Port of Taranaki

Baseline survey for non-indigenous marine species (Research Project ZBS2000/4)

Biosecurity New Zealand Technical Paper No: 2005/04

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ISBN No: 0-478-07931-1
ISSN No: 1176-838X

March 2006

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Executive Summary

This report describes the results of an April 2002 survey to provide a baseline inventory of native, non indigenous and cryptogenic marine species within the Port of Taranaki.

- The survey is part of a nationwide investigation of native and non-native marine biodiversity in 13 international shipping ports and three marinas of first entry for yachts entering New Zealand from overseas.

- Sampling methods used in these surveys were based on protocols developed by the Australian Centre for Research on Introduced Marine Pests (CRIMP) for baseline surveys of non-indigenous species in ports. Modifications were made to the CRIMP protocols for use in New Zealand port conditions.

- A wide range of sampling techniques was used to collect marine organisms from habitats within the Port of Taranaki. Fouling assemblages were scraped from hard substrata by divers, benthic assemblages were sampled using a sled and benthic grabs, and a gravity corer was used to sample for dinoflagellate cysts. Mobile predators and scavengers were sampled using baited fish, crab, starfish and shrimp traps.

- The distribution of sampling effort in the Port of Taranaki was designed to maximise the chances of detecting non-indigenous species and concentrated on high-risk locations and habitats where non-indigenous species were most likely to be found.

- Organisms collected during the survey were sent to local and international taxonomic experts for identification.

- A total of 270 species or higher taxa was identified from the Taranaki Port survey. They consisted of 180 native species, 15 non-indigenous species, 20 cryptogenic species (those whose geographic origins are uncertain) and 55 species indeterminata (taxa for which there is insufficient taxonomic or systematic information available to allow identification to species level).

- Two NIS and seven cryptogenic species sampled in the Port of Taranaki were recorded for the first time in New Zealand waters. These were the hydroid *Eudendrium capillare* the ascidian *Cnemidocarpa* sp., the cryptogenic portunid crab, *Ovalipes elongatus*, an undescribed pycnogonid (*Achelia* sp. nov. A), an amphipod (*Leucothoe* sp. 1), and five species of sponge (*Esperiopsis* n. sp. 1, *Halichondria* n. sp. 4, *Halichondria* n. sp. 1, *Paraesperella* n. sp. 1, *Phorbas* n. sp. 2).

- The 15 non-indigenous organisms described from the Port of Taranaki included representatives of six phyla. The non-indigenous species detected (ordered alphabetically by phylum, class, order, family, genus and species) were: (Annelida) *Barantolla lepte,* (Bryozoa) *Bugula flabellata, Bugula neritina, Bugula stolonifera, Cryptosula pallasiana, Tricellaria inopinata, Watersipora arcuata* and *Watersipora subtorquata,* (Cnidaria) *Eudendrium capillare*, (Mollusca) *Crassostrea gigas* and *Theora lubrica*, (Phycophyta) *Griffithsia crassiuscula* and *Polysiphonia sertularioides,* (Porifera) *Halisarca dujardini,* and (Urochordata) *Cnemidocarpa* sp.

- None of the non-indigenous organisms collected and described from the Port of Taranaki are currently on the New Zealand register of unwanted organisms. The Pacific oyster, *Crassostrea gigas*, and cysts of the cryptogenic toxic dinoflagellate, *Gymnodinium catenatum*, were present in the Port. Both species are included on the ABWMAC list of unwanted marine species in Australia.

- Most non-indigenous species located in the Port of Taranaki are likely to have been introduced to New Zealand accidentally by international shipping or through domestic translocation or spread from other locations in New Zealand.

- Approximately 73 % (11 of 15 species) of NIS in the Port of Taranaki are likely to have been introduced in hull fouling assemblages, 7 % via ballast water and 20 % could have been introduced by either ballast water or hull fouling vectors.

- The predominance of hull fouling species in the introduced biota of the Port of Taranaki (as opposed to ballast water introductions) is consistent with findings from similar port baseline studies overseas.

Introduction

Introduced (non-indigenous) plants and animals are now recognised as one of the most serious threats to the natural ecology of biological systems worldwide (Wilcove et al 1998, Mack et al 2000). Growing international trade and trans-continental travel mean that humans now intentionally and unintentionally transport a wide range of species outside their natural biogeographic ranges to regions where they did not previously occur. A proportion of these species are capable of causing serious harm to native biodiversity, industries and human health. Recent studies suggest that coastal marine environments may be among the most heavily invaded ecosystems, as a consequence of the long history of transport of marine species by international shipping (Carlton and Geller 1993, Grosholz 2002). Ocean-going vessels transport marine species in ballast water, in sea chests and other recesses in the hull structure, and as fouling communities attached to submerged parts of their hulls (Carlton 1985, 1999, AMOG Consulting 2002, Coutts et al 2003). These shipping transport mechanisms have enabled hundreds of marine species to spread worldwide and establish populations in shipping ports and coastal environments outside their natural range (Cohen and Carlton 1995, Hewitt et al 1999, Eldredge and Carlton 2002, Leppäkoski et al 2002).

Biosecurity[1] is important to all New Zealanders. New Zealand's geographic isolation makes it particularly vulnerable to marine introductions because more than 95% of its trade in commodities is transported by shipping, with several thousand international vessels arriving and departing from more than 13 ports and recreational boat marinas of first entry (Inglis 2001). The country's geographic remoteness also means that its marine biota and ecosystems have evolved in relative isolation from other coastal ecosystems. New Zealand's marine biota is as unique and distinctive as its terrestrial biota, with large numbers of native marine species occurring nowhere else in the world.

The numbers, identity, distribution and impacts of non-indigenous species in New Zealand's marine environments are poorly known. A recent review of existing records suggested that by 1998, at least 148 species had been deliberately or accidentally introduced to New Zealand's coastal waters, with around 90 % of these establishing permanent populations (Cranfield et al 1998). To manage the risk from these and other non-indigenous species, better information is needed on the current diversity and distribution of species present within New Zealand.

BIOLOGICAL BASELINE SURVEYS FOR NON-INDIGENOUS MARINE SPECIES

In 1997, the International Maritime Organisation (IMO) released guidelines for ballast water management (Resolution A868-20) encouraging countries to undertake biological surveys of port environments for potentially harmful non-indigenous aquatic species. As part of its comprehensive five-year Biodiversity Strategy package on conservation, environment, fisheries, and biosecurity released in 2000, the New Zealand Government funded a national series of baseline surveys. These surveys aimed to determine the identity, prevalence and distribution of native, cryptogenic and non-indigenous species in New Zealand's major shipping ports and other high risk points of entry. The government department responsible for biosecurity in the marine environment at the time, the New Zealand Ministry of Fisheries (MFish), commissioned NIWA to undertake biological baseline surveys in 13 ports and three marinas that are first ports of entry for vessels entering New Zealand from overseas (Fig. 1). Marine biosecurity functions are now vested in Biosecurity New Zealand.

[1] Biosecurity is the management of risks posed by introduced species to environmental, economic, social, and cultural values.

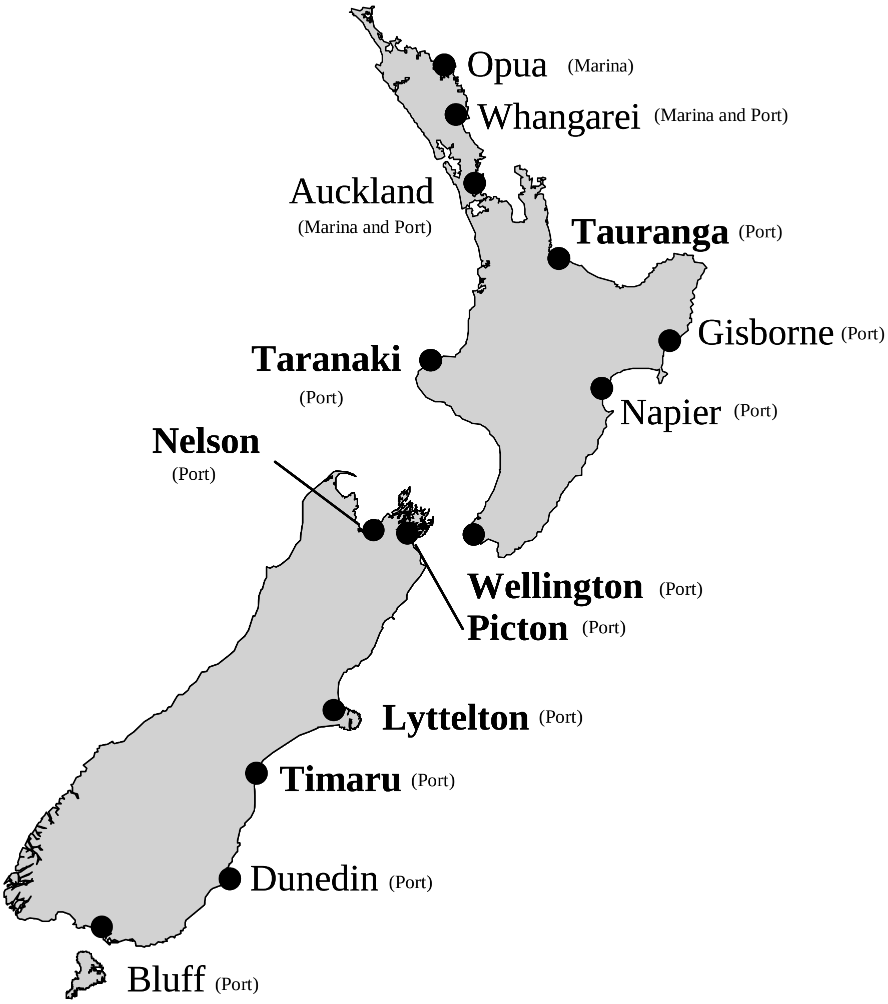

Figure 1: Commercial shipping ports in New Zealand where baseline non-indigenous species surveys have been conducted. Group 1 ports surveyed in the summer of 2001/2002 are indicated in bold and group 2 ports surveyed in the summer of 2002/2003 are indicated in plain font. Marinas were also surveyed for NIS in Auckland, Opua and Whangarei in 2002/2003.

The port surveys have two principal objectives:

i. To provide a baseline assessment of native, non-indigenous and cryptogenic[2] species, and
ii. To determine the distribution and relative abundance of a limited number of target species in shipping ports and other high risk points of entry for non-indigenous marine species.

The surveys will form a baseline for future monitoring of new incursions by non-indigenous marine species in port environments nationwide, and will assist international risk profiling of problem species through the sharing of information with other shipping nations.
This report summarises the results of the Port of Taranaki survey and provides an inventory of species detected in the Port. It identifies and categorises native, introduced ("non-indigenous") and cryptogenic species. Organisms that could not be identified to species level are also listed as species indeterminata.

[2] "Cryptogenic:" species are species whose geographic origins are uncertain (Carlton 1996).

DESCRIPTION OF THE PORT OF TARANAKI

The Port of Taranaki is centrally located on the west coast of New Zealand's North Island, servicing the city of New Plymouth (39° 03'S. 174° 02.5'E; Fig. 1). The Port is protected from the open sea by two artificial breakwaters, one of which is also a fully operational berthing facility (Fig. 2).

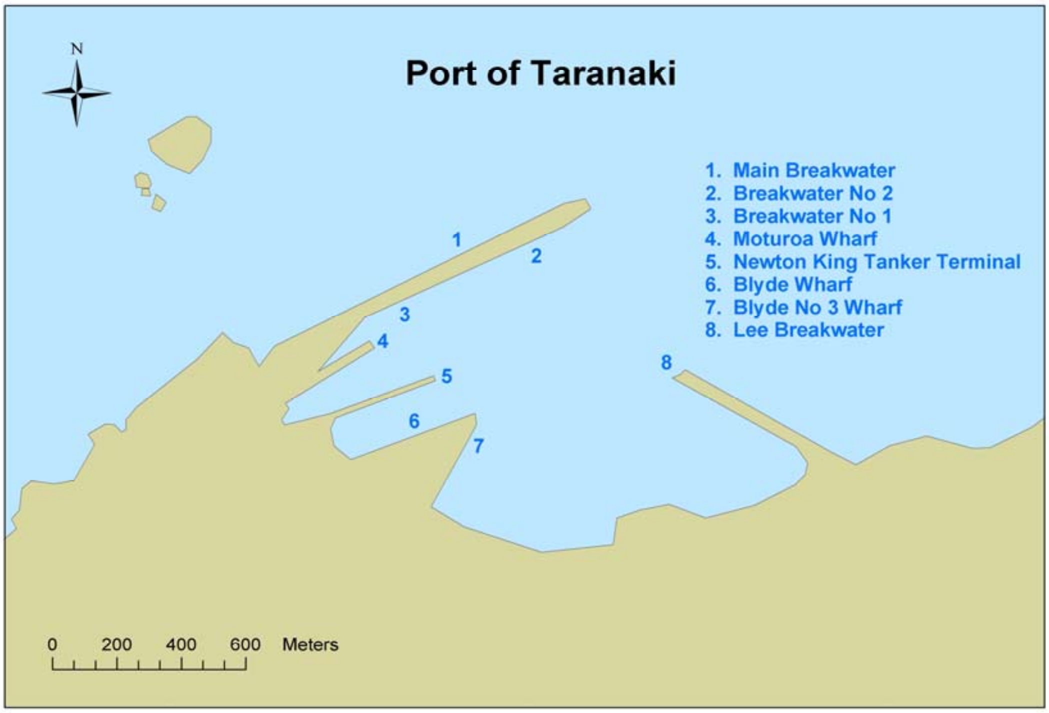

Figure 2: Port of Taranaki map.

PORT OPERATION AND SHIPPING MOVEMENTS

The Port of Taranaki was established in 1875. In 1881, work began on a breakwater to provide safe anchorage. Since 1881 the port has grown apace with its province with increasing export/import and coastal trade, as well as with oil exploration-related trade that has occurred in the Taranaki region since the 1960's.

The Port of Taranaki is the only deep-water seaport on New Zealand's western seaboard, is New Zealand's fifth largest seaport, and ranks second largest with regard to export volume (freight tonnes handled). Port Taranaki has the ability to handle a wide diversity of cargoes including all forms of bulk products (liquid and dry), break-bulk products (palletised or containerised, general and refrigerated) and has specialist experience in the handling of heavy lift and project cargoes. All wharves are supported by covered and open storage areas. The Port of Taranaki has MAF customs clearance, inspection and quarantine facilities (www.westgate.co.nz).

On the lee breakwater there is an 18 to 20 berth marina constructed with steel pontoons and piles. On the south-eastern side of the harbour is a 6.5 ha reclamation. Fitzroy Yachts Limited, TCF Limited (boat storage) and Tasman Marine Limited (retail and marine services) currently lease areas of this reclamation.

The Port of Taranaki (operated by Westgate Transport Ltd, www.westgate.co.nz) currently has nine main berths capable of handling a wide diversity of cargoes and vessels with an official maximum draught of 10 m. The inner side of the Main Breakwater terminal primarily handles coastal bulk traders and offshore support vessels, as well as catering for the needs of Taranaki's offshore oil and gas operations (inner breakwater #2 berth). The inner breakwater #1 berth is used by fishing vessels. Moturoa Wharf is generally used for dry bulk cargoes. Berths on both sides of the Newton King Tanker Terminal handle a wide range of petrochemical products and bulk liquids including crude oils, liquefied petroleum gas and methanol. The newest development at the Port of Taranaki is the Blyde Terminal, an integrated facility handling containers, general/refrigerated cargoes and catering for vessels that service oil and gas production operations offshore (www.westgate.co.nz). Berth construction is predominantly concrete deck on concrete or steel piles, although the Main Beakwater is solid concrete. Details of the berthing facilities available are provided in Table 1.

Total trade volume in 2004 was 2.03 million tonnes, with significant growth in container trade, which saw the number of containers exceed 50,000 TEU. Within containerised cargo volumes, butter and cheese exports were up to 99,200 tonnes and meat exports up to 17,900 tonnes. Log and coal export volumes, and fertiliser import volumes also increased during 2004. High-value seafood exports are also increasing, with 375 tonnes being exported from the port annually (www.westgate.co.nz). In 2000, there were 15 registered fishing vessels in the Port of Tauranga (Sinner et al 2000).

Analyses of shipping arrivals to the Port of Taranaki show that most commercial vessels visiting the port arrived from Australia and the northwest Pacific (34 % from each, respectively), south Pacific (12 %), southeast Pacific (5 %), east Asian Seas (4 %) and other New Zealand ports (Inglis 2001). More recent analyses of shipping arrivals to the Port of Taranaki (Campbell 2004) show that there was a total of 230 international ship visits during 2002/2003 (227 merchant, two pleasure, and one fishing vessel) with essentially the same source country proportions as in Inglis (2001). In 2004, vessel arrivals (domestic and international over 100 GRT) were 612 with a total gross registered tonnage of 6.98 million (www.westgate.co.nz).

Vessels unable to be berthed immediately in the port may anchor outside the port to the west of a line running 197° to the end of the main breakwater, but no closer than 1 nautical mile to any point of land in approximately 20 m of water. Pilotage is compulsory on vessels over 100 GRT unless the Master holds a current pilot exemption certificate (www.westgate.co.nz).

Vessels are expected to comply with the Voluntary Controls on the Discharge of Ballast Water in New Zealand (http://www.fish.govt.nz/sustainability/biosecurity/); vessels are requested to exchange ballast water in mid-ocean (away from coastal influences) en route to New Zealand and discharge only the exchanged water while in port. Only clean water in segregated ballast water tanks can be discharged with no bilge water discharge permitted in the port (www.westgate.co.nz). According to Inglis (2001), a total volume of 1,150,570 m^3 of ballast water was discharged in the Port of Taranaki in 1999, with the largest country-of-origin volumes of 507,895 m^3 from Australia, 224,601 m^3 from Japan, 210,589 m^3 from Hong Kong, and 119,926 m^3 unspecified.

Within the port, there is on-going maintenance dredging as required. This usually occurs every two years, with removal of approximately 350,000 m^3. The spoil is deposited in two sites: one in-shore site with sand for beach renourishment; one off-shore site approximately 2 km north of the breakwater for mud and silt poil (marked on nautical chart) (Ray Barlow, Westgate Transport Ltd, pers comm.).

In terms of future development, in February 2005 the Westgate Board decided to deepen Port Taranaki with capital dredging from the current 10 m to a draught of 12.5 m by early 2006 to accommodate the increasing size of visiting vessels and to remain competitive with other ports such as Auckland, Tauranga, Lyttleton and Otago (www.westgate.co.nz). This port deepening will involve the dredging of approximately 800,000 m^3 of sediment, and opens up new possibilities such as South Island West Coast coal being barged up for trans-shipment and export to Asia. Consents have also been granted to further deepen the port draught to 14 m by the year 2015. There is also a current emphasis on increasing productivity and efficiency within the Port of Taranaki. A 100-berth marina has been proposed for the port.

PHYSICAL ENVIRONMENT OF PORT OF TARANAKI

The Port entrance is subject to a high frequency of swell conditions (Henwood 1989) but is easily navigable, with an open road-stead and anchorage in 18-22 m of water. There is no bar. The main Port breakwater has had a large impact on sand transport along the coastline, and sand accumulation has to be controlled by regular dredge activity (Gibb 1983). The harbour floor consists of a broad deep trough that merges with the inner continental margin beyond the harbour entrance (Carter et al 1981). Harbour sediments are predominantly anaerobic fine sandy muds (Don 1981), becoming mixed sand and gravel near the wharves (Carter et al 1981). The Port of Taranaki experiences a fairly large tidal range of 1.7 to 3.9 m. The mean oceanic flow is to the northeast adjacent to the Port, but tidal currents are not significant (they do not exceed 0.5 m/s and are typically 0.25 m/s or less) and are mainly wind-induced closer inshore (Gibb 1983).

EXISTING BIOLOGICAL INFORMATION

Many studies examining the coastal processes at work in the harbour and the effects of deepening the Port by dredge have been completed (see Carter et al 1981; Gibb 1983, Henwood 1989), but none of these incorporate studies of the ecology of the area. A small number of studies relating to the ecology of the Port and harbour environment do exist, but unfortunately we have been unable to source most of these.

Don (1981) examined the benthic communities within the Port and harbour. The study was part of an environmental impact assessment by Bruce Wallace and Partners, to assess the ecological impact of the Taranaki Harbour Board's proposal to dredge 1.75 million cubic metres of sediment from the harbour, and the disposal of the sediment at an open water site. Twenty-one sublittoral stations were sampled by dredge. Species lists were generated for each station, with a total of 38 species recorded, including the non-indigenous bivalve *Theora lubrica*. The biota was noted to be similar to that recorded in previous studies during the mid-1970s. Unfortunately, we were unable to obtain copies of these earlier reports.

Taylor and MacKenzie (2001) tested the Port of Taranaki for the presence of the toxic blooming dinoflagellate *Gymnodinium catenatum*, and detected both resting cysts (sediment samples) and motile cells (phytoplankton samples).

Survey methods

SURVEY METHOD DEVELOPMENT

The sampling methods used in this survey were based on the CSIRO: Centre for Research on Introduced Marine Pests (CRIMP) protocols developed for baseline port surveys in Australia (Hewitt and Martin 1996, 2001). CRIMP protocols have been adopted as a standard by the International Maritime Organisation’s Global Ballast Water Management Programme (GloBallast). Variations of these protocols are being applied to port surveys in many other nations. A group of New Zealand marine scientists reviewed the CRIMP protocols and conducted a workshop in September 2001 to assess their feasibility for surveys in this country (Gust et al. 2001). A number of recommendations for modifications to the protocols ensued from the workshop and were implemented in surveys throughout New Zealand. The modifications were intended to ensure cost effective and efficient collection of baseline species data for New Zealand ports and marinas. The modifications made to the CRIMP protocols and reasons for the changes are summarised in Table 2. Further details are provided in Gust et al. (2001).

Baseline survey protocols are intended to sample a variety of habitats within ports or marinas, including epibenthic fouling communities on hard substrata, soft-sediment communities, mobile invertebrates and fishes, and dinoflagellates. Below, we describe the methods and sampling effort used for the Port of Taranaki survey. The survey was undertaken between April 16th and 19th, 2002. Most sampling was concentrated on four main berths: Blyde Wharf No. 2, Newton King Tanker Terminal No. 2, Moturoa Wharf No. 2 and Breakwater Berth No. 2. Additional trapping and opportunistic sampling was conducted at 13 other locations. A summary of sampling effort within the Port is provided in Tables 3a,b.

DIVER OBSERVATIONS AND COLLECTIONS ON WHARF PILES

Fouling assemblages were sampled on four pilings at each berth. Selected pilings were separated by 10 – 15 m and comprised two pilings on the outer face of the berth and, where possible, two inner pilings beneath the berth (Gust et al 2001). On each piling, four quadrats (40 cm x 25 cm) were fixed to the outer surface of the pile at water depths of approximately -0.5 m, -1.5 m, -3.0 m and -7 m. A diver descended slowly down the outer surface of each pile and filmed a vertical transect from approximately high water to the base of the pile, using a digital video camera in an underwater housing. On reaching the sea floor, the diver then ascended slowly and captured high-resolution still images of each quadrat using the photo capture mechanism on the video camera. Because of limited visibility, four overlapping still images, each covering approximately ¼ of the area of the quadrat were taken for each quadrat. A second diver then removed fouling organisms from the piling by scraping the organisms inside each quadrat into a 1-mm mesh collection bag, attached to the base of the quadrat (Fig. 3). Once scraping was completed, the sample bag was sealed and returned to the laboratory for processing. The second diver also made a visual search of each piling for potential invasive species and collected samples of large conspicuous organisms not represented in quadrats. Opportunistic visual searches were also made of breakwalls and rock facings within the commercial port area. Divers swam vertical profiles of the structures and collected specimens that could not be identified reliably in the field.

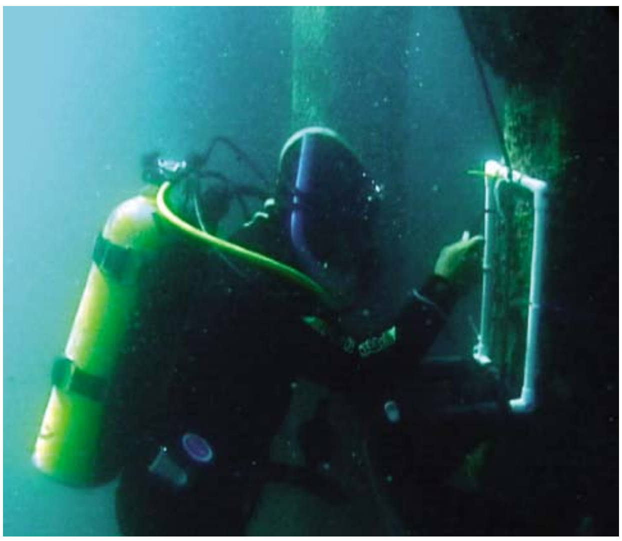

Figure 3: Diver sampling organisms on pier piles.

BENTHIC INFAUNA

Benthic infauna was sampled using a Shipek grab sampler deployed from a research vessel moored adjacent to the berth (Fig. 4), with samples collected from within 5 m of the edge of the berth. The Shipek grab removes a sediment sample of ~3 *l* and covers an area of approximately 0.04 m^2 on the seafloor to a depth of about 10 cm. It is designed to sample unconsolidated sediments ranging from fine muds and sands to hard-packed clays and small cobbles. Because of the strong torsion springs and single, rotating scoop action, the Shipek grab is generally more efficient at retaining samples intact than conventional VanVeen or Smith McIntyre grabs with double jaws (Fenwick, NIWA, *pers obs*). Three grab samples were taken at haphazard locations along each sampled berth. Sediment samples were washed through a 1-mm mesh sieve and animals retained on the sieve were returned to the field laboratory for sorting and preservation.

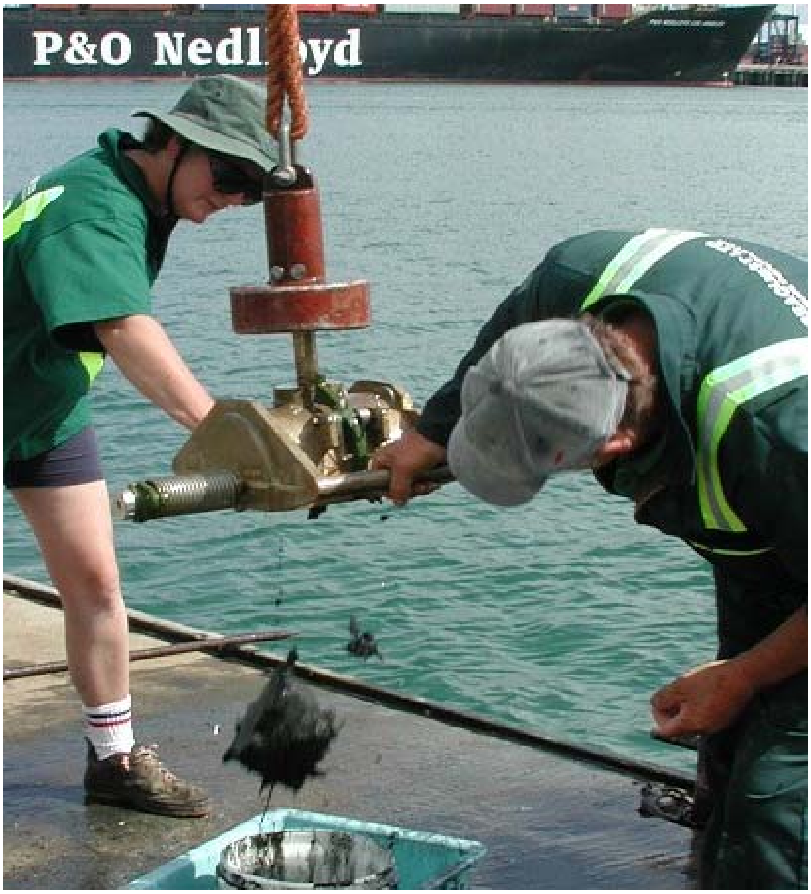

Figure 4: Shipek grab sampler: releasing benthic sample into bucket

EPIBENTHOS

Larger benthic organisms were sampled using an Ocklemann sled (hereafter referred to as a "sled"). The sled is approximately one meter long with an entrance width of ~0.7 m x 0.2 m. A short yoke of heavy chain connects the sled to a tow line (Fig. 5). The mouth of the sled partially digs into the sediment and collects organisms in the surface layers to a depth of a few centimetres. Runners on each side of the sled prevent it from sinking completely into the sediment so that shallow burrowing organisms and small, epibenthic fauna pass into the exposed mouth. Sediment and other material that enters the sled is passed through a mesh basket that retains organisms larger than about two mm. Sleds were towed for a standard time of two minutes at approximately two knots. During this time, the sled typically traversed between 80 – 100 m of seafloor before being retrieved. Two to three sled tows were completed adjacent to each sampled berth within the port, and the entire contents were sorted.

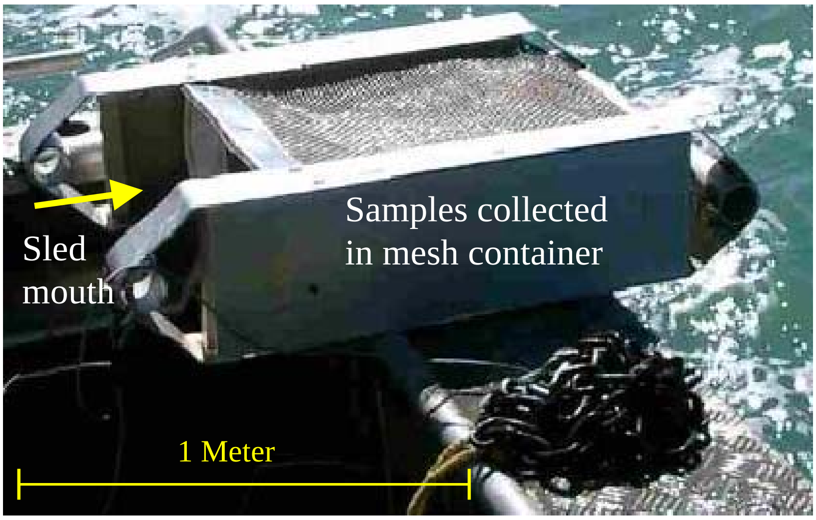

Figure 5: Benthic sled

SEDIMENT SAMPLING FOR CYST-FORMING SPECIES

A TFO gravity corer (hereafter referred to as a "javelin corer") was used to take small sediment cores for dinoflagellate cysts (Fig. 6). The corer consists of a 1.0-m long x 1.5-cm diameter hollow stainless steel shaft with a detachable 0.5-m long head (total length = 1.5 m). Directional fins on the shaft ensure that the javelin travels vertically through the water so that the point of the sampler makes first contact with the seafloor. The detachable tip of the javelin is weighted and tapered to ensure rapid penetration of unconsolidated sediments to a depth of 20 to 30 cm. A thin (1.2 cm diameter) sediment core is retained in a perspex tube within the hollow spearhead. In muddy sediments, the corer preserves the vertical structure of the sediments and fine flocculant material on the sediment surface more effectively than hand-held coring devices (Matsuoka and Fukuyo 2000). The javelin corer is deployed and retrieved from a small research vessel. Cyst sample sites were not constrained to the berths sampled by pile scraping and trapping techniques. Sampling focused on high sedimentation areas within the Port and avoided areas subject to strong tidal flow. On retrieval, the perspex tube was removed from the spearhead and the top 5 cm of sediment retained for analysis. Sediment samples were kept on ice and refrigerated prior to culturing. Culture procedures generally followed those described by Hewitt and Martin (2001).

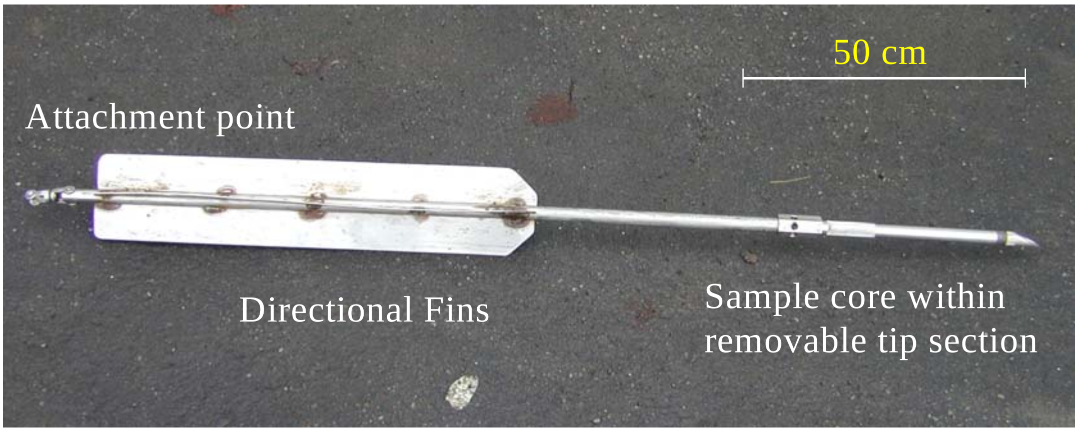

Figure 6: Javelin corer

MOBILE EPIBENTHOS

Benthic scavengers and fishes were sampled using a variety of baited trap designs described below.

Opera house fish traps

Opera house fish traps (1.2 m long x 0.8 m wide x 0.6 m high) were used to sample fishes and other bentho-pelagic scavengers (Fig. 7). These traps were covered in 1-cm^2 mesh netting and had entrances on each end consisting of 0.25 m long tunnels that tapered in diameter from 40 to 14 cm. The trap was baited with two dead pilchards (*Sardinops neopilchardus*) held in plastic mesh suspended in the centre of the trap. Two trap lines, each containing two opera house traps were set for a period of 1 hour at each site before retrieval. Previous studies have shown opera house traps to be more effective than other types of fish trap and that consistent catches are achieved with soak times of 20 to 50 minutes (Ferrell et al 1994; Thrush et al 2002).

