Port of Timaru

Baseline survey for non-indigenous marine species (Research Project ZBS2000/04)

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Prepared for BNZ Post-clearance Directorate
by Graeme Inglis, Nick Gust, Isla Fitridge, Oliver Floerl, Chris Woods, Barbara Hayden, Graham Fenwick

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Publication Adviser
MAF Information Bureau
P O Box 2526
WELLINGTON

Telephone: (04) 474 4100
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Executive Summary

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

- 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 Timaru. 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 Timaru 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 282 species or higher taxa was identified from the Timaru Port survey. They consisted of 177 native species, 16 non-indigenous species, 27 cryptogenic species (those whose geographic origins are uncertain) and 62 species indeterminata (taxa for which there is insufficient taxonomic or systematic information available to allow identification to species level).

- Twenty-one species of marine organisms collected from the Port of Timaru have not previously been described from New Zealand waters. Three of these were newly discovered non-indigenous species (a crab, *Cancer gibbosulus*, an amphipod, *Caprella mutica*, and an ascidian, *Cnemidocarpa* sp.), and 18 are considered cryptogenic. The 18 cryptogenic species included eight species of amphipod, a pycnogonid, an ascidian, and eight species of sponge that did not match existing descriptions and may be new to science.

- The 16 non-indigenous organisms described from the Port of Timaru included representatives of five phyla. The non-indigenous species detected (ordered alphabetically by phylum, class, order, family, genus and species) were: (Annelida) *Euchone limnicola*, *Barantolla lepte*, (Bryozoa) *Bugula flabellata*, *Bugula neritina*, *Cryptosula pallasiana* and *Watersipora subtorquata*, (Crustacea) *Caprella mutica*, *Apocorophium acutum*, *Monocorophium acherusicum, Jassa slatteryi* and *Cancer gibbosulus*, (Phycophyta) *Undaria pinnatifida*, *Griffithsia crassiuscula*, *Polysiphonia subtilissima*, (Urochordata) *Ciona intestinalis* and *Cnemidocarpa sp*.

- The only species from the Port of Timaru on the New Zealand register of unwanted organisms is the Asian kelp, *Undaria pinnatifida*. This alga is known to now have a wide distribution in southern and eastern New Zealand.

- Most non-indigenous species located in the Port are likely to have been introduced to New Zealand accidentally by international shipping. Approximately 69 % (11 of 16 species) of NIS in the Port of Timaru are likely to have been introduced in hull fouling assemblages, and 31 % (five species) 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 Timaru (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 Timaru, 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 Timaru 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.

DESCRIPTION OF THE PORT OF TIMARU

The Port of Timaru is on the central east coast of New Zealand's South Island (Figs. 1,2), south of Caroline Bay (44° 25'S. 171° 15'E). It is an artificial harbour, protected by two man-made concrete breakwaters (Fig. 2). Vessels of up to 228 m in length and up to 10.9 m draft regularly use the Port due to its wide, deep approach channel and the sheltered inner harbour environment. The approach channel is 1.5 nautical miles long (www.primeport.co.nz).

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

PORT OPERATION AND SHIPPING MOVEMENTS

The first Māori to settle in the district appear to have inhabited the caves and rock overhangs in the limestone country of the Opihi and Opuha River gorges, and were followed by the Rapuwai and Ngāti Māmoe. In 1837 Joseph Price, established a shore station at Patiti (Jacks) Point, with a subsidiary station at Whalers Creek. In 1853 the Canterbury Provincial Government defined the town boundaries and residents began to arrive. Progress was slow and by 1874 the population was still less than 2,000, chiefly because of the difficulties of access. Port facilities were non-existent and ships were moored out in the open roadstead. Wrecks were frequent. A landing service was initiated by the Provincial Government in 1864 and in 1870 a local authority, the Timaru and Gladstone Board of Works, completed a groyne which was the first step in the development of harbour works. A harbour board was formed in 1877 and a 300-ft breakwater begun in the following year. By 1881 it had been extended in stages to 2,000 ft. The eastern extension, which makes the harbour safe in all weathers, was begun in 1900 and finished in 1906 (Hassall 1955). The Port of Timaru handled 273,076 tons in 1964, the major exports being frozen meat, timber, wool, and manufactured goods (www.teara.govt.nz).

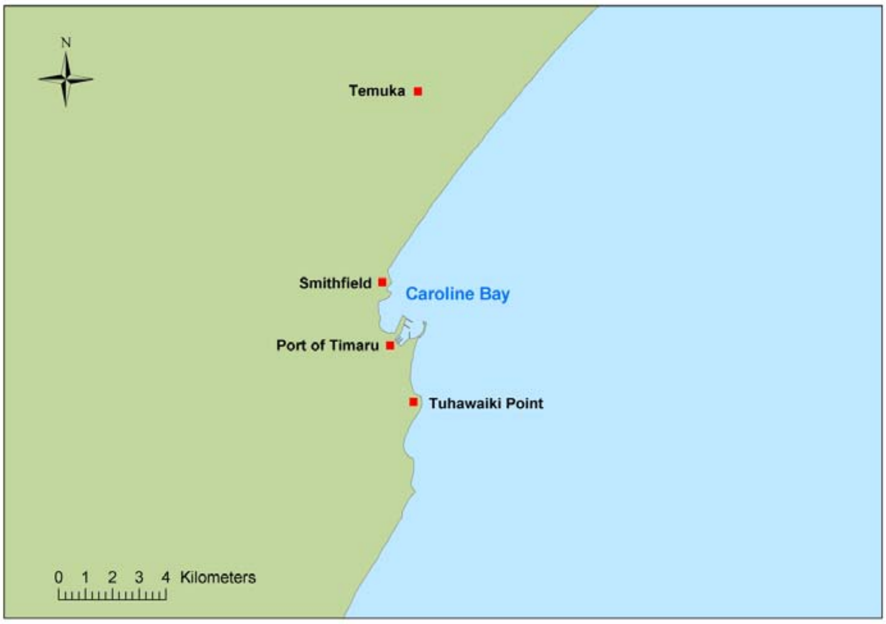

Figure 2: Caroline Bay and Timaru coast map

The Port of Timaru is currently New Zealand's second largest fishing port and is run by PrimePort Timaru (www.primeport.co.nz). Accordingly its principal users are fishing vessels and the main imports and exports are seafood. Other major export products include grain, bulk chemicals, livestock, vegetables, and MDF forestry products. Timaru is the major South Island export port for bulk tallow. In 2004, PrimePort exchanged 1.2 million tonnes of cargo, a small increase over the previous year, with 55,000 TEU (www.primeport.co.nz).

The Port incorporates seven main terminals of varying depths and lengths, as shown in Table 1. The largest of these is the North Mole Container Terminal, which at 460 m length is capable of handling a wide variety of cargo such as containers, fertiliser, woodchips and livestock. The other terminals range from 100 to 220 m in length and handle reefer exports, logs, bulk chemicals, diesel bunkers, grains and fish imports/exports (Table 1.). Berth construction is a mixture of concrete and wood decking on predominantly Australian hardwood piles.

Initial analyses of shipping patterns show that most (60 %) commercial vessels visiting the port arrive from Australia and other New Zealand ports (Inglis 2001). More recent analyses of shipping arrivals to the Port of Timaru (Campbell 2004) show that there was a total of 11 international ship visits during 2002/2003 (nine merchant and two fishing pleasure vessels) with essentially the same source country proportions as in Inglis (2001). In 2000, there were 30 registered fishing vessels in the Port of Timaru (Sinner et al 2000). In 2004, the total number of ships visiting the Port of Timaru was 391 (www.primeport.co.nz).

Vessels unable to be berthed immediately in the port may anchor outside the port, 1.5 nautical miles southeast of the Fairway beacon (44°24.2'S, 171°19.2'E). Pilotage is compulsory on vessels over 500 GRT or in excess of 44 m in length (Roger Dunn, PimePort Timaru, pers. comm.). According to Inglis (2001), a total volume of 3,885 m^3 of ballast water was discharged in the Port of Timaru in 1999, with the largest country-of-origin volumes of 3,012 m^3 from South Korea, 177 m^3 from Australia, and 696 m^3 unspecified.

Vessels are expected to comply with the Voluntary Controls on the Discharge of Ballast Water in New Zealand (www.fish.govt.nz/sustainability/biosecurity). Ballast water is to be exchanged in mid-ocean (away from coastal influences) en route to New Zealand and only the exchanged water is to be discharged while in port.

Within the port, there is on-going maintenance dredging every 10 months to maintain appropriate channel depth with approximately 100,000m^3 of spoil removed, although this varies considerably from year to year. The spoil is taken out to a consented spoil ground marked on nautical chart NZ6422 (Roger Dunn, PimePort Timaru, pers. comm.). Current development has been primarily focused on the PrimePort Dairy Store and associated services at South Beach, and the purchase of a new container forklift (www.primeport.co.nz). There is also a current emphasis on increasing productivity and efficiency within the Port of Timaru.

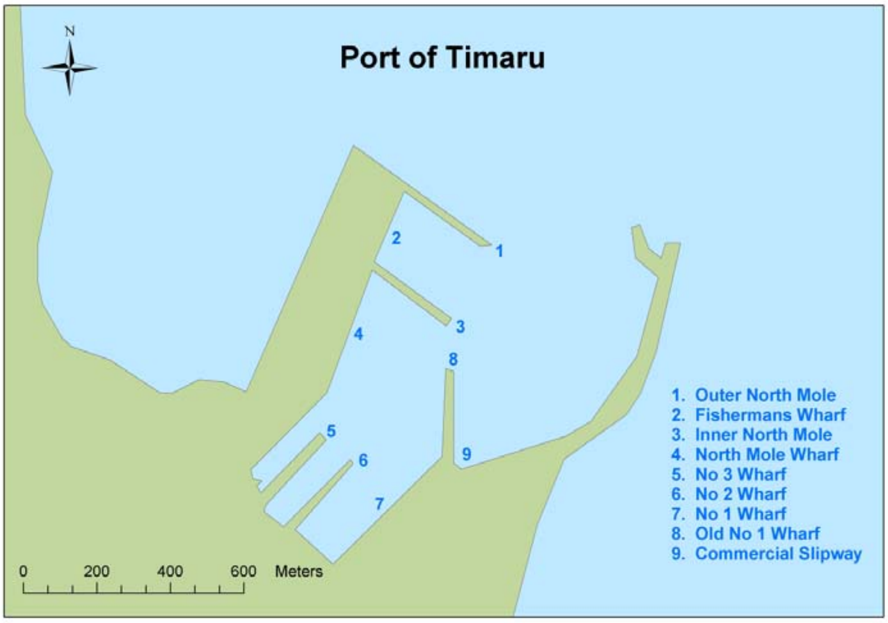

Figure 3: Port of Timaru map

PHYSICAL ENVIRONMENT OF TIMARU HARBOUR

The coastal zone in the vicinity of Timaru harbour is a high-energy environment with large northward-directed fluxes of a wide range of sediment sizes. Sediment transport past the Port occurs in two different but closely related systems. The harbour was formed from part of an extensive gravel beach ecosystem that runs along the South Canterbury coastline (Thrush 1986). These gravel beaches are highly mobile and are generally biologically impoverished due to storm driven wave action and turbidity, which influences the structure of benthic communities (Thrush 1986).

EXISTING BIOLOGICAL INFORMATION

Several biological studies have taken place just outside the Port of Timaru, most recently as a result of assessing the ecological effects of dredging the main shipping channel to the Port. Other studies are related to the biological effects of proposed reclamation works within the Port. We briefly review these studies below, and note that none of these surveys has specifically focused on collecting and identifying non-indigenous marine species.

Jillett (1979) reported on the biological effects of the proposed Evans Bay reclamation, as part of an environmental impact assessment by the Timaru Harbour Board. Benthic samples were collected from the sublittoral zone by dredge in the area of the proposed development, and the intertidal zone was also visually examined. Although animals present were typical of those known elsewhere from New Zealand, the conditions at the site were deemed unstable as there was no evidence of a particularly established benthic population. A limited species list was produced.

Thrush (1986) investigated the ecological implications of a proposed extension of the sea-wall and re-alignment of the beach at South Beach, Timaru. The study was part of a larger environmental impact assessment completed by the Timaru Harbour Board. Visual observations were made of the immediate area upon which the proposed groin would impact. The proposed extension was thought unlikely to significantly affect the ecology of the area. Thrush (1986) also makes reference to the fact that coarser gravel sediments of the type found at Timaru will result generally in a low abundance and biomass of organisms. Furthermore he expected that frequent and severe disturbance due to wave action (and associated sand and gravel scour) would reduce diversity and abundance of flora and fauna along both the outer and more sheltered inner parts of the sea-wall.

The invasive kelp *Undaria pinnatifida* was identified in the Port of Timaru in 1987, and this port is deemed to be in the optimal temperature zone for this macroalga (Sinner et al 2000).

Royds Consulting Limited (1994) was commissioned by the Port of Timaru to undertake a study of the diversity, abundance and age structure of the benthic community outside the Port. They found a healthy community, high in density and diversity of species covering a broad spectrum of phyla. The fauna characterised both open sand beaches and an annelid assemblage typical of fine sediments and muds. Lists of specimens were produced for each of the study sites. Typically, only molluscs, decapod crustaceans and larger invertebrates were identified to species. Many of the polychaetes and smaller crustaceans were identified only to genus or family level.

Bunckenburg (1997) repeated the Royds Consulting sampling of 1994, and investigated the diversity and abundance of the benthic faunal community at nine offshore sites in the approaches to Timaru Harbour. A total of 6,179 individuals collected from 61 taxa were identified in this study, with polychaetes dominating the fauna. Again, no non-indigenous species were recorded.

Bunckenburg undertook a further study in 2000 (Bunckenburg 2000). The most striking feature from this study was the presence of large densities of the Venus shell *Dosinia anus* at all but two sample sites. Maximum densities in excess of 3,300 animals per m^2 were recorded at some sites. No holothurians were present in any of the samples taken, while the prior study had shown the group to be an important member of the local benthic assemblage.

Fenwick (2001) assessed the likely ecological effects of deepening, extending and realigning the main shipping channel and dumping spoil from these operations closer to the Washdyke shore, north of the Port of Timaru. Faunal assemblages from the channel were representative of those over a wide area within the depth zone north and south of the Port, and of no major significance in terms of New Zealand's marine biodiversity. Species lists were produced.
Taylor and MacKenzie (2001) tested the Port of Timaru for the presence of the toxic blooming dinoflagellate *Gymnodinium catenatum*, and did not detect any resting cysts (sediment samples) or 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, 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 Timaru survey. The survey was undertaken between February 11th and 18th, 2002. Most sampling was concentrated on four main berths: No.1, No. 3, Fishermans Wharf and North Mole Container Terminal. A summary of sampling effort within the Port of Timaru 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. 4). 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.

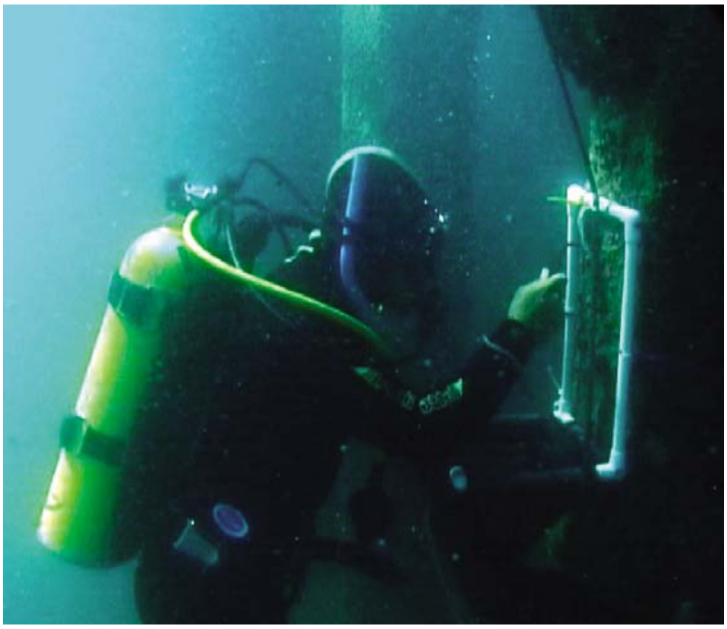

Figure 4: Diver sampling organisms on pier piles.

BENTHIC INFAUNA

Benthic infauna was sampled using a Shipek grab sampler deployed from a research vessel moored adjacent to the berth (Fig. 5), 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.

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. 6). 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 2 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: Shipek grab sampler: releasing benthic sample into bucket

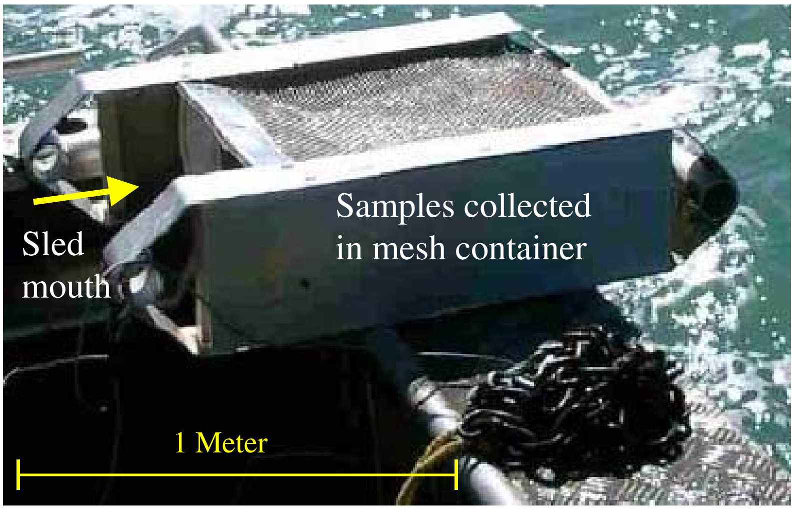

Figure 6: Benthic sled

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. 7). 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).

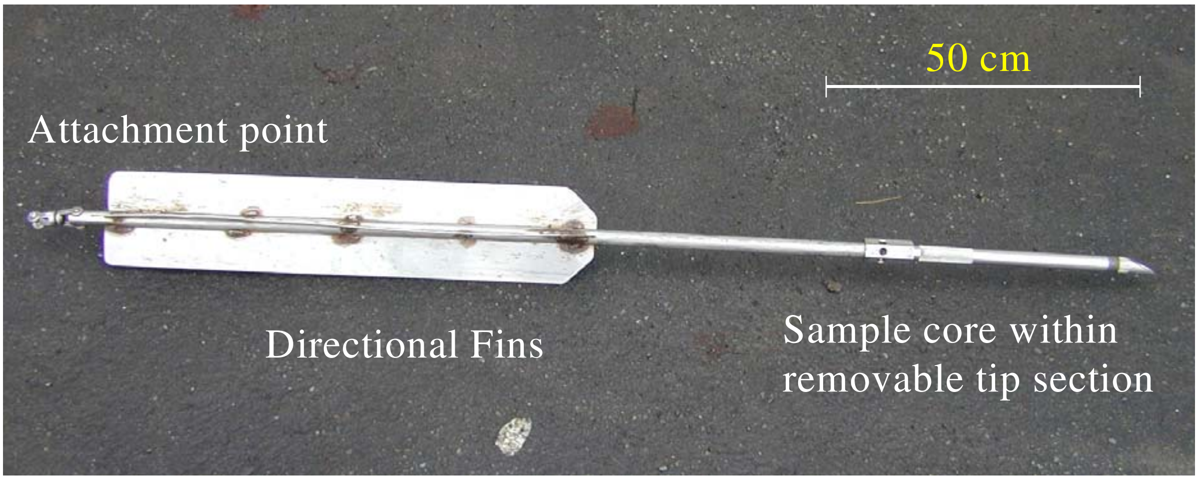

Figure 7: Javelin corer

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. 8). 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. 8). 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. 8). 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.

