaws	Territorial local authorities have the power to impose bylaws on shoreline activities as well as on landward activities, e.g. dog control on beaches. Bylaws are often not widely known, and require good publicity and an enforcement regime to be effective. Usually applied as simple restrictions (can/cannot do specified activities), their use in managing the coastal environment is relatively limited.	Bylaws offer site specific protection against vehicles, fire, dogs. Useful for management along the Esplanade Reserves, but should be applied as consistently as possible to achieve awareness. It is also possible to apply Bylaws to private land.
STATUTORY FUNCTIONS		
Annual Planning	Under the Local Government Act, local authorities are required to plan their anticipated income and expenditure according to annual programmes within a longer-term context. The preparation of such plans has to go through a public participation process. Such plans cover all aspects of expenditure from operating activities, to one-off activities and works, through to large investments and developments.	Any identified works or purchases are included in annual plan process to secure funding e.g. buying land or supporting biodiversity protection on private land.
Asset Management Planning	The management of local government assets is facilitated by the use of management plans: for example, community facilities (such as recreation grounds), sewage treatment facilities and water supply. Their use for other broader purposes is relatively limited.	Upgrades and access should take into account appropriate ecological goals.
RMA Monitoring & Enforcement	Local authorities have general obligations of monitoring the state of the environment under their jurisdiction, and enforcing rules and other RMA requirements.	Active enforcement and monitoring is ongoing.
Reserve Management Plans	Under the Reserves Act 1977, Reserve Management Plans (RMP) must be prepared for all reserves held by local authorities or the Crown.	There are relatively few reserves along the coastline, and thus the impact of RMPs would be relatively limited, unless significant new reserves were to be established, but they should be consistent with ecological goals.
Conservation Management Strategies and Conservation Management Plans	*Conservation management strategies* are required under the Conservation Act 1987 and are 10-year regional strategies that give direction for the management of conservation areas by the Department of Conservation. *Conservation management plans* are 10-year statutory plans that implement the	As there is a relatively little land under the conservation estate along Wairarapa's coastline, these methods only have general application.

	conservation management strategies by establishing detailed plans for the integrated management of natural and historic resources within a particular area. CMPs are only developed for areas where there is a high level of activity or a complexity of issues that cannot be satisfactorily dealt with in the Conservation Management Strategy: for example, National Parks.	
NON-STATUTORY RESPONSES		
Strategies & Programmes	A strategy is a systematic plan to coordinate and implement such actions as are needed to achieve specified outcomes. A programme is an ordered list or schedule of events to take place or procedures to be followed. Strategies are most effective when there is a need to coordinate actions that come under a number of different statutes and/or agencies and groups. Programmes are more specific plans of actions, within identified timeframes and responsibilities. Strategies are increasingly being used by local authorities to coordinate the actions required to achieve a more effective result than would otherwise occur.	A strategy process is an effective way of communities being heard, for opinions to be aired and for articulating clear policies specific to a focus area. They also provide an opportunity for authorities to provide guidance on 'public good' issues which communities may not raise.
Guidelines	Guidelines are written forms of guidance to inform people how to meet or achieve certain standards or outcomes. They can supplement regulatory controls, or be stand-alone instruments to educate and inform people without coercion. Guidelines are not widely used outside urban areas (for example, building design guides), but have potential to promote a better understanding about how to protect the coastal environment in the design or use of facilities or land.	Targeted guidelines for large landholders, small landholders and industry are recommended. Ecological guidelines should be incorporated into landscape guidelines.
Codes of Practice	Codes of practice are a set of written rules, principles, procedures or conduct. They may have a legal basis (such as Codes of Subdivision and Land Development applied through District Plans), or they may have no statutory basis and be used to encourage changes in behaviour or ways of achieving outcomes.	Most applicable in an industry setting, so probably of little practical value along the Wairarapa Coast.
Education	This method refers to ways of informing and educating people about protection issues, programmes and to promote better understanding and changes in behaviour and responses. It can be through on-site information, such as through signs and interpretation facilities, or through either targeted or widely disseminated education programmes. At best, this method is most effective as a means of supplementing other methods.	The key problems are either caused by a largely transient public with no sense of 'ownership' of the coast or a small number of landholders who are best communicated with in other ways. On-site signs are unlikely to withstand vandalism unless they are associated with settlements and where used should be informative but non-authoritative. Holiday accommodation offers a viable educational opportunity for visitors.

Publicity	Publicity relates to methods used for awareness-raising, to highlight issues and preferably motivate people to promote changes or actions.	Most effective as part of specific public debates (such as the development of this Strategy) which can act as a focus. Effective in a setting like the Wairarapa where there is a large town-based populace that regularly visits the coast.
Voluntary contractual agreements	There is a range of voluntary types of agreements that can influence the protection or management of land. Voluntary Farm Management Plans, which are derived from soil conservation purposes, can address a wide spectrum of matters. Memoranda of Understanding and or other legal contracts can also be brought into effect, usually as limits the ability to use land. These agreements ensure that the property remains in private hands.	These tools are appropriate for a largely rural population and could be pursued especially where properties extend to the foreshore.
Voluntary conservation methods	Voluntary conservation and protection agreements, such as by QEII Covenants, once brought into effect, are cost-effective. They avoid the public acquisition of land but may attract limited financial and professional support from QEII agencies.	Pursue this options for high ranking Sites of Significance, especially where there is not an existing 'community of interest' which might make a Stewardship arrangement more applicable.
Wardens	In terms of the coast, wardens are people who are keepers, guardians or official charged with the enforcement of certain laws and regulations. Little used, but potentially applicable if used in conjunction with other actions such as beachcare groups and bylaws.	Their use would be a community-based request.
Coastal Care Groups	These are voluntary groups of residents and other interested persons who act as guardians for sections of coastline. They usually work closely with local authorities in the management of the coastline: for example, such groups help to monitor the state of the coastline and activities occurring thereon, and undertake programmes such as planting and litter cleaning. Without qualified guidance unintentional mistakes with species choice or erosion control methods can ensue.	The scope of these groups is limited to public land, usually in the vicinity of settlements and tends to be concentrated on planting and weeding efforts. This is commendable, but should have a professional overview, and it is recommended that activities are extended to include regular monitoring and observation of wildlife habitats.
Stewardship 'Action' Groups	These are groups of representatives from relevant organisations and sectors of the community who meet to coordinate actions and oversee programmes requiring an integrative approach.	The strength of this approach is in getting a range of viewpoints (landowners, iwi, farmers, local authorities, industry) discussing openly how they value local ecosystems. This is to be encouraged in the Wairarapa to increase all parties' understanding. It is appropriate where there is an existing 'community of interest' rather than individual large-land holdings.
Financial Incentives	Rate relief, reduction in consent fees, land swop or purchase, transferable development rights, financial assistance for protection	This is most likely to occur as a land swop or purchase, which is appropriate only where it is clear that long-term management of the

	measures could be explored as incentives for ecosystem protection.	ecosystem is best undertaken by the Crown or Local Authority. This may occur where sites adjoin existing Reserves, where pest management is expensive to maintain or where there are other reasons (such as control over access) that make it appropriate for the Crown to seek ownership.
Research, experimentation and monitoring		Provision and publication of issues relating specifically to development options on the Wairarapa coast should be co-ordinated jointly between DOC and the Coastal Strategy Group. DOC Wellington Conservancy have published a paper Coastal Dune Vegetation in Wellington Conservancy: Current Status and Future Management in which a number of research and monitoring proposals are recommended. The New Zealand Coastal Vegetation Network (Forest Institute, Landcare and Regional Councils) also offer opportunities for co-ordinated research into dune rehabilitation. Relevant issues to research may include: Á the relationship between settlement and pest distribution; Á dune rehabilitation methods; Á impact of settlement and access on ecology of indigenous skinks and spiders

5.2 Recommended Responses

Read in conjunction with 5.1

There are two main ways of achieving protection: through direct management (which is active and proactive) and through planning controls (which may be retrospective and also entail a large degree of trust in the meantime).

Within these approaches there are options of ownership and management responsibility. What is most appropriate should be determined by the characteristics of the site. If the site will require ongoing pest control, who is best placed and funded to provide it? If a buffer zone is recommended, what mechanism can best achieve the constraints required?

Direct Management

- All sites ranked Extreme and High significance require action to sustain or improve their ecological quality. Sites ranked moderate should not be allowed to deteriorate.

- Strategic planning should be giving priority firstly to significant *sites* which are (i) threatened by immediate activities or land use changes; (ii) the most intrinsically vulnerable of the sites (refer Fig 4.1); (iii) the due regard must then be given to other aspects such as costs, accessibility etc.

A primary objective is to seek formal protection for sites of Extreme Significance;

If formal protection is not available for other Sites of Significance then community-based stewardship should be sought;

A primary objective is to manage entire areas *of ecological interest (refer section 4.3) for conservation goals;*

The protection and planting of key species such as spinifex is a priority. (Loss of spinifex from foredunes may in time lead to the loss of the dune system.)

Planning controls

Given that there is no regional plan for the landward side of the Coastal Marine Area in terms of ecological issues, the Regional Policy Statement would be the logical place for any specific policies managing the area's coastal environment, when it is next reviewed.

It is recommended that consent processes establish a 'no nett loss' bottom line for all sites of significance and take into account the vulnerabilities of different types of sites and the effects of activities in their vicinity.

