Nelson
State of the Environment Report

NELSON CITY COUNCIL

Coast — 2003

CONTENTS

Foreword

This is Nelson City's fifth State of the Environment Report. The focus this year is on the quality of our coastal environment which, although comparatively small in area, is of vital importance to us for cultural, recreational, economic and environmental reasons.

The report documents monitoring that Council has carried out along Nelson's coast and coastal marine area over the last few years. Key components include:

- Recreational water quality, reporting on the results of the last five years bathing water quality results and on the application of Microbiological Water Quality Guidelines (June 2003) which introduced new methods for beach grading. While results for Monaco and Tahunanui are good, other areas are of concern.

- Waimea Inlet, reporting on the results of the Waimea Inlet Survey work undertaken by Cawthron Institute with support from Nelson City Council and Tasman District Council as part of a Sustainable Management Fund project to develop estuarine monitoring protocols.

- Tahunanui Beach, where the results of the June 2003 resurvey of beach profiles and a reassessment of some of the earlier monitoring results show that, after a period of growth and erosion, current beach levels are similar to those of 1958 at either end of the beach. In the centre of the front beach, levels are the highest recorded since surveys began.

- Nelson Haven, where a variety of monitoring programmes reveal:
  - common port contaminants are below guideline levels, except at Calwell Slipway, Saltwater Creek and the Old Boat Harbour (remediation work has been undertaken at all these locations);
  - at some Port Nelson sites contamination from new antifouling paints has been detected and exceeds international guidelines; and
  - the extent and density of undaria has remained constant over the last few years.

- Limited progress with marine protected areas, with a taiapure established at Delaware Bay but a decision on the proposed North Nelson Marine Reserve still waiting for approval by Central Government.

This report ends the cycle of State of Environment reports for Nelson, which started with a general report in 1999, followed by more specific reports on land (2000), air and noise (2001), and freshwater (2002). Next year the Council will begin the cycle again reporting on the overall state of Nelson's environment.

Councillor Derek Shaw
Chair Environment and Planning Committee
Nelson City Council

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Cover photograph: Aerial view of Waimea Inlet, March 2000

INTRODUCTION - NELSON'S COASTAL ENVIRONMENT

Nelson's coastal environment includes the Coastal Marine Area and its land backdrop. The Coastal Marine Area is the area of coastal water stretching 52 km in length from the eastern Waimea Inlet to Cape Soucis, generally being the area from mean high water springs out to the 12 mile limit of the territorial sea (see Figure 1).

While the total land area administered by Nelson City Council (NCC) is comparatively small in size, the Council administers an important and varied coastal environment. This environment includes areas of high conservation, cultural, scenic, commercial, recreation and amenity values, and contains the major port in the northern South Island.

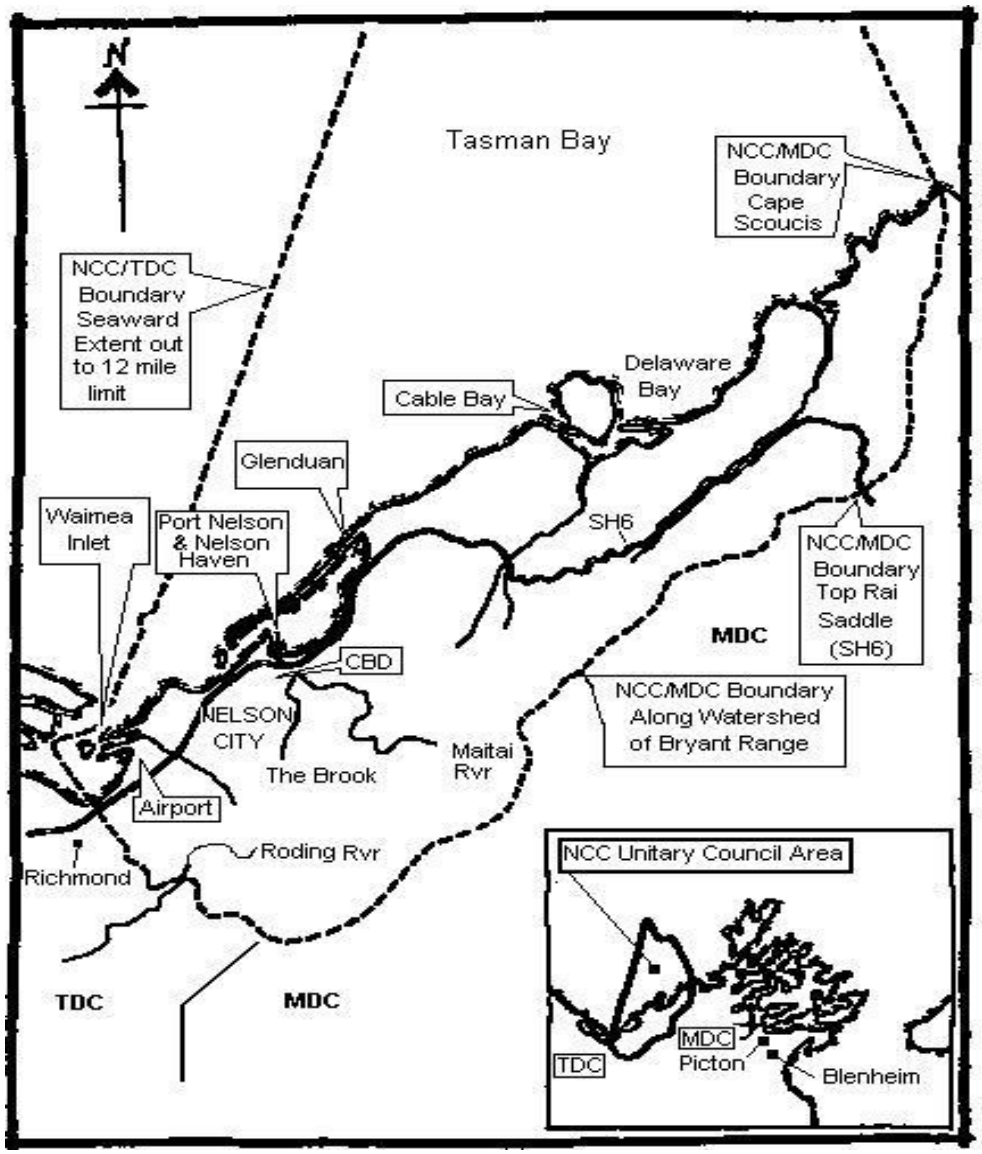


Figure 1 Coastal Nelson – the area covered by this report

WAIMEA INLET

Waimea Inlet (3455 ha) is the largest enclosed estuary in the South Island, providing sheltered intertidal habitat for a diverse range of plant, invertebrate, fish and bird life. The inlet is used for a variety of recreational activities including boating, fishing, swimming, water skiing, duck shooting and walking. The margins of the inlet have been modified by drainage and reclamation.

Tahunanui Beach, at the mouth of Waimea Inlet, is Nelson's main bathing beach. Approximately one-third of the inlet is within Nelson District; the southern and western portions of it are administered by the Tasman District Council (TDC).

NELSON HAVEN

Nelson Haven is a large (1600 ha) estuarine area also providing habitat for a diverse range of plant and animal life. The Maitai River discharges into the haven and is estuarine in its lower reaches. The margins of the haven are highly modified as a result of drainage and reclamation to create farmland (at the head of the haven), roadways, industrial land and port land. The haven possesses high recreational, scenic and amenity values.

Port Nelson

Port Nelson is located within Nelson Haven near the mouth of the Maitai River. The potential to develop a sheltered port was a key factor in the establishment of the Nelson settlement.

Today, Port Nelson is a busy and growing port. It occupies about 78 ha of land and last year handled around 2.5 million tonnes of cargo (mainly export). Forestry products made up the bulk of the total cargo (42%), with fruit being 12.5%. The main import cargo is fuel, being 13.7% of the total cargo volume. Strong growth in cargo is predicted to continue across all cargo types, reflecting growth in the region. Total tonnage is expected to exceed 3 million tonnes by 2015.

BOULDER BANK TO PEPIN ISLAND

The outer Boulder Bank extends from the entrance to Nelson Haven to the Glen (Glenduan) where it joins the coastal cliffs of Mackay Bluff, which in turn adjoin the Cable Bay and Pepin Island area. The area includes approximately 20 km of exposed rocky shore habitat, with intertidal and benthic (seabed) communities quite different from those which occur in the sheltered estuarine environments of Nelson Haven and Waimea Inlet. The Boulder Bank is a distinctive geomorphic feature probably produced by long-shore drift of boulders southwards from Mackay Bluff. It is a natural barrier, creating the harbour within Nelson. The Cable Bay area is popular for recreational pursuits such as diving, fishing and walking.

DELAWARE INLET

Delaware Inlet is a relatively unmodified inlet at the mouth of the Wakapuaka River, some 15 km north of Nelson City. It provides a sheltered estuarine habitat for a wide range of species, including some rare or endangered bird species. A large number of archaeological sites exist around the margins of the inlet. The inlet is of high value to Maori for spiritual reasons and as a traditional food gathering area. Some significant forest remnants occur in the Wakapuaka River Valley. The area is sensitive to change owing to its relatively unmodified state.

WHANGAMOA COAST

The Whangamoa Coast section of coastline stretches approximately 16 km from Delaware Inlet to Cape Soucis, and is dominated by impressive coastal cliffs falling to rock- and boulder-strewn shores and wave-cut reef platforms. The adjoining coastal waters are deep and the coastline exposed to the prevailing northerly storms. Whangamoa Inlet is a small estuarine area with high natural values. It is a wild and scenic part of the coastal environment, with limited public access and is rarely visited. Although the area is highly vulnerable to change, because of its isolation and relatively undeveloped nature, it is not currently under pressure. To date, no State of the Environment (SOE) monitoring has occurred here.

FISHERIES

The waters within Nelson's Coastal Marine Area support highly valued commercial, recreational and traditional fisheries. Responsibility for the conservation, enhancement, protection, allocation and management of all fisheries resources lies with the Minister and Ministry of Fisheries (MFish) under the Fisheries Act 1996.

The Council cannot control the harvesting or enhancement of fish populations (or any other aquatic life) where the purpose of that control is to conserve, enhance, protect, allocate or manage any fishery controlled by the Fisheries Act 1996. Nor can it control disturbance or damage to the foreshore or seabed arising from the lawful harvesting of any animal or plant. (See sections 12 and 30 of the Resource Management Act 1991 (RMA).)

Notwithstanding the above, the Council has a number of functions and responsibilities under the RMA which relate directly or indirectly to the maintenance of fisheries or to fisheries management issues. These include the overall responsibility to promote sustainable management of the district's natural resources, the allocation of coastal space (involving, among other things, the avoidance of conflict between fishing and other activities), the management of coastal water quality, habitat protection (including the protection of nursery and spawning areas) and provision for the relationship between Maori and their traditional resources.

MARINE FARMING

Currently, the only marine farming operation within the Nelson District is the Southern Scallop Enhancement Programme which covers most of Golden Bay and Tasman Bay. A Marine Farming Study, undertaken by the Nelson Bays United Council in 1984, did not identify any sites suitable for marine farming within the area now covered by this report. Following publication of the Marine Farming Study, a moratorium was placed on the issuing of leases or licences for marine farming in Tasman Bay.

The moratorium remains in place until the Regional Coastal Plan becomes operative. In the meantime, a nationwide moratorium has been placed on new marine farming applications, pending changes to the legislation. (Note that the Southern Scallop Enhancement Programme was authorised by way of special legislation.)

Figure 2 Scalloping in Tasman Bay *(photo courtesy Challenger Scallop Enhancement Company Ltd)*

Part 7 of this report outlines current law changes dealing with aquaculture and the implications for NCC.

IWI ENVIRONMENTAL PERFORMANCE INDICATORS PROJECT

To date, plans prepared by NCC and monitoring work undertaken and reported have not fully embraced traditional Iwi knowledge or values, or adequately recognised the fact that Iwi have traditionally managed these resources.

NCC is working with Iwi representatives to involve Iwi more in its environmental monitoring programmes. The process was initiated with a pilot project preparing a Tangata Whenua World View Statement. This project had three objectives:

- to prepare an agreed statement recording Iwi world views for the NCC area;
- to develop and trial a process by which NCC and Iwi can work towards developing agreed indicators for air quality, water quality, and coastal- and land-based management issues within the NCC area; and
- to identify potential funding for the development of individual indicators.

The Iwi World View Statement provides a reference point from which more specific monitoring programmes will be developed. It reflects a holistic framework and will be used to guide Iwi environmental management practices. The project is the start of what may become a far bigger project to record and give effect to Iwi knowledge and values.

HISTORY OF THE PROJECT

The project began in September 2002 and involved hui and interviews with key people from Iwi. The knowledge was recorded in a resource management-style framework suitable for inclusion within both Iwi and Council planning documents. A report was completed in July 2003 on time and within budget, and demonstrated the ability of this type of project to succeed.

During the development of the statement, it became clear that the detail it contained was important to many Iwi-related projects and in particular Iwi Management Plans. Iwi Management Plans are becoming increasingly important in resource management and now have an enhanced status under the provisions of the Local Government Act 2002. The preparation of the plan by Nelson Iwi is well advanced, and it is anticipated that the detailed contents of the Tangata Whenua World View Statement will become part of these Iwi documents.

As a pilot project, the Tangata Whenua World View Statement also recommended a process for the development of specific Iwi indicators for priority resources such as air and water. Iwi have considered these recommendations and wish to proceed with the development of specific indicators as soon as they are available. Current indications are that development of specific indicators is likely to commence during late 2003 or early 2004 .

The proposed methodology for this work follows (and is Appendix 1 of the Tangata Whenua World View Statement report).

A PROCESS FOR DEVELOPING TANGATA WHENUA ENVIRONMENTAL INDICATORS

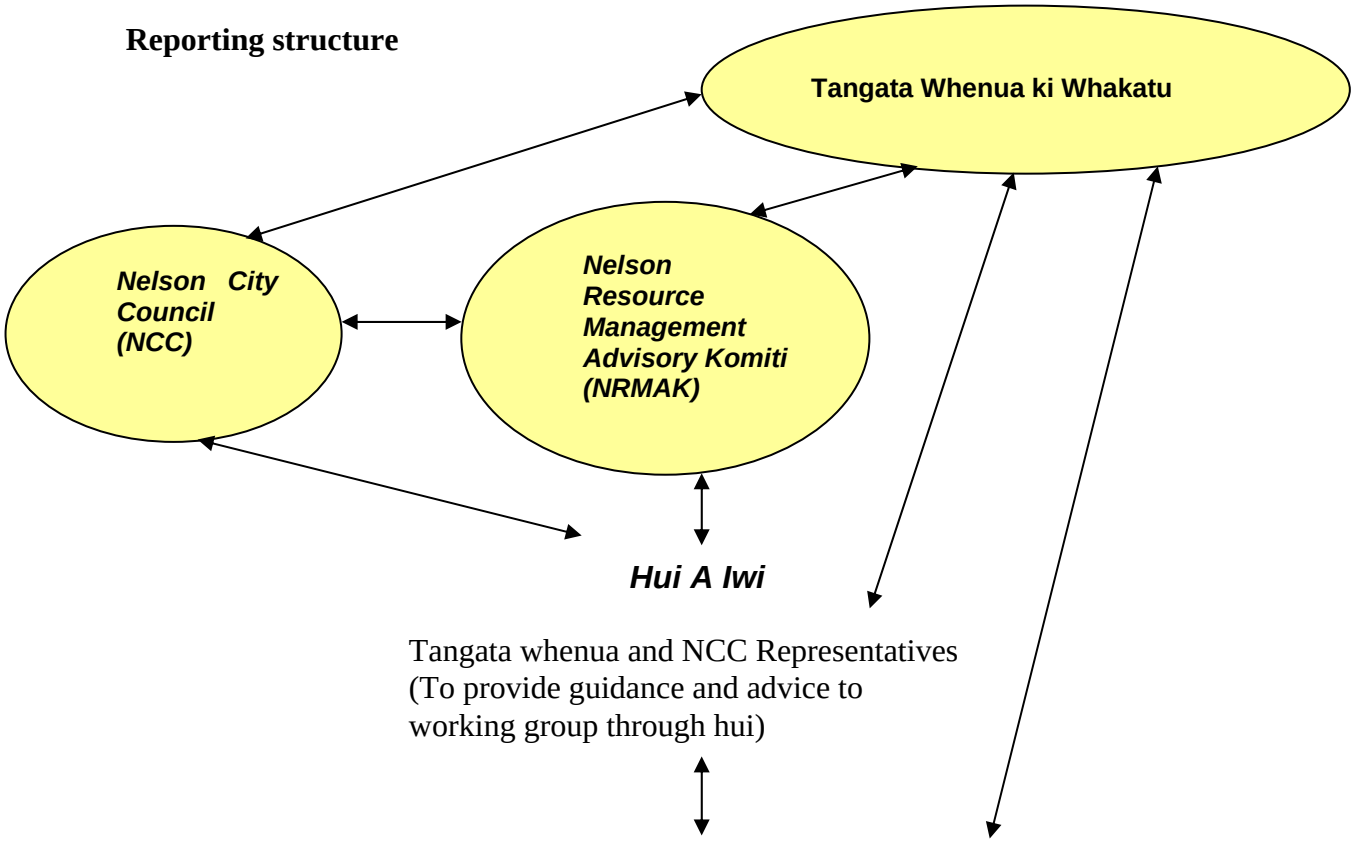
Objective

To develop a process to work towards the development of *tangata whenua* environmental indicators, which complement monitoring and reporting already being undertaken by NCC.

Purpose

- To develop agreed methods for environmental monitoring and reporting in a manner appropriate to *tangata whenua* traditional values and uses.
- To monitor natural resources according to *tangata whenua* values, in order to complement work already being undertaken as part of the NCC's environmental monitoring programme.
- To improve the health and well being of natural resources of Nelson for the benefit of the whole community.

Reporting structure



Process

Appoint a facilitator to co-ordinate and report on the project. The facilitator could be the working group itself or an individual(s) commissioned to carry out the project on behalf of the working group.[1]

STAGE ONE: DEVELOP A PROJECT PROTOCOL

Facilitate the development of an agreement between *tangata whenua* and the NCC detailing:

- The selection of *taonga* for which indicators will be developed and their order of priority.

  NB: It is proposed that wai (water) will be the starting point for the development of environmental indicators, using the *Maitahi*[2] River as a case study.
- NCC staffing requirements, including NCC Councillors and staff involvement in the process, for example, going on site visits with *tangata whenua*, and possible training requirements for Council staff. Facilitation of *tangata whenua* understanding of NCC's current SOE monitoring work will be necessary.
- How the information will be used, in particular, sensitive information.
- The level of support the NCC will give to assist *tangata whenua* participation and the role *tangata whenua* will play.

  The relationship between the indicators project and the Local Government Act means that there may need to be emphasis on capacity building.

  It will be necessary to prepare *tangata whenua* representatives to take part in the project, by, for example supplying relevant background information, or identifying of *wananga* (training courses) for *tangata whenua* taking an active role in monitoring.
- The commitment of *hapu* and *whanau* to long-term monitoring and reporting of *tangata whenua* environmental indicators.
- Responsibilities for gaining extra funding. This may be gained through Iwi and Council working on joint funding applications.
- How the indicator project will relate to the Council's other monitoring work and the management of natural resources.

STAGE TWO: DEVELOP A PROJECT OUTLINE FOR WAI (WATER)

Develop a project outline for *wai* in consultation with *tangata whenua* and NCC, focusing on the *Maitahi* River as a case study. A forecast of the funding required to complete indicator assessment for *wai* will also be necessary, along with a suggested methodology, time frame, work programme and outputs of the project.

[1] The working group or contracted individual(s) may be required to work closely with each iwi, including kaumatua members as identified by each iwi.
[2] Maitahi: Maori name for Maitai River

STAGE THREE: INFORMATION GATHERING FOR CASE STUDY

Gather information on the *Maitahi* River's:

- Changing pathways
- History of its relationship with people

  Analyse the rivers relationship with people over time and effects of that relationship on the *Maitahi.*
- Sustainability, including:

  (a) *Matauranga* (knowledge) of the *Maitahi* held by *tangata whenua*.

  (b) Scientific research.

  (c) Any other documentation or information found to be relevant through the information gathering process.

Note: NCC's Fresh Water Working Party, currently developing the Nelson Freshwater Provisions, has raised issues related to the perceived decline of the *Maitahi* River fish stocks. It is likely that a review of existing research and commissioning of further research will be undertaken. If this project proceeds, the literature review will provide a resource for the Iwi indicators project.

STAGE FOUR: SITE VISITS

Co-ordinate site visits to examine a range of indicator tests.

STAGE FIVE: COMPARISON OF INDICATORS WITH MONITORING PROGRAMME

Compare and contrast potential *tangata whenua*-based indicators with the current monitoring programme in order to assess the programme's performance and to identify knowledge gaps and where the programmes reinforce each other.

STAGE SIX: REPORT ON INDICATORS FOR WAI

Write a report detailing all relevant material pertaining to monitoring of *wai*, including details of the indicators developed through the above process, including:

- What indicators are recommended for adoption;
- How these will be measured;
- How often they will be measured;
- Who will undertake the measurement;
- How results will be reported; and
- How costs will be apportioned.

SCORE CARD: IWI INDICATORS

Iwi of the Nelson area and NCC staff began a joint project to develop traditional Iwi-based indicators for priority natural resources in Nelson. Once developed, the indicators can be regularly assessed and reported alongside scientific indicators in subsequent State of the Environment Reports.	
The first stage of this project, the development of a Tangata Whenua World View Statement, has been successfully completed on time and within budget.	
Work is scheduled to commence in late 2003 on the development of indicators for fresh water using the *Maitahi* River as a case study.	

PART 1 – SUMMARY OF NELSON'S COASTAL ENVIRONMENT QUALITY

OVERVIEW

This State of the Environment (SOE) Report 2003 deals mainly with environmental issues pertaining to Nelson's coastline and the coastal marine area. Each section is structured to provide an introduction, a statement of relevant Council policy, an outline of the work undertaken and a list of key results and conclusions. Appendices to the report present the precise wording of relevant council policies and details of the SOE monitoring programme for the coming year.

Part 1 is simply a compilation of the key results and conclusions for each section of the report. Where additional detail or clarification is required, refer to the relevant section of this report.

IWI ENVIRONMENTAL PERFORMANCE INDICATORS PROJECT

SCORE CARD	IWI INDICATORS
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PART 2 RECREATIONAL WATER QUALITY

SITE SUMMARY MARINE AND FRESHWATER RECREATIONAL AREAS

Site name	**Microbiological Classification (MAC)** A = Good E= Very Poor	**Sanitary Grade (SIC)**	**Primary impact**	**Recreation grade (SFRG)**	
Monaco	B (interim)	Moderate	Urban storm water	Good	
Tahunanui	B (interim)	Moderate	Urban storm water	Good	
Atawhai	D (interim)	Moderate	Urban storm water	Poor	
Cable Bay	C (interim)	Very low		Fair	
Girlies Hole	D (interim)	Moderate	Urban storm water	Poor	
Sunday Hole	D (interim)	High	Stock access upstream	Very poor	
Smiths Ford	B (interim)	Very low		Very good	

PART 3 WAIMEA INLET

WAIMEA INLET SURVEY

Values	Threats	Comment	
Water quality (except Bell Island wastewater outfall)	Faecal indicator bacteria	Suitable for contact recreational activities, but unsuitable for shellfish gathering.	
Water quality (Bell Island)	Effluent discharge	Enrichment effects minimal.	
	Chemical leachates from contaminated soils	Remedial action to be taken.	
Biodiversity	Spartina	Largely eradicated with minimal herbicide effects on native habitats. Affected areas returned to natural character.	
	Pacific oyster	Well established; localised pockets of sediment enrichment and changes to natural character.	

PART 4 TAHUNANUI BEACH

TAHUNANUI BEACH SURVEY

General conclusions from Tahunanui Beach surveys 1958 – 2003:

- In common with many other New Zealand beaches, Tahunanui Beach is a dynamic system and experiences periods erosion and periods of accretion.