Box traps

Fukui-designed box traps (63 cm x 42 cm x 20 cm) with a 1.3-cm mesh netting were used to sample mobile crabs and other small epibenthic scavengers (Fig. 7). A central mesh bait holder containing two dead pilchards was secured inside the trap. Organisms attracted to the bait enter the traps through slits in inward sloping panels at each end. Two trap lines, each containing two box traps, were set on the sea floor at each site and left to soak overnight before retrieval.

Starfish traps

Starfish traps designed by Whayman-Holdsworth were used to catch asteroids and other large benthic scavengers (Fig. 7). These are circular hoop traps with a basal diameter of 100 cm and an opening on the top of 60 cm diameter. The sides and bottom of the trap are covered with 26-mm mesh and a plastic, screw-top bait holder is secured in the centre of the trap entrance (Andrews et al 1996). Each trap was baited with two dead pilchards. Two trap lines, each with two starfish traps were set on the sea floor at each site and left to soak overnight before retrieval.

Shrimp traps

Shrimp traps were used to sample small, mobile crustaceans. They consisted of a 15 cm plastic cylinder with a 5-cm diameter screw top lid in which a funnel had been fitted. The funnel had a 20-cm entrance that tapered in diameter to 1-cm. The entrance was covered with 1 cm plastic mesh to prevent larger animals from entering and becoming trapped in the funnel entrance. Each trap was baited with a single dead pilchard. Two trap lines, each containing two scavenger traps, were set on the sea floor at each site and left to soak overnight before retrieval.

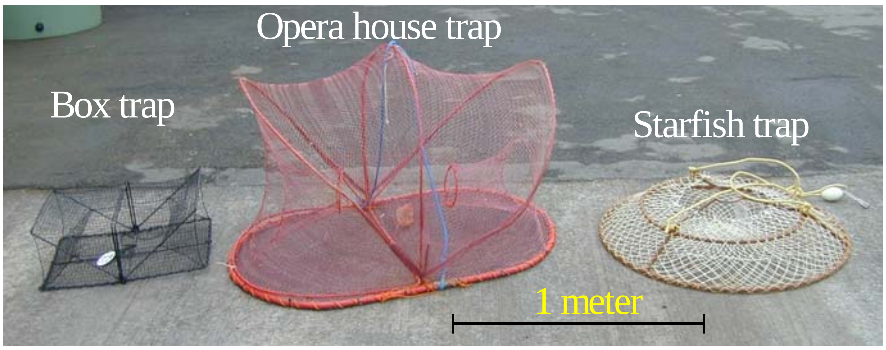

Figure 7: Trap types deployed in the port

SAMPLING EFFORT

A summary of sampling effort within the Port of Taranaki is provided in Tables 3 a,b. We particularly focused sampling effort on hard substrata within ports (such as pier piles and wharves) where invasive species are likely to be found (Hewitt and Martin 2001), and increased the level of quadrat scraping replication on each pile from the CRIMP protocols, as well as sampling both shaded and unshaded piles. The distribution of effort within ports aimed to maximise spatial coverage and represent the diversity of active berthing sites within the area. The spatial distribution of sampling effort in the Port of Taranaki is indicated in the following figures; diver pile scrapings (Fig. 8), benthic sledding (Fig. 9), box, starfish and shrimp trapping (Fig. 10), opera house fish trapping (Fig. 11), shipek benthic grab sampling (Fig. 12), and javelin cyst coring and visual inspections (Fig. 13). Sampling effort was varied between ports on the basis of risk assessments (Inglis 2001) to maximise the search efficiency for NIS nationwide. Sampling effort in each of the thirteen Ports and three marinas surveyed over two summers is summarised in Table 3c.

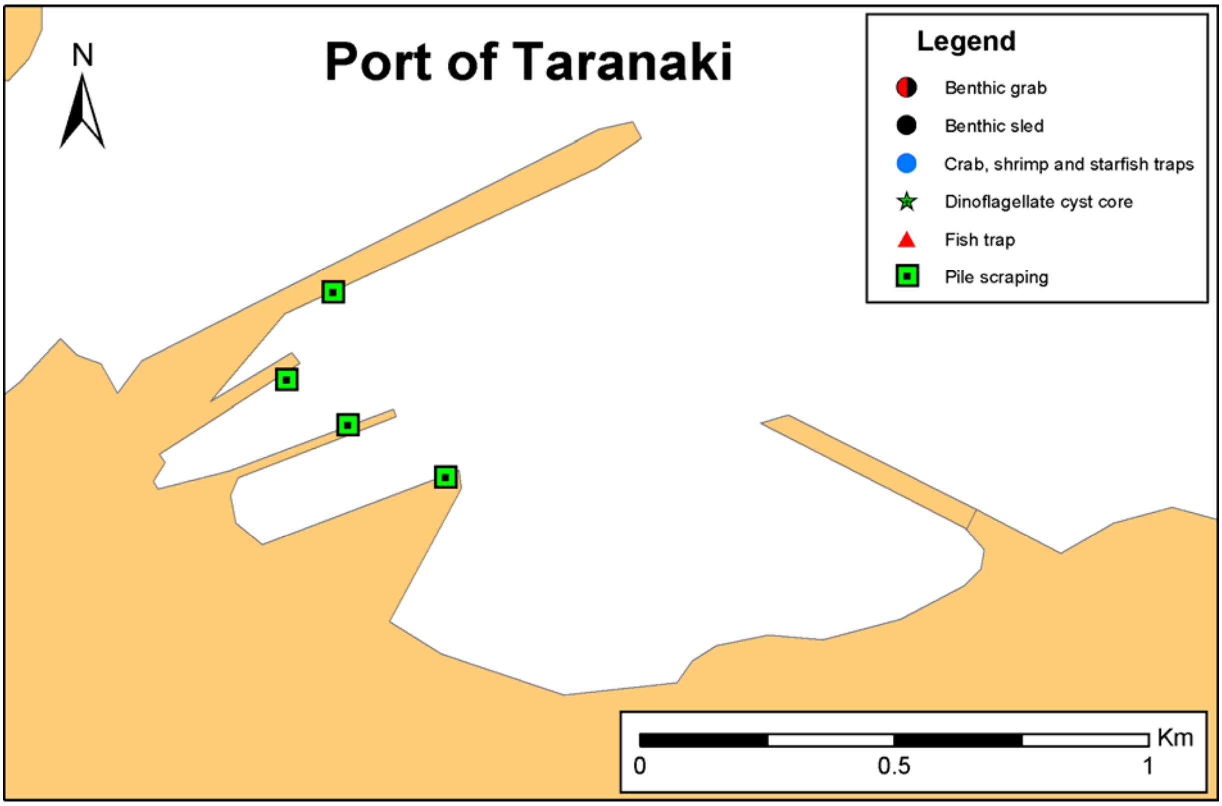

Figure 8: Diver pile scraping sites.

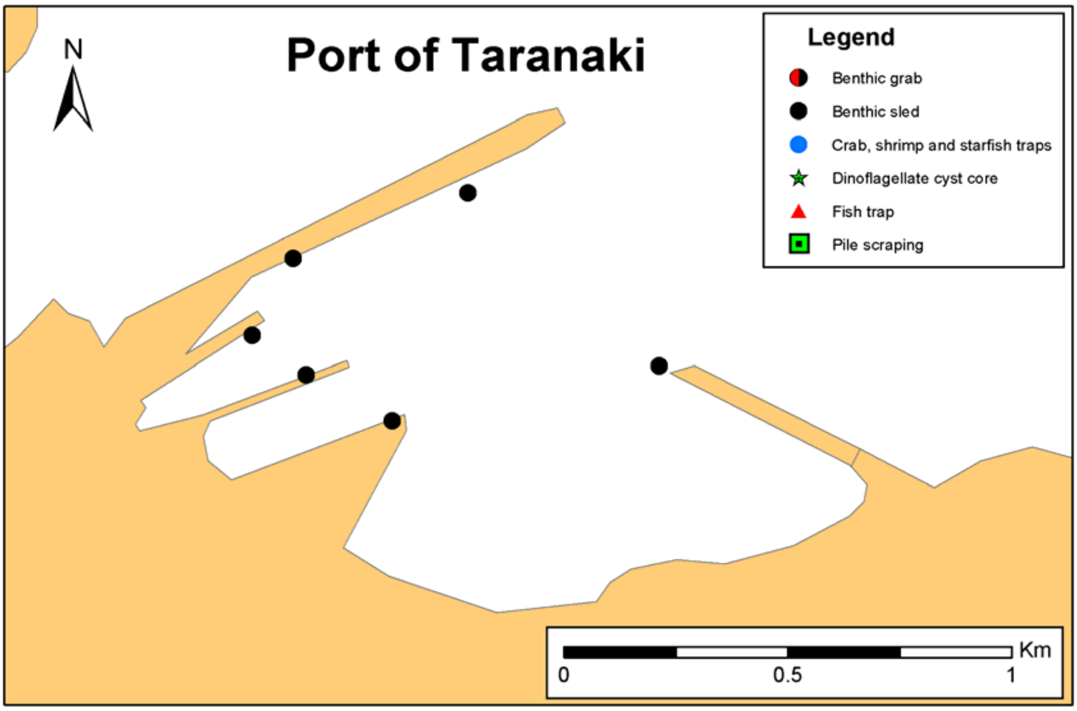

Figure 9: Benthic sledding sites.

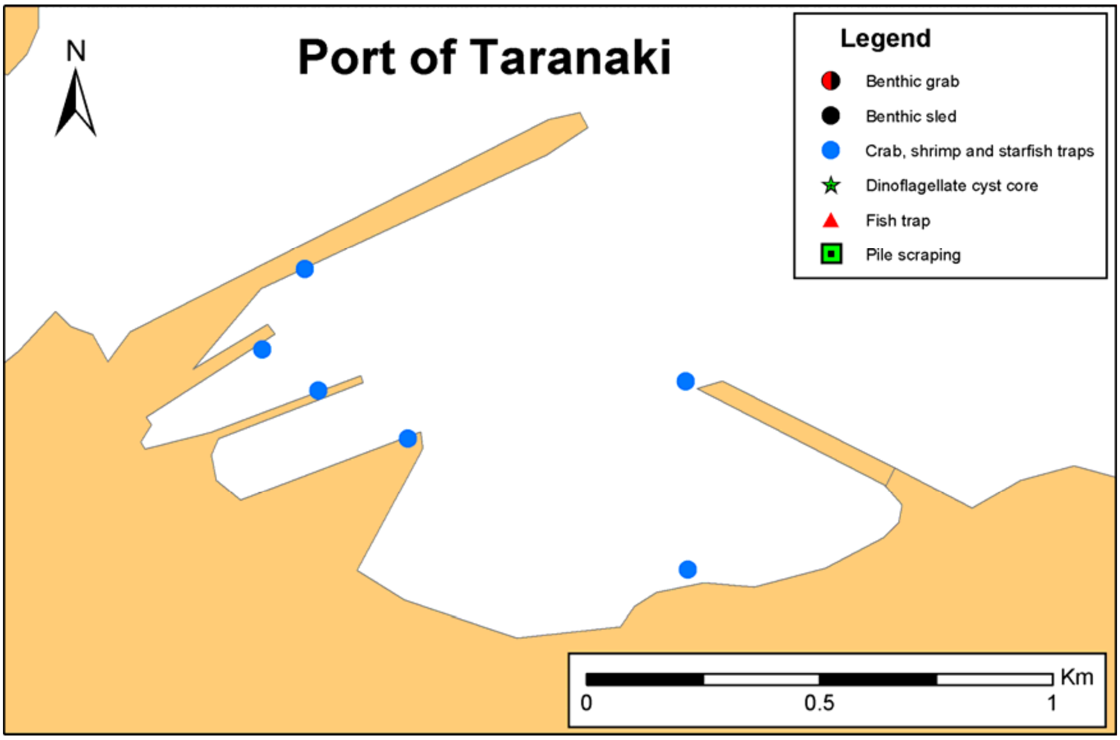

Figure 10: Box, starfish and shrimp trapping sites.

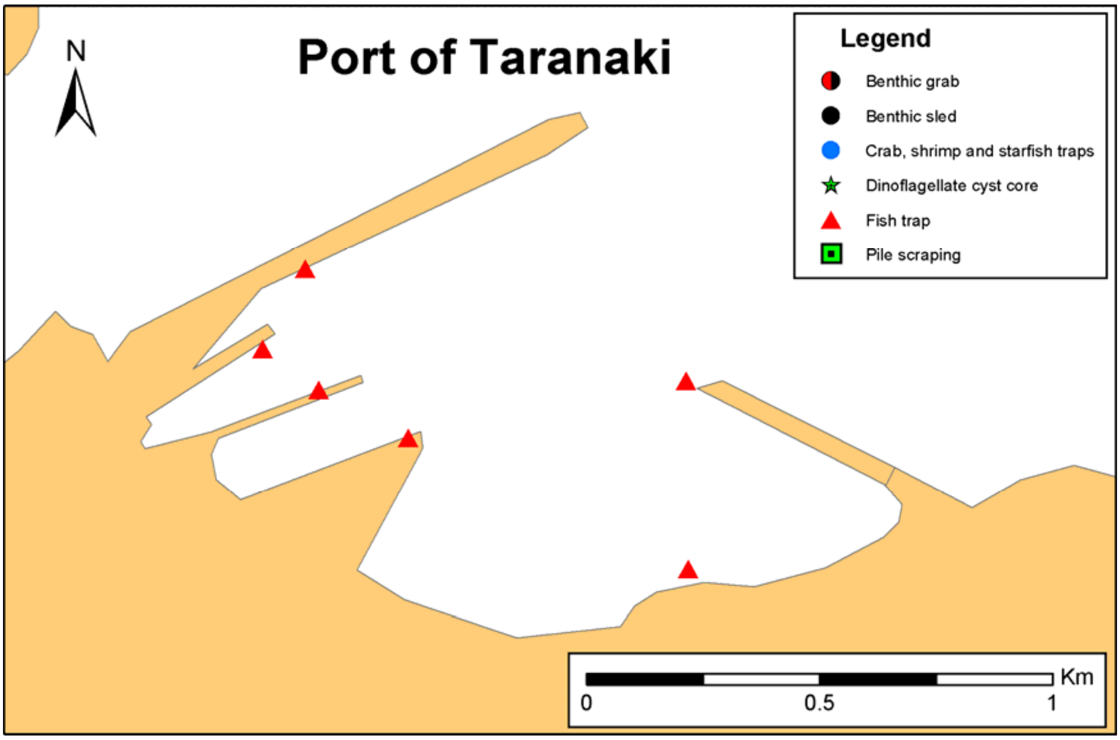

Figure 11: **Opera house (fish) trapping sites.**

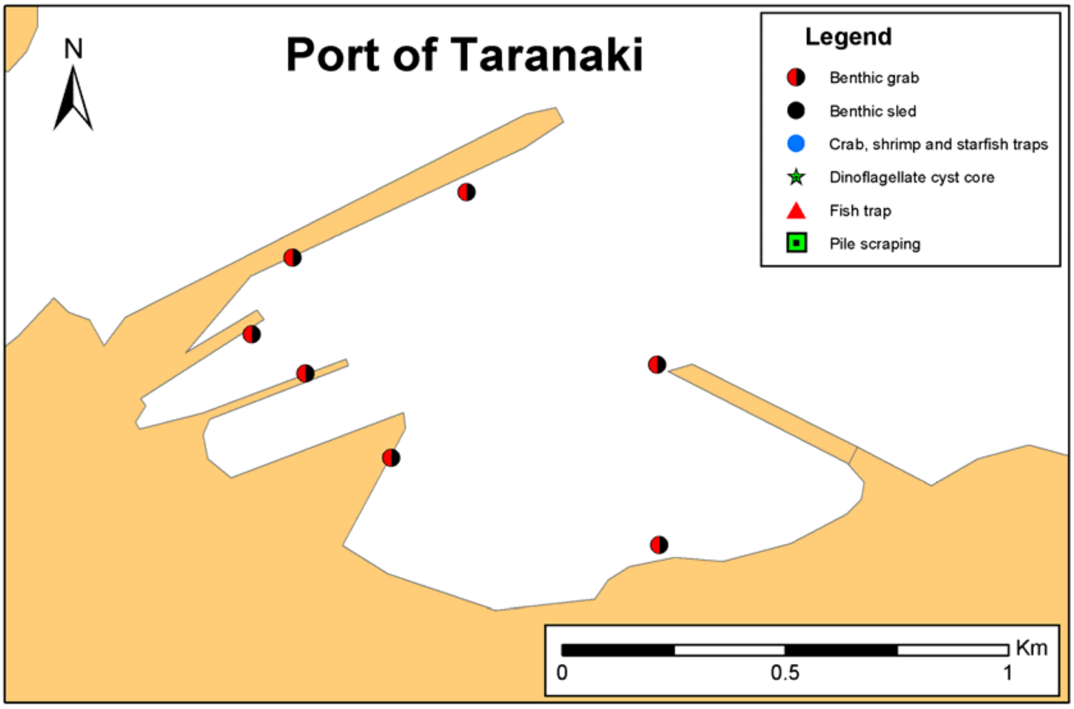

Figure 12: **Shipek grab sampling sites.**

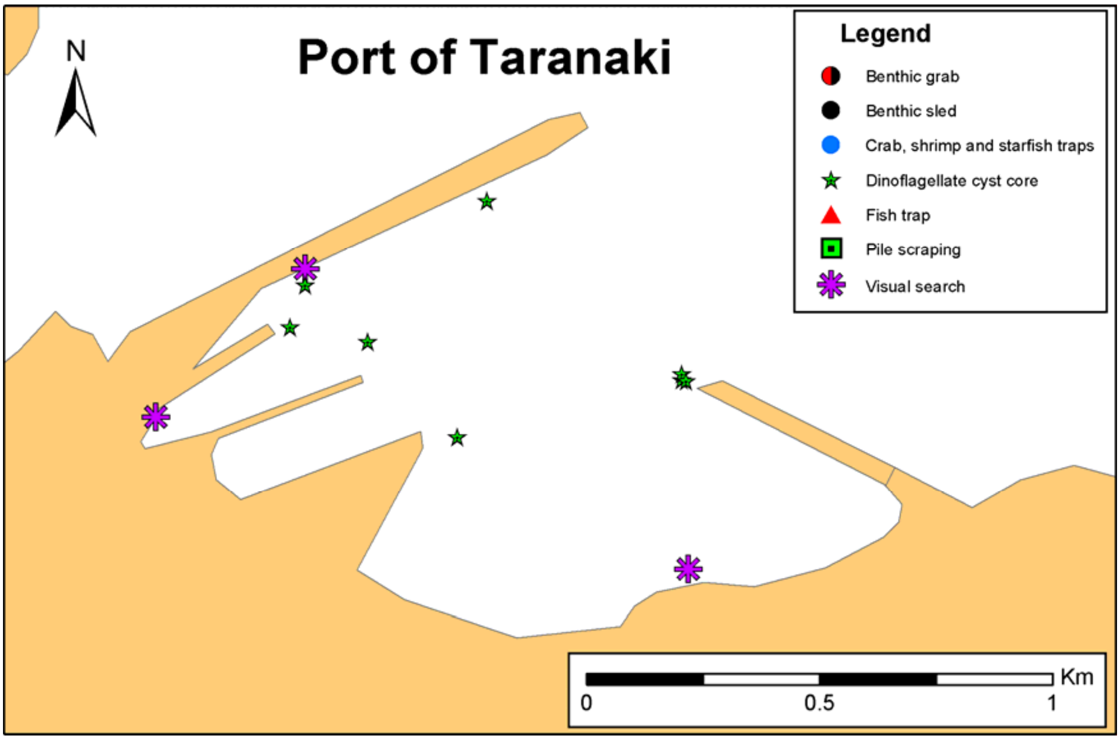

Figure 13: Javelin coring and visual inspection sites.

SORTING AND IDENTIFICATION OF SPECIMENS

Each sample collected in the diver pile scrapings, benthic sleds, box, starfish and shrimp traps, opera house fish traps, shipek grabs and javelin cores was allocated a unique code on waterproof labels and transported to a nearby field laboratory where it was sorted by a team into broad taxonomic groups (e.g. ascidians, barnacles, sponges etc.). These groups were then preserved and individually labelled. Details of the preservation techniques varied for many of the major taxonomic groups collected, and the protocols adopted and preservative solutions used are indicated in Table 4. Specimens were subsequently sent to over 25 taxonomic experts (Appendix 1) for identification to species or lowest taxonomic unit (LTU). We also sought information from each taxonomist on the known biogeography of each species within New Zealand and overseas. Species lists compiled for each port were compared with the marine species listed on the New Zealand register of unwanted organisms under the Biosecurity Act 1993 (Table 5a) and the marine pest list produced by the Australian Ballast Water Management Advisory Council (Table 5b).

DEFINITIONS OF SPECIES CATEGORIES

Each species recovered during the survey was classified into one of four categories that reflected its known or suspected geographic origin. To do this we used the experience of taxonomic experts and reviewed published literature and unpublished reports to collate information on the species' biogeography.

Patterns of species distribution and diversity in the oceans are complex and still poorly understood (Warwick 1996). Worldwide, many species still remain undescribed or undiscovered and their biogeography is incomplete. These gaps in global marine taxonomy and biogeography make it difficult to reliably determine the true range and origin of many species. The four categories we used reflect this uncertainty. Species that were not demonstrably native or non-indigenous were classified as "cryptogenic" (sensu Carlton 1996). Cryptogenesis can arise because the species was spread globally by humans before scientific descriptions of marine flora and fauna began in earnest (i.e. historical introductions). Alternatively the species may have been discovered relatively recently and there is insufficient biogeographic information to determine its native range. We have used two categories of cryptogenesis to distinguish these different sources of uncertainty. In addition, a fifth category ("species indeterminata") was used for specimens that could not be identified to species-level. Formal definitions for each category are given below.

Native species

Native species are known to be endemic to the New Zealand biogeographical region and have not been introduced to coastal waters by human mediated transport.

Non-indigenous species (NIS)

Non-indigenous species (NIS) are known or suspected to have been introduced to New Zealand as a result of human activities. They were determined using a series of questions posed by Chapman and Carlton (1991, 1994) as a guide, as exemplified by Cranfield et al (1998).

1. Has the species suddenly appeared locally where it has not been found before?
2. Has the species spread subsequently?
3. Is the species' distribution associated with human mechanisms of dispersal?
4. Is the species associated with, or dependent on, other non-indigenous species?
5. Is the species prevalent in, or restricted to, new or artificial environments?
6. Is the species' distribution restricted compared to natives?

The worldwide distribution of the species was tested by a further three criteria:

7. Does the species have a disjunctive worldwide distribution?
8. Are dispersal mechanisms of the species inadequate to reach New Zealand, and is passive dispersal in ocean currents unlikely to bridge ocean gaps to reach New Zealand?
9. Is the species isolated from the genetically and morphologically most similar species elsewhere in the world?

In this report we distinguish two categories of NIS. "NIS" refers to non-indigenous species previously recorded from New Zealand waters, and "NIS (new)" refers to non-indigenous species first discovered in New Zealand waters during this project.

Cryptogenic species Category 1:

Species previously recorded from New Zealand whose identity as either native or non-indigenous is ambiguous. In many cases this status may have resulted from their spread around the world in the era of sailing vessels prior to scientific survey (Chapman and Carlton 1991, Carlton 1992), such that it is no longer possible to determine their original native distribution. Also included in this category are newly described species that exhibited invasive behaviour in New Zealand (Criteria 1 and 2 above), but for which there are no known records outside the New Zealand region.

Cryptogenic species Category 2:

Species that have recently been discovered but for which there is insufficient systematic or biogeographic information to determine whether New Zealand lies within their native range. This category includes previously undescribed species that are new to New Zealand and/or science.

Species indeterminata

Specimens that could not be reliably identified to species level. This group includes: (1) organisms that were damaged or juvenile and lacked morphological characteristics necessary for identification, and (2) taxa for which there is not sufficient taxonomic or systematic information available to allow identification to species level.

Survey results

A total of 270 species or higher taxa were identified from the Port of Taranaki survey. This collection consisted of 180 native (Table 6), 20 cryptogenic (Table 7), 15 non-indigenous species (Table 8) and 55 species indeterminata (Table 9, Fig. 14). The biota included a diverse array of organisms from 13 phyla (Fig. 15). Nine species from the Port of Taranaki – two NIS and seven cryptogenic Category 2 species - had not previously been described from New Zealand waters. For general descriptions of the main groups of organisms (phyla) encountered during this study refer to Appendix 2.

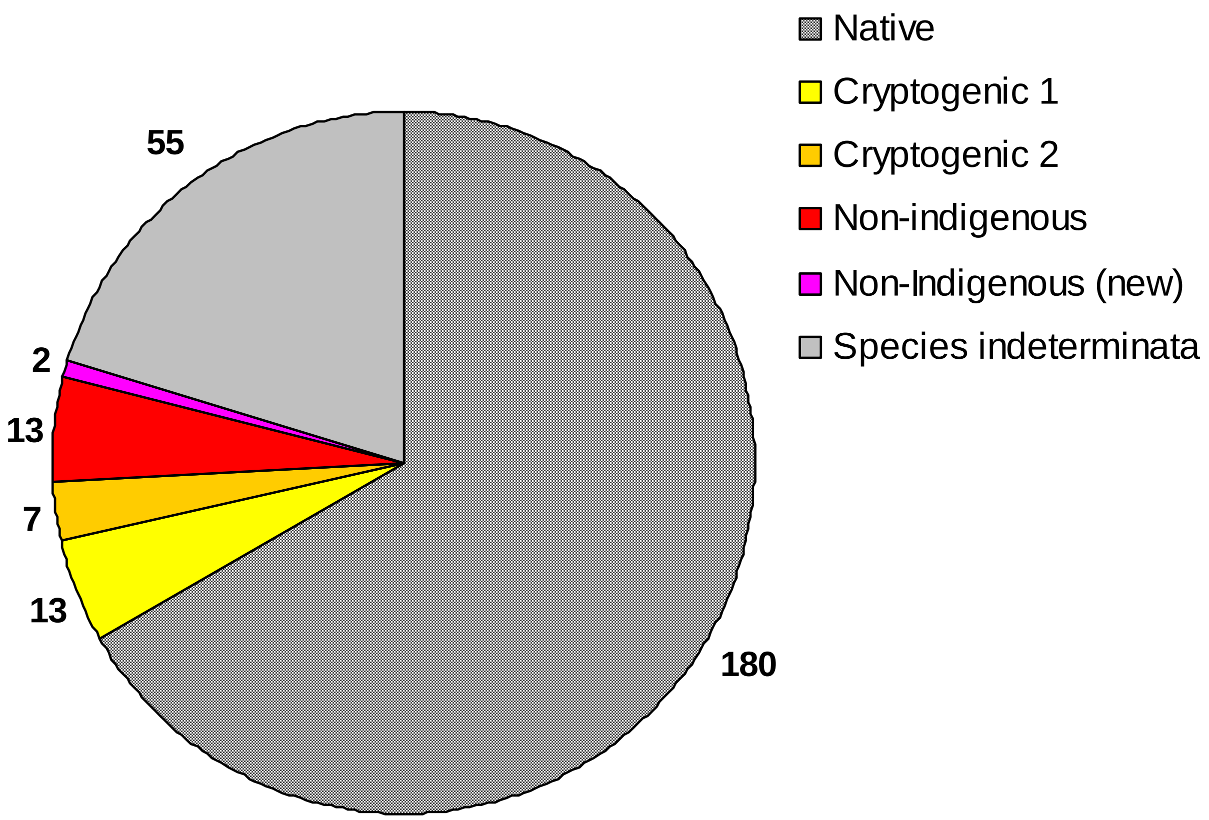

Figure 14: Diversity of marine species sampled in the Port of Taranaki. Values indicate the number of species in native, cryptogenic, non-indigenous and species indeterminata categories.

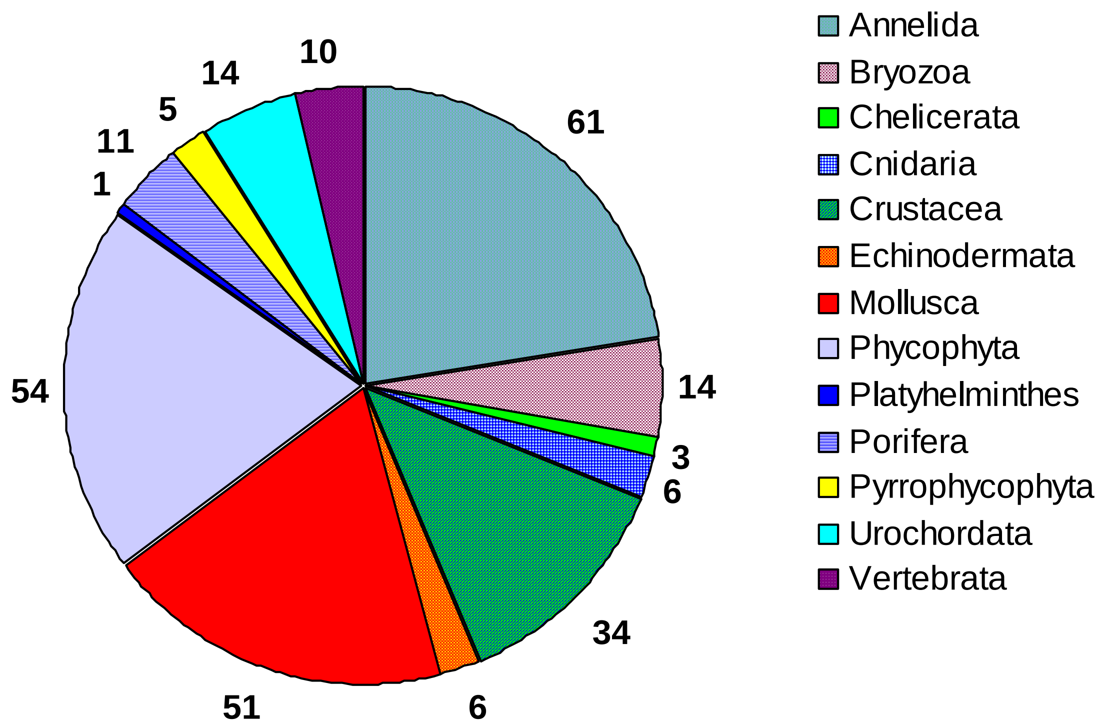

Figure 15: Marine Phyla sampled in the Port of Taranaki. Values indicate the number of species in each of the major taxonomic groups.

NATIVE SPECIES

A total of 180 native species was identified from the Port of Taranaki. Native species represent 66.7 % of all species identified from this location (Table 6) and included highly diverse assemblages of annelids (36 species), crustaceans (26 species), molluscs (47 species), phycophyta (30 species), urochordates (8 species), and vertebrates (10 species). A number of other less diverse phyla including bryozoans, chelicerates, cnidarians, echinoderms, porifera, and pyrrophycophyta were also sampled from the Port (Table 6).

CRYPTOGENIC SPECIES

Twenty cryptogenic species were discovered in the Port of Taranaki. Cryptogenic species represent 7.4 % of all species or higher taxa identified from the Port. The cryptogenic organisms identified included 13 Category 1 and seven Category 2 species as defined in Section 2.8 above. These organisms included one bryozoan, one chelicerata, two cnidarians, four crustaceans, six sponges, one pyrrophycophyta, and five ascidian species (Table 7). Some of the Category 1 cryptogenic species (e.g. the ascidians *Astereocarpa cerea*, *Botrylloides leachii*, and *Corella eumyota*; and the hydroid *Plumularia setacea*) have been present in New Zealand for more than 100 years but have distributions outside New Zealand that suggest non-native origins (Cranfield et al. 1998).

NON-INDIGENOUS SPECIES

Fifteen non-indigenous species (NIS) were recorded from the Port of Taranaki (Table 8). NIS represented 5.5 % of all identified species from this location. Two of these species, the cnidarian *Eudendrium capillare* and the ascidian *Cnemidocarpa sp*., were not previously known from New Zealand. NIS included one annelid, seven bryozoans, one cnidarian, two molluscs, two phycophyta, one porifera, and one urochordate. A list of Chapman and

Carlton's (1994) criteria (see Section 2.9.2) that were met by the non-indigenous species sampled in this survey is given in Appendix 3. Below we summarise available information on the biology of each of these species, providing images where available, and indicate what is known about their distribution, habitat preferences and impacts. This information was sourced from published literature, the taxonomists listed in Appendix 1 and from regional databases on non-indigenous marine species in Australia (National Introduced Marine Pest Information System; http://www.crimp.marine.csiro.au/nimpis) and the USA (National Exotic Marine and Estuarine Species Information System; http://invasions.si.edu/nemesis). Distribution maps for each NIS in the port are composites of multiple replicate samples. Where overlayed presence and absence symbols occur on the map, this indicates the NIS was found in at least one, but not all replicates at that GPS location. NIS are presented below by phyla in the same order as Table 8.

Barantolla lepte **(Hutchings, 1974)**

No image available

Barantolla lepte is a small polychaete worm in the family Capitellidae. It is found predominantly in estuarine sublittoral muds and weed beds. The type specimen for this species was described from New South Wales, Australia (Hutchings 1974). It is also known to occur in Victoria and Tasmania (Australian Faunal Directory 2005). The first New Zealand record of *B. lepte* was from the port of Timaru in 1998 (G. Read, NIWA, *pers. comm.*). During the baseline port surveys, it was recorded from the ports of Timaru, Napier and Taranaki. In the Port of Taranaki it occurred in benthic grab samples taken near the Moturoa Wharf (Fig. 16).