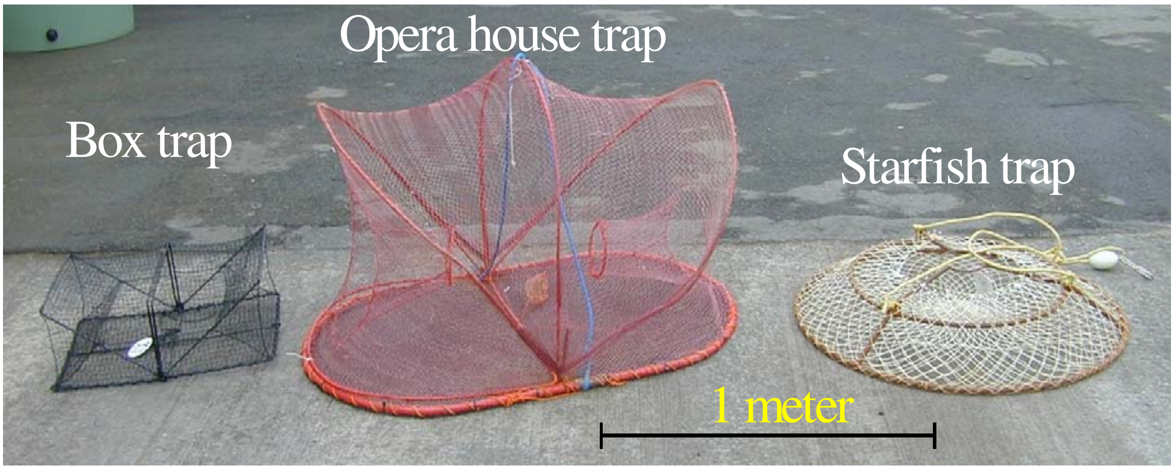

Figure 8: Trap types deployed in the port.

SAMPLING EFFORT

A summary of sampling effort within the Port of Timaru 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 number of quadrats sampled on each pile relative to 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. Total sampling effort was constrained by the costs of processing and identifying specimens obtained during the survey.

The spatial distribution of sampling effort for each of the sample methods in the Port of Timaru is indicated in the following figures: diver pile scrapings (Fig. 9), benthic sledding (Fig. 10), box, starfish and shrimp trapping (Fig. 11), opera house fish trapping (Fig. 12), shipek grab sampling (Fig. 13) and javelin cyst coring (Fig. 14). Sampling effort was varied between ports and marinas 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.

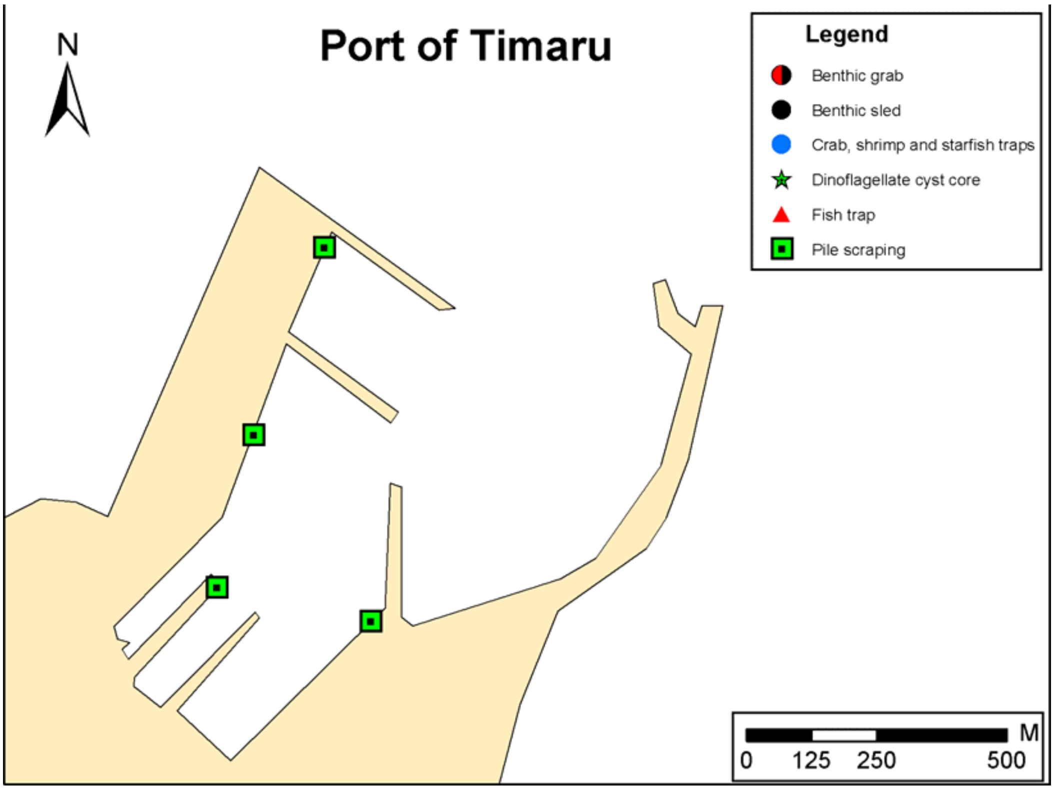

Figure 9: **Diver pile scraping sites (green squares)**

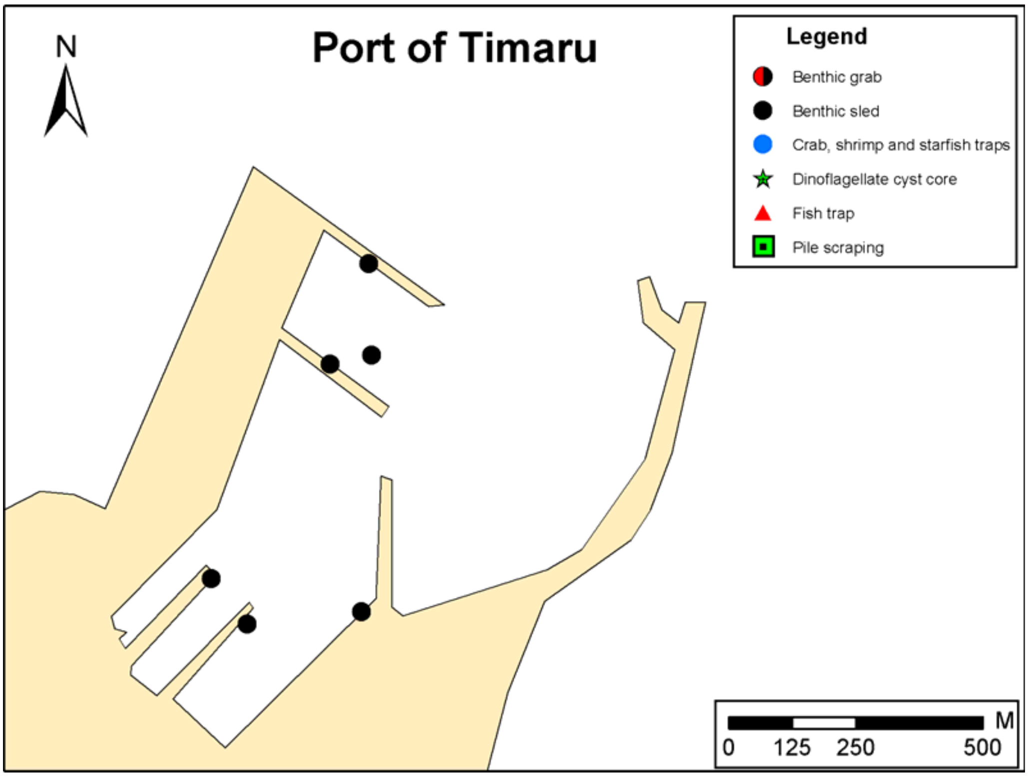

Figure 10: **Benthic sled sites (black circles)**

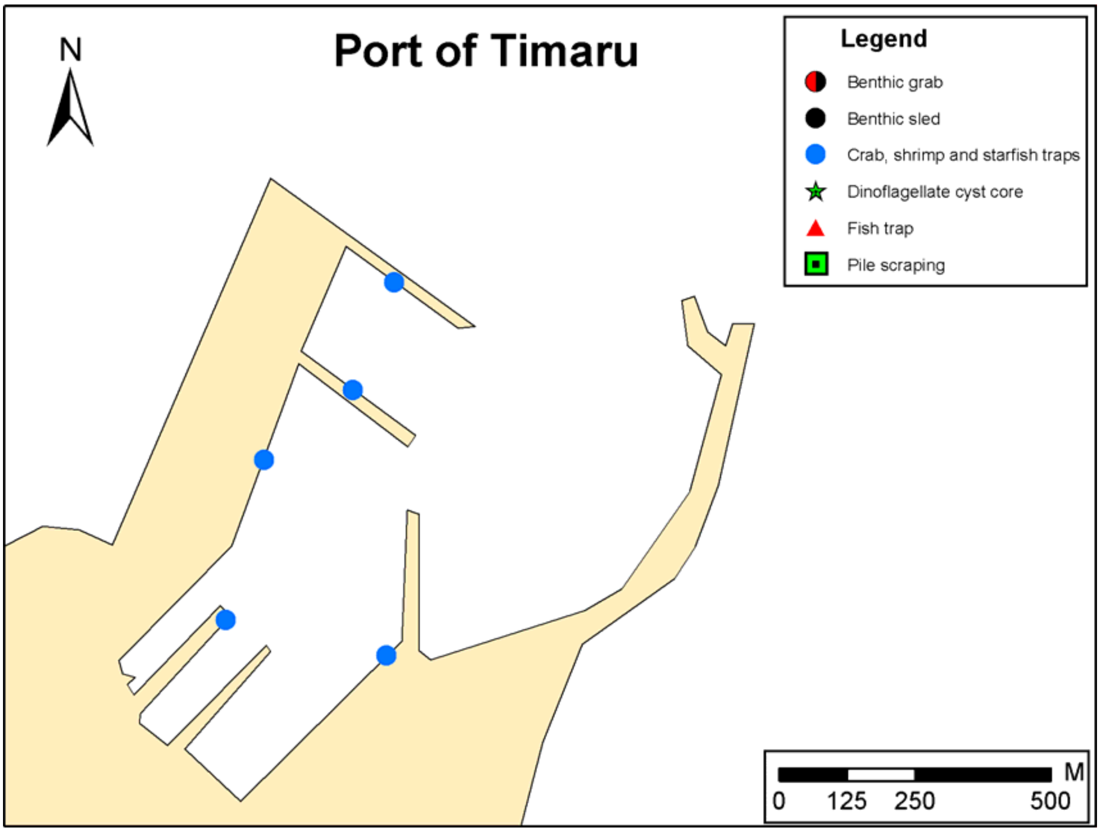

Figure 11: **Sites trapped using box, shrimp and starfish traps (blue circles)**

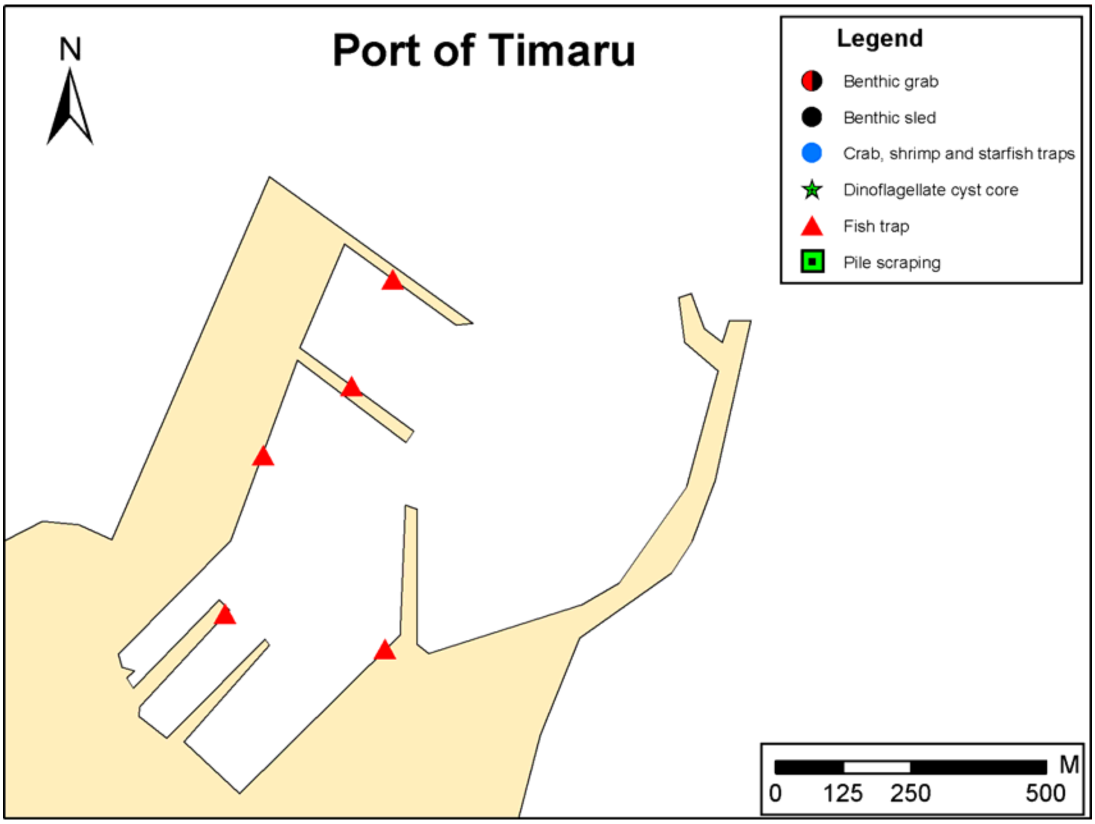

Figure 12: **Sites trapped using opera house fish traps (red triangles)**

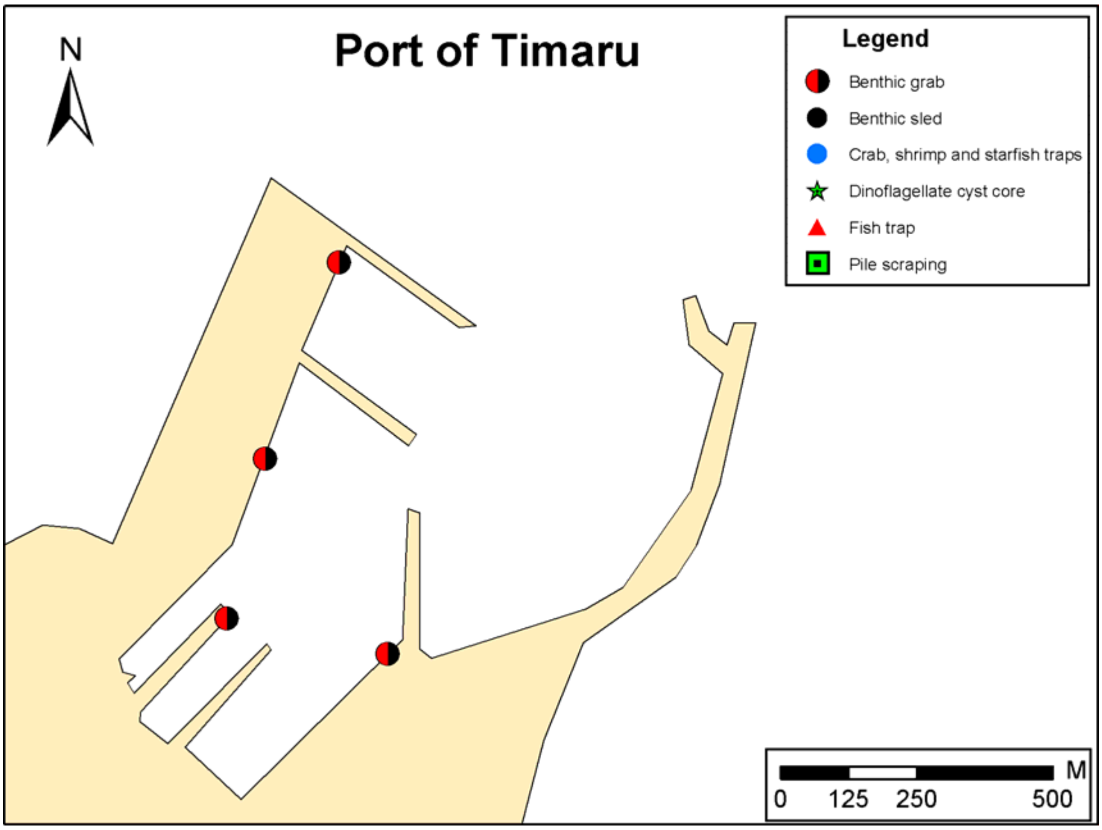

Figure 13: Sites sampled with Shipek grab sampler (red and black circles)

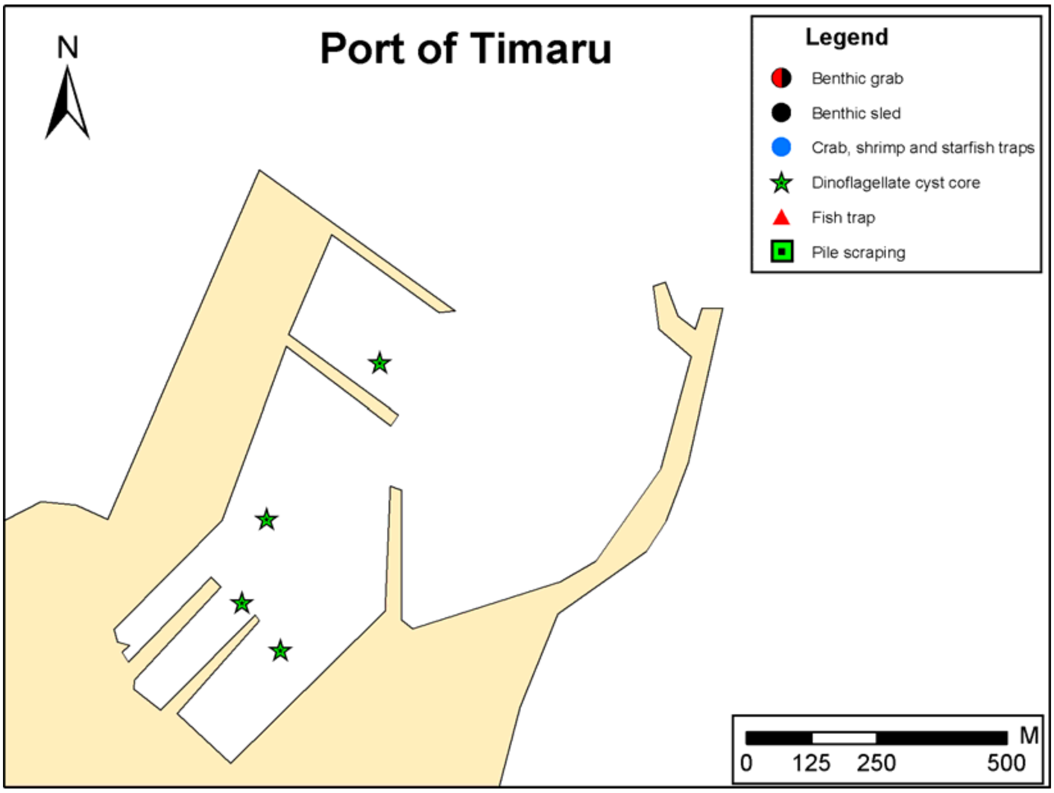

Figure 14: Sites sampled for dinoflagellates with javelin corer (green stars)

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 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 282 species or higher taxa was identified from the Timaru Port survey. This collection consisted of 177 native (Table 6), 27 cryptogenic (Table 7), 16 non-indigenous species (Table 8) and 62 species indeterminata (Table 9, Fig. 15). The biota included a diverse array of organisms from 13 phyla (Fig. 16). Twenty-one species from the Port of Timaru 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.