Certain characteristics of the Wairarapa Coastal Zone provide a steer for appropriate responses.

- The coast typically supports small, isolated cluster or ribbon settlements strung along coast roads or at remote road ends.

- There is a long history of Maori settlement, with evidence of intense horticulture much more widespread than it is currently.

- Á Many of the road ends have boat access utilised by both industry and recreational fishers.

In such areas there are well established communities of interest and Stewardship approaches may be the most beneficial approach.

- Á The coast roads offer ready access to the foreshore at many locations both close to settlements and remote from habitation. Access is enjoyed by visitors as well as by locals especially where there is an Esplanade Reserve.

Vehicular access is an issue everywhere along the coast, causing disturbance and damage along the foreshore in particular. Compatibility of rules, controls or bylaws that are well understood throughout the Region is required. It is recommended that vehicles be prohibited from estuary sand bars.

- Á Current rural land use is dominated by agriculture, with minor horticulture and silviculture.

- Á There is a predominance of large land-holdings, mostly family owned and operated.

In these situations individual owner rights and a lack of 'community of interest' suggest that financial incentives or land swops would be appropriate mechanisms.

- Á There are large blocks of Department of Conservation managed land (mostly reverting scrub and forest in wetter regions) and water bodies.

- Á Remaining sites are predominantly highly vulnerable long, narrow strips of coastal habitat (in particular duneland and soft cliffs), bounded by sea and by agricultural land.

- Á There are very few areas of indigenous scrub or forest on coastal terraces and low-lying land.

With little scope for expansion and many tracts of coast already threatened by erosion the emphasis for many sites is restoration and enhancement. On public land this can be achieved with the assistance of beach-care groups.

It would be useful to identify foreshore title for the length of the coast, to assist with prioritising management actions. Some titles have allowance for a shifting esplanade strip. Areas where there are either no esplanade strips or where they are eroding, are vulnerable.

Research, monitoring, surveying

Recognition of the unique circumstance of the coastal environment with respect to ecological values is a prerequisite for all regulatory, statutory and non-statutory responses. The interface between marine and terrestrial biotic populations, the physical processes and the habitats of salt and infertility-tolerant vegetation cannot be traded or compensated for elsewhere.

Recognition that responses are often site-specific or species-specific is another fundamental prerequisite. It is recommended that:

Comprehensive survey of Sites of Ecological Significance be undertaken providing, for example, accurate GPS boundaries of sites; and

An analysis of vegetation classes is undertaken to identify the threshold targets within Ecodomains for sustainable biodiversity.

At the same time that we are learning about species' 'natural' ecology we have to learn about species' responses to massive habitat perturbation, competition and fragmentation. Research and monitoring will therefore be an underlying requirement of recommended responses. There is a range of recent reports available regarding ecology of individual species (such as katipo) and good networking between organisations will ensure these are widely distributed. Further subjects could include:

Research into distribution of pests with respect to proximity to settlements;

Dune restoration techniques.

Prioritising threats and vulnerabilities is somewhat dependent upon understanding the relationship between foreshore tenure and coastal dynamics. It is recommended that:

An analysis is undertaken of foreshore tenure, coastal erosion and accretion and the consequences on indigenous habitats.

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Sawyer, J. McFadgen, B. Hughes, P. *Karaka in Wellington Conservancy (excluding Chatham Islands*. Department of Conservation, Wellington, NZ.

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Databases:

ECOLSITES Wellington Conservancy, Department of Conservation

Appendices

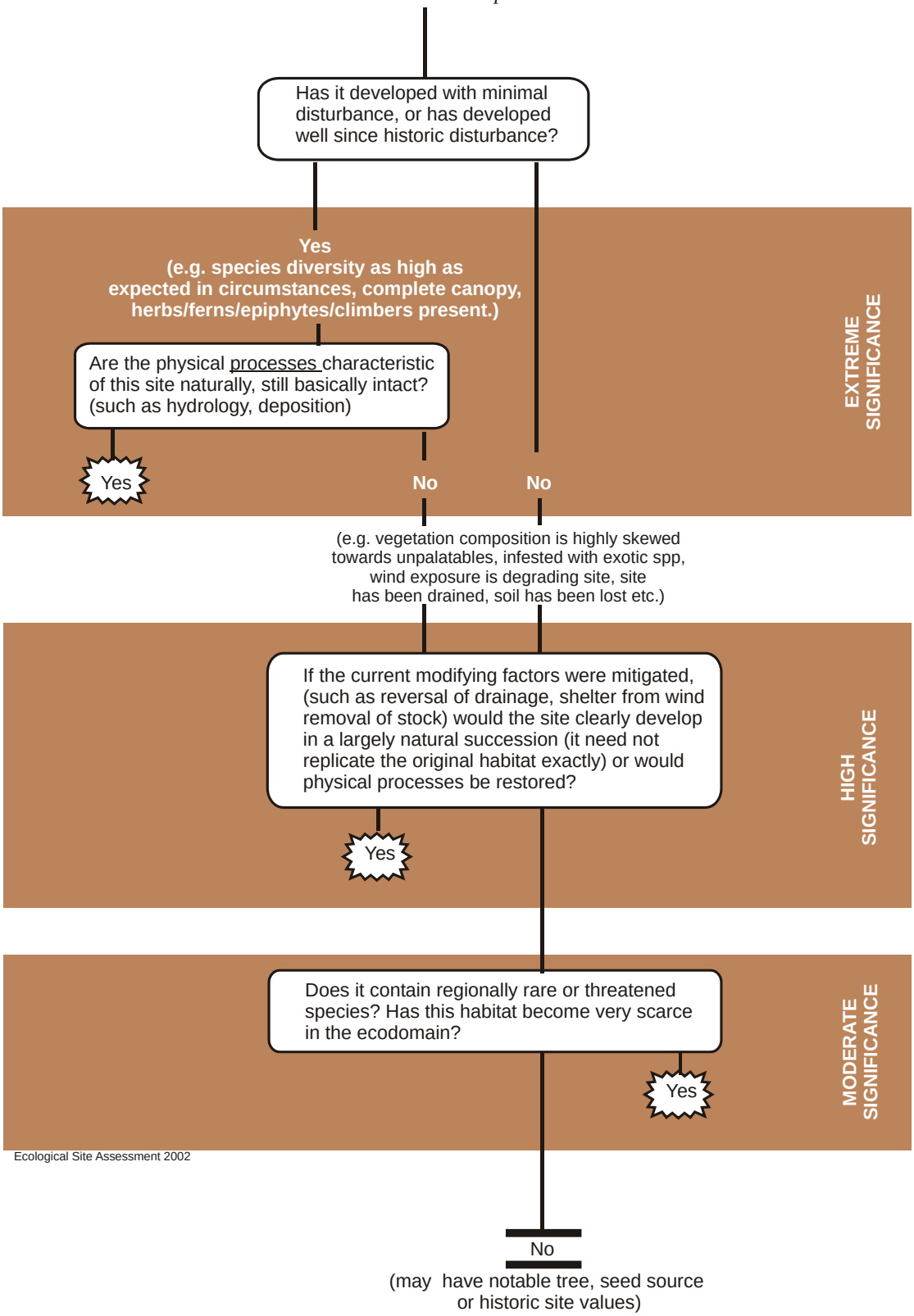
Appendix 1

Field checklists

These field sheets represent guidelines for a field process of quick reconnaisance assessment and significance ranking. They do not detail the significance criteria used, (viability, diversity, context, shape-size, distinctiveness, representativeness); rather the way in which these aspects are interpreted to provide a ranking.

Old native vegetation (a continuum)

Assumptions: all sites are responding to perturbation, increased wind exposure, soil loss; possums, cats, mustelids and rodents are pervasive.