- Tahunanui Beach went though a period of growth between 1958 and 1982, with the beach reaching its greatest extent.

- Since 1982, the eastern end of the front beach near Rocks Road and along the Blind Channel have been subject to erosion.

- Since 1958, the central part of the main beach has generally continued to grow, especially above the high water mark along the beach ridge. The beach ridge in this area is now at its highest level since surveys started in 1958.

- Some net erosion of the mid and lower parts of the central beach occurred between 1982 and 2003, but levels are still much higher than they were in 1958.

- The beach in the Rocks Road and the Lions Playground grew until 1982 and has since eroded. It has now almost reached its 1958 profile.

- The beach in the Blind Channel and Parkers Cove area was not surveyed in 1958. Survey results between 1982 and 2003 show the beach ridge continuing to erode.

- The lower beach in the Parkers Cove area has accreted between 2000 and 2003.

Coast Care programme established and successful in stabilising the central section of Tahunanui Beach through planting and sand-trapping barriers.

PART 5 NELSON HAVEN

NELSON HAVEN SEDIMENT SAMPLING AND LONG—TERM MONITORING

- Sediment sampling undertaken in 1999 jointly by PNL and NCC found that the port and haven were below guideline levels for common port contaminants with the exception of three sites. 
- The three sites found to have elevated levels of contaminant were Calwell Slipway, Saltwater Creek and the Old Boat Harbour. 
- A sanitation survey was undertaken in the Saltwater Creek catchment to identify and rectify potential sources of contamination. 
- Dredging of the Old Boat Harbour for marina development has largely removed contamination in this area. 
- Further investigation of the level and extent of contamination in the Calwell Slipway area was undertaken and management options developed. 
- A long—term monitoring programme for Port Nelson and Nelson Haven has been agreed on by NCC and PNL. It includes sediment quality, sediment toxicity and shellfish bioaccumulation. Sampling will commence late in 2003. 

NELSON HAVEN CO—BIOCIDE SURVEY

Site Name	**Sample type**	**Co—biocides** *Diuron*	*Irgarol*	
Port Nelson slipway 1	Sediment	146 ng/g	8ng/g	
Port Nelson slipway 2	Sediment	20 ng/g	<5 ng/g	
Nelson harbour	Seawater	110 ng/L	<5 ng/L	
Nelson marina entrance	Seawater	330 ng/L	<5 ng/L	

Nelson marina outer jetties	Sediment	6 ng/g	<5 ng/g	
	Seawater	570 ng/L	7 ng/L	
Nelson marina between jetties	Seawater	510 ng/L	11 ng/L	
Nelson marina inner jetties	Sediment	8 ng/g	<5 ng/g	
	Seawater	770 ng/L	19 ng/L	

INVASIVE MARINE PLANTS INCLUDING UNDARIA IN NELSON HAVEN

Undaria	It is not practical to eradicate undaria from Nelson Haven.	
	The extent and density of undaria infestation in the Haven has remained constant over the last few years.	
	Undaria has not spread to the high-energy environments of the outer Boulder Bank or the seaward side of Haulashore Island.	
	Native seaweeds appear to successfully coexist with undaria and appear to dominate undaria in some areas.	
Central Government action	Government has indicated it will not fund undaria control in Nelson and will concentrate on: vector control for outer islands, research into control methods and public education.	
	A base-line survey of Port Nelson has been undertaken so that newly arrived species can be readily identified and the effectiveness of marine biosecurity controls assessed.	
	Nelson has been included in twice-yearly port surveys for the six marine invasive species of greatest concern.	

PART 6 MARINE PROTECTED AREAS

MARINE PROTECTED AREAS

Type of protection	Site	
Taiapure	Delaware Bay Taiapure established	
Marine reserves	North Nelson Marine Reserve proposed only.	

PART 7 AQUACULTURE MANAGEMENT AREAS

AQUACULTURE MANAGEMENT AREAS

In response to concerns regarding the process, costs and equity of decision making on marine farming applications, Central Government has initiated a review of the legislation.	
The new legislation is likely to place more responsibility on regional government to assess the impact of marine farms on the marine environment and on the sustainability of fishing resources. Previously this part of the assessment was undertaken by MFish and required a separate consent.	
The new legislation is likely to specify that the concept of aquaculture management areas be defined by councils within their resource management plans. Consent applications can be made for marine farm consents only within an aquaculture management area.	
It will not be possible to apply to establish a marine farm outside aquaculture management areas.	
NCC has yet to complete investigation of potential aquaculture management areas.	

PART 2 — RECREATIONAL WATER QUALITY

WHY MONITOR?

There is an established link between water quality and swimming-associated illness. Generally, the higher the bug levels in the water, the greater the risk of contracting a water-borne disease. NCC has obligations under the RMA and the Health Act 1956 to manage bathing areas.

Nelson has many excellent rivers and marine beaches. The combination of a good climate and high visitor numbers over the summer months means that those rivers and beaches are well-used for water contact recreation.

The greatest danger is where water is contaminated by animal or human waste. Contaminated water may contain a diverse range of disease-causing micro-organisms such as viruses, bacteria and protozoa.

Research is continuing into the health risks associated with contamination of water by sewage and excreta. Until recently, scientists believed that gastro-enteritis was the main health effect from contact with polluted water, but it is now becoming clear that respiratory effects, such as coughs and colds, also occur and may be more common than gastro-enteritis.

In most cases, the ill-health effects from exposure to contaminated water are minor and short-lived. However, the potential for contracting more serious diseases, such as Hepatitis A, protozoan infections and salmonellosis, exists.

WHAT THE COUNCIL WANTS TO ACHIEVE

The Council wants to:

- protect the integrity, functioning and resilience of the coastal environment including natural water quality
- maintain and enhance the quality of both inland and coastal waters.

(see Nelson Regional Policy Statement (RPS) objectives CO1.2.1, WA1.2.1, WA1.2.2)

GUIDELINE REVIEW

Both the Ministry for the Environment (MfE) and the Ministry of Health have carried out a rolling review of bathing water guidelines for a number of years. New guidelines, issued in June 2003, have a significantly different approach from those previously adopted. The new guidelines introduce the following three-step process to assess bathing beaches.

The first step of the assessment process involves collation of existing results from water quality samples. A computer software package is then used to do a statistical analysis on

the results and to assign a "Microbiological Assessment Category" or MAC to each sampling site, ranging from A to D (D being most contaminated). Ideally, 100 or more samples are needed for each site, spanning a sampling period of no more than 5 years.

While 100 samples is the ideal, the software recognises that many sites will not have that many data. Where there are fewer than 100 samples but more than 20, the site is assigned an "interim grade" until further sample results are available, thus satisfying the 100-sample, 5-year criteria.

The second part of assessment is to look at the contamination risks associated with a particular beach or bathing area and allocate a "Sanitary Inspection Category" or SIC to each. Allocation of a SIC includes consideration of all likely sources of microbiological contamination associated with that site. These include:

- the surrounding land use,
- the adjoining facilities such as ports and landfills,
- potential contamination from boat toilets and the like,
- discharges of treated or untreated effluent such as from sewage treatment plants or coastal outfalls,
- feral animals in the catchment including bird life,
- livestock in the catchment, particularly where stock numbers are high or where stock have direct access to the river banks or beds.

The computer software package weights each of the potential contamination sources and derives a SIC for each site ranging from "very low" (least risk of contamination) to "very high" (most risk). The greatest weighting is given to discharges of human or animal effluent in the catchment and to its degree of treatment prior to discharge.

The third part of assessment involves combining the MAC and the SIC to derive a "Suitability for Recreation Grade" or SFRG. The software assigns SFRG grades from "very good" to "very poor". Sometimes, where the results of the MAC and SIC assessments are contradictory in some way, the software will display the message "irreconcilable follow up" which indicates the MAC and SIC assessments need to be reviewed (in case omissions or errors exist in these assessments).

The grading of beaches obtained using the SFRG assessment provides guidance for the ongoing management for swimming. Recommendations for each grade are as follows:

Very good *Considered satisfactory for swimming at all times, and therefore may not require monitoring on a regular basis.*

Good *Satisfactory for swimming most of the time. Exceptions may include following rainfall. Such beaches are monitored regularly throughout the summer season and warning signs will be erected if water quality deteriorates.*

Fair *Generally satisfactory for swimming, though there are many potential source of faecal material. Caution should be taken during periods of high rainfall, and swimming avoided if the water is discoloured. Sites are monitored weekly and warning signs erected if water quality deteriorates.*

Poor	*Generally not okay for swimming, according to historical results. Swimming should be avoided, particularly by the very young, the very old and those with compromised immunity. Permanent warning signs may be erected at these sites, although councils may monitor these sites weekly and post temporary warning signs.*
Very poor	*Avoid swimming, as there are direct discharges of faecal material. Permanent signage will be erected stating that swimming is not recommended.*

HOW DO NELSON BATHING AREAS COMPARE?

The Council's SOE Report 2002 featured freshwater quality and monitoring. Reassessment of Nelson swimming areas in terms of the new guidelines was undertaken during the winter of 2003. No sites had 100 samples taken over a 5-year period so all results are interim. Some sites had 20 or fewer results so could not be assessed at all using the revised guidelines. These sites will be included once sufficient results are available.

The SFRG results for Nelson bathing areas are detailed below. They also provide an outline of the proposed management approach for the summer of 2003/2004. It should be noted that the SFRG assessments will be revised once the results of the summer monitoring programme are available. Reassessments may also extend to the SIC where management changes relate to the potential for microbiological contamination of these sites.

It should also be noted that while freshwater sites are not part of the coastal environment, they are part of the Council's Recreational Water Monitoring Programme. As water quality in river systems does have impacts on the coastal environment, details from freshwater sites have also been included.

Monaco

Monaco is located within Waimea Inlet (see Figure 2.1), which receives drainage from 22 streams and rivers, is surrounded by urban development (including industrial uses) and receives both direct discharge from wastewater and industrial plants and diffuse discharge from agricultural uses. The potential for contamination is reflected by a "moderate" SIC. Monitoring results to date are consistent with a B MAC. When combined, these classifications give an overall SFRG of "good".

About 60 water quality samples have been taken from the Monaco monitoring site and there is a need to increase this number so that a full classification can be completed. NCC proposes to continue weekly monitoring over the summer, with a minimum of 20 samples to be collected.

Figure 2.1 Monaco

Tahunanui

Tahunanui (Figure 2.2) is the main swimming beach of Nelson. Samples are taken near the middle of the beach. In the past, sampling has also been done at either end of the beach, but, given the uniformity of the results and potential contamination sources, sampling now occurs at only one central site but with higher frequency than before (twice weekly in mid summer).

Figure 2.2 Tahunanui Beach

Because of its location — within the urban area, close to the port and at the mouth of the Waimea Inlet — Tahunanui Beach is exposed to wide range of potential sources of contamination. This is reflected by a "moderate" SIC. There are nearly 100 sample results from over the last 5 years, which give a B MAC. When combined, these classifications give an overall SFRG of "good".

NCC proposes to continue weekly sampling of Tahunanui Beach over the coming summer, with a minimum of 20 samples to be collected. In addition, shellfish sampling during the summer period is proposed. Shellfish tend to accumulate toxins in their flesh over time and can act as reservoirs of contaminants. They can be associated with food poisoning when contamination levels are elevated. No shellfish sampling has been previously undertaken at Tahunanui and this work is precautionary, to ensure that shellfish contamination levels, like water quality, are at acceptable levels.

Atawhai

Atawhai is a popular location for contact water sports such as wind surfing and kite surfing. Some swimming also occurs in the area, generally by local residents and their children.

The monitoring site is located adjacent to residential areas and in proximity to the main urban area. Agricultural areas also occur in upper valleys and in the Wakapuaka flats area. As a consequence, there are multiple sources of potential contamination and the SIC of the site is assessed as “moderate”.

Past water quality samples have generally shown good background water quality, but a number of unexplained high results have a D MAC. Investigations have not identified a definitive cause but suggest that discharge from the adjoining Corder Pond impoundment may be a possible source of contamination. Corder Pond is no longer operated as an impoundment and is now open to tidal flushing (if the tide is high enough). Microbiological results from the Atawhai site will be monitored, to see whether spikes still occur, over the next few seasons. As the MAC assessment is a rolling 5-year average, the grading of the site should improve over time as historic spikes more than 5-years old fall off the record.

The combined classifications give an overall SFRG of “poor”.

It is proposed that weekly monitoring continue over the summer period with the intention of collecting at least 20 samples during the summer period. If unexplained spikes occur in the results, further work will be undertaken to identify possible causes.

Cable Bay

Cable Bay is separated from the main urban area by a stretch of open coastline. The bay itself is a popular location for holidaying and sightseeing. Swimming occurs only occasionally as wind and wave conditions often make the bay unsuitable for it.

While water quality in the bay is generally good, there are occasions when high bug counts are recorded, resulting in a lower than expected MAC of C . The SIC of the bay is “very low” which produces a conflict between the poor water quality and the very low potential for contamination (irreconcilable follow up). Discussion with local residents has so far failed to enable conclusive identification of the source of this contamination.

When combined, these classifications give an overall SFRG of “fair”.

It is intended that weekly monitoring continues during the coming summer season and that NCC work with local residents to identify potential sources or episodes of contamination. It has been suggested that contaminated water is being driven into the bay under certain weather and tide conditions. When an event of this type can be identified, sampling from a boat and photography from vantage points may help locate the source of contamination.

Girlies Hole

Girlies Hole is a popular swimming site in the lower Maitai River, especially for children and young people. Vehicle access is not available and a short walk is needed to reach the swimming hole.

The MAC for existing water quality is D while the SIC assessment of potential source of contamination is "moderate". This gives an overall SFRG of "poor".

Water quality at the site is lower than the surrounding land use would suggest and it appears contamination is occurring upstream, above Sunday Hole. Further discussion of sources of potential contamination is in the next section.

NCC intends to continue weekly monitoring of Girlies Hole during the summer season, collecting at least 20 samples for the summer.

Sunday Hole

Sunday Hole is a very popular swimming hole on the Maitai River. It is located on the upstream edge of the urban area and is surrounded by reserve land popular for family picnics and group social events. It is heavily used during the summer period.

Existing water quality at Sunday Hole is marginal in terms of the Microbiological Water Quality Guidelines. The MAC for the site is D. The sample dataset for Sunday Hole includes 98 sample results so it is nearly a full dataset.

During periods of significant rainfall (enough to discolour the river), high bug counts are usually recorded. These events are typical of contamination from diffuse sources being flushed into the river by surface runoff. Bug levels tend to peak early in the rainfall event, long before the peak river flow.

The SIC of potential contamination sources for the site is "high". This is largely as a result of stock having direct access to the water course upstream of the swimming hole. When combined, these classifications give an overall SFRG of "very poor".

In order to identify sources of contamination at Sunday Hole, a full sanitary survey of the Maitai River was undertaken June–October 1999. River banks and all septic tanks in the upper catchment were inspected. No proven link was found between defective septic tanks/effluent disposal systems and pollution levels of the Maitai River, even though some systems were obviously defective. It was proposed that the main source of pollution was stock and animal waste runoff from the surrounding land into the Maitai River, directly or indirectly via smaller tributaries.

Further investigation of Sharlands Creek and other tributaries of the Maitai River undertaken over the 2000/2001 summer found that there were consistently high levels of pollution in Sharlands Creek. Although those levels were reduced when creek water was diluted in the Maitai River, there was little doubt that Sharlands Creek is a significant contributor to the overall contaminant levels at Sunday Hole and Girlies Hole. Inspection of the Sharlands Creek catchment revealed no obvious point sources of pollution but stock were seen feeding and resting beneath the trees along the creek bed.

Sampling of Sharlands Creek during July and August of 2003 confirmed that at least some of the contamination is associated with stock in the catchment. Samples were taken mid winter as disturbance of the catchment is at a minimum. Results showed that bug levels in the Sharlands Creek and lower Maitai River increased following the introduction of stock into the area, although they were considerably lower than guideline limits. This suggests that during the summer swimming period there are probably multiple sources of contamination in the Maitai catchment, of which stock is only one.

In order to minimise potential water contamination in the catchment this summer, a meeting was held with landowners and lessees in the area. As a result, agreement was reached that:

- as far as practical, stock will not be grazed in areas where they have unrestricted access to the main stem of the Maitai River and to Sharlands and Packers creeks, during the period mid-December to mid-February;
- where grass needs mowing along reserve areas adjoining the main stem of the Maitai River during this mid-December to mid-February period, it will be done using machinery rather than stock;
- toilet facilities will be provided by Council during the summer swimming period at major swimming holes and in particular at the Maitai Camp swimming hole; and
- creek crossings along Groom Road will be reviewed to assess the practicality of reducing the number of stock crossing points.

During this summer, NCC intends to continue weekly samples from the Sunday Hole, with a minimum of 20 samples to be collected, and to monitor the implementation and effectiveness of the management agreement.

Smiths Ford

Smiths Ford is located in the upper Maitai catchment. It is used during the mid summer period for picnics and group activities, which include some swimming. There is little development in the catchment further upstream. The MAC classification for Smiths Ford is B with only just enough samples to assign a classification (21). The SIC assessment records a “very low” risk of contamination at the site and the SFRG assessment is “very good”.

Water quality and catchment characteristics at Smiths Ford are such that only occasional monitoring is needed to ensure a high standard is maintained in this part of the river. It is, however, of ongoing value as a control site against which to compare the downstream Sunday Hole and Girlies Hole sites.

It is intended that weekly monitoring continues at Smiths Ford during the coming summer season with the intention of collecting at least 20 samples for the summer.

SCORE CARD : RECREATIONAL WATER QUALITY

Site name	Microbiological Classification (MAC)	Sanitary Grade (SIC)	Primary impact	Recreation grade (SFRG)	
Monaco	B (interim)	Moderate	Urban storm water	Good	
Tahunanui	B (interim)	Moderate	Urban storm water	Good	
Atawhai	D (interim)	Moderate	Urban storm water	Poor	
Cable Bay	C (interim)	Very low		Fair	
Girlies Hole	D (interim)	Moderate	Urban storm water	Poor	
Sunday Hole	D (interim)	High	Stock access upstream	Very poor	
Smiths Ford	B (interim)	Very low		Very good	

REFERENCES

Ministry for the Environment and Ministry of Health. June 2003. *Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas.*

Nelson City Council. *Nelson State of the Environment Report – Freshwater 2002.*

Nelson City Council internal report. July–August 2003. *Microbiological Survey – Maitai River and Sharlands Creek.*

PART 3 – WAIMEA INLET

Waimea Inlet was one of eight New Zealand estuaries studied by the Cawthron Institute and used by MfE to develop a national protocol for estuarine environmental assessment and monitoring. This arose out of the need for councils to have a standardised, cost-effective and useful method to assess and monitor the conditions of New Zealand estuaries. In particular, NCC was seeking a rapid monitoring tool to assess the impact of wastewater discharges on overall estuary condition.

WHAT THE COUNCIL WANTS TO ACHIEVE

The Council wants to:

- protect the natural character as well as natural and physical resources associated with the coast
- protect the integrity, functioning and resilience of the coastal environment

(see RPS objective CO1.2.1 and policy CO1.3.4)

THE VALUE OF ESTUARIES

An estuary is a partially enclosed body of water that is open to the sea (permanently or periodically) and within which there are variations in salinity due to the dilution of seawater with freshwater from land drainage. Although estuaries are considered short-term features of the landscape on a geological time-scale, they are often highly productive areas that play important roles at the boundary between land and sea. They provide a link between terrestrial and marine ecosystems and nourish the marine food web. Owing to their position at the foot of watersheds on the coastal interface, estuaries are dynamic, complex and variable environments. New Zealand estuaries, in particular, are generally characterised by extensive intertidal zones that provide productive, high-value habitat for a variety of plants (*e.g.* mangrove, salt marsh, ribbonwood, eelgrass) and animals (*e.g.* fish, shellfish, waterfowl). Estuaries and their resources are also highly valued in human terms. They often provide transportation arteries and accessible locations for a wide variety of recreational pursuits. When properly managed, they can have high aesthetic/scenic values, particularly in populated areas, and commercial ecotourism use of estuaries is growing rapidly.

Globally, the coastal zone is under increasing pressure from human activities, and multi-use estuarine environments are reflecting the increase in human impacts by a change, and sometimes deterioration, in their condition. Because they are convenient receiving bodies for the wastes of cities, industries and farms, many New Zealand estuaries are considered to be at risk from contaminant impacts. Thus, the development of management techniques to assess estuarine habitat status and change is currently a major resource management priority within New Zealand. The localised effects of point source discharges (*e.g.* treated sewage, industrial wastewater, dairy and landfill effluents) have generally been adequately handled through consent procedures but managing and monitoring overall estuary condition, particularly for SOE reporting, has largely been inadequate. Hence, the overall health of many New Zealand estuaries, and the differences between estuaries subject to different pressures from human activities, are poorly

understood. In part, this is attributable to the lack of a standard and affordable monitoring approach.

ABOUT WAIMEA INLET

Waimea Inlet is a shallow, bar-built estuary located within Tasman Bay adjacent to the city of Nelson (see Figure 3.1). It is classed as a fluvial (river) erosion, barrier (island)-enclosed estuary. One of the largest in New Zealand, it has been estimated to cover a total area of 34.6 km^2, with 28.7 km^2 comprising a variety of intertidal flat habitats (primarily over mud and sand). The remainder consists of subtidal areas; *e.g.* river and tidal channels. Ten islands within the inlet, with a total approximate area of 296 ha, contribute to considerable habitat diversity.

Figure 3.1 Bell Island in Waimea Inlet with Nelson suburbs in the background

There are two tidal openings to the estuary located at opposite ends of the barrier island, Rabbit Island. Owing to its broad, shallow configuration and a tidal range of up to 4.2 m, the tidal compartment of approximately 62 million m^3 is largely drained with each ebbing tide, resulting in a relatively rapid flushing rate. Residence time for Waimea Inlet has been estimated to be about 14.4 hours (or 1.2 tidal periods) as a lower limit; however, somewhat longer times might be expected if we assume a partial return of inlet water with succeeding tides.

Freshwater contributions are minor relative to the size of the tidal compartment, resulting in salinity ranging from 30 ppt to 35 ppt throughout most of the estuary. However, reduced salinities have been reported for some localised areas in the vicinity of freshwater discharge channels. The main freshwater inflow to the estuary is via the Waimea River and its tributaries, including the Roding, Lee, Wairoa and Waiiti rivers that drain the southern and eastern catchments. The resulting freshwater discharge (annual mean flow 20.8 m^3/s) separates into a primary and a secondary channel at Rabbit Island to coincide with the two tidal openings. The primary channel, taking most of the flow, is presently on the eastern side of the island. A number of smaller streams (total mean annual flow of 0.55─0.65 m^3/s) also contribute to the total fresh water inflow.

A survey of intertidal habitats in the Waimea estuary (see Figure 3.2) indicates the area is dominated by unvegetated habitat (77% of the total estuary area, covering 2480 ha). Almost half of the unvegetated habitat was classified as soft mud (34% of the total estuary area). The remaining unvegetated areas consisted of a variety of habitats, the most predominant of which were firm mud and firm sand (23% and 10% of the total cover, respectively) and cobble and gravel beds (together covering 8% of the total area). The vegetated habitats were diverse, although each covered less than 4% of the total estuary. Herbfields were the most abundant of these, covering 123 ha, of which glasswort *(Sarcocornia quinqueflora)* was the dominant species. Approximately 98 ha of the estuary (3% of the total cover) were described as rushland, and the majority of this was vegetated with searush *(Juncus kraussii).* A mixture of macroalgal species formed beds covering 2% of the estuary, and there were minor oyster fields and areas of seagrass, tussock and scrub.

Human occupation

Waimea Inlet and the surrounding lands have been occupied since the 1500s. A large but fluctuating Maori presence was associated with the Waimea Pa and 35 archaeological sites have been recorded, including 27 Maori midden or oven sites.