NATIVE SPECIES

A total of 177 native species was identified from the Port of Timaru. Native species represent 62.8 % of all species identified from this location (Table 6) and included highly diverse assemblages of annelids (45 species), crustaceans (38 species), molluscs (26 species), phycophyta (15 species), urochordates (11 species) and cnidarians (10 species). A number of other less diverse phyla including bryozoans, chelicerates, echinoderms, porifera, pyrrophycophyta and vertebrates were also sampled from the Port (Table 6).

CRYPTOGENIC SPECIES

Twenty-seven cryptogenic species were discovered in the Port of Timaru. Cryptogenic species represent 9.6 % of all species or higher taxa identified from the Port. The cryptogenic organisms identified included nine Category 1 and 18 Category 2 species as defined in Section 2.8 above. These organisms included one bryozoan, two chelicerata, one cnidarian, eight crustaceans, one mollusc, nine sponges and five ascidian species (Table 7). Many of the Category 1 cryptogenic species (the ascidians *Aplydium phortax*, *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).

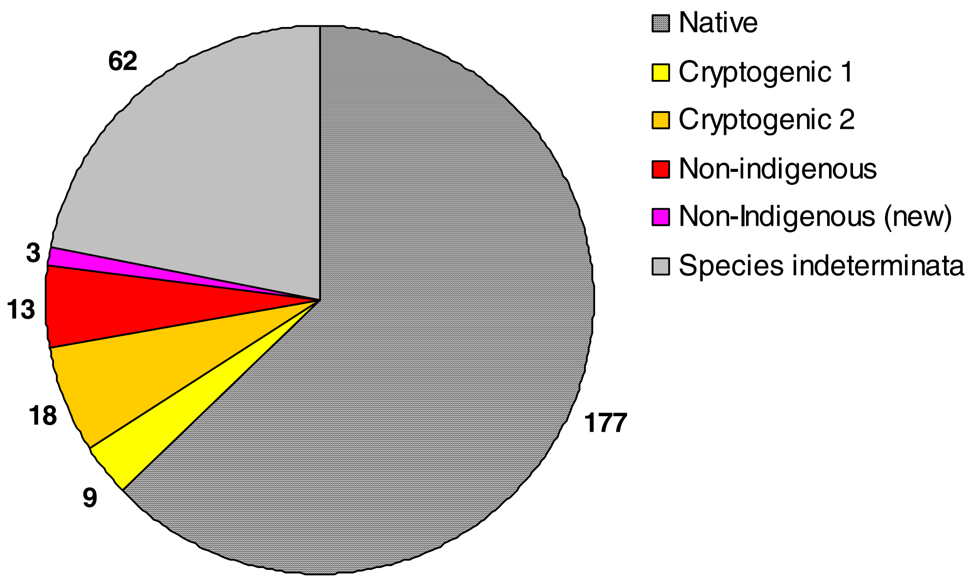

Figure 15: Diversity of marine species sampled in the Port of Timaru. Values indicate the number of species in native, cryptogenic, non-indigenous and species indeterminata categories.

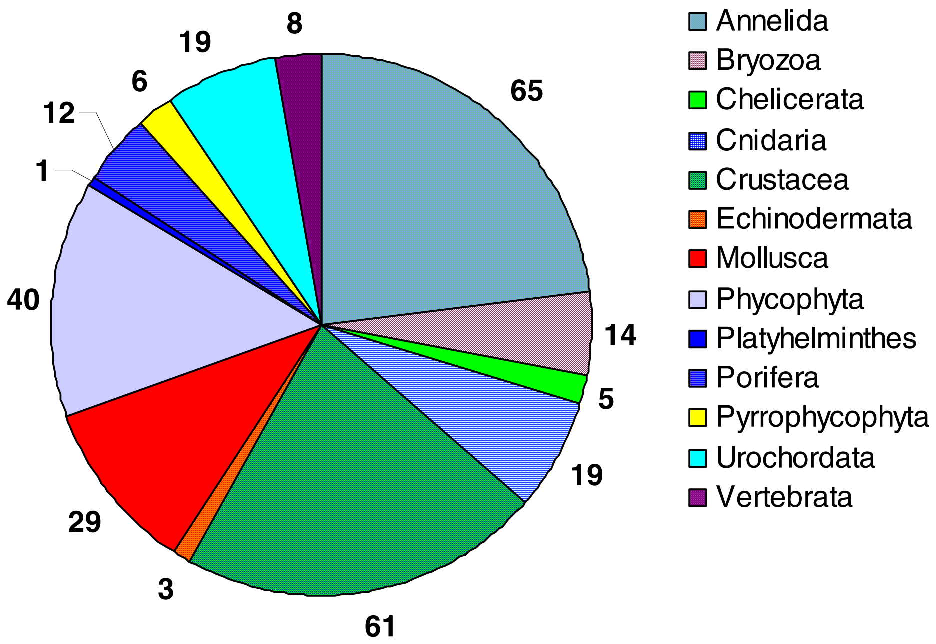

Figure 16: Marine Phyla sampled in the Port of Timaru. Values indicate the number of species in each of the major taxonomic groups.

NON-INDIGENOUS SPECIES

Sixteen non-indigenous species (NIS) were recorded from the Port of Timaru (Table 8). NIS represent 5.7 % of all identified species from this location. Three of these species, the crab *Cancer gibbosulus*, the amphipod *Caprella mutica* and the ascidian *Cnemidocarpa sp*., were not previously known from New Zealand. The other 13 species included two annelid worms, four bryozoans, five crustaceans, three phycophyta and two urochordates (Table 8). 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.

Euchone limnicola **(Reish, 1959)**

Image and information: NIMPIS (2002a)

Euchone limnicola is a sedentary worm, growing to 12 mm in length. The absence of a membranous flap over the anal depression is only seen in *E. limnicola* and is therefore used to distinguish this species from other *Euchone* species. A crown, comprised of 7 pairs of feeding appendages, is seen above the sediment, with the body of the worm in a tube below. *Euchone limnicola* is native to the USA west coast and has been introduced to Australia and New Zealand. It burrows into soft sediments, secreting a mucous layer to enable it to build firm burrow walls. It has been found subtidally to 24 m in Port Phillip Bay, Australia. *Euchone limnicola* establishes dense populations within the sediments, possibly competing with native species for food and space. The process of tube building consolidates the sediments, thereby altering the habitat for other organisms. During the port baseline surveys, *E. limnicola* was recorded from the ports of Gisborne and Timaru. In the Port of Timaru *E. limnicola* occurred in benthic sled samples taken from the No. 1 and 2 Wharves and from the North Mole and Outer North Mole berths, and from grab samples taken from the No. 1 and 3 Wharves, Fisherman's Wharf and North Mole (Fig. 17).

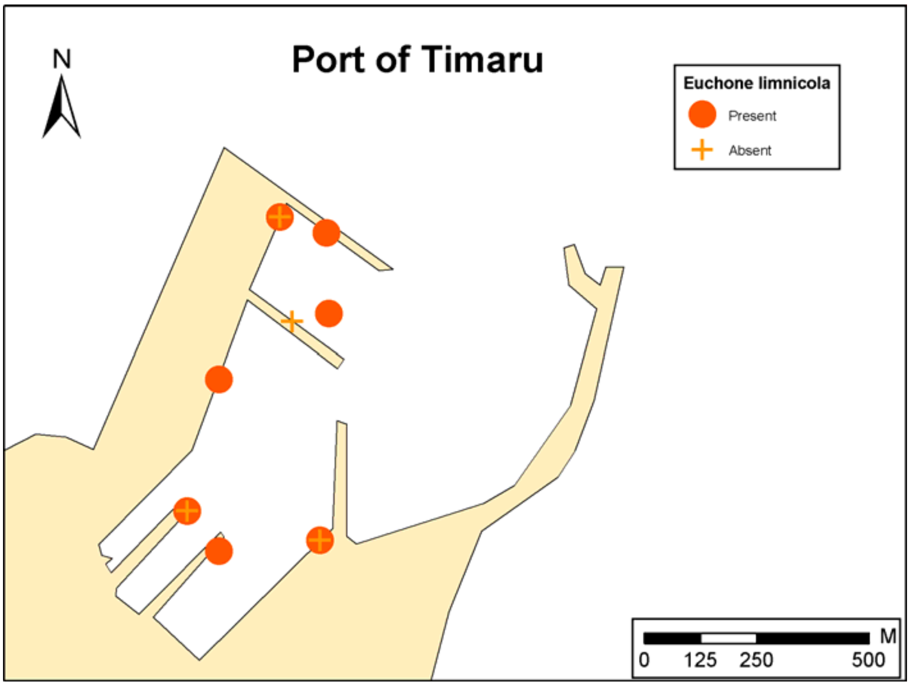

Figure 17: ***Euchone limnicola*** **distribution in the Port of Timaru**

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, pers. comm.). During the baseline port surveys, it was recorded from the ports of Timaru, Napier and Taranaki. In the Port of Timaru *B. lepte* occurred in benthic grab samples taken from the No. 1 Wharf (Fig. 18).

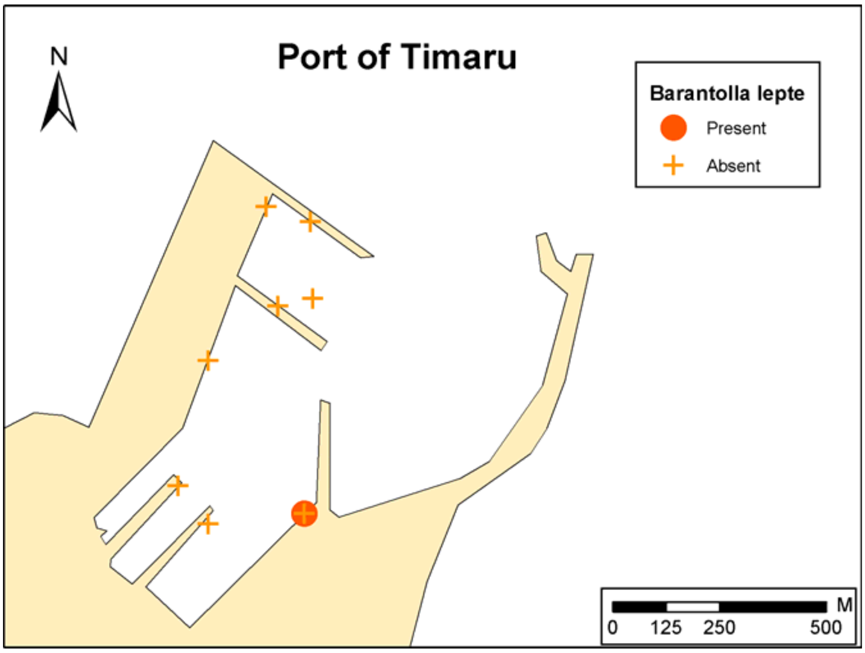

Figure 18: ***Barantolla lepte*** **distribution in the Port of Timaru**

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

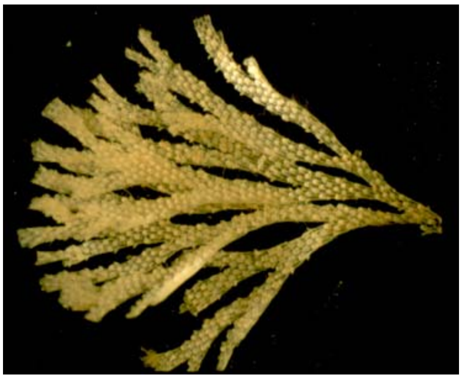

Image and information: NIMPIS (2002b)

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 Timaru *B. flabellata* occurred in benthic sled samples taken from the No. 1 Wharf and North Mole, in pile scrape samples from the Fisherman's Wharf, North Mole and Inner North Mole and in benthic grab samples from the No.1 Wharf (Fig. 19).

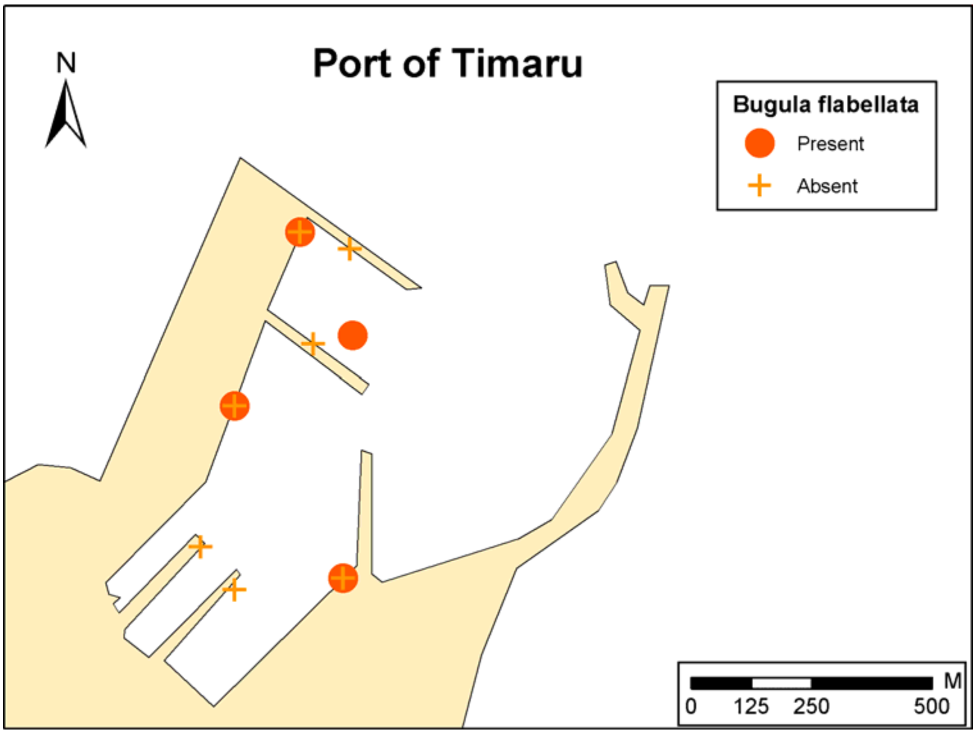

Figure 19: *Bugula flabellata* distribution in the Port of Timaru

***Bugula neritina* (Linnaeus, 1758)**

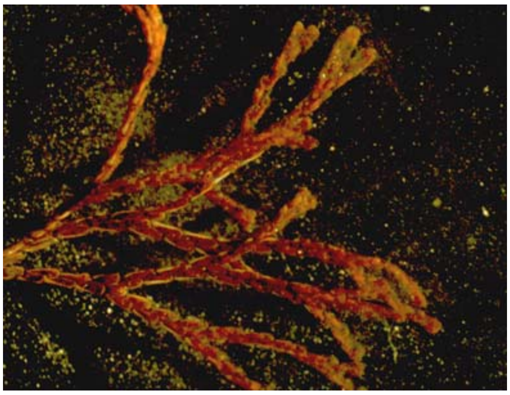

Image and information: NIMPIS (2002c)

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 Timaru *B. neritina* occurred in pile scrape samples from the No.1 Wharf, Fisherman's Wharf and North Mole (Fig. 20).

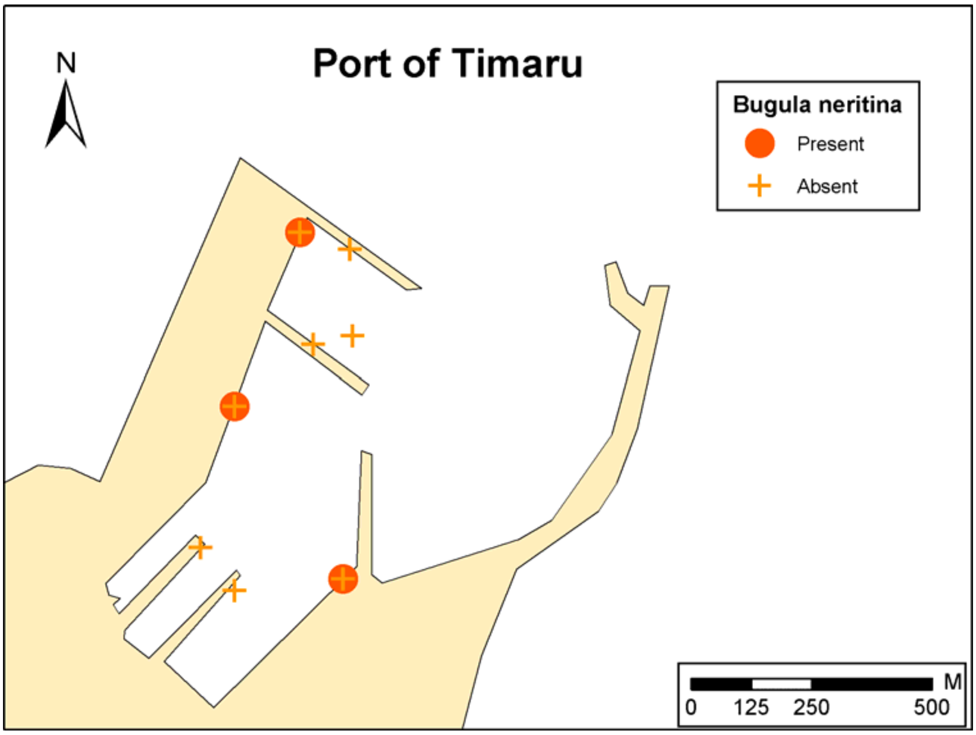

Figure 20: *Bugula neritina* distribution in the Port of Timaru

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

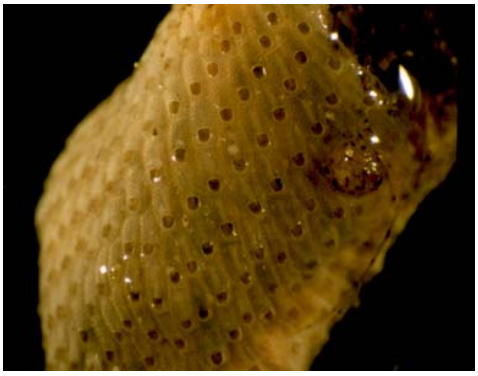

Image and information: NIMPIS (2002d)

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 Timaru it occurred in pile scrape samples taken from the No. 1, 2 and 3 Wharves, the Fisherman's Wharf and North Mole, from benthic sled samples from the No.2 and 3 Wharves and from benthic grab samples from the No. 1 and 2 Wharves (Fig. 21).