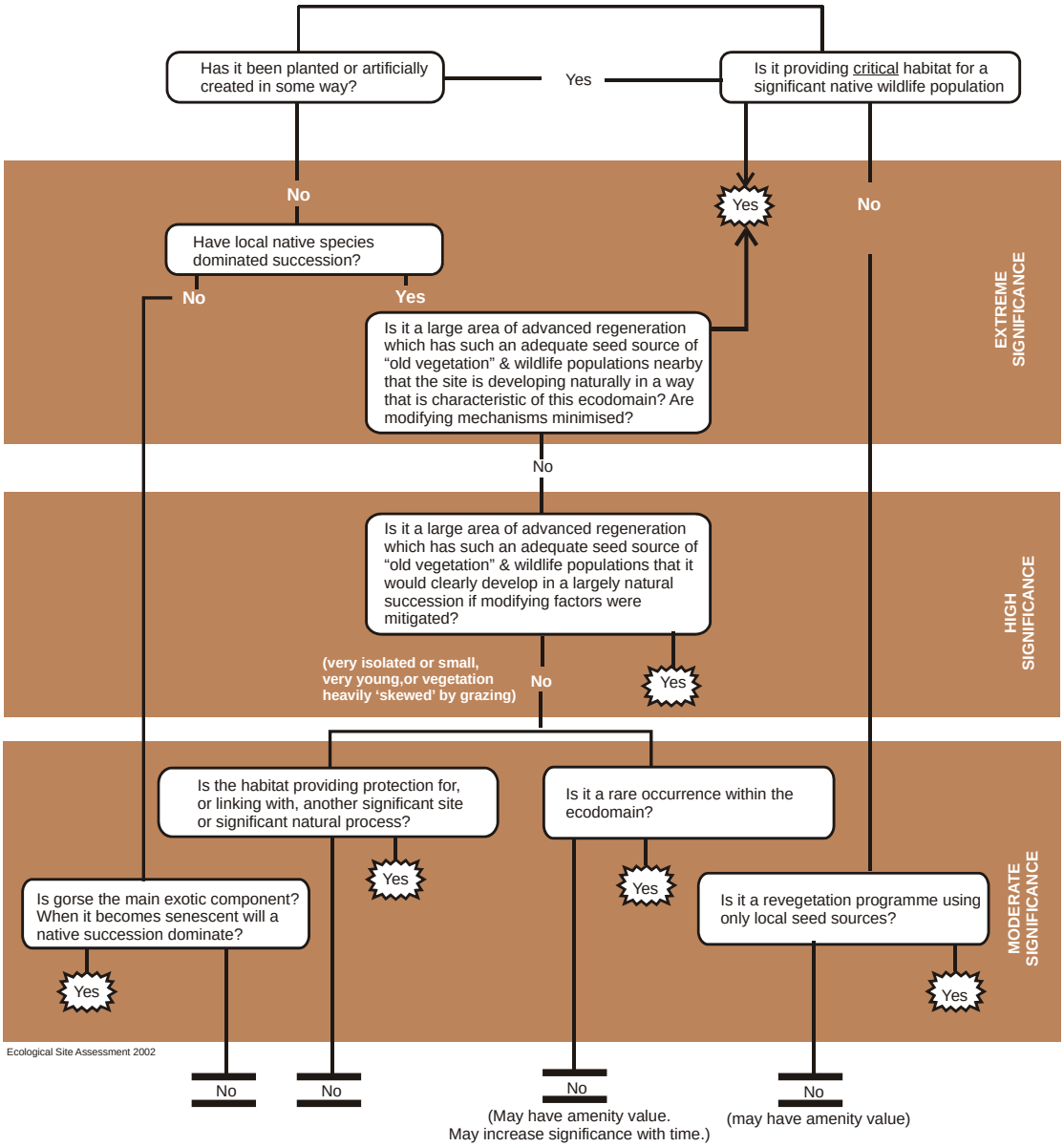


Ecological Site Assessment 2002

Recent *(colonising)* native vegetation
either > 4 metres* or beyond initial seral stage

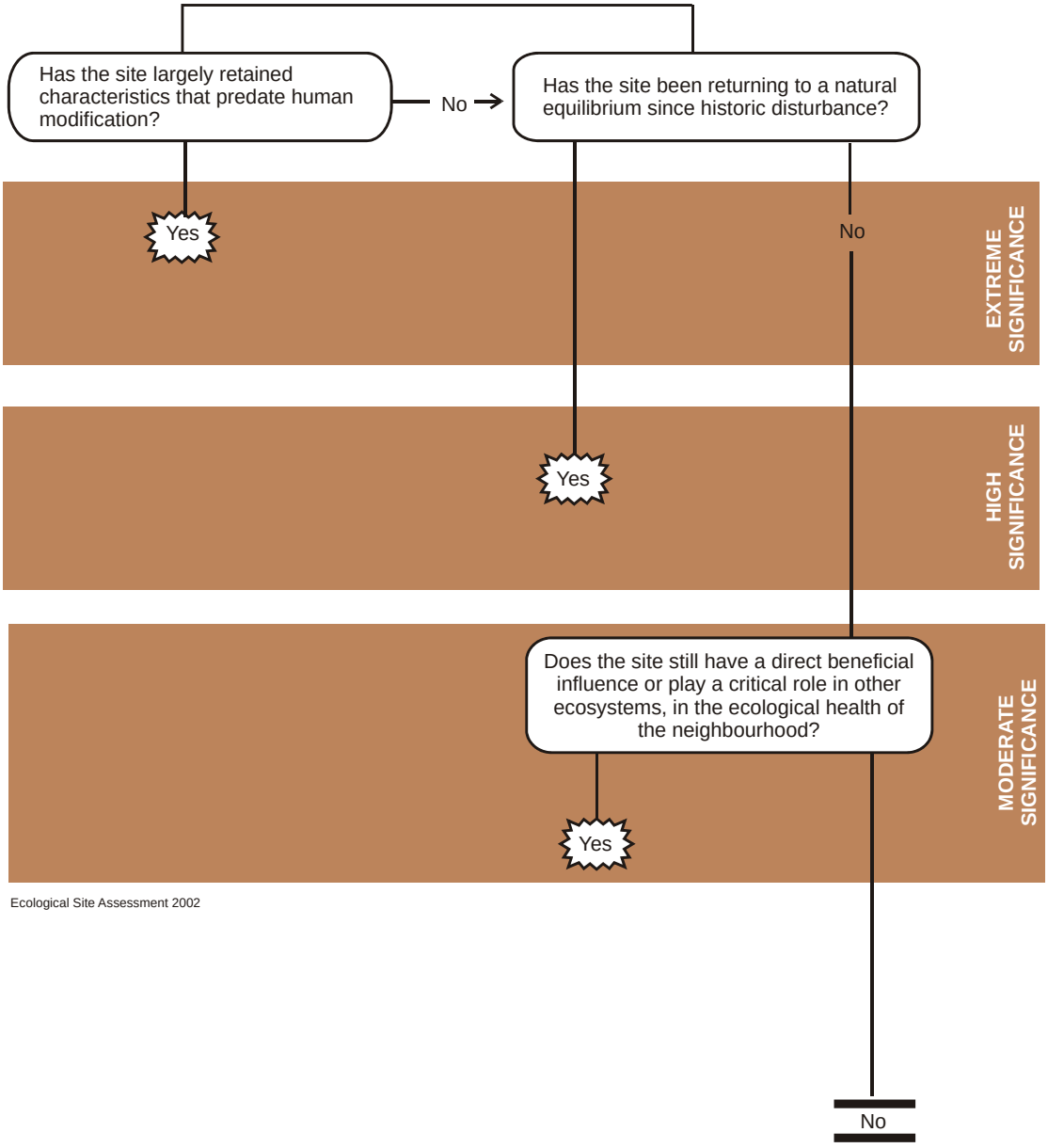
Assumptions: all sites are responding to perturbation (especially modification by stock grazing and soil loss) possums, cats, mustelids and rodents are pervasive.

* 4m is approximate. The intention is to only assess the mature stage of an initial sere, rather than being all-inclusive of pioneering vegetation.



Old physical process / site

Assumptions: all sites are responding to perturbation.



Ecological Site Assessment 2002

Appendix 2

Schedule 1: site description, current threats, buffer requirements

Area code	Significance rating	Field Note	Approx. area (ha)	Key Values	Tenure	Protection Status	DOC ECOLSITES reference	Landform	Vegetation / processes	Wildlife	Notes about conditions and threats requiring management	Buffer recommendations
ECODOMAIN TITLES TH Turakirae Head-Cape Palliser OB Ocean Beach LF Lake Ferry-Lake Wairarapa WH (a)(b) Whatarangi TH-NG Te Humenga-Ngawi CPE Turakirae Head-Cape Palliser WR White Rock WR-HR (a)(b)(c) White Rock-Honeycomb Rock GL-FP Glenburn-Flat Point KA Karaka Bay KW-RD Kaiwhata - Riversdale RD-CP Riversdale - Castlepoint CP Castlepoint CP-MK (a)(b)(c) Castlepoint-Mataikona	SIGNIFICANCE KEY: Old native vegetation: OV extreme / high / moderate New native vegetation: NV extreme / high / moderate Wildlife habitat: WH extreme / high / moderate Coastal process: CP extreme / high / moderate							Landform classification Milne *et al* 1995	Vegetation structural class (Atkinson and Blashke, 1995; in Milne *et al* 1995)	Noted during field survey or identified by recent DOC survey '+ denotes notable, rare or uncommon species or populations		
TH 001-1	OV-extreme NV - high WH - high		6.5	ecosystem	DOC	Conservation Park	Rimutaka Forest Park	bedrock steepland; residual hillslope	closed canopy native **forest** on upper slopes; recolonising **scrub** (both closed canopy kanuka and mixed tauhinu scrub) on lower slopes and toeslopes	unknown	Fire	
TH 001-02	OV-extreme NV - high WH - high		31.9	ecosystem	DOC	Conservation Park	Rimutaka Forest Park	bedrock steepland; residual hillslope	closed canopy native **forest** on upper slopes; recolonising **scrub** (both closed canopy kanuka and mixed tauhinu scrub) on lower slopes and toeslopes		Fire	
TH 002	NV - moderate		0.6	ecosystem	private			bedrock steepland; residual hillslope	karaka **treeland**	unknown	Fire	
TH 003	WH - extreme		1.8	seabird roost site	-			rock stack		shag, tern	Disturbances	
TH 004	OV - extreme		2.0	threatened spp; ecosystem; landform	private			gravel beach	**stonefield** sequence from seaward shingle bank with scattered *Austrofestuca littoralis* to coarse sand with *Carex pumilo* to shingle flat with *Pimelea prostrata* and *Raoulia* sp. Few weeds.	earwigs, black spider, snails, slaters spur-winged plover, red-bill gull	Grazed (no fencing).	No invasive woody exotics. No plantation.
TH 005	OV - extreme NV - extreme		28.5	ecosystem	DOC	Conservation Park	Rimutaka Forest Park	residual hillslope; bedrock steepland; colluvial steepland	native **forest** on upper hillslope; mosaic of **flaxland** on bluffs and tauhinu and kanuka dominated **scrub** on lower slopes with species such as tree hebe, ngaio and kowhai dominant	fantail, tui, finches, magpie,		
TH 006	OV - extreme		6.5	ecosystem	DOC	Stewardship: Ocean Beach Conservation Area	DOC-577	gravel beach; sand beach; wetland; open water	Mosaic of **reedland** (raupo) **scrubland** (mahoe, taupata, small-leaved coprosmas, kowhai, Olearia paniculata, kohuhu), **reedland** (oioi), **fernland** (bracken and **grassland** (toetoe). Any sandy beach areas have tussockland of *Spinifex sericeus*, *Carex pumila* and driftwood	black shag, blackbird, fantail	Roading is restricted to the narrow coastal platform and 4WD tracks on the beaches are evidence of alternative routes. No weeds evident except one juvenile pine at north end, near baches. Mature pines are found associated with the baches.	No invasive woody exotics.
TH 007	NV - extreme		4.9	ecosystem	DOC	Conservation Park	part Rimutaka FP	coastal terrace	kanuka **forest** with high proportion of kowhai and Hebe parviflora (tree hebe)	fantail, tui, finches, magpie,	Road and baches through this patch of forest. Mature pine trees associated with baches a likely threat.	
TH 008-1	NV - moderate		8.5	ecosystem	DOC	Conservation Park	part Rimutaka FP	cliff; colluvial hillslope (coastal and river cliffs below Wharekahau Station)	mosaic of **flaxland,** coastal **shrubland, scrub** and sedges in seepages	spur-winged plover, black-backed gull, magpie	Gorse infestations. Baches introduce weeds and ATV damage	
TH 008-2	NV - moderate		10.1	ecosystem	DOC	Conservation Park	part Rimutaka FP	cliff; colluvial hillslope (coastal and river cliffs below Wharekahau Station)	mosaic of **flaxland,** coastal **shrubland, scrub** and sedges in seepages			
TOTAL AREA			**101.3**									
TOTAL ECODOMAIN (within coastal zone)			**270.0**									
PERCENTAGE AREA			**38**									
OB 001-1	NV - moderate		5.7	ecosystem	private			cliff; colluvial hillslope (coastal and river cliffs below Wharekahau Station)	mosaic of **flaxland,** coastal **shrubland, scrub** and sedges in seepages			
OB 001-2	NV - moderate		2.1	ecosystem	private			cliff; colluvial hillslope (coastal and river cliffs below Wharekahau Station)	mosaic of **flaxland,** coastal **shrubland, scrub** and sedges in seepages			
OB 001-3	NV - moderate		9.2	ecosystem	DOC	Stewardship	DOC-1266	cliff; colluvial hillslope (coastal and river cliffs below Wharekahau Station)	mosaic of **flaxland,** coastal **shrubland, scrub** and sedges in seepages			