Europeans colonised the area in the 1840s and began an intensive programme of land development, resulting in significant changes to the estuary and its surrounds. The present population within an 8 km radius of the inlet is approximately 45 000.

Catchment Characteristics

Area

The total area of the Waimea Inlet catchment is 812 km^2.

Geology and soils

Much of the central lower estuary catchment is relatively flat or undulating, particularly the Waimea Plain and the river valleys. However, the catchment extends south to the Gordon Range and east to encompass the eastern slopes of the Richmond and Bryant ranges and the Dun Mountain, draining predominantly steeply sloped land. The Dun Mountain "mineral belt" region contains ultramafic rock formations that are particularly high in metals such as copper, nickel and chromium. The composition of the estuary catchment and its soils reflect the complicated geological structure and history of the region. Most soils are characteristically of low natural fertility; however, the fertile, deep, fine soils on the lower flood plain of the Waimea River are a notable exception. The catchment soils impart a physical (*e.g.* texture) and chemical (*e.g.* heavy metal) "signature" to the estuary substrate.

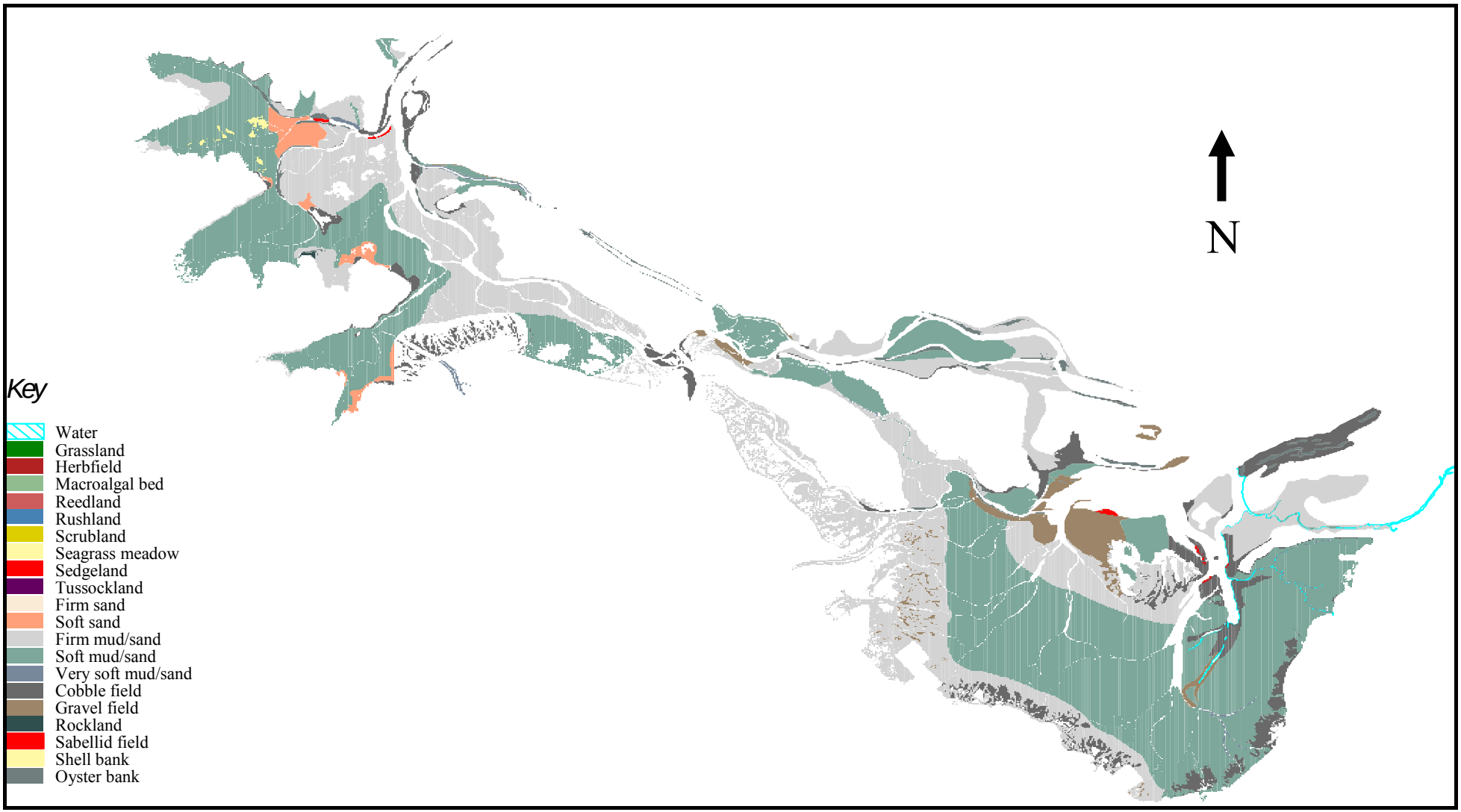


Figure 3.2 Waimea Inlet habitat types

Land use

During the period of Maori and European settlement, but primarily within the past 150 years, land-use modification to the estuary margins has been significant, thereby restricting the ecological connectivity between the terrestrial and coastal sea environments. These modifications include the draining of freshwater wetlands, burning and logging of coastal native forests, urban development (domestic and industrial), rubbish disposal and livestock grazing. The inlet is close to the urban and industrial areas of Nelson, Stoke and Richmond.

Some of these uses have resulted in a loss of intertidal habitat (*e.g.* fringing mudflat and saltmarsh) through infilling, particularly on the Nelson (eastern) side of the inlet. It has been estimated that approximately 200 ha of intertidal habitat has been removed in this way.

The greater estuary catchment is presently dominated by native bush, exotic forests and pastoral development. However, a variety of other agricultural and urban uses are also represented, particularly within the lower regions (Table 3.1).

Table 3.1 Waimea Inlet catchment land use

Land use	**Area (ha)**	**Cover (%)**
Planted forest	25 877	31.9
Indigenous forest	25 359	31.2
Prime pastoral	20 797	25.6
Scrub	3950	4.9
Tussock	2414	3.0
Prime horticultural	1425	1.8
Urban	645	0.8
Total	**81 170***	

* Includes some minor uses not defined.

Source: *Estuarine Environmental Assessment and Monitoring: A National Protocol* (Cawthron Institute, 2002).

Estuary values and uses

Waimea Inlet plays a significant role in the integration of terrestrial and coastal sea ecosystems by, for example, providing critical habitat for a variety of plant and animal species, maintaining coastal productivity and nourishing the marine food web. High value is placed on the inlet's terrestrial → wetland → coastal aquatic continuum as wildlife (*e.g.* waterfowl), fish and invertebrate habitat. The inlet has been classed by the Department of Conservation as a wetland of national importance, one of 73 in the country. It has also been ranked as an estuary of international importance for migratory birds. Its significance is mainly owing to its large size and the potential ecological importance of its complex, varied physical and biological structure.

The estuary's visual and aesthetic values are very important to the region, particularly for residential developments along the estuary margins (*e.g.* Monaco, Mapua, Bests Island) and elevated subdivisions in Nelson, Stoke and Richmond.

In view of the high ecological, biodiversity and aesthetic values placed on the inlet, some shore/wetland walkways and reserves have been established (*e.g.* Higgs Reserve, Waimea Inlet Walkway) and the estuary is of potential importance to a developing ecotourism industry. The inlet is used for a variety of recreational pursuits, including boating, swimming, waterskiing, waterfowl shooting and fishing (*e.g.* for whitebait, flounder, kahawai). The pressure of increasing recreational usage is seen as a particular threat to the natural character of the estuary.

The inlet is also used for wastewater discharge including treated sewage (from Bell Island regional sewage treatment facility) and stormwater from industrial, agricultural (horticulture, drystock farming, dairying) and urban (Stoke and Richmond) sources. Areas of Rabbit and Bell islands have been used for the land disposal of sewage sludge from the Bell Island oxidation ponds since 1993 and 1996, respectively.

Water and sediment quality

Some of the above varied uses indicate potential threats of contamination to environmental quality. Studies of faecal indicator bacteria concentrations in waters and shellfish indicate that the inlet (with the exception of the immediate mixing zone down current from the Bell Island wastewater outfall) is suitable for contact recreational activities, but unsuitable for gathering shellfish for human consumption. Freshwater inflows and direct runoff from estuary margins were seen as primary contributors of bacterial contamination.

Effluent discharge from the Nelson regional sewerage facility at Bell Island may be perceived as a particular threat to the estuary environment. However, conditions for effluent composition and discharge, as well as monitoring requirements for the receiving environment, have been adopted as part of the consent process to minimise this threat. Monitoring reports thus far conclude that, owing to the ebb-tide discharge schedule and the flushing characteristics of the outfall location, enrichment effects on the estuary have been minimal. Localised reductions in water and sediment quality in the vicinity of industrial and domestic point source discharges occurred prior to establishment of the Bell Island treatment facility. These have recovered to a more natural condition since incorporation with the regional wastewater treatment scheme in 1983.

An additional perceived threat to ecological health is chemical leachates from contaminated soils. This has occurred at a former Fruitgrowers Chemical Company industrial site bordering on the inlet at Mapua. The 3.3 ha site was found to contain high levels of primarily DDT and dieldrin and both have been observed in sediments of the Mapua channel. The site is presently the subject of remedial action.

Exotic plant and animal species

The exotic saltmarsh cordgrass *(Spartina anglica)* was introduced into Waimea Inlet during the 1930s through a series of intentional plantings. After a period of some 50 years it had become well established, covering over 30 ha with several dense monospecific stands. In view of its impact on the natural character of the inlet, a herbicide spray programme was implemented in 1986─1999. The spray programme was highly successful, and *Spartina* has been largely eradicated from the inlet. Simultaneous environmental monitoring suggested that short-term herbicide effects on native habitats

were minimal. Although long-term effects (*e.g.* sediment redistribution and reorganisation of native habitats) are yet to be determined, areas previously colonised by *Spartina* seem to have returned to a "natural" character.

A more recent invasion by an exotic bivalve, the Pacific oyster (*Crassostrea gigas*), occurred in the Nelson region during the early 1980s and the oyster subsequently spread to Waimea Inlet within a few years. It is now well established in a number of intertidal locations within the inlet. The resulting oyster beds and shell banks have led to localised pockets of sediment enrichment, and represent a significant departure from the natural character.

SCORE CARD : WAIMEA INLET

Values	Threats	Comment	
Water quality (except Bell Island wastewater outfall)	Faecal indicator bacteria	Suitable for contact recreational activities, but unsuitable for shellfish gathering.	
Water quality (Bell Island)	Effluent discharge	Enrichment effects minimal.	
	Chemical leachates from contaminated soils	Remedial action to be taken.	
Biodiversity	*Spartina*	Largely eradicated with minimal herbicide effects on native habitats. Affected areas returned to native character.	
	Pacific oyster	Well established; localised pockets of sediment enrichment and changes to natural character.	

REFERENCES:

Cawthron Institute Report (for Supporting Councils and the Ministry for the Environment). Sustainable Management Fund Contract 5096, December 2002. *Estuarine Environmental Assessment and Monitoring: A National Protocol.*

PART 4 – TAHUNANUI BEACH

KEY ISSUES AND HISTORIC TRENDS

Tahunanui Beach, with its shallow and protected water and its proximity to Nelson, is a major recreational asset (Figure 4.1). Like many coasts, it is subject to change. Since the 1840s the beach has extended seaward by the addition of a large area of sand to the north of Beach Road, forming the present front and back beaches. This and other changes to the Tahunanui area are the consequence of geological processes at work in Tasman Bay.

Figure 4.1 Tahunanui Beach

Geological processes

The area between Tahunanui Beach and Annesbrook, and bounded by the Blind Channel and Port Hills, in the west and east, respectively, is geologically very young, having accumulated during the last 6500 years. The process began with the sea rising to its present level 6500 years ago and cutting a cliff in fan gravel at Annesbrook. The eroded gravel was then transported westwards by long-shore drift to form the spit of Monaco. On the seaward side of the cliff, and trending parallel to it, a series of beach ridges of marine gravel and sand progressively accumulated in a northerly direction to form the Tahunanui area. Gravel dominates the eastern end of the ridges, including adjacent to Rocks Road where historical photographs show a gravel beach. Urbanisation has almost totally destroyed the shape of the ridges.

While marine deposition was taking place in the Tahunanui area, Rabbit Island and the other islands of Waimea Inlet were being formed by long-shore drift from the Motueka River mouth and the Ruby Bay area. Between Rabbit Island and Tahunanui, the Blind

Channel acts as the main route for flows in and out of Waimea Inlet. The channel largely trends northeast, but, opposite the back beach, it curves towards the northwest. On the west side of the channel, a large area of sand, formerly known as the Waimea Bank, is exposed at low tide. Fronting the Tahunanui side of the channel are the lines of dunes formed by the prevailing northerly winds blowing sand onto the land. Many of the dunes have been destroyed by human activity, such as establishment of the Tahuna Motor Camp. Since 1870, sand has accumulated rapidly north of Beach Road to form the present front and back beaches. The tidal outflow of the Blind Channel, augmented by a similar outflow through the Old Entrance to the Boulder Bank, scoured the seabed at Bolton Hole.

Source of the materials forming the Tahunanui area

While much of the sand in the Tahunanui area was derived from west of Tasman Bay, most of the gravel was eroded from Port Hills Gravel that forms the adjacent Port Hills. Large-scale collapse of the Port Hills south of Magazine Point increased the erosion of the Port Hills Gravel. The northern part of this landslide, the Tahunanui Slump, is still active and prior to the construction of Rocks Road in the 1890s was supplying sand and gravel to the Tahunanui area. The landslide does not extend below sea level; rather, bedrock of the Magazine Point Formation, which underlies the Port Hills Gravel, is exposed at low tide close to the eastern end of the front beach.

Historical changes

Since the 1840s there have been significant changes in the Tahunanui area. Tasman Bay has become shallower, as a result of continual deposition of material from the east and west sides of the bay. However, tidal flows in and out of Waimea Inlet continue to maintain the Blind Channel, which is extending northwards and has sand spits developing on its flanks where it emerges from the Waimea Inlet into Tasman Bay. In response to the prevailing current on the east side of Tasman Bay, the spits are curving towards the northwest.

Following a storm event in the 1870s, the northern part of the Blind Channel shifted westwards, mobilising a large volume of sand, some of which was redeposited to form the present day front and back beaches. Sand was also deposited offshore, constricting the channel leading to the Old Entrance to Nelson Haven. Although construction of The Cut through the Boulder Bank in 1906 provided an alternative entry to Nelson Haven, it reduced the tidal flows through the Old Entrance. As a consequence, tidal scouring in the vicinity of Bolton Hole has diminished. The construction of Rocks Road, by preventing the sea from eroding the Tahunanui Slump, has eliminated a significant source of material, including gravel, that would have been transported into the Tahunanui Beach area.

The northern part of the Blind Channel adjacent to Tahunanui Beach is slowly migrating eastwards in response to the dominant southeasterly-trending current in the west of Tasman Bay. Between 1988 and 2000, the channel north of the western end of the front beach has shifted eastwards approximately 200 m, at an average rate of 16 m per year. Southwards, the rate of movement progressively diminishes so that, where the channel changes direction west of the back beach, there have been only minimal changes. Despite the changes in its position, the channel has maintained a constant width.

WHAT COUNCIL WANTS TO ACHIEVE

The Council wants to minimise adverse effects from hazard events in the coastal area by:

- avoiding inappropriate development in hazard-prone areas
- recognising the function of natural coastal features and processes in protecting coastal subdivision, use or development, and maintaining and enhancing that ability

(see RPS objectives DH2.2.2, DH2.3.3 and policies DH2.3.2, DH2.3.6; and proposed Nelson Resource Management Plan (RMP) objective DO2.1)

BEACH SURVEYS

Following a period of accelerated beach erosion and rising public concerns regarding the future of Tahunanui Beach, regular surveys of beach levels began in 1958. The surveys involved establishing fixed benchmarks along the beach and then calculating levels from these benchmarks along cross sections oriented at right angle to the beach face.

The interval between surveys has varied and was largely dependent on the level of concern about the beach at the time. Initial surveys concentrated on the beach closest to Rocks Road and the Lions Playground area. Later surveys were extended further westward along the beach and into the Blind Channel area as far south as Parkers Cove.

The dynamic nature of the beach front meant that frequently survey benchmarks were lost or damaged as a result of erosion or accretion. Many benchmarks were also damaged by people (unintentionally or intentionally). New or replacement benchmarks were established at each survey but their changing positions complicate the survey record. As survey followed survey, the expanding database became increasingly more difficult to interpret.

With the development of computer software, it is possible to use survey data to generate a computer model of the ground surface and to compare changes in that surface between consecutive surveys. It is also possible to superimpose aerial photographs over the ground-surface model to assist interpretation of the results.

In order to use the survey data in this manner, it is necessary to record three dimensional co-ordinates for each survey point.

During mid 2003, eroded or damaged benchmarks were replaced and beach cross sections were resurveyed for computer interpretation. In addition, a number of representative previous surveys were repeated so that earlier data could be included in the modelling. While this makes it easier to interpret beach changes over time, it also revealed significant limitations of earlier data.

Firstly, the lack of fixed survey locations inland of the beach face tends to confuse the computer software, causing it to portray inaccurate surface shapes inland of the beach. Additional data for this area would help resolve this.

Secondly, because the earlier surveys were limited in extent and therefore only short-term comparisons are available for the Blind Channel and Parkers Cove areas. While time will

address this problem, other data sources such as aerial photographs assist interpretation of changes in this area.

Data from five representative stations on the beach extending from Rocks Road to Parkers Cove (see Figure 4.2) are presented in Figures 4.3─4.16. Cross sections through the beach for each station show changes in beach profiles and grades over time. The 2003 beach is compared with beach data from earlier surveys (1958, 1982, and 2000). The resulting images are representative of the type of images the model is able to generate; many other comparisons are possible giving the potential to further utilise the growing database.

Figure 4.2 Location of Tahunanui Beach stations

Figure 4.3 Tahunanui Beach sections at Station 1

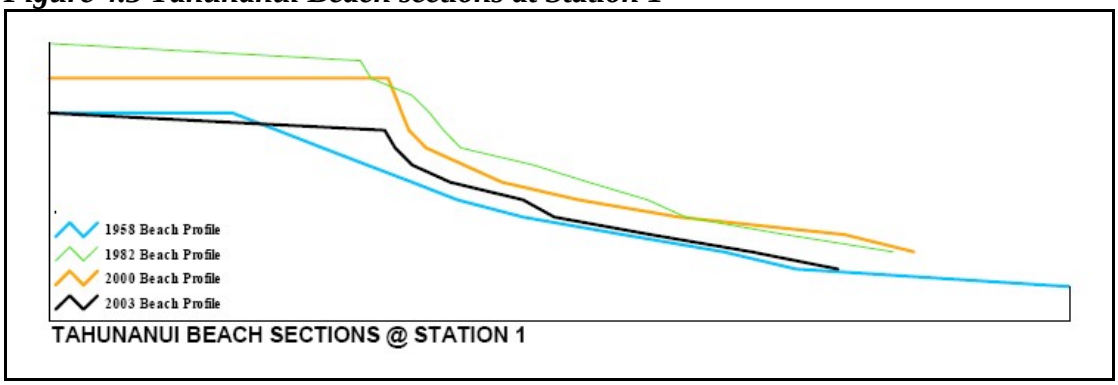
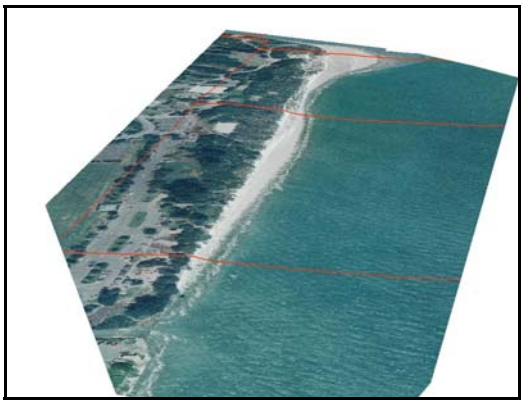
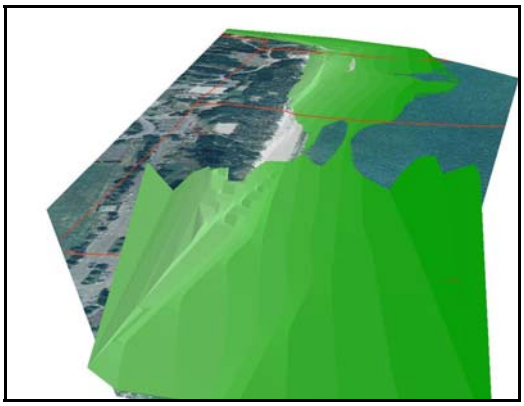


Figure 4.4 Comparison of 1958 (blue) and 2003 (photograph) beach profiles, Station 1



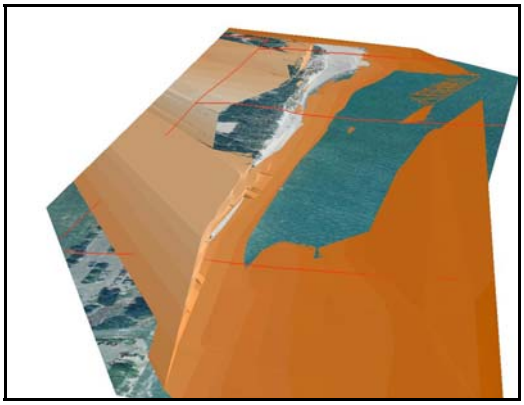
In Figure 4.4, the 1958 beach profile is blue and the 2003 beach profile is depicted on the photograph. As only the 2003 image is visible, overall this part of the beach has built up (accreted) since 1958 despite losses in recent years. This is consistent with Figure 4.3, which shows the beach at its lowest level in 1958, its highest level in 1982 and falling rapidly between 2000 and 2003 to almost 1958 levels.

Figure 4.5 Comparisons of 1982 (green) and 2003 (photograph) beach profiles, Station 1



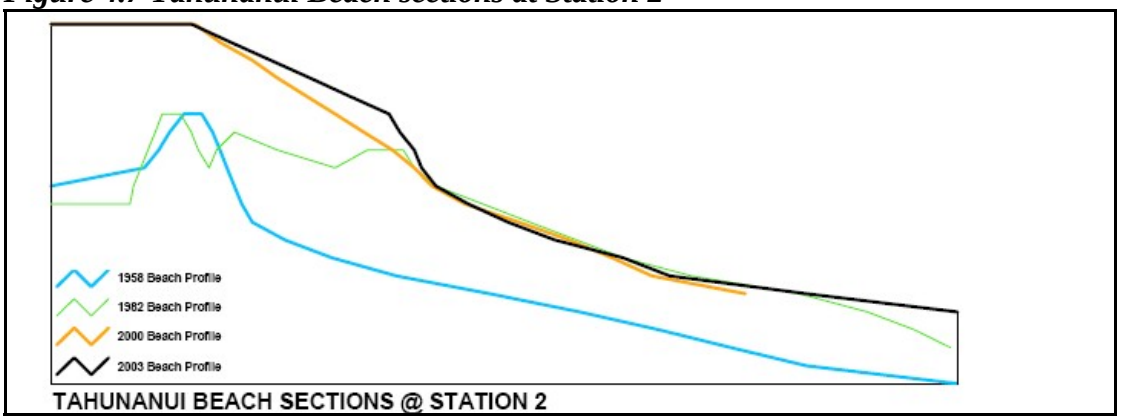
From 1982 to 2003, most of the beach as viewed from Station 1 has eroded. The 1982 surface blankets most of the 2003 photographic image. (The area below the low water mark well offshore should be ignored as lack of survey fixes has rendered the computer models to be inaccurate).

Figure 4.6 Comparison of 2000 (brown) and 2003 (photograph) profiles, Station 1



Extensive areas of beach were eroded between 2000 and 2003 along the beach crest, net beach accretion has occurred in middle beach area. (The middle beach is discussed in sections for stations 2 and 3). Again, areas offshore should be ignored.