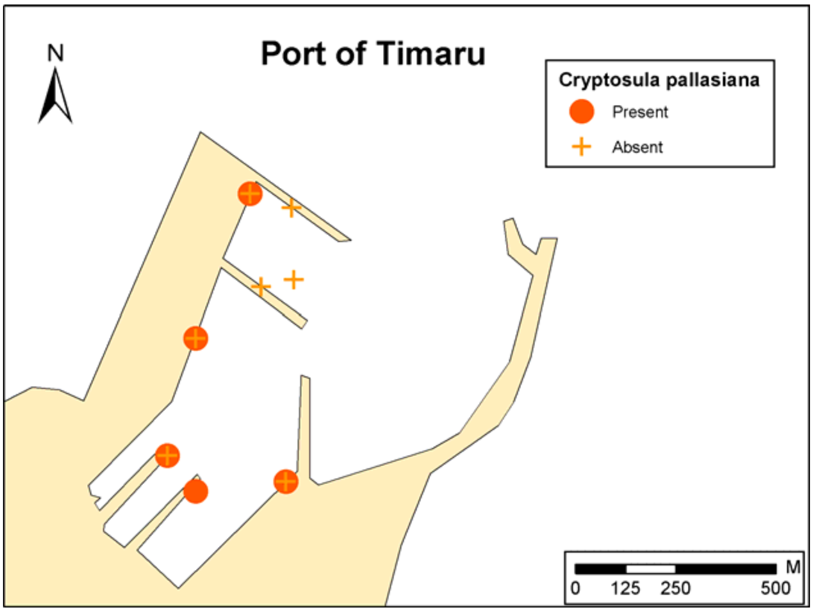

Figure 21: *Cryptosula pallasiana* distribution in the Port of Timaru

Watersipora subtorquata (d'Orbigny, 1842)

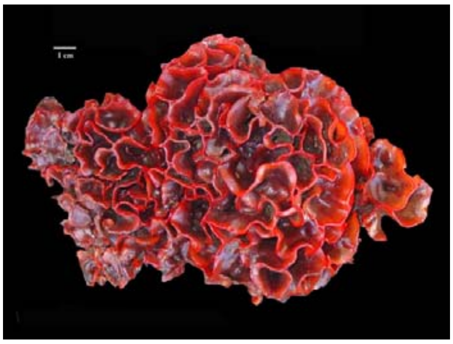

Image: California Academy of Sciences.
Information: Gordon and Matawari (1992)

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 Timaru *W. subtorquata* occurred in pile scrape samples taken from the No. 1, 2, and 3 Wharves, Fisherman's Wharf and North Mole, and from benthic sled samples taken near No. 1 and 3 Wharves, Inner North Mole, North Mole and Outer North Mole, and from benthic grab samples from the No. 1 and 3 Wharves, Fisherman's Wharf and North Mole (Fig. 22).

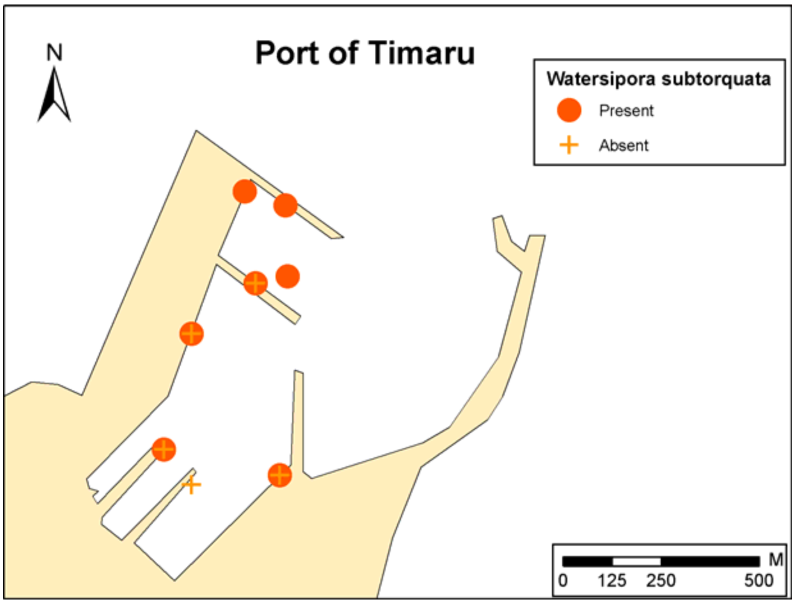

Figure 22: *Watersipora subtorquata* distribution in the Port of Timaru

***Caprella mutica* (Schurin, 1935)**

MIT Sea Grant Centre for Coastal Resources. Available online at: http://massbay.mit.edu/exoticspecies/exoticmaps/index.html

Caprella mutica is a large (up to 34 mm long) caprellid amphipod from the north-west Pacific (the Siberian coast and the Sea of Japan). It lives as an epibiont on a variety of substrata, including algae, hydroids, bryozoans and brittle stars, and has also been frequently observed on mooring lines and ropes around aquaculture sites, marinas and ports. *Caprella mutica* has a history of accidental introductions. In the 1970s and 1980s, this species was discovered at various locations along the Pacific coast of North America (Cohen and Carlton 1995) and, more recently (1990's), it has been recorded from the Atlantic Coast of the USA, the United Kingdom, Netherlands, Norway, Belgium and Ireland (Ashton *et al.* 2004). The specimens recovered from the Port of Timaru are the first known occurrence of this species in the southern hemisphere. Little is known about its biology or ecology, or its potential impact on marine ecosystems where it has been introduced. In the Port of Timaru *C. mutica* occurred in pile scrape samples taken from the No.1 and No.3 wharves, Fisherman's Wharf and North Mole (Fig. 23).

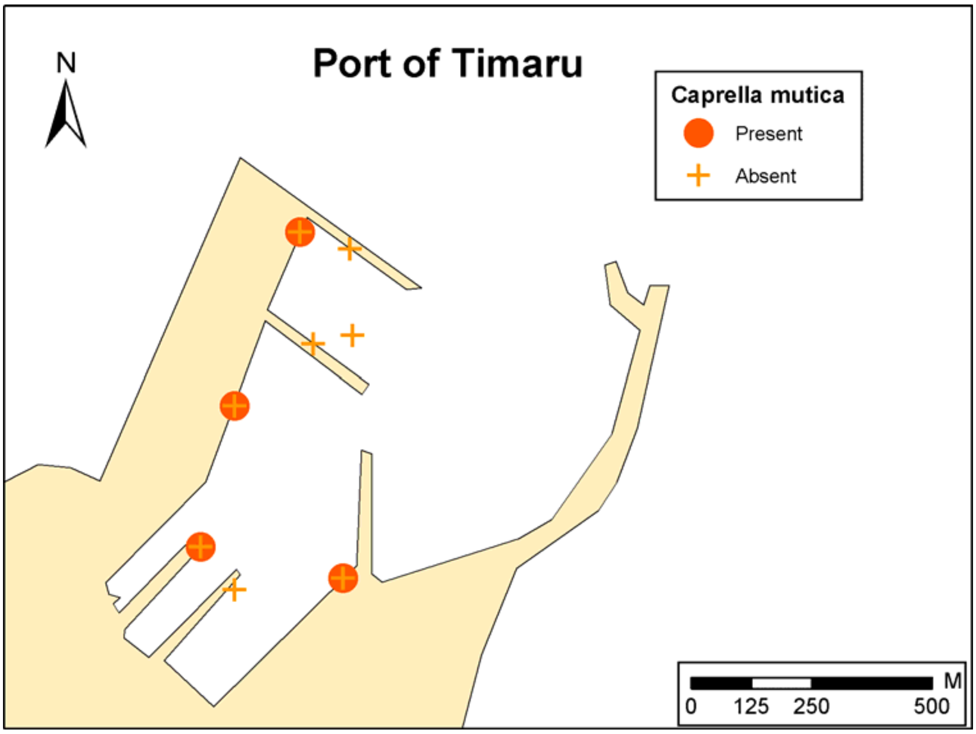

Figure 23: *Caprella mutica* distribution in the Port of Timaru

***Apocorophium acutum* (Chevreux, 1908)**

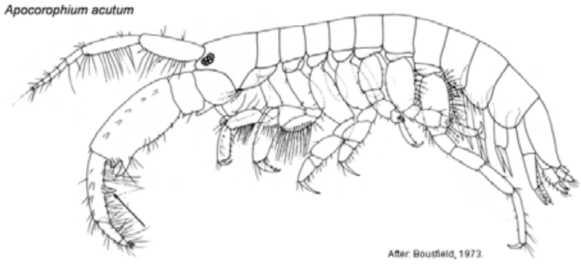

Image and information: Keys to the Northeast Atlantic and Mediterranean amphipods. [http://www.amphipoda.com/acutum.htm l]

Apocorophium acutum is a corophiid amphipod, known from the Atlantic Ocean (England, France, North America, Brazil, South Africa), Pacific Ocean (New Zealand) and the Mediterranean Sea. The exact native range of this species is not known, although the type specimen of this species was described from the southern Mediterranean. *Apocrophium acutum* inhabits marine sediments in estuarine mudflats and brackish water and fouling assemblages where it builds muddy tubes. It has no known documented impacts. During the port baseline surveys *A. acutum* was recorded from the ports of Lyttelton, Tauranga and Timaru, and from Gulf Harbour and Opua marinas. In the Port of Timaru this species occurred in pile scrapings taken from the No. 3 Wharf, Fisherman's Wharf and North Mole (Fig. 24).

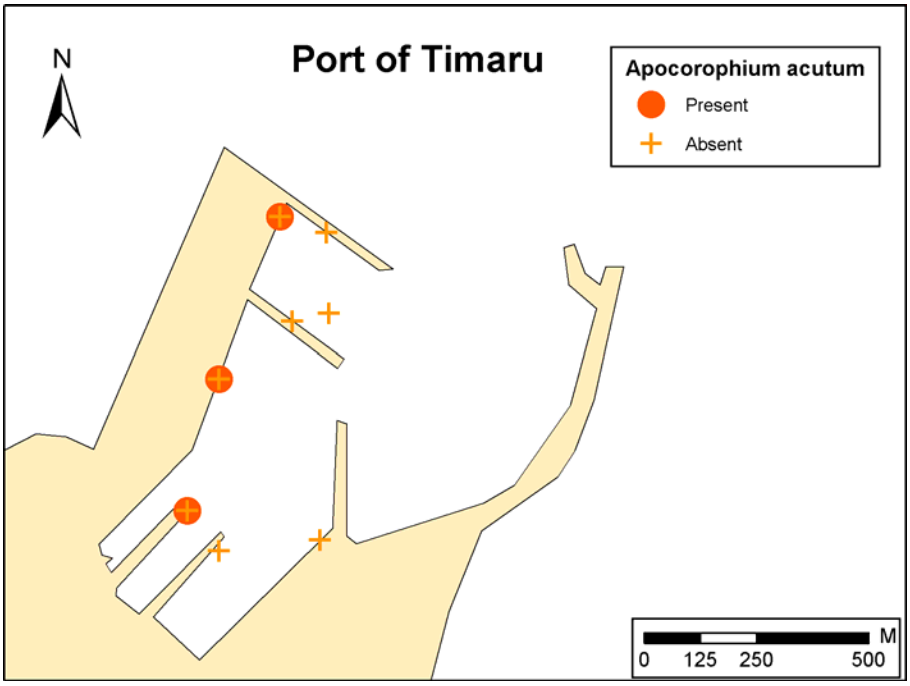

Figure 24: *Apocorophium acutum* distribution in the Port of Timaru

***Monocorophium acherusicum* (A. Costa, 1851)**

Image and information: NIMPIS (2002e)

Monocorophium acherusicum is a flat, yellowish-brown amphipod crustacean that lives amongst assemblages of marine invertebrates and plants or in soft-bottom habitats, and feeds by grazing on bacteria on sediment particles or on organic matter suspended in the water column. It is native to the northeast Atlantic, the Mediterranean and the northwest African coast and has been introduced to Brazil, southeast Africa, India, the Japanese and China Seas, Australia and New Zealand. It is cryptogenic in the Baltic Sea, the Caribbean and the east and northwest coasts of the USA. *Monocorophium acherusicum* occurs subtidally on sediments or where silt and detritus accumulate among fouling communities such as algae, ascidians and bryozoans, and man-made installations eg. wharf pylons, rafts and buoys. It is a tube building species constructing conspicuous, fragile U-shaped tubes of silk, mud and sand particles. It can reach high abundances and can tolerate a wide range of salinities. Pilisuctorid ciliates are parasites on this species in the Black Sea, but it is unknown whether these parasites could transfer to native species and cause negative impacts in New Zealand. During the port baseline surveys, *M. acheruscium* was recorded from the ports of Tauranga, Gisborne, Lyttelton, Timaru, Dunedin and the Whangarei Town Basin Marina. In the Port of Timaru it occurred in pile scrape samples taken from the No.1 Wharf, No. 3 Wharf and North Mole (Fig. 25).

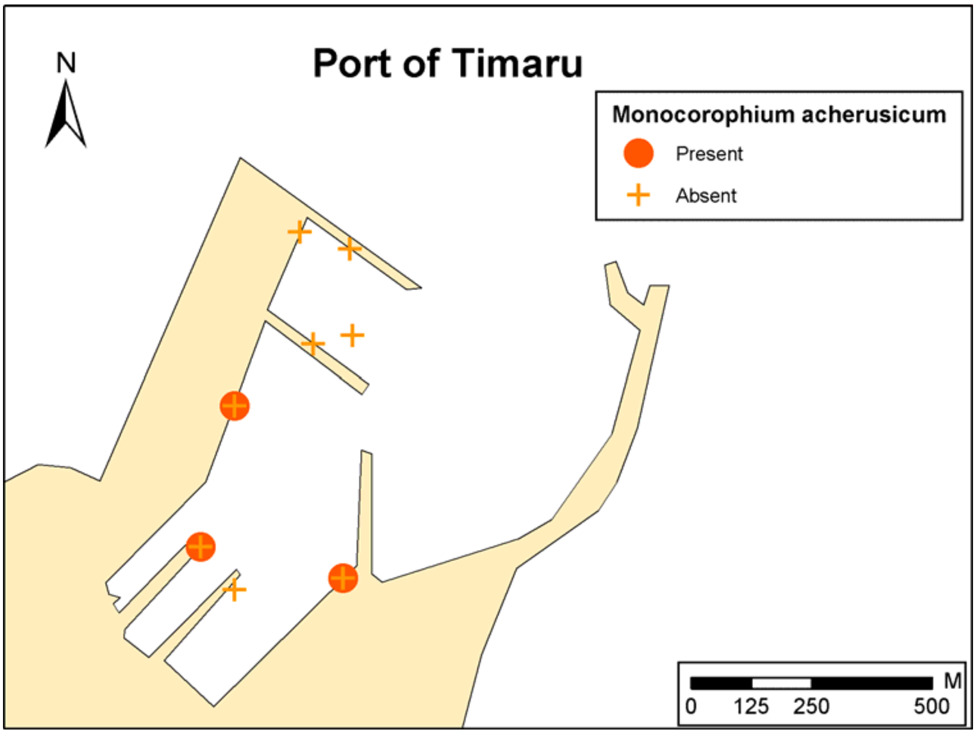

Figure 25: *Monocorophium acherusicum* distribution in the Port of Timaru

Jassa slatteryi **(Conlan, 1990)**

No image available.

Jassa slatteryi is an amphipod in the family Ischyroceridae. It is a cosmopolitan species. The type specimen was recorded from California, but it is known to be present in the Atlantic and Pacific Oceans and the Mediterranean Sea. Its habitat requirements and impacts are unknown. *J. slatteryi* also occurs in southeastern Australia and New Zealand. During the baseline port surveys it was recorded from the ports of Whangarei, Lyttelton and Timaru. In the Port of Timaru *J. slatteryi* occurred in pile scrape samples taken from the No.1 and No. 3 wharves, Fisherman's Wharf and North Mole (Fig. 26).

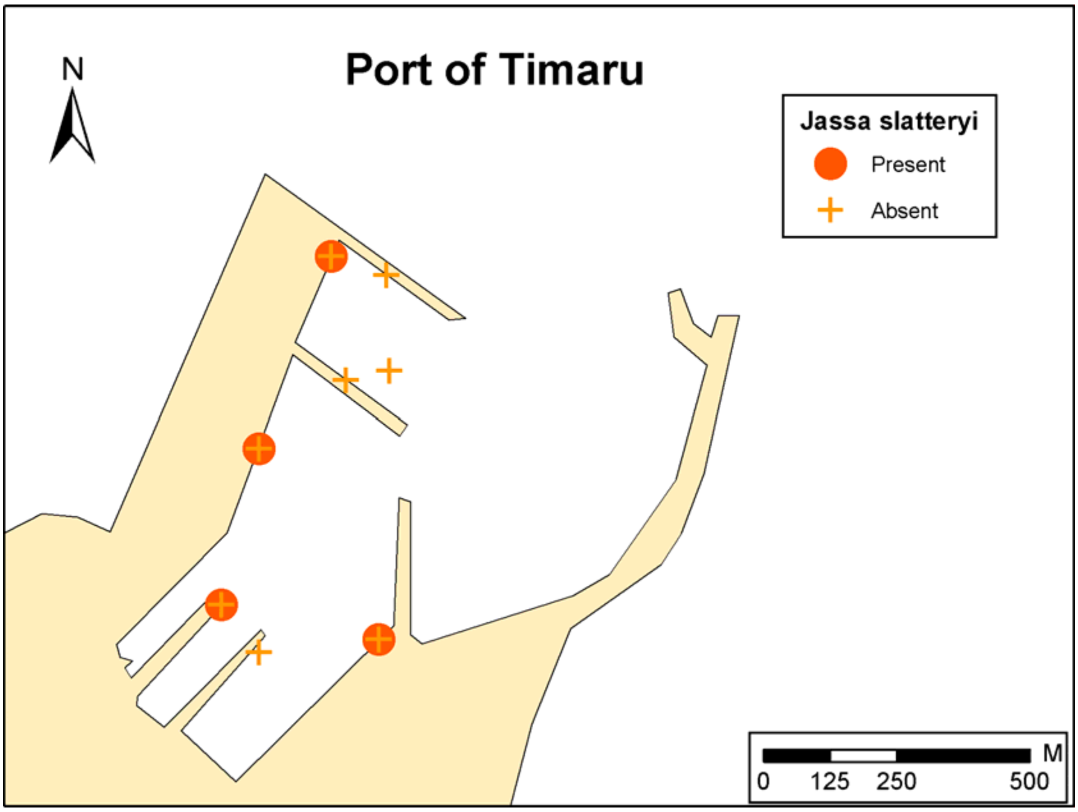

Figure 26: *Jassa slatteryi* distribution in the Port of Timaru

***Cancer gibbosulus* (de Haan, 1835)**

Image: Colin McClay. Information: Sakai (1965)

Cancer gibbosulus is a mottled, oval shaped cancer crab with a carapace width of up to 20 mm. It is native to Japan, Korea and northern China (Liaodong Peninsular) where it is usually found on muddy sand or broken shell and sandy bottoms (Ai-Yun and Si-Liang 1991). *Cancer gibbosulus* is a new record in New Zealand waters and has no known documented impacts. During the baseline port surveys, *C. gibbosulus* was recorded from Wellington, Lyttelton and Timaru. These are the first known records of its presence in New Zealand. In the Port of Timaru this species occurred in a benthic grab sample taken from the No. 1 Wharf and in pile scrape samples taken from the No. 3 Wharf and Fisherman's Wharf (Fig. 27).