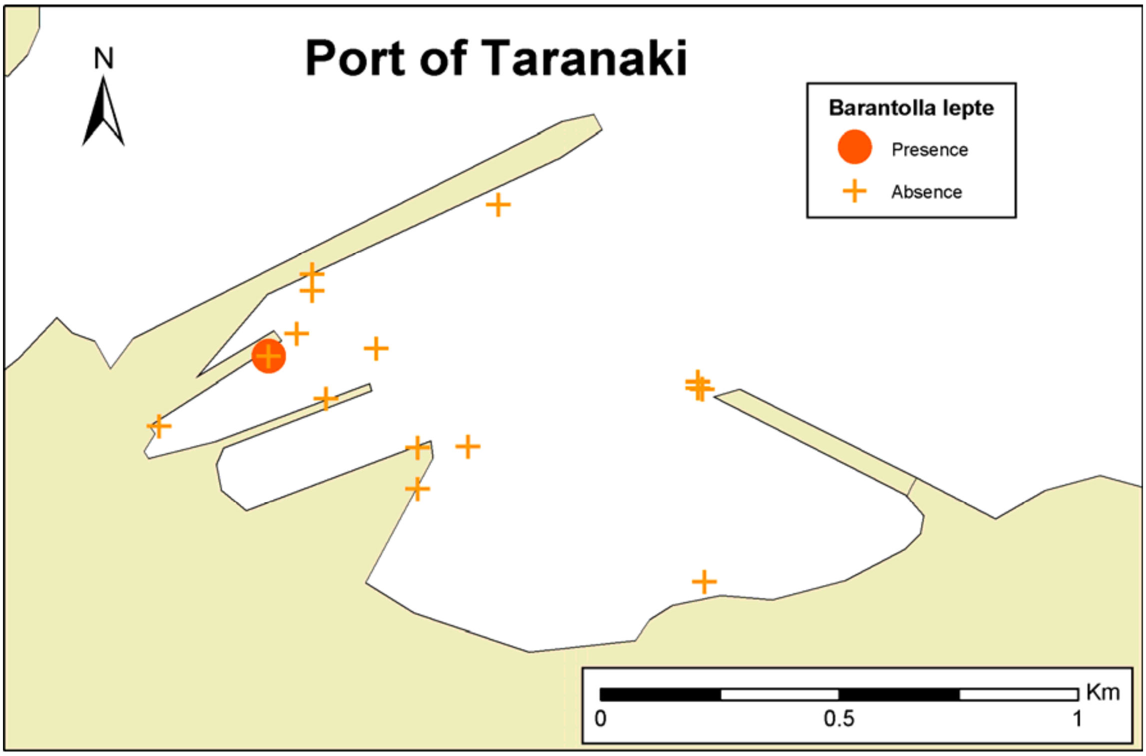

Figure 16: ***Barantolla lepte*** **distribution in Taranaki.**

Bugula flabellata **(Thompson in Gray, 1847)**

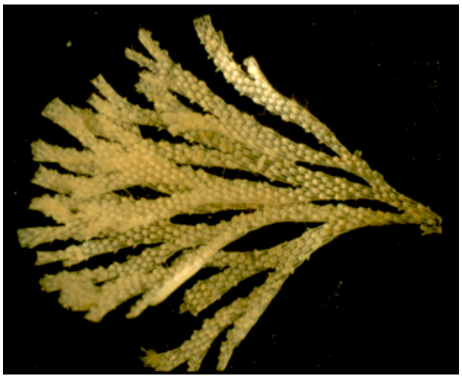

Image and information: NIMPIS (2002a)

Bugula flabellata is an erect bryozoan with broad, flat branches. It is a colonial organism and consists of numerous 'zooids' connected to one another. It is pale pink and can grow to about 4 cm high and attaches to hard surfaces such as rocks, pilings and pontoons or the shells of other marine organisms. It is often found growing with other erect bryozoan species such as *B. neritina* (see below), or growing on encrusting bryozoans. Vertical, shaded, sub-littoral rock surfaces also form substrata for this species. It has been recorded down to 35 m. *Bugula flabellata* is native to the British Isles and North Sea and has been introduced to Chile, Florida and the Caribbean and the northern east and west coasts of the USA, as well as Australia and New Zealand. It is cryptogenic on the Atlantic coasts of Spain, Portugal and France. *Bugula flabellata* is a major fouling bryozoan in ports and harbours, particularly on vessel hulls, pilings and pontoons and has also been reported from offshore oil platforms. There have been no recorded impacts from *B. flabellata.* During the current baseline surveys it was recorded from Opua marina, Whangarei, Auckland, Tauranga, Napier, Taranaki, Wellington, Picton, Nelson, Lyttelton, Timaru, Dunedin and Bluff. In the Port of Taranaki *B. flabellata* occurred in benthic sled and pile scrape samples taken from near Blyde, Breakwall 1, Moturoa and Newton King Wharves (Fig. 17).

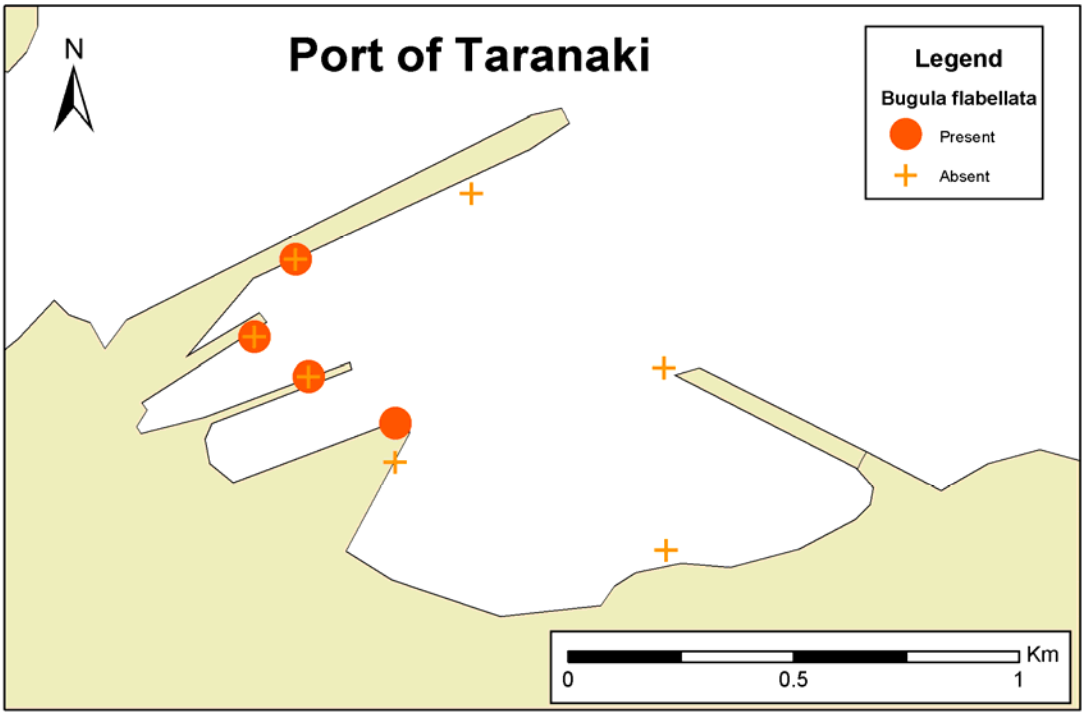

Figure 17: ***Bugula flabellata*** **distribution in Taranaki.**

Bugula neritina (Linnaeus, 1758)

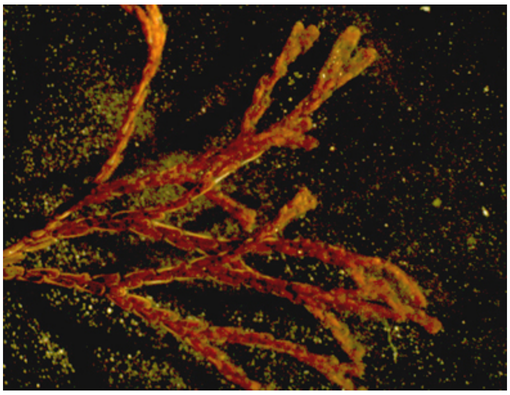

Image and information: NIMPIS (2002b)

Bugula neritina is an erect, bushy, red-purple-brown bryozoan. Branching is dichotomous (in series of two) and zooids alternate in two rows on the branches. Unlike all other species of *Bugula*, *B. neritina* has no avicularia (defensive structures) or spines, but there is a single pointed tip on the outer corner of zooids. Ovicells (reproductive structures) are large, globular and white in colour. They often appear in such high numbers that they resemble small snails or beads. *Bugula neritina* is native to the Mediterranean Sea. It has been introduced to most of North America, Hawaii, India, the Japanese and China Seas, Australia and New Zealand. It is cryptogenic in the British Isles. *Bugula neritina* is one of the most abundant bryozoans in ports and harbours and an important member of the fouling community. The species colonises any available substratum and can form extensive monospecific growths. It grows well on pier piles, vessel hulls, buoys and similar submerged surfaces. It even grows heavily in ships' intake pipes and condenser chambers. In North America, *B. neritina* occurs on rocky reefs and seagrass leaves. In Australia, it occurs primarily on artificial substrata. *B. neritina* occurs in all New Zealand ports (Gordon and Matawari 1992). In the Port of Taranaki this species occurred in benthic sled and pile scrape samples taken from near Blyde, Breakwall 1, Moturoa and Newton King Wharves, and from a benthic sled sample near the Lee Breakwater (Fig. 18).

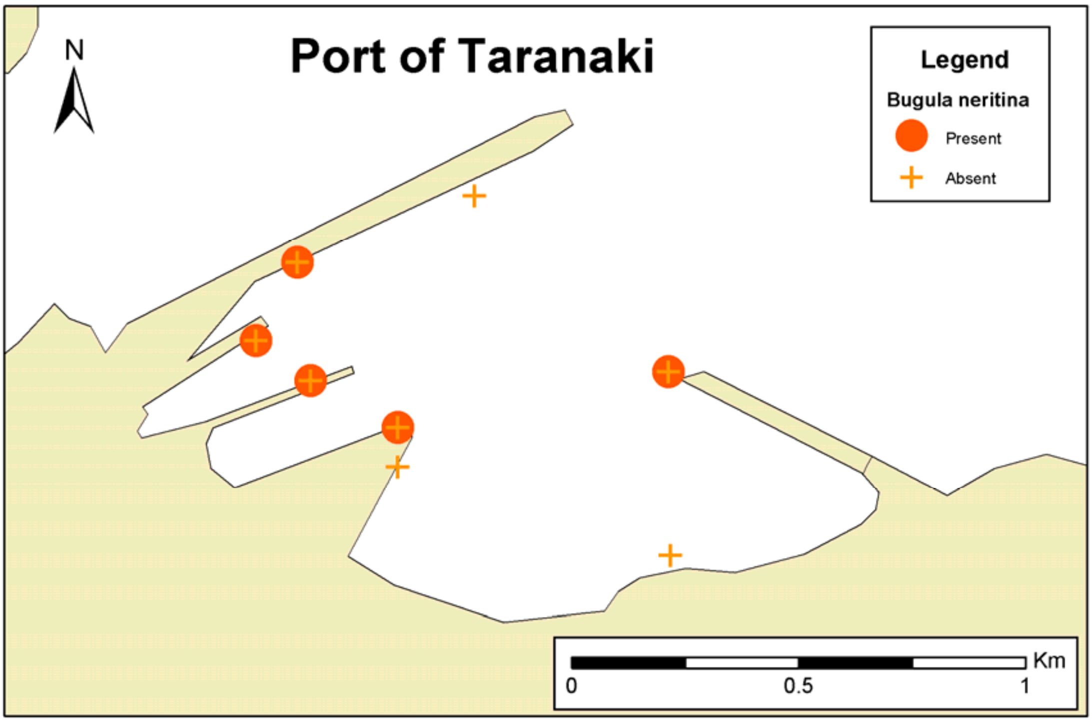

Figure 18: *Bugula neritina* distribution in Taranaki.

***Bugula stolonifera* (Ryland, 1960)**

Image: California Academy of Sciences.

Information:
US Geological Survey: Centre for Aquatic Resource Studies.
Non-indigenous Aquatic Species Database
(http://nas.er.usgs.gov/queries/SpFactSheet.asp?speciesID=268%20)
and
Smithsonian Marine Station, Smithsonian Institution.
Taxonomic database
(http://www.sms.si.edu/irlspec/Bugula_stolon.htm)

Bugula stolonifera forms dense tufted colonies of 30-40 mm high. It is a off-white colour and lives attached to the substratum with rhyzoids. Its basal and lateral walls are lightly calcified. Young colonies take on a fan or funnel shape, while established colonies form dense tufts. The zooids of *B. stolonifera* are smaller than those of *B. neritina*, yet they still taper proximally. *Bugula stolonifera* is native to southern Britain. It has been introduced to California, Hawaii, Mexico, Brazil, the Mediterranean and the eastern Atlantic. Like other species within the genus, *B. stolonifera* is a prolific fouling organism that readily occupies available hard substrata, as well as the exposed shells or carapaces of other organisms. The impacts of *B. stolonifera* on native benthic assemblages are unknown. During the port baseline surveys, *B. stolonifera* was recorded from the ports of Taranaki and Whangarei, although it is also known from Auckland, Napier, Nelson, Lyttelton, Timaru and Bluff (Gordon and Matawari 1992). In the Port of Taranaki *B. stolonifera* was recorded in pile scrape samples taken from Moturoa Wharf (Fig. 19).

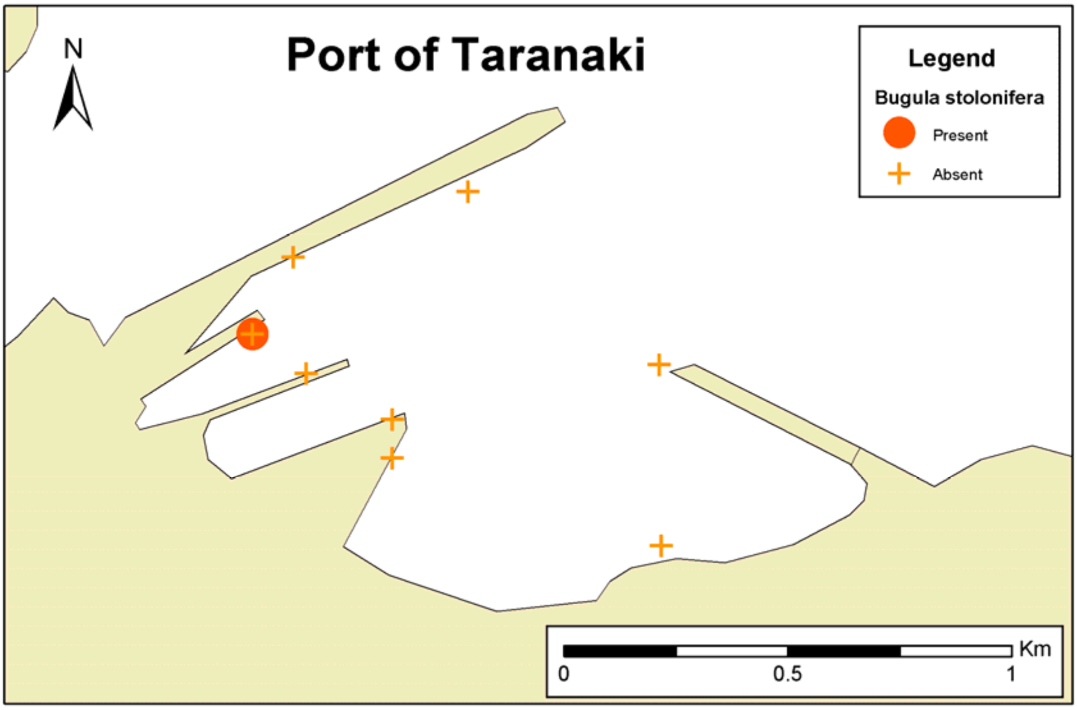

Figure 19: *Bugula stolonifera* distribution in Taranaki.

Tricellaria inopinata (d'Hondt and Occhipinti Ambrogi, 1985)

Image: RMIT University, Australia.
Information: Dyrynda et al (2000), Occhipinti Ambrogi (2000)

Tricellaria inopinata is an erect bryozoan. An assessment of samples and literature from various global regions suggests that Atlantic and Adriatic *T. inopinata* correspond with a morphospecies known to be invasive in New Zealand, and cryptogenic in Pacific North America, Japan and Australia. The morphospecies in question has usually been referred to as *T. occidentalis* (Trask, 1857) and, in at least one instance, as *T. porteri* (MacGillivray, 1889). *Tricellaria inopinata*'s widespread Pacific distribution and the possibility of anthropogenic dispersal there in historical times preclude the more precise identification of its source region. *Tricellaria inopinata* is a prolific fouling species with a high reproductive output. It has documented impacts on the abundance of native bryozoan species: *T. inopinata*'s invasion of the Laguna di Venezia (Italy) resulted in a sharp decline in the abundance of native bryozoans whose populations had been stable prior to *T. inopinata*'s introduction. During the port baseline surveys, *T. inopinata* was reported from the ports of Lyttelton and Taranaki. In the Port of Taranaki this species was recorded from a benthic sled sample taken near the Lee Breakwater (Fig. 20).

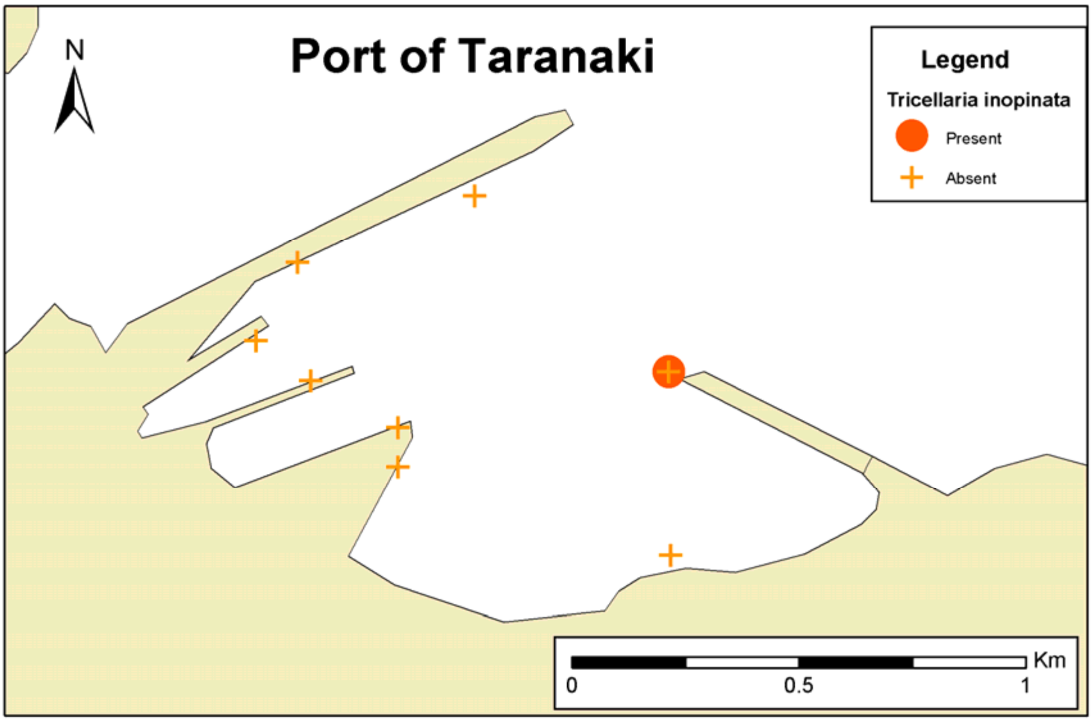

Figure 20: ***Tricellaria inopinata* distribution in Taranaki**

***Cryptosula pallasiana* (von Moll, 1803)**

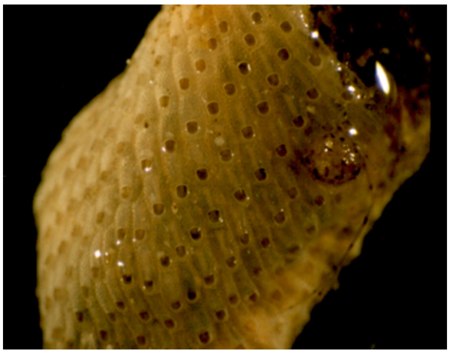

Image and information: NIMPIS (2002c)

Cryptosula pallasiana is an encrusting bryozoan, white-pink with orange crusts. The colonies sometimes rise into frills towards the edges. Zooids are hexagonal in shape, measuring on average 0.8 mm in length and 0.4 mm in width. The frontal surface of the zooid is heavily calcified, and has large pores set into it. Colonies may sometimes appear to have a beaded surface due to zooids having a suboral umbo (ridge). The aperture is bell shaped, and occasionally sub-oral avicularia (defensive structures) are present. There are no ovicells (reproductive structures) or spines present on the colony. *Cryptosula pallasiana* is native to Florida, the east coast of Mexico and the northeast Atlantic. It has been introduced to the northwest coast of the USA, the Japanese Sea, Australia and New Zealand. It is cryptogenic in the Mediterranean. *Cryptosula pallasiana* is a common fouling organism on a wide variety of substrata. Typical habitats include seagrasses, drift algae, oyster reef, artificial structures such as piers and breakwaters, man-made debris, rock, shells, ascidians, glass and vessel hulls. It has been reported from depths of up to 35 m. There have been no recorded impacts of *Cryptosula pallasiana* throughout its introduced range. However, in the USA, it has been noted as one of the most competitive fouling organisms in ports and harbours it occurs in. Within Australia, colonies generally do not reach a large size or cover large areas of substrata. *C. pallasiana* has been recorded from all New Zealand ports (Cranfield et al. 1998). In the Port of Taranaki this species was recorded in pile scrape samples taken from Blyde Wharf, Moturoa Wharf and the Newton King Terminal (Fig. 21).

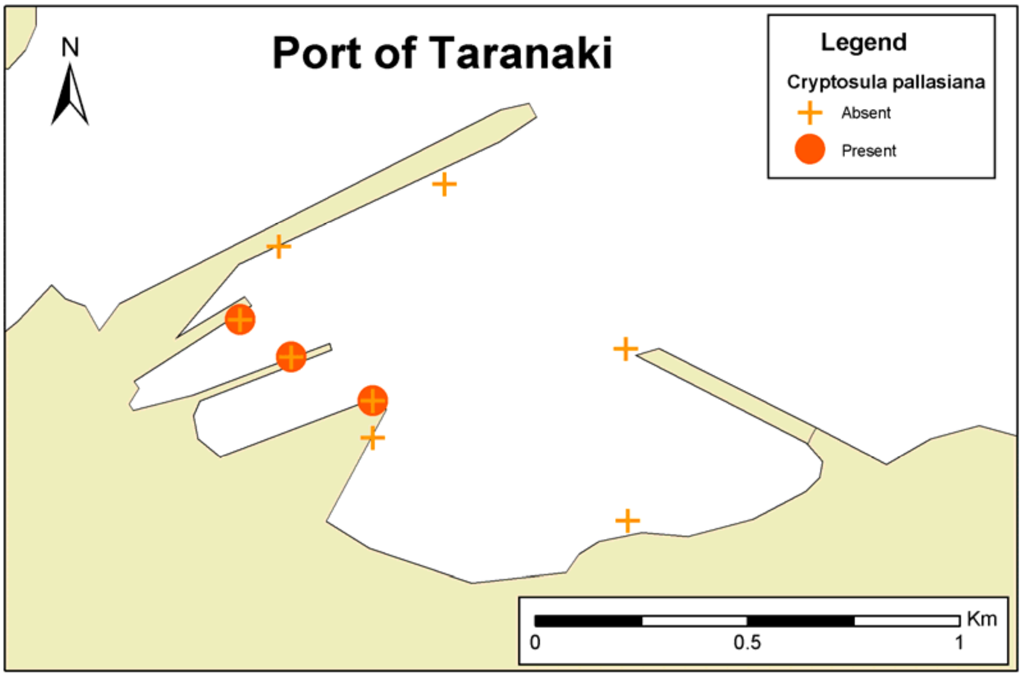

Figure 21: ***Cryptosula pallasiana* distribution in Taranaki.**

***Watersipora arcuata* (Banta, 1969)**

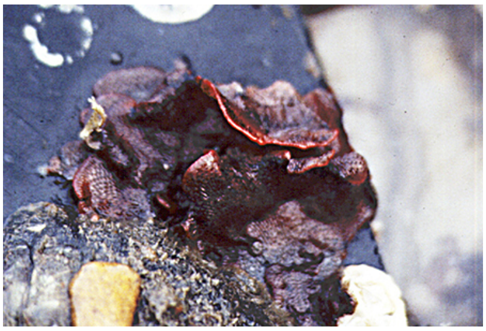

Image and information: NIMPIS (2000d)

Watersipora arcuata is a loosely encrusting bryozoan capable of forming single or multiple layer colonies. The colonies range from dark red-brown to black, with a thin bright red margin. *Watersipora arcuata* has no spines, avicularia (defensive structures) or ovicells (reproductive structures). The aperture of the zooid is black, with a semicircular distal margin and a concave proximal margin - a key distinguishing feature of this species.

Watersipora arcuata is native along the east coast of Central and North America. It has been introduced to the Japan and China Seas, Australia and New Zealand. *Watersipora arcuata* is an important marine fouling species found in ports and harbours. It is mostly found on vessel hulls, pilings and pontoons, but also attaches to rocks and seaweeds, typically around the low water mark. *Watersipora arcuata* is an abundant fouling organism and is resistant to a range of antifouling paints. It can, therefore, spread rapidly on vessel hulls and provide an area for other species to settle upon. This, in turn, has an impact on vessel maintenance and speed, as many more organisms are able to foul the hull.

In New Zealand, *W. arcuata* was first recorded from Waitemata Harbour in the mid-1950s, where it subsequently spread to become a dominant component of intertidal fouling assemblages. It has also been recorded from Whangarei, Tauranga and the Bay of Islands (Gordon and Matawari 1992). In the Port of Taranaki *W. arcuata* occurred in pile scrape samples taken from Blyde Wharf, Moturoa Wharf and the Newton King Terminal (Fig. 22).

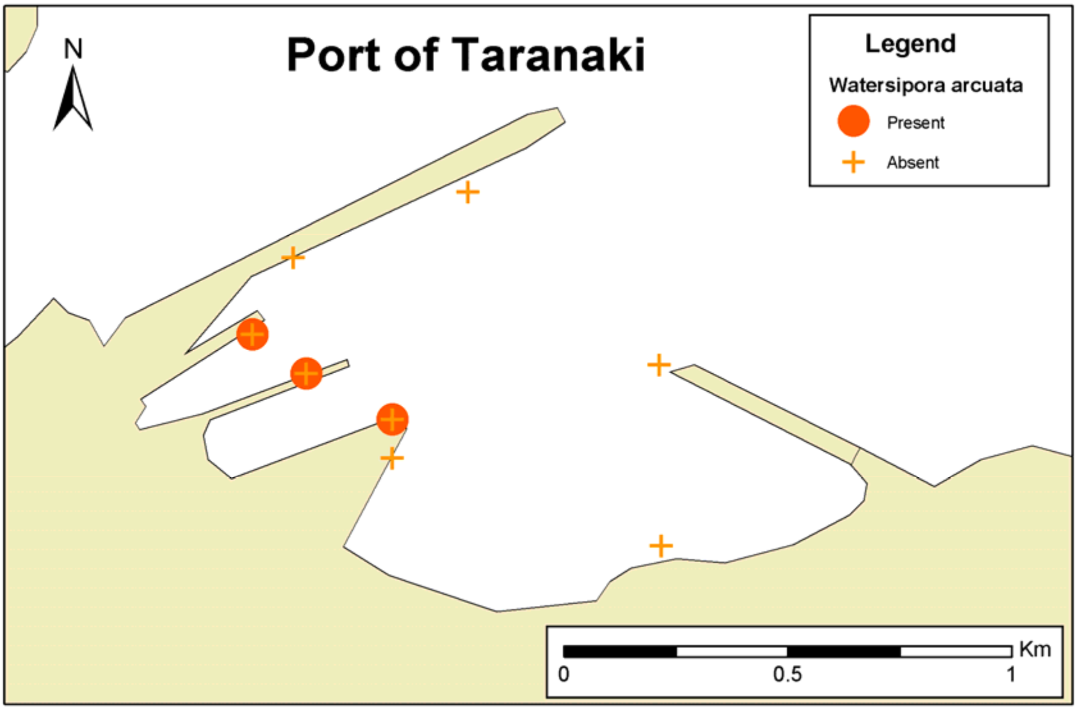

Figure 22: ***Watersipora arcuata* distribution in Taranaki.**

Watersipora subtorquata **(d'Orbigny, 1842)**

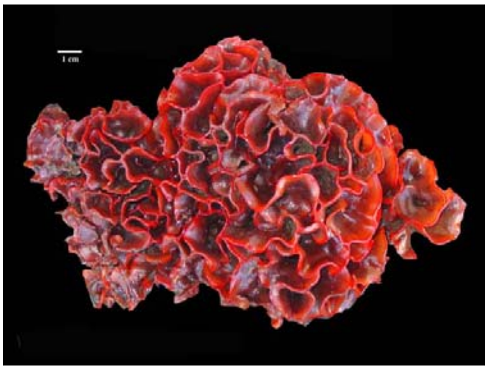

Image: California Academy of Sciences.
Information: Gordon and Matawari (1992)

Watersipora subtorquata is a loosely encrusting bryozoan capable of forming single or multiple layer colonies. The colonies are usually dark red-brown, with a black centre and a thin, bright red margin. The operculum is dark, with a darker mushroom shaped area centrally. *Watersipora subtorquata* has no spines, avicularia or ovicells. The native range of the species is unknown, but is thought to include the wider Caribbean and South Atlantic. The type specimen was described from Rio de Janeiro, Brazil (Gordon and Matawari 1992). It also occurs in the north-west Pacific, Torres Strait and north-eastern and southern Australia.

W. subtorquata is an important marine fouling species in ports and harbours. It occurs on vessel hulls, pilings and pontoons. This species can also be found attached to rocks and seaweeds. They form substantial colonies on these surfaces, typically around the low water mark. *Watersipora subtorquata* is also an abundant fouling organism and is resistant to a range of antifouling toxins. It can therefore spread rapidly on vessel hulls and provide an area for other species to settle onto which can adversely impact on vessel maintenance and speed, as fouling assemblages can build up on the hull.

W. subtorquata has been present in New Zealand since at least 1982 and is now present in most ports from Opua to Bluff (Gordon and Matawari 1992). In the Port of Taranaki it occurred in benthic sled samples taken from near Breakwater 1 and in pile scrapes taken from Blyde Wharf, Moturoa Wharf, and Newton King Terminal (Fig. 23).

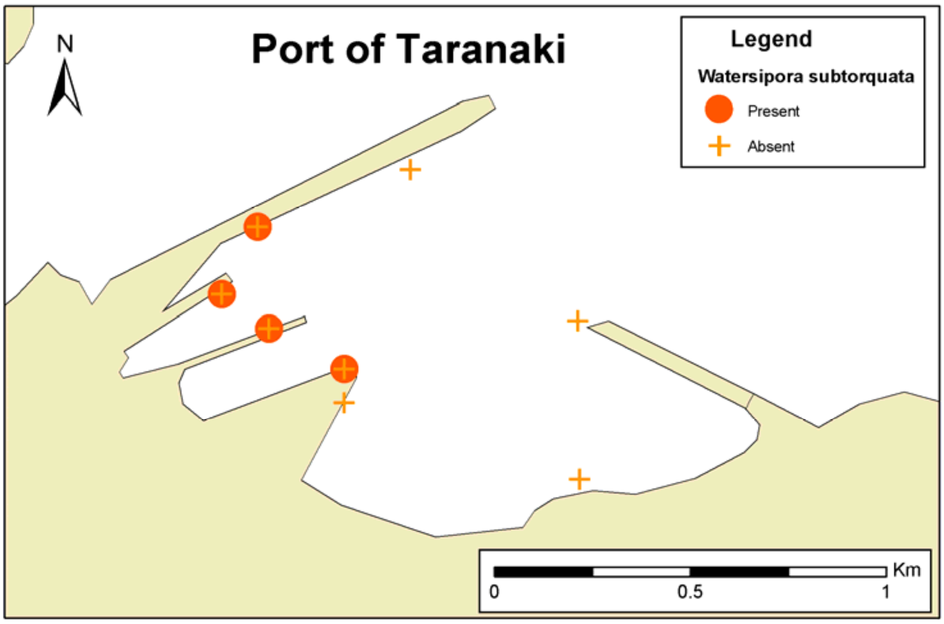

Figure 23: ***Watersipora subtorquata*** **distribution in Taranaki.**

***Eudendrium capillare* (Alder, 1856)**

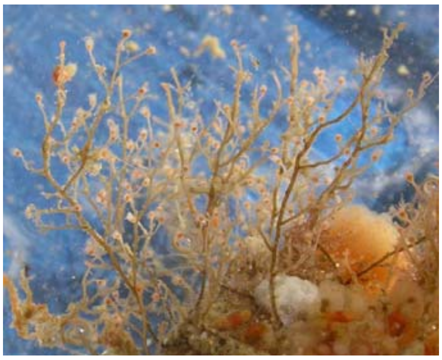

Image: http://www.unige.ch

Eudendrium capillare is an athecate hydroid in the family Eudendriidae. It has a cosmopolitan distribution and is known from the Western Atlantic, Eastern Atlantic, Indian Ocean, Western Pacific, Eastern Pacific, Bermudas, and Brazil. It is also common in southern Australia (J. Watson, pers. comm.). During the baseline port surveys, it was recorded from Tauranga, Taranaki and Wellington. These are the first known records of its presence in New Zealand. In the Port of Taranaki this species occurred in pile scrapings taken from Moturoa Wharf and the Newton King Terminal (Fig. 24).