Figure 4.7 Tahunanui Beach sections at Station 2



Station 2 is located in the middle part of the beach, between Stations 1 and 3. Information about this area is presented in the Figures for Stations 1 and 3.

As can be seen from Figure 4.7, this part of the beach has steadily grown since 1958 and is currently at its highest level since survey records began. Growth has continued between 2000 and 2003 particularly in the upper beach dune area. The beach at Station 2 is currently included in the Coast Care project (see later) which includes dune stabilisation plants.

Figure 4.8 Tahunanui Beach sections at Station 3

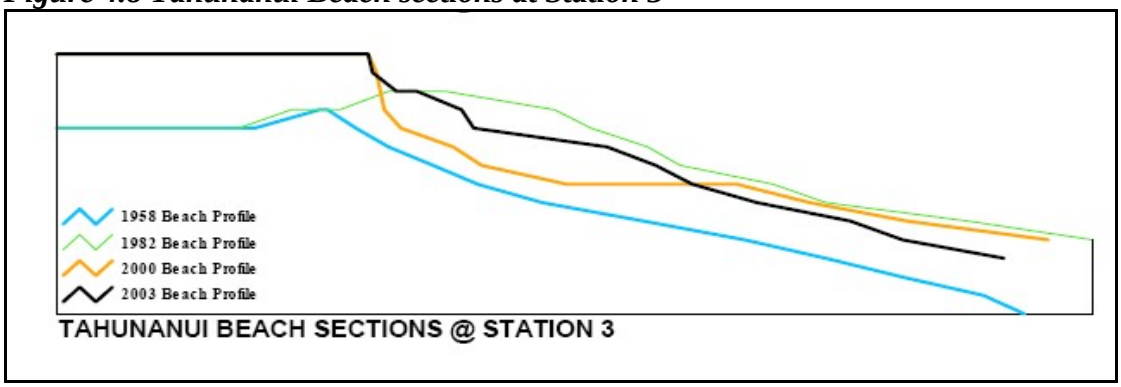
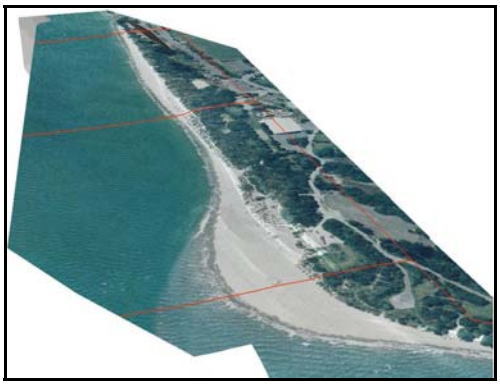
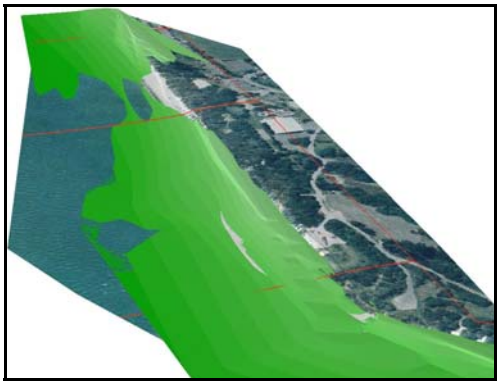


Figure 4.9 Comparison of 1958 (blue) and 2003 (photograph) beach profiles, Station 3



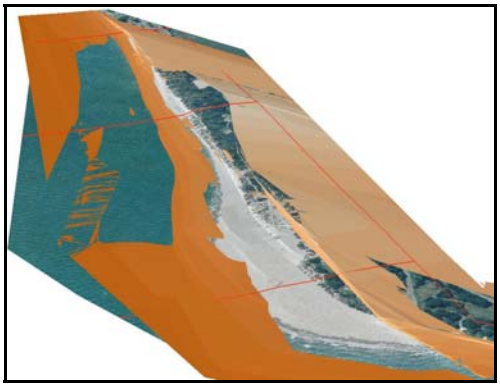
The 2003 beach levels at Station 3 are higher than they were in 1958. (Figure 4.9). Near the Blind Channel (lower part of the image) the comparison is not valid as the original 1958 survey includes this area.

Figure 4.10 Comparison of 1982 (green) and 2003 (photograph), Station 3



Since 1982, the mid to lower beach (towards the low water mark) has generally lowered, but the upper beach area and beach ridge has continued to accrete (grow) (Figure 4.10).

Figure 4.11 Comparison of 2000 (brown) and 2003 (photograph), Station 3



In the area around Station 3, the beach has generally accreted (grown) between 2000 and 2003 (Figure 4.11). There has been some erosion of the lower beach (near the low water mark) where the profile has returned to a grade similar to that surveyed in 1958 and 1982 (see profile at the top of the page).

Figure 4.12 Tahunanui Beach sections at Station 4

Station 4 is located along the edge of the Blind Channel between Parkers Cove and the sand spit, at the apex of the main beach and Blind channel. Information about this area is presented with that for Station 5.

As can be seen from a cross section (Figure 4.12), this part of the beach has experienced significant erosion since 1982, with the beach ridge retreating inland. No 1958 survey record exists for this part of the beach. It is interesting to note that between 2000 and 2003, while net erosion has continued, there has been some accretion of the beach ridge so levels even higher than in 1982.

Figure 4.13 Tahunanui Beach sections at Station 5

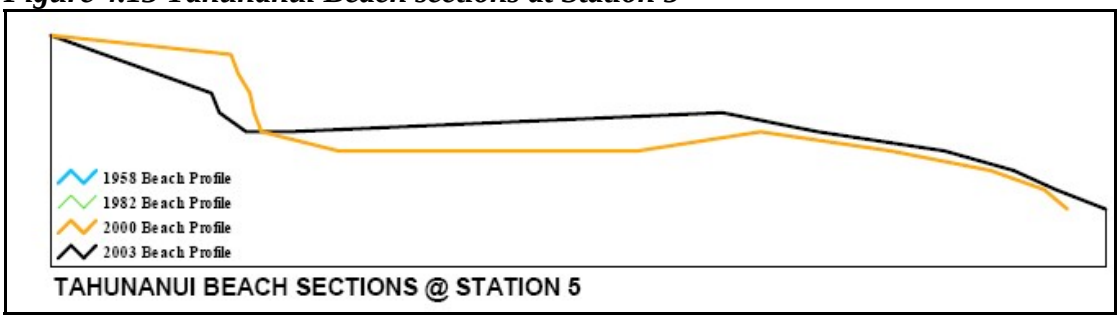
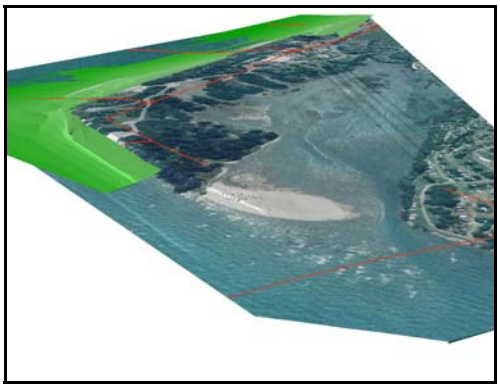
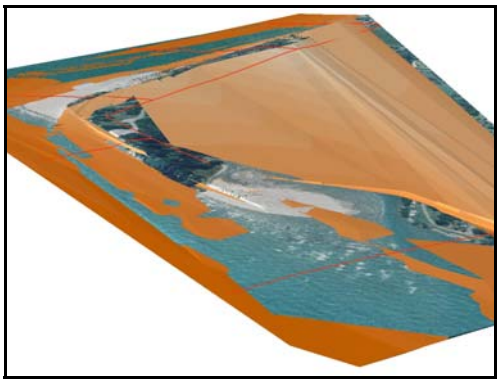


Figure 4.14 Comparison of 1982 (green) and 2003 (photograph) beach profiles, Station 5



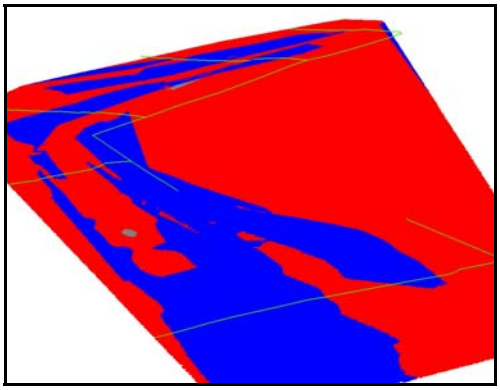
The area around Station 5 was not surveyed until 1982, the 1982 survey finished before Parkers Cove. According to Figure 4.14, there was general beach erosion in the area between 1982 and 2003.

Figure 4.14 Comparison of 2000 (brown) and 2003 (photograph) beach profiles, Station 5



Between 2000 and 2003, the area around Station 5 experienced a variable pattern of erosion and accretion, (Figure 4.15), with the beach ridge eroding in the blind channel area (on the left), deposition occurring in the mid to lower beach area (in the middle) and erosion of the beach ridge curing in the Parkers Cove area (on the right). This pattern is also clearly seen in the cross sections of Figure 4.13.

Figure 4.16 Erosion (red) and accretion (blue) between 2000 and 2003, Station 5



The output from the beach profile modelling program can be tailored to the users' demands. For example, erosion and accretion can be depicted (Figure 4.16), provided the computer has sufficient information, *e.g.* areas of red in the upper right of Figure 4.16 inland from the beach ridge should be ignored, as there are insufficient survey data.

WHERE TO FROM HERE

The Council recognises that the beach is a dynamic coastal feature and that change, either by erosion or accretion, can be anticipated. It is Council's aim to allow the change to occur without, as far as possible, compromising the natural character of the beach. By allowing sufficient space for the beach to change will require development to be sited an appropriate distance from the coast.

In December 2002 the Council made the following decisions regarding the management of erosion at Tahunanui Beach:

- The stormwater discharge point by the Lions Playground will be extended and a low-flow pipe with appropriate protection works will be constructed to discharge at a point further east along Rocks Road.
- A beach renourishment programme incorporating a Coast Care Programme will be implemented.
- Provision will be made in the 2003/2004 Annual Plan for the additional funding required to implement the above decisions.
- A contribution will be sought from Transit NZ to the cost of remedying the effects of the Rocks Road sea wall on the beach.
- Installation of a reno mattress or similar hard-protection structure on the beach will not proceed at this stage.

Coast Care

In June 2002, the Council established the Tahuna Beach Coast Care Committee. Its mission statement is to:

- monitor the erosion of the sand dunes caused by the action of the tides, the wind and people on Coast Care installations and plantings
- note the beneficial and detrimental effects of the Coast Care Programme
- suggest and/or initiate Coast Care proposals and suggest priorities for such work
- ensure the public is aware of the Coast Care Programme by the provision of noticeboards, publicity in newspapers or on radio or TV, and encourage schools and the public to become involved
- take any other initiatives that may be deemed to be in the interests of the Coast Care Programme

Coast Care activities to date include erecting sand-trapping nets and barriers in 2000 (see Figure 4.17). These have proved to be successful in:

1. slowing down the energy in the waves that erode the bases of the dunes during high tide or a storm
2. eliminating the number of people playing, sunbathing or walking over the dunes and causing erosion
3. trapping wind-blown sand, helping in the accretion of the sand dunes.

Figure 4.17 Coast Care sand trapping nets, Tahunanui Beach

In May 2002, 4500 pingao (*Desmoschoenus spiralis*) were planted by the local community. Owing to a number of factors, about 60% of these died over the next year. However, the plants that survived have grown very well and have already made an impact in the dunes with their growth and sand collection abilities. In 2003 more pingao, as well as spinifex (*Spinifex sericeus*), will be planted, filling in gaps left by dead pingao and continuing on down the beach. Local schools and some local community groups will carry out the planting.

Signs have been placed around the dunes, (see Figure 4.18), to inform the public what Coast Care is doing and to encourage the public to treat the beach with care.

Figure 4.18 Coast Care sign, Tahunanui Beach

More walkways have been formed to discourage the public from walking over the dunes and causing erosion.

Some other Coast Care sanctioned work has taken place. It has not had as much success as would be liked as storm water continues to work against the accretion of the dunes.

1. A small sand bag wall was built to deflect the sea from hitting the bank forming the edge of the artificially reclaimed Abel Tasman Carpark. These sand bags lasted one summer before falling down in a storm, and since then have gradually been removed as the sand erodes.
2. Sand was brought in from other areas to build up specific dunes. The new sand soon washed away, including by stormwater discharges at the eastern end of the beach, and the new dunes were eroded. Even the erection of sand-trapping barriers around this new sand has not stopped the erosion of the dunes.

The Coast Care committee meets about six times a year to suggest ideas on how to encourage the development of Coast Care and to help with plantings. Members make many decisions based on their own observations, on previous Coast Care works from other areas and on advice from Council staff. Planting, building of the sand-trapping barriers, erecting signage and other work is generally done by Council contractors, Coast Care committee members, community groups and schools.

SCORE CARD: TAHUNANUI BEACH

General conclusions from Tahunanui Breach surveys 1958 – 2003:

- In common with many other New Zealand beaches Tahunanui Beach is a dynamic system and experiences periods of erosion and periods of accretion. 
- Tahunanui Beach went though a period of growth between 1958 and 1982, with the beach reaching its greatest extent. 
- Since 1982 the eastern end of the front beach near Rocks Road and along the Blind Channel have been subject to erosion. 
- Since 1958, the central part of the main beach has generally continued to grow, especially above the high water mark along the beach ridge. The beach ridge in this area is now at its highest level since surveys started in 1958. 
- Some net erosion of the mid and lower parts of the central beach occurred between 1982 and 2003, but levels are still much higher than they were in 1958. 
- The beach in Rocks Road and the Lions Playground grew until 1982 and has since eroded back. It has now almost reached its 1958 profile. 
- The beach in the Blind Channel and Parkers Cove area was not surveyed in 1958. Survey results between 1982 and 2003 show the beach ridge continuing to erode. 
- The lower beach in the Parkers Cove area has accreted between 2000 and 2003. 

Coast Care programme established and successful in stabilising the central section of Tahunanui Beach through planting and sand-trapping barriers. 

PART 5 – NELSON HAVEN

A significant feature of Nelson Haven is Port Nelson, one of New Zealand's highest volume ports, handling around 2.5 million tonnes of cargo in the last year (see Figure 5.1). It is a major outlet for northern South Island forestry and horticulture, and is also New Zealand's primary fishing base for national and international fishing activity, including fish processing and ship maintenance, repair and refitting. To maintain ship passage, Nelson Haven requires constant dredging to remove sediment deposited from local streams and rivers. Annually, 50 000 m^3 is dredged just to maintain a constant water depth.

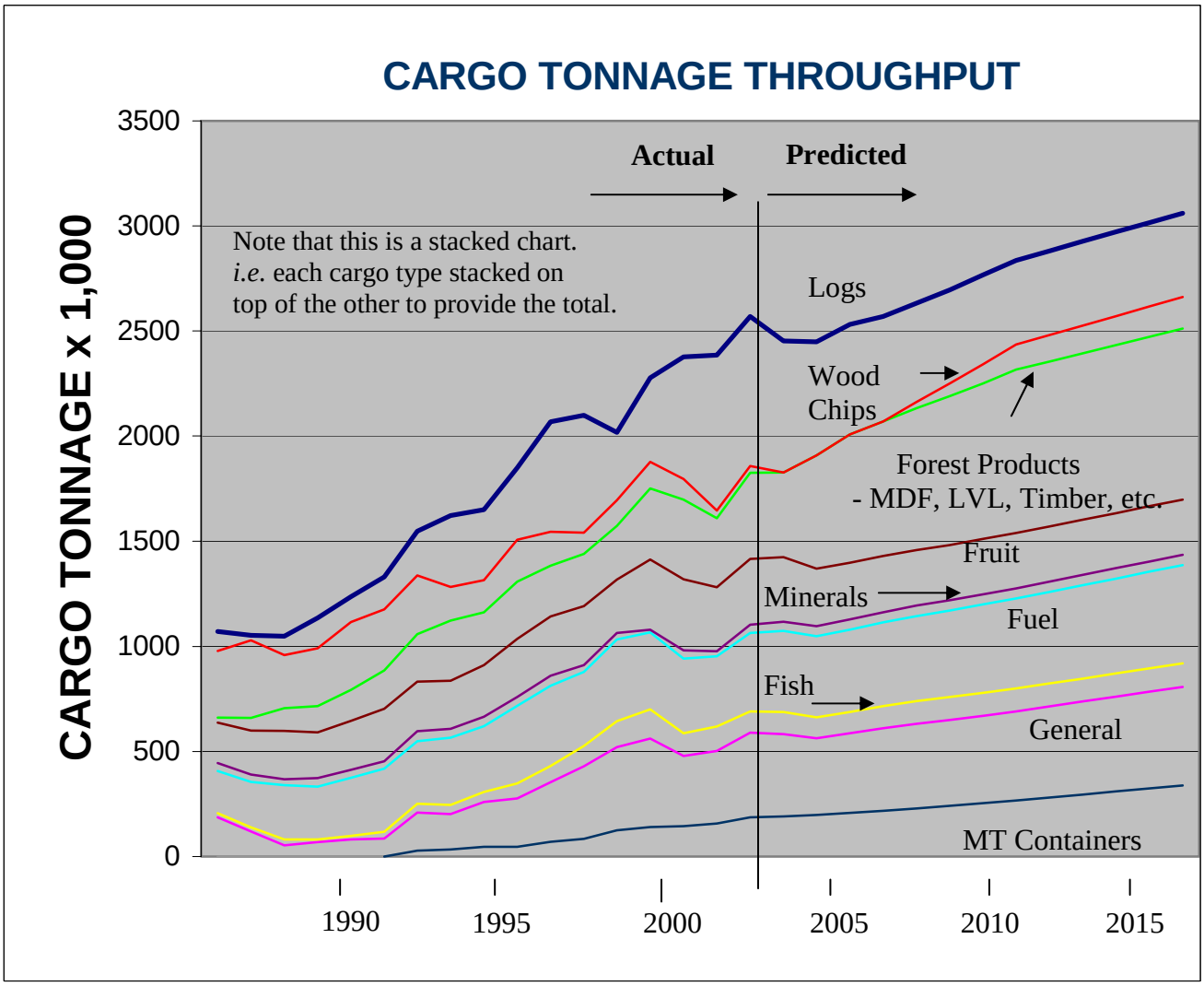


Figure 5.1 Port Nelson cargo tonnage

The river and stream catchments of Nelson Haven are being increasingly modified by residential development, tracking and forestry. Demand for industrial land and recreational and commercial boat facilities in the port area is high and has resulted in substantial infilling. In total, Nelson Haven and its former margins have been reduced in extent by 40%. Given the high and diverse values associated with Nelson's coastal environment, the potential exists for significant conflict between uses and values.

Moreover, the high degree of industrialisation coupled with the high level of shipping creates the potential for major as well as minor pollution events.

WHAT THE COUNCIL WANTS TO ACHIEVE

The Council wants to:

- meet social, economic and cultural needs of the community within the coastal environment, while protecting the coast's natural character and natural and physical resources
- encourage appropriate use or development in areas where the natural character has already been compromised
- separate incompatible activities in the coastal environment
- provide for use and development that depend on the natural and physical resources in the coastal environment as long as the quality of the environment is maintained
- maintain and enhance the quality of Nelson's coastal water
- meet maritime transport needs whilst avoiding, remedying or mitigating adverse environmental effects
- ensure all vessel construction, maintenance and servicing sites possess facilities for the containment, collection and treatment or disposal of wastes or contaminants

(see RPS objectives CO1.2.1, IN3.2.1 and policies CO1.3.8, CO1.3.11, CO1.3.16; and RMP objective DO7.2 and policies DO7.2.1, DO7.2.2, DO7.2.3, DO7.2.4)

MONITORING PORT CONTAMINANTS

Since December 1996 the Council, jointly with Port Nelson Ltd (PNL), has regularly carried out sediment sampling within Nelson Haven and adjacent to the port area to establish the type and extent of contamination. Samples were analysed for a number of contaminants including metals, chemicals and pesticides.

Nelson Haven and marina were also included in a study by MFE (report released in April 2003) of 12 key recreational boating areas around New Zealand, assessing levels of antifouling co-biocides (see later for explanation of term).

A summary of various Port Nelson monitoring projects follows, including efforts to eradicate the invasive Asian kelp *(Undaria sp.)* from Nelson Haven.

COASTAL SEDIMENT MONITORING

Results from coastal sediment monitoring were last summarised in the December 1999 SOE report, which highlighted a joint NCC/PNL study of sediment contaminant levels within the Port Nelson area. Most coastal sites sampled within the port had low or negligible contaminant levels with the exception of three main areas:

(i) the Old Boat Harbour. This site has since been rectified as part of the Haven Holes development project.

(ii) the Calwell Slipway.

(iii) Saltwater Creek.

Port Nelson Calwell Slipway

From the previous monitoring, the Calwell Slipway was considered to be the most important area for further investigation because of its high contaminant levels. While sediment contaminant concentrations were not as high as other slipways in New Zealand or around the world, they were considered locally significant. However, the spatial extent of the slipway contamination could not be determined given the limited number of samples collected prior to 1999. Therefore, a follow-up study of the slipway was conducted in 1999.

A total of 54 sediment chemistry samples were collected from the slipway basin and analysed for a range of different contaminants mostly comprising heavy metals and semivolatile organic compounds (Figure 5.2). Emphasis, however, was placed on copper concentrations since it was assumed that other contaminants would follow a similar spatial pattern to that of copper. The results of the survey showed that copper concentrations within the slipway ranged from near-background values (for port sediments), to values that were well above criteria for international sediment quality. Furthermore, copper concentrations were comparable to other trace metals at the slipway and representative of contaminant levels in general.

Figure 5.2 Sediment core sampling equipment

Screening levels (based on criteria developed for a Canadian Puget Sound Dredge Disposal Analysis project) were generated. They relate to areas where adverse biological effects from contamination are probable (*i.e.* PSML criterion) and possible (*i.e.* PSSL criterion) (see Figure 5.3). These criteria were used in the absence of any relevant New Zealand guidelines for sediment quality; however, the recent revision and re-release of the ANZECC water quality guidelines includes sediment quality guidelines which cover the same criteria. The ANZECC sediment criteria are used to predict both possible and probable adverse biological effects and use low and high Interim Sediment Quality Guidelines (ISQG), respectively, to do so.

Given that this area exhibited the potential for adverse ecological effects, possible management measures and mitigation options for addressing the problem were discussed. The three main options for dealing with the contaminated sediments were: leave them in place, treat them in-situ or remove them. The removal option under annual maintenance dredging was considered the most appropriate mitigation measure.