Area code	Significance rating	Field Note	Approx. area (ha)	Key Values	Tenure	Protection Status	DOC ECOLSITES reference	Landform	Vegetation / processes	Wildlife	Notes about conditions and threats requiring management	Buffer recommendations
OB 002	OV - extreme CP-extreme		0.7	threatened plant; coastal process	DOC	Stewardship	DOC-1266	dune	pingao scattered on **sandfield** drift against cliff		4WD damage	
OB 003	NV-moderate		1.4	ecosystem	private		DOC-1269, 2325	cliff	small pocket of **forest** above the Wharepapa River of ngaio, karaka, titoki, kawakawa, taupata, Olearia paniculata, mahoe, surrounded by pines, willows and poplars	unknown	**Potential** for fire and weeds from bach habitation. Exotic tree competition	
OB 004-1	OV-extreme WH-extreme CP-extreme	NOT VISITED	28.0	threatened spp; ecosystem; landform	mostly private; minor road reserve	candidate for RAMSAR	part DOC-1519	gravel beach; sand flats; open water	backswamp wetland fringed by Plagianthus **shrubland;** backdune with **sandfield** of Carex pumila, spinifex, occ pingao, knobby clubrush and weeds; foreshore **gravelfield** with driftwood	swallow, hawk, spur-winged plover, white faced heron, fantail, pipit, caspian tern+	Weeds, primarily gorse, boxthorn, lupin 4WD damage	
OB 004-2	OV-moderate WH-extreme CP-extreme	NOT ENTERED	101.6	threatened spp; ecosystem; landform	DOC	Stewardship	DOC-579	shingle beach; beach ridge; sand flats; backswamp	backswamp wetland fringed by Plagianthus **shrubland;** backdune with **sandfield** of Carex pumila, spinifex, occ pingao, knobby clubrush and weeds; foreshore **gravelfield** with driftwood	little black shag, pipit, goldfinch, white faced heron, swallow, starlings, gulls, feral pigeon, caspian tern+, banded dotterel+	Weeds, primarily gorse, boxthorn, lupin 4WD damage	
OB 005	NV-moderate	NOT VISITED	4.5	ecosystem	mostly private; minor road reserve		part DOC-1519	gully	kanuka **treeland,** mahoe-dominated **scrub**	unknown		
OB 006	CP-extreme		39.4	coastal processes	DOC	Stewardship: Ocean Beach Conservation Area	part DOC-2321	shingle beach and coastal terrace	marram **grassland**		4WD damage, weeds	
OB 007	CP-high		18.9	coastal processes	DOC	Stewardship: Lake Wairarapa Wetland	DOC-627	bar	**sandfield; shrubland** of gorse		4WD damage, weeds	
TOTAL AREA			**211.5**									
TOTAL ECODOMAIN (within coastal zone)			**424.0**									
%			**49.9**									
LF 001	NV-extreme	NOT VISITED	19.0	ecosystem	DOC	Stewardship: Lake Wairarapa Wetland	DOC-?	waterlogged sandplain	**rushland** and **shrubland** of *Plagianthus divaricatus*	unknown		Avoid changes to hydrology.
LF 002	WH-extreme OV-high	NOT VISITED	13.0	wildlife habitat	part Council Reserve, part private		DOC-2320	waterlogged sandplain	**saltmarsh**	breeding ground for banded dotterel+ and inanga		Avoid changes to hydrology. No settlement. No trees.
LF 003	WH-extreme OV-high	NOT ENTERED	11.7	wildlife habitat; rare species	part District Council Reserve	candidate for RAMSAR	DOC-2319	wetland	**rushland, sedgeland**			
TOTAL AREA			**43.7**									
TOTAL ECODOMAIN (within coastal zone)			**194.0**									
%			**22.5**									
WH(b) 001	NV-high CP-extreme		24.0	ecosystem; coastal process	private			cliff; windblown sand; dune; shingle beach	On cliffs a mosaic of exotic **grassland; scrubland** of manuka, tauhinu, taupata, Olearia solandri; **grassland** of silver tussock, toetoe; **flaxland.** On dunes a **sandfield** dominated by spinifex and bunnytail	none seen	grazing and weeds	
WH(b) 002	OV - extreme NV-high CP-extreme		23.0	threatened spp; terrestrial and aquatic ecosystems; coastal process	private		DOC-1387	river terrace; cliff; stream channel; sand beach	**grassland / sandfield** on dunes of marram, spinifex and pingao; **reedland** dominated by raupo along stream and wetland; silver tussock dominated **grassland** on bluffs	paradise shelduck, thrush, kingfisher	weeds - primarily gorse, pampas Ggarden escapes near the baches 4WD damage	
WH(b) 003	NV-high		23.5	ecosystem	private			bedrock steepland (soft, eroding; wind-blown sand drifts); sand beach	on cliff face sand drifts, a **grassland** dominated by exotic spp but significant silver tussock, toetoe; flax and cabbage trees throughout. On the beach a **sandfield** dominated by spinifex - driftwood	pukeko, paradise shelduck, australasian hawk, starling, magpie	4WD (4WD have driven away dotterels; fewer pied stilts now - local pers comm); Gorse Grazing (not fenced off)	
WH(a) 004	OV-extreme	NOT VISITED	61.7	ecosystem	DOC	Stewardship		cliff (soft, eroding); sand beach	Coastal **scrub** in gullies of kohuhu, five finger, mahoe, tauhinu, ngaio, akiraho, koromiko, titoki, kanuka, tree fern etc. native species scattered through grassland and shrubland on lower slopes		Gorse biggest threat to plant communities. The area is fenced off (also too steep for stock)	