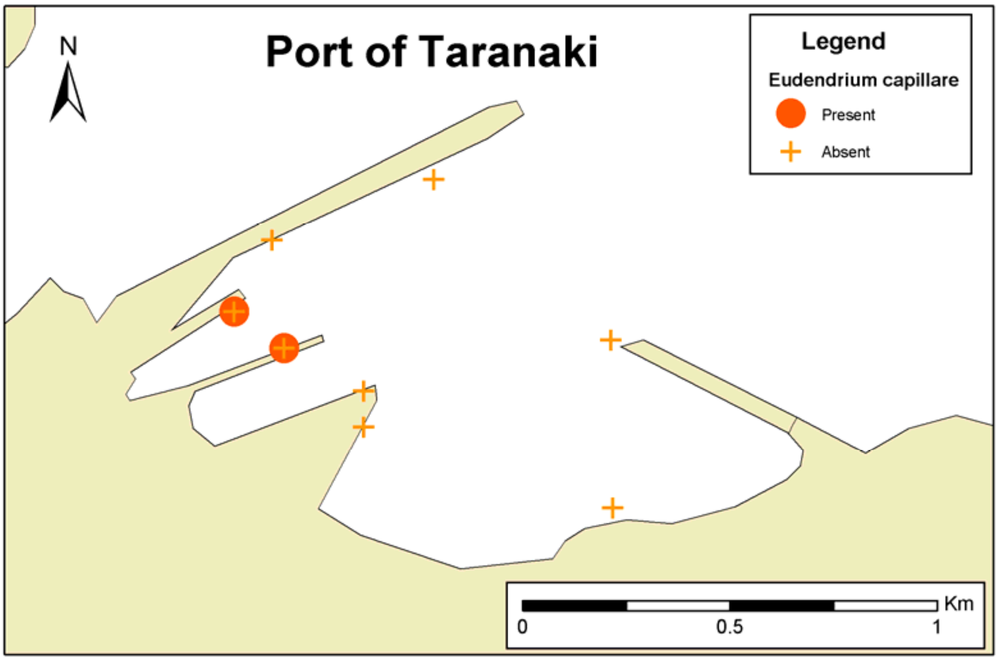

Figure 24: *Eudendrium capillare* distribution in Taranaki.

***Crassostrea gigas* (Thunberg, 1793)**

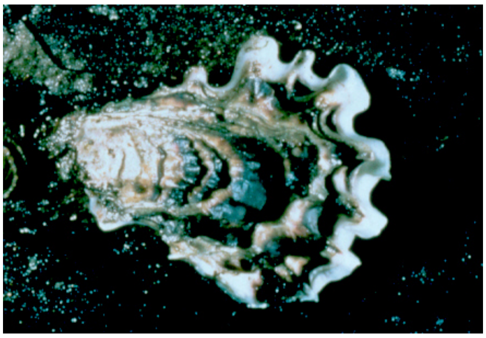

Image and information: NIMPIS (2002e)

The Pacific oyster, *Crassostrea gigas*, is an important aquaculture species throughout the world, including New Zealand. It has a white elongated shell, with an average size of ~100 mm (New Zealand intertidal). The two valves are solid, but unequal in size and shape. The left valve is slightly convex and the right valve is quite deep and cup shaped. One valve is usually entirely cemented to the substratum. The shells are sculpted with large, irregular, rounded, radial folds.

Crassostrea gigas is native to the Japan and China Seas and the northwest Pacific. It has been introduced to the west coast of both North and South America, the West African coast, the northeast Atlantic, the Mediterranean, Australia, New Zealand, Polynesia and Micronesia. It is cryptogenic in Alaska. *Crassostrea gigas* will attach to almost any hard surface in sheltered waters. Whilst they usually attach to rocks, the oysters can also be found in muddy or sandy areas. Oysters will also settle on adult oysters of the same or other species. They prefer sheltered waters in estuaries where they are found in the intertidal and shallow subtidal zones, to a depth of about 3 m. *Crassostrea gigas* settles in dense aggregations in the intertidal zone, resulting in the limitation of food and space available for other intertidal species.

C. gigas has been present in New Zealand since the early 1960s. Little is known about the impacts of this species in New Zealand, but it is now a dominant structural component of fouling assemblages and intertidal shorelines in northern harbours of New Zealand and the upper South Island. *C. gigas* is now the basis of New Zealand's oyster aquaculture industry, having displaced the native rock oyster, *Saccostrea glomerata*. *C. gigas* was recorded from Opua marina, Whangarei Harbour, Gulf Harbour marina, Auckland, Taranaki, Nelson and Dunedin during the port baseline surveys (Table 10). In the Port of Taranaki *C. gigas* occurred in pile scrape samples taken from Moturoa Wharf and the Newton King Terminal (Fig. 25).

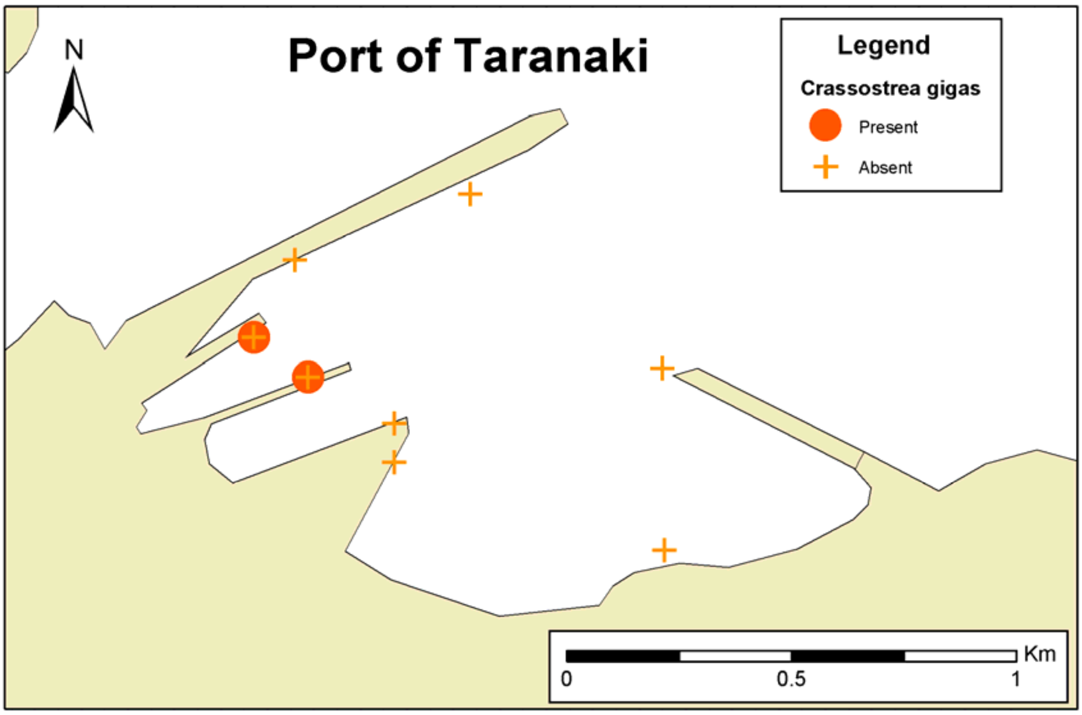

Figure 25: ***Crassostrea gigas* distribution in Taranaki**

***Theora lubrica* (Gould, 1861)**

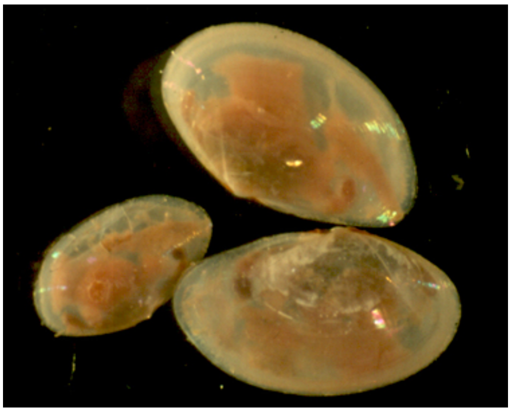

Image and information: NIMPIS (2002f)

Theora lubrica is a small bivalve with an almost transparent shell. The shell is very thin, elongated and has fine concentric ridges. *T. lubrica* grows to about 15 mm in size, and is characterised by a fine elongate rib extending obliquely across the internal surface of the shell. *Theora lubrica* is native to the Japanese and China Seas. It has been introduced to the west coast of the USA, Australia and New Zealand.

Theora lubrica typically lives in muddy sediments from the low tide mark to 50 m, however it has been found at 100 m. In many localities, *T. lubrica* is an indicator species for eutrophic and anoxic areas. *T. lubrica* has been present in New Zealand since at least 1971. It occurs in estuaries of the north-east coast of the North Island, including the Bay of Islands, Whangarei Harbour, Waitemata Harbour, Wellington and Pelorus Sound. During the port baseline surveys, it was recovered from Opua, Whangarei port and marina, Gulf Harbour marina, Auckland, Gisborne, Napier, Taranaki, Wellington, Nelson, and Lyttelton. In the Port of Taranaki this species occurred in benthic grab samples taken near Blyde Wharf and in benthic sled samples taken from near Breakwaters 1 & 2, Moturoa Wharf, and the Newton King Terminal (Fig. 26).

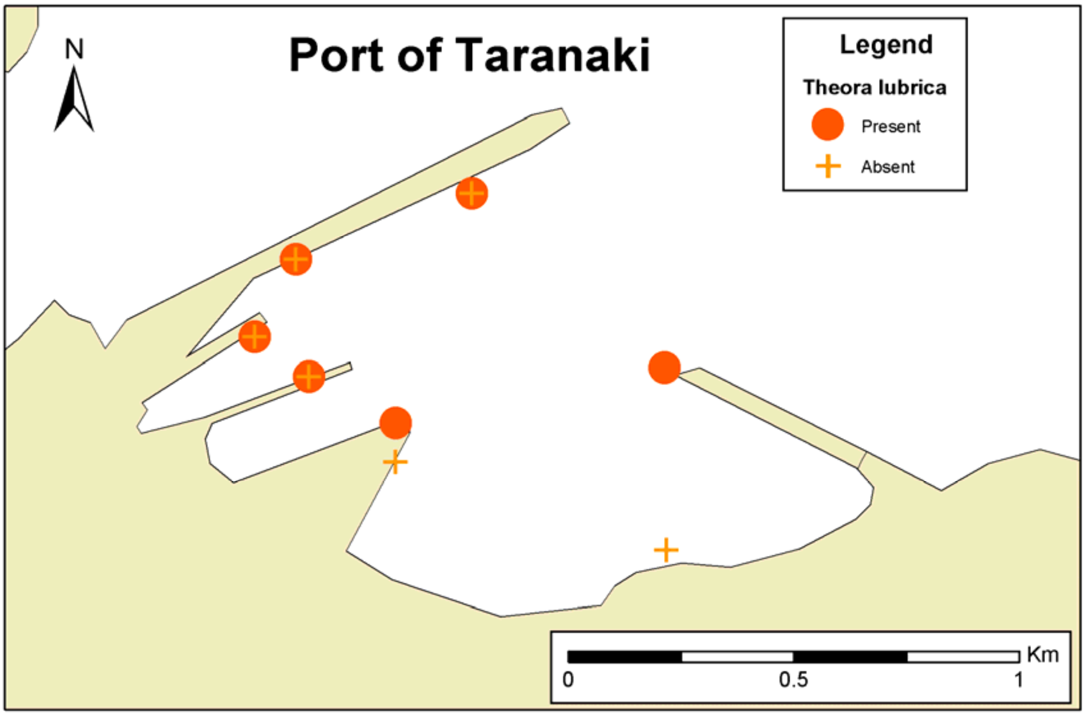

Figure 26: ***Theora lubrica* distribution in Taranaki**

***Griffithsia crassiuscula* (C.Agardh 1824)**

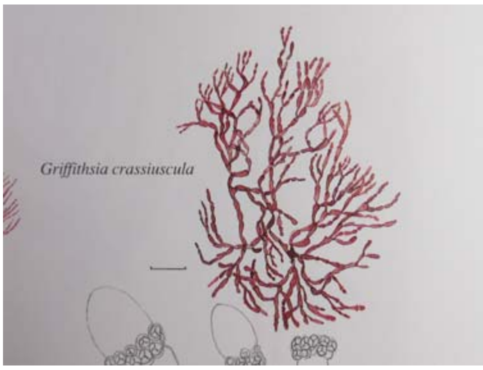

Image and information: Adams (1994)

Griffithsia crassiuscula is a small filamentous red alga. Plants are up to 10 cm high, dichotomously branched, with holdfasts of copious rhizoids. This species is bright rosy red to pink and of a turgid texture. Its native origin is thought to be southern Australia. *Griffithsia crassiuscula* is found subtidally and is mainly epiphytic on other algae and shells, but can also be found on rocks and pebbles. It has no known impacts. During the port baseline surveys, *G. crassicuscula* was recorded from Taranaki, Wellington, Picton, Lyttelton, Timaru and Bluff. In the Port of Taranaki this species occurred in pile scrape samples taken from Breakwater 1 and the Newton King Terminal (Fig. 27).

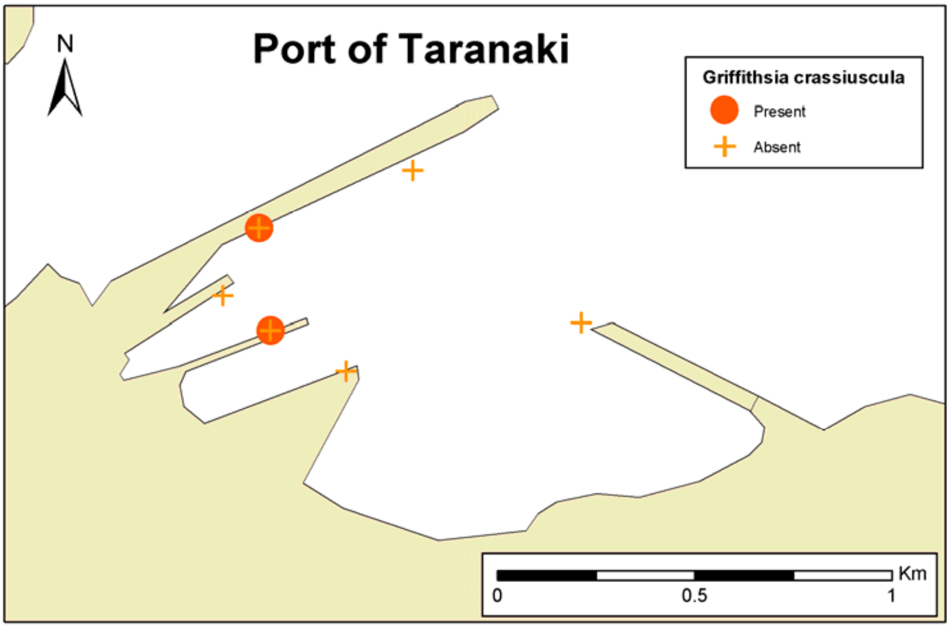

Figure 27: ***Griffithsia crassiuscula* distribution in Taranaki**

***Polysiphonia sertularioides* (Grateloup J.Agardh)**

Image: http://www.com.univ-mrs.fr/
Information: Adams (1994)

Polysiphonia sertularioides is a small filamentous red alga. Plants are delicate and tufted and grow up to 4 cm high. They have very slender stems and a holdfast of creeping stems. They are of a reddish brown colour and soft and flaccid texture. The type specimen for *P. sertularioides* was described from France, but although it is found throughout the Mediterranean its native range is largely unknown. *P. sertularoides* has been recorded from the Caribbean, the Indian Ocean, French Polynesia and southern Australia (Guiry et al. 2005). It usually occurs on pebbles and twigs, and is epiphytic on various other seaweeds. It can be found in sheltered bays and tidal pools. The impacts of *P. sertularioides* are unknown. During the baseline port surveys, *P. sertularoides* was recorded from the port of Taranaki and Opua marina. In the Port of Taranaki it was found during qualitative visual searches of the reclamation area (Fig. 28).

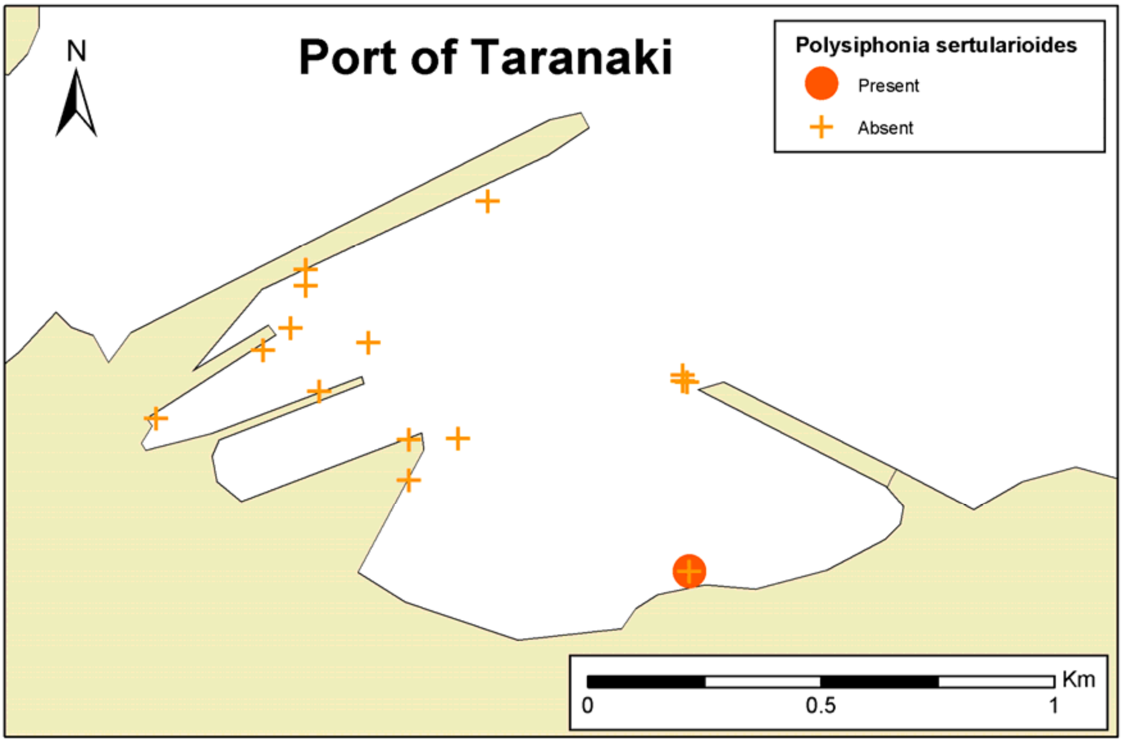

Figure 28: ***Polysiphonia sertularioides*** **distribution in Taranaki.**

Halisarca dujardini **(Johnston, 1842)**

No image available.

Halisarca dujardini is an encrusting cold-water sponge. It is a cosmopolitan species with a wide distribution that includes the Arctic and Antarctic, the Subantarctic Islands, Australia, New Zealand, Chile, England, the Atlantic and the Mediterranean. It occurs from the shallow subtidal to a depth of 450 m. It has no known impacts. During the port baseline surveys *H. dujardini* was recorded from Auckland, Taranaki, Picton, Dunedin and Bluff. In the Port of Taranaki it occurred in pile scrape samples taken from the Newton King Terminal (Fig. 29).

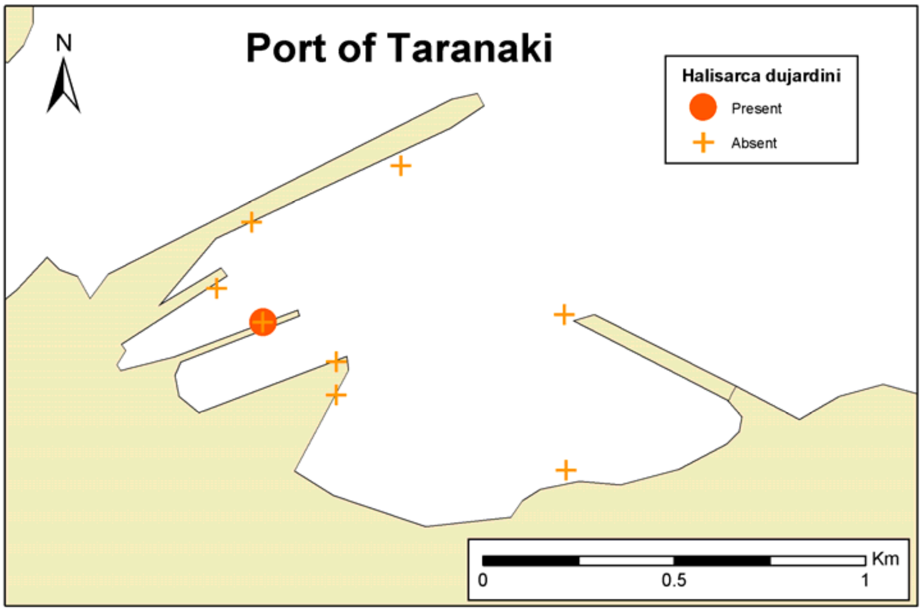

Figure 29: ***Halisarca dujardini* distribution in Taranaki**

***Cnemidocarpa* sp. (Kott, 1952)**
No image available

This ascidian is in the family Styelidae. It appears to be a new species that is closely related to *C. nisiotus*, but varies from this species in gonad structure, the number of branchial tentacles and shape of rectal opening. It is not similar to any species described in Australia, Japan or South Africa. Its native distribution, habitat preferences and impacts are unknown. Specimens matching this description were also recovered from Gulf Harbour marina, Auckland, Tauranga, Gisborne, Taranaki, Picton, Lyttelton and Timaru during the port baseline surveys. In the Port of Taranaki this species occurred in pile scrape samples taken from Moturoa wharf and the Newton King Terminal (Fig. 30).

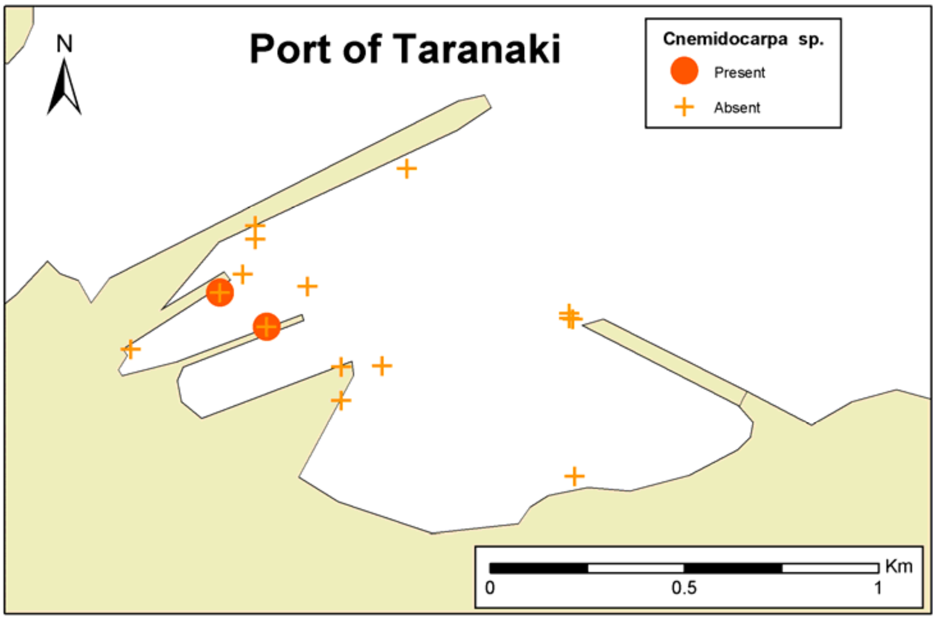

Figure 30: ***Cnemidocarpa* sp. distribution in Taranaki**.

SPECIES INDETERMINATA

Fifty-five organisms from the Port of Taranaki were classified as species indeterminata. If each of these organisms is considered a species of unresolved identity, then together they represent 20.4 % of all species collected from this survey (Fig 14). Species indeterminata from the Port of Taranaki included 24 annelida, two cnidaria, four crustacea, two mollusca, 22 phycophyta, and one platyhelminth species (Table 9).

NOTIFIABLE AND UNWANTED SPECIES

Of the 15 non-indigenous species identified from Taranaki Port, none is currently listed as an unwanted species on the New Zealand register of unwanted organisms (Table 4a). However, the non-indigenous bivalve, *Crassostrea gigas*, and the cryptogenic toxic dinoflagellate, *Gymnodinium catenatum*, were encountered in the Port and are included on the ABWMAC list of unwanted species in Australia (Table 5b).

PREVIOUSLY UNDESCRIBED SPECIES IN NEW ZEALAND

Two NIS and eight cryptogenic species sampled in the Port of Taranaki were recorded for the first time in New Zealand waters. The two NIS recorded for the first times were the hydroid *Eudendrium capillare* and the ascidian *Cnemidocarpa* sp. (Table 8).

A small portunid crab, identified as *Ovalipes elongatus* (Stephenson & Rees, 1968), occurred in a benthic sled sample taken from near Breakwater 2. Prior to this record, *O. elongatus* was known only from the Tasman Sea (C. McLay, pers. comm.). Only limited information is available on its ecology. Subsequent records of this species were obtained during target surveillance surveys of Whangarei Harbour (November 2002) and Tauranga Harbour (February 2004) undertaken for Biosecurity NZ project ZBS2001/01 (Inglis et al. in review). Given the proximity of the supposed native range of this species and the broad distribution within New Zealand of the recent specimens it is possible that the presence of *O. elongatus* in the Port of Taranaki is the result of natural dispersal from populations in the Tasman Sea, rather than a human-assisted introduction (Francis et al. 1999). For this reason, we included *O. elongatus* in the Cryptogenic 1 category.

Seven other cryptogenic species (Category 2) did not match existing descriptions from New Zealand or overseas and may be new to science. These included a pycnogonid (*Achelia* sp. nov. A), an amphipod (*Leucothoe* sp. 1), and five species of sponge (*Esperiopsis* n. sp. 1, *Halichondria* n. sp. 4, *Halichondria* n. sp. 1, *Paraesperella* n. sp. 1, *Phorbas* n. sp. 2).

CYST-FORMING SPECIES

Cysts of the cryptogenic dinoflagellate, *Gymnodinium catenatum*, were collected from the Port of Taranaki (Table 7). Toxins produced by the motile form of *G. catenatum* can cause Paralytic Shellfish Poisoning (PSP) and are a significant public health problem. Blooms of *G. catenatum* can cause problems for aquaculture and recreational harvesting of shellfish.

Cysts of four other species of dinoflagellate were collected during this survey. They are indicated as members of the Pyrrophycophyta in Table 6. None of these species is known to produce toxins or to cause nuisance blooms.

POSSIBLE VECTORS FOR THE INTRODUCTION OF NON-INDIGENOUS SPECIES TO THE PORT

The non-indigenous species located in the Port are thought to have arrived in New Zealand via international shipping. Table 8 indicates the possible vectors for the introduction of each NIS into the Port. Likely vectors of introduction are largely derived from Cranfield et al (1998) and indicate that approximately 7 % (one of the 15 NIS) probably arrived via ballast water, 73 % probably were introduced to New Zealand waters via hull fouling, and 20 % could have arrived via either of these mechanisms.

COMPARISON WITH OTHER PORTS

Sixteen locations (13 ports and three marinas) were surveyed during the summers of 2001/2002 and 2002/2003 (Fig. 1). The total number of species identified in these surveys varied from 336 in the Port of Wellington to 56 in Whangarei Town Basin Marina (Fig. 31a). The number of species recorded in each location reflects sampling effort (Table 3c) and local patterns of marine biodiversity within the ports and marinas. Sampling effort alone (expressed as the total number of registered samples in each port), accounted for significant proportions of variation in the numbers of native (linear regression; $F_{1,14}$ = 33.14, P< 0.001, R^2 = 0.703), Cryptogenic 1 ($F_{1,14}$ = 5.94, P = 0.029, R^2 = 0.298) and Cryptogenic 2 ($F_{1,14}$ = 7.37, P = 0.017, R^2 = 0.345) species recorded in the different locations. However differing sampling effort between locations did not explain differences in the numbers of NIS found there ($F_{1,14}$ = 0.77, P = 0.394, R^2 = 0.052). When sample effort was adjusted for, the Port of Taranaki had about average numbers of native, NIS, and Cryptogenic 1 species, but fewer Cryptogenic 2 species than other ports (Fig 32a, b, c, d). Largest numbers of NIS were reported from the ports of Lyttelton and Whangarei, but significantly more Cryptogenic 1 species were recorded in Whangarei port than in other surveyed locations (Fig 32c, Studentised residual = 3.87).

Native organisms represented over 60 % of the species diversity sampled in each surveyed location, with a minimum contribution of 61.0 % in the Port of Lyttelton and a maximum of 68.5 % in Picton (Fig. 31b). Species indeterminata organisms represented between 10.6 % and 22.0 % of the sampled diversity in each location. Non-indigenous and category 1 and 2 cryptogenic species were present in each port and marina, although their relative contributions differed between locations (Fig. 31b). Non-indigenous species represented between 3.6 % of all identified species in Bluff and 16.1 % in Whangarei Marina. The 15 NIS in the Port of Taranaki comprised 5.6 % of the total sampled diversity in the Port (Fig. 31b), which ranked it 11th in percentage composition of NIS from the sixteen locations surveyed.

Assessment of the risk of new introductions to the port

Many NIS introduced to New Zealand ports, through hull fouling, ships' sea chests, or ballast water discharge, do not survive to establish self-sustaining local populations. Those that do, often come from coastlines that have similar marine environments to New Zealand. For example, approximately 80% of the marine NIS known to be present within New Zealand are native to temperate coastlines of Europe, the northwest Pacific, and southern Australia (Cranfield et al. 1998).

Commercial shipping arriving in the Port of Taranaki from overseas comes predominantly from temperate regions of Australia and the northwest Pacific (34% for each); environments which are broadly compatible to those in the Port of Taranaki. In addition, relative to other ports in New Zealand, the Port of Taranaki has a high trade volume of bulk cargoes, ranking second largest with regard to export volume (freight tonnes handled) (Statistics NZ 2004). This is reflected in the relatively high volume of ballast that is discharged in the Port of Taranaki. According to Inglis (2001), the Port of Taranaki received the highest volume of reported ballast water discharged in 1999 with a total volume of 1,150,570 m^3 of ballast water discharged into the Port. This discharged ballast water was derived from a variety of sources, including 507,895 m^3 from Australia, 224,601 m^3 from Japan, 210,589 m^3 from Hong Kong, with 119,926 m^3 from unspecified source countires. Shipping from these regions presents an on-going risk of introduction of new NIS to the Port of Taranaki.