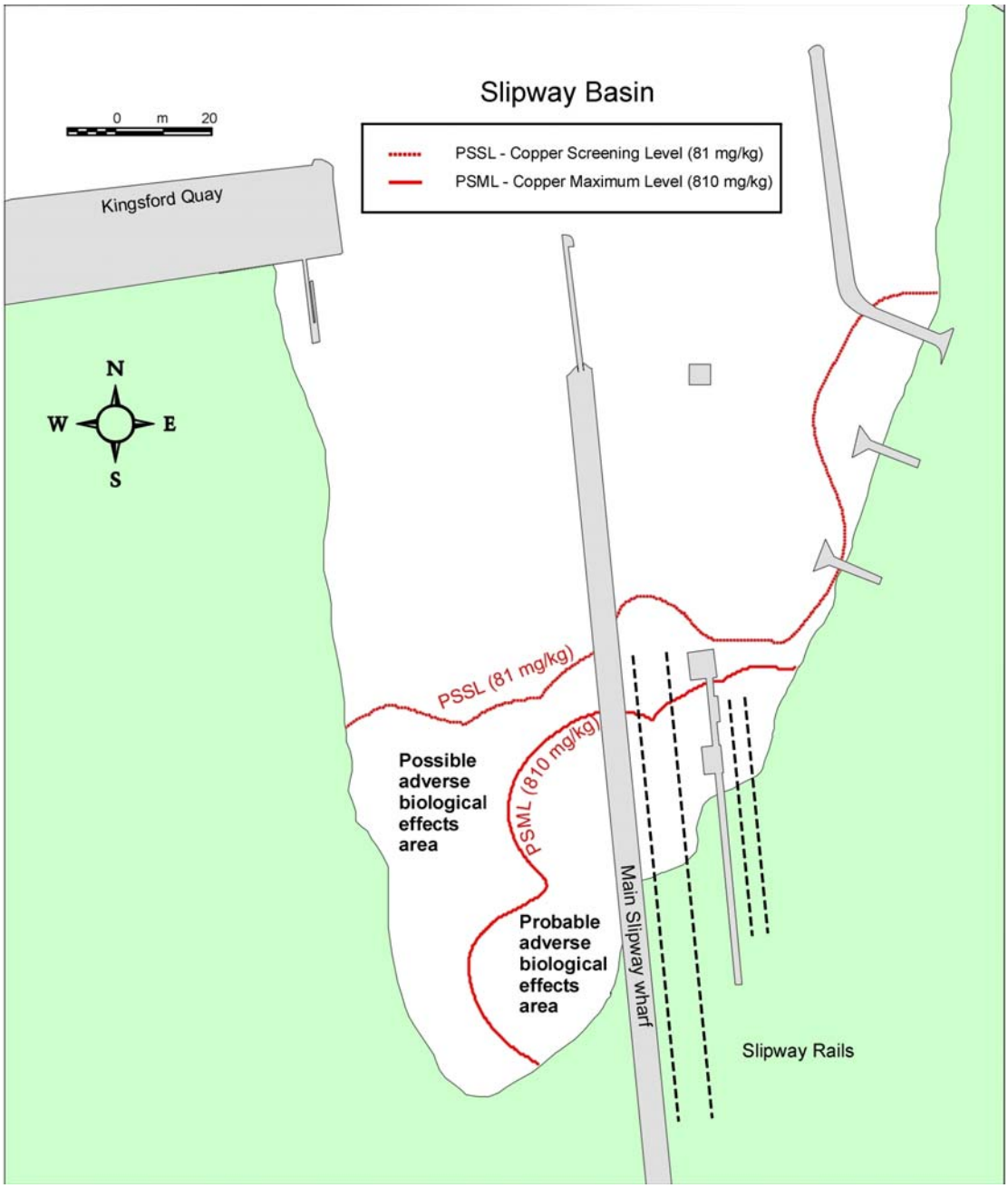


Figure 5.3 Effect-level contours for copper within the Calwell Slipway basin showing areas of possible and probable biological effects.

NELSON ANTIFOULING CO-BIOCIDE MONITORING

Background

Copper compounds in conjunction with organic biocides are being used increasingly in antifouling paints applied to the hulls of ships and boats to prevent the growth of bacteria, algae, larvae, mussels, barnacles and other invertebrates which colonise submerged surfaces and reduce vessel speed, safety and maneuverability. Copper is toxic to fouling organisms such as barnacles, tube worms and bryozoa. However, several algal species such as *Enteromorpha* and *Ectocarpus* are tolerant to copper so various organic biocides are used along with copper to improve antifouling protection. Use of these "co-biocides" (a combination of copper and a biocide) is increasing because Tributylin (TBT), which has been used for antifouling since the 1960s, can no longer be used as it is a major toxic threat to the marine environment.

There are currently 45 marine antifouling formulations registered for use in New Zealand, of which 36 contain co-biocides. During the past 5 years, there has been growing scientific interest and increasing concern related to the effect of antifouling co-biocides on the marine environment. Attention has focused especially on the herbicides Irgarol 1051 and diuron because of their persistence in marine surface waters and their reported harmful effects. They are also common constituents of marine antifouling paints in New Zealand.

Irgarol inhibits photosynthesis and is therefore potentially toxic not only to fouling species but also to other marine plants such as microalgae (including those living symbiotically in coral), seaweeds, seagrasses and mangroves. It is stable and involatile in seawater, and is therefore quite persistent in the marine environment. Irgarol also has a tendency to accumulate in underlying sediments and in marine plants such as seagrasses. Internationally, Irgarol concentrations in many coastal waters are now at levels which may be damaging microalgal communities, macroalgae, seagrasses and, indirectly, coral- and plant-eating animals. Other potentially serious effects of Irgarol include the alteration of microalgal community structures, which constitute the base of the marine food web.

Diuron has a similar mode of action to Irgarol, although is less potent as a photosynthetic inhibitor. Diuron is generally used in a greater range of antifouling products than Irgarol, and reported levels therefore are higher than Irgarol in seawater.

The United Kingdom has now regulated the use of co-biocides in marine antifouling paints. Diuron is no longer approved for use as an active ingredient on any size of vessel, and Irgarol 1051 has been deregistered for use on vessels under 25 m in length. Other countries such as the Netherlands have taken the approach of setting Maximum Permissible Concentrations (MPCs) for co-biocides in seawater, based on a review of toxicological data.

In New Zealand, the marine antifouling paints based on co-biocides were registered under the pre-Hazardous Substances and New Organisms (HSNO) Act 1996, which has yet to be transferred into the HSNO Amendment Act 2000. Recently, an application to import/manufacture a range of new marine antifoulants based on co-biocides was submitted to the Environmental Risk Management Authority (ERMA) New Zealand; this

application was approved with controls which included the setting of Environmental Exposure Limits (EEL) for concentrations of co-biocides in seawater.

Marine environmental protection guidelines for both the Netherlands and New Zealand are shown in Table 5.1. The Dutch MPC values are based on 'safe' levels, derived from a review of available toxicity data. The Dutch MPC value for Irgarol appears to have been used as the basis for the New Zealand environmental exposure limit, but the diuron EEL is based on the ANZECC guidelines and is considerably less protective than the Netherlands value. It is worth pointing out that the Netherlands MPC values are widely used in open literature as a basis for assessing seawater co-biocide levels, and that the ANZECC guidelines themselves describe the diuron value of 1800ng/L for marine waters as a low reliability trigger value based on a limited dataset, and to be used only as an indicative interim working level.

Table 5.1 Marine environmental protection guidelines for Irgarol 1051 and diuron

Guidelines	**Irgarol 1051**		**Diuron**	
	Seawater	*Sediment*	*Seawater*	*Sediment*
New Zealand Environmental Exposure Limits (EELs)[1]	24 ng/L	-	1800 ng/L	-
Netherlands Maximum Permissible Concentrations	24 ng/L	1.4 µg/kg[2]	430 ng/L	-

[1]Proposed by ERMA New Zealand in relation to application HSR02005, referred to in December 2002 decision.
[2]This is equivalent to 1.4ng/g
Source: Antifouling Co-biocides in New Zealand Coastal Waters (2003)

Antifouling paints are regularly used to treat boats near the Calwell Slipway at Port Nelson (see Figure 5.4). In February 2003, both seawater and sediment sampling was undertaken at various sites at Port Nelson (see Figure 5.5 for locations) as part of a national study on the occurrence of antifouling co-biocide compounds in key recreational boating areas around the New Zealand coast. The main purpose of the study was to collect a set of high-quality and reliable data for future comparisons. The dataset will be particularly important if a current application for a range of new antifouling formulations is approved and a greater range of marine paints based on co-biocides becomes available in future.

Figure 5.4 Nelson hardstand yard

Figure 5.5 Location and features of sampling stations in Nelson

Station	Location	Number of boat moorings[1]	Seawater	Sediment
22	Nelson main slipway 1 (5 m from)			✓
23	Nelson main slipway 2 (50 m from)			✓
24	Nelson harbour (Port of Nelson)		✓	
25	Nelson marina entrance		✓	
26	Nelson marina outer jetties	450	✓	✓
27	Nelson marina between jetties	450	✓	
28	Nelson marina inner jetties	450	✓	✓

[1] Numbers of moorings given only for enclosed marinas. Numbers of moorings include marina berths plus swing and pile moorings. Information taken from *Antifouling Co-biocides in New Zealand Coastal Waters.*

Results

Co-biocide concentrations in Port Nelson seawater

Levels of the antifouling co-biocides Irgarol 1051 and diuron in Nelson seawater samples are presented in Table 5.2 and Figure 5.6.

Nationally, diuron was a widespread contaminant in the marina, port and estuarine waters sampled in the MfE survey. It was detected in 24 out of 26 (92%) samples. The average concentration of diuron was 273 ng/L. In Nelson, it was detected at each of the five sampling sites, with concentrations ranging from 110 ng/L at the Port of Nelson site to 770 ng/L at the Nelson marina's inner jetties.

Irgarol 1051 had a much more restricted distribution nationally in the surface waters and was detected in only 4 out of 23 (17%) samples, to a maximum concentration of 45 ng/L. The average concentration of Irgarol was 3.2 ng/L. In Nelson, it was detected at the three marina jetty sites, in concentrations ranging from 7 ng/L at the outer jetties to 19 ng/L at the inner jetties. In line with national results, Irgarol was only detected in samples where diuron concentrations exceeded 500 ng/L. It appears likely that an association does exist between Irgarol and diuron, but it is not statistically discernible owing to the large proportion of samples containing very low levels of Irgarol.

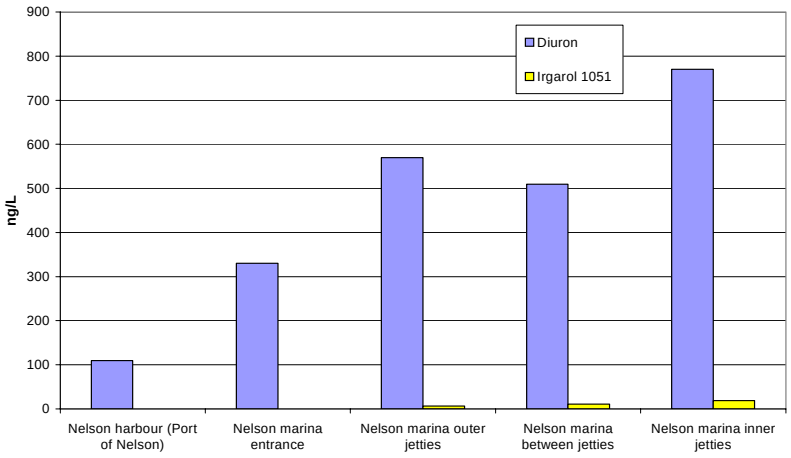


Figure 5.6 Co-biocide concentrations in Port Nelson seawater

Table 5.2 Co-biocide concentrations in Port Nelson seawater

Station	Location	Marina size[1]	Tidal state during sampling[2]	Diuron (ng/L)	Irgarol 1051 (ng/L)
24	Nelson harbour (Port of Nelson)		-33	110	<5
25	Nelson marina entrance		-17	330	<5
26	Nelson marina outer jetties	450	0	570	7
27	Nelson marina between jetties	450	+15	510	11
28	Nelson marina inner jetties	450	+25	770	19

[1] Numbers of marina berths, swing and pile moorings. Information taken from *Antifouling Co-biocides in New Zealand Coastal Waters*

[2] Time in minutes before (-) or after (+) low tide

Spatial patterns in seawater

Diuron contamination of seawater within marinas is well established, with levels typically 200─400 ng/L. Marina size, in terms of numbers of boats, does not appear to be the main determinant of seawater diuron levels, as the largest marinas sampled nationally were only moderately contaminated. It is probable that the amount of tidal exchange in relation to the number of boats is the main influence on diuron build-up in seawater. The effects of restricted tidal flushing can be seen clearly in the Nelson marina, where diuron concentrations increase towards the innermost part of the long, narrow marina embayment where tidal flushing is most restricted.

The influence of hull-washing facilities on seawater levels of biocides is expected to be sporadic, because the activities are episodic in nature.

The results from Nelson marina suggest diuron is exported out of marinas to surrounding waters. Care was taken to sample the outgoing tidal plume from the marina. A concentration gradient was observed from 770 ng/L in the innermost part of the marina, to 330 ng/L at the marina entrance and 110 ng/L in the harbour. Diuron is apparently being dispersed from the marina into Nelson Haven.

For diuron in Nelson seawater, three samples exceeded the Netherlands MPC level of 430 ng/L, but no samples exceeded the proposed New Zealand EEL of 1800 ng/L. For Irgarol, none of the samples exceeded the Netherlands MPC of 24 ng/L, which has also been adopted as the proposed New Zealand EEL. Overall, any adverse effects on sensitive marine species are very unlikely for Irgarol, and unlikely for diuron except in marina waters.

Co-biocide concentrations in Port Nelson sediment

Levels of the antifouling co-biocides Irgarol 1051 and diuron in sediment samples collected at Port Nelson sites are shown in Table 5.3.

Table 5.3 Co-biocides in Port Nelson sediment samples

Station	Location	Number of boat moorings[1]	Proximity to hull-washing facilities	Diuron (ng/g)	Irgarol 1051 (ng/g)
22	Nelson main slipway 1		5 m	146	8
23	Nelson main slipway 2		50 m	20	<5
26	Nelson marina outer jetties	450		6	<5
28	Nelson marina inner jetties	450		8	<5

[1] Numbers of moorings given only for enclosed marinas. Numbers of moorings include marina berths plus swing and pile moorings. Information taken from *Antifouling Co-biocides in New Zealand Coastal Waters.*

Diuron was detected in all of the sediment samples, with the distribution of both Irgarol and diuron in the sediments clearly influenced by proximity to hull washing and repainting facilities. However, sediments collected close to the base of the main Nelson slipway had much lower levels of diuron than sites at Tauranga and in Marlborough Sounds.

An important finding of the national study was that Irgarol and diuron contamination was high by international standards in sediments adjacent to certain hull repainting and washing operations, and exceeded most other published values. This points to a need to improve wastewater management practices for such facilities, as they represent a significant and preventable source of not only co-biocides but also a range of other associated contaminants such as copper, zinc and hydrocarbons.

FUTURE PORT NELSON MONITORING

Since the nationwide study was conducted, some notable progress has been made towards an integrated approach to monitoring the Port Nelson region. As the primary marine industrial area for Nelson, the port has sediments that have historically been subject to contamination from a multitude of different sources including stormwater, vessel maintenance activities, industrial runoff and bulk loading operations, to name a few.

Previous studies have shown that, while contaminant inputs have gradually been reduced and are likely to continue to improve, there are still areas within the port that should be subject to regular and standardised monitoring to better define trends over time. This need for a consistent approach has been addressed in the Port Nelson Long-term Monitoring Programme (LTMP). The LTMP is jointly funded by PNL and NCC and is scheduled to commence during the summer of 2004.

In short, the purpose of the programme is to provide:

(i) sampling which can be regularly repeated to produce a long-term record of environmental quality in the port

(ii) identification of key contaminants, the activities which produce them and the effects of those contaminants, so that steps can be taken to minimise further inputs where necessary

(iii) a cost-effective approach which maximises information gained while minimising costs to achieve a practical and useful result.

To accomplish this, 16 permanent station locations have been established within the port area (see Figure 5.7) and each has been placed in a hierarchy according to the previously assessed level of contamination (see Table 5.4). Sites with the highest levels of historic or perceived contaminant inputs are subject to more regular and intensive monitoring whilst sites that have lower levels are sampled less frequently and less intensively. The approach is loosely based on other long-term programmes of this type and incorporates what is often termed a “sediment quality triad”, where chemistry, biology and toxicity are all evaluated to give a complete picture of environmental health. Results of the first round of sampling will be summarised and incorporated into the SOE report next year and subsequent sampling will be appended to future SOE reports.

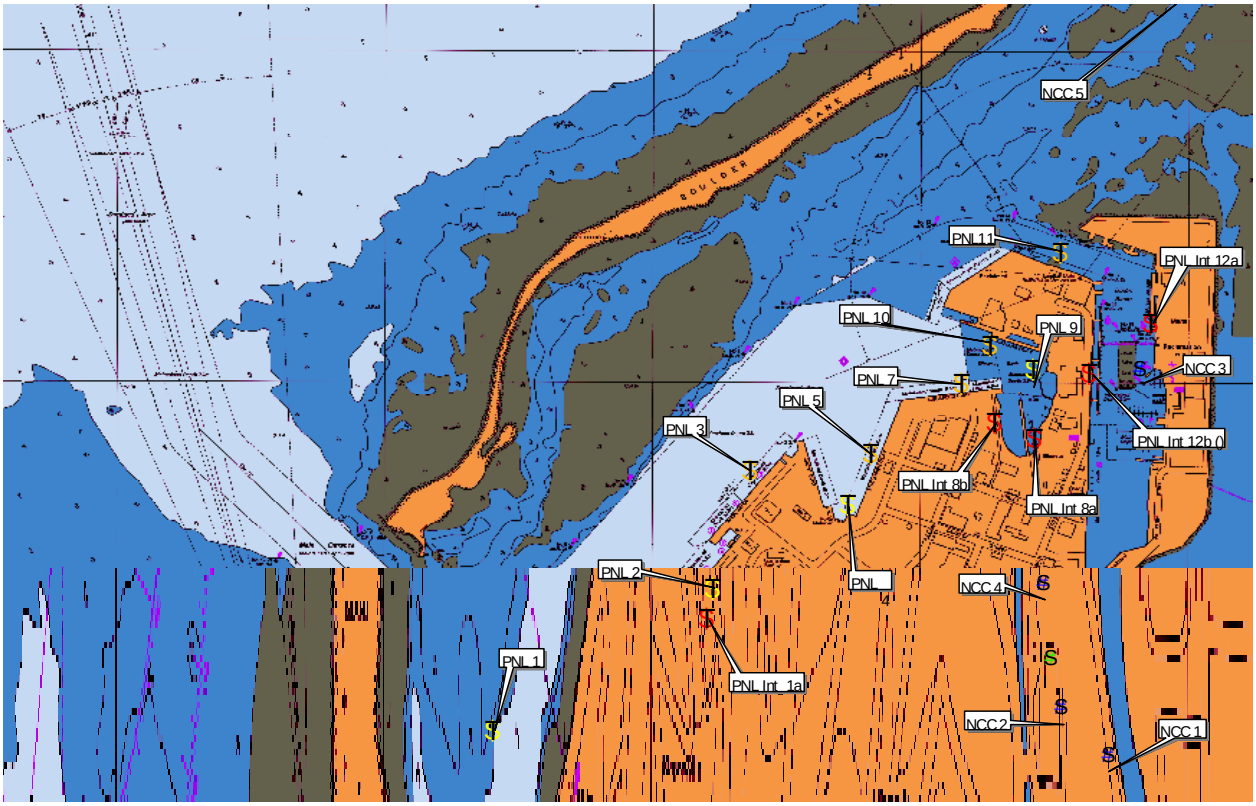


Figure 5.7 Port Nelson future monitoring sites

Table 5.4 Summary of proposed analyses and sample sites for LTMP

		Site	Year:	2004	2005	2006	2007	2008	2009	2010
PNL	Primary (1°)	PNL1	Control – West	◆	◇	◇	◇	◆	◇	◇
		PNL2	Wakefield Quay	◆	◇	◇	◇	◆	◇	◇
		PNL4	Brunt/McGlashen Basin	◆	◇	◇	◇	◆	◇	◇
		PNL9	Slipway Basin	◆	◇	◇	◇	◆	◇	◇
	Secondary (2°)	PNL5	Wood-chip pile		◆		◇		◆	
		PNL10	Sealord Wharf		◆		◇		◆	
		PNL11	Dixon Basin entrance	◇		◆		◇		◆
		PNL7	Kingsford Wharf	◇		◆		◇		◆
		PNL3	Main Wharf East		◇		◆		◇	
		PNL13	Future		◇		◆		◇	
	Intertidal	PNL 1a Int .	Control	⦿		⦿			⦿	
		PNL 8a Int .	Slipway	⦿		⦿			⦿	
		PNL 8b Int.	Slipway	⦿		⦿			⦿	
		PNL 12b Int .	Dixon Basin	⦿		⦿			⦿	
NCC	1°	NCC1	Lower Maitai (s/w site)	◆	◇	◇	◇	◆	◇	◇
		NCC4	Old Boat Harbour	◆	◇	◇	◇	◆	◇	◇
		NCC5	Control – East	◆	◇	◇	◇	◆	◇	◇
	2°	NCC2	Saltwater Creek		◆		◇		◆	
		NCC3	Dixon Basin boat ramp		◇		◆		◇	
	Int.	NCC4(int)	Old Boat Harbour	⦿		⦿			⦿	

Key to analysis and methods indicated in Table 5.4

Symbol	Analysis and Methods
◇	Sediment physics and chemistry (trace metals, grain size and organic content)
◆	Macrofaunal sampling (Identify and enumerate biota; 3 replicates), Sediment toxicity testing (toxicity response; composite of 3 cores), Bivalve bioaccumulation (trace metals, semivolatile organic compounds, organotins)
⦿	Intertidal survey (identify and estimate relative abundance on shore; includes biosecurity checklist)

OTHER COASTAL SEDIMENT MONITORING

While Port Nelson has clearly been, and will continue to be, the primary focus of coastal sediment monitoring in the region, other smaller-scale sampling efforts have been undertaken. These include regular and ongoing monitoring of dredge spoil disposal into Tasman Bay (for PNL'S discharge consent), and monitoring of intertidal coastal sediments that are subject to stormwater runoff.

Port Nelson Ltd dredge spoil disposal

In September 2001, the fourth monitoring survey was carried out under PNL's coastal permit which authorises maintenance dredging around the Port of Nelson, and disposal of dredge spoil in southern Tasman Bay. Results of the 2001 monitoring survey provided no evidence of significant contaminant-related ecological impacts from this operation, and showed that there has been no significant change in contaminant concentrations from previous surveys.

The monitoring focused on the measurement of key contaminants in sediments and shellfish, and on direct assessment of effects on seafloor macrofaunal communities at sites within the spoil dumping area, a spreading zone and a control zone.

Results from this survey showed that relative abundance and species richness of macrofauna were similar across the sampling zones and were comparable with previous monitoring surveys. Average concentrations within the disposal area were lower than at the control and spreading zone sites for zinc and copper, but was second highest for lead over the three zones. Contaminant levels were well within the maximum limits specified in biological effects-based guidelines for sediment quality (ANZECC 2000). The concentrations of a variety of other contaminants measured in the flesh of a marine snail (*Austrofusus glans*) were well within acceptable levels for human consumption of shellfish. These results were consistent with the previous monitoring surveys. Similarly a measure of the effects from antifouling materials (*i.e.* imposex in marine snails) was most prevalent in the dumping area and spreading zone, and was not detected at the control sites; however, the levels were well below those indicative of reproductive impairment in snails. These findings are also consistent with previous monitoring surveys.

Stormwater runoff into the Coastal Marine Area

In March of 2001, the Council conducted a review of sediment contaminant levels in the eight major catchments that drain the greater Nelson City area. The results from the entire review, which included both freshwater and costal sediments, were incorporated into the Council's 2002 SOE report.

SCORE CARD : NELSON HAVEN SITE SUMMARY

NELSON HAVEN SEDIMENT SAMPLING AND LONG-TERM MONITORING

- Sediment sampling undertaken in 1999 jointly by PNL and NCC found that the port and haven were below guideline levels for common port contaminants with the exception of three sites. 
- The three sites found to have elevated levels of contaminant were Calwell Slipway, Saltwater Creek and the Old Boat Harbour. 
- A sanitation survey was undertaken in the Saltwater Creek catchment to identify and rectify potential sources of contamination. 
- Dredging of the Old Boat Harbour for marina development has largely removed contamination in this area. 
- Further investigation of the level and extent of contamination in the Calwell Slipway area was undertaken and management options developed. 
- A long-term monitoring programme for Port Nelson and Nelson Haven has been agreed on by NCC and PNL. It includes sediment quality, sediment toxicity and shellfish bioaccumulation. Sampling will commence late in 2003. 