Area code	Significance rating	Field Note	Approx. area (ha)	Key Values	Tenure	Protection Status	DOC ECOLSITES reference	Landform	Vegetation / processes	Wildlife	Notes about conditions and threats requiring management	Buffer recommendations
WH(a) 005	NV-high		44.0	ecosystem	DOC	part Aorangi Conservation Park, part Scenic Reserve	DOC-321	bedrock steepland; cliff; colluvial hillslope	mosaic of regenerating vegetation and exotic grassland; **scrub** dominated by manuka, kanuka, kowhai, cabbage tree, native broom, tauhinu.	black backed gull	Mosaic of pine plantation and pasture in close proximity. Gorse (nearby stream-mouth choked with willow and gorse) Willows scattered throughout. Conifers around houses. Erosion induced by past landuses	
TOTAL AREA			176.2									
TOTAL ECODOMAIN (within coastal zone)			889									
%			**19.8**									
TH-NG(b) 001	NV-extreme		19.0	ecosystem	mostly private; minor Council esplanade reserve			sandfield - gravelfield with rock outcrops	**Grassland** on flat area dominated with exotic species, but with scattered native shrubs and herbs including Muehlenbeckia complexa, Melicytus crassifolius, native broom, Pimelea prostrata, Acaena spp. Raoulia spp, Calystegia. **Gravelfield** of raised mounds closer to beach, with Poa spp, Pimelea prostrata, Raoulia, knobby clubrush and bunnytail; **Sandfield** on foredunes dominated by spinifex.	Giant grasshoppers! Spur-winged plover	4WD damage Weeds include lupin, garden escapes e.g. Euphorbia and wild rose. Rubbish (apparently a party site, so fire may also be a threat). Past grazing?	No settlement. No invasive woody exotics. Weed infestation control.
TH-NG(b) 002	OV - extreme		30.7	ecosystem; threatened spp.	mostly private; minor road reserve and Council esplanade reserve		DOC-325	dune; sandfield	Mosaic of blowouts, stable spinifex, pingao and Carex pumila **grassland** on dunes and oioi **rushland** on boggy ground. Other species include meuhlenbeckia complexa, knobby clubrush	finches	Recently fenced. Nearby willows may have been killed?	
TH-NG(a) 003	WL-high	NOT VISITED	3.0	wildlife habitat - gull colony	private; minor Council esplanade reserve		DOC-500		?	red-billed gulls. SSWI - moderate		
TOTAL AREA			**52.7**									
TOTAL ECODOMAIN (within coastal zone)			**574.0**									
%			**9.2**									
CPE 001	WH - high		24.5	wildlife habitat	private		DOC-594	rock stacks; rocky point	NOTE plant of National Concern Muehlenbeckia ephedroides	seabirds fur seal	Disturbance from recreational use (4WD access tracks)	
CPE 002	NV-high		69.7	ecosystem; landform			mostly in Aorangi Park	bedrock steepland; cliff; colluvial steepland	**shrubland** dominated by manuka, tauhinu**; rockland**	unknown	boxthorn associated with nearby baches and grazed land	Still open scrub regeneration, so susceptible to weed invasion until canopy closes. No woody exotics. Manage fire risk.
CPE 003	WH-extreme		22.6	wildlife habitat; threatened species	District Council		includes DOC-264, 600	rock stacks; rocky point	**rockland** (and patches of indigenous **herbfield** including threatened species)	fur seal		
CPE 004	NV-extreme		2.9	ecosystem	DOC	Conservation Park	Aorangi Park	bedrock steepland; cliff; colluvial steepland	**shrubland; rockland** and extraordinary numbers of cabbage trees throughout	unknown		
CPE 005	OV-extreme NV-extreme		15.0	ecosystem	DOC	Conservation Park	Aorangi Park	bedrock hillslope; coastal terrace with rock outcrops	on colluvial toeslope a **scrub** of tauhinu, *Olearia solandri* , bracken, *Phormium cookianum, Meuhlenbeckia complexa, Coprosma propinqua* , toetoe and *Coriaria arbore* a. On the terrace, amongst rock outcrops, a mosaic of **reedland** (raupo, *Phormium tenax* , *Cyperus ustulatus*) and **shrubland** with notable presence of herbs, ferns, lichens and mosses. *Melicytus crassifolius* associated with rock outcrops.	none seen	Currently weed free and low browse. Very good condition.	
CPE 006	NV-extreme / moderate		57.9	ecosystem	DOC	Conservation Park	Aorangi Park	bedrock steepland; fan; cliff;	**scrub,** on hillslopes dominated by kanuka, on fan dominated by manuka; **rockland** with scattered flax and cabbage tree dominating. The association on the fan is the least significant in terms of ecological integrity and naturalness	unknown		

Area code	Significance rating	Field Note	Approx. area (ha)	Key Values	Tenure	Protection Status	DOC ECOLSITES reference	Landform	Vegetation / processes	Wildlife	Notes about conditions and threats requiring management	Buffer recommendations
CPE 007	CP-extreme OV-extreme	Ngapotiki fan	63.8	ecosystem; landform	DOC	Conservation Park	Aorangi Park	bedrock steepland; fan; cliff;	on upper hillslopes, **rockland** with flax, bracken and manuka dominating vegetation; on midslopes there is a mosaic of **scrub** dominated by manuka and cabbage trees on spurs, ngaio and kanuka in guts; on lower slopes **flaxland** and **fernland** mix with cabbage trees; on fan there is a **stonefield** with successional colonisation of ground herbs (*Raoulia* and *Pimelea prostrata*), grasses (silver tussock and knobby clubrish) and open **shrubland** of tauhinu, kanuka, *Clematis forsteri*, *Coprosma rhamnoides* and *Meuhlenbeckia complexa*.	none seen	Currently weed free and low browse. Very good condition.	
CPE 008	NV-high		32.3	ecosystem	DOC	Conservation Park	part Aorangi Park	bedrock steepland; colluvial steepland	**scrub** dominated by manuka and kanuka but with a notable proportion of other mature-first-sere species	rabbits not fenced off	Currently grazed by stock and browsed by pests. Has good recovery potential, however, and is already a diverse vegetation. Boxthorn has a strong presence in the vicinity, mostly towards the northern end associated with buildings and farmland	
TOTAL AREA			**288.7**									
TOTAL ECODOMAIN (within coastal zone)			**772.0**									
%			**37.4**									
WR 001	NV-high WH-moderate	White Rock	31.5	ecosystem; wildlife habitat; threatened species	mostly private; minor Council esplanade reserve and accretion; small parcel of "unclassified Reserve - DOC" at base of White Rock		DOC-2316	coastal terrace; sand beach; wetlands	**shrubland** of *Meuhlenbeckia complexa* and taupata; **rushland;** (foredunes have marram grassland)	Shag colony on White Rock; starling, pied stilt, greenfinch, pipit, paradise shelduck, black-backed gull, oystercatcher, swallow, banded dotterel+	Grazed, but likely to recover well if released from grazing. Rabbits. Boxthorn present associated with camping area at base of White Rock. Seasonal disturbance from recreational visitors.	No settlement. No plantation. No invasive woody exotics.
WR 002	WH-moderate CP-moderate		25.8	wildlife habitat; coastal process	mostly private; minor road reserve and Council esplanade reserve		DOC-96	lagoon; shingle beach; river terrace	pasture; *Carex pumila* alongside estuary	Dotterel (sp?)+ black swan, paradise shelduck, swallow, pied stilt, black-backed gull	area is grazed and 4WD have access	
WR 003	OV-moderate WH-high		4.4	wildlife habitat	part private; part Council Esplanade Reserve		DOC-602	coastal terrace; rock outcrops	pasture; narrow zone of coastal **herbfield** of *Samulus, Selliera, Plantago* etc and **boulderfield**	Fur seal Colony of seabirds (spp unknown), finches	Weeds include thistle and Calefornian poppy.	
TOTAL AREA			**61.7**									
TOTAL ECODOMAIN (within coastal zone)			**422.0**									
%			**14.6**									
WR-HR(c) 001-1	NV-extreme		4.5	ecosystem	part private; part Council Esplanade Reserve		DOC-602	coastal terrace	Mosaic on marine terraces of **grassland** (exotic), **reedland, rushland** and open water. Rock outcrops have associated shrubs and ferns. Zonation of species with respect to waterlogging is distinct.	Fur seal spur-winged plover, small (white faced) shag	Grazed (sheep present). Waterlogging minimises browse. Low weed presence (mostly thistles and pasture grasses). Farm tracks disrupt vegetation	No plantation. No invasive woody exotics.
WR-HR(c) 001-2	NV-extreme		13.4	ecosystem	part private; part Council Esplanade Reserve		DOC-602	coastal terrace	Mosaic on marine terraces of **grassland** (exotic), **reedland, rushland** and open water. Rock outcrops have associated shrubs and ferns. Zonation of species with respect to waterlogging is distinct.	Fur seal spur-winged plover, small (white faced) shag	Grazed (sheep present). Waterlogging minimises browse. Low weed presence (mostly thistles and pasture grasses). Farm tracks disrupt vegetation	
WR-HR(c) 001-3	NV-moderate		14.9	ecosystem	mostly private; part Council Esplanade Reserve		DOC-1638	coastal terrace	**sedgelend** dominated by *Cyperus ustulatus* with occassional cabbage tree and patches of Juncus spp.	none seen	Grazed.	
WR-HR(c) 002	NV-moderate	NOT ENTERED	1.8	ecosystem	private			gully in bedrock steepland	coastal **treeland** - probably dominated by ngaio.	refer DOC	Grazed	
WR-HR(c) 003-1	NV-high	NOT ENTERED	5.2	ecosystem	private		DOC-595, 1632	bedrock steepland	coastal **forest** dominated by kanuka, kowhai, ngaio, tauhinu with karaka groves at base of slope (latter not included)	refer DOC	Grazed	
WR-HR(c) 003-2	NV-high	NOT ENTERED	4.4	ecosystem	private		DOC-1634	bedrock steepland	coastal **forest** dominated by kanuka, kowhai, ngaio, tauhinu with karaka groves at base of slope; **scrub** dominated by kanuka, tauhinu etc	refer DOC		
WR-HR(c) 004	NV-high	NOT ENTERED	0.6	ecosystem	private		DOC-1633	coastal terrace - wetland	**reedland/flaxland** (raupo/flax) in wetland behind beach ridge	refer DOC		Vegetative buffer to reduce influence of grazing, run-off and topdressing.