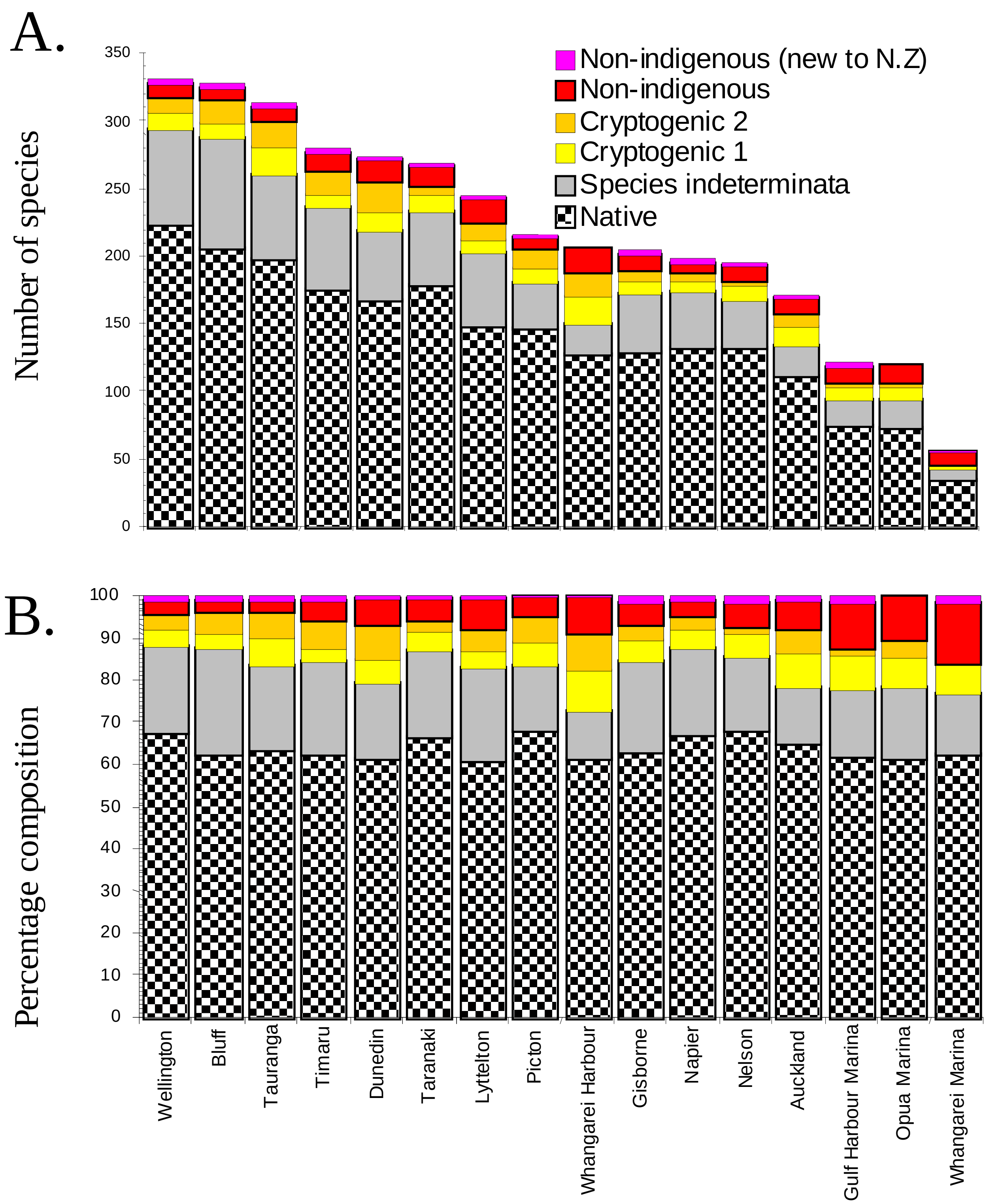

Figure 31: **Differences in (a) the number of species, and (b) the relative proportions of non-indigenous, cryptogenic, species indeterminata and native categories among the sixteen locations sampled over the summers of 2001 – 2002, and 2002-2003. Locations are presented in order of decreasing species diversity sampled.**

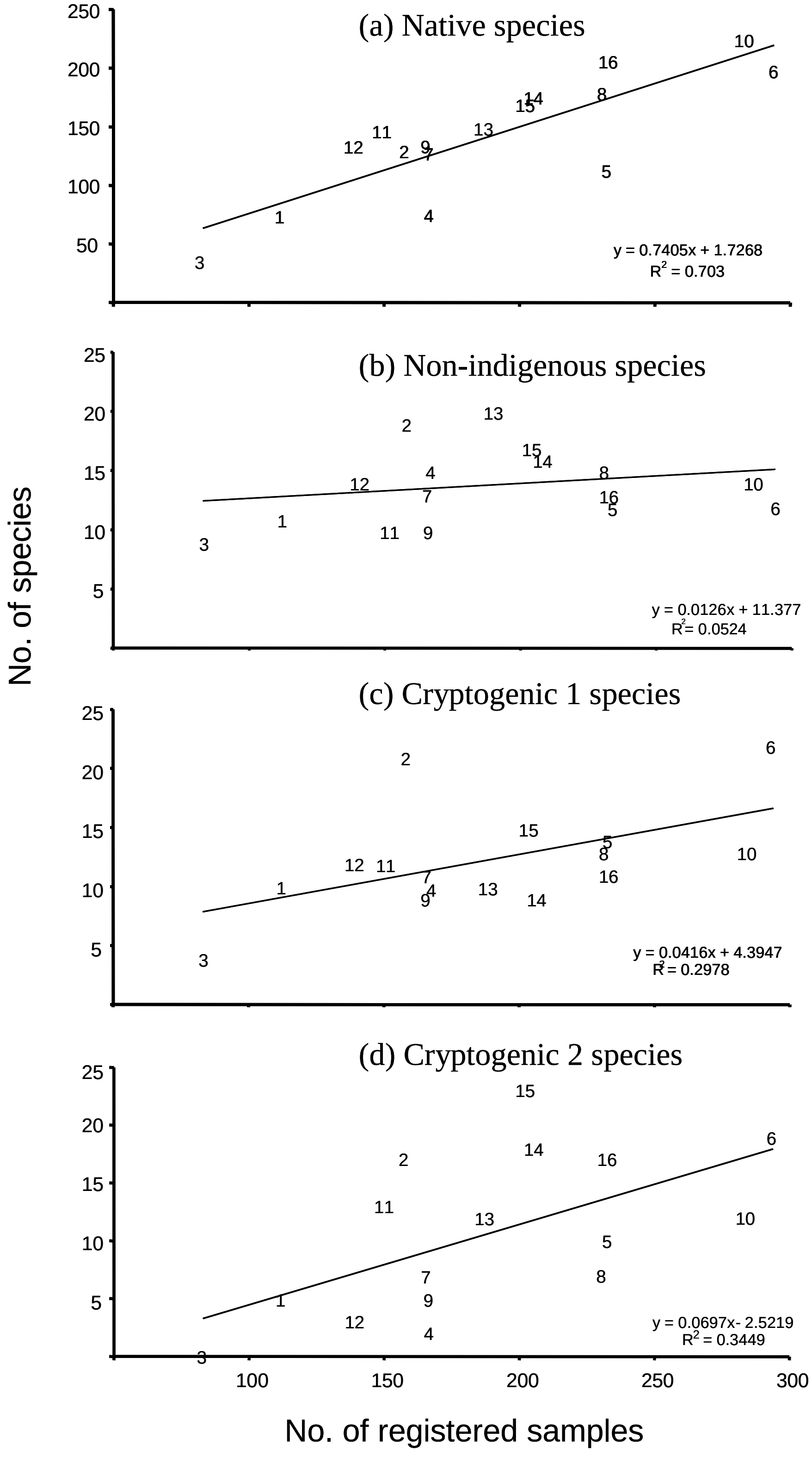

Figure 32: Linear regression equations relating numbers of species detected to sample effort at the 16 locations surveyed nation-wide. Location codes are as follows; 1 = Opua, 2 = Whangarei port, 3 = Whangarei marina, 4 = Gulf Harbour marina, 5 = Auckland port, 6 = Tauranga port, 7 = Gisborne port, 8 = Taranaki port, 9 = Napier Port, 10 = Wellington port, 11 = Picton port, 12 = Nelson port, 13 = Lyttelton port, 14 = Timaru port, 15 = Dunedin port, 16 = Bluff port

Assessment of translocation risk for introduced species found in the port

The Port of Taranaki is connected directly to the ports of Wellington and Nelson by regular coastal shipping and is indirectly connected to most other domestic ports throughout mainland New Zealand (Dodgshun et al 2004). Although many of the non-indigenous and cryptogenic species found in the Port of Taranaki survey have wide distributions throughout the ports and marinas of New Zealand, several species are restricted in their distributions and are not yet present in many New Zealand ports. These include the capitellid polychaete, *Barantolla lepte* (known from Timaru, and now Taranaki and Napier), the cnidarian, *Eudendrium capillare* (known from Taranaki, Tauranga and Wellington) and the cryptogenic crab, *Ovalipes elongatus* (known from Taranaki, Whangarei and Tauranga). The patterns of domestic shipping from the Port of Taranaki make the Ports of Wellington and Nelson the most likely places for these three species to be spread within New Zealand based on the frequency of vessel movements between these locations.

Management of existing non-indigenous species in the port

For most marine NIS eradication by physical removal or chemical treatment is not yet a cost-effective option. Many of the species recorded in the Port of Taranaki are widespread and local population controls are unlikely to be effective. Further, their impacts are unknown or unquantified. Management should be directed toward preventing the spread of species established in the Port of Taranki to locations where they do not presently occur. Such management will require better understanding of the frequency of movements by vessels of different types from the Port of Taranaki to other domestic and international locations and improved procedures for hull maintenance and domestic ballast transfer by vessels leaving this port.

Prevention of new introductions

Interception of unwanted species transported by shipping is best achieved offshore, through control and treatment of ships destined for the Port of Taranaki from high-risk locations elsewhere in New Zealand or overseas. Under the Biosecurity Act 1993, the New Zealand Government has developed an Import Health Standard for ballast water that requires large ships to exchange foreign coastal ballast water with oceanic water prior to entering New Zealand, unless exempted on safety grounds. This procedure ("ballast exchange") does not remove all risk, but does reduce the abundance and diversity of coastal species that may be discharged with ballast. Ballast exchange requirements do not currently apply to ballast water that is uptaken domestically. Globally, shipping nations are moving toward implementing the International Convention for the Control and Management of Ships Ballast Water & Sediments that was recently adopted by the International Maritime Organisation (IMO). By 2016 all merchant vessels will be required to meet discharge standards for ballast water that are stipulated within the agreement.

Options are currently lacking, however, for effective in-situ treatment of biofouling and sea-chests. Biosecurity New Zealand has recently embarked on a national survey of hull fouling on vessels entering New Zealand from overseas. The study will characterise risks from this pathway (including high risk source regions and vessel types) and identify predictors of risk that may be used to manage problem vessels. Shipping companies and vessel owners can reduce the risk of transporting NIS in hull fouling or sea chests through regular maintenance and antifouling of their vessels.

Overseas studies suggest that changes in trade routes can herald an influx of new NIS from regions that have not traditionally had major shipping links with the country or port (Carlton

1987). The growing number of baseline port surveys internationally and an associated increase in published literature on marine NIS means that information is becoming available that will allow more robust risk assessments to be carried out for new shipping routes. We recommend that port companies consider undertaking such assessments for their ports when new import or export markets are forecast to develop. The assessment would allow potential problem species to be identified and appropriate management and monitoring requirements to be put in place.

Conclusions and recommendations

The national biological baseline surveys have significantly increased our understanding of the identity, prevalence and distribution of introduced species in New Zealand's shipping ports. They represent a first step towards a comprehensive assessment of the risks posed to native coastal marine ecosystems from non-indigenous marine species. Although measures are being taken by the New Zealand government to reduce the rate of new incursions, foreign species are likely to continue being introduced to New Zealand waters by shipping, especially considering the lack of management options for hull fouling introductions. There is a need for continued monitoring of marine NIS in port environments to allow for (1) early detection and control of harmful or potentially harmful non-indigenous species, (2) to provide on-going evaluation of the efficacy of management activities, and (3) to allow trading partners to be notified of species that may be potentially harmful. Baseline inventories, like this one, facilitate the second and third of these two purposes. They become outdated when new introductions occur and, therefore, should be repeated on a regular basis to ensure they remain current. Hewitt and Martin (2001) recommend an interval of three to five years between repeat surveys.

The predominance of hull fouling as a likely introduction vector for NIS encountered in the Port of Taranaki (probably responsible for 73% of the NIS introductions) is consistent with previous findings from a range of overseas locations. For instance, Hewitt et al (1999) attributed the introduction of 77 % of the 99 NIS encountered in Port Phillip Bay (Australia) to hull fouling, and only 20 % to ballast water. Similarly, 61 % of the 348 marine and brackish water NIS established in the Hawaiian Islands are thought to have arrived on ships' hulls, but only 5 % in ballast water (Eldredge and Carlton 2002). However, ballast water is thought to be responsible for the introduction of 30 % of the 212 marine NIS established in San Fransisco Bay (USA), compared to 34 % for hull fouling (Cohen and Carlton 1995). The high percentages of NIS thought to have been introduced by hull fouling in Australasia may reflect the fact that hull fouling has a far longer history (~200 years) as an introduction vector than ballast water (~40 years). However, the fact that some of New Zealand and Australia's most recent marine NIS introductions (e.g. *Undaria pinnatifida*, *Codium fragile sp. tomentosoides*) have been facilitated by hull fouling suggests that it has remained an important transport mechanism (Cranfield et al 1998; Hewitt et al 1999).

Non-indigenous marine species can have a range of adverse impacts through interactions with native organisms. For instance, NIS can cause ecological impacts through competition, predator-prey interactions, hybridisation, parasitism or toxicity and can modify the physical environment through altering habitat structure (Ruiz et al 1999; Ricciardi 2001). Assessing the impact of a NIS in a given location ideally requires information on a range of factors, including the mechanism of their impact and their local abundance and distribution (Parker et al 1999). To predict or quantify NIS impacts over larger areas or longer time scales requires additional information on the species' seasonality, population size and mechanisms of dispersal (Mack et al 2000). Further studies may be warranted to establish the abundance and potential impacts of the non-indigenous species encountered in this port to determine the threat they represent to New Zealand's native ecosystems.

Acknowledgements

We thank the Port of Taranaki for access to its facilities and assistance during the survey, and Ray Barlow for port information. We also thank the following people for field assistance with the diving, boat, trapping and sorting of organisms during this survey program: Aleki Taumoepeau, Anna Bradley, Anthony Dugdale, Corina Kemp, Crispin Middleton, Evan Skipworth, Gavin Newmarch, Geoff Holland, Graeme MacKay, Ian Maze, Jeff Forman, John Hunt, Kate Neill, Marty Flanagan, Matt Smith, Mike Page, Neil Blair, Niki Davey, Peter Marriott, Phil James, Rob Stewart, Rob Tasker, Scott Stephens, Sean Handley, Stephen Brown, Todd Williston, Tony Dugdale and Walter Hillman. Many thanks to Don Morrisey for reviewing drafts of this report.

We also extend our thanks to the numerous taxonomists involved in this programme, including: Bruce Marshall, Clive Roberts, Colin McLay, David Staples, Dennis Gordon, Don McKnight, Fukuuoka Kouki, Geoff Read, Hoe Chang, Jan Watson, Lesley Newman, Michelle Kelly, Mike Page, Niel Bruce, Niki Davey, Patricia Kott, Sean Handley and Wendy Nelson.

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Tables

Table 1: Berthage facilities in the Port of Taranaki.

Berth	Berth No.	Purpose	Construction	Length of Berth (m)	Max. Draft (m)
Main Breakwater	Inner #1	Offloading and provisioning by fishing vessels	Solid concrete	78	6
	Inner # 2	Multipurpose, coastal bulk traders, offshore support vessels	Solid concrete	150	6
Moturoa Wharf	1	Dry bulk cargoes	Concrete deck/concrete piles	99	6
	2	Dry bulk cargoes	Concrete deck/concrete piles	196	9.8
	3	Dry bulk cargoes	Concrete deck/concrete piles	75	5.5
Newton King Tanker Terminal		Petrochemical products and bulk liquids	Concrete deck/steel piles	211	10
Blyde Terminal	1	Containers, general/refrigerated cargoes	Concrete deck/steel piles + steel sheet pile wall	225	10.6
	2	Containers, general/refrigerated cargoes	Concrete deck/steel piles + steel sheet pile wall	225	10.6
	3	Oil and gas production vessels	Concrete deck/steel piles + steel sheet pile wall	78	6.5

Table 2: Comparison of survey methods used in this study with the CRIMP protocols (Hewitt and Martin 2001), indicating modifications made to the protocols following recommendations from a workshop of New Zealand scientists. Full details of the workshop recommendations can be found in Gust et al. (2001).

	CRIMP Protocol		NIWA Method		
Taxa sampled	Survey method	Sample procedure	Survey method	Sample procedure	Notes
Dinoflagellate cysts	Small hand core	Cores taken by divers from locations where sediment deposition occurs	TFO Gravity core ("javelin" core)	Cores taken from locations where sediment deposition occurs	Use of the javelin core eliminated the need to expose divers to unnecessary hazards (poor visibility, snags, boat movements, repetitive dives > 10 m). It is a method recommended by the WESTPAC/IOC Harmful Algal Bloom project for dinoflagellate cyst collection (Matsuoka and Fukuyo 2000)
Benthic infauna	Large core	3 cores close to (0 m) and 3 cores away (50 m) from each berth	Shipek benthic grab	3 cores within 10 m of each sampled berth and at sites in the port basin	Use of the benthic grab eliminated need to expose divers to unnecessary hazards (poor visibility, snags, boat movements, repetitive dives > 10 m).
Dinoflagellates	20µm plankton net	Horizontal and vertical net tows	Not sampled	Not sampled	Plankton assemblages spatially and temporally variable, time-consuming and difficult to identify to species. Workshop recommended using resources to sample other taxa more comprehensively
Zooplankton and/ phytoplankton	100 µm plankton net	Vertical net tow	Not sampled	Not sampled	Plankton assemblages spatially and temporally variable, time-consuming and difficult to identify to species. Workshop recommended using resources to sample other taxa more comprehensively
Crab/shrimp	Baited traps	3 traps of each kind left overnight at each site	Baited traps	4 traps (2 line x 2 traps) of each kind left overnight at each site	
Macrobiota	Qualitative visual survey	Visual searches of wharves & breakwaters for target species	Qualitative visual survey	Visual searches of wharves & breakwaters for target species	

	CRIMP Protocol		NIWA Method		
Taxa sampled	Survey method	Sample procedure	Survey method	Sample procedure	Notes
Sedentary / encrusting biota	Quadrat scraping	0.10 m^2 quadrats sampled at -0.5 m, -3.0 m and -7.0 m on 3 outer piles per berth	Quadrat scraping	0.10 m^2 quadrats sampled at -0.5 m, -1.5 m, -3.0 m and -7 m on 2 inner and 2 outer piles per berth	Workshop recommended extra quadrat in high diversity algal zone (-1.5 m) and to sample inner pilings for shade tolerant species
Sedentary / encrusting biota	Video / photo transect	Video transect of pile/rockwall facing. Still images taken of the three 0.10 m^2 quadrats	Video / photo transect	Video transect of pile/rockwall facing. Still images taken of the four 0.10 m^2 quadrats	
Mobile epifauna	Beam trawl or benthic sled	1 x 100 m or timed trawl at each site	Benthic sled	2 x 100 m (or 2 min.) tows at each site	
Fish	Poison station	Divers & snorkelers collect fish from poison stations	Opera house fish traps	4 traps (2 lines x 2 traps) left for min. 1 hr at each site	Poor capture rates anticipated from poison stations because of low visibility in NZ ports. Some poisons also an OS&H risk to personnel and may require resource consent.
Fish/mobile epifauna	Beach seine	25 m seine haul on sand or mud flat sites	Opera house fish traps / Whayman Holdsworth starfish traps	4 traps (2 lines x 2 traps) of left at each site (Whayman Holdworth starfish traps left overnight)	Few NZ ports have suitable intertidal areas to beach seine.

Table 3a: Summary of the Port of Taranaki sampling effort.

Sample method	Number of shipping berths sampled	Number of replicate samples taken
Benthic Sled Tows	6 [a]	12
Benthic Grab (Shipek)	6 [a]	21
Box traps	7 [a]	25
Diver quadrat scraping	4	66
Opera house fish traps	6 [a]	24
Starfish traps	6 [a]	24
Shrimp traps	6 [a]	24
Javelin cores	N/A	14

[a] Includes shipping berths and additional locations such as recreational yacht moorings.

Table 3b: Pile scraping sampling effort in the Port of Taranaki. Number of replicate quadrats scraped on Outer (unshaded) and Inner (shaded) pier piles at four depths. Pile materials scraped are indicated. Miscellaneous samples are opportunistic additional specimens collected from piles outside of the scraped quadrat areas.

Sample Depth (M)	Outer Piles	Inner Piles
0.5	8 concrete	8 concrete
1.5	8 concrete	8 concrete
3.5	8 concrete	8 concrete
7	7 concrete	5 concrete
Miscellaneous	Nil	6 concrete

Table 3c: Summary of sampling effort in Ports and Marinas surveyed during the austral summers of 2001-2002 (shown in bold type), and 2002-2003 (shown in plain type). The number of shipping berths sampled is indicated, along with the total numbers of samples taken (in brackets).

Survey Location	Benthic sled tows	Benthic grab	Box traps	Diver quadrat scraping	Opera house traps	Starfish traps	Shrimp traps	Javelin cores
Port of Lyttelton	5 (10)	5 (15)	6 (20)	5 (77)	5 (20)	6 (20)	6 (19)	(8)
Port of Nelson	4 (8)	1 (2) *	4 (16)	4 (55)	4 (16)	4 (16)	4 (16)	(8)
Port of Picton	3 (6)	*	3 (18)	3 (53)	3 (16)	3 (24)	3 (24)	(6)
Port of Taranaki	6 (12)	6 (21)	7 (25)	4 (66)	6 (24)	6 (24)	6 (24)	(14)
Port of Tauranga	6 (18)	6 (28)	8 (32)	6 (107)	6 (25)	7 (28)	7 (28)	(8)
Port of Timaru	6 (12)	4 (14)	5 (20)	4 (58)	5 (20)	5 (20)	5 (20)	(8)
Port of Wellington	7 (13)	6 (18)	7 (28)	6 (98)	7 (34)	7 (28)	7 (28)	(6)
Port of Auckland	6 (12)	6 (18)	6 (24)	6 (101)	6 (24)	6 (24)	5 (20)	(10)
Port of Bluff	6 (21)	7 (21)	7 (29)	5 (75)	6 (24)	7 (28)	7 (24)	(12)
Dunedin Harbour	5 (10)	5 (15)	5 (20)	5 (75)	5 (20)	5 (20)	5 (18)	(9)
Port of Gisborne	5 (10)	6 (18)	5 (20)	4 (50)	5 (20)	5 (20)	5 (20)	(8)
Gulf Harbour Marina	N/A (17)	4 (12)	4 (16)	4 (66)	4 (16)	4 (16)	4 (16)	(8)
Port of Napier	5 (10)	5 (15)	5 (18)	4 (59)	5 (20)	5 (18)	5 (18)	(8)
Opua Marina	N/A (10)	4 (12)	4 (12)	4 (46)	4 (8)	4 (8)	4 (8)	(8)
Whangarei Marina	3 (6)	2 (6)	2 (8)	4 (33)	2 (8)	2 (8)	2 (8)	(6)
Whangarei Harbour	4 (9)	4 (12)	4 (16)	4 (65)	4 (16)	4 (16)	4 (16)	(7)

* Shipek grab malfunctioned in the Ports of Nelson and Picton

Table 4: Preservatives used for the major taxonomic groups of organisms collected during the port survey. [1] indicates photographs were taken before preservation, and [2] indicates they were relaxed in magnesium chloride prior to preservation.

5 % Formalin solution	10 % Formalin solution	70 % Ethanol solution	Air dried
Phycophyta	Asteroidea	Alcyonacea [2]	Bryozoa
	Brachiopoda	Ascidiacea [1, 2]	
	Crustacea (large)	Crustacea (small)	
	Ctenophora [1]	Holothuria [1, 2]	
	Echinoidea	Mollusca (with shell)	
	Hydrozoa	Mollusca [1, 2] (without shell)	
	Nudibranchia [1]	Platyhelminthes [1]	
	Ophiuroidea	Porifera [1]	
	Polychaeta	Zoantharia [1, 2]	
	Scleractinia		
	Scyphozoa [1, 2]		
	Vertebrata [1] (pisces)		

Table 5a: Marine pest species listed on the New Zealand register of Unwanted Organisms under the Biosecurity Act 1993.

Phylum	Class/Order	Genus and Species
Annelida	Polychaeta	*Sabella spallanzanii*
Arthropoda	Decapoda	*Carcinus maenas*
Arthropoda	Decapoda	*Eriocheir sinensis*
Echinodermata	Asteroidea	*Asterias amurensis*
Mollusca	Bivalvia	*Potamocorbula amurensis*
Phycophyta	Chlorophyta	*Caulerpa taxifolia*
Phycophyta	Phaeophyceae	*Undaria pinnatifida*

Table 5b: Marine pest species listed on the Australian Ballast Water Management Advisory Council's (ABWMAC) schedule of non-indigenous pest species.

Phylum	Class/Order	Genus and Species
Annelida	Polychaeta	*Sabella spallanzanii*
Arthropoda	Decapoda	*Carcinus maenas*
Echinodermata	Asteroidea	*Asterias amurensis*
Mollusca	Bivalvia	*Corbula gibba*
Mollusca	Bivalvia	*Crassostrea gigas*
Mollusca	Bivalvia	*Musculista senhousia*
Phycophyta	Dinophyceae	*Alexandrium catenella*
Phycophyta	Dinophyceae	*Alexandrium minutum*
Phycophyta	Dinophyceae	*Alexandrium tamarense*
Phycophyta	Dinophyceae	*Gymnodinium catenatum*

Table 6: Native species recorded from the Port of Taranaki survey.

Phylum, Class	Order	Family	Genus and species
Annelida			
Polychaeta	Eunicida	Dorvilleidae	*Schistomeringos loveni*
Polychaeta	Eunicida	Eunicidae	*Eunice australis*
Polychaeta	Eunicida	Lumbrineridae	*Lumbricalus aotearoae*
Polychaeta	Eunicida	Lumbrineridae	*Lumbrineris sphaerocephala*
Polychaeta	Eunicida	Onuphidae	*Diopatra akarana*
Polychaeta	Eunicida	Onuphidae	*Onuphis aucklandensis*
Polychaeta	Phyllodocida	Glyceridae	*Glycera lamelliformis*
Polychaeta	Phyllodocida	Nephtyidae	*Aglaophamus verrilli*
Polychaeta	Phyllodocida	Nereididae	*Neanthes kerguelensis*
Polychaeta	Phyllodocida	Nereididae	*Nereis falcaria*
Polychaeta	Phyllodocida	Nereididae	*Perinereis amblyodonta*
Polychaeta	Phyllodocida	Nereididae	*Perinereis camiguinoides*
Polychaeta	Phyllodocida	Nereididae	*Perinereis pseudocamiguina*
Polychaeta	Phyllodocida	Phyllodocidae	*Eulalia microphylla*
Polychaeta	Phyllodocida	Polynoidae	*Lepidonotus jacksoni*
Polychaeta	Phyllodocida	Polynoidae	*Lepidonotus polychromus*
Polychaeta	Phyllodocida	Polynoidae	*Ophiodromus angustifrons*
Polychaeta	Phyllodocida	Sigalionidae	*Labiosthenolepis laevis*
Polychaeta	Phyllodocida	Sigalionidae	*Pelogenia antipoda*
Polychaeta	Phyllodocida	Syllidae	*Clavisyllis alternate*
Polychaeta	Phyllodocida	Syllidae	*Odontosyllis polycera*
Polychaeta	Phyllodocida	Syllidae	*Trypanosyllis gigantean*
Polychaeta	Sabellida	Sabellidae	*Megalomma suspicions*
Polychaeta	Sabellida	Sabellidae	*Pseudopotamilla laciniosa*
Polychaeta	Sabellida	Serpulidae	*Galeolaria hystrix*
Polychaeta	Sabellida	Serpulidae	*Neovermilia sphaeropomatus*
Polychaeta	Sabellida	Serpulidae	*Spirobranchus cariniferus*
Polychaeta	Scolecida	Opheliidae	*Armandia maculate*
Polychaeta	Scolecida	Orbiniidae	*Scoloplos simplex*
Polychaeta	Spionida	Spionidae	*Prionospio aucklandica*
Polychaeta	Spionida	Spionidae	*Prionospio multicristata*
Polychaeta	Terebellida	Acrocirridae	*Acrocirrus trisectus*
Polychaeta	Terebellida	Flabelligeridae	*Pherusa parmata*
Polychaeta	Terebellida	Pectinariidae	*Pectinaria australis*
Polychaeta	Terebellida	Terebellidae	*Neoleprea papilla*
Polychaeta	Terebellida	Terebellidae	*Streblosoma toddae*
Bryozoa			
Gymnolaemata	Cheilostomata	Beaniidae	*Beania plurispinosa*
Gymnolaemata	Cheilostomata	Bugulidae	*Bicellariella ciliate*

Phylum, Class	Order	Family	Genus and species
Gymnolaemata	Cheilostomata	Calloporidae	*Crassimarginatella papulifera*
Gymnolaemata	Cheilostomata	Romancheinidae	*Escharoides angela*
Gymnolaemata	Cheilostomata	Smittinidae	*Parasmittina delicatula*
Gymnolaemata	Cheilostomata	Steginoporellidae	*Steginoporella magnifica*
Chelicerata			
Pycnogonida	Pantopoda	Ammotheidae	*Achelia assimilis*
Pycnogonida	Pantopoda	Ammotheidae	*Pallenopsis oblique*
Cnidaria			
Hydrozoa	Hydroida	Haleciidae	*Halecium beanie*
Crustacea			
Cirripedia	Thoracica	Balanidae	*Austrominius modestus*
Cirripedia	Thoracica	Balanidae	*Notobalanus vestitus*
Cirripedia	Thoracica	Balanidae	*Notomegabalanus decorus*
Cirripedia	Thoracica	Chthamalidae	*Chaemosipho columna*
Cirripedia	Thoracica	Pachylasmidae	*Epopella plicata*
Malacostraca	Amphipoda	Aoridae	*Haplocheira barbimana*
Malacostraca	Amphipoda	Dexaminidae	*Paradexamine pacifica*
Malacostraca	Amphipoda	Leucothoidae	*Leucothoe trailli*
Malacostraca	Amphipoda	Phoxocephalidae	*Torridoharpinia hurleyi*
Malacostraca	Anomura	Paguidae	*Pagurus traverse*
Malacostraca	Anomura	Paguridae	*Pagurus novizealandiae*
Malacostraca	Anomura	Porcellanidae	*Petrolisthes novaezelandiae*
Malacostraca	Brachyura	Cancridae	*Cancer novaezelandiae*
Malacostraca	Brachyura	Grapsidae	*Leptograpsus variegates*
Malacostraca	Brachyura	Hymenosomatidae	*Halicarcinus cookie*
Malacostraca	Brachyura	Hymenosomatidae	*Halicarcinus varius*
Malacostraca	Brachyura	Hymenosomatidae	*Hymenosoma depressum*
Malacostraca	Brachyura	Hymenosomatidae	*Neohymenicus pubescens*
Malacostraca	Brachyura	Majidae	*Notomithrax minor*
Malacostraca	Brachyura	Ocypodidae	*Macrophthalmus hirtipes*
Malacostraca	Brachyura	Pinnotheridae	*Pinnotheres atrinocola*
Malacostraca	Brachyura	Pinnotheridae	*Pinnotheres novaezelandiae*
Malacostraca	Brachyura	Portunidae	*Ovalipes catharus*
Malacostraca	Caridea	Crangonidae	*Pontophilus australis*
Malacostraca	Caridea	Palemonidae	*Palaemon affinis*
Malacostraca	Isopoda	Holognathiidae	*Cleantis tubicola*
Echinodermata			
Asteroidea	Forcipulata	Asteriidae	*Allostichaster polyplax*
Asteroidea	Forcipulata	Asteriidae	*Stichaster australis*

Phylum, Class	Order	Family	Genus and species
Asteroidea	Valvatida	Asterinidae	*Patiriella regularis*
Echinoidea	Spatangoida	Loveniidae	*Echinocardium cordatum*
Holothuroidea	Aspidochirotida	Stichopodidae	*Stichopus mollis*
Ophiuroidea	Ophiurida	Ophiactidae	*Ophiactis resiliens*
Mollusca			
Bivalvia	Arcoida	Arcidae	*Barbatia novaezelandiae*
Bivalvia	Myoida	Hiatellidae	*Hiatella arctica*
Bivalvia	Mytiloida	Mytilidae	*Modiolarca impacta*
Bivalvia	Mytiloida	Mytilidae	*Perna canaliculus*
Bivalvia	Mytiloida	Mytilidae	*Xenostrobus pulex*
Bivalvia	Nuculoida	Nuculidae	*Nucula hartvigiana*
Bivalvia	Nuculoida	Nuculidae	*Nucula nitidula*
Bivalvia	Ostreoida	Anomiidae	*Pododesmus zelandicus*
Bivalvia	Solemyoida	Solemyidae	*Solemya parkinsonii*
Bivalvia	Veneroida	Semelidae	*Leptomya retiaria*
Bivalvia	Veneroida	Veneridae	*Irus reflexus*
Bivalvia	Veneroida	Veneridae	*Tawera spissa*
Gastropoda	Basommatophora	Siphonariidae	*Siphonaria australis*
Gastropoda	Littorinimorpha	Calyptraeidae	*Sigapatella novaezelandiae*
Gastropoda	Littorinimorpha	Littorinidae	*Austrolittorina antipodum*
Gastropoda	Littorinimorpha	Littorinidae	*Risellopsis varia*
Gastropoda	Littorinimorpha	Naticidae	*Tanea zelandica*
Gastropoda	Littorinimorpha	Ranellidae	*Cabestana spengleri*
Gastropoda	Neogastropoda	Buccinidae	*Austrofusus glans*
Gastropoda	Neogastropoda	Buccinidae	*Cominella adspersa*
Gastropoda	Neogastropoda	Muricidae	*Dicithais orbita*
Gastropoda	Neogastropoda	Muricidae	*Xymene traverse*
Gastropoda	Neogastropoda	Turridae	*Phenatoma rosea*
Gastropoda	Neotaenioglossa	Velutinidae	*Lamellaria ophione*
Gastropoda	Notaspidea	Pleurobranchidae	*Pleurobranchaea maculate*
Gastropoda	Nudibranchia	Dendrodorididae	*Dendrodoris citrina*
Gastropoda	Nudibranchia	Dorididae	*Archidoris wellingtonensis*
Gastropoda	Patellogastropoda	Lottiidae	*Notoacmea helmsi*
Gastropoda	Patellogastropoda	Lottiidae	*Notoacmea parviconoidea*
Gastropoda	Patellogastropoda	Lottiidae	*Patelloida corticata*
Gastropoda	Patellogastropoda	Nacellidae	*Cellana ornate*
Gastropoda	Patellogastropoda	Nacellidae	*Cellana radians*
Gastropoda	Patellogastropoda	Nacellidae	*Cellana stellifera*
Gastropoda	Vetigastropoda	Calliostomatidae	*Calliostoma punctulatum*
Gastropoda	Vetigastropoda	Calliostomatidae	*Calliostoma tigris*
Gastropoda	Vetigastropoda	Fissurellidae	*Scutus breviculus*
Gastropoda	Vetigastropoda	Trochidae	*Cantharidus purpureus*

Phylum, Class	Order	Family	Genus and species
Gastropoda	Vetigastropoda	Trochidae	*Micrelenchus sanguineus*
Gastropoda	Vetigastropoda	Trochidae	*Micrelenchus tenebrosus*
Gastropoda	Vetigastropoda	Trochidae	*Trochus viridus*
Gastropoda	Vetigastropoda	Turbinidae	*Cookia sulcata*
Gastropoda	Vetigastropoda	Turbinidae	*Turbo smaragdus*
Polyplacophora	Acanthochitonina	Acanthochitonidae	*Cryptoconchus porosus*
Polyplacophora	Ischnochitonidae	Ischnochitonidae	*Eudoxochiton nobilis*
Polyplacophora	Ischnochitonina	Chitonidae	*Sypharochiton pelliserpentis*
Polyplacophora	Ischnochitonina	Chitonidae	*Sypharochiton sinclairi*
Polyplacophora	Ischnochitonina	Mopaliidae	*Plaxiphora caelata*
Phycophyta			
Phaeophyceae	Cutleriales	Cutleriaceae	*Microzonia velutina*
Phaeophyceae	Dictyotales	Dictyotaceae	*Dictyota papenfussii*
Phaeophyceae	Fucales	Cystoseiraceae	*Cystophora retroflexa*
Phaeophyceae	Fucales	Cystoseiraceae	*Cystophora torulosa*
Phaeophyceae	Fucales	Sargassaceae	*Carpophyllum maschalocarpum*
Phaeophyceae	Fucales	Sargassaceae	*Sargassum sinclairii*
Phaeophyceae	Scytosiphonales	Scytosiphonaceae	*Endarachne binghamiae*
Phaeophyceae	Scytosiphonales	Scytosiphonaceae	*Scytosiphon lomentaria*
Rhodophyceae	Ceramiales	Ceramiaceae	*Anotrichium crinitum*
Rhodophyceae	Ceramiales	Ceramiaceae	*Antithamnion pectinatum*
Rhodophyceae	Ceramiales	Ceramiaceae	*Centroceras clavulatum*
Rhodophyceae	Ceramiales	Ceramiaceae	*Ceramium aff apiculatum*
Rhodophyceae	Ceramiales	Ceramiaceae	*Ceramium flaccidum*
Rhodophyceae	Ceramiales	Ceramiaceae	*Microcladia novae-zelandiae*
Rhodophyceae	Ceramiales	Ceramiaceae	*Pterothamnion simile*
Rhodophyceae	Ceramiales	Dasyaceae	*Dasya subtilis*
Rhodophyceae	Ceramiales	Delesseriaceae	*Myriogramme denticulate*
Rhodophyceae	Ceramiales	Rhodomelaceae	*Bostrychia harveyi*
Rhodophyceae	Ceramiales	Rhodomelaceae	*Pterosiphonia pennata*
Rhodophyceae	Ceramiales	Rhodomelaceae	*Stictosiphonia hookeri*
Rhodophyceae	Corallinales	Corallinaceae	*Corallina officinalis*
Rhodophyceae	Corallinales	Corallinaceae	*Haliptilon roseum*
Rhodophyceae	Gelidiales	Gelidiaceae	*Pterocladiella capillacea*
Rhodophyceae	Gigartinales	Gigartinaceae	*Chondracanthus chapmanii*
Rhodophyceae	Gracilariales	Gracilariaceae	*Gracilaria truncate*
Rhodophyceae	Halymeniales	Halymeniaceae	*Cryptonemia latissima*
Rhodophyceae	Plocamiales	Plocamiaceae	*Plocamium angustum*
Rhodophyceae	Rhodymeniales	Faucheaceae	*Gloiocladia saccata*
Rhodophyceae	Rhodymeniales	Rhodomeniaceae	*Rhodymenia leptophylla*
Ulvophyceae	Ulvales	Ulvaceae	*Enteromorpha compressa*

Phylum, Class	Order	Family	Genus and species
Porifera			
Calcarea	Leucosolenida	Sycettidae	*Sycon cf. ornatum*
Demospongiae	Haplosclerida	Chalinidae	*Haliclona glabra*
Demospongiae	Poecilosclerida	Desmacellidae	*Biemna rhabderemioides*
Demospongiae	Poecilosclerida	Hymedesmiidae	*Phorbas fulva*
Pyrrophycophyta			
Dinophyceae	Gymnodiniales	Polykrikaceae	*Pheopolykrikos sp.*
Dinophyceae	Gymnodiniales	Polykrikaceae	*Polykrikos schwartzii*
Dinophyceae	Peridiniales	Peridiniaceae	*Scrippsiella trochoidea*
Dinophyceae	Peridiniales	Gonyaulacaceae	*Gonyaulax grindleyi*
Urochordata			
Ascidiacea	Stolidobranchia	Molgulidae	*Molgula mortenseni*
Ascidiacea	Stolidobranchia	Pyuridae	*Microcosmus australis*
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura carnea*
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura pulla*
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura rugata*
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura subuculata*
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa bicornuta*
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa nisiotus*
Vertebrata			
Actinopterygii	Anguilliformes	Congridae	*Conger wilsoni*
Actinopterygii	Gadiformes	Moridae	*Lotella rhacinus*
Actinopterygii	Gadiformes	Moridae	*Pseudophycis breviuscula*
Actinopterygii	Gasterosteiformes	Syngnathidae	*Hippocampus abdominalis*
Actinopterygii	Perciformes	Arripidae	*Arripis trutta*
Actinopterygii	Perciformes	Carangidae	*Pseudocarynx dentex*
Actinopterygii	Perciformes	Carangidae	*Trachurus novaezelandiae*
Actinopterygii	Perciformes	Cheilodactylidae	*Nemadactylus macropterus*
Actinopterygii	Perciformes	Labridae	*Notolabrus celidotus*
Actinopterygii	Perciformes	Labridae	*Notolabrus fucicola*

Table 7: Cryptogenic marine species recorded from the Port of Taranaki survey. Category 1 cryptogenic species (C1); Category 2 cryptogenic species (C2). Refer to section 2.9 for definitions.