NELSON HAVEN ANTIFOULING CO-BIOCIDE MONITORING

Site name	Sample type	Co-biocides		
		Diuron	***Irgarol***	
Port Nelson slipway 1	Sediment	146 ng/g	8ng/g	
Port Nelson slipway 2	Sediment	20 ng/g	<5 ng/g	
Nelson harbour	Seawater	110 ng/L	<5 ng/L	
Nelson marina entrance	Seawater	330 ng/L	<5 ng/L	
Nelson marina outer jetties	Sediment	6 ng/g	<5 ng/g	
	Seawater	570 ng/L	7 ng/L	
Nelson marina between jetties	Seawater	510 ng/L	11 ng/L	
Nelson marina inner jetties	Sediment	8 ng/g	<5 ng/g	
	Seawater	770 ng/L	19 ng/L	

Note: The assessment above is based on Netherlands MPC guidelines (see Table 5.1 for detail) as New Zealand guidelines are interim only and based on a limited dataset. For sediment the only guideline currently established is for Irgarol (Netherlands MPC of 1.4ng/g). Levels less than 5ng/L for seawater and less than 5ng/g for sediment are considered virtually undetectable.

UNDARIA IN NELSON HAVEN

INTRODUCTION

Undaria pinnatifidia is an accidentally introduced Asian kelp (see Figure 5.8). It was first identified in Nelson Haven in 1997 and has rapidly spread since. It is a rapidly colonising plant and has the potential to displace native species and to foul structures. Undaria is often spread by boats and is comparatively widespread, being found in ports throughout New Zealand.

Figure 5.8 Undaria from Nelson Haven 1999

Undaria was declared as an 'unwanted organism' under the provisions of the Biosecurity Act 1993 following the sinking of an infested vessel on the Chatham Rise.

Potential biosecurity and economic threats associated with undaria infestation were drawn to the attention of NCC and PNL in 1999 by officers of MFish and Department of Conservation. Central Government commissioned an investigation into management options for undaria that was undertaken by the Cawthron Institute.

WHAT THE COUNCIL WANTS TO ACHIEVE

The Council wants to:

- prevent infestations of new pest species in Nelson or, where they establish, to rapidly control them
- prevent pest damage to natural and physical resources
- protect the integrity, functioning and resilience of the coastal environment.

(see RPS objectives NA4.2.1, NA4.2.2, CO1.3.4)

1999 SURVEY

To buy time while Central Government established its policy for undaria, a survey of the extent of Nelson's undaria infestation and removal of plants was undertaken during spring 1999. The work was jointly funded by NCC and PNL. Undaria was included for consideration as a possible pest species in the Joint Nelson/Tasman Regional Pest Management Strategy.

Comparatively heavy infestations of undaria were found in the Nelson marina, on Haulashore Island and through the Cut. One vessel was found to be infested. The marina area was cleared by professional divers, who removed 2002 kg of undaria from the area. Follow-up clearance of marina regrowth and of infestations in the wider Haven was undertaken by volunteers, including members of Nelson dive clubs and by shore-based volunteers (during a period of extreme low tides). Even with this good voluntary effort, the level of infestation in the Haven was so great that not all plants could be removed, especially around the lighthouse, Fifeshire Rock (see Figure 5.9) and the Cut.

Figure 5.9 Undaria breaking the surface off Fifeshire Rock

2000 SURVEY

In spite of written requests from NCC for guidance, Central Government had still not made any decision on future undaria management by spring 2000 and further funds were allocated by NCC and PNL to repeat the survey and clearance work of the previous year. This survey found that the infestation had spread, particularly in the Rocks Road and Haulashore Island areas, and 35 vessels were infested. A total of 4500 kg of undaria was removed, mainly from the marina. Follow-up clearance by dive clubs continued in the marina and Fifeshire Rock areas.

2001 SURVEY

By the spring of 2001, Central Government had still to make a decision on future undaria management, although MFish advised it was likely to restrict any management action to "high value areas". In the absence of Central Government policy, NCC and TDC addressed undaria in the Regional Pest Management Strategy and accorded it the status of a "regional surveillance pest" along with cats and possums.

With the continuing absence of Central Government policy, PNL withdrew further financial support for undaria control, but continued with logistical support. Nelson City reviewed its allocation for survey and control work and, in light of funding assistance from an anonymous private donor, decided to fund undaria survey and monitoring work during 2001 and the private donor funded clearance work.

Survey and clearance work was undertaken during a period of extreme low tides in mid September 2001. This work was the last full, dive survey and clearance work undertaken in Nelson Haven.

Key points arising from the 2001 work follow:

- In spite of previous efforts, the extent of infestation within the Nelson Haven continued to grow between 2000 and 2001. In the area along Rocks Road and around Haulashore Island, there was an increase in plant density from intermittent plants to dense beds. New areas of infestation developed on harbour piles and on harbour shoals.
- The number of infested vessels continued to increase from 35 in 2000 to 45 in 2001.
- The plant biomass removed from marina fingers A–E decreased from 2500 kg in 2000 to 1900 kg in 2001. A similar decrease was observed at the reference sites: from 94 kg, with 2658 plants in 2000 to 69 kg and 995 plants in 2001. This suggested that regular removal was having some impact on total plant biomass and numbers, but that the effect was not enough to prevent more vessels being infested. Caution should be exercised when interpreting biomass and abundance results as there will be natural seasonal variability in growth rates.

The extent of undaria infestation in Nelson Haven determined by the surveys in 1999, 2000 and 2001 is shown in Figure 5.10.

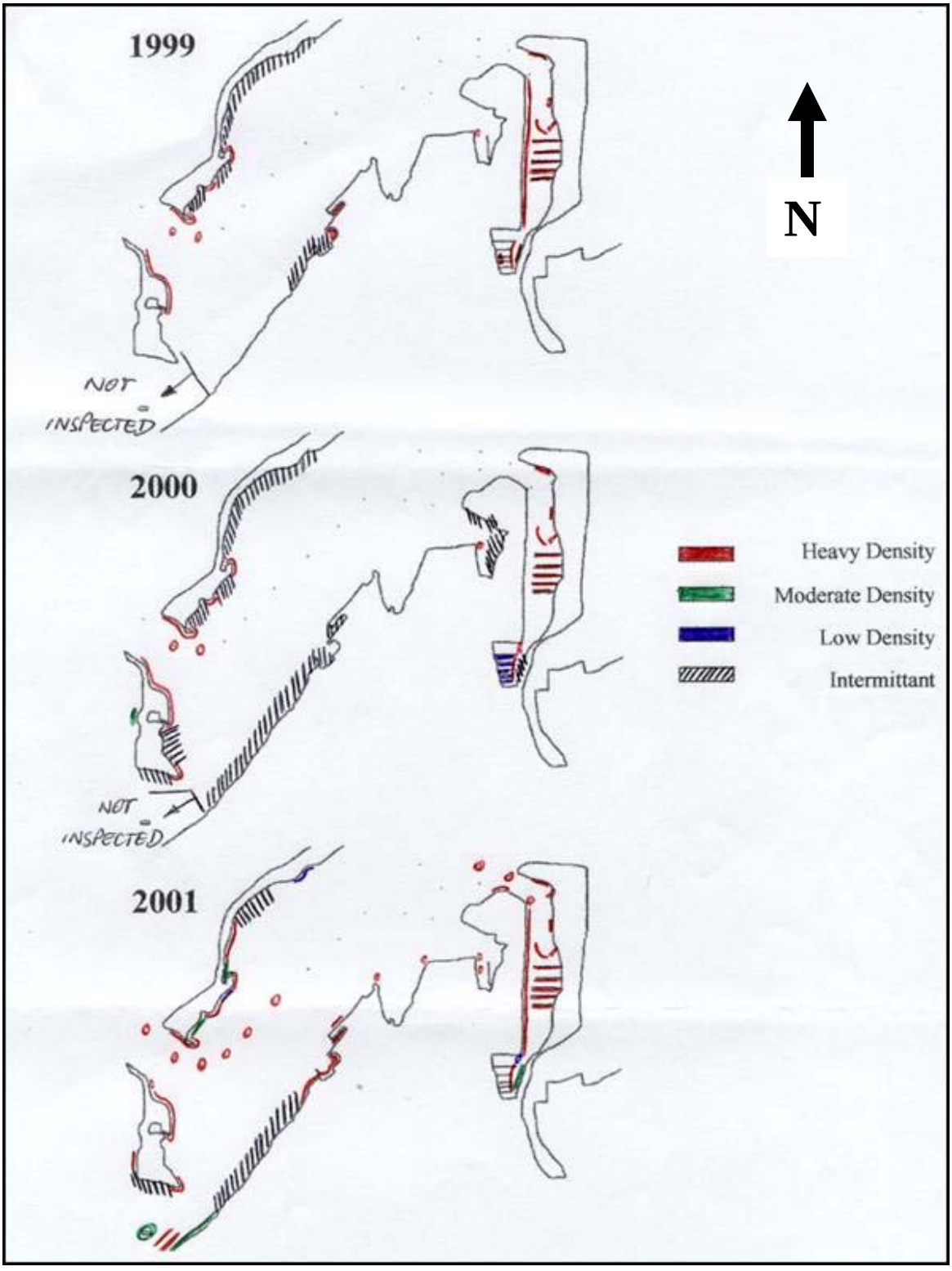


Figure 5.10 Distribution and density of* Undaria pinnatifida *in Nelson Haven

During 2001, a number of other events occurred relevant to the management of undaria in the wider area.

- Surveys undertaken in the TDC area discovered undaria on marine farms in Wainui Bay.
- A number of vessels infested with undaria entered the Abel Tasman National Park area from ports outside Nelson, including Waikawa and Port Chalmers. One of these vessels was observed deliberately clearing undaria from its hull at Anchorage.
- MFish advised that a contract has been let to investigate options for controlling of vectors (*i.e.* the ways in which undaria is moved from place to place) to high value areas. The work was predicted to take at least 2 years to complete. During that time Government did not intend to establish any new policy related to undaria management.

NCC considered the outcome of the first 3 years of undaria control work at its Environment and Planning Committee meeting of January 2002, and passed the following resolutions:

That *future monitoring of undaria be limited to gross changes in density and distribution achieved by taking photographs from a boat during a period of extreme low tide.*

And that *no further clearance of undaria be undertaken but the Council discuss the matter with marine users in an effort to continue the education programmes targeted to encourage boat owners to maintain their vessels clear of undaria to prevent it spread to new areas.*

And that *Council review its policy should changes in Central Government policy relating to undaria management make it desirable to do so and where government funding is provided to assist with the costs involved.*

And that *the Council review endeavours to evoke a positive Central Government response to the control of the weed, through representation to Local Government New Zealand.*

And that *the Council discuss with the Tasman District Council and Department of Conservation possible contributions from these bodies to the control of undaria in the Nelson Marina, on the basis that work here contributes to protecting the Abel Tasman National Park from infestation.*

ACTIVITIES SINCE 2001

Annual monitoring

Since 2001, annual monitoring has been carried out in 2002 and 2003 on the distribution and relative density of undaria in Nelson Haven. This work entailed visual observations from a boat during extreme, low spring tides, during undaria's peak growing season and when it is exposed out of the water or close enough to the water surface to identify.

Specific observation include:

- The infestation in the marina area is similar to previous years in terms of density and extent.
- A number of vessels had heavy undaria infestations, particularly around their props and rudders. These vessels were, in general, laid up rather than being actively used.
- Marina floats, tire berths and buffers were the structures most prone to infestation, especially the outer ones close to the Haven.
- The infestation along the inner Boulder Bank, between Dixon Basin and the Cut, seems to have consolidated since 2001 with most available habitat infested at a medium–high density. The density of plants in the shoal areas between the lighthouse and the Cut seems lower than in previous years.
- Plants are evident within the Cut and on outer harbour markers in the Cut. Many native seaweeds were evident in this area also.
- The margins of the infestation seem stable, as no obvious plants were found on the outside of the Boulder Bank.
- The seaward side of Haulashore Island remains largely clear of undaria, with plants not being observed until the observers were closer to Fifeshire Rock.
- The shoreward side of Haulashore Island showed heavy infestations similar to those observed in 2001.
- Infestation at Fifeshire Rock seems to be declined since 2001, with fewer plants showing on reef areas. Native seaweeds seem more prevalent here than previously.
- Infestation along the foreshore at Rocks Road seems to have peaked during 2001/2002 and declined slightly since then, with only a narrow band of plants being found along the foreshore. The beds of plants that were present at the northern end of this band in 2001 were not evident, although the Straitsman berth is still heavily infested.
- Infestation of the active port area seemed to be restricted to a small number of piles in similar locations to previous years.

General observations are:

- Efforts to clear the undaria infestation from Nelson Haven have been largely ineffective. Without the development of new control techniques, undaria appears here to stay.
- The highest densities of undaria plants are usually found where there is a sheltered environment and a suitable substrate onto which the plants can hold (see Figure 5.11).
- undaria has failed to colonise areas of high wave exposure such as the outer Boulder Bank and the seaward side of Haulashore Island.
- undaria has failed to colonise areas where the bottom comprises of fine-grained or mobile sediments.
- undaria has failed to colonise areas which are regularly exposed at low tide.
- The overall extent of infestation in the Haven has remained fairly constant over the last few years.

- The overall density of the infestation has remained constant, but there have been relative changes between areas, with undaria consolidating in some areas but declining in others.
- The vigour of native seaweeds appears to be undiminished throughout the Haven and relatively high densities of native seaweeds were observed in areas where undaria density has subsequently declined.

Figure 5.11 Undaria on the inside of the Boulder Bank, between The Cut and the lighthouse

Central Government action

In early 2002, Central Government released its "Action Plan for Unwanted Species".

For undaria, this included the following steps:

- Implementing vector management programmes in selected area such as the Sub-Antarctic and Chatham islands
- Educating a wide range of marine stakeholders on how to avoid spreading undaria
- Researching ways to treat vectors so as to minimise the amount of vector-transported undaria
- Supporting regional initatives to control undaria by developing treatment methods and education material.

In practical terms, these actions do nothing to address the current undaria infestation in Nelson Haven, although in time they may result in a wider public understanding of the issues related to invasive marine species and improved techniques to prevent further spread of undaria.

Also during early 2002, Central Government commissioned National Institute of Water and Atmospheric Research (NIWA) to undertake base-line surveys of major international ports and marinas around New Zealand. Nelson was included in these surveys, which are intended to provide a comprehensive base-line of all native and introduced species in ports and marina areas. This inventory will assist with the detection of new introductions and allow assessment of the effectiveness of border controls.

However, owing to the large number of specimens collected during these surveys and to the difficulty identifying some of them, the final results of the surveys are not expected until late 2004.

In addition, MFish is implementing surveillance of a number of "high risk" harbours throughout New Zealand, including Nelson Haven, 6-monthly. The level of risk will be assessed in terms of a harbour's proximity to a port of entry, the availability of suitable habitat for target species, the previous history of incursions and how restricted water exchange is. The surveys will concentrate on the six species thought to pose the greatest risk to New Zealand waters: Mediterranean fanworm, European shore crab, Northern Pacific seastar, Chinese mitten crab, green seaweed and Asian clam.

SCORE CARD: UNDARIA IN NELSON HAVEN

Undaria	It is not practical to eradicate undaria from Nelson Haven.	
	The extent and density of undaria infestation in the Haven has remained constant over the last few years.	
	Undaria has not spread to the high-energy environments of the outer Boulder Bank or the seaward side of Haulashore Island.	
	Native seaweeds appear to successfully coexist with undaria and appear to dominate undaria in some areas.	
Central Government action	Government has indicated it will not fund undaria control in Nelson and will concentrate on: vector control for outer islands, research into control methods and public education.	
	A base-line survey of Port Nelson has been undertaken so that newly arrived species can be readily identified and the effectiveness of marine biosecurity controls assessed.	
	Nelson has been included in twice-yearly port surveys for the six marine invasive species of greatest concern.	

REFERENCES

Australia and New Zealand Environment and Conservation Council (ANZECC). 2000. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.*

Cawthron Institute. 1999. *Port Nelson Slipway Study.*

Stewart, C. 2003. *Antifouling Co-biocides in New Zealand Coastal Waters.* Report prepared for the Ministry for the Environment.

PART 6 – MARINE PROTECTED AREAS

Protection of marine areas can occur in a number of ways – through marine reserves, *taiapure*[1] or *mahinga mataitai*[2]. The first marine reserve anywhere in New Zealand was created at Leigh, north of Auckland, in 1975 (from Cape Rodney to Okakari Point Marine Reserve). Since then, a further 14 marine reserves have been created and another 25 areas are presently under investigation. Most of the areas included in both existing and proposed marine reserves are of relatively modest size (usually under 1000 ha), with existing marine reserves protecting less than 1% of the coastal marine area of New Zealand's main islands. In comparison, terrestrial reserves today protect over 30% of the country's land area.

The Nelson/Marlborough region reflects this national pattern, with three modest-sized marine reserves scattered along its 2500-km coastline, all of them created as recently as 1993.

- Westhaven-Te Tai Tapu (536 ha), on the northwest coast of Golden Bay
- Tonga Island (1835 ha), on the coastline of Abel Tasman National Park
- Long Island-Kokomohua (619 ha), in Queen Charlotte Sound

While this means that the Nelson/Marlborough region currently has three of New Zealand's 14 marine reserves, the reality is that less than 3000 ha of marine environment have been protected around the region's long and diverse coastline. In comparison, upwards of 1 million hectares of land have been protected within the Department of Conservation's Nelson/Marlborough Conservancy.

WHAT COUNCIL WANTS TO ACHIEVE

The Council wants to:

- protect the integrity, functioning and resilience of the coastal environment
- support in principle the investigation and possible establishment of marine reserves, *taiapure* and *mahinga mataitai*
- restore and rehabilitate the natural character of the coastal environment where appropriate
- maintain or enhance the life-supporting capacity of coastal ecosystems
- protect areas of significant indigenous vegetation, habitat and natural features
- promote research on, public consultation about and, where appropriate, the establishment of a network of marine protected areas

(see RPS objectives CO1.3.4, CO1.3.12 and CO1.3.14 and RMP objective CM2 and policy CM2.4)

[1] Local fishery areas which are recognised as being of special significance to *hapu* or *iwi*
[2] Areas of the sea from where food resources are gathered

DELAWARE BAY TAIAPURE

In 1997, the Ngati Tama Trust made application under the Fisheries Act for a *taiapure* in the area at Cable Bay─Delaware Bay, from Ataata Point to Whangamoa Head (Figure 6.1). The Governor-General, by Order in Council, has recently declared this area to be a *taiapure*-local fishery. The *taiapure* abuts the proposed Nelson North Marine Reserve (Ataata Point to the Glen).

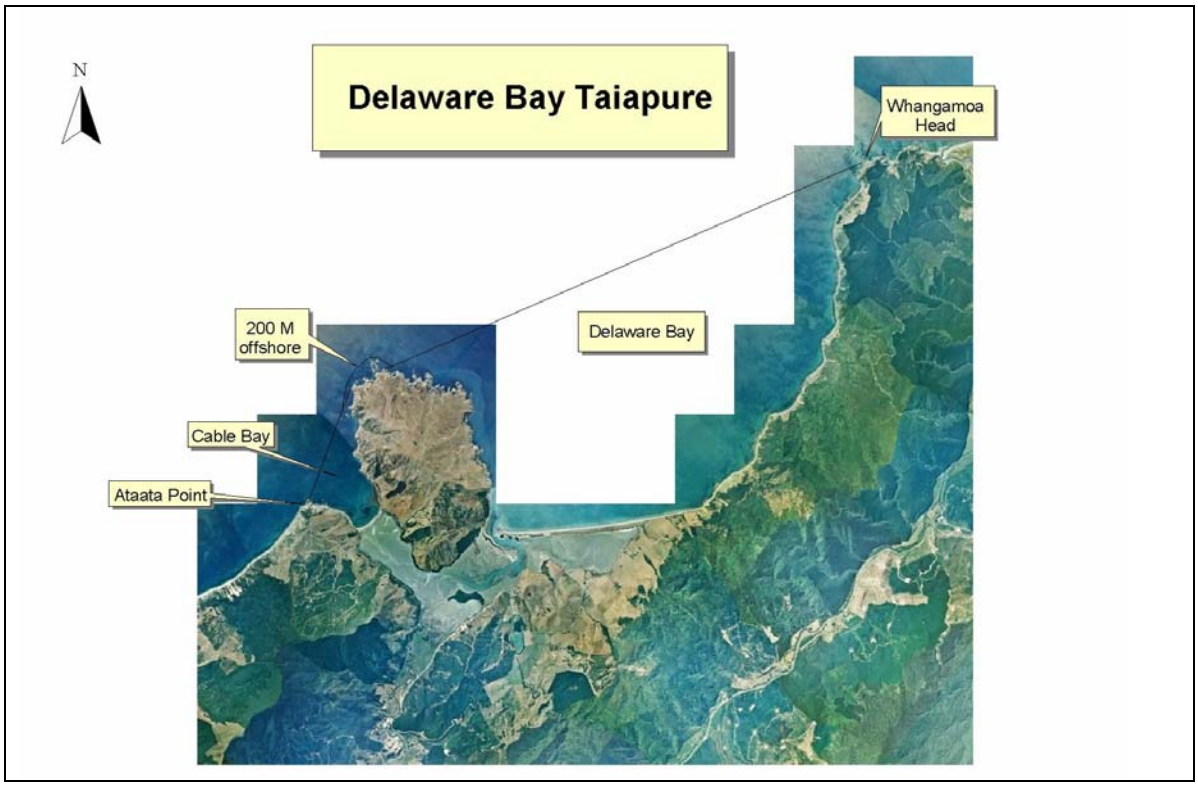


Figure 6.1 Map of Delaware Bay Taiapure

The area has been traditionally important to the Ngati Tama Iwi. The formation of the *taiapure* fishery recognises Ngati Tama's *rangatiratanga*, and of their right secured in relation to fisheries by Article II of the Treaty of Waitangi.

Taiapure are local fishery areas which are recognised as being of special significance to *hapu* or *iwi*. Where *taiapure* are established, advisory committees are formed to promote the concerns of *hapu* and *iwi* about the use and condition of these fisheries. In this way, Maori can advise the Minister of Fisheries on the regulations most appropriate for the sustainable management of fish resources in the *taiapure*.

A management committee has been appointed and is empowered to recommend to the Minister of Fisheries the making of specific fisheries regulations to control such things as daily bag and size limits, seasons, closures and fishing methods or gear restrictions. None of these controls may discriminate on the grounds of race or colour or ethnic or national origins.

The trustees of the Ngati Tama Manawhenua ki Te Tau Ihu Trust nominated a group of people representing recreational, customary and commercial fishing interests, conservation groups and local residents, to the Delaware Bay Taiapure-Local Fishery Management Committee.

Issues that the committee has identified as requiring attention include stock assessments of certain key species such as flounder, snapper, crayfish and paua (*Haliotis iris*), (and their preferred seaweed foods). Interventions being considered are the framing and gazettal of regulations for reducing catch limits, reduction of predators (starfish etc) and re-seeding/restocking with juveniles of target species.

Because of the wide range of often divergent interests represented on the committee, the complexity of the issues under consideration and the significant overlap between them, it is anticipated that it will take some time before details on the management of this fisheries area are finalised and programmes for enhancing the area implemented.

MARINE RESERVES

Under the Marine Reserves Act 1971, marine reserves are created "for the scientific study of marine life". They are created in areas that contain underwater scenery, natural features or marine life, of such distinctive quality, so typical or beautiful or unique that their continued preservation is in the national interest.

There are no marine reserves currently in the Nelson City district. However interest in protecting part of the coastal marine environment northeast of Nelson City began in the early 1980s. The then Ministry of Agriculture and Fisheries (MAF) invited suggestions on possible candidates for marine reserves within the Challenger Fisheries Management Area (which includes most of the Nelson/Marlborough coastline). A public submissions process identified Cable Bay and adjacent parts of the coast as one of the most appropriate areas for marine protection in the Nelson region.