Area code	Significance rating	Field Note	Approx. area (ha)	Key Values	Tenure	Protection Status	DOC ECOLSITES reference	Landform	Vegetation / processes	Wildlife	Notes about conditions and threats requiring management	Buffer recommendations
WR-HR(c) 005	NV-high	Te Oroi NOT ENTERED	6.0	ecosystem	private		DOC-1666	coastal terrace - wetland	**sedgeland / flaxland** pockets on coastal terrace		main areas of interest are fenced off - recovering from grazing?	Vegetative buffer to reduce influence of grazing, run-off and topdressing.
WR-HR(c) 006	OV-extreme	Tora Bush NOT ENTERED	7.0	ecosystem	private		DOC-596	bedrock steepland	coastal **forest** with understorey, canopy dominated by ngaio, karaka, five finger with cabbage tree, tree ferns	unknown	Fenced. Possum probably only major threat.	
WR-HR(c) 007	WH-moderate		2.6	wildlife habitat	mostly DOC Esplanade Reserve; minor private		DOC-629	coastal terrace		fur seal		(see 020) No settlement.
WR-HR(c) 008	WH-extreme		0.8	wildlife habitat	offshore			rock stack		shag colony		
WR-HR(c) 009	WH-moderate CP-high	Te Awaiti Stn	7.5	wildlife habitat; coastal process	mostly private; minor road reserve		DOC 99	estuary and bar		oystercatcher, small black shag, swallow, white faced heron	Recreational use high; degraded habitat fringing waterway	No settlement, for wildlife protection (note that there already is both permanent and seasonal habitation. Pets should be controlled). Riparian habitat protection. No invasive woody species near dunes.
WR-HR(b) 010	WH-moderate CP-extreme	Rerewhakaitu Rv	1.7	wildlife habitat; coastal process	private			rivermouth and black sand bar; rock stack	sandfield; rock outcrop	black shag (colony on rock stack), swallow, paradise shelduck	Grazed. Riparian habitat greatly degraded.	No settlement, for wildlife protection. Riparian habitat protection.
WR-HR(b) 011	OV-moderate NV-extreme - high CP-extreme		125.3	ecosystem; threatened spp; coastal process	private; Council Esplanade Rreserve; DOC	includes Pahaoa Scientific Reserve	includes DOC-2057, 598, 597, 2351	bedrock steepland, colluvial bedrock, fan, dune, coastal rocks	On stable slopes and in gullies, coastal **treeland** dominated by karaka, *Olearia paniculata* , mahoe, cabbage tree and kawakawa. On unstable slopes, **rockfield** and **shrubland** with exotic grasses dominating but diverse regeneration of tauhinu, bracken, *Phormium cookianum* , *Coprosma propinqua, Meuhlenbeckia complexa* with ferns, herbs. **Grassland** on foredunes and wind-blown sand drifts against cliffs are dominated by marram, but substantive areas of spinifex and pingao and sand coprosma throughout. On fan there is a **stonefield** successional vegetation of Raoulia, manuka, kanuka, sand coprosma, silver tussock and rushes.	tui, bellbird, rironiro, finches	Hillslopes are grazed but only lightly, and shrubland would recover well. Forest is lacking understorey and may not recover well without intervention. Dunes have been fenced off but boat launching facilities have destroyed areas at the Karingaringa Reef point. Baches in the vicinity have exotic weeds which are spreading, posing major threat to grassland and shrubland vegetation. Possums are being poisoned in karaka groves.	(see also 012, 013) To protect grassland and shrubland areas : no settlement (note that there is already bach accomodation and fishing facilities); no invasive woody species (including pine); no plantation.
WR-HR(b) 012	NV-high OV-moderate	NOT ENTERED	0.9	ecosystem; threatened species	mostly private; minor Council Esplanade Reserve		DOC 2056	damp depression	flax reedland	unknown	Grazed	(see also 011, 013) Vegetative buffer to reduce influence of grazing, run-off and topdressing.
WR-HR(b) 013	OV-extreme WH-extreme CP-extreme		9.6	ecosystem; threatened spp; wildlife habitat	private		DOC 2055	duneland (foredune, sand plain, slack); rock outcrop	**grassland** of pingao, spinifex and only minor marram on black sand foredunes; **shinglefield** with raoulia, knobby clubrush and Carex pumila on flats behind dunes	goldfinch, variable oystercatcher, black shag, pipit, pied stilt, red billed gull, welcome swallow, spur-winged plover	4WD access tracks as well as threat of untracked access. Grazed by stock and browsed by rabbits. Marram infestation likely.	(see also 011, 012) To protect from weeds, pollution and animal pests : no settlement (note there is already bach accomodation - weed, fire and pets risk must be managed); no invasive woody species (including pine); no plantation; no road access
WR-HR(a) 014	NV-high		1.6	ecosystem; threatened spp	private			colluvial steepland	**treeland** of karaka, ngaio, mahoe with shrubs including Brachyglottis greyii	unknown	Grazed	
WR-HR(a) 015	WH-extreme	Glendhu	5.3	wildlife habitat	private		DOC-2063	rock stacks		fur seal little black shag roost, black backed gull, magpie, white faced heron, pipit		Management of disturbance and pets to protect wildlife.
WR-HR(a) 016-1	NV-extreme CP-high		36.5	ecosystem; coastal process	private		DOC-2298	coastal terrace; residual hillslope; duneland (drifts at base of hillslopes)	**scrub** dominated by manuka, kanuka, tauhinu, Olearia solandri; **shrubland** dominated by manuka, Olearia solandri, tauhinu, bracken; **flaxland** on bluffs; **treeland** clusters of karaka; sandfield (blowout)	unknown	Large scale regeneration - possum browse probably main threat. Little sign of weeds. These areas are connected by initial sere of tauhinu regeneration across a large area of hillsides; Blowout in duneland appears to have been caused by access track destabilisation. There are a number of baches possibly presenting a fire risk..	
WR-HR(a) 016-2	NV-extreme		2.4	ecosystem	private		DOC-2298	residual hillslope	**treeland** clusters of karaka; **scrub** dominated by manuka-kanuka	unknown	Large scale regeneration - possum browse probably main threat. Little sign of weeds. These areas are connected by initial sere of tauhinu regeneration across a large area of hillsides	
WR-HR(a) 017	CP-moderate		28.0	coastal process	private			duneland; coastal terrace	**Grassland** (marram and knobby clubrush); **stonefield** and **rushland** on landforms created by wind-blown sand and silts. Sequence from eroding dune foreshore through slack to sand drifts against foothills	paradise shelduck, pipit, little black shag, crickets	Grazed. Slack vegetation heavily pugged. Road passes through middle of sequence.	