Phylum, Class	Order	Family	Genus and species	
Bryozoa				
Gymnolaemata	Cheilostomata	Scrupariidae	*Scruparia ambigua*	C1
Chelicerata				
Pycnogonida	Pantopoda	Ammotheidae	*Achelia sp. nov. A*	C2
Cnidaria				
Anthozoa	Corallimorpharia	Corallimorphidae	*Corynactis australis*	C1
Hydrozoa	Hydroida	Plumulariidae	*Plumularia setacea*	C1
Crustacea				
Malacostraca	Amphipoda	Leucothoidae	*Leucothoe sp. 1*	C2
Malacostraca	Amphipoda	Liljeborgiidae	*Liljeborgia sp. aff. akaroica*	C1
Malacostraca	Brachyura	Grapsidae	*Plagusia chabrus*	C1
Malacostraca	Brachyura	Portunidae	*Ovalipes elongatus*	C1
Porifera				
Demospongiae	Hadromerida	Suberitidae	*Pseudosuberites sulcatus*	C1
Demospongiae	Halichondrida	Halichondriidae	*Halichondria n. sp. 1*	C2
Demospongiae	Halichondrida	Halichondriidae	*Halichondria n. sp. 4*	C2
Demospongiae	Poecilosclerida	Esperiopsidae	*Esperiopsis n. sp. 1*	C2
Demospongiae	Poecilosclerida	Hymedesmiidae	*Phorbas n. sp. 2*	C2
Demospongiae	Poecilosclerida	Mycalidae	*Paraesperella n. sp. 1*	C2
Pyrrophycophyta				
Dinophyceae	Gymnodiniales	Gymnodiniacea	*Gymnodinium catenatum*	C1
Urochordata				
Ascidiacea	Aplousobranchia	Didemnidae	*Diplosoma listerianum*	C1
Ascidiacea	Phlebobranchia	Rhodosomatidae	*Corella eumyota*	C1
Ascidiacea	Stolidobranchia	Botryllinae	*Botrylliodes leachii*	C1
Ascidiacea	Stolidobranchia	Styelidae	*Asterocarpa cerea*	C1
Ascidiacea	Stolidobranchia	Styelidae	*Styela plicata*	C1

Table 8: Non-indigenous marine species recorded from the Port of Taranaki survey. L Likely vectors of introduction are largely derived from Cranfield et al (1998), where H = Hull fouling and B = Ballast water transport. Novel NIS not listed in Cranfield et al (1998) or previously encountered by taxonomic experts in New Zealand waters are marked as New Records (NR). For these species and others for which information is scarce, we provide dates of first detection rather than probable dates of introduction.

Phylum, Class	Order	Family	Genus and species	Probable means of introduction	Date of introduction or detection (d)
Annelida					
Polychaeta	Scolecida	Capitellidae	*Barantolla lepte*	H or B	Unknown [1]
Bryozoa					
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula flabellata*	H	Pre-1949
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula neritina*	H	1949
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula stolonifera*	H	1962
Gymnolaemata	Cheilostomata	Candidae	*Tricellaria inopinata*	H	Pre-1964
Gymnolaemata	Cheilostomata	Cryptosulidae	*Cryptosula pallasiana*	H	1890s
Gymnolaemata	Cheilostomata	Watersiporidae	*Watersipora arcuata*	H	Pre-1957
Gymnolaemata	Cheilostomata	Watersiporidae	*Watersipora subtorquata*	H or B	Pre-1982
Cnidaria					
Hydrozoa	Hydroida	Eudendriidae	*Eudendrium capillare* **(NR)**	H	Nov. 2001 [d]
Mollusca					
Bivalvia	Ostreoida	Ostreidae	*Crassostrea gigas*	H	1961
Bivalvia	Veneroida	Semelidae	*Theora lubrica*	B	1971
Phycophyta					
Rhodophyceae	Ceramiales	Ceramiaceae	*Griffithsia crassiuscula*	H	Pre-1954
Rhodophyceae	Ceramiales	Rhodomelaceae	*Polysiphonia sertularioides*	H	Pre-1938
Porifera					
Demospongiae	Halisarcida	Halisarcidae	*Halisarca dujardini*	H or B	Pre-1973
Urochordata					
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa sp.* **(NR)**	H	Dec. 2001 [d]

[1] Date of introduction currently unknown but species had been encountered in New Zealand prior to the present survey.

Table 9: **Species indeterminata recorded from the Port of Taranaki survey. This group includes: (1) organisms that were damaged or juvenile and lacked crucial morphological characteristics, and (2) taxa for which there is not sufficient taxonomic or systematic information available to allow positive identification to species level.**

Phylum, Class	Order	Family	Genus and species
Annelida			
Polychaeta	Eunicida	Lumbrineridae	*Eranno Eranno-A*
Polychaeta	Eunicida	Onuphidae	*Onuphidae Indet*
Polychaeta	Phyllodocida	Nereididae	*Nereididae indet*
Polychaeta	Phyllodocida	Nereididae	*Nereis Indet*
Polychaeta	Phyllodocida	Nereididae	*Perinereis Perinereis-A*
Polychaeta	Phyllodocida	Nereididae	*Platynereis Platynereis_australis_group*
Polychaeta	Phyllodocida	Phyllodocidae	*Eumida Eumida-B*
Polychaeta	Phyllodocida	Phyllodocidae	*Eumida Eumida-C*
Polychaeta	Phyllodocida	Phyllodocidae	*Phyllodocidae Indet*
Polychaeta	Phyllodocida	Phyllodocidae	*Pirakia Pirakia-A*
Polychaeta	Phyllodocida	Syllidae	*Autolytin-unknown Autolytin-unknown-A*
Polychaeta	Phyllodocida	Syllidae	*Eusyllin-unknown Indet*
Polychaeta	Phyllodocida	Syllidae	*Eusyllis Eusyllis-A*
Polychaeta	Phyllodocida	Syllidae	*Eusyllis Eusyllis-B*
Polychaeta	Phyllodocida	Syllidae	*Syllidae Indet*
Polychaeta	Phyllodocida	Syllidae	*Syllis Syllis-A*
Polychaeta	Phyllodocida	Syllidae	*Typosyllis Typosyllis-A*
Polychaeta	Sabellida	Sabellidae	*Branchiomma Branchiomma-B*
Polychaeta	Sabellida	Sabellidae	*Pseudopotamilla indet*
Polychaeta	Sabellida	Serpulidae	*Serpula Indet*
Polychaeta	Spionida	Spionidae	*Scolelepis Scolelepis-A*
Polychaeta	Spionida	Spionidae	*Spionidae Indet*
Polychaeta	Terebellida	Ampharetidae	*Amphicteis Amphicteis-A*
Polychaeta	Terebellida	Terebellidae	*Terebellidae Indet*
Cnidaria			
Anthozoa	Actiniaria		*Actiniaria sp.*
Anthozoa	Corallimorpharia	Corallimorphidae	*Corynactis sp.*
Crustacea			
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis sp. 1*

Phylum, Class	Order	Family	Genus and species
Malacostraca	Brachyura		*Brachyuran megalopa*
Malacostraca	Isopoda	Cymothoidae	*?genus sp*
Malacostraca	Isopoda	Sphaeromatidae	*Pseudosphaeroma sp*
Mollusca			
Bivalvia	Nuculoida	Nuculidae	*Linucula sp.*
Gastropoda	Neogastropoda	Turridae	*Neoguraleus sp.*
Phycophyta			
Bangiophyceae	Erythropeltidales	Erythrothrichiaceae	*Erythrotrichia sp.*
Bryopsidophyceae	Bryopsidales	Bryopsidaceae	*Derbesia sp.*
Phaeophyceae	Sphacelariales	Stypocaulaceae	*Halopteris sp.*
Rhodophyceae	Ceramiales	Ceramiaceae	*Antithamnion sp.*
Rhodophyceae	Ceramiales	Ceramiaceae	*Callithamnion sp.*
Rhodophyceae	Ceramiales	Ceramiaceae	*Griffithsia sp.*
Rhodophyceae	Ceramiales	Ceramiaceae	*Pterothamnion sp.*
Rhodophyceae	Ceramiales	Dasyaceae	*Dasya sp.*
Rhodophyceae	Ceramiales	Dasyaceae	*Dasyaceae sp.*
Rhodophyceae	Ceramiales	Delesseriaceae	*Delesseriaceae sp.*
Rhodophyceae	Ceramiales	Delesseriaceae	*Hypoglossum sp.*
Rhodophyceae	Ceramiales	Rhodomelaceae	*Bostrychia sp.*
Rhodophyceae	Ceramiales	Rhodomelaceae	*Polysiphonia sp.*
Rhodophyceae	Gigartinales	Gigartinaceae	*Gigartina sp.*
Rhodophyceae	Halymeniales	Halymeniaceae	*Halymenia sp.*
Rhodophyceae	Rhodymeniales	Lomentariaceae	*Lomentaria sp.*
Rhodophyceae	Rhodymeniales	Rhodomeniaceae	*Rhodymenia sp.*
Ulvophyceae	Cladophorales	Cladophoraceae	*Cladophora sp.*
Ulvophyceae	Ulvales	Ulvaceae	*Enteromorpha sp.*
Ulvophyceae	Ulvales	Ulvaceae	*Ulva sp.*
Ulvophyceae			*Unknown filamentous green A*
Ulvophyceae			*Unknown filamentous green B*
Platyhelminthes			
Turbellaria	Polycladida		*Indet genus indet sp.*

Table 10: Non-indigenous marine organisms recorded from the Port of Taranaki survey and the techniques used to capture each species. Species distributions throughout the port and in other ports and marinas around New Zealand are indicated.

Genus and species	Capture technique in Port of Taranaki	Locations detected in Port of Taranaki	Detected in the following locations surveyed in ZBS2000_04
Barantolla lepte	Benthic grab	Moturoa Wharf (See Fig 16)	Napier, Timaru
Bugula flabellata	Benthic sled, Pile scrape	Blyde Wharf; Breakwater No. 1; Moturoa; Newton King Tanker Terminal (See Fig 17)	Auckland, Bluff, Dunedin, Lyttleton, Napier, Nelson, Opua Marina, Picton, Tauranga, Timaru, Whangarei Harbour, Wellington
Bugula neritina	Benthic sled, Pile scrape	Blyde Wharf; Breakwater No. 1; Lee Breakwater; Moturoa; Newton King Tanker Terminal (See Fig 18)	Auckland, Dunedin, Gisborne, Gulf Harbour Marina, Lyttleton, Napier, Opua, Tauranga, Timaru, Whangarei Harbour, Whangarei Marina
Bugula stolonifera	Pile scrape	Moturoa Wharf (See Fig 19)	Whangarei Harbour
Tricellaria inopinata	Benthic sled	Lee Breakwater (See Fig 20)	Gisborne, Lyttleton, Whangarei Harbour
Cryptosula pallasiana	Pile scrape	Blyde Wharf; Moturoa Wharf; Newton King Tanker Terminal (See Fig 21)	Dunedin, Gisborne, Lyttleton, Nelson, Timaru, Whangarei Harbour, Wellington
Watersipora arcuata	Pile scrape	Blyde Wharf; Moturoa Wharf; Newton King Tanker Terminal (See Fig 22)	None
Watersipora subtorquata	Benthic sled, Pile scrape	Breakwater No. 1; Blyde Wharf; Moturoa Wharf; Newton King Tanker Terminal (See Fig 23)	Bluff, Dunedin, Gisborne, Gulf Harbour Marina, Lyttleton, Napier, Nelson, Opua, Picton, Tauranga, Whangarei Harbour, Wellington
Eudendrium capillare	Pile scrape	Moturoa Wharf; Newton King Tanker Terminal (See Fig 24)	Tauranga, Wellington

Genus and species	Capture technique in Port of Taranaki	Locations detected in Port of Taranaki	Detected in the following locations surveyed in ZBS2000_04
Crassostrea gigas	Pile scrape	Moturoa Wharf; Newton King Tanker Terminal (See Fig 25)	Auckland, Dunedin, Gulf Harbour Marina, Nelson, Opua, Whangarei Harbour
Theora lubrica	Benthic grab, Benthic sled	Blyde Wharf; Breakwater No. 1; Breakwater No. 2; Lee Breakwater; Moturoa Wharf; Newton King Tanker Terminal (See Fig 26)	Auckland, Gisborne, Gulf Harbour Marina, Lyttleton, Napier, Nelson, Opua, Whangarei Harbour, Whangarei Marina, Wellington
Griffithsia crassiuscula	Pile scrape	Breakwater No. 2; Newton King Tanker Terminal (See Fig 27)	Bluff, Lyttleton, Picton, Timaru, Wellington
Polysiphonia sertularioides	Visual inspection	Reclamation (See Fig 28)	Opua marina
Halisarca dujardini	Pile scrape	Newton King Tanker Termina (See Fig 29)	Auckland, Bluff, Dunedin, Picton, Wellington
Cnemidocarpa sp.	Pile scrape	Moturoa Wharf; Newton King Tanker Terminal (See Fig 30)	Auckland, Gisborne, Gulf Harbour Marina, Lyttleton, Nelson, Picton, Tauranga, Timaru, Wellington

Appendices

Appendix 1: Specialists engaged to identify specimens obtained from the New Zealand Port surveys.

Phylum	Class	Specialist	Institution
Annelida	Polychaeta	Geoff Read, Jeff Forman	NIWA Greta Point
Bryozoa	Gymnolaemata	Dennis Gordon	NIWA Greta Point
Chelicerata	Pycnogonida	David Staples	Melbourne Museum, Victoria, Australia
Cnidaria	Anthozoa	Adorian Ardelean	West University of Timisoara, Timisoara, 1900, Romania
Cnidaria	Hydrozoa	Jan Watson	Hydrozoan Research Laboratory, Clifton Springs, Victoria, Australia
Crustacea	Amphipoda	Graham Fenwick	NIWA Christchurch
Crustacea	Cirripedia	Graham Fenwick, Isla Fitridge John Buckeridge[1]	NIWA Christchurch and [1]Auckland University of Technology
Crustacea	Decapoda	Colin McLay[1] Graham Fenwick, Nick Gust	[1]University of Canterbury and NIWA Christchurch
Crustacea	Isopoda	Niel Bruce	NIWA Greta Point
Crustacea	Mysidacea	Fukuoka Kouki	National Science Museum, Tokyo
Echinodermata	Asteroidea	Don McKnight	NIWA Greta Point
Echinodermata	Echinoidea	Don McKnight	NIWA Greta Point
Echinodermata	Holothuroidea	Niki Davey	NIWA Nelson
Echinodermata	Ophiuroidea	Don McKnight, Helen Rotman	NIWA Greta Point
Echiura	Echiuroidea	Geoff Read	NIWA Greta Point
Mollusca	Bivalvia. Cephalopoda, astropoda, Polyplacophora	Bruce Marshall	Museum of NZ Te Papa Tongarewa
Nemertea	Anopla, Enopla	Geoff Read	NIWA Greta Point
Phycophyta	Phaeophyceae, Rhodophyceae, Ulvophyceae	Wendy Nelson, Kate Neill	NIWA Greta Point
Platyhelminthes	Turbellaria	Sean Handley	NIWA Nelson
Porifera	Demospongiae, Calcarea	Michelle Kelly-Shanks	NIWA Auckland
Priapula	Priapulidae	Geoff Read	NIWA Greta Point
Pyrrophycophyta	Dinophyceae	Hoe Chang, Rob Stewart	NIWA Greta Point
Urochordata	Ascidiacea	Mike Page, Anna Bradley Patricia Kott[1]	NIWA Nelson and [1]Queensland Museum
Vertebrata	Osteichthyes	Clive Roberts, Andrew Stewart	Museum of NZ Te Papa Tongarewa

Appendix 2: Generic descriptions of representative groups of the main marine phyla collected during sampling

Phylum Annelida

Polychaetes: The polychaetes are the largest group of marine worms and are closely related to the earthworms and leeches found on land. Polychaetes are widely distributed in the marine environment and are commonly found under stones and rocks, buried in the sediment or attached to submerged natural and artificial surfaces including rocks, pilings, ropes and the shells or carapaces of other species. All polychaete worms have visible legs or bristles. Many species live in tubes secreted by the body or assembled from debris and sediments, while others are free-living. Depending on species, polychaetes feed by filtering small food particles from the water or by preying upon smaller creatures.

Phylum Bryozoa

Bryozoans: This group of organisms is also referred to as ‘moss animals’ or ‘lace corals’. Bryozoans are sessile and live attached to submerged natural and artificial surfaces including rocks, pilings, ropes and the shells or carapaces of other species. They are all colonial, with individual colonies consisting of hundreds of individual ‘zooids’. Bryozoans can have encrusting growth forms that are sheet-like and approximately 1 mm thick, or can form erect or branching structures several centimetres high. Bryozoans feed by filtering small food particles from the water column, and colonies grow by producing additional zooids.

Phylum Chelicerata

Pycnogonids: The pycnogonids, or sea spiders, are a group within the Arthropoda, and closely related to land spiders. They are commonly encountered living among sponges, hydroids and bryozoans on the seafloor. They range in size from a few mm to many cm and superficially resemble spiders found on land.

Phylum Cnidaria

Hydroids: Hydroids can easily be mistaken for erect and branching bryozoans. They are also sessile organisms that live attached to submerged natural and artificial surfaces including rocks, pilings, ropes and the shells or carapaces of other species. All hydroids are colonial, with individual colonies consisting of hundreds of individual ‘polyps’. Like bryozoans, they feed by filtering small food particles from the water column.

Phylum Crustacea

Crustaceans: The crustaceans represent one of the sea’s most diverse groups of organisms, well known examples include shrimps, crabs and lobsters. Most crustaceans are motile (capable of movement) although there are also a variety of sessile species (e.g. barnacles). All crustaceans are protected by an external carapace, and most can be recognised by having two pairs of antennae.

Phylum Echinodermata

Echinoderms: This phylum contains a range of predominantly motile organisms – sea stars, brittle stars, sea urchins, sea cucumbers, sand dollars, feather stars and sea lilies. Echinoderms feed by filtering small food particles from the water column or by extracting food particles from sediment grains or rock surfaces.

Phylum Mollusca

Molluscs: The molluscs are a highly diverse group of marine animals characterised by the presence of an external or internal shell. This phyla includes the bivalves (organisms with hinged shells e.g. mussels, oysters, etc), gastropods (marine snails, e.g. winkles, limpets, topshells), chitons, sea slugs and sea hares, as well as the cephalopods (squid, cuttlefish and octopus).

Phylum Phycophyta

Algae: These are the marine plants. Several types were encountered during our survey. Large *macroalgae* were sampled that live attached to submerged natural and artificial surfaces including rocks, pilings, ropes and the shells or carapaces of other species. These include the green algae (Ulvophyceae), red algae (Rhodophyceae) and brown algae (Phaecophyceae). We also encountered microscopic algal species called *dinoflagellates* (phylum Pyrrophycophyta), single-celled algae that live in the water column or within the sediments.

Phylum Porifera

Sponges: Sponges are very simple colonial organisms that live attached to submerged natural and artificial surfaces including rocks, pilings, ropes and the shells or carapaces of other species. They vary greatly in colour and shape, and include sheet-like encrusting forms, branching forms and tubular forms. Sponge surfaces have thousands of small pores to through which water is drawn into the colony, where small food particles are filtered out before the water is again expelled through one or several other holes.

Phylum Pyrrophycophyta

Dinoflagellates: Dinoflagellates are a large group of unicellular algae common in marine plankton. About half of all dinoflagellates are capable of photosynthesis and some are symbionts, living inside organisms such as jellyfish and corals. Some dinoflagellates are phosphorescent and can be responsible for the phosphorescence visible at night in the sea. The phenomenon known as red tide occurs when the rapid reproduction of certain dinoflagellate species results in large brownish red algal blooms. Some dinoflagellates are highly toxic and can kill fish and shellfish, or poison humans that eat these infected organisms.

Phylum Urochordata

Ascidians: This group of organisms is sometimes referred to as ‘sea squirts’. Adult ascidians are sessile (permanently attached to the substrate) organisms that live on submerged natural and artificial surfaces including rocks, pilings, ropes and the shells or carapaces of other species. Ascidians can occur as individuals (solitary ascidians) or merged together into colonies (colonial ascidians). They are soft-bodied and have a rubbery or jelly-like outer coating (test). They feed by pumping water into the body through an inhalant siphon. Inside the body, food particles are filtered out of the water, which is then expelled through an exhalant siphon. Ascidians reproduce via swimming larvae (ascidian tadpoles) that retain a notochord, which explains why these animals are included in the phylum Chordata along with vertebrates.

Phylum Vertebrata

Fishes: Fishes are an extremely diverse group of the verterbrates familiar to most people. Approximately 200 families of fish are represented in New Zealand waters ranging from tropical and subtropical groups in the north to subantarctic groups in the south. Fishes can be classified according to their depth preferences. Fish that live on or near the sea floor are considered demersal while those living in the upper water column are termed pelagics.

Appendix 3: Criteria for assigning non-indigenous status to species sampled from the Port of Taranaki.

Criteria that apply to each species are indicated by (+). Criteria (C1-C9) were developed by Chapman and Carlton (1994). Here we apply Cranfield et al's (1998) analysis to species previously known from New Zealand waters. For non-indigenous species first detected during the present study, criteria were assigned using advice from the taxonomists that identified them. Refer to footnote for a full description of C1–C9 criteria.

Phylum and species	C1	C2	C3	C4	C5	C6	C7	C8	C9
Annelida									
Barantolla lepte	+		+					+	
Bryozoa									
Bugula flabellate	+	+	+		+	+	+	+	+
Bugula neritina	+				+	+	+	+	+
Bugula stolonifera	+	+	+		+	+	+	+	+
Tricellaria inopinata	+	+	+		+	+		+	+
Cryptosula pallasiana	+	+	+		+	+	+	+	+
Watersipora arcuata	+	+	+		+	+	+	+	+
Watersipora subtorquata	+	+	+		+	+	+	+	+
Cnidaria									
Eudendrium capillare	+		+		+			+	+
Mollusca									
Crassostrea gigas	+	+	+			+	+	+	+
Theora lubrica	+	+			+	+	+	+	+
Phycophyta									
Griffithsia crassiuscula	+	+				+		+	+
Polysiphonia sertularioides	+	+				+	+	+	+
Porifera									
Halisarca dujardini	+		+	+		+	+	+	+
Urochordata									
Cnemidocarpa sp.	+		+		+			+	

Criterion 1: Has the species suddenly appeared locally where it has not been found before?
Criterion 2: Has the species spread subsequently?
Criterion 3: Is the species' distribution associated with human mechanisms of dispersal?
Criterion 4: Is the species associated with, or dependent on, other introduced species?
Criterion 5: Is the species prevalent in, or restricted to, new or artificial environments?
Criterion 6: Is the species' distribution restricted compared to natives?
Criterion 7: Does the species have a disjunct worldwide distribution?
Criterion 8: Are dispersal mechanisms of the species inadequate to reach New Zealand, and is passive dispersal in ocean currents unlikely to bridge ocean gaps to reach New Zealand?
Criterion 9: Is the species isolated from the genetically and morphologically most similar species elsewhere in the world?

Appendix 4. Geographic locations of the sample sites in Port of Taranaki

Site	Eastings	Northings	NZ Latitude	NZ Longitude	Survey Method	No. of sample units
B1	2599891	6238075	-39.05936	174.03774	BGRB	3
B2	2599891	6238162	-39.05858	174.03774	BSLD	2
B2	2599891	6238162	-39.05858	174.03774	CRBTP	4
B2	2599891	6238162	-39.05858	174.03774	FSHTP	4
B2	2599891	6238162	-39.05858	174.03774	PSC	18
B2	2599891	6238162	-39.05858	174.03774	SHRTP	4
B2	2599891	6238162	-39.05858	174.03774	STFTP	4
BE	2599997	6238164	-39.05855	174.03895	CYST	2
BR					VISS	1
BW1	2600061	6238672	-39.05396	174.03962	BGRB	3
BW1	2600061	6238672	-39.05396	174.03962	BSLD	2
BW1	2600061	6238672	-39.05396	174.03962	CYST	2
BW2	2599670	6238497	-39.05558	174.03514	BGRB	3
BW2	2599670	6238497	-39.05558	174.03514	BSLD	2
BW2	2599670	6238497	-39.05558	174.03514	CRBTP	4
BW2	2599670	6238497	-39.05558	174.03514	CYST	2
BW2	2599670	6238497	-39.05558	174.03514	FSHTP	4
BW2	2599670	6238497	-39.05558	174.03514	PSC	15
BW2	2599670	6238497	-39.05558	174.03514	SHRTP	4
BW2	2599670	6238497	-39.05558	174.03514	STFTP	4
BW2	2599670	6238497	-39.05558	174.03514	VISS	1
LBW1	2600487	6238284	-39.05741	174.04460	BGRB	3
LBW1	2600487	6238284	-39.05741	174.04460	BSLD	2
LBW1	2600487	6238284	-39.05741	174.04460	CRBTP	4
LBW1	2600487	6238284	-39.05741	174.04460	CYST	2
LBW1	2600487	6238284	-39.05741	174.04460	FSHTP	4
LBW1	2600487	6238284	-39.05741	174.04460	OPP	1
LBW1	2600487	6238284	-39.05741	174.04460	SHRTP	4

Site	Eastings	Northings	NZ Latitude	NZ Longitude	Survey Method	No. of sample units
LBW1	2600487	6238284	-39.05741	174.04460	STFTP	4
M2	2599579	6238352	-39.05690	174.03410	BGRB	3
M2	2599579	6238352	-39.05690	174.03410	BSLD	2
M2	2599579	6238352	-39.05690	174.03410	CRBTP	4
M2	2599579	6238352	-39.05690	174.03410	FSHTP	4
M2	2599579	6238352	-39.05690	174.03410	PSC	16
M2	2599579	6238352	-39.05690	174.03410	SHRTP	4
M2	2599579	6238352	-39.05690	174.03410	STFTP	4
M2-3	2599579	6238352	-39.05690	174.03410	CRBTP	1
M2-3	2599638	6238400	-39.05646	174.03477	CYST	2
MC	2600478	6238287	-39.05739	174.04449	CYST	2
MP	2599350	6238207	-39.05823	174.03147	VISS	1
NK2	2599699	6238253	-39.05778	174.03550	BGRB	3
NK2	2599699	6238253	-39.05778	174.03550	BSLD	2
NK2	2599699	6238253	-39.05778	174.03550	CRBTP	4
NK2	2599699	6238253	-39.05778	174.03550	FSHTP	4
NK2	2599699	6238253	-39.05778	174.03550	PSC	17
NK2	2599699	6238253	-39.05778	174.03550	SHRTP	4
NK2	2599699	6238253	-39.05778	174.03550	STFTP	4
NKE	2599805	6238369	-39.05672	174.03671	CYST	2
PBH					VISS	1
REC	2600492	6237940	-39.06051	174.04470	BGRB	3
REC	2600492	6237940	-39.06051	174.04470	CRBTP	4
REC	2600492	6237940	-39.06051	174.04470	FSHTP	4
REC	2600492	6237940	-39.06051	174.04470	SHRTP	4
REC	2600492	6237940	-39.06051	174.04470	STFTP	4
REC	2600492	6237940	-39.06051	174.04470	VISS	2

*Survey methods: PSC = pile scrape, BSLD = benthic sled, BGRB = benthic grab, CYST = dinoflagellate cyst core, CRBTP = crab trap, FSHTP = fish trap, STFTP = starfish trap, SHRTP = shrimp trap, VISS = visual.

Appendix 5a. Results from the diver collections and pile scrapings

					Berth code	B2																						BW2											
					Pile replicate	1									2									1							2				
					Pile position	IN					OUT				IN					OUT				IN				OUT			IN				OUT
Class	Orders	Family	Genus	Species	*Status	1	2	3	4	MISC	1	2	3	4	1	2	3	4	MISC	1	2	3	4	1	2	3	MISC	1	2	3	1	2	3	MISC	1
Anthozoa	Actiniaria		*Actiniaria*	*sp.*	SI	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthozoa	Corallimorpharia	Corallimorphidae	*Corynactis*	*australis*	C1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Anthozoa	Corallimorpharia	Corallimorphidae	*Corynactis*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Aplousobranchia	Didemnidae	*Diplosoma*	*listerianum*	C1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Phlebobranchia	Rhodosomatidae	*Corella*	*eumyota*	C1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Botryllinae	*Botrylliodes*	*leachii*	C1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Molgulidae	*Molgula*	*mortenseni*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*carnea*	N	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*rugata*	N	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Microcosmus*	*australis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*pulla*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*subuculata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*nisiotus*	N	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*bicornuta*	N	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*sp.*	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Asterocarpa*	*cerea*	C1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asteroidea	Forcipulata	Asteriidae	*Stichaster*	*australis*	N	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asteroidea	Valvatida	Asterinidae	*Patiriella*	*regularis*	N	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	Myoida	Hiatellidae	*Hiatella*	*arctica*	N	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Bivalvia	Mytiloida	Mytilidae	*Xenostrobus*	*pulex*	N	1	1	1	0	0	1	1	1	0	1	1	1	0	0	1	1	1	1	0	0	1	0	1	0	0	1	1	0	0	1
Bivalvia	Mytiloida	Mytilidae	*Modiolarca*	*impacta*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	Mytiloida	Mytilidae	*Perna*	*canaliculus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	Ostreoida	Anomiidae	*Pododesmus*	*zelandicus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Bivalvia	Ostreoida	Ostreidae	*Crassostrea*	*gigas*	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	Veneroida	Veneridae	*Irus*	*reflexus*	N	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryopsidophyceae	Bryopsidales	Bryopsidaceae	*Derbesia*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
Crustacea	Anomura	Paguidae	*Pagurus*	*traversi*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Anomura	Porcellanidae	*Petrolisthes*	*novaezelandiae*	N	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Grapsidae	*Plagusia*	*chabrus*	C1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Grapsidae	*Leptograpsus*	*variegatus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Crustacea	Brachyura	Hymenosomatidae	*Halicarcinus*	*cookii*	N	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Hymenosomatidae	*Neohymenicus*	*pubescens*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Majidae	*Notomithrax*	*minor*	N	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Pinnotheridae	*Pinnotheres*	*atrinocola*	N	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Pinnotheridae	*Pinnotheres*	*novaezelandiae*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura		*Brachyuran*	*megalopa*	SI	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Caridea	Crangonidae	*Pontophilus*	*australis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Caridea	Palemonidae	*Palaemon*	*affinis*	N	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Thoracica	Balanidae	*Austrominius*	*modestus*	N	0	0	0	1	0	1	1	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	1	1	0	0	1
Crustacea	Thoracica	Balanidae	*Notobalanus*	*vestitus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0
Crustacea	Thoracica	Balanidae	*Notomegabalanus*	*decorus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Thoracica	Chthamalidae	*Chaemosipho*	*columna*	N	1	1	1	0	0	1	1	0	1	1	1	1	0	0	1	1	1	1	1	0	1	0	1	0	1	1	1	1	0	0
Crustacea	Thoracica	Pachylasmidae	*Epopella*	*plicata*	N	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Hadromerida	Suberitidae	*Pseudosuberites*	*sulcatus*	C1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Halichondrida	Halichondriidae	*Halichondria*	*n. sp. 1 (knubby oxeas 290-380)*	C2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Halisarcida	Halisarcidae	*Halisarca*	*dujardini*	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Haplosclerida	Chalinidae	*Haliclona*	*glabra*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Poecilosclerida	Desmacellidae	*Biemna*	*rhabderemioides*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Poecilosclerida	Esperiopsidae	*Esperiopsis*	*n. sp. 1 (smooth bubble sponge)*	C2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Poecilosclerida	Hymedesmiidae	*Phorbas*	*fulva*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Poecilosclerida	Hymedesmiidae	*Phorbas*	*n. sp. 2 (Taranaki)*	C2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Poecilosclerida	Mycalidae	*Paraesperella*	*n. sp. 1 (macrosigma)*	C2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Basommatophora	Siphonariidae	*Siphonaria*	*australis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Littorinimorpha	Calyptraeidae	*Sigapatella*	*novaezelandiae*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Littorinimorpha	Littorinidae	*Risellopsis*	*varia*	N	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Gastropoda	Littorinimorpha	Littorinidae	*Austrolittorina*	*antipodum*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Littorinimorpha	Ranellidae	*Cabestana*	*spengleri*	N	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Neogastropoda	Muricidae	*Xymene*	*traversi*	N	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Status: A = non-indigenous (highlighted by shading), C1 = cryptogenic category 1, C2 = cryptogenic category 2, N = native, SI = species indeterminata. See text for details.