Since then, the possibility of creating a marine reserve on this part of the Nelson coastline has been further investigated (or at least considered) by MAF, local conservation groups, the former Nelson Bays United Council and the Department of Conservation ─ all of whom have concluded that this would seem to be an appropriate area for marine protection. Although these investigations have given rise to considerable debate about where exactly such a reserve should be located, the general concept of a marine reserve on this part of the Nelson coastline has consistently been given a clear vote of support by members of the public.

In early 1996, the Nelson Branch of the Royal Forest and Bird Society ("Forest and Bird") published a public discussion document and questionnaire that set out three options for a marine reserve in this area. All options included the area around Pepin Island, and two options, which included the area now suggested, proposed a reserve extending considerably further south to Snapper Point. There were nearly 700 submissions to the 1996 proposals, with three-quarters of them generally in support of the principle of a marine reserve in this area.

Those opposing the 1996 proposals included local iwi, interested parties wanting to establish land-based aquaculture south of the Glen, recreational fishers and the NCC. The engineering section of the Council was concerned about the possible effect of a marine reserve on water-quality discharge standards for the outfall from the North Nelson oxidation ponds and a nearby major stormwater outfall.

On 18 March 1999, Forest and Bird formally applied to the Director General of Conservation for the creation of a marine reserve between the Glen and Ataata Point (on the southern side of Cable Bay). The proposed marine reserve (see Figure 6.2) extends seaward, one nautical mile (1.85 km), in a line from the Glen fire station north to a point a little beyond Ataata Point. It would have an approximate area of 985 ha. In November 1999, the then Minister of Conservation Nick Smith approved the application, to which concurrence was subsequently given by the Minister of Transport. The final requirement for the creation of the marine reserve is the concurrence of the Minister of Fisheries (as required by section 5(9) of the Marine Reserves Act 1971). After nearly three years, this approval has still not been granted.

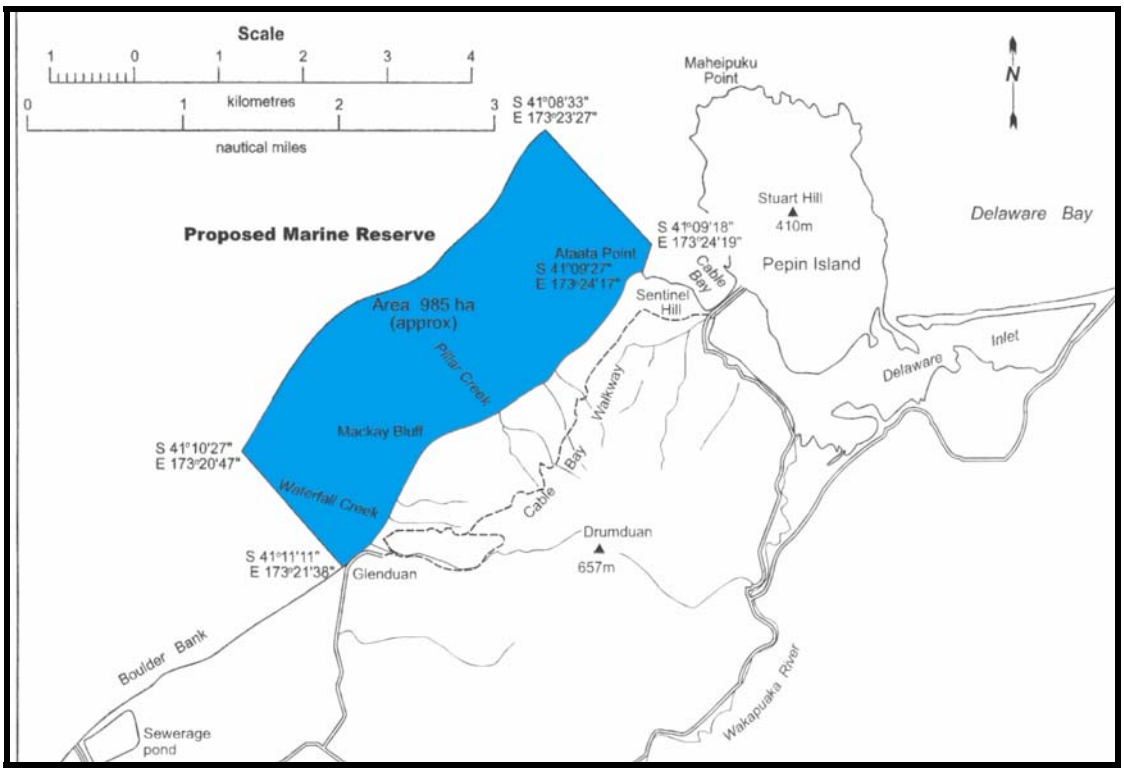


Figure 6.2: Proposed Glenduan (The Glen) to Ataata Point (North Nelson) Marine Reserve

Values of the proposed North Nelson marine reserve

The following assessment of the proposed marine reserve's values is from Forest and Bird's formal application in January 1999.

Natural values

Under section 3(1) of the Marine Reserves Act 1971, marine reserves are created for the *scientific study of marine life* in areas of New Zealand that contain *underwater scenery, natural features, or marine life, of such distinctive quality, or so typical, or beautiful, or unique that their continued preservation is in the national interest*. It follows that a marine reserve should provide significant opportunities for *scientific study,* having natural features that are either representative of that part of the coast (*typical*) or are in some way special (*distinctive, beautiful, unique*).

Opportunities for scientific study:

The proposed marine reserve will provide significant opportunities for scientific study as a result of:

- its proximity to Nelson City and the range of educational, scientific and governmental institutions based in Nelson with an interest in the *scientific study of marine life* (including the Cawthron Institute, NIWA, MFish, Nelson/Marlborough Institute of Technology and local schools)
- the opportunity it will provide to study the rate and pattern of recovery of marine ecosystems in this part of Tasman Bay once human impacts have ceased. Anticipated changes include increases in numbers, size and diversity of fin fish; increases in size and numbers of crayfish and paua; changes in kelp/seaweed distribution and abundance and recovery of encrusting animal communities including bryozoan corals and sponges that have previously been damaged by trawling and dredging
- the opportunity the reserve will provide to develop ecological base-lines against which to assess the adequacy of management regimes in other parts of Tasman Bay (including the proposed adjacent Delaware Bay Taiapure).

Representativeness:

The intertidal and subtidal landforms and marine habitats of the proposed marine reserve are representative of much of the coast along the eastern side of Tasman Bay. The dominant pattern of this coast is boulder beaches and banks interspersed by rocky reefs and platforms which eventually give way to a silt/mud bottom at greater depth. Key features of this inshore environment are:

(a) Intertidal communities

The intertidal area is composed mainly of inter-locking boulders grading from small stones and rocks at the high-tide level to much larger boulders about the low-tide mark. These boulders host a variety of forms of algae (mainly *Carpophyllum flexuosum* and *C. maschalocarpum)* along with coralline paint. Many creatures live beneath the boulders, even though these bouldery parts of the intertidal zone appear relatively barren due to the difficult conditions created by the continued movement and transport of boulders by wave action. The inhabitants commonly include barnacles, turban shells, top shells, chitons, limpets, window oysters, brittle stars, sea slugs and immature mussels.

(b) Subtidal communities

Beyond the zone in which the boulders are constantly moved by wave action, three main habitat zones characteristic of much of the eastern parts of Tasman Bay occur in the sub-tidal areas of the proposed marine reserve:

(i) A shallow, small cobble or boulder area of depths from 4 m to 10 m, with coralline paint covering much of the upper surface of the boulders. Sea urchins are very prevalent in this zone along with other herbivorous grazing snails, limpets and sea cucumbers. Starfish and sea squirts are also common.

(ii) A "sponge garden" habitat which occurs at depths from 10 m to 15 m (generally about 120─150 m from the shore) and includes several species of very large

sponges (such as *Aaptos aaptos, Ancorina alata* and *Polymastia fusca*) as well as numerous finger sponges *(Callyspongia ramosa* and *Iophon* sp. – see Figure 6.3*).* Besides being visually spectacular, these sponge gardens provide important habitat and shelter for juvenile fish. They are described by NIWA scientists as likely to be "nationally significant" owing to the large size of many sponges, the range of species and the shallow depth at which they occur.

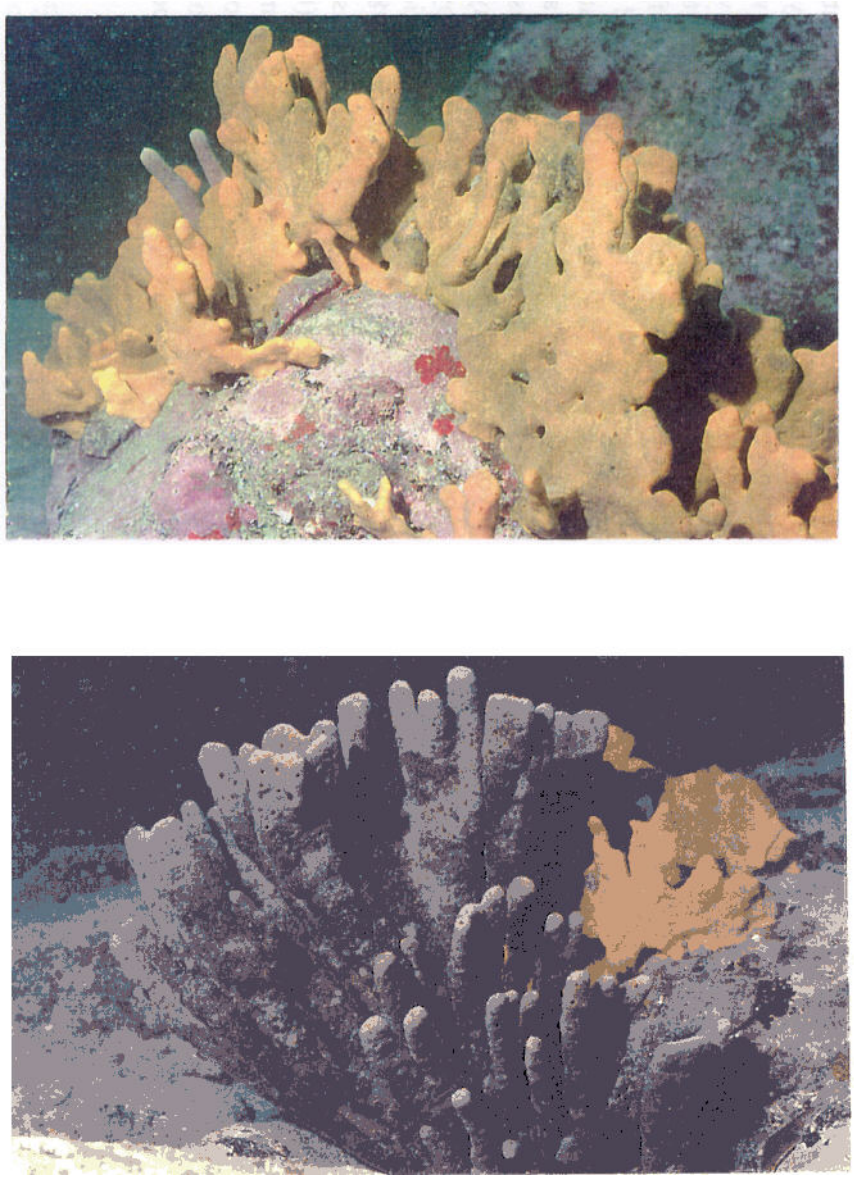


Figure 6.3 Sponges found in sponge gardens at depths of 12─ 13m near Glenduan.
Iophon sp. ***(top) and*** **Callyspongia ramosa** ***(bottom)***

(iii)A deeper silt/mud bottom typical of much of the remainder of Tasman Bay, which becomes dominant from about 15 m depth. Prominent here are heart urchins, sand dollars, polychaete worms, whelks, mantis shrimps and small scallops with red cod *(Pseudophycis bachus),* gurnard *(Chelidonichthys kumu),* eagle rays *(Myliobatus tenuicaudatus),* dogfish and opal fish (*Hemerocoetes monopterygius)* being the main fish species.

In addition to this basic pattern of zonation, a number of rocky reefs are scattered along the coast, of which the most complex is at Ataata Point. This reef supports large patches of common anemone *(Actinothoe albocincta)* while a variety of sponges along with colonial coral *(Culicia rubeola)* are common on underhangs and vertical rock faces. Species considered uncommon elsewhere like brachiopods, ambush starfish *(Stegnastur inflatus)* and window oysters are found here in a profusion that is considered uncommon, and the numerous crevices, guts and caverns provide excellent habitat for cryptic creatures. In contrast, there are comparatively few reef fish, a situation that is believed to be the result of fishing and spearfishing pressure. The Ataata Point reef was surveyed by Department of Conservation scientists in 1989 and by NIWA scientists in 1995, and should provide a useful site to monitor the effectiveness of the creation of the marine reserve. Species expected to return to reef habitats in the proposed reserve following protection include rock cod *(Lotella rhanicus),* blue cod *(Parapercis colias)*, butterfish *(Odax pullus*), scarlet wrasse *(Pseudolabrus miles),* banded wrasse *(Notolabrus fucicola),* tarakihi *(Nemadactylus macropterus),* blue moki *(Latridopsis ciliaris),* red moki *(Cheilodactylus spectabilis),* and crayfish.

Special features:

A number of features of this section of the Nelson coast are of such *distinctive quality* that they are of special significance both for *scientific study* and from the wider perspective of *national interest*.

- Nelson Boulder Bank: While boundary compromises mean that the proposed marine reserve contains only the northernmost extremity of the Nelson Boulder Bank (which as a landform is ranked as being of international significance), the intertidal and sub-tidal zones of the coast north of the Glen are continuous with the Boulder Bank and are very similar to it.
- Sponge gardens: These are visually spectacular and are notable for the large size, range of colours (orange, brown, grey, green, purple) and numbers of sponges; the gardens' function as habitat, and their accessibility (they occur at depths less than 15 m). NIWA surveys describe these sponge gardens as "some of the most colourful and with the largest individual sponges that we have seen in New Zealand" and rank them as "likely to be of national significance".
- High densities of *Stegnaster* starfish: The ambush starfish *(Stegnastur inflatus),* which occurs infrequently elsewhere, was common along each of the transects surveyed within the proposed reserve. The NIWA surveys commissioned by Forest and Bird reported densities of this starfish to be "greater than observed by the authors elsewhere in New Zealand".
- Bryozoan corals: The "sponge gardens" habitat also includes small colonies of a variety of bryozoan corals (or lace corals). Both sponges and bryozoan corals were very common around the Nelson coast, where they provided a major habitat for juvenile fish. However, vast areas have been destroyed by trawling, dredging and increased sedimentation from adjacent land. For example, it is estimated that an area of up to 160 km^2 of bryozoan corals and sponges off Torrent Bay in Abel Tasman National Park has been destroyed as a result of commercial fishing operations. Remaining areas of bryozoan coral are thus of considerable scientific importance. (Off Separation Point on the coast of Abel Tasman National Park, surviving areas of

bryozoan coral are ranked as being of international significance and as a result this area has been closed to trawling since 1980).

- Ataata Point shag-roost: Along with the coast of nearby Pepin Island, the rocks at Ataata Point provide roosting sites for 500─1000 spotted shags *(Stictocarbo punctatus),* and the area has been ranked as a wildlife site of moderate-to-high importance.

Landscape/seascape values:

The section of coast between the Glen and Cable Bay is typical of much of the rugged coastline of eastern Tasman Bay. Although the coastal hills backing the proposed reserve and those on nearby Pepin Island are predominantly modified landscapes, they nonetheless provide a wilder and more rugged land/sea interface than most other easily accessible places around the coast of Tasman Bay. The hills along this part of the coast rise abruptly to the summit of Drumduan (657 m) 2 km inland and are at their steepest in the area immediately adjacent to the sea. These hills carry sizeable remnants of indigenous forest with moderate─high wildlife values and financial assistance has been provided to the landowner to fence-off covenanted areas. Coastal gullies north of the Glen are regionally significant for the presence of karaka *(Corynocarpus laerigatus)* and nikau palm *(Rhopalostylis sapida)* and for a transferred population of the land snail *Powelliphanta gilliesi subfusca.*

The coastal faces of these hills consist of granite, granodorite and andesite ─ a group of rocks known as the "Tasman Intrusives" that have not only provided the boulders for the adjacent beach but also for the Nelson Boulder Bank (according to the most accepted theory) and the tombolo that links Pepin Island to the mainland at Cable Bay. The 13.5-km-long Nelson Boulder Bank is one of the outstanding landforms in the northern parts of the South Island, and is regarded as being of international significance. The 600-m-long boulder bank which links Pepin Island to the mainland and separates Cable Bay from Delaware Inlet is a classic example of a tombolo and, along with Delaware Inlet, is ranked as a regionally significant landform.

Maori historical/cultural values

Coastal land adjacent to the proposed marine reserve has a long history of Maori occupation. Legends tell of Rakaihautu arriving at Nelson Haven (probably about 800 AD) and Kupe legends also describe dramatic events in the waters of eastern Tasman Bay. Archaeological evidence indicates that the Nelson Boulder Bank was visited by Maori in the early archaic (or "moa hunter") era and boulders from the Boulder Bank have since been used as hammer stones in many of the argillite quarries scattered across the Nelson Mineral Belt and on D'Urville Island. Both the Glen and the Cable Bay/Delaware Inlet area have long been permanent or seasonal habitations and there are important pa sites, *waahi tapu* (sacred places) and *urupa* (burial grounds) along this section of the Nelson coast, although not in the area immediately adjoining the proposed marine reserve.

By the early 1800s, Ngati Kuia and their close relatives from the North Island ─ Ngati Apa and Rangitane ─ held *mana whenua* over the Whakapuaka region, having succeeded Ngati Tumatakokiri who had been present in Nelson since the 1500s. In the period between 1824 and 1832, these tribes were largely displaced by Ngati Koata, Ngati Rarua,

Ngati Tama and Te Atiawa, who arrived in the northern parts of the South Island as part of the alliance of invading forces under the Ngati Toa chief Te Rauparaha. These four *iwi* still hold *mana whenua* over much of the Nelson/Marlborough, region with Ngati Tama holding *mana whenua* over the eastern parts of Tasman Bay as far north as Whangamoa Head. Prominent events in the 1800s nvolving Ngati Tama included occupation of the Rotokura pa on Pepin Island by paramount chief Te Puoho ki te Rangi, and the dramatic rescue by Huria (Julia) and Hemi (James) Matenga of the crew of the brig *Delaware* which was wrecked in a storm in 1863 on rocks at the northern end of what has since been known as Delaware Bay.

Nelson City Council's position

In its submission on the proposed North Nelson Marine Reserve, the Council acknowledged that the proposal should not adversely affect the continued or proposed sewage and stormwater discharges or consent renewals.

The Council has expressed several reservations about the proposal, the first regarding its location on a beach of high energy wave action with large boulders and which are not easy to walk along. Secondly, Nelson's current port requires constant dredging and has significant limitations on vessel size associated to draft. As there are potential environmental effects of significantly increasing the depth of the port and disposing of such dredgings, it may be necessary (in the distant future) to accommodate larger ships in Nelson by building a new deep water port ─ the most likely site being in the Snapper Point/Glen area, close to the proposed marine reserve. While the Council has not formed a view on the merits or otherwise of any future deepwater port, a future reserve nearby would need to be considered when evaluating any such port option.

However, on balance, NCC considers that the public advantages of the proposed marine reserve outweigh possible future disadvantages. Therefore, the Council has no objection to the proposal.

SCORE CARD: MARINE PROTECTED AREAS

Type of protection	Site	
Taiapure	Delaware Bay Taiapure established	☺
Marine reserves	North Nelson Marine Reserve proposed only	😐

REFERENCES

Royal Forest & Bird Protection Society (Nelson Branch). 8 January 1999. *Application for a Marine Reserve between Glenduan and Ataata Point (Cable Bay), Nelson.*

PART 7 – AQUACULTURE MANAGEMENT AREAS

THE NEED FOR REFORM

Over the past five years, there has been a rapid expansion in marine farming nationally and a significant increase in applications for sites. There is increasing demand for unpolluted, nutrient-rich waters in which to locate an increasingly diverse range of aquaculture activities.

This demand for coastal space and coastal water of high quality has resulted in considerable pressure on some councils, and has exposed deficiencies in the present site allocation system. Central Government responded on 28 November 2001 with a joint statement from the Ministers of Fisheries and the Environment, announcing a package of legislative reforms providing for the sustainable development of aquaculture.

WHAT THE COUNCIL WANTS TO ACHIEVE

The Council wants to:

- meet the social, economic and cultural needs of the community within the coastal environment, while ensuring the coast is protected
- provide for the occupation of the coastal marine area by aquaculture and ancillary purposes once other values are protected.

(see RPS objective CO1.2.1 and policy CO1.3.10)

WHAT THE REFORM MEANS

Aquaculture is defined as the breeding and growing of aquatic organisms where they are in the "exclusive and continuous possession" of the marine farmer and must be "distinguished or kept separate" from wild stocks. It does not include enhancement, such as scallop enhancement, where the organisms are released into the environment to intermingle with wild stock.

The Resource Management (Aquaculture Moratorium) Amendment Act 2002 provides for a two-year moratorium until March 2004 on the granting of resource consents for new aquaculture developments. This allows time for new legislation to be drafted, introduced and passed, and at the regional level for suitable areas for aquaculture to be identified. The Aquaculture Reform Bill is due to be introduced to Parliament later in 2003 and is likely to become law at about the same time as the aquaculture moratorium is lifted.

Prior to this legislative reform, the framework for aquaculture management was fragmented and out-dated. There are currently several different management regimes and authorisations applicable to marine farms, and multiple agencies providing authorisations. The different management regimes do not provide for integration between coastal planning, aquaculture development or fisheries management.

One consequence of this is that regional councils are having difficulty managing the demand for marine farming and spat-catching permits. At present, throughout New Zealand there are applications for more than 35 000 ha of space, and indications are that

this pressure is likely to increase, both in numbers of applications and the size of areas applied for.

Another problem is that marine farming rights and fishing rights sometimes conflict. There is no mechanism available to allow water space to be allocated to the higher value use, without undermining existing rights. The RMA operates on a "first come, first served" basis and successful applicants need to also obtain a fisheries permit.

The end result is high costs and lengthy delays in the coastal planning system. Most of the costs are in the appeal process. TDC alone has reportedly spent $490,000 defending their position on aquaculture over the past three years.

KEY ELEMENTS OF THE REFORM

The Council has identified the following key aspects of the reforms:

- changing the coastal planning provisions of the RMA to improve the integration between coastal planning, aquaculture development and fisheries management, and allow greater benefit to be obtained from the use of coastal space;
- changing the interface between the RMA and fisheries legislation so that regional councils are required to consider all environmental effects, including the impact that marine farming has on the aquatic environment and the use and sustainability of fisheries resources, when they are providing for aquaculture in coastal plans required under the RMA;
- streamlining the application and environmental assessment process for new marine farms by providing a single-permit approval process, to be operated under the RMA;
- clarifying the existing presumption against allowing the occupation of coastal space to ensure that occupation of coastal space is controlled properly by plan provisions;
- providing regional councils with greater powers to manage and control (including staging) development within zones;
- requiring marine farm developments to take place within clearly defined "Aquaculture Management Areas" (AMAs) (see Figure 7.1 for process);
- providing for experimental aquaculture in AMAs tailored to that purpose;
- providing regional councils with additional rule-making powers to deal with competition for coastal space by all activities, including the power to limit the coastal space that can be applied for in individual applications, and the power to determine appropriate mechanisms to allocate individual sites within zones (including AMAs);
- providing provisions for regional councils to tender the right to apply for coastal permits for space, including for individual marine farm sites within each AMA;
- providing policy guidance on the allocation of coastal space through a coastal policy statement, supported by use of the powers of the Minister of Conservation under the RMA and through involvement in RMA processes; and
- agreement that regional councils should retain 50% of the tender money to provide appropriate planning incentives and for use in improving management of the coastal marine area.