Area code	Significance rating	Field Note	Approx. area (ha)	Key Values	Tenure	Protection Status	DOC ECOLSITES reference	Landform	Vegetation / processes	Wildlife	Notes about conditions and threats requiring management	Buffer recommendations
WR-HR(a) 018	WH-extreme OV-moderate NV-moderate CP-moderate	Honeycomb Rk	10.9	ecosystem; threatened species; wildlife habitat; coastal process	private		DOC-603, 604	coastal terrace with wetlands; rock stack	Foredune **grassland** dominated by marram with spinifex and pingao**;** terrace wetlands with dense mix of exotic grasses and Cyperus ustulatus or raupo or knobby clubrush **rushland-reedland** (one has been artificially deepened to become open water**)**, occasional coastal flax; scattered flax, tauhinu and cabbage tree on grazed terrace at foot of hills; **herbfield** and ferms in rock stacks.	fur seal hawk, pipit, little black shag, black backed gull, paradise shelduck	Grazed, and grassed access track runs along beach ridge, disrupting process sequence. Pastural invasive weeds competing with natives. Wetland vegetation heavily pugged. Heavy recreational use.	No habitation.
WR-HR(a) 019	CP-high NV-moderate	NOT ENTERED	0.8	coastal process	private		DOC--2290	duneland; shingle beach; reef	**grassland** of marram and spinifex on dunes; **shinglefield** foreshore	black backed gull	Grazed	
WR-HR(c) 020	CP-moderate		10.6	coastal process			DOC-35	rivermouth - bar; duneland; coastal terrace	marram **grassland** on foredune; black sandfield on bar; pasture	katipo+	Grazed; ATV access; recreational trampling and disturbance.	(see 007) No settlement. Riparian habitat protection.
WR-HR (b) 021	WH-moderate	NOT ENTERED Pahaoa River	25.9	wildlife habitat	private; Crown		DOC-599	river				
TOTAL AREA			**328.2**									
TOTAL ECODOMAIN (within coastal zone)			**2387.0**									
%			**13.7**									
GL-FP 001	OV-moderate WH-high		13.0	threatened spp; wildlife habitat	private		DOC-2289, 907	progradation plain with rock outcrops	**grassland** (marram and exotic grasses) - includes *Meuhlenbeckia astonii (endangered)* and Crassula peduncularis (threatened) **rushland** in poorly drained areas; **sandfield**	seal pipit, paradise shelduck	Grazed (although light grazing may enhance habitat for Crassula); easy 4WD access because flat; boxthorn is present	No habitation.
GL-FP 002-1	CP-moderate NV-moderate	NOT ENTERED	2.0	coastal process	private		DOC-1976	coastal terrace wetland	Raupo **rushland** in coastal terrace wetland. This is a rare wetland vegetation type although probably induced.	paradise shelduck, pipit	Grazed. Boxthorn abundant in vicinity and wildling pines spreading down valleys. Nutrient enrichment likely.	Vegetative buffer to reduce influence of grazing, run-off and topdressing.
GL-FP 002-2	CP-moderate NV-moderate	NOT ENTERED	1.1	coastal process; ecosystem	private			coastal terrace wetland (behind beach ridge); open water	**Rushland**	unknown	Grazed. Boxthorn abundant in vicinity and wildling pines spreading down valleys. Nutrient enrichment likely.	Vegetative buffer to reduce influence of grazing, run-off and topdressing.
GL-FP 003	NV-high		7.1	ecosystem	private		DOC-2031	colluvial and residual hillslope	closed **forest** canopy ansd **treeland** of karaka, ngaio, mahoe, cabbage tree and kanuka	unknown	Boxthorn present. Grazed understorey. Baches nearby.	
GL-FP 004-1	CP-moderate	NOT ENTERED	4.0	coastal process	private		DOC-899	foredune; mud 'wall' unusual natural feature	**sandfield; stonefield;** foredunes dominated by marram **grassland**	unknown	Fenced but limited scope for full dynamics of a duneland system	Avoid woody exotic vegetation especially of invasive weed species.
GL-FP 004-2	CP-moderate	NOT ENTERED	4.0	coastal process	private		DOC-2053	foredune	foredune **grassland** (marram dominated)and **rushland** in wet areas behind foredune	unknown	Fenced but limited scope for full dynamics of a duneland system	Avoid woody exotic vegetation especially of invasive weed species.
GL-FP 005	CP-moderate NV-high	NOT ENTERED	1.5	coastal process; ecosystem	private		DOC-2335, 697	coastal plain (at foot of coastal terrace)	raupo and baumea **reedland** in wetlands behind foredune (once harakeke?)	unknown	Grazed. Nutrient enrichment likely.	Vegetative buffer to reduce influence of grazing, run-off and topdressing. Avoid woody exotic vegetation especially of invasive weed species.
GL-FP 006	CP-moderate WH-moderate		49.3	coastal process; threatened species (foreshore)	private		includes DOC-896	coastal plain; drained dune slacks; rear dunes and drifts on footslopes	pasture and pine plantation	katipo+	Dynamic onshore sand accumulation probably impeded by pine plantation; wetlands have been drained for pastoral use	
GL-FP 007	CP-high OV-extreme NV-moderate	Partially VISITED	53.4	coastal process; ecosystem; threatened species	private; minor Road Reserve		DOC-1956, 881, 882, 883	duneland including slacks	foredune **grassland** dominated by marram and spinifex, with pingao, Pimelea and sand coprosma; dune slacks dominated by **rushland** and **sedgeland**	sparrow (lots), greenfinch (lots), starling, mallard, paradise shelduck, hawk, rook+, magpie, spur-winged plover, spotted skink+, katipo+.	Pines are planted nearby and are producing wildings. Nearby settlements and associated birdlife induce weed invasion (including boxthorn). Lupin is present. The area is not fenced but landuse is currently horticultural, or pastoral with indigenous areas remaining unploughed. Recent subdivision at Flat Point and horticultural landuses have destroyed both indigenous communities and natural coastal processes.	To protect dune grassland and shrubland areas from weeds, pollution and animal pests: no settlement (note that there is already bach and permanent accomodation and recent subdivision); no invasive woody species (including pine); no plantation.
GL-FP 008	CP-moderate	Partially VISITED	22.3	coastal process	private; minor Road Reserve			funedune - slack - rear dune system	mixed native and exotic **grassland-rushland-sedgeland**		Pines are planted nearby and are producing wildings. Nearby settlements and associated birdlife induce weed invasion (including boxthorn). Lupin is present. The area is not fenced. Subdivision and consequences of settlement development nearby are serious threats.	
GL-FP 009	CP-moderate NV-moderate		4.1	ecosystem	private			shingle beach ridge and foreshore; reef; dunes	wetland dominated by raupo **reedland** (diverse); marram dominated **grassland** on foredunes; brackish swamp behind beach ridge has fringe of salt-marsh ribbonwood	pipit, red billed gull, black back gull, little black shag, grey heron, oystercatcher, black swan on wetland	nutrient enrichment of wetland; grazing of other areas.	
TOTAL AREA			**161.8**									
TOTAL ECODOMAIN (within coastal zone)			**1546.0**									
%			**10.5**									

Area code	Significance rating	Field Note	Approx. area (ha)	Key Values	Tenure	Protection Status	DOC ECOLSITES reference	Landform	Vegetation / processes	Wildlife	Notes about conditions and threats requiring management	Buffer recommendations
KA 001	NV-moderate	NOT VISITED Caledonian wetland	5.9	ecosystem; threatened species	mostly private; minor Road Reserve		DOC-887	shingle beach ridge; backswamp wetland	open water fringed by **rushland** and scattered saltmarsh ribbonwood**;** marram dominated **grassland** on foredunes contains sand coprosma	black backed gull, oystercatcher	Fenced. Drained, degraded wetland.	Vegetative or management buffer to reduce influence of grazing, run-off and topdressing.
TOTAL AREA			**5.9**									
TOTAL ECODOMAIN (within coastal zone)			**165.0**									
%			**3.6**									
KW-RV 001	WH-moderate	Kaiwhata River	2.7	wildlife habitat	mostly private; minor Road Reserve		DOC-35	rivermouth	Small pockets of spinifex, sand sedge, oioi, tauhinu and manuka along fringes of rivermouth. NB petrified totara stumps along foreshore	fur seal swallow, kingfisher, oystercatcher, black swan, paradise shelduck, big black shag (colony), pied shag, little shag, black backed gull, grey duck, white faced heron, pied stilt, black fronted dotterel+	Poor surrounding habitat - pasture and small plantations	
KW-RV 002	NV-moderate		5.5	ecosystem	private		DOC-2219	cliff	seepages have toetoe, coastal flax and ground ferns	unknown	Erosion and grazing.	
KW-RV 003	CP-high WH-moderate OV-moderate	Patanui Stream	11.5	coastal process; wildlife habitat	private		DOC-107	rivermouth, bar, shingle beach ridge	estuary fringed with saltmarsh ribbonwood **shrubland** and oioi dominated **rushland.** Exotic grasses and weeds (e.g. lupin) elsewhere.	Katipo+ Big black shag, black swan, pied stilt, grey heron, swallow	Stock have access. Lupinis requiring ongoing control. Pampas hedges in the vicinity.	Vegetative or management buffer to reduce influence of grazing, run-off and topdressing. No invasive woody exotic species. No settlement.
KW-RV 004	CP-extreme OV-high	Ureti	151.7	coastal process; ecosystem; threatened species	private north to northing 06; District Council Reserve with DOC Esplanade Reserve from 06 to Riversdale township.	Council Reserve - confirm status	DOC-771, 825	duneland system including foredunes, slacks, reardunes; estuary	**grasslands** on foredune and coastal platform dominated by marram but also containing spinifex, pingao, occasional matagouri, sand pimelea and native bindweed; estuary fringed with saltmarsh ribbonwood **shrubland;** slacks have raupo-swamp flax-toetoe **reedland**	Big black shag, goldfinch,	Weeds include boxthorn, acacia, boneseed and pine wildings, especially in proximity to settlements. Karo has been planted at road ends and will probably behave as a weed. Road access for boat launching and ATVs is causing or exacerbating erosion (blowouts).	To protect dune grassland, shrubland and reedland areas from weeds, pollution and animal pests: no settlement (note that there is already habitation - care should be taken with choice of trees and garden weed escapes); no invasive woody species (including pine, karo); no plantation.
KW-RV 005	CP-moderate	Riversdale	44.2	coastal process	mostly private; Council Esplanade Reserve		includes DOC- 770	sand beach, foredune, estuary, bar	marram dominated **grassland** on foredune;	red billed gull, black backed gull	ATV access. Trampling causing erosion. Habitat potential of estuary low.	
KW-RV 006	OV-moderate	Riversdale	5.3	coastal process; ecosystem	private		includes DOC-807	foredune and dune slack; estuary fringe	saltmarsh ribbonwood **shrubland** fringes estuary; stable indigenous **shrubland** and **grassland** on dune	unknown	Grazing. Trampling causing erosion. Habitat potential of estuary low. Pine plantation in close proximity.	
KW-RV 007	OV-moderate	nth Riversdale	2.1	coastal process; ecosystem	accretion		DOC-1978	foredune and dune slack	sedgeland-reedland dominated by raupo, swamp flax	kingfisher, spur-winged plover nearby, magpie		Vegetative or management buffer to reduce influence of grazing, run-off and topdressing, or soil chemistry effects of plantation.
TOTAL AREA			**223.0**									
TOTAL ECODOMAIN (within coastal zone)			**1015.0**									
%			**22.0**									
RV-CP 001	CP-moderate OV-high		24.0	coastal process; ecosystem	private; minor Council esplanade reserve		DOC-826, 806	coastal terrace, duneland, rock outcrop	Dense populations of sand coprosma throughout dune **grassland** (including dune drifts against hillslopes), and in **shrubland-sandfield** on point		Grazed. Rabbits. Open vegetation prone to weed infestation.	To protect dune grassland and shrubland areas from weeds and animal pests: no settlement; no invasive woody species; no plantation.
RV-CP 002	OV-moderate	NOT ENTERED	1.1	ecosystem	private			residual hillslope	small **forest** canopy remnant? Appears to be predominantly ngaio.	unknown	Surrounding pine plantation offers protection.	
RV-CP 003	CP-moderate NV-moderate		4.9	coastal process; ecosystem	private; minor Council esplanade reserve		DOC-2183	coastal terrace; foredune; dune slack;	marram dominated grassland on foredune (some sand coprosma); wetland dominated by raupo, with swamp flax	sparrow, goldfinch, kingfisher, pipit	Grazed, and only narrow strip between road and sea. Enrichment of wetland.	
RV-CP 004	CP-moderate	Whareama River	13.0	coastal process	private; minor Council esplanade reserve		DOC-2169	coastal terrace; foredune; dune slack; open water	Foredunes have mosaic of spinifex or marram dominated **grassland;** sedgeland and **rushland-sedgeland** associated with ephemeral wetlands and fringing open water.	pipit, hawk	Grazed. Rabbits. Open vegetation susceptible to weed infestation (shrubby weeds associated with settlement present). Open water is eutrophic.	
RV-CP 005-1	CP-extreme OV-moderate	Otahome	22.5	coastal process; ecosystem; threatened species	private		DOC-814	duneland	mosiac of marram **grassland** and sand coprosma and rush **shrubland** on foredunes; exotic pasture **grassland** and **fernland** (bracken) on rear dunes**.** Occasional indigenous grasses and shrubs throughout.		Grazed. Weed infestation including wilding pines.	To protect dune grassland areas from weeds: no settlement (note there is already permanent and bach habitation - care should be taken in choosing tree species and with garden weed escapes); no invasive woody species; no plantation.