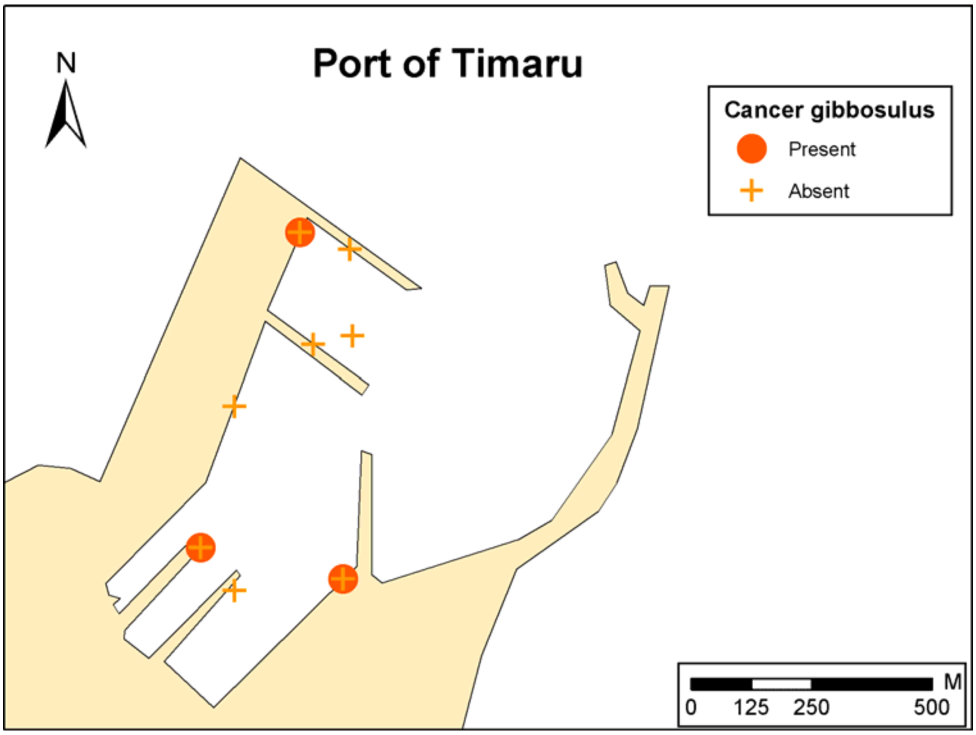

Figure 27: ***Cancer gibbosulus*** **distribution in the Port of Timaru**

Undaria pinnatifida (Harvey Suringer, 1873)

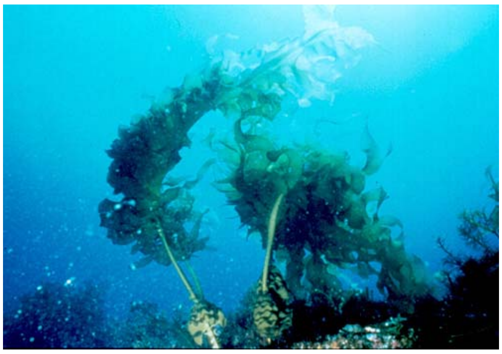

Image and information: NIMPIS (2002f); Fletcher and Farrell (1999)

Undaria pinnatifida is a brown seaweed that can reach an overall length of 1-3 metres. It is an annual species with two separate life stages; it has a large, "macroscopic" stage, usually present through the late winter to early summer months, and small, "microscopic" stage, present during the colder months. The macroscopic stage is golden-brown in colour, with a lighter coloured stipe with leaf-like extensions at the beginning of the blade and develops a distinctive convoluted structure called the "sporophyll" at the base during the reproductive season. It is this sporophyll that makes *Undaria* easily distinguishable from native New Zealand kelp species such as *Ecklonia radiata.* It is native to the Japan Sea and the northwest Pacific coasts of Japan and Korea and has been introduced to the Mediterranean and Atlantic coasts of France, Spain and Italy, the south coast of England, and parts of the coastline of Tasmania and Victoria (Australia), southern California and Argentina. It is cryptogenic on the coast of China.

Undaria pinnatifida is an opportunistic alga that has the ability to rapidly colonise disturbed or new surfaces. It grows from the intertidal zone down to the subtidal zone to a depth of 15-20 metres, particularly in sheltered reef areas subject to oceanic influence. It does not tend to become established successfully in areas with high wave action, exposure and abundant local vegetation. *Undaria pinnatifida* is highly invasive, grows rapidly and has the potential to overgrow and exclude native algal species. The effects on the marine communities it invades are not yet well understood, although its presence may alter the food resources of herbivores that would normally consume native species. In areas of Tasmania (Australia) it has become very common, growing in large numbers in areas where sea urchins have depleted stocks of native algae. It can also become a problem for marine farms by increasing labour costs due to fouling problems. *U. pinnatifida* is known to occur in a range of ports and marinas throughout eastern New Zealand, from Gisborne to Stewart Island. In the Port of Timaru it was observed by divers or occurred in pile scrape samples taken from the No. 1 and 3 Wharves, Fisherman's Wharf and North Mole (Fig. 28). Drift sporophytes were recovered in benthic sled samples taken near No. 2 Wharf and the Outer North Mole.

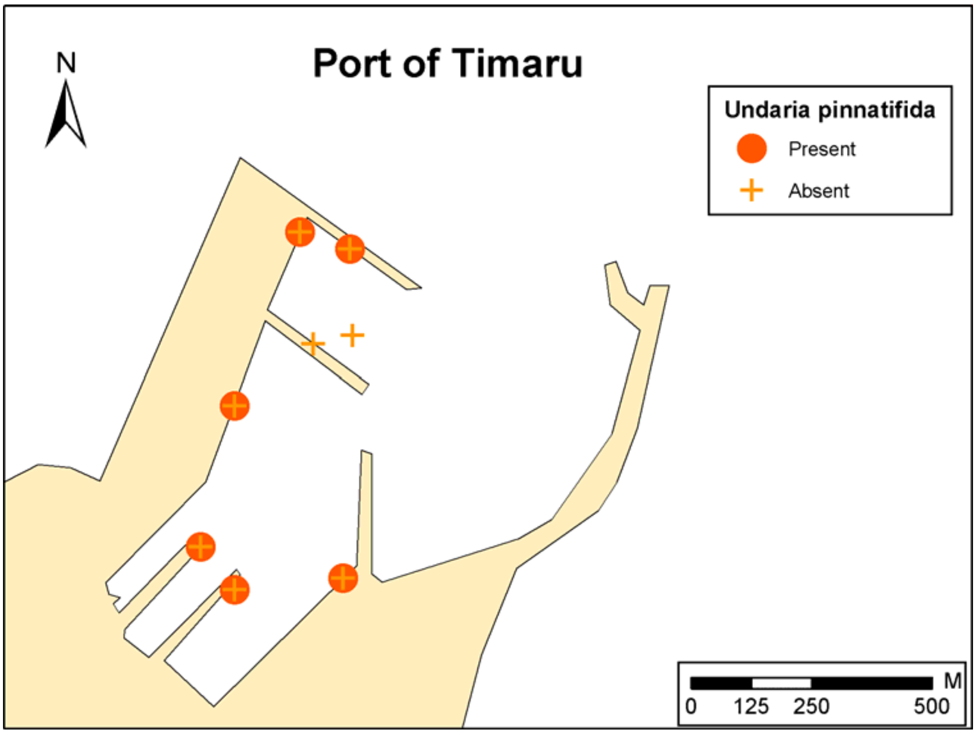

Figure 28: *Undaria pinnatifida* distribution in the Port of Timaru

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

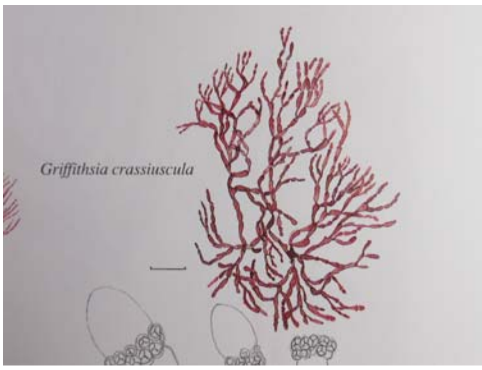

Image and information: Adams (1994)

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 Timaru it occurred in pile scrape samples taken from North Mole Wharf (Fig. 29).

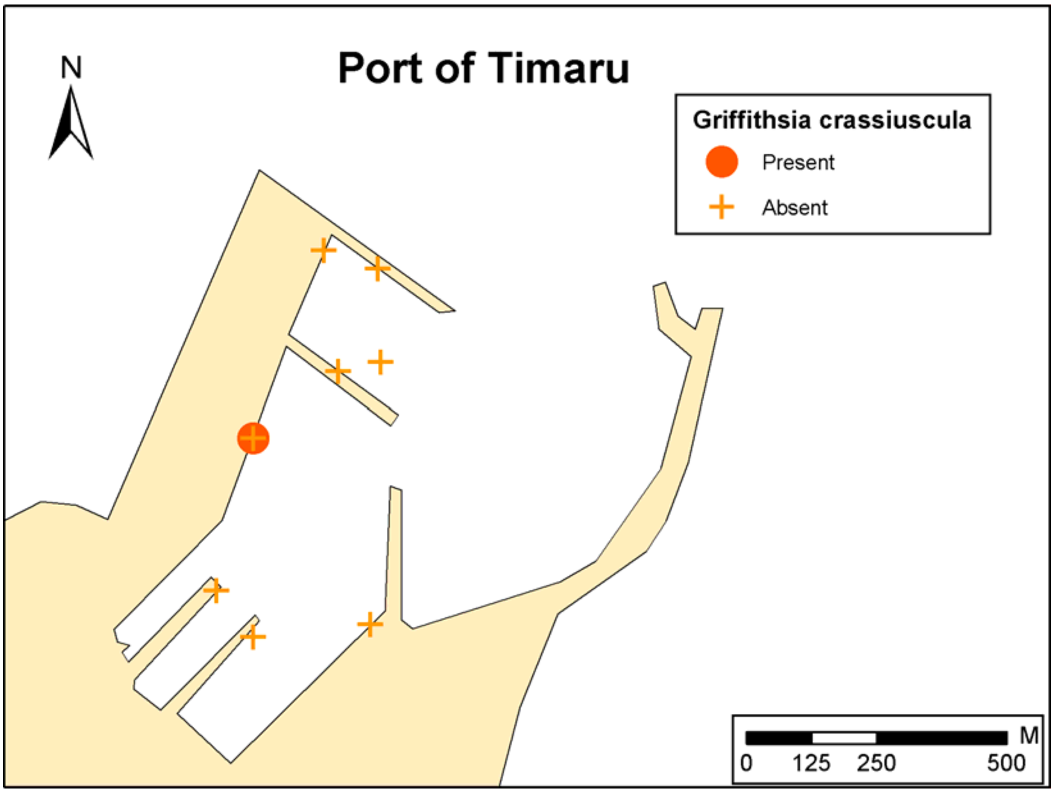

Figure 29: ***Griffithsia crassiuscula*** **distribution in the Port of Timaru**

Polysiphonia subtilissima **(Montagne 1840)**

Image: http://www.omp.gso.uri.edu/
Information: Adams (1994)

Polysiphonia subtilissima is a red alga with delicate, tufted structures up to 4 cm high with slender and much-divided stems and a holdfast of prostrate branches. It is pink to pale crimson and has a soft and flaccid texture. *Polysiphonia subtilissima* usually occurs as an epiphyte subtidally in sheltered, warm and muddy bays. The native distribution of this species includes tropical and subtropical eastern USA, the Hawaiian Islands, and parts of Australia including South Australia, Victoria, New South Wales and Tasmania (Adams 1994). Its impacts are unknown. During the port baseline surveys, *P. subtilissima* was recorded from the ports of Lyttelton, Timaru and Dunedin. In the Port of Timaru it occurred in pile scrape samples taken from the No.1 Wharf (Fig. 30).

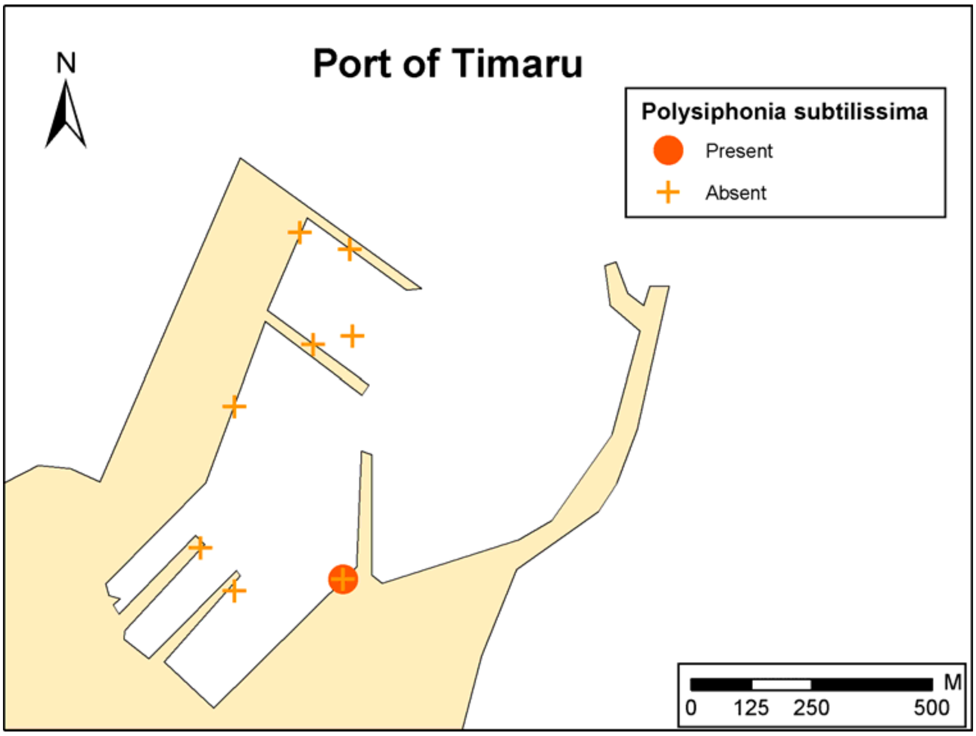

Figure 30: ***Polysiphonia subtilissima*** **distribution in the Port of Timaru**

Ciona intestinalis **(Linnaeus, 1767)**

Image and information: NIMPIS (2002g)

Ciona intestinalis is a solitary ascidian, commonly found in dense aggregations on rocks, algal holdfasts, seagrass, shells and artificial structures such as pylons, buoys and ships hulls. It usually hangs vertically upside-down in the water column, attached to hard surfaces. It is cylindrical, and 100-150 mm in length with distinctive inhalant and exhalant apertures (siphons) having yellow margins and orange/red spots. The body wall is generally soft and translucent with the internal organs visible. They can also be hard and leathery due to heavy fouling. Short projections (villi) at its base anchor the animal to the substratum.

The type specimen of *C. intestinalis* was described from Europe by Linnaeus 1767. It is thought to have been introduced to Chile and Peru, the northern west coast of the USA, equatorial West Africa and South Africa, Australia and New Zealand. *Ciona intestinalis* is considered cryptogenic to Alaska, the east coast of the USA and Canada, Greenland, Iceland, Japan, China and south east Asia. It is often found in enclosed and semi-protected marine embayments and estuaries and although it occurs in the low intertidal and shallow subtidal zones, *C. intestinalis* clearly decreases in abundance with depth. Australian populations appear to be in decline, disappearing from port areas where the species had previously dominated in the 1950s-1960s and the same phenomenon has been observed in New England, USA. Its high filtration rates and large numbers can reduce water turbidity and food availability in shallow waters and it can out-compete native species for food and space. Since it appeared in southern California in 1917, native species of ascidians previously found in the harbours have disappeared or have become much rarer. It is known to be a nuisance fouling species in aquaculture facilities such as mussel rope culture, oyster farms and suspended scallop ropes in Nova Scotia and other parts of North America, the Mediterranean, South Africa, Korea and Chile, and recently in the Marlborough Sounds, New Zealand. During the port baseline surveys it was recorded from the ports of Napier, Nelson, Lyttelton, and Timaru. In the Port of Timaru *C. intestinalis* occurred in pile scrape samples taken from the No. 1, Fisherman's and North Mole Wharves (Fig. 31).

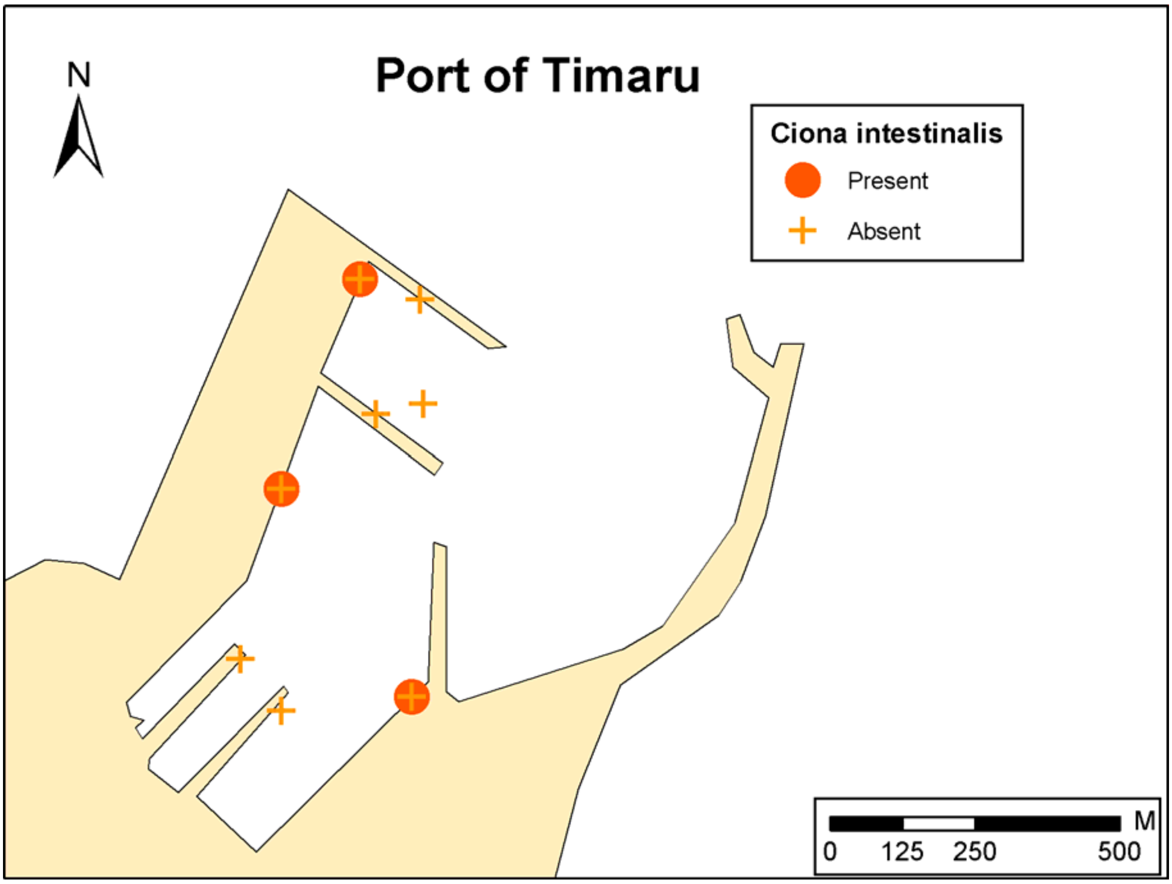

Figure 31: ***Ciona intestinalis*** **distribution in the Port of Timaru**

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, Wellington, Picton, Lyttelton and Timaru during the port baseline surveys. In the Port of Timaru this species occurred in pile scrape samples taken from the Fisherman's Wharf, and North Mole Wharf (Fig. 32).