IMPLICATIONS FOR NCC

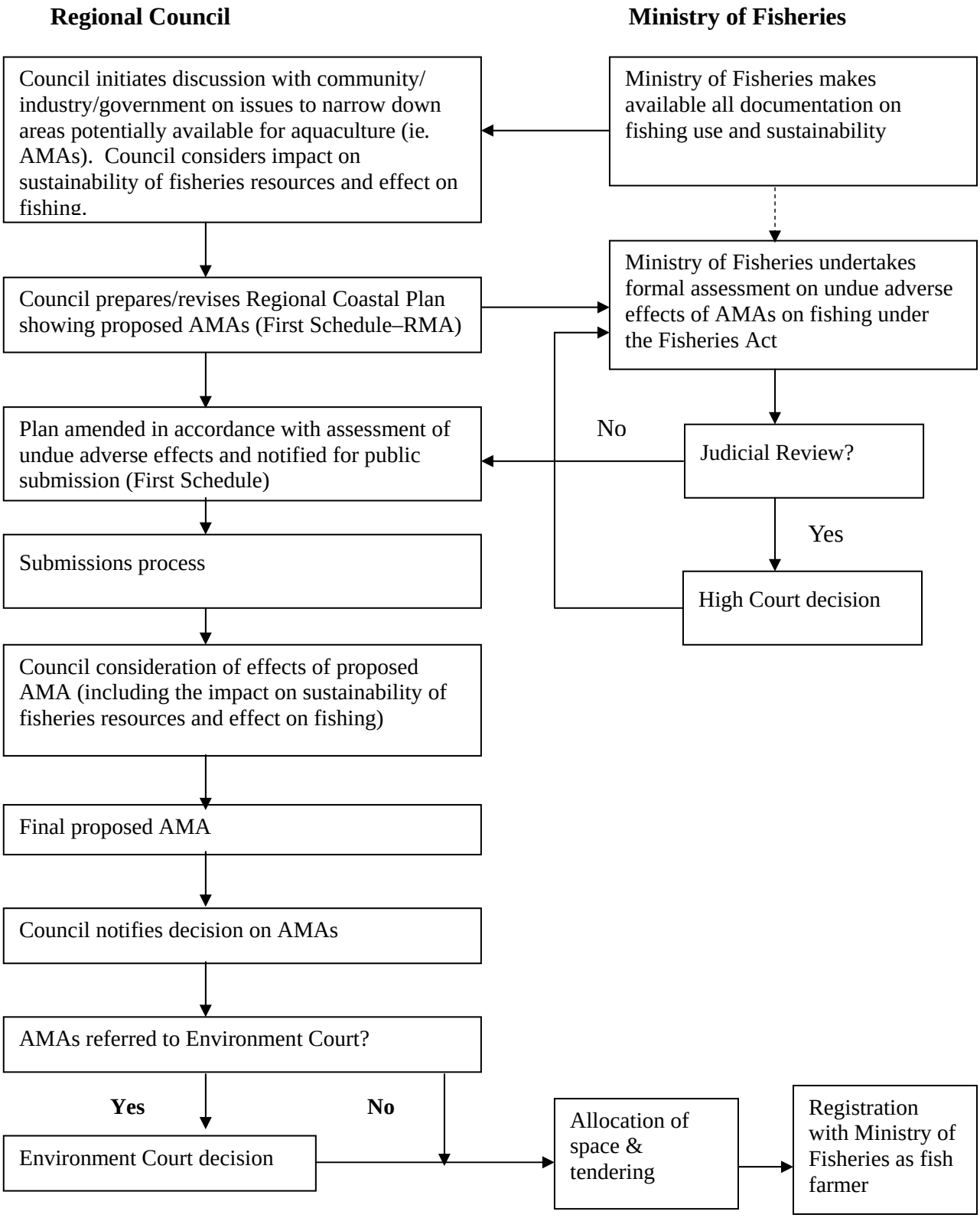
Although the moratorium will lapse in March 2004, the Bill is likely to contain a clause prohibiting the establishment of marine farms unless they are located within an AMA. This will have the effect of extending the moratorium until the regional councils have addressed the issue of whether or not AMAs should be established in their region.

The Council will be required to consider all environmental effects and fisheries matters, including impacts on the carrying capacity of the aquatic ecosystem, when providing for aquaculture under the coastal marine provisions of the Nelson Resource Management Plan. MFish will retain a significant role in the application process by identifying "undue adverse effects" on the collective rights of customary, recreational and commercial fishers.

A key element of the proposed reform is to have MFish and other agencies provide more input at the start of the planning process, when AMAs are identified for new marine farm development.

The task of collecting the necessary data for the establishment process is significant. Some preliminary work has already been carried out, and a process of consultation with *iwi*, commercial users and MFish staff should be underway in March 2004.

Whether or not the process envisaged by the Bill results in the establishment of an AMA within the Nelson coastal marine area, the outcome will be a significantly greater knowledge base, and improved plan provisions.



Note: To ensure optimal placement of AMAs, councils need to consider all impacts of AMAs (including impacts on fishing) during development of Regional Coastal Plans. The undue adverse effects test is only a safety net to ensure that AMAs do not have an unreasonable impact on fishing. It is not designed as the sole consideration of fisheries impact.

Figure 7.1 Process for establishing Aquaculture Management Areas

SCORE CARD: AQUACULTURE MANAGEMENT AREAS

In response to concerns regarding the process, costs and equity of decision making on marine farming applications, Central Government has initiated a review of the legislation.	
The new legislation is likely to place more responsibility on regional government to assess the impact of marine farms on the marine environment and on the sustainability of fishing resources. Previously this part of the assessment was undertaken by MFish and required a separate consent.	
The new legislation is likely to specify that the concept of aquaculture management areas be defined by councils within their resource management plans. Consent applications can be made for marine farms only within an aquaculture management area.	
It will not be possible to apply to establish a marine farm outside aquaculture management areas.	
NCC has yet to complete investigation of potential aquaculture management areas.	

APPENDIX 1 — REGIONAL POLICY STATEMENT INDICATORS

THE COAST

CO1.8.1 The number, type and style of developments and activities locating within the coastal environment.

CO1.8.2 Trends in water quality.

CO1.8.3 Changes in public access to the coast.

CO1.8.4 Species number and diversity in the coastal environment.

CO1.8.5 The preparation of water quality management plans and undertaking of water classifications within annual plan targets.

DEVELOPMENT

DH1.8 The degree to which minimum environmental standards and the protection of significant areas are maintained.

HAZARDS

DH1.8.1 The degree to which minimum environmental standards and the protection of significant areas are maintained.

DH2.8.1 Reported damage of threats to human life and natural and physical resources from hazard events being reduced.

DH3.7.1 The presence or absence of any facilities for the use of nuclear power or disposal of nuclear waste.

DH3.7.2 The presence/absence of nuclear propelled craft or nuclear weapons capable ships, planes or conveyances from coastal waters and territory administered by Council.

TANGATA WHENUA

TW1.10.1 A reduction in the incidence of damage to sites of cultural significance.

TW1.10.2 An increase in the level of physical and legal protection of archaeological and cultural sites.

TW1.10.3 The level of satisfaction expressed by *tangata whenua* on procedures and practices followed by Council in terms of its resource management responsibilities.

APPENDIX 2 — PROPOSED NELSON RESOURCE MANAGEMENT PLAN INDICATORS

COASTAL ENVIRONMENT

Anticipated environmental results	Indicators	Data source
DO7e.1 Preservation of the natural character of the coastal environment.	**DO7e.1.1** Maintained or enhanced water quality, maintained or enhanced natural vegetation and habitats.	Council records, especially aerial photos and water sampling records.
DO7e.2 Reduced building and development impacts on the coast.	**DO7e.2.1** Level of new building and development in the coastal environment. New building and development in sympathy with landscape character. Consistent treatment of resource consent applications for activities in coastal environment.	Media reports, Council records.
CMe.1 Foreshore and seabed that exhibit natural character, including the retention of significant indigenous vegetation and habitats of indigenous fauna, significant community types, landscapes, seascapes and landform.	**CMe.1.1** a) The levels of public complaints and/or media reports about loss of natural values in the Coastal Marine Area.	Council records
CMe.2 Intrinsic values of coastal ecosystems and life-support capacity retained.	**CMe.2.1** a) Flora and fauna populations, biodiversity, water quality	Fishing catch records, Council research
CMe.3 Areas of Significant Conservation Value protected.	**CMe.3.1** a) Flora and fauna populations, biodiversity, water quality	Fishing catch records, Council research
CMe.4 Indigenous vegetation protected.	**CMe.4.1** a) Quantities and range of indigenous and exotic plants	Fishing catch records, Council research
CMe.5 Maintenance or enhancement of amenity, recreational, landscape, cultural, educational and social values, including access.	**CMe.5.1** a) Number of people using CMA and nature of use b) Complaints, media reports	Inspection and surveys, Council records
CMe.6 Unobstructed views to or from the sea and improved visual amenities.	**CMe.6.1** a) Placement of structures in or near CMA b) Complaints, media reports	Inspections, Council records

Anticipated environmental result	Indicators	Data source
CMe.8 Structures that are related only to coastal activities.	**CMe.8.1** a) Consistent treatment of resource consent applications by the Council.	Council records
CMe9. Structures in the CMA that accommodate sea level rise and other natural hazards.	**CMe.9.1** a) Consistent application of standards and enforcement.	Council records
CMe.10 Natural coastal processes are not affected by structures.	**CMe.10.1** a) Erosion and sedimentation relative to natural levels b) Complaints, media reports	Council records

WATER QUALITY

Anticipated environmental result	Indicators	Data source
DO7e.3 Coastal water quality that supports community aspirations for use.	**DO7e.3.1** Trends in visual water quality. Uses continuing in terms of classification. Consistent enforcement of water standards.	Fishing catch records, inspection, Council research and files

NATURAL AND AMENITY VALUES

Anticipated environmental results	Indicators	Data source
DO5e.2 Increased knowledge by public and property owners of natural values of places.	**DO5e.2.1** General level of community discussion and debate	News media, correspondence on Council files.
DO5e.3 Retention of areas of significant natural and conservation values.	**DO5e3.1** New development that avoids or accommodates natural and conservation values	Council records, resource consents granted.
DO6e.2 Increased knowledge by the public and property owners of natural values of margins.	**DO6e.2.1** General level of community discussion and debate	News media, correspondence on Council files.
DO6e.3 Retention of margins having significant natural and conservation values.	**DO6e.3.1** New development that avoids, remedies or mitigates adverse effects on margins	Council records, resource consents granted.

WASTE

Anticipated environmental result	Indicators	Data source
DO3e.2 Reduced volumes of waste produced by industry and the community.	**DO3e2.1** Volume of waste being disposed of at the Council … sewerage systems.	Sewerage system records

TANGATA WHENUA

Anticipated environmental result	Indicators	Data source
DO1e.1 Resource management decision making that includes perspectives of Maori communities.	**DO1e.1.1** Regular consultation between Maori and the Council.	Feedback from *hui*
DO1e.2 Increased management by *iwi* of their resources.	**DO1.e.2.1** Establishment of *papakainga*, *taiapure* or *mahinga mataitai*.	Council records

APPENDIX 3 — PROPOSED MONITORING WORK PROGRAMME 2003—2004

Environment	Project	Proposed work	Existing commitment
Water quality	Recreation waters	Recreational water quality: ongoing monitoring of microbiological water quality at coastal bathing beaches and river swimming holes to protect public health when swimming, shellfish gathering and fishing. Sampling at multiple locations over the Nov 2003—March 2004 period including collection and analysis of samples, entering data and presenting a summary report.	RPS: RM1.3.1 WA1.2.1 WA1.2.2
	River ecology	Collection of data on the water quality and habitat health of Nelson's rivers to assess any changes resulting from stormwater discharges, changes in land use, land-use practices and city development. Sampling of 32 sites 4 times a year, including analysis of samples, entering data, reviewing data and report preparation.	
	Waimea sanitation survey	Establishing the nature and sources of contamination in Waimea Inlet streams, and requiring the polluters to address the issue. This will reduce the contamination entering Waimea Inlet and Tasman Bay from these streams. This is an ongoing project to establish full cover of the inlet over time.	
Noise	Ambient noise survey	Noise monitoring: background noise monitoring at a range of sites including within residential zones, the Port and Airport effects areas, and proposed Southern Link. By identifying significant noise sources, measures to minimise these sources can be undertaken. There will also be an assessment of complaints where the complaint relates to ongoing noise from an activity or premises.	RPS: RM1.3.1 DA2.2.1 DA2.3.1 DA2.3.2
	Road noise survey	Pre-commissioning survey of noise levels on Southern Link route. Involves establishing reference sites and taking of base-line readings at multiple sites for a week at each site.	
Air	Particulate monitoring	Continuation of particulate monitoring undertaken at three sites being Swift Suzuki reference site, Victory School and a roving monitor (sampling a number of airsheds). The aim is to provide good base-line information for planning purposes and for public health purposes.	RPS: RM1.3.1 DA1.2.1

Environment	Project	Proposed work	Existing commitment
	Meteorology monitoring	Collection of meteorological data for Nelson and development of a met dataset suitable for direct input into computer databases forair pollution models. The availability of a suitable met dataset will greatly simplify the use of such models and improve their ability to accurately predict the effects of discharges to air in Nelson. Cost includes operation and maintenance of meteorological station, QA of data and development of Calmet datasets.	
Coastal	Undaria	Undaria survey at Port Nelson and environs by way of a low tide photographic survey will report on the extent and relative density of undaria infestation of Nelson Haven.	RPS: RM1.3.1 NA4.2.1 NA4.2.2 CO1.2.1 CO1.3.4 DH2.2.3 DH2.3.6
	Marine biosecurity	Survey of Nelson Haven for other invasive marine organisms (jointly with PNL).	
	Tahunanui Beach surveys	Tahunanui Beach survey: assessing the changes occurring to the beach as a result of natural forces, and as a result of beach protection works. Involving land-based surveys of beach profiles and sounding of the seabed to provide offshore profiles.	
	Marine pollution	Marine water quality and ecosystems: sampling of marine sediment, and shellfish, to test for the presence of heavy metals, pesticides and hydrocarbons. Undertaking toxicity testing for the pollutants identified.	
Water resources	Permanent river recorder sites	Maintaining and operating a river recorder and rainfall gauge network to provide continuous records of river flows and to provide reference conditions against which other rivers and streams can be assessed. These data provide base line information which will assist development of a freshwater plan for Nelson and consideration of resource consent applications. Most of this work is undertaken by Tasman District Council under contract.	RPS: RM1.3.1 WA2.2.1 WA2.2.4
	Spot gauging of smaller rivers	River gauging carried out on rivers or reaches not having continuous recorders to provide data for these water bodies. Two full rounds of gauging are provided for this year.	
	Maintenance of flow correlations	Flow correlations are developed and maintained between rivers with continuous recorders and those that are gauged only periodically, so that accurate synthetic flow data can be generated for gauged rivers to assist with the development of the freshwater plan and consideration of resource consents.	

Environment	Project	Proposed work	Existing commitment
	Maintenance and upgrading of river recorder sites	Upgrading of flow recorder at Collins River from punch tape recorder to digital and installation of a rain gauge. Purchase, upgrading and operation of the existing McCashin water recorder on Orphanage Creek at Ngawhatu. This site is crucial to monitoring low flows on Stoke Fan streams as no other continuous recorder exists in this area.	
Natural hazards	Fault hazards	Detailed investigation including trenching of the Waimea Flaxmore fault system in order to better understand the nature and extent of seismic hazards in Nelson.	RPS: RM1.3.1 DH2.2.3 DH2.3.6
	Flood hazards	Photography contouring of flood events to better understand the nature and extent of flooding in rural parts of Nelson.	
	River stability	Continuation of survey of Nelson's rural rivers to assess bed and bank stability and likely flooding potential. This work provides base-line information for preparation of a rivers management plan, consideration of resource consents for river protection works, or for gravel extraction.	
Iwi	Development of monitoring indicators	Working with Nelson Iwi to develop environmental monitoring indicators to assess the cultural health of the natural environment. This forms the second stage of the pilot World View project.	RPS: TW.4.3
Biodiversity	Survey of significant natural areas	Survey of significant natural areas , development of strategies and guides to maintain and enhance natural biodiversity in the Nelson area.	RPS: RM1.3.1 NA2.3.1 RM1.3.1
	Rural extension work	Biodiversity enhancement: This is a important project to assist protection of biodiversity within the Nelson area. It includes preparation of promotional literature including guides, assistance with fencing costs for significant areas including wetlands, forest remnants and riparian margins. It is hoped that by allocating some funds to this area leverage of further funding can be achieved from community trust and Central Government agencies.	
Data management	Monitoring database	Development of a monitoring database to house all monitoring data and to provide a link with the GIS system. This database will be constructed so that a number of automated queries can be run to provide up-to-date information on a range of issues. Once operational it will assist with direct public access to this data via internet and intranet queries.	RPS: RM1.3.5

APPENDIX 4 – NELSON REGIONAL POLICY STATEMENT (RPS) AND PROPOSED NELSON RESOURCE MANAGEMENT PLAN (RMP) OBJECTIVES AND POLICIES REFERRED TO IN THIS DOCUMENT

THE COAST

RPS objective

CO1.2.1: Achievement of the social, economic and cultural needs of the community within the coastal environment, while ensuring a high level of protection is afforded to the natural character and to natural and physical resources associated with the coast.

RPS policies

CO1.3.4 To protect the integrity, functioning and resilience of the coastal environment in terms of:

i) the dynamic processes and features arising from the natural movement of sediments, water and air;

ii) natural movement of biota;

iii) natural substrate composition;

iv) natural water and air quality;

v) natural biodiversity, productivity, and biotic patterns; and

vi) intrinsic values of ecosystems.

CO1.3.8 To encourage appropriate subdivision, use or development in areas where the natural character has already been compromised, while:

i) avoiding sprawling or sporadic subdivision, use or development in the coastal environment;

ii) taking into account the potential effects of subdivision, use or development on the values relating to the natural character of the coastal environment, both within and outside the immediate location; and

iii) avoiding cumulative adverse effects of subdivision, use and development in the coastal environment.

CO1.3.10 To provide for occupation of the coastal marine area for aquaculture and ancillary purposes where Policies 1—9 are satisfied and where there is sufficient information available to satisfy that adverse effects will be avoided, remedied or mitigated.

CO1.3.11 Where possible, to separate incompatible activities in the coastal environment, in order to minimise the potential for conflict in resource use and management.

CO1.3.12 To support in principle the investigation and possible establishment of marine reserves, *taiapure* and *mahinga mātaitai* and other appropriate means of marine protection within the Nelson City coastal marine area where these would provide for a broad range of benefits for the region, including ecological, scientific, educational, cultural and recreational use or value.

CO1.3.14 To restore and rehabilitate the natural character of the coastal environment where appropriate.

CO1.3.16 To recognise that some uses and developments dependent on the natural and physical resources in the coastal environment and important to the social, economic and cultural well-being of the people and the community should be provided for within the coastal environment, providing that the quality of the environment is maintained.

RMP objectives

CM2: The protection of areas of significant indigenous vegetation, significant habitats of indigenous fauna and outstanding natural features within the Coastal Marine Area; and restoration and rehabilitation of degraded vegetation and habitats.

RMP policies

CM2.4 The possibility of establishing a network of marine protected areas should be researched, and the public consulted, and where appropriate established within the Coastal Marine Area.

COASTAL WATER QUALITY

RPS objective

WA1.2.1: The maintenance and enhancement of the quality of inland water to protect the life-supporting capacity of aquatic ecosystems and, in specific areas, for urban water supply.

WA1.2.2: The maintenance and enhancement of coastal water quality to protect fishery, fish spawning and aquatic ecosystems and, in specific areas, to protect shellfish gathering, contact recreation, and cultural and spiritual values.

RMP objective

DO7.2 Maintenance and enhancement of the quality of Nelson's coastal water at or to a level which safeguards its life supporting capacity and is safe for contact recreation and for gathering and consumption of seafood.

RMP policies

DO7.2.1 Discharges of contaminants to water or land within the coastal environment should not adversely affect the standard of coastal water, after reasonable mixing or result in a breach of classification standards, and the discharge should not (either in itself or with other discharges) give rise to any significant adverse effect on habitats, feeding grounds or ecosystems, either in the Coastal Marine Area or on land.

DO7.2.2 The level of contaminants in storm water discharges to the Coastal Marine Area should be minimised to the greatest practicable extent.

DO7.2.3 All vessel construction, maintenance and servicing sites should possess facilities for the containment, collection and treatment or disposal of wastes or contaminants arising from the activities on the site.

DO7.2.4 Land-use management practices should minimise the contribution of diffuse (or "non-point") source contaminants to water quality deterioration in the coastal environment.

PESTS

RPS objectives

NA4.2.1: Natural and physical resources not subject to significant adverse effects as a result of existing pest infestation.

NA4.2.2: Prevention or rapid control of new infestations of pest species in the Nelson City area.

HAZARDS

RPS objectives

DH2.2.2: Adverse effects from hazard events being minimised.

DH2.2.3: Hazard proneness being minimised.

RPS policies

DH2.3.2 Where possible Council will avoid inappropriate development in hazard prone areas. Where this is not practical or achievable Council will require that remedial or mitigation measures are undertaken in such a way as to avoid adverse environmental effects to the extent practicable.

DH2.3.6 To recognise the function of natural coastal features (such as beaches, sand dunes, wetlands and barrier islands) and natural processes in protecting subdivision, use or development and to maintain and, where appropriate, enhance that ability.

RMP objective

DO2.1: An environment within which adverse effects of natural hazards on people, property and the environment are avoided or mitigated.

TANGATA WHENUA

RPS objectives

TW1.4.1: Resource use which provides for the relationship of the Maori and their culture with their ancestral lands, water and sites, *waahi tapu*, *urupa*, and other *taonga*.

TW1.4.2: A mutually satisfactory relationship between Council and *tangata whenua* regarding resource management.

TW1.4.3: Increased opportunities for *tangata whenua* to exercise *kaitiakitanga* in the region.

TW1.4.4: Increased opportunities for the cultural aspirations and *tikanga* of the *tangata whenua* with regard to natural and physical resources to be met.

RMP objective

DO1.1: Management of natural and physical resources that recognises the needs of Maori communities and enables them to provide for their social, economic and cultural well being and their health and safety.

INFRASTRUCTURE

RPS objective

IN3.2.1 The maritime transport needs of Nelson City and surrounding areas being met whilst avoiding, remedying or mitigating adverse effects on the environment and adjoining uses.

APPENDIX 5 – GLOSSARY OF MAORI TERMS

(NOTE: Definitions in italics are taken directly from the Resource Management Act 1991).

Hapu	Means sub-tribe, usually a number of whanau with a common ancestor.
Hui	Meeting.
Iwi	Tribe or grouping of people.
Mahinga Kai	Means areas from which food resources are gathered and/or propagated.
Mahinga Mataitai	Areas of the sea from where food resources are gathered.
Maitahi	An alternative spelling for the Maitai River
Mana Whenua	Customary authority and title exercised by an iwi or hapu over land or other taonga within the tribal rohe.
Matauranga	Knowledge.
Rangatiratanga	Kingdom, principality, sovereignty, realm.
Rohe	Area**.**
Taiapure	Means a taiapure-local fishery declared under the Maori Fisheries Act 1989, Part IIIA. Refers to local fishery areas which are recognised as being of special significance to hapu or iwi.
Tangata Whenua	*In relation to a particular area, means the iwi or hapu that holds mana whenua over the area.*
Taonga	Treasure.
Treaty of Waitangi (Te Tiriti O Waitangi)	*Has the same meaning as the word "Treaty" as defined in section 2 of the Treaty of Waitangi Act 1975. Note: there are two different versions of the Treaty of Waitangi – one in Engish and one in Maori (Te Tiriti).*
Urupa	Burial grounds.
Waahi Tapu	A place which has particular sacred or spiritually meaning to local iwi. It includes burial grounds and places where significant events have taken place.
Wai	Water.

Whakatu Maori name for Nelson city area.

Whanau Family.