Area code	Significance rating	Field Note	Approx. area (ha)	Key Values	Tenure	Protection Status	DOC ECOLSITES reference	Landform	Vegetation / processes	Wildlife	Notes about conditions and threats requiring management	Buffer recommendations
RV-CP 005-2	CP-extreme OV-moderate	Otahome	9.3	coastal process; ecosystem; threatened species	private		DOC-814 (part)	duneland; creek	foredune **grassland** of spinifex, marram, sand coprosma, pingao, knobby clubrush, pohuehue; saltmarsh ribbonwood **shrubland** and **rushland** fringing streams.	katipo+; lizards	Area more restricted than for RV-CP 005-1. Part grazed, part fenced off Queens Chain. Weed infestation e.g. boxthorn.	To protect dune grassland and shrubland areas from weeds and animal pests: no settlement; no invasive woody species; no plantation.
RV-CP 006	WH-moderate NV-moderate		0.6	ecosystem	private		DOC 2181	residual hillslope	**treeland** of aged kanuka	fantail, goldfinch, magpie, yellowhammer	Grazed. Site is moist and sheltered so vegetation could respond well to management.	
RV-CP 007	OV-high		5.7	ecosystem	private; minor Council esplanade reserve		DOC-2176	cliff	mosaic of exotic grassland and indigenous **herbfield-grassland**, with Cortaderia fulvida, coastal flax, silver tussock, NZ iceplant etc	unknown	Self-protecting to a large degree.	
RV-CP 008	WH-moderate	Whareama River	9.2	wildlife habitat	part private part Esplanade Reserve		DOC-168	river				
TOTAL AREA			**90.3**									
TOTAL ECODOMAIN (within coastal zone)			**1200.0**									
%			**7.5**									
CP 001	CP-high OV-high NV-high	Castlepoint	14.4	coastal process; ecosystem; threatened species	DOC	Scenic Reserve	DOC-834	duneland; sand flats	dunes have marram-spinifex **grassland** with sand pimelea**, sand coprosma and pingao;** sandfield	unknown	Trampling and ATV pressure; weeds especially settlement-related species such as kikuyu, Tasmanian ngaio, tree lupin. Very large starling population.	To protect dune grassland areas from weeds: no settlement (note there is already permanent and bach habitation - care should be taken in choosing tree species and with garden weed escapes); no invasive woody species; no plantation (note there is a plantation within this buffer zone which provides a major starling roost).
CP 002	OV-extreme WH-high	Castlepoint	6.0	ecosystem; threatened species	DOC	Scenic Reserve	DOC-822	cliff, rock stack	**shrubland** and **herbfield**		Trampling; built structures	
CP 003	OV-high	Castle Rock	6.8	ecosystem; threatened species	DOC	Scenic Reserve	DOC-823	cliff, rock stack	**shrubland** and **herbfield**			
TOTAL AREA			**27.2**									
TOTAL ECODOMAIN (within coastal zone)			**96.0**									
%			**28.3**									
CP-MK(c) 001	CP-moderate		34.0	coastal process	private; minor Council esplanade reserve		DOC-805, 2190	duneland; estuary-bar	dunes dominated by marram grassland or plantation pine. Scattered taupata and coastal flax on stable dune	red billed gull, black backed gull, cat	Pines will impede the natural dune formation process; habitat quality of estuary and bar is low due to human disturbance and predation. Wilding pines beginning to spread.	
CP-MK(c) 002	CP-moderate	Okau	6.4	coastal process	Road Reserve		DOC-803	estuary-bar	dunes dominated by marram grassland		Grazed	
CP-MK(c) 003	NV-moderate		6.4	ecosystem	Council esplanade reserve; minor private		DOC-802	duneland				
CP-MK(c) 004	WH-moderate		1.9	wildlife habitat	?		DOC-757	rock stack		big black shag	close to road (dusty, disturbance?)	
TOTAL AREA			**48.7**									
TOTAL ECODOMAIN (within coastal zone)			**537.0**									
%			**9.1**									

Appendix 3
Sheet Series 1

Coastal zone

Sites of significance

Please refer to map folder bound separately

Appendix 4
Sheet Series 2

Intersection of Ecodomains with Coastal Zone

Recommended Buffer Zones (refer to Schedule 1 Appendix 2)

Photographs of coastal landscape and features for orientation (not necessarily of sites)

Please refer to map folder bound separately

Appendix 5

Vulnerabilities of Coastal Zone Habitats

VULNERABILITIES HABITAT TYPE	Climate extremes	Physical damage (storms, vehicles, erosion, trampling)	Fire	Weed invasion and/or suppression	Animal pests – competition, predation, browse	Fertility change
Forest	Dense, single tier structure intrinsically resilient to wind, drought, but on steep slopes requires edge buffering to reduce runoff and erosion.	Intrinsically resilient unless weakened by browse damage and loss of vigour	Resilient	Relatively resilient to invasion	Vulnerable to possum, goat, stock, mustelids, cats and rodents	Relatively resilient
Scrub	Relatively resilient	Resilient	Low tolerance due to inflammable nature of duff and species	Moderate vulnerability to suppression by tall trees or woody shrubs such as boxthorn (high vulnerability if scrub is of open nature)	Successional stages with broadleaf juveniles vulnerable to possum and stock browse.	Relatively resilient
Shrubland – *saltmarsh*	Resilient	Resilient	Resilient	Resilient	Resilient	Resilient
Grassland and grassland-herbfield or grassland-shrubland – *on dune*	Regenerative vigour appears to decrease with hotter, drier summers (increasing northwards)	Foredunes extremely vulnerable to substrate disturbance (e.g. blowouts induced by storms. tracks or trampling) but will 'heal' quickly where spinifex still dominates; stable rear dune vegetation extremely vulnerable to substrate disturbance and will not 'heal' quickly. Cumulative loss of driftwood removes katipo habitat.	Vulnerable	Extremely vulnerable to drought and salt-tolerant species including tree, woody shrub, grass and herb species because of intrinsically open nature of vegetation. Marram reduces habitat for katipo spiders, native herbs.	Extremely vulnerable to grazing and subsequent invasion of exotic weeds and grasses. Predation of skinks, nesting birds.	Extremely vulnerable to increase in fertility which induces exotic weeds.
Reedland, rushland, flaxland including open water – *in duneland slacks and terrace wetlands*	Resilient	Vulnerable to drainage, infilling	Resilient	Vulnerable to competition from exotic reed and rush species; vulnerable to blackberry	Wetland birds vulnerable to predation	Vulnerable to changes in fertility (e.g. loss of sundews, eutrophication and algal blooms)
Herbfield – *on shingle shore, scree*	Resilient	Vulnerable	Resilient	Vulnerable to weed invasion (especially of nitrogen-fixers and colonizers) because open habitat and frequently in colonization phase	Vulnerable to selective grazing	Vulnerable to increases in fertility encouraging exotic species
Herbfield – *on rocky shore, cliffs*	Resilient	Intrinsically less vulnerable to human activities but soft substrate cliffs prone to erosion make sites susceptible to weed invasion	Resilient	Vulnerable to weed invasion (especially of nitrogen-fixers and colonizers) because open habitat and frequently in colonization phase	Vulnerable to selective grazing	Vulnerable to increases in fertility encouraging exotic species, especially nitrogen fixers such as gorse
Sandfield, shinglefield	Resilient	Intrinsically tolerant of disturbance and should reestablish following disturbance	Resilient	Vulnerable to weed invasion (especially of nitrogen-fixers and colonizers) because open habitat and frequently in colonization phase	Vulnerable to selective grazing	Vulnerable to increases in fertility

Appendix 5 Vulnerabilities of coastal zone habitats