Appendix 5a. Results from the diver collections and pile scrapings

					Berth code	B2																			BW2									
					Pile replicate	1									2										1						2			
					Pile position	IN					OUT				IN					OUT					IN				OUT		IN				OUT
Class	Orders	Family	Genus	Species	*Status	1	2	3	4	MISC	1	2	3	4	1	2	3	4	MISC	1	2	3	4	1	2	3	MISC	1	2	3	1	2	3	MISC	1
Gastropoda	Neogastropoda	Muricidae	*Dicithais*	*orbita*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Neotaenioglossa	Velutinidae	*Lamellaria*	*ophione*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Nudibranchia	Dorididae	*Archidoris*	*wellingtonensis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Patellogastropoda	Lottiidae	*Patelloida*	*corticata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Gastropoda	Patellogastropoda	Lottiidae	*Notoacmea*	*helmsi*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Patellogastropoda	Lottiidae	*Notoacmea*	*parviconoidea*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Vetigastropoda	Calliostomatidae	*Calliostoma*	*tigris*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Gastropoda	Vetigastropoda	Fissurellidae	*Scutus*	*breviculus*	N	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Beaniidae	*Beania*	*plurispinosa*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*flabellata*	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*neritina*	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Bugulidae	*Bicellariella*	*ciliata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*stolonifera*	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Calloporidae	*Crassimarginatella*	*papulifera*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Cryptosulidae	*Cryptosula*	*pallasiana*	A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Romancheinidae	*Escharoides*	*angela*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Scrupariidae	*Scruparia*	*ambigua*	C1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Gymnolaemata	Cheilostomata	Steginoporellidae	*Steginoporella*	*magnifica*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Watersiporidae	*Watersipora*	*subtorquata*	A	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1	0	1	1	0	0
Gymnolaemata	Cheilostomata	Watersiporidae	*Watersipora*	*arcuata*	A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrozoa	Hydroida	Eudendriidae	*Eudendrium*	*capillare*	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrozoa	Hydroida	Haleciidae	*Halecium*	*beanii*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrozoa	Hydroida	Plumulariidae	*Plumularia*	*setacea*	C1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Aoridae	*Haplocheira*	*barbimana*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Dexaminidae	*Paradexamine*	*pacifica*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis*	*sp. 1*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Leucothoidae	*Leucothoe*	*trailli*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Malacostraca	Amphipoda	Leucothoidae	*Leucothoe*	*sp. 1*	C2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Isopoda	Sphaeromatidae	*Pseudosphaeroma*	*sp*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ophiuroidea	Ophiurida	Ophiactidae	*Ophiactis*	*resiliens*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phaeophyceae	Scytosiphonales	Scytosiphonaceae	*Endarachne*	*binghamiae*	N	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Eunicida	Dorvilleidae	*Schistomeringos*	*loveni*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Polychaeta	Eunicida	Eunicidae	*Eunice*	*australis*	N	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Eunicida	Lumbrineridae	*Lumbrineris*	*sphaerocephala*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Hesionidae	*Ophiodromus*	*angustifrons*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*Perinereis-A*	SI	0	0	1	0	0	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	1	0	0	1	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*amblyodonta*	N	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*camiguinoides*	N	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Neanthes*	*kerguelensis*	N	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Platynereis*	*Platynereis_australis_group*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Nereididae*	*indet*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*pseudocamiguina*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Nereis*	*Indet*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Nereis*	*falcaria*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Phyllodocidae	*Eulalia*	*microphylla*	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Phyllodocidae	*Phyllodocidae*	*Indet*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Phyllodocidae	*Pirakia*	*Pirakia-A*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Phyllodocidae	*Eumida*	*Eumida-B*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Phyllodocidae	*Eumida*	*Eumida-C*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Polynoidae	*Lepidonotus*	*polychromus*	N	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Polynoidae	*Lepidonotus*	*jacksoni*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Eusyllis*	*Eusyllis-A*	SI	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Syllidae*	*Indet*	SI	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Autolytin-unknown*	*Autolytin-unknown-A*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Eusyllis*	*Eusyllis-B*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Eusyllin-unknown*	*Indet*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Syllis*	*Syllis-A*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Clavisyllis*	*alternata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Status: A = non-indigenous (highlighted by shading), C1 = cryptogenic category 1, C2 = cryptogenic category 2, N = native, SI = species indeterminata. See text for details.

Appendix 5a. Results from the diver collections and pile scrapings

					Berth code	B2														BW2															
					Pile replicate	1									2									1							2				
					Pile position	IN					OUT				IN					OUT				IN				OUT			IN				OUT
Class	Orders	Family	Genus	Species	*Status	1	2	3	4	MISC	1	2	3	4	1	2	3	4	MISC	1	2	3	4	1	2	3	MISC	1	2	3	1	2	3	MISC	1
Polychaeta	Phyllodocida	Syllidae	*Trypanosyllis*	*gigantea*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Typosyllis*	*Typosyllis-A*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Sabellidae	*Megalomma*	*suspiciens*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Sabellidae	*Pseudopotamilla*	*laciniosa*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Sabellidae	*Branchiomma*	*Branchiomma-B*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Sabellidae	*Pseudopotamilla*	*indet*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Serpulidae	*Galeolaria*	*hystrix*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
Polychaeta	Sabellida	Serpulidae	*Neovermilia*	*sphaeropomatus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
Polychaeta	Sabellida	Serpulidae	*Spirobranchus*	*cariniferus*	N	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Serpulidae	*Serpula*	*Indet*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Polychaeta	Terebellida	Acrocirridae	*Acrocirrus*	*trisectus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Terebellida	Flabelligeridae	*Pherusa*	*parmata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Polychaeta	Terebellida	Terebellidae	*Terebellidae*	*Indet*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Terebellida	Terebellidae	*Neoleprea*	*papilla*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polyplacophora	Acanthochitonina	Acanthochitonidae	*Cryptoconchus*	*porosus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
Polyplacophora	Ischnochitonina	Chitonidae	*Sypharochiton*	*pelliserpentis*	N	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Polyplacophora	Ischnochitonina	Chitonidae	*Sypharochiton*	*sinclairi*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polyplacophora	Ischnochitonina	Mopaliidae	*Plaxiphora*	*caelata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pycnogonida	Pantopoda	Ammotheidae	*Achelia*	*assimilis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Pycnogonida	Pantopoda	Callipallenidae	*Pallenopsis*	*obliqua*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Anotrichium*	*crinitum*	N	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Callithamnion*	*sp.*	SI	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Griffithsia*	*sp.*	SI	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Griffithsia*	*crassiuscula*	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Pterothamnion*	*simile*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Pterothamnion*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Antithamnion*	*pectinatum*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Antithamnion*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Ceramium*	*aff apiculatum*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Microcladia*	*novae-zelandiae*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Dasyaceae	*Dasya*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Dasyaceae	*Dasya*	*subtilis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Deleseriaceae	*Myriogramme*	*denticulata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Delesseriaceae	*Delesseriaceae*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Delesseriaceae	*Hypoglossum*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Bostrychia*	*harveyi*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Stictosiphonia*	*hookeri*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Polysiphonia*	*sp.*	SI	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Bostrychia*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Gigartinales	Gigartinaceae	*Chondracanthus*	*chapmanii*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Gracilariales	Gracilariaceae	*Gracilaria*	*truncata*	N	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Rhodymeniales	Faucheaceae	*Gloiocladia*	*saccata*	N	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Rhodymeniales	Lomentariaceae	*Lomentaria*	*sp.*	SI	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Rhodymeniales	Rhodomeniaceae	*Rhodymenia*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Turbellaria	Polycladida		*Indet genus*	*indet sp.*	SI	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ulvophyceae	Ulvales	Ulvaceae	*Ulva*	*sp.*	SI	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ulvophyceae			*Unknown*	*filamentous green A*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ulvophyceae			*Unknown*	*filamentous green B*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

*Status: A = non-indigenous (highlighted by shading), C1 = cryptogenic category 1, C2 = cryptogenic category 2, N = native, SI = species indeterminata. See text for details.

Appendix 5a. Results from the diver collections and pile scrapings

					Berth code				M2																	NK2														
					Pile replicate				1								2									1								2						
					Pile position				IN				OUT				IN				OUT					IN				OUT				IN					OUT
Class	Orders	Family	Genus	Species	*Status	2	3	4	1	2	3	4	1	2	3	4	1	2	3	MISC	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	MISC	1
Anthozoa	Actiniaria		*Actiniaria*	*sp.*	SI	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthozoa	Corallimorpharia	Corallimorphidae	*Corynactis*	*australis*	C1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthozoa	Corallimorpharia	Corallimorphidae	*Corynactis*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Aplousobranchia	Didemnidae	*Diplosoma*	*listerianum*	C1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Phlebobranchia	Rhodosomatidae	*Corella*	*eumyota*	C1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0
Ascidiacea	Stolidobranchia	Botryllinae	*Botrylloides*	*leachii*	C1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Molgulidae	*Molgula*	*mortenseni*	N	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*carnea*	N	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	1	0	0	1	1	1	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*rugata*	N	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	1	0	1	0	0	1	0	0	0	1	1	0	0	1	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Microcosmus*	*australis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*pulla*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*subuculata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*nisiotus*	N	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*bicornuta*	N	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*sp.*	A	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Asterocarpa*	*cerea*	C1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asteroidea	Forcipulata	Asteriidae	*Stichaster*	*australis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asteroidea	Valvatida	Asterinidae	*Patiriella*	*regularis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	Myoida	Hiatellidae	*Hiatella*	*arctica*	N	0	0	0	0	0	1	0	0	0	0	1	0	1	1	0	0	1	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0
Bivalvia	Mytiloida	Mytilidae	*Xenostrobus*	*pulex*	N	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0	1	1	1	0	1	1	1	1	0	1
Bivalvia	Mytiloida	Mytilidae	*Modiolarca*	*impacta*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bivalvia	Mytiloida	Mytilidae	*Perna*	*canaliculus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	Ostreoida	Anomiidae	*Pododesmus*	*zelandicus*	N	0	0	0	0	0	1	0	0	0	0	1	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	Ostreoida	Ostreidae	*Crassostrea*	*gigas*	A	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Bivalvia	Veneroida	Veneridae	*Irus*	*reflexus*	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Bryopsidophyceae	Bryopsidales	Bryopsidaceae	*Derbesia*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Anomura	Paguidae	*Pagurus*	*traversi*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Anomura	Porcellanidae	*Petrolisthes*	*novaezelandiae*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Crustacea	Brachyura	Grapsidae	*Plagusia*	*chabrus*	C1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Crustacea	Brachyura	Grapsidae	*Leptograpsus*	*variegatus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Crustacea	Brachyura	Hymenosomatidae	*Halicarcinus*	*cookii*	N	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0
Crustacea	Brachyura	Hymenosomatidae	*Neohymenicus*	*pubescens*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Majidae	*Notomithrax*	*minor*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Crustacea	Brachyura	Pinnotheridae	*Pinnotheres*	*atrinocola*	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Crustacea	Brachyura	Pinnotheridae	*Pinnotheres*	*novaezelandiae*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura		*Brachyuran*	*megalopa*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Caridea	Crangonidae	*Pontophilus*	*australis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Crustacea	Caridea	Palemonidae	*Palaemon*	*affinis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Crustacea	Thoracica	Balanidae	*Austrominius*	*modestus*	N	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	0	0	0	1	0	1	0
Crustacea	Thoracica	Balanidae	*Notobalanus*	*vestitus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Thoracica	Balanidae	*Notomegabalanus*	*decorus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Crustacea	Thoracica	Chthamalidae	*Chaemosipho*	*columna*	N	0	1	1	1	1	0	1	1	0	1	1	0	0	0	0	1	1	0	0	1	1	0	0	0	0	1	0	0	1	1	0	0	1
Crustacea	Thoracica	Pachylasmidae	*Epopella*	*plicata*	N	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Hadromerida	Suberitidae	*Pseudosuberites*	*sulcatus*	C1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Halichondrida	Halichondriidae	*Halichondria*	*n. sp. 1 (knubby oxeas 290-380)*	C2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Demospongiae	Halisarcida	Halisarcidae	*Halisarca*	*dujardini*	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Demospongiae	Haplosclerida	Chalinidae	*Haliclona*	*glabra*	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Poecilosclerida	Desmacellidae	*Biemna*	*rhabderemioides*	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Poecilosclerida	Esperiopsidae	*Esperiopsis*	*n. sp. 1 (smooth bubble sponge)*	C2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Demospongiae	Poecilosclerida	Hymedesmiidae	*Phorbas*	*fulva*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Demospongiae	Poecilosclerida	Hymedesmiidae	*Phorbas*	*n. sp. 2 (Taranaki)*	C2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Poecilosclerida	Mycalidae	*Paraesperella*	*n. sp. 1 (macrosigma)*	C2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Gastropoda	Basommatophora	Siphonariidae	*Siphonaria*	*australis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0
Gastropoda	Littorinimorpha	Calyptraeidae	*Sigapatella*	*novaezelandiae*	N	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Littorinimorpha	Littorinidae	*Risellopsis*	*varia*	N	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
Gastropoda	Littorinimorpha	Littorinidae	*Austrolittorina*	*antipodum*	N	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
Gastropoda	Littorinimorpha	Ranellidae	*Cabestana*	*spengleri*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Neogastropoda	Muricidae	*Xymene*	*traversi*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0

*Status: A = non-indigenous (highlighted by shading), C1 = cryptogenic category 1, C2 = cryptogenic category 2, N = native, SI = species indeterminata. See text for details.

Appendix 5a. Results from the diver collections and pile scrapings

					Berth code				M2																NK2													
					Pile replicate				1								2								1								2					
					Pile position				IN				OUT				IN				OUT				IN				OUT				IN					OUT
Class	Orders	Family	Genus	Species	*Status	2	3	4	1	2	3	4	1	2	3	4	1	2	3	MISC	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	MISC	1
Gastropoda	Neogastropoda	Muricidae	*Dicithais*	*orbita*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Gastropoda	Neotaenioglossa	Velutinidae	*Lamellaria*	*ophione*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Nudibranchia	Dorididae	*Archidoris*	*wellingtonensis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Patellogastropoda	Lottiidae	*Patelloida*	*corticata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Patellogastropoda	Lottiidae	*Notoacmea*	*helmsi*	N	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Patellogastropoda	Lottiidae	*Notoacmea*	*parviconoidea*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Vetigastropoda	Calliostomatidae	*Calliostoma*	*tigris*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Gastropoda	Vetigastropoda	Fissurellidae	*Scutus*	*breviculus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Beaniidae	*Beania*	*plurispinosa*	N	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*flabellata*	A	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	1	1	0	0
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*neritina*	A	0	1	0	0	0	1	0	1	0	1	0	0	1	1	0	0	1	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Bugulidae	*Bicellariella*	*ciliata*	N	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*stolonifera*	A	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Calloporidae	*Crassimarginatella*	*papulifera*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Gymnolaemata	Cheilostomata	Cryptosulidae	*Cryptosula*	*pallasiana*	A	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Romancheinidae	*Escharoides*	*angela*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Scrupariidae	*Scruparia*	*ambigua*	C1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Gymnolaemata	Cheilostomata	Steginoporellidae	*Steginoporella*	*magnifica*	N	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Gymnolaemata	Cheilostomata	Watersiporidae	*Watersipora*	*subtorquata*	A	1	1	0	1	1	1	1	0	1	1	0	1	1	1	0	0	0	0	1	0	1	1	0	0	1	0	0	0	0	1	1	0	0
Gymnolaemata	Cheilostomata	Watersiporidae	*Watersipora*	*arcuata*	A	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrozoa	Hydroida	Eudendriidae	*Eudendrium*	*capillare*	A	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
Hydrozoa	Hydroida	Haleciidae	*Halecium*	*beanii*	N	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrozoa	Hydroida	Plumulariidae	*Plumularia*	*setacea*	C1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Malacostraca	Amphipoda	Aoridae	*Haplocheira*	*barbimana*	N	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	1	1	0	0
Malacostraca	Amphipoda	Dexaminidae	*Paradexamine*	*pacifica*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis*	*sp. 1*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Leucothoidae	*Leucothoe*	*trailli*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0
Malacostraca	Amphipoda	Leucothoidae	*Leucothoe*	*sp. 1*	C2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Malacostraca	Isopoda	Sphaeromatidae	*Pseudosphaeroma*	*sp*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiuroidea	Ophiurida	Ophiactidae	*Ophiactis*	*resiliens*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phaeophyceae	Scytosiphonales	Scytosiphonaceae	*Endarachne*	*binghamiae*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Eunicida	Dorvilleidae	*Schistomeringos*	*loveni*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Eunicida	Eunicidae	*Eunice*	*australis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
Polychaeta	Eunicida	Lumbrineridae	*Lumbrineris*	*sphaerocephala*	N	1	0	0	0	0	1	1	0	1	1	1	1	1	1	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Hesionidae	*Ophiodromus*	*angustifrons*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*Perinereis-A*	SI	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	1	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*amblyodonta*	N	1	0	0	0	0	1	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*camiguinoides*	N	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1
Polychaeta	Phyllodocida	Nereididae	*Neanthes*	*kerguelensis*	N	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Platynereis*	*Platynereis_australis_group*	SI	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Nereididae*	*indet*	SI	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*pseudocamiguina*	N	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Nereis*	*Indet*	SI	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Nereis*	*falcaria*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Phyllodocidae	*Eulalia*	*microphylla*	N	0	0	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	1
Polychaeta	Phyllodocida	Phyllodocidae	*Phyllodocidae*	*Indet*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Polychaeta	Phyllodocida	Phyllodocidae	*Pirakia*	*Pirakia-A*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Polychaeta	Phyllodocida	Phyllodocidae	*Eumida*	*Eumida-B*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Phyllodocidae	*Eumida*	*Eumida-C*	SI	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Polynoidae	*Lepidonotus*	*polychromus*	N	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0
Polychaeta	Phyllodocida	Polynoidae	*Lepidonotus*	*jacksoni*	N	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
Polychaeta	Phyllodocida	Syllidae	*Eusyllis*	*Eusyllis-A*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Polychaeta	Phyllodocida	Syllidae	*Syllidae*	*Indet*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Autolytin-unknown*	*Autolytin-unknown-A*	SI	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Polychaeta	Phyllodocida	Syllidae	*Eusyllis*	*Eusyllis-B*	SI	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Eusyllin-unknown*	*Indet*	SI	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Syllis*	*Syllis-A*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Clavisyllis*	*alternata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Status: A = non-indigenous (highlighted by shading), C1 = cryptogenic category 1, C2 = cryptogenic category 2, N = native, SI = species indeterminata. See text for details.

Appendix 5a. Results from the diver collections and pile scrapings

					Berth code				M2																		NK2															
					Pile replicate				1								2										1								2					
					Pile position				IN				OUT				IN				OUT						IN				OUT				IN					OUT
Class	Orders	Family	Genus	Species	*Status	2	3	4	1	2	3	4	1	2	3	4	1	2	3	MISC	1	2	3	4			1	2	3	4	1	2	3	4	1	2	3	4	MISC	1
Polychaeta	Phyllodocida	Syllidae	*Trypanosyllis*	*gigantea*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Typosyllis*	*Typosyllis-A*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	1	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Sabellidae	*Megalomma*	*suspiciens*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0			0	0	1	0	0	0	1	0	0	0	0	0	0	0
Polychaeta	Sabellida	Sabellidae	*Pseudopotamilla*	*laciniosa*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	1	0	0	1	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Sabellidae	*Branchiomma*	*Branchiomma-B*	SI	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Sabellidae	*Pseudopotamilla*	*indet*	SI	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Serpulidae	*Galeolaria*	*hystrix*	N	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0			0	0	0	0	0	0	0	0	0	0	1	0	0	0
Polychaeta	Sabellida	Serpulidae	*Neovermilia*	*sphaeropomatus*	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0			0	0	0	0	0	0	1	0	0	0	0	0	0	0
Polychaeta	Sabellida	Serpulidae	*Spirobranchus*	*cariniferus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Serpulidae	*Serpula*	*Indet*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Terebellida	Acrocirridae	*Acrocirrus*	*trisectus*	N	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0			0	0	0	0	0	1	0	0	0	0	0	0	0	0
Polychaeta	Terebellida	Flabelligeridae	*Pherusa*	*parmata*	N	0	0	0	0	1	1	1	0	0	0	1	1	1	1	0	0	0	0	0			0	1	1	0	0	0	0	0	0	0	0	1	0	0
Polychaeta	Terebellida	Terebellidae	*Terebellidae*	*Indet*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	1	0	0	1	0	0	0	0	0	1	0	0
Polychaeta	Terebellida	Terebellidae	*Neoleprea*	*papilla*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	1	0	0	0	0	0	0	0	0
Polyplacophora	Acanthochitonina	Acanthochitonidae	*Cryptoconchus*	*porosus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	1	0	0	0	0	0	0	0
Polyplacophora	Ischnochitonina	Chitonidae	*Sypharochiton*	*pelliserpentis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	1	0	0	0	0	0	0	0	0
Polyplacophora	Ischnochitonina	Chitonidae	*Sypharochiton*	*sinclairi*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	1	0	0
Polyplacophora	Ischnochitonina	Mopaliidae	*Plaxiphora*	*caelata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	1	0	0	0	0	0	0	0	0
Pycnogonida	Pantopoda	Ammotheidae	*Achelia*	*assimilis*	N	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0			0	0	1	0	0	0	0	0	0	0	0	0	0	0
Pycnogonida	Pantopoda	Callipallenidae	*Pallenopsis*	*obliqua*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Anotrichium*	*crinitum*	N	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0			0	0	0	0	0	0	0	0	0	0	0	1	1	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Callithamnion*	*sp.*	SI	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0			0	0	0	0	0	0	0	0	0	0	1	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Griffithsia*	*sp.*	SI	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0			0	0	0	0	0	1	0	0	0	0	1	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Griffithsia*	*crassiuscula*	A	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	1	0	0	1	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Pterothamnion*	*simile*	N	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	1	0	0	0	1	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Pterothamnion*	*sp.*	SI	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0			0	0	0	0	0	0	0	0	0	0	1	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Antithamnion*	*pectinatum*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Antithamnion*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Ceramium*	*aff apiculatum*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	1	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Microcladia*	*novae-zelandiae*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	1	0	0	0
Rhodophyceae	Ceramiales	Dasyaceae	*Dasya*	*sp.*	SI	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0			0	0	0	0	0	0	1	0	0	0	1	0	0	0
Rhodophyceae	Ceramiales	Dasyaceae	*Dasya*	*subtilis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Deleseriaceae	*Myriogramme*	*denticulata*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	1	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Delesseriaceae	*Delesseriaceae*	*sp.*	SI	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Delesseriaceae	*Hypoglossum*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Bostrychia*	*harveyi*	N	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	1	0	0	0	0	0	0	0	0	1
Rhodophyceae	Ceramiales	Rhodomelaceae	*Stictosiphonia*	*hookeri*	N	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0			0	0	0	0	0	1	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Polysiphonia*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Bostrychia*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Gigartinales	Gigartinaceae	*Chondracanthus*	*chapmanii*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Gracilariales	Gracilariaceae	*Gracilaria*	*truncata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Rhodymeniales	Faucheaceae	*Gloiocladia*	*saccata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Rhodymeniales	Lomentariaceae	*Lomentaria*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Rhodymeniales	Rhodomeniaceae	*Rhodymenia*	*sp.*	SI	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0			0	0	0	0	0	0	1	1	0	0	0	0	1	0
Turbellaria	Polycladida		*Indet genus*	*indet sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	1	0	0	0	0	0	0	0
Ulvophyceae	Ulvales	Ulvaceae	*Ulva*	*sp.*	SI	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0			0	0	0	0	0	1	0	0	0	0	0	0	0	0
Ulvophyceae			*Unknown*	*filamentous green A*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ulvophyceae			*Unknown*	*filamentous green B*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Status: A = non-indigenous (highlighted by shading), C1 = cryptogenic category 1, C2 = cryptogenic category 2, N = native, SI = species indeterminata. See text for details.

Appendix 5a. Results from the diver collections and pile scrapings

					Berth code Pile replicate Pile position			
Class	Orders	Family	Genus	Species	*Status	2	3	4
Anthozoa	Actiniaria		*Actiniaria*	*sp.*	SI	0	0	0
Anthozoa	Corallimorpharia	Corallimorphidae	*Corynactis*	*australis*	C1	0	0	0
Anthozoa	Corallimorpharia	Corallimorphidae	*Corynactis*	*sp.*	SI	0	0	0
Ascidiacea	Aplousobranchia	Didemnidae	*Diplosoma*	*listerianum*	C1	0	0	0
Ascidiacea	Phlebobranchia	Rhodosomatidae	*Corella*	*eumyota*	C1	0	0	0
Ascidiacea	Stolidobranchia	Botryllinae	*Botrylliodes*	*leachii*	C1	0	0	0
Ascidiacea	Stolidobranchia	Molgulidae	*Molgula*	*mortenseni*	N	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*carnea*	N	0	0	1
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*rugata*	N	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Microcosmus*	*australis*	N	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*pulla*	N	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*subuculata*	N	0	0	1
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*nisiotus*	N	0	1	1
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*bicornuta*	N	0	1	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*sp.*	A	0	1	1
Ascidiacea	Stolidobranchia	Styelidae	*Asterocarpa*	*cerea*	C1	0	0	0
Asteroidea	Forcipulata	Asteriidae	*Stichaster*	*australis*	N	0	0	0
Asteroidea	Valvatida	Asterinidae	*Patiriella*	*regularis*	N	0	0	0
Bivalvia	Myoida	Hiatellidae	*Hiatella*	*arctica*	N	0	0	0
Bivalvia	Mytiloida	Mytilidae	*Xenostrobus*	*pulex*	N	1	1	1
Bivalvia	Mytiloida	Mytilidae	*Modiolarca*	*impacta*	N	0	0	1
Bivalvia	Mytiloida	Mytilidae	*Perna*	*canaliculus*	N	0	0	0
Bivalvia	Ostreoida	Anomiidae	*Pododesmus*	*zelandicus*	N	0	0	0
Bivalvia	Ostreoida	Ostreidae	*Crassostrea*	*gigas*	A	0	0	0
Bivalvia	Veneroida	Veneridae	*Irus*	*reflexus*	N	0	0	0
Bryopsidophyceae	Bryopsidales	Bryopsidaceae	*Derbesia*	*sp.*	SI	0	0	0
Crustacea	Anomura	Paguidae	*Pagurus*	*traversi*	N	0	0	0
Crustacea	Anomura	Porcellanidae	*Petrolisthes*	*novaezelandiae*	N	0	0	0
Crustacea	Brachyura	Grapsidae	*Plagusia*	*chabrus*	C1	0	1	1
Crustacea	Brachyura	Grapsidae	*Leptograpsus*	*variegatus*	N	0	0	0
Crustacea	Brachyura	Hymenosomatidae	*Halicarcinus*	*cookii*	N	0	0	0
Crustacea	Brachyura	Hymenosomatidae	*Neohymenicus*	*pubescens*	N	0	0	1
Crustacea	Brachyura	Majidae	*Notomithrax*	*minor*	N	0	0	1
Crustacea	Brachyura	Pinnotheridae	*Pinnotheres*	*atrinocola*	N	0	0	0
Crustacea	Brachyura	Pinnotheridae	*Pinnotheres*	*novaezelandiae*	N	0	0	0
Crustacea	Brachyura		*Brachyuran*	*megalopa*	SI	0	0	0
Crustacea	Caridea	Crangonidae	*Pontophilus*	*australis*	N	0	0	0
Crustacea	Caridea	Palemonidae	*Palaemon*	*affinis*	N	0	0	0
Crustacea	Thoracica	Balanidae	*Austrominius*	*modestus*	N	1	1	0
Crustacea	Thoracica	Balanidae	*Notobalanus*	*vestitus*	N	0	1	0
Crustacea	Thoracica	Balanidae	*Notomegabalanus*	*decorus*	N	0	0	0
Crustacea	Thoracica	Chthamalidae	*Chaemosipho*	*columna*	N	1	1	1
Crustacea	Thoracica	Pachylasmidae	*Epopella*	*plicata*	N	0	0	0
Demospongiae	Hadromerida	Suberitidae	*Pseudosuberites*	*sulcatus*	C1	0	0	0
Demospongiae	Halichondrida	Halichondriidae	*Halichondria*	*n. sp. 1 (knubby oxeas 290-380)*	C2	0	0	0
Demospongiae	Halisarcida	Halisarcidae	*Halisarca*	*dujardini*	A	0	0	0
Demospongiae	Haplosclerida	Chalinidae	*Haliclona*	*glabra*	N	0	0	0
Demospongiae	Poecilosclerida	Desmacellidae	*Biemna*	*rhabderemioides*	N	0	0	0
Demospongiae	Poecilosclerida	Esperiopsidae	*Esperiopsis*	*n. sp. 1 (smooth bubble sponge)*	C2	0	0	0
Demospongiae	Poecilosclerida	Hymedesmiidae	*Phorbas*	*fulva*	N	0	0	0
Demospongiae	Poecilosclerida	Hymedesmiidae	*Phorbas*	*n. sp. 2 (Taranaki)*	C2	0	0	0
Demospongiae	Poecilosclerida	Mycalidae	*Paraesperella*	*n. sp. 1 (macrosigma)*	C2	0	0	0
Gastropoda	Basommatophora	Siphonariidae	*Siphonaria*	*australis*	N	0	0	0
Gastropoda	Littorinimorpha	Calyptraeidae	*Sigapatella*	*novaezelandiae*	N	0	0	0
Gastropoda	Littorinimorpha	Littorinidae	*Risellopsis*	*varia*	N	1	0	0
Gastropoda	Littorinimorpha	Littorinidae	*Austrolittorina*	*antipodum*	N	0	0	0
Gastropoda	Littorinimorpha	Ranellidae	*Cabestana*	*spengleri*	N	0	0	0
Gastropoda	Neogastropoda	Muricidae	*Xymene*	*traversi*	N	0	0	0

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Appendix 5a. Results from the diver collections and pile scrapings