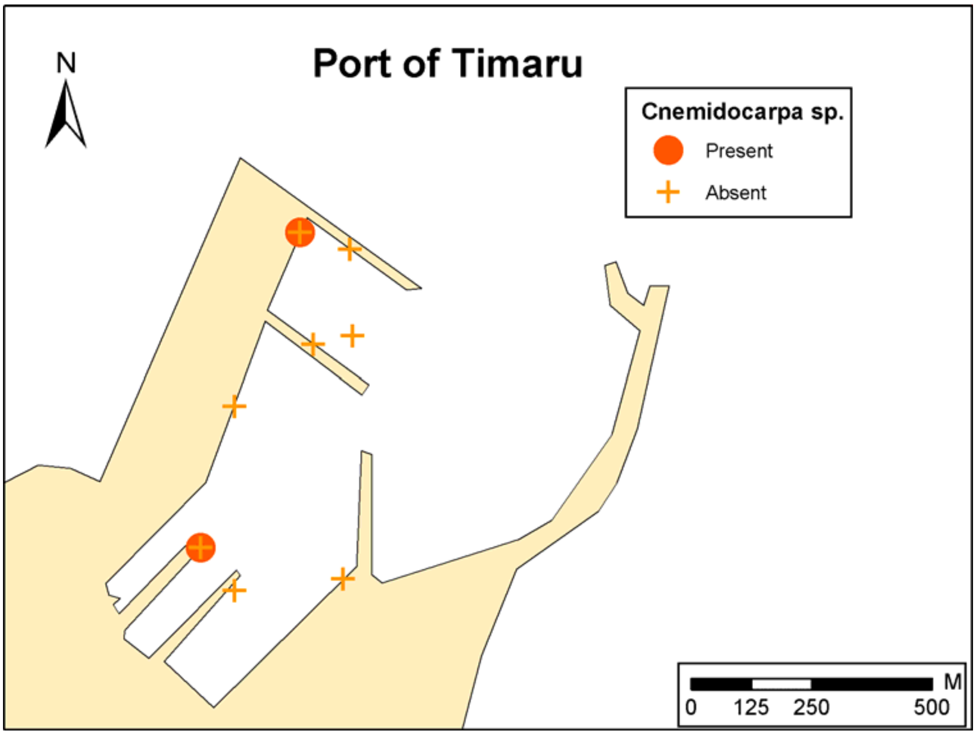

Figure 32: ***Cnemidocarpa*** **sp. distribution in the Port of Timaru**

SPECIES INDETERMINATA

Sixty-two organisms from the Port of Timaru were classified as species indeterminata. If each of these organisms is considered a species of unresolved identity, then together they represent 22.0 % of all species collected from this survey (Fig 15). Species indeterminata from the Port of Timaru included 18 annelid worms, eight cnidarians, ten crustaceans, two molluscs, 22 phycophytes, one platyhelminth and one ascidian (Table 9).

NOTIFIABLE AND UNWANTED SPECIES

Of the non-indigenous species identified from the Port of Timaru, only the Asian seaweed, *Undaria pinnatifida*, is currently listed as an unwanted species on either the New Zealand register of unwanted organisms (Table 5a) or the ABWMAC Australian list of pest species (Table 5b).

PREVIOUSLY UNDESCRIBED SPECIES IN NEW ZEALAND WATERS

Twenty-one species from the Port of Timaru were previously undescribed from New Zealand waters. These species are classified either as Category 2 cryptogenic species in Table 7, or are marked as new records in the non-indigenous species list (Table 8). Previously undescribed cryptogenic species included one pycnogonid (?*Tanystylum* sp. nov. B), eight amphipod crustaceans (*Gammaropsis* sp. aff. *typical*, *Meridiolembos* sp. aff. *M. pertinax*, *Meridiolembos* sp. aff. *acherontis*, *Oedicerotidae* n.gen. n. sp., *Parawaldeckia* sp. aff. *angusta*, *Photis* sp. aff. *P. nigrocula*, *Polycheria* sp. aff. *P. obtusa*, *Stomacontion* sp. aff. *S. pungpunga*), eight sponges (*Axociella* n. sp. 1, *Callyspongia* n. sp. 1, *Chalinopsilla* n. sp. 1, *Euryspongia* n. sp. 2, *Halichondria* n. sp. 1, *Halichondria* n. sp. 6, *Haliclona* n. sp. 2, *Haliclona* n. sp. 3), and one ascidian (*Pyura* n. sp. 1; Table 7). Many of these species did not fit existing species descriptions and may be new to science. The non-indigenous species recorded for the first time from New Zealand waters in the Port of Timaru included the crab *Cancer gibbosulus* (see section 3.3.13 above), the amphipod *Caprella mutica* (see section 3.3.7 above) and the ascidian *Cnemidocarpa* sp. (see section 3.3.16 above).

CYST-FORMING SPECIES

Six species of dinoflagellate cysts were collected during this survey. They are indicated as members of the Pyrrophycophyta in Table 6. None of these species is known to be toxic 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 of Timaru 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 68 % (11 species) probably were introduced to New Zealand waters via hull fouling and 32 % (five species) 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. 33a). 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 (Fig. 34 b, c, d). However differing sampling effort between locations did not explain differences in the numbers of NIS found there ($F_{1,14} = 0.77$, $P = 0.394$, $R^2 = 0.052$; Fig. 34 a). When sample effort was adjusted for, Timaru had slightly larger numbers of native, NIS and Cryptogenic 2 species, and slightly lower numbers of Cryptogenic 1 species relative to the other ports and marinas surveyed (Fig 34).

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. 33b). Species indeterminata organisms represented between 10.6 % and 25.6 % 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. 33b). The port of Lyttelton’s 20 NIS was the highest diversity of non-indigenous species recorded from any of the locations surveyed. Non-indigenous species represented between 3.6 % of all identified species in Bluff and 16.1 % in Whangarei Marina. NIS comprised 5.7 % of the total sampled diversity in the Port of Timaru (Fig. 33b), ranking it 10th highest 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 North West Pacific, and southern Australia (Cranfield *et al.* 1998).

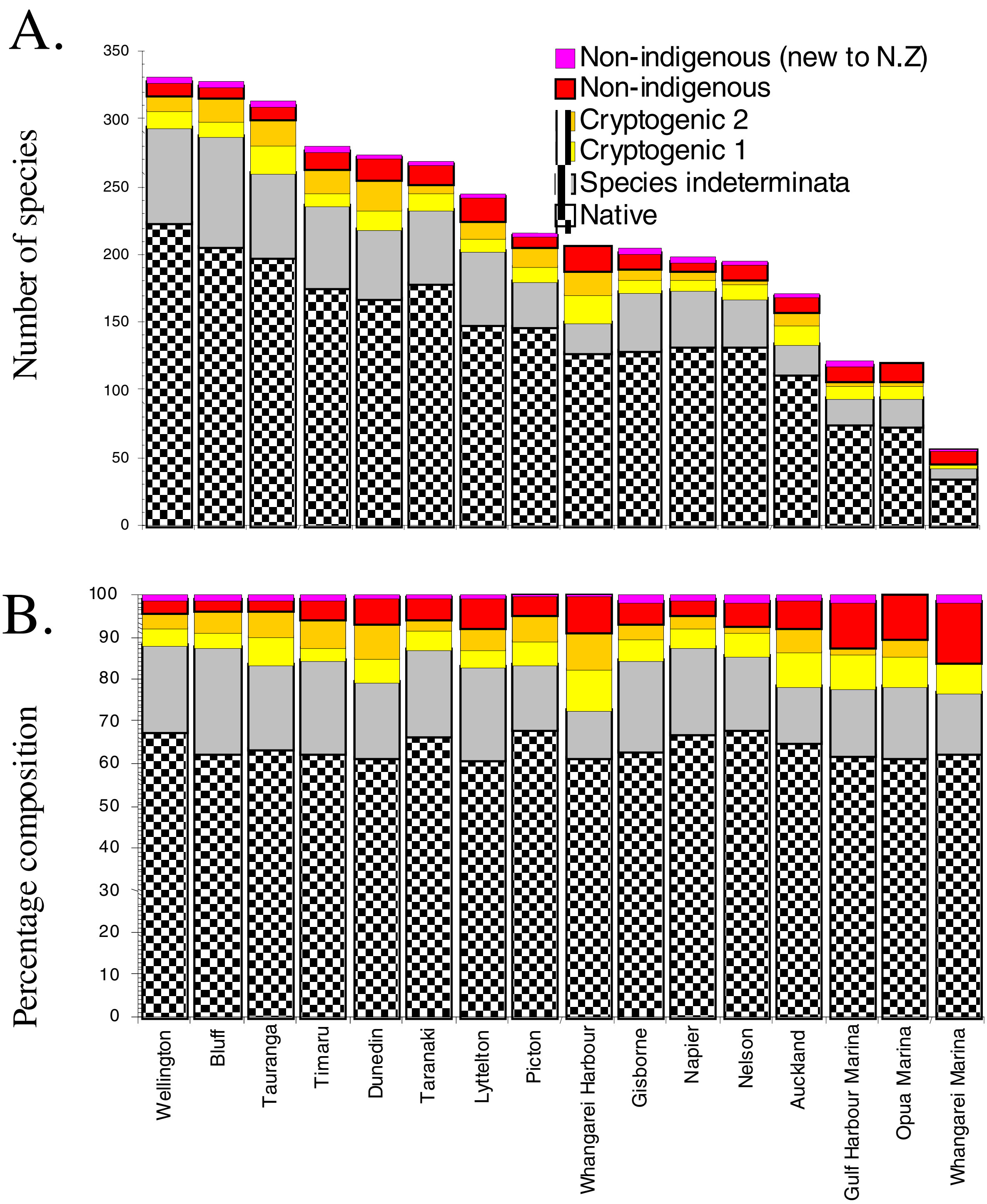

Figure 33: **Differences in (a) the number of species, and (b) the relative proportions of non-indigenous, cryptogenic, species indeterminata and native categories among the sixteen locations sampled over the summers of 2001 – 2002, and 2002-2003. Locations are presented in order of decreasing species diversity sampled.**

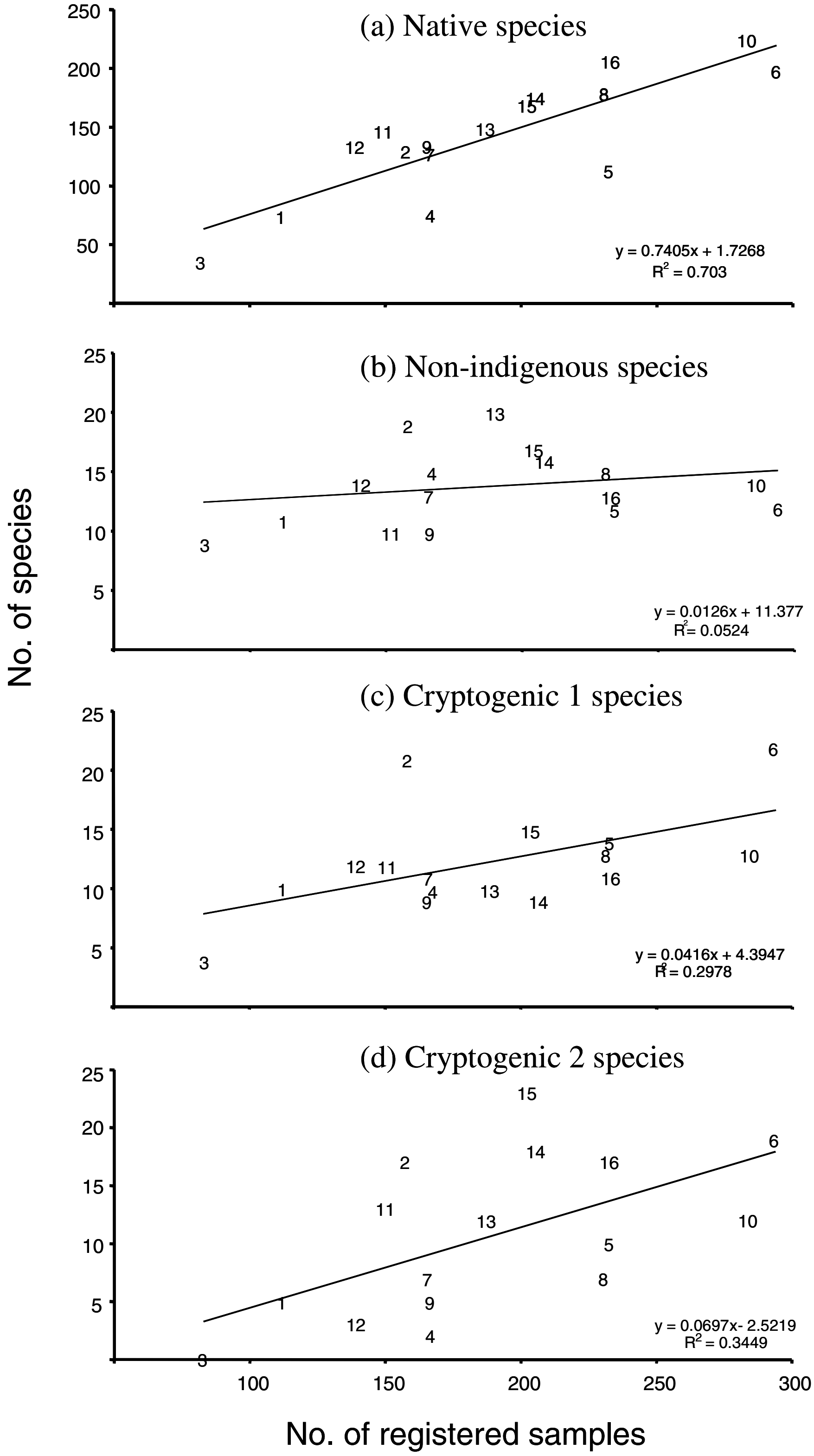

Figure 34: **Linear regression equations relating numbers of species detected to sample effort at the 16 locations surveyed nation-wide. Location codes are as follows; 1 = Opua, 2 = Whangarei port, 3 = Whangarei marina, 4 = Gulf Harbour marina, 5 = Auckland port, 6 = Tauranga port, 7 = Gisborne port, 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.**

Commercial shipping arrivals in the port of Timaru from overseas are low in number and relatively infrequent. Between 2002 and 2003, the Port of Timaru received a total of 15 visits of international commercial vessels (New Zealand Customs Service, unpublished data). Nine of these vessels (60 %) arrived from Australia, two from the northwest Pacific (14 %) and one from each of the Arabian Sea and east Asia (14 %). The Port of Timaru has the second-lowest volume of discharged ballast water amongst New Zealand's commercial ports (3,885 m^3 in 1999). This is a consequence of Timaru importing goods from overseas rather than exporting goods - in contrast, the Port of Lyttelton, only 150 km North of Timaru, is primarily an export facility with a high volume of annual ballast water discharge (Inglis 2001). The majority (78 %) of ballast water discharged in the Port of Timaru originates from South Korea and only 6 % from Australia (Inglis 2001). Data for ship arrivals and ballast water dicharge suggest that the majority of potential NIS inoculations through hull fouling, sea chests or ballast water arrive from the temperate regions of the northwest Pacific, environments which are broadly compatible with those around Timaru. Shipping from these regions presents an on-going risk of introduction of new NIS to the Port of Timaru.

Assessment of translocation risk for introduced species found in the port

The Port of Timaru is connected directly to the ports of Lyttelton, Dunedin (incl. Port Chalmers), Napier and the Chatham Islands and, indirectly, to most other domestic ports throughout mainland New Zealand (Dodgshun et al. 2004). Although many of the non-indigenous species found in the Timaru port survey have been recorded previously in New Zealand, there were three notable exceptions. The ascidian *Cnemidocarpa sp*. was first described from New Zealand waters during these port surveys, and was found to be present in Auckland, Gisborne, Gulf Harbour Marina, Nelson, Picton, Tauranga, Taranaki, Timaru and Wellington. Little is currently known about this species, however it appears to now be widely spread through New Zealand's shipping ports where it may be competing with native fauna for space in fouling assemblages. The Asian crab, *Cancer gibbosulus* was also unknown from New Zealand waters prior to the surveys, but has now been discovered in Wellington, and Lyttelton ports in addition to the record from the Port of Timaru. There is no information on the risks posed by this species to New Zealand's native ecosystems and species. New Zealand has an indigenous (but much larger) species of cancer crab, *Cancer novaezelandiae*, which is common in the Port of Timaru and throughout southern New Zealand.

The highly invasive alga, *Undaria pinnatifida*, has been present in New Zealand since at least 1987 (Cranfield *et al.* 1998). It has been spread through shipping and other vectors to 11 of the 16 ports and marinas surveyed during the baseline surveys (the exceptions being Opua, Whangarei Port and marina, Gulf Harbour Marina and Tauranga Port), although a control programme in Bluff Harbour has subsequently removed populations established there. Nevertheless, vessels departing from Timaru after having spent time at berth within the port may pose a significant risk of spreading this species to ports within New Zealand that remain uninfested. The risk of translocation of *U. pinnatifida* and other fouling species is highest for slow-moving vessels, such as yachts and barges, and vessels that have long residence times in port. In Timaru, bulk carriers, recreational craft, and seasonal fishing vessels that are laid up for significant periods of time pose a particular risk for the spread of these species.

The port of Timaru is the principal port of departure for vessels travelling to the Chatham Islands. Although no surveys for NIS have been undertaken in the Chatham Islands, it is thought to be relatively free of marine pests and its marine environments are valued for their fisheries productivity and unique biodiversity (including species endemic to the Chatham Islands). The invasive alga *Undaria pinnatifida*, which is present throughout the port of Timaru, has not yet established wild populations in the Chatham Islands, but has been the subject of a successful incursion response there (Wotton *et al.* 2004). Shipping departing the port of Timaru, particularly slow-moving barges, or vessels that have been laid up within Timaru, poses a continuing threat of spreading this and other NIS to the Chatham Islands.

Management of existing non-indigenous species in the port

Most of the NIS detected in this survey, with the exception of the crab *Cancer gibbosulus*, appear to be well established in the port. It is unclear whether a viable population of *C. gibbosulus* has established in Timaru, since this crab was found in only three sites sampled within the port. Similarly, in Wellington and Lytelton, where this species was also found, it occurred in just a single site each. Further surveys, targeting this species, are necessary to determine the true extent of its population in each 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 Timaru are widespread and local population controls are unlikely to be effective. Management should be directed toward preventing spread of species established in Timaru Harbour to locations where they do not presently occur. This may be particularly relevant to species found only in the Port of Timaru, such as the amphipod *Caprella mutica*, which has exhibited invasive characteristics (multiple global introductions, rapid population growth and large abundance) and was not detected in any other port or marina surveyed nationwide. Such management will require better understanding of the frequency of movements by vessels of different types from Timaru 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 Timaru 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 have suggested 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 Timaru (probably responsible for 75 % 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) (Hewitt et al 1999). 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 determine the threat they represent to New Zealand's native ecosystems.

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Tables

Table 1: Berthage facilities in the Port of Timaru.

Berth	Berth No.	Purpose	Construction	Length of Berth (m)	Depth at LWOST (m)
No. 1	-	Fish, reefer exports, bulk chemicals	Wood deck/wood piles	200	8.5
No. 1	Extension	Bulk liquids, fish, logs, diesel bunkers	Concrete deck/wood piles	220	10.6
No. 1	East	Fish, reefer exports, diesel bunkers	Concrete deck/wood piles	100	8.6
No.2	North	Grain exports	Concrete + wood deck/wood piles	200	10.5
No.3	South	Fish cargoes, repair	Concrete deck/wood piles	200	10.5
North Mole Container Terminal	-	Container terminal, multipurpose	Concrete deck/concrete piles	460	11.0
Fish Wharf	-	Fish imports/exports	Concrete deck/wood piles	165	6.2

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	
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	Quadrat scraping	0.10 m^2 quadrats sampled at -0.5 m, -1.5 m, -3.0 m and -7	Workshop recommended extra quadrat in high diversity algal zone (-1.5 m) and to sample inner pilings for shade tolerant species

	CRIMP Protocol		NIWA Method		
Taxa sampled	Survey method	Sample procedure	Survey method	Sample procedure	Notes
		per berth		m on 2 inner and 2 outer piles per berth	
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 Timaru sampling effort.

Sample method	Number of shipping berths sampled	Number of replicate samples taken
Benthic Sled Tows	6[a]	12
Benthic Grab (Shipek)	4	14
Box traps	5[a]	20
Diver quadrat scraping	4	58
Opera house fish traps	5[a]	20
Starfish traps	5[a]	20
Shrimp traps	5[a]	20
Javelin cores	N/A	8

Table 3b: Pile scraping sampling effort in the Port of Timaru. 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	1 concrete, 7 wood	1 concrete, 7 wood
1.5	1 concrete, 7 wood	1 concrete, 7 wood
3.5	1 concrete, 5 wood	1 concrete, 7 wood
7	1 concrete, 2 wood	1 concrete, 5 wood
Miscellaneous	Nil	1 wood

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 grabs	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)	N/A (8)
Port of Nelson	4 (8)	1 (2) *	4 (16)	4 (55)	4 (16)	4 (16)	4 (16)	N/A (8)
Port of Picton	3 (6)	*	3 (18)	3 (53)	3 (16)	3 (24)	3 (24)	N/A (6)
Port of Taranaki	6 (12)	6 (21)	7 (25)	4 (66)	6 (24)	6 (24)	6 (24)	N/A (14)
Port of Tauranga	6 (18)	6 (28)	8 (32)	6 (107)	6 (25)	7 (28)	7 (28)	N/A (8)
Port of Timaru	6 (12)	4 (14)	5 (20)	4 (58)	5 (20)	5 (20)	5 (20)	N/A (8)
Port of Wellington	7 (13)	6 (18)	7 (28)	6 (98)	7 (34)	7 (28)	7 (28)	N/A (6)
Port of Auckland	6 (12)	6 (18)	6 (24)	6 (101)	6 (24)	6 (24)	5 (20)	N/A (10)
Port of Bluff	6 (21)	7 (21)	7 (29)	5 (75)	6 (24)	7 (28)	7 (24)	N/A (12)
Dunedin Harbour	5 (10)	5 (15)	5 (20)	5 (75)	5 (20)	5 (20)	5 (18)	N/A (9)
Port of Gisborne	5 (10)	6 (18)	5 (20)	4 (50)	5 (20)	5 (20)	5 (20)	N/A (8)
Gulf Harbour Marina	N/A (17)	4 (12)	4 (16)	4 (66)	4 (16)	4 (16)	4 (16)	N/A (8)
Port of Napier	5 (10)	5 (15)	5 (18)	4 (59)	5 (20)	5 (18)	5 (18)	N/A (8)
Opua Marina	N/A (10)	4 (12)	4 (12)	4 (46)	4 (8)	4 (8)	4 (8)	N/A (8)
Whangarei Marina	3 (6)	2 (6)	2 (8)	4 (33)	2 (8)	2 (8)	2 (8)	N/A (6)
Whangarei Harbour	4 (9)	4 (12)	4 (16)	4 (65)	4 (16)	4 (16)	4 (16)	N/A (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 Timaru survey.

Phylum, Class	Order	Family	Genus and species
Annelida			
Polychaeta	Eunicida	Dorvilleidae	*Dorvillea australiensis*
Polychaeta	Eunicida	Dorvilleidae	*Schistomeringos loveni*
Polychaeta	Eunicida	Lumbrineridae	*Lumbrineris sphaerocephala*
Polychaeta	Eunicida	Onuphidae	*Onuphis aucklandensis*
Polychaeta	Phyllodocida	Glyceridae	*Glycera lamelliformis*
Polychaeta	Phyllodocida	Glyceridae	*Glycera ovigera*
Polychaeta	Phyllodocida	Glyceridae	*Hemipodus simplex*
Polychaeta	Phyllodocida	Goniadidae	*Glycinde dorsalis*
Polychaeta	Phyllodocida	Nereididae	*Neanthes cricognatha*
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	Phyllodocidae	*Nereiphylla castanea*
Polychaeta	Phyllodocida	Polynoidae	*Lepidastheniella comma*
Polychaeta	Phyllodocida	Polynoidae	*Lepidonotus polychromus*
Polychaeta	Phyllodocida	Polynoidae	*Ophiodromus angustifrons*
Polychaeta	Phyllodocida	Sigalionidae	*Labiosthenolepis laevis*
Polychaeta	Phyllodocida	Sigalionidae	*Sthenelais novaezealandiae*
Polychaeta	Phyllodocida	Syllidae	*Amblyosyllis granosa*
Polychaeta	Sabellida	Oweniidae	*Owenia petersenae*
Polychaeta	Sabellida	Sabellidae	*Branchiomma curta*
Polychaeta	Sabellida	Sabellidae	*Demonax aberrans*
Polychaeta	Sabellida	Sabellidae	*Megalomma kaikourense*
Polychaeta	Sabellida	Serpulidae	*Galeolaria hystrix*
Polychaeta	Sabellida	Serpulidae	*Neovermilia sphaeropomatus*
Polychaeta	Scolecida	Opheliidae	*Armandia maculata*
Polychaeta	Scolecida	Orbiniidae	*Scoloplos cylindrifer*
Polychaeta	Scolecida	Orbiniidae	*Scoloplos simplex*
Polychaeta	Spionida	Spionidae	*Boccardia chilensis*
Polychaeta	Spionida	Spionidae	*Boccardia lamellata*
Polychaeta	Spionida	Spionidae	*Boccardia syrtis*
Polychaeta	Spionida	Spionidae	*Prionospio aucklandica*
Polychaeta	Spionida	Spionidae	*Prionospio multicristata*
Polychaeta	Spionida	Spionidae	*Scolecolepides benhami*
Polychaeta	Terebellida	Ampharetidae	*Ampharete kerguelensis*
Polychaeta	Terebellida	Cirratulidae	*Protocirrineris nuchalis*
Polychaeta	Terebellida	Cirratulidae	*Timarete anchylochaetus*
Polychaeta	Terebellida	Flabelligeridae	*Flabelligera affinis*
Polychaeta	Terebellida	Flabelligeridae	*Pherusa parmata*
Polychaeta	Terebellida	Pectinariidae	*Pectinaria australis*
Polychaeta	Terebellida	Terebellidae	*Amaeana antipoda*
Polychaeta	Terebellida	Terebellidae	*Streblosoma toddae*
Bryozoa			
Gymnolaemata	Cheilostomata	Arachnopusiidae	*Arachnopusia unicornis*
Gymnolaemata	Cheilostomata	Beaniidae	*Beania n. sp. [whitten]*
Gymnolaemata	Cheilostomata	Calloporidae	*Odontionella cyclops*

Phylum, Class	Order	Family	Genus and species
Gymnolaemata	Cheilostomata	Calwelliidae	*Calwellia gracilis*
Gymnolaemata	Cheilostomata	Candidae	*Caberea zelandica*
Gymnolaemata	Cheilostomata	Microporellidae	*Fenestrulina disjuncta*
Gymnolaemata	Cheilostomata	Romancheinidae	*Escharoides angela*
Gymnolaemata	Cheilostomata	Romancheinidae	*Escharoides excavata*
Gymnolaemata	Ctenostomata	Flustrellidridae	*Elzerina binderi*
Chelicerata			
Pycnogonida	Pantopoda	Ammotheidae	*Achelia assimilis*
Pycnogonida	Pantopoda	Ammotheidae	*Ammothea magniceps*
Pycnogonida	Pantopoda	Ammotheidae	*Pallenopsis obliqua*
Cnidaria			
Anthozoa	Actiniaria	Diadumenidae	*Diadumene neozelandica*
Anthozoa	Actiniaria	Sagartiidae	*Anthothoe vagrans*
Hydrozoa	Hydroida	Sertulariidae	*Amphisbetia bispinosa*
Hydrozoa	Hydroida	Sertulariidae	*Amphisbetia fasciculata*
Hydrozoa	Hydroida	Sertulariidae	*Amphisbetia trispinosa*
Hydrozoa	Hydroida	Sertulariidae	*Sertularia unguiculata*
Hydrozoa	Hydroida	Sertulariidae	*Stereotheca elongata*
Hydrozoa	Hydroida	Sertulariidae	*Symplectoscyphus johnstoni*
Hydrozoa	Hydroida	Sertulariidae	*Symplectoscyphus subarticulatus*
Hydrozoa	Hydroida	Syntheciidae	*Synthecium elegans*
Crustacea			
Cirripedia	Thoracica	Balanidae	*Austrominius modestus*
Cirripedia	Thoracica	Balanidae	*Notomegabalanus decorus*
Malacostraca	Amphipoda	Aoridae	*Haplocheira barbimana*
Malacostraca	Amphipoda	Cyproideidae	*Peltopes peninsulae*
Malacostraca	Amphipoda	Dexaminidae	*Paradexamine pacifica*
Malacostraca	Amphipoda	Eusiridae	*Eusiroides monoculoides*
Malacostraca	Amphipoda	Eusiridae	*Oradarea novaezealandiae*
Malacostraca	Amphipoda	Eusiridae	*Paramoera rangitira*
Malacostraca	Amphipoda	Hyalidae	*Hyale grandicornis*
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis dentifera*
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis typica*
Malacostraca	Amphipoda	Liljeborgiidae	*Liljeborgia hansoni*
Malacostraca	Amphipoda	Lysianassidae	*Orchomene aahu*
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia angusta*
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia stephenseni*
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia vesca*
Malacostraca	Amphipoda	Melitidae	*Melita inaequistylis*
Malacostraca	Amphipoda	Phoxocephalidae	*Torridoharpinia hurleyi*
Malacostraca	Amphipoda	Podoceridae	*Podocerus cristatus*
Malacostraca	Amphipoda	Podoceridae	*Podocerus karu*
Malacostraca	Amphipoda	Podoceridae	*Podocerus manawatu*
Malacostraca	Amphipoda	Stenothoidae	*Stenothoe moe*
Malacostraca	Anomura	Paguridae	*Pagurus novizealandiae*
Malacostraca	Anomura	Porcellanidae	*Petrolisthes elongatus*
Malacostraca	Anomura	Porcellanidae	*Petrolisthes novaezelandiae*
Malacostraca	Brachyura	Cancridae	*Cancer novaezelandiae*
Malacostraca	Brachyura	Hymenosomatidae	*Hymenosoma depressum*
Malacostraca	Brachyura	Majidae	*Notomithrax peronii*

Phylum, Class	Order	Family	Genus and species
Malacostraca	Brachyura	Majidae	*Notomithrax ursus*
Malacostraca	Brachyura	Ocypodidae	*Macrophthalmus hirtipes*
Malacostraca	Caridea	Crangonidae	*Pontophilus australis*
Malacostraca	Isopoda	Cirolanidae	*Natatolana rossi*
Malacostraca	Isopoda	Holognathiidae	*Cleantis tubicola*
Malacostraca	Isopoda	Paranthuridae	*Paranthura cf. flagellata*
Malacostraca	Isopoda	Sphaeromatidae	*Cilicaea canaliculata*
Malacostraca	Isopoda	Sphaeromatidae	*Pseudosphaeroma campbellense*
Malacostraca	Mysida	Mysidae	*Tenogomysis macropsis*
Malacostraca	Mysida	Mysidae	*Tenogomysis producta*
Echinodermata			
Asteroidea	Forcipulata	Asteriidae	*Allostichaster polyplax*
Asteroidea	Valvatida	Asterinidae	*Patiriella regularis*
Ophiuroidea	Ophiurida	Amphiuridae	*Amphipholis squamata*
Mollusca			
Bivalvia	Myoida	Hiatellidae	*Hiatella arctica*
Bivalvia	Mytiloida	Mytilidae	*Aulacomya atra maoriana*
Bivalvia	Mytiloida	Mytilidae	*Perna canaliculus*
Bivalvia	Mytiloida	Mytilidae	*Xenostrobus pulex*
Bivalvia	Ostreoida	Ostreidae	*Ostrea chilensis*
Bivalvia	Veneroida	Lasaeidae	*Arthritica bifurca*
Bivalvia	Veneroida	Lasaeidae	*Lasaea hinemoa*
Bivalvia	Veneroida	Mactridae	*Cyclomactra ovata*
Bivalvia	Veneroida	Semelidae	*Leptomya retiaria*
Bivalvia	Veneroida	Veneridae	*Irus reflexus*
Bivalvia	Veneroida	Veneridae	*Ruditapes largillierti*
Cephalopoda	Octopoda	Octopodidae	*Octopus maorum*
Gastropoda	Cephalaspidea	Aglajidae	*Melanochlamys cylindrica*
Gastropoda	Littorinimorpha	Calyptraeidae	*Sigapatella tenuis*
Gastropoda	Littorinimorpha	Littorinidae	*Risellopsis varia*
Gastropoda	Neogastropoda	Buccinidae	*Buccinulum pallidum*
Gastropoda	Neogastropoda	Muricidae	*Xymene plebeius*
Gastropoda	Neogastropoda	Muricidae	*Xymene pusillus*
Gastropoda	Nudibranchia	Dorididae	*Archidoris nanula*
Gastropoda	Patellogastropoda	Lottiidae	*Notoacmea helmsi*
Gastropoda	Vetigastropoda	Fissurellidae	*Scutus breviculus*
Gastropoda	Vetigastropoda	Trochidae	*Micrelenchus sanguineus*
Gastropoda	Vetigastropoda	Trochidae	*Micrelenchus tenebrosus*
Gastropoda	Vetigastropoda	Trochidae	*Trochus tiaratus*
Polyplacophora	Acanthochitonina	Acanthochitonidae	*Cryptoconchus porosus*
Polyplacophora	Ischnochitonina	Chitonidae	*Sypharochiton pelliserpentis*
Phycophyta			
Rhodophyceae	Ceramiales	Ceramiaceae	*Ceramium apiculatum*
Rhodophyceae	Ceramiales	Delesseriaceae	*Myriogramme denticulata*
Rhodophyceae	Ceramiales	Delesseriaceae	*Schizoseris dichotoma*
Rhodophyceae	Ceramiales	Delesseriaceae	*Schizoseris griffithsia*
Rhodophyceae	Ceramiales	Rhodomelaceae	*Bostrychia harveyi*
Rhodophyceae	Corallinales	Corallinaceae	*Corallina officinalis*
Rhodophyceae	Gigartinales	Gigartinaceae	*Gigartina decipiens*
Rhodophyceae	Gigartinales	Kallymeniaceae	*Callophyllis calliblepharoides*

Phylum, Class	Order	Family	Genus and species
Rhodophyceae	Gigartinales	Phyllophoraceae	*Stenogramme interrupta*
Rhodophyceae	Rhodymeniales	Champiacea	*Lomentaria secunda*
Rhodophyceae	Rhodymeniales	Lomentariaceae	*Lomentaria umbellata*
Rhodophyceae	Rhodymeniales	Rhodomeniaceae	*Rhodymenia leptophylla*
Rhodophyceae	Rhodymeniales	Rhodomeniaceae	*Rhodymenia novazelandica*
Ulvophyceae	Cladophorales	Wittrockiellaceae	*Wittrockiella salina*
Ulvophyceae	Ulvales	Ulvaceae	*Enteromorpha intestinalis*
Porifera			
Demospongiae	Haplosclerida	Callyspongiidae	*Callyspongia cf. fistulosa*
Demospongiae	Haplosclerida	Chalinidae	*Haliclona cf. punctata*
Demospongiae	Poecilosclerida	Mycalidae	*Mycale (Carmia) tasmani*
Pyrrophycophyta			
Dinophyceae	Gymnodiniales	Polykrikaceae	*Pheopolykrikos sp.*
Dinophyceae	Gymnodiniales	Polykrikaceae	*Polykrikos schwartzii*
Dinophyceae	Peridiniales	Gonyaulacaceae	*Protoceratium reticulatum*
Dinophyceae	Peridiniales	Peridiniaceae	*Lingulodinium polyedrum*
Dinophyceae	Peridiniales	Peridiniaceae	*Protoperidinium leonis*
Dinophyceae	Peridiniales	Peridiniaceae	*Protoperidinium sp.*
Urochordata			
Ascidiacea	Aplousobranchia	Polyclinidae	*Aplidium adamsi*
Ascidiacea	Aplousobrancia	Holoziodae	*Hypsitozoa fasmeriana*
Ascidiacea	Stolidobranchia	Molgulidae	*Molgula mortenseni*
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura cancellata*
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura carnea*
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura lutea*
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura pachydermatina*
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura pulla*
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa bicornuta*
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa nisiotus*
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa otagoensis*
Vertebrata			
Actinopterygii	Gadiformes	Moridae	*Pseudophycis bachus*
Actinopterygii	Mugiliformes	Mugilidae	*Aldrichetta forsteri*
Actinopterygii	Perciformes	Eleotridae	*Grahamichthys radiatus*
Actinopterygii	Perciformes	Labridae	*Notolabrus celidotus*
Actinopterygii	Perciformes	Trypterigiidae	*Blennodon dorsale*
Actinopterygii	Perciformes	Trypterigiidae	*Grahamina gymnota*
Chondrichthyes	Squaliformes	Squalidae	*Squalus acanthias*
Actinopterygii	Tetradontiformes	Tetraodontidae	*Contusus richiei*

Table 7: Cryptogenic marine species recorded from the Port of Timaru survey. Category 1 cryptogenic species (C1); Category 2 cryptogenic species (C2). Refer to section 2.8 for definitions.