Class	Orders	Family	Genus	Species	Berth code Pile replicate Pile position *Status	2	3	4
Gastropoda	Neogastropoda	Muricidae	*Dicithais*	*orbita*	N	0	0	0
Gastropoda	Neotaenioglossa	Velutinidae	*Lamellaria*	*ophione*	N	0	0	0
Gastropoda	Nudibranchia	Dorididae	*Archidoris*	*wellingtonensis*	N	0	0	0
Gastropoda	Patellogastropoda	Lottiidae	*Patelloida*	*corticata*	N	1	0	0
Gastropoda	Patellogastropoda	Lottiidae	*Notoacmea*	*helmsi*	N	0	0	0
Gastropoda	Patellogastropoda	Lottiidae	*Notoacmea*	*parviconoidea*	N	0	0	0
Gastropoda	Vetigastropoda	Calliostomatidae	*Calliostoma*	*tigris*	N	0	0	0
Gastropoda	Vetigastropoda	Fissurellidae	*Scutus*	*breviculus*	N	0	0	0
Gymnolaemata	Cheilostomata	Beaniidae	*Beania*	*plurispinosa*	N	0	1	1
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*flabellata*	A	0	1	1
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*neritina*	A	0	1	1
Gymnolaemata	Cheilostomata	Bugulidae	*Bicellariella*	*ciliata*	N	0	0	0
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*stolonifera*	A	0	0	0
Gymnolaemata	Cheilostomata	Calloporidae	*Crassimarginatella*	*papulifera*	N	0	0	0
Gymnolaemata	Cheilostomata	Cryptosulidae	*Cryptosula*	*pallasiana*	A	0	0	0
Gymnolaemata	Cheilostomata	Romancheinidae	*Escharoides*	*angela*	N	0	0	0
Gymnolaemata	Cheilostomata	Scrupariidae	*Scruparia*	*ambigua*	C1	0	0	0
Gymnolaemata	Cheilostomata	Steginoporellidae	*Steginoporella*	*magnifica*	N	0	0	0
Gymnolaemata	Cheilostomata	Watersiporidae	*Watersipora*	*subtorquata*	A	0	0	0
Gymnolaemata	Cheilostomata	Watersiporidae	*Watersipora*	*arcuata*	A	1	0	0
Hydrozoa	Hydroida	Eudendriidae	*Eudendrium*	*capillare*	A	0	0	0
Hydrozoa	Hydroida	Haleciidae	*Halecium*	*beanii*	N	0	0	0
Hydrozoa	Hydroida	Plumulariidae	*Plumularia*	*setacea*	C1	1	0	0
Malacostraca	Amphipoda	Aoridae	*Haplocheira*	*barbimana*	N	0	1	0
Malacostraca	Amphipoda	Dexaminidae	*Paradexamine*	*pacifica*	N	0	0	0
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis*	*sp. 1*	SI	0	0	0
Malacostraca	Amphipoda	Leucothoidae	*Leucothoe*	*trailli*	N	0	1	1
Malacostraca	Amphipoda	Leucothoidae	*Leucothoe*	*sp. 1*	C2	0	0	0
Malacostraca	Isopoda	Sphaeromatidae	*Pseudosphaeroma*	*sp*	SI	0	0	0
Ophiuroidea	Ophiurida	Ophiactidae	*Ophiactis*	*resiliens*	N	0	0	0
Phaeophyceae	Scytosiphonales	Scytosiphonaceae	*Endarachne*	*binghamiae*	N	0	0	0
Polychaeta	Eunicida	Dorvilleidae	*Schistomeringos*	*loveni*	N	0	0	0
Polychaeta	Eunicida	Eunicidae	*Eunice*	*australis*	N	0	0	0
Polychaeta	Eunicida	Lumbrineridae	*Lumbrineris*	*sphaerocephala*	N	0	0	1
Polychaeta	Phyllodocida	Hesionidae	*Ophiodromus*	*angustifrons*	N	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*Perinereis-A*	SI	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*amblyodonta*	N	1	0	0
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*camiguinoides*	N	1	0	0
Polychaeta	Phyllodocida	Nereididae	*Neanthes*	*kerguelensis*	N	0	0	1
Polychaeta	Phyllodocida	Nereididae	*Platynereis*	*Platynereis_australis_group*	SI	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Nereididae*	*indet*	SI	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*pseudocamiguina*	N	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Nereis*	*Indet*	SI	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Nereis*	*falcaria*	N	0	0	1
Polychaeta	Phyllodocida	Phyllodocidae	*Eulalia*	*microphylla*	N	1	0	0
Polychaeta	Phyllodocida	Phyllodocidae	*Phyllodocidae*	*Indet*	SI	0	0	0
Polychaeta	Phyllodocida	Phyllodocidae	*Pirakia*	*Pirakia-A*	N	0	0	1
Polychaeta	Phyllodocida	Phyllodocidae	*Eumida*	*Eumida-B*	SI	0	0	0
Polychaeta	Phyllodocida	Phyllodocidae	*Eumida*	*Eumida-C*	SI	0	0	0
Polychaeta	Phyllodocida	Polynoidae	*Lepidonotus*	*polychromus*	N	1	0	0
Polychaeta	Phyllodocida	Polynoidae	*Lepidonotus*	*jacksoni*	N	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Eusyllis*	*Eusyllis-A*	SI	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Syllidae*	*Indet*	SI	1	0	0
Polychaeta	Phyllodocida	Syllidae	*Autolytin-unknown*	*Autolytin-unknown-A*	SI	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Eusyllis*	*Eusyllis-B*	SI	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Eusyllin-unknown*	*Indet*	SI	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Syllis*	*Syllis-A*	SI	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Clavisyllis*	*alternata*	N	0	0	0

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Appendix 5a. Results from the diver collections and pile scrapings

					Berth code Pile replicate Pile position			
Class	Orders	Family	Genus	Species	*Status	2	3	4
Polychaeta	Phyllodocida	Syllidae	*Trypanosyllis*	*gigantea*	N	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Typosyllis*	*Typosyllis-A*	SI	0	0	0
Polychaeta	Sabellida	Sabellidae	*Megalomma*	*suspiciens*	N	0	0	0
Polychaeta	Sabellida	Sabellidae	*Pseudopotamilla*	*laciniosa*	N	0	0	0
Polychaeta	Sabellida	Sabellidae	*Branchiomma*	*Branchiomma-B*	SI	0	0	0
Polychaeta	Sabellida	Sabellidae	*Pseudopotamilla*	*indet*	SI	0	0	0
Polychaeta	Sabellida	Serpulidae	*Galeolaria*	*hystrix*	N	0	0	0
Polychaeta	Sabellida	Serpulidae	*Neovermilia*	*sphaeropomatus*	N	0	0	1
Polychaeta	Sabellida	Serpulidae	*Spirobranchus*	*cariniferus*	N	1	0	0
Polychaeta	Sabellida	Serpulidae	*Serpula*	*Indet*	SI	0	0	0
Polychaeta	Terebellida	Acrocirridae	*Acrocirrus*	*trisectus*	N	0	0	0
Polychaeta	Terebellida	Flabelligeridae	*Pherusa*	*parmata*	N	0	0	0
Polychaeta	Terebellida	Terebellidae	*Terebellidae*	*Indet*	SI	0	0	1
Polychaeta	Terebellida	Terebellidae	*Neoleprea*	*papilla*	N	1	0	0
Polyplacophora	Acanthochitonina	Acanthochitonidae	*Cryptoconchus*	*porosus*	N	0	1	0
Polyplacophora	Ischnochitonina	Chitonidae	*Sypharochiton*	*pelliserpentis*	N	1	0	0
Polyplacophora	Ischnochitonina	Chitonidae	*Sypharochiton*	*sinclairi*	N	1	0	0
Polyplacophora	Ischnochitonina	Mopaliidae	*Plaxiphora*	*caelata*	N	0	0	0
Pycnogonida	Pantopoda	Ammotheidae	*Achelia*	*assimilis*	N	0	0	0
Pycnogonida	Pantopoda	Callipallenidae	*Pallenopsis*	*obliqua*	N	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Anotrichium*	*crinitum*	N	0	1	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Callithamnion*	*sp.*	SI	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Griffithsia*	*sp.*	SI	0	0	1
Rhodophyceae	Ceramiales	Ceramiaceae	*Griffithsia*	*crassiuscula*	A	0	1	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Pterothamnion*	*simile*	N	0	1	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Pterothamnion*	*sp.*	SI	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Antithamnion*	*pectinatum*	N	0	1	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Antithamnion*	*sp.*	SI	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Ceramium*	*aff apiculatum*	N	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Microcladia*	*novae-zelandiae*	N	0	0	0
Rhodophyceae	Ceramiales	Dasyaceae	*Dasya*	*sp.*	SI	0	1	0
Rhodophyceae	Ceramiales	Dasyaceae	*Dasya*	*subtilis*	N	0	0	1
Rhodophyceae	Ceramiales	Deleseriaceae	*Myriogramme*	*denticulata*	N	0	0	0
Rhodophyceae	Ceramiales	Delesseriaceae	*Delesseriaceae*	*sp.*	SI	0	0	0
Rhodophyceae	Ceramiales	Delesseriaceae	*Hypoglossum*	*sp.*	SI	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Bostrychia*	*harveyi*	N	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Stictosiphonia*	*hookeri*	N	1	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Polysiphonia*	*sp.*	SI	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Bostrychia*	*sp.*	SI	0	0	0
Rhodophyceae	Gigartinales	Gigartinaceae	*Chondracanthus*	*chapmanii*	N	0	0	0
Rhodophyceae	Gracilariales	Gracilariaceae	*Gracilaria*	*truncata*	N	0	0	0
Rhodophyceae	Rhodymeniales	Faucheaceae	*Gloiocladia*	*saccata*	N	0	0	0
Rhodophyceae	Rhodymeniales	Lomentariaceae	*Lomentaria*	*sp.*	SI	0	0	0
Rhodophyceae	Rhodymeniales	Rhodomeniaceae	*Rhodymenia*	*sp.*	SI	0	1	1
Turbellaria	Polycladida		*Indet genus*	*indet sp.*	SI	0	0	0
Ulvophyceae	Ulvales	Ulvaceae	*Ulva*	*sp.*	SI	0	0	0
Ulvophyceae			*Unknown*	*filamentous green A*	SI	1	0	0
Ulvophyceae			*Unknown*	*filamentous green B*	SI	0	0	0

*Status: A = non-indigenous (highlighted by shading), C1 = cryptogenic category 1, C2 = cryptogenic category 2, N = native, SI = species indeterminata. See text for details.

Appendix 5b. Results from the benthic grab samples.

					Berth code	B1			BW1			BW2			LBW1			M2			NK2			REC		
Class	Order	Family	Genus	Species	*Status	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Ascidiacea	Stolidobranchia	Molgulidae	*Molgula*	*mortenseni*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*carnea*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*rugata*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*bicornuta*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Asteroidea	Forcipulata	Asteriidae	*Allostichaster*	*polyplax*	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Bivalvia	Nuculoida	Nuculidae	*Nucula*	*hartvigiana*	N	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	1	0	1	1
Bivalvia	Veneroida	Semelidae	*Leptomya*	*retiaria*	N	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
Bivalvia	Veneroida	Semelidae	*Theora*	*lubrica*	A	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0
Bivalvia	Veneroida	Veneridae	*Irus*	*reflexus*	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Calcarea	Leucosolenida	Sycettidae	*Sycon*	*cf. ornatum*	N	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Crustacea	Anomura	Paguridae	*Pagurus*	*novizealandiae*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Crustacea	Brachyura	Hymenosomatidae	*Halicarcinus*	*cookii*	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Hymenosomatidae	*Halicarcinus*	*varius*	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Ocypodidae	*Macrophthalmus*	*hirtipes*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Echinoidea	Spatangoida	Loveniidae	*Echinocardium*	*cordatum*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Gastropoda	Vetigastropoda	Trochidae	*Micrelenchus*	*tenebrosus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Malacostraca	Amphipoda	Phoxocephalidae	*Torridoharpinia*	*hurleyi*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Phaeophyceae	Fucales	Sargassaceae	*Carpophyllum*	*maschalocarpum*	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Phaeophyceae	Sphacelariales	Stypocaulaceae	*Halopteris*	*sp.*	SI	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Eunicida	Lumbrineridae	*Lumbricalus*	*aotearoae*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0
Polychaeta	Eunicida	Lumbrineridae	*Eranno*	*Eranno-A*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Polychaeta	Eunicida	Onuphidae	*Onuphis*	*aucklandensis*	N	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0
Polychaeta	Eunicida	Onuphidae	*Diopatra*	*akarana*	N	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
Polychaeta	Eunicida	Onuphidae	*Onuphidae*	*Indet*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Polychaeta	Phyllodocida	Glyceridae	*Glycera*	*lamelliformis*	N	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0
Polychaeta	Phyllodocida	Nephtyidae	*Aglaophamus*	*verrilli*	N	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Sigalionidae	*Labiosthenolepis*	*laevis*	N	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Sigalionidae	*Pelogenia*	*antipoda*	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Polychaeta	Scolecida	Capitellidae	*Barantolla*	*lepte*	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Polychaeta	Scolecida	Orbiniidae	*Scoloplos*	*simplex*	N	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0
Polychaeta	Spionida	Spionidae	*Prionospio*	*aucklandica*	N	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Spionida	Spionidae	*Prionospio*	*multicristata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Polychaeta	Spionida	Spionidae	*Scolelepis*	*Scolelepis-A*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Polychaeta	Terebellida	Ampharetidae	*Amphicteis*	*Amphicteis-A*	SI	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Polychaeta	Terebellida	Flabelligeridae	*Pherusa*	*parmata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Polychaeta	Terebellida	Terebellidae	*Neoleprea*	*papilla*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Polychaeta	Terebellida	Terebellidae	*Streblosoma*	*toddae*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Griffithsia*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Deleseriaceae	*Myriogramme*	*denticulata*	N	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Rhodophyceae	Gelidiales	Gelidiaceae	*Pterocladiella*	*capillacea*	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Plocamiales	Plocamiaceae	*Plocamium*	*angustum*	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Rhodymeniales	Lomentariaceae	*Lomentaria*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

*Status: A = non-indigenous (highlighted by shading), N = native, C1 = cryptogenic category 1, C2 = cryptogenic category 2, SI = species indeterminata. See text for details.

Appendix 5c. Results from the benthic sled samples.

					Berth code	B2		BW1		BW2		LBW1		M2		NK2	
Class	Order	Family	Genus	Species	*Status	1	2	1	2	1	2	1	2	1	2	1	2
Anthozoa	Actiniaria		*Actiniaria*	*sp.*	SI	0	0	1	0	0	0	0	0	0	0	1	0
Ascidiacea	Phlebobranchia	Rhodosomatidae	*Corella*	*eumyota*	C1	1	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*nisiotus*	N	0	0	0	0	0	0	0	0	0	0	1	0
Ascidiacea	Stolidobranchia	Styelidae	*Styela*	*plicata*	C1	0	0	0	0	0	0	0	0	1	0	0	0
Asteroidea	Valvatida	Asterinidae	*Patiriella*	*regularis*	N	0	0	0	0	0	0	1	1	0	1	0	0
Bivalvia	Nuculoida	Nuculidae	*Nucula*	*hartvigiana*	N	1	1	0	0	1	1	1	1	1	1	1	1
Bivalvia	Nuculoida	Nuculidae	*Linucula*	*sp.*	SI	1	0	0	0	0	0	0	1	0	0	0	0
Bivalvia	Nuculoida	Nuculidae	*Nucula*	*nitidula*	N	1	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	Solemyoida	Solemyidae	*Solemya*	*parkinsonii*	N	0	1	0	0	0	0	0	0	0	0	0	0
Bivalvia	Veneroida	Semelidae	*Theora*	*lubrica*	A	1	1	1	0	1	1	1	1	1	1	1	1
Bivalvia	Veneroida	Semelidae	*Leptomya*	*retiaria*	N	1	1	0	0	0	0	0	0	0	0	1	0
Bivalvia	Veneroida	Veneridae	*Tawera*	*spissa*	N	0	0	0	0	0	0	1	1	1	0	0	1
Cladophorophyceae	Cladophorales	Cladophoraceae	*Cladophora*	*sp.*	SI	0	0	0	0	0	0	0	0	1	0	0	0
Crustacea	Anomura	Paguidae	*Pagurus*	*traversi*	N	0	0	0	0	0	0	1	1	0	0	0	0
Crustacea	Anomura	Paguridae	*Pagurus*	*novizealandiae*	N	0	0	1	0	0	0	0	0	0	0	1	1
Crustacea	Anomura	Porcellanidae	*Petrolisthes*	*novaezelandiae*	N	0	0	0	0	0	0	0	1	0	0	0	0
Crustacea	Brachyura	Grapsidae	*Plagusia*	*chabrus*	C1	0	0	0	0	0	0	0	0	0	0	1	0
Crustacea	Brachyura	Hymenosomatidae	*Halicarcinus*	*cookii*	N	0	0	1	0	0	0	0	0	1	0	1	0
Crustacea	Brachyura	Hymenosomatidae	*Hymenosoma*	*depressum*	N	0	0	0	0	0	0	0	0	0	0	0	1
Crustacea	Brachyura	Majidae	*Notomithrax*	*minor*	N	0	0	0	0	0	0	0	0	0	0	1	0
Crustacea	Brachyura	Ocypodidae	*Macrophthalmus*	*hirtipes*	N	1	0	0	0	1	0	0	1	0	0	1	0
Crustacea	Brachyura	Pinnotheridae	*Pinnotheres*	*atrinocola*	N	0	0	0	0	1	0	0	0	0	0	0	0
Crustacea	Brachyura	Portunidae	*Ovalipes*	*catharus*	N	0	0	1	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Portunidae	*Ovalipes*	*elongatus*	C2	0	1	0	0	0	0	0	0	0	0	0	0
Crustacea	Caridea	Crangonidae	*Pontophilus*	*australis*	N	0	0	1	0	0	0	0	1	0	1	1	1
Crustacea	Caridea	Palemonidae	*Palaemon*	*affinis*	N	0	0	0	0	0	0	0	0	1	1	0	1
Echinoidea	Spatangoida	Loveniidae	*Echinocardium*	*cordatum*	N	1	1	0	0	0	0	0	1	0	0	1	0
Gastropoda	Littorinimorpha	Naticidae	*Tanea*	*zelandica*	N	0	0	0	0	0	0	0	0	0	0	1	0
Gastropoda	Neogastropoda	Buccinidae	*Cominella*	*adspersa*	N	0	0	0	0	0	0	0	0	0	0	1	0
Gastropoda	Neogastropoda	Muricidae	*Xymene*	*traversi*	N	0	0	0	0	0	0	0	0	0	0	1	0
Gastropoda	Neogastropoda	Turridae	*Neoguraleus*	*sp.*	SI	0	0	0	0	0	0	0	0	1	0	0	1
Gastropoda	Neogastropoda	Turridae	*Phenatoma*	*rosea*	N	0	0	0	0	0	0	0	0	0	1	0	0
Gastropoda	Neotaenioglossa	Velutinidae	*Lamellaria*	*ophione*	N	0	0	0	0	0	0	0	0	1	0	0	0
Gastropoda	Notaspidea	Pleurobranchidae	*Pleurobranchaea*	*maculata*	N	0	0	0	0	0	0	0	0	0	1	0	0
Gastropoda	Nudibranchia	Dendrodorididae	*Dendrodoris*	*citrina*	N	0	0	0	0	0	0	0	0	0	0	0	1
Gastropoda	Nudibranchia	Dorididae	*Archidoris*	*wellingtonensis*	N	0	0	0	0	0	0	0	0	0	0	0	1
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*neritina*	A	1	0	0	0	0	0	1	1	1	1	0	0
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*flabellata*	A	0	1	0	0	0	0	0	0	1	1	1	0
Gymnolaemata	Cheilostomata	Candidae	*Tricellaria*	*inopinata*	A	0	0	0	0	0	0	0	1	0	0	0	0
Gymnolaemata	Cheilostomata	Scrupariidae	*Scruparia*	*ambigua*	C1	0	0	0	0	0	0	0	1	1	0	0	0
Gymnolaemata	Cheilostomata	Watersiporidae	*Watersipora*	*subtorquata*	A	0	0	0	0	0	0	0	0	0	1	0	0
Holothuroidea	Aspidochirotida	Stichopodidae	*Stichopus*	*mollis*	N	0	1	0	0	0	0	0	0	1	1	1	0
Malacostraca	Isopoda	Holognathiidae	*Cleantis*	*tubicola*	N	0	1	0	0	0	0	0	0	0	0	0	0
Phaeophyceae	Cutleriales	Cutleriaceae	*Microzonia*	*velutina*	N	0	0	0	1	0	0	0	0	0	0	0	0
Phaeophyceae	Dictyotales	Dictyotaceae	*Dictyota*	*papenfussii*	N	0	0	0	0	0	1	0	0	0	0	0	0
Phaeophyceae	Fucales	Cystoseiraceae	*Cystophora*	*torulosa*	N	0	0	0	0	0	0	1	0	0	0	0	0
Phaeophyceae	Fucales	Sargassaceae	*Sargassum*	*sinclairii*	N	0	1	0	0	0	0	0	0	0	0	0	0
Polychaeta	Eunicida	Lumbrineridae	*Lumbricalus*	*aotearoae*	N	0	0	0	0	0	0	0	0	0	0	1	0
Polychaeta	Phyllodocida	Glyceridae	*Glycera*	*lamelliformis*	N	0	0	0	0	0	1	0	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Platynereis*	*Platynereis_australis_group*	SI	0	0	0	0	0	0	0	0	0	0	1	0
Polychaeta	Phyllodocida	Sigalionidae	*Labiosthenolepis*	*laevis*	N	0	0	0	0	0	0	0	0	0	0	1	1
Polychaeta	Scolecida	Opheliidae	*Armandia*	*maculata*	N	0	0	0	0	0	0	0	0	1	0	0	0
Polychaeta	Scolecida	Orbiniidae	*Scoloplos*	*simplex*	N	0	0	0	0	0	1	0	0	0	0	1	0
Polychaeta	Spionida	Spionidae	*Spionidae*	*Indet*	SI	0	0	0	0	0	1	0	0	0	0	0	0
Polychaeta	Terebellida	Pectinariidae	*Pectinaria*	*australis*	N	1	0	0	0	0	0	0	0	0	0	0	0
Polyplacophora	Acanthochitonina	Acanthochitonidae	*Cryptoconchus*	*porosus*	N	0	1	0	0	0	0	0	0	0	0	0	0

*Status: A = non-indigenous (highlighted by shading), N = native, C! = cryptogenic category 1, C2 = cryptogenic category 2, SI = species indeterminata. See text for details.

Appendix 5c. Results from the benthic sled samples.

					Berth code	B2		BW1		BW2		LBW1		M2		NK2	
Class	Order	Family	Genus	Species	*Status	1	2	1	2	1	2	1	2	1	2	1	2
Polyplacophora	Ischnochitonina	Chitonidae	*Sypharochiton*	*pelliserpentis*	N	1	0	0	0	0	0	0	0	0	0	0	0
Pycnogonida	Pantopoda	Ammotheidae	*Achelia*	*sp. nov. A*	C2	0	0	1	0	0	0	0	0	1	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Pterothamnion*	*sp.*	SI	0	0	0	1	1	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Anotrichium*	*crinitum*	N	1	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Antithamnion*	*sp.*	SI	0	0	0	0	1	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Centroceras*	*clavulatum*	N	0	0	1	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Dasyaceae	*Dasya*	*subtilis*	N	0	0	0	0	0	0	0	0	0	1	0	0
Rhodophyceae	Ceramiales	Delesseriaceae	*Delesseriaceae*	*sp.*	SI	0	0	0	0	0	1	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Polysiphonia*	*sp.*	SI	0	0	0	0	1	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Pterosiphonia*	*pennata*	N	0	0	1	0	0	0	0	0	0	0	0	0
Rhodophyceae	Corallinales	Corallinaceae	*Haliptilon*	*roseum*	N	0	0	0	1	0	1	0	0	0	0	0	0
Rhodophyceae	Corallinales	Corallinaceae	*Corallina*	*officinalis*	N	0	0	0	1	0	0	0	0	0	0	0	0
Rhodophyceae	Gigartinales	Gigartinaceae	*Gigartina*	*sp.*	SI	0	0	1	0	0	0	0	0	0	0	0	0
			Land plants	-	SI	0	0	0	0	0	0	0	1	0	0	0	0
			Too small to ID	-	SI	0	0	0	0	0	0	0	0	0	0	0	1

*Status: A = non-indigenous (highlighted by shading), N = native, C! = cryptogenic category 1, C2 = cryptogenic category 2, SI = species indeterminata. See text for details.

Appendix 5d. Results from the dinoflagellate cyst core samples.

				Berth code	BE		BW1		BW2		LBW1		M2-3		MC		NKE	
Class	Order	Family	Genus	Species	*Status	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Dinophyceae	Gymnodiniales	Gymnodiniacea	*Gymnodinium*	*catenatum*	C1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Dinophyceae	Gymnodiniales	Polykrikaceae	*Pheopolykrikos*	*sp.*	N	1	0	0	0	0	0	0	0	0	1	0	0	0	0
Dinophyceae	Peridiniales	Gonyaulacaceae	*Gonyaulax*	*grindleyi*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Dinophyceae	Peridiniales	Peridiniaceae	*Scrippsiella*	*trochoidea*	N	0	0	0	0	0	0	0	0	0	0	1	0	1	0

*Status: A = non-indigenous (highlighted by shading), N = native, C1 = cryptogenic category 1, C2 = cryptogenic category 2, SI = species indeterminata. See text for details.

Appendix 5e. Results from the fish trap samples.

					Berth code	B2				BW2				LBW1				M2				NK2				REC			
					Line No.	1		2		1		2		1		2		1		2		1		2		1		2	
Class	Order	Family	Genus	Species	*Status	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Actinopterygii	Anguilliformes	Congridae	*Conger*	*wilsoni*	N	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0
Actinopterygii	Gasterosteiformes	Syngnathidae	*Hippocampus*	*abdominalis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Actinopterygii	Perciformes	Arripidae	*Arripis*	*trutta*	N	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Actinopterygii	Perciformes	Carangidae	*Pseudocarynx*	*dentex*	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	1
Actinopterygii	Perciformes	Carangidae	*Trachurus*	*novaezelandiae*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Actinopterygii	Perciformes	Cheilodactylidae	*Nemadactylus*	*macropterus*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Actinopterygii	Perciformes	Labridae	*Notolabrus*	*celidotus*	N	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Vetigastropoda	Turbinidae	*Cookia*	*sulcata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Malacostraca	Isopoda	Cymothoidae	*?genus*	*sp*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

*Status: A = non-indigenous (highlighted by shading), N = native, C1 = cryptogenic category 1, C2 = cryptogenic category 2, SI = species indeterminata. See text for details.

Appendix 5f. Results from the crab trap samples.

						Taranaki_Port																								
					Berth code	B2				BW2				LBW1				M2				M2-3	NK2				REC			
					Line no.	1		2		1		2		1		2		1		2		1	1		2		1		2	
Class	Order	Family	Genus	Species	*Status	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	1	2	1	2	1	2	1	2
Actinopterygii	Anguilliformes	Congridae	*Conger*	*wilsoni*	N	1	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0
Actinopterygii	Gadiformes	Moridae	*Pseudophycis*	*breviuscula*	N	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
Actinopterygii	Gadiformes	Moridae	*Lotella*	*rhacinus*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Actinopterygii	Gasterosteiformes	Syngnathidae	*Hippocampus*	*abdominalis*	N	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Actinopterygii	Perciformes	Labridae	*Notolabrus*	*celidotus*	N	0	1	0	0	0	1	1	1	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0
Actinopterygii	Perciformes	Labridae	*Notolabrus*	*fucicola*	N	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Asteroidea	Valvatida	Asterinidae	*Patiriella*	*regularis*	N	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Anomura	Paguridae	*Pagurus*	*novizealandiae*	N	1	1	0	1	1	1	1	1	0	1	1	0	1	1	1	1	0	1	1	0	1	0	1	1	1
Crustacea	Brachyura	Cancridae	*Cancer*	*novaezelandiae*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Crustacea	Brachyura	Grapsidae	*Plagusia*	*chabrus*	C1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0
Crustacea	Brachyura	Majidae	*Notomithrax*	*minor*	N	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Gastropoda	Neogastropoda	Buccinidae	*Cominella*	*adspersa*	N	1	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	1	1	1	1	1	0	0	0	0
Gastropoda	Neogastropoda	Buccinidae	*Austrofusus*	*glans*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

*Status: A = non-indigenous (highlighted by shading), N = native, C1 = cryptogenic category 1, C2 = cryptogenic category 2, SI = species indeterminata. See text for details.

Appendix 5g. Results from the starfish trap samples.

					Berth code	B2				BW2				LBW1				M2				NK2				REC			
					Line No.	1		2		1		2		1		2		1		2		1		2		1		2	
Class	Order	Family	Genus	Species	*Status	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Gastropoda	Neogastropoda	Buccinidae	*Cominella*	*adspersa*	N	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	1	0	0	1	1	0	0	0	0
Actinopterygii	Gasterosteiformes	Syngnathidae	*Hippocampus*	*abdominalis*	N	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Asteroidea	Valvatida	Asterinidae	*Patiriella*	*regularis*	N	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
Crustacea	Anomura	Paguridae	*Pagurus*	*novizealandiae*	N	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Holothuroidea	Aspidochirotida	Stichopodidae	*Stichopus*	*mollis*	N	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Actinopterygii	Perciformes	Labridae	*Notolabrus*	*celidotus*	N	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Grapsidae	*Plagusia*	*chabrus*	C1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Gastropoda	Patellogastropoda	Lottiidae	*Patelloida*	*corticata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

*Status: A = non-indigenous (highlighted by shading), N = native, C1 = cryptogenic category 1, C2 = cryptogenic category 2, SI = species indeterminata. See text for details.

Appendix 5h. Results from the shrimp trap samples.

					Berth code	B2				BW2				LBW1				M2				NK2				REC			
					Line No.	1		2		1		2		1		2		1		2		1		2		1		2	
Class	Order	Family	Genus	Species	*Status	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2

Nothing captured in shrimp traps

*Status: A = non-indigenous (highlighted by shading), N = native, C1 = cryptogenic category 1, C2 = cryptogenic category 2, SI = species indeterminata. See text for details.

Appendix 5i. Results from visual shoreline surveys.

					Berth code	BR	BW2	MP	PBH	REC	
Class	Order	Family	Genus	Species	*Status	1	1	1	1	1	1
Rhodophyceae	Ceramiales	Rhodomelaceae	*Polysiphonia*	*sertularioides*	A	1	0	0	0	0	1
Rhodophyceae	Halymeniales	Halymeniaceae	*Cryptonemia*	*latissima*	N	1	0	1	0	0	0
Ulvophyceae	Ulvales	Ulvaceae	*Ulva*	*sp.*	SI	0	0	1	0	0	0
Bangiophyceae	Erythropeltidales	Erythrothrichiaceae	*Erythrotrichia*	*sp.*	SI	1	0	0	0	0	0
Phaeophyceae	Fucales	Cystoseiraceae	*Cystophora*	*retroflexa*	N	1	0	0	0	0	0
Phaeophyceae	Fucales	Sargassaceae	*Carpophyllum*	*maschalocarpum*	N	1	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Ceramium*	*flaccidum*	N	0	0	0	0	0	1
Rhodophyceae	Ceramiales	Ceramiaceae	*Griffithsia*	*sp.*	SI	1	0	0	0	0	0
Rhodophyceae	Halymeniales	Halymeniaceae	*Halymenia*	*sp.*	SI	0	0	0	0	0	1
Rhodophyceae	Rhodymeniales	Rhodomeniaceae	*Rhodymenia*	*leptophylla*	N	1	0	0	0	0	0
Rhodophyceae	Rhodymeniales	Rhodomeniaceae	*Rhodymenia*	*sp.*	SI	1	0	0	0	0	0
Ulvophyceae	Ulvales	Ulvaceae	*Enteromorpha*	*compressa*	N	0	0	0	0	1	0
Ulvophyceae	Ulvales	Ulvaceae	*Enteromorpha*	*sp.*	SI	1	0	0	0	0	0

*Status: A = non-indigenous (highlighted by shading), N = native, C1 = cryptogenic category 1, C2 = cryptogenic category 2, SI = species indeterminata. See text for details.

Appendix 5i. Results from visual shoreline surveys.

						LBW1
Class	Orders	Family	Genus	Species	*Status	1
Ascidiacea	Phlebobranchia	Rhodosomatidae	*Corella*	*eumyota*	C1	1
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*bicornuta*	N	1
Asteroidea	Forcipulata	Asteriidae	*Stichaster*	*australis*	N	1
Asteroidea	Valvatida	Asterinidae	*Patiriella*	*regularis*	N	1
Bivalvia	Arcoida	Arcidae	*Barbatia*	*novaezelandiae*	N	1
Bivalvia	Myoida	Hiatellidae	*Hiatella*	*arctica*	N	1
Bivalvia	Ostreoida	Anomiidae	*Pododesmus*	*zelandicus*	N	1
Bivalvia	Veneroida	Veneridae	*Irus*	*reflexus*	N	1
Gastropoda	Neogastropoda	Buccinidae	*Cominella*	*adspersa*	N	1
Gastropoda	Neogastropoda	Muricidae	*Dicithais*	*orbita*	N	1
Gastropoda	Patellogastropoda	Lottiidae	*Patelloida*	*corticata*	N	1
Gastropoda	Patellogastropoda	Nacellidae	*Cellana*	*ornata*	N	1
Gastropoda	Patellogastropoda	Nacellidae	*Cellana*	*radians*	N	1
Gastropoda	Patellogastropoda	Nacellidae	*Cellana*	*stellifera*	N	1
Gastropoda	Vetigastropoda	Calliostomatidae	*Calliostoma*	*punctulatum*	N	1
Gastropoda	Vetigastropoda	Trochidae	*Cantharidus*	*purpureus*	N	1
Gastropoda	Vetigastropoda	Trochidae	*Micrelenchus*	*sanguineus*	N	1
Gastropoda	Vetigastropoda	Trochidae	*Trochus*	*viridus*	N	1
Gastropoda	Vetigastropoda	Turbinidae	*Cookia*	*sulcata*	N	1
Gastropoda	Vetigastropoda	Turbinidae	*Turbo*	*smaragdus*	N	1
Gymnolaemata	Cheilostomata	Smittinidae	*Parasmittina*	*delicatula*	N	1
Malacostraca	Amphipoda	Liljeborgiidae	*Liljeborgia*	*sp.*	SI	1
Ophiuroidea	Ophiurida	Ophiactidae	*Ophiactis*	*resiliens*	N	1
Phaeophyceae	Fucales	Cystoseiraceae	*Cystophora*	*retroflexa*	N	1
Phaeophyceae	Fucales	Sargassaceae	*Carpophyllum*	*maschalocarpum*	N	1
Phaeophyceae	Fucales	Sargassaceae	*Sargassum*	*sinclairii*	N	1
Polyplacophora	Acanthochitonina	Acanthochitonidae	*Cryptoconchus*	*porosus*	N	1
Polyplacophora	Ischnochitonidae	Ischnochitonidae	*Eudoxochiton*	*nobilis*	N	1
Polyplacophora	Ischnochitonina	Chitonidae	*Sypharochiton*	*sinclairi*	N	1

*Status: A = non-indigenous (highlighted by shading), N = native, C1 = cryptogenic category 1, C2 = cryptogenic category 2, SI = species indeterminata. See text for details.

Addendum

After completing these reports we were advised of changes in the identification of one species. The ascidian *Cnemidocarpa sp*. refered to in this report as a new introduction to New Zealand has been revised to *Cnemidocarpa nisiotus* (status: native).