Phylum, Class	Order	Family	Genus and species	
Bryozoa				
Gymnolaemata	Cheilostomata	Scrupariidae	*Scruparia ambigua*	C1
Chelicerata				
Pycnogonida	Pantopoda	Ammotheidae	*?Tanystylum sp. nov. B*	C2
Pycnogonida	Pantopoda	Ammotheidae	*Achelia sp. cf. A. australiensis*	C1
Cnidaria				
Hydrozoa	Hydroida	Plumulariidae	*Plumularia setacea*	C1
Crustacea				
Malacostraca	Amphipoda	Corophiidae	*Meridiolembos sp. aff. M. pertinax*	C2
Malacostraca	Amphipoda	Corophiidae	*Meridiolembos sp. aff. acherontis*	C2
Malacostraca	Amphipoda	Dexaminidae	*Polycheria sp. aff. P. obtusa*	C2
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis sp. aff. typica*	C2
Malacostraca	Amphipoda	Isaeidae	*Photis sp. aff. P. nigrocula*	C2
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia sp. aff. angusta*	C2
Malacostraca	Amphipoda	Lysianassidae	*Stomacontion sp. aff. S. pungpunga*	C2
Malacostraca	Amphipoda	Oedicerotidae	*Oedicerotidae n.gen. n. sp.*	C2
Mollusca				
Bivalvia	Mytiloida	Mytilidae	*Mytilus galloprovincialis*	C1
Porifera				
Demospongiae	Dictyoceratida	Dysideidae	*Euryspongia n. sp. 2*	C2
Demospongiae	Halichondrida	Halichondriidae	*Halichondria n. sp. 1*	C2
Demospongiae	Halichondrida	Halichondriidae	*Halichondria n. sp. 6*	C2
Demospongiae	Haplosclerida	Callyspongiidae	*Callyspongia n. sp. 1*	C2
Demospongiae	Haplosclerida	Callyspongiidae	*Chalinopsilla n. sp. 1*	C2
Demospongiae	Haplosclerida	Chalinidae	*Haliclona n. sp. 2*	C2
Demospongiae	Haplosclerida	Chalinidae	*Haliclona n. sp. 3*	C2
Demospongiae	Poecilosclerida	Ancinoiidae	*Crella (Pytheas) incrustans*	C1
Demospongiae	Poecilosclerida	Microcionidae	*Axociella n. sp. 1*	C2
Urochordata				
Ascidiacea	Aplousobrancia	Polyclinidae	*Aplidium phortax*	C1
Ascidiacea	Phlebobranchia	Rhodosomatidae	*Corella eumyota*	C1
Acidiacea	Solidobranchia	Pyuridae	*Pyura sp. (new?)*	C2
Ascidiacea	Stolidobranchia	Botryllinae	*Botrylliodes leachii*	C1
Ascidiacea	Stolidobranchia	Styelidae	*Asterocarpa cerea*	C1

Table 8: Non-indigenous marine species recorded from the Port of Timaru survey. 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	Sabellida	Sabellidae	*Euchone limnicola*	H or B	Unknown [1]
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	Cryptosulidae	*Cryptosula pallasiana*	H	1890s
Gymnolaemata	Cheilostomata	Watersiporidae	*Watersipora subtorquata*	H or B	Pre-1982
Crustacea					
Malacostraca	Amphipoda	Caprellidae	*Caprella mutica* **(NR)**	H	Feb. 2002 [d]
Malacostraca	Amphipoda	Corophiidae	*Apocorophium acutum*	H	Pre-1921
Malacostraca	Amphipoda	Corophiidae	*Monocorophium acherusicum*	H	Pre-1921
Malacostraca	Amphipoda	Ischyroceridae	*Jassa slatteryi*	H	Unknown [1]
Malacostraca	Brachyura	Cancridae	*Cancer gibbosulus* **(NR)**	H or B	Nov. 2001 [d]
Phycophyta					
Phaeophyceae	Laminariales	Alariaceae	*Undaria pinnatifida*	H or B	Pre-1987
Rhodophyceae	Ceramiales	Ceramiaceae	*Griffithsia crassiuscula*	H	Pre-1954
Rhodophyceae	Ceramiales	Rhodomelaceae	*Polysiphonia subtilissima*	H	Pre-1974
Urochordata					
Ascidiacea	Aplousobranchia	Cionidae	*Ciona intestinalis*	H	Pre-1950
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 Timaru 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	Phyllodocida	Nereididae	*Neanthes Neanthes-A*
Polychaeta	Phyllodocida	Nereididae	*Platynereis Platynereis_australis_group*
Polychaeta	Phyllodocida	Phyllodocidae	*Eulalia Eulalia-NIWA-2*
Polychaeta	Phyllodocida	Phyllodocidae	*Pirakia Pirakia-A*
Polychaeta	Phyllodocida	Polynoidae	*Lepidonotus Indet*
Polychaeta	Phyllodocida	Syllidae	*Eusyllin-unknown Eusyllin-unknown-A*
Polychaeta	Phyllodocida	Syllidae	*Eusyllis Eusyllis-B*
Polychaeta	Phyllodocida	Syllidae	*Syllidae Indet*
Polychaeta	Phyllodocida	Syllidae	*Syllis Syllis-B*
Polychaeta	Phyllodocida	Syllidae	*Syllis Syllis-C*
Polychaeta	Sabellida	Sabellidae	*Sabellidae Indet*
Polychaeta	Sabellida	Serpulidae	*Serpulidae Indet*
Polychaeta	Scolecida	Maldanidae	*Asychis Asychis-B*
Polychaeta	Spionida	Spionidae	*Paraprionospio Paraprionospio-A [pinnata]*
Polychaeta	Spionida	Spionidae	*Rhynchospio Rhynchospio-A*
Polychaeta	Terebellida	Cirratulidae	*Cirratulidae Indet*
Polychaeta	Terebellida	Cirratulidae	*Cirratulus Cirratulus-A*
Polychaeta	Terebellida	Terebellidae	*Terebellidae Indet*
Cnidaria			
Anthozoa	Actiniaria	Acontiophoridae	*Mimetridium sp.*
Anthozoa	Actiniaria	Diadumenidae	*Diadumene sp.*
Anthozoa	Actiniaria	Diadumenidae	*Diadumenidae sp.*
Anthozoa	Actiniaria	Sagartiidae	*Actinothoe sp.*
Anthozoa	Actiniaria	Sagartiidae	*Anthothoe sp.*
Anthozoa	Actiniaria	Sagartiidae	*Sagartiidae sp.*
Anthozoa	Actiniaria		*Acontiaria sp.*
Hydrozoa	Hydroida	Sertulariidae	*Amphisbetia ?bipsinosa*
Crustacea			
Malacostraca	Amphipoda	Corophiidae	*Meridiolembos sp.*
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis sp. 1*
Malacostraca	Decapoda		*Shrimp sp.*
Malacostraca	Isopoda	Anthuridae	*Mesanthura ?affinis*
Malacostraca	Isopoda	Sphaeromatidae	*?Cilicaea sp*
Malacostraca	Mysida	Mysidae	*Siriella sp.*
Malacostraca	Mysida	Mysidae	*Tenogomysis sp. 1*

Phylum, Class	Order	Family	Genus and species
Malacostraca	Tanaidacea	Tanaidae	*Zeuxoides sp.*
Malacostraca	Tanaidacea	Tanaidae	*Zeuxoides sp. 1*
Malacostraca	Tanaidacea	Tanaidae	*Zeuxoides sp. 2*
Mollusca			
Bivalvia	Nuculoida	Nuculidae	*Linucula sp.*
Gastropoda	Neogastropoda	Turridae	*Neoguraleus sp.*
Phycophyta			
Phaeophyceae	Ectocarpales	Ectocarpaceae	*Hincksia sp*
Phaeophyceae	Laminariales	Alariaceae	*Ecklonia sp*
Phaeophyceae	Scytosiphonales	Scytosiphonaceae	*Colpomenia sp.*
Phaeophyceae	Sphacelariales	Sphacelariaceae	*Sphacelaria sp.*
Rhodophyceae	Acrochaetiales	Acrochaetiaceae	*Audouinella sp.*
Rhodophyceae	Bangiales	Bangiaceae	*Bangia sp.*
Rhodophyceae	Bangiales	Bangiaceae	*Porphyra sp.*
Rhodophyceae	Ceramiales	Ceramiaceae	*Antithamnionella sp*
Rhodophyceae	Ceramiales	Ceramiaceae	*Ceramium sp.*
Rhodophyceae	Ceramiales	Ceramiaceae	*Griffithsia sp.*
Rhodophyceae	Ceramiales	Ceramiaceae	*Pterothamnion sp.*
Rhodophyceae	Ceramiales	Delesseriaceae	*Delesseriaceae sp.*
Rhodophyceae	Ceramiales	Delesseriaceae	*Erythroglossum sp.*
Rhodophyceae	Ceramiales	Delesseriaceae	*Unidentifiable Delesseriaceae*
Rhodophyceae	Ceramiales	Rhodomelaceae	*Bostrychia sp.*
Rhodophyceae	Ceramiales	Rhodomelaceae	*Polysiphonia sp.*
Rhodophyceae	Rhodymeniales	Rhodomeniaceae	*Rhodymenia sp.*
Rhodophyceae			*Unidentifiable red*
Ulvophyceae	Bryopsidales	Bryopsidaceae	*Bryopsis sp.*
Ulvophyceae	Cladophorales	Cladophoraceae	*Cladophora sp.*
Ulvophyceae	Ulvales	Ulvaceae	*Enteromorpha sp.*
Ulvophyceae	Ulvales	Ulvaceae	*Ulva sp.*
Platyhelminthes			
Turbellaria	Polycladidia		*Indet genus indet sp.*
Urochordata			
Ascidiacea	Aplousobranchia	Didemnidae	*Didemnum sp.*

Table 10: Non-indigenous marine organisms recorded from the Port of Timaru 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 Timaru	Locations detected in Port of Timaru	Detected in other locations surveyed in ZBS2000_04
Euchone limnicola	Benthic sled, Benthic grab	No. 1 Wharf; No. 2 Wharf; No. 3 Wharf; Fishermans Wharf; Inner North Mole; Outer North Miole; North Mole See Fig 17	Gisborne
Barantolla lepte	Benthic grab	No. 1 Wharf; North Mole See Fig 18	Napier, Taranaki
Bugula flabellata	Benthic sled, Benthic grab	No. 1 Wharf; Fishermans Wharf; Inner North Mole; North Mole See Fig 19	Auckland, Bluff, Dunedin, Lyttleton, Napier, Nelson, Opua, Picton, Taranaki, Tauranga, Whangarei Harbour, Wellington
Bugula neritina	Pile scrape, Benthic sled, Benthic grab	No. 1 Wharf; Fishermans Wharf; North Mole See Fig 20	Auckland, Dunedin, Gisborne, Gulf Harbour Marina, Lyttleton, Napier, Opua, Taranaki, Tauranga, Whangarei Harbour, Whangarei Marina
Cryptosula pallasiana	Pile scrape, Benthic sled, Benthic grab	No. 1 Wharf; No. 2 Wharf; No. 3 Wharf; Fishermans Wharf; North Mole See Fig 21	Dunedin, Gisborne, Lyttleton, Nelson, Taranaki, Whangarei Harbour, Wellington
Watersipora subtorquata	Pile scrape	No. 1 Wharf; No. 3 Wharf; Fishermans Wharf; Inner North Mole; Outer North Mole; North Mole See Fig 22	Bluff, Dunedin, Gisborne, Gulf Harbour Marina, Lyttleton, Napier, Nelson, Opua, Picton, Taranaki, Tauranga, Whangarei Harbour, Wellington
Caprella mutica	Pile scrape	No. 1 Wharf; No. 3 Wharf; Fishermans Wharf; North Mole See Fig 23	None
Apocorophium acutum	Pile scrape	No. 3 Wharf; Fishermans Wharf; North Mole See Fig 24	Dunedin, Gulf Harbour Marina, Lyttleton, Opua, Tauranga
Monocorophium acherusicum	Pile scrape	No. 1 Wharf; No. 3 Wharf; North Mole See Fig 25	Dunedin, Gisborne, Lyttleton, Tauranga, Whangarei Marina
Jassa slatteryi	Pile scrape	No. 1 Wharf; No. 3 Wharf; Fishermans Wharf; North Mole See Fig 26	Lyttleton, Whangarei Harbour

Genus and species	Capture technique in Port of Timaru	Locations detected in Port of Timaru	Detected in other locations surveyed in ZBS2000_04
Cancer gibbosulus	Benthic grab, Pile scrape	No. 1 Wharf; No. 3 Wharf; Fishermans Wharf See Fig 27	Lyttleton, Wellington
Undaria pinnatifida	Benthic sled, Pile scrape	No. 1 Wharf; No. 2 Wharf; No. 3 Wharf; Fishermans Wharf; Outer North Mole; North Mole See Fig 28	Dunedin, Gisborne, Lyttleton, Napier, Picton, Wellington
Griffithsia crassiuscula	Pile scrape	North Mole Wharf See Fig 29	Bluff, Lyttleton, Picton, Taranaki, Wellington
Polysiphonia subtilissima	Pile scrape	No. 1 Wharf See Fig 30	Dunedin, Lyttleton
Ciona intestinalis	Pile scrape	No. 1 Wharf; Fishermans Wharf; North Mole Wharf See Fig 31	Lyttleton, Napier, Nelson
Cnemidocarpa sp.	Pile scrape	No. 3 Wharf; Fishermans Wharf See Fig 32	Auckland, Gisborne, Gulf Harbour Marina, Lyttleton, Nelson, Picton, Taranaki, Tauranga, 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, Gastropoda, 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 (Phaeophyceae). 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 Timaru.

List of Chapman and Carlton's (1994) nine criteria (C1 – C9) for assigning non-indigenous species status that were met by the non-indigenous species sampled in the Port of Timaru. Criteria that apply to each species are indicated by (+). Cranfield et al's (1998) analysis was used for species previously known from New Zealand waters. For non-indigenous species that were 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.

Phylum and species	C1	C2	C3	C4	C5	C6	C7	C8	C9
Annelida									
Euchone limnicola	+		+		+	+	+	+	
Barantolla lepte	+		+					+	
Bryozoa									
Bugula flabellata	+	+	+		+	+	+	+	+
Bugula neritina	+				+	+	+	+	+
Cryptosula pallasiana	+	+	+		+	+	+	+	+
Watersipora subtorquata	+	+	+		+	+	+	+	+
Crustacea									
Caprella mutica	+		+			+	+	+	+
Apocorophium acutum			+			+		+	+
Monocorophium acherusicum			+		+	+		+	+
Jassa slatteryi	+		+			+		+	+
Cancer gibbosulus	+		+				+	+	+
Phycophyta									
Undaria pinnatifida	+	+	+		+	+	+	+	+
Griffithsia crassiuscula	+	+				+		+	+
Polysiphonia subtilissima	+	+			+	+	+	+	+
Urochordata									
Ciona intestinalis	+		+		+	+	+	+	+
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 the port of Timaru

Site	Eastings	Northings	NZ Latitude	NZ Longitude	Survey Method	No. of sample units
1	2371336	5644741	-44.39349	171.25951	BGRB	5
1	2371336	5644741	-44.39349	171.25951	BSLD	2
1	2371336	5644741	-44.39349	171.25951	CRBTP	4
1	2371336	5644741	-44.39349	171.25951	FSHTP	4
1	2371336	5644741	-44.39349	171.25951	PSC	16
1	2371336	5644741	-44.39349	171.25951	SHRTP	4
1	2371336	5644741	-44.39349	171.25951	STFTP	4
2	2371111	5644716	-44.39367	171.25668	BSLD	2
3	2371040	5644806	-44.39285	171.25582	BGRB	3
3	2371040	5644806	-44.39285	171.25582	BSLD	2
3	2371040	5644806	-44.39285	171.25582	CRBTP	4
3	2371040	5644806	-44.39285	171.25582	FSHTP	4
3	2371040	5644806	-44.39285	171.25582	PSC	17
3	2371040	5644806	-44.39285	171.25582	SHRTP	4
3	2371040	5644806	-44.39285	171.25582	STFTP	4
BTWN 1 & 2	2371162	5644692	-44.39390	171.25732	CYST	2
BTWN 2 & 3	2371089	5644784	-44.39306	171.25643	CYST	2
FISH	2371246	5645461	-44.38700	171.25857	BGRB	3
FISH	2371246	5645461	-44.38700	171.25857	PSC	10
IN NTH MOLE	2371274	5645228	-44.38910	171.25886	BSLD	2
IN NTH MOLE	2371274	5645228	-44.38910	171.25886	CRBTP	4
IN NTH MOLE	2371274	5645228	-44.38910	171.25886	FSHTP	4
IN NTH MOLE	2371274	5645228	-44.38910	171.25886	SHRTP	4
IN NTH MOLE	2371274	5645228	-44.38910	171.25886	STFTP	4
MID PORT	2371136	5644945	-44.39162	171.25706	CYST	2
MOLE	2371356	5645245	-44.38896	171.25990	BSLD	2
NTH MOLE	2371111	5645100	-44.39022	171.25678	BGRB	3
NTH MOLE	2371111	5645100	-44.39022	171.25678	FSHTP	1
NTH MOLE	2371111	5645100	-44.39022	171.25678	PSC	15
NTH MOLE	2371111	5645100	-44.39022	171.25678	CRBTP	4
NTH MOLE	2371111	5645100	-44.39022	171.25678	FSHTP	3
NTH MOLE	2371111	5645100	-44.39022	171.25678	SHRTP	4
NTH MOLE	2371111	5645100	-44.39022	171.25678	STFTP	4
OUT MID PORT	2371354	5645245	-44.38896	171.25987	CYST	2
OUT NTH MOLE	2371350	5645425	-44.38734	171.25987	BSLD	2
OUT NTH MOLE	2371350	5645425	-44.38734	171.25987	CRBTP	4
OUT NTH MOLE	2371350	5645425	-44.38734	171.25987	FSHTP	4
OUT NTH MOLE	2371350	5645425	-44.38734	171.25987	SHRTP	4
OUT NTH MOLE	2371350	5645425	-44.38734	171.25987	STFTP	4
ROCKWALL					VISS	1

*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	1															3									
					Pile replicate	1							2							MISC	1								2
					Pile position	IN			OUT				IN			OUT						IN				OUT				IN
Class	Orders	Family	Genus	Species	*Status	1	2	3	1	2	3	4	1	2	3	1	2	3	4	MISC	MISC	1	2	3	4	1	2	3	4	1
Anthozoa	Actiniaria	Acontiophoridae	*Mimetridium*	*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
Anthozoa	Actiniaria	Diadumenidae	*Diadumene*	*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
Anthozoa	Actiniaria	Diadumenidae	*Diadumenidae*	*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
Anthozoa	Actiniaria	Sagartiidae	*Sagartiidae*	*sp.*	SI	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
Anthozoa	Actiniaria	Sagartiidae	*Anthothoe*	*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
Anthozoa	Actiniaria	Sagartiidae	*Anthothoe*	*vagrans*	N	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
Anthozoa	Actiniaria	Sagartiidae	*Actinothoe*	*sp.*	SI	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
Anthozoa	Actiniaria		*Acontiaria*	*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
Ascidiacea	Aplousobranchia	Cionidae	*Ciona*	*intestinalis*	A	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
Ascidiacea	Aplousobranchia	Didemnidae	*Didemnum*	*sp.*	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
Ascidiacea	Aplousobranchia	Polyclinidae	*Aplidium*	*phortax*	C1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0
Ascidiacea	Aplousobranchia	Polyclinidae	*Aplidium*	*adamsi*	N	0	0	1	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0
Ascidiacea	Aplousobrancia	Holoziodae	*Hypsitozoa*	*fasmeriana*	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
Ascidiacea	Phlebobranchia	Rhodosomatidae	*Corella*	*eumyota*	C1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Botryllinae	*Botrylliodes*	*leachii*	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
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
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*pachydermatina*	N	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*cancellata*	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
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*lutea*	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
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
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*carnea*	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
Ascidiacea	Stolidobranchia	Styelidae	*Asterocarpa*	*cerea*	C1	0	0	1	0	0	0	1	0	0	0	0	0	1	0	1	0	0	1	1	0	0	0	1	1	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*nisiotus*	N	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*bicornuta*	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
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	1	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*otagoensis*	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
Asteroidea	Forcipulata	Asteriidae	*Allostichaster*	*polyplax*	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
Asteroidea	Valvatida	Asterinidae	*Patiriella*	*regularis*	N	0	0	0	0	0	0	1	0	0	1	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	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0
Bivalvia	Mytiloida	Mytilidae	*Aulacomya*	*atra maoriana*	N	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	1	0
Bivalvia	Mytiloida	Mytilidae	*Mytilus*	*galloprovincialis*	C1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	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	1	0	0	0	0	0	0	0
Bivalvia	Mytiloida	Mytilidae	*Xenostrobus*	*pulex*	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
Bivalvia	Ostreoida	Ostreidae	*Ostrea*	*chilensis*	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
Bivalvia	Veneroida	Lasaeidae	*Lasaea*	*hinemoa*	N	1	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	Veneroida	Veneridae	*Irus*	*reflexus*	N	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0
Bivalvia	Veneroida	Veneridae	*Ruditapes*	*largillierti*	N	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
Bryopsidophyceae	Bryopsidales	Bryopsidaceae	*Bryopsis*	*sp.*	SI	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cladophorophyceae	Cladophorales	Cladophoraceae	*Cladophora*	*sp.*	SI	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
Crustacea	Anomura	Porcellanidae	*Petrolisthes*	*elongatus*	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
Crustacea	Brachyura	Cancridae	*Cancer*	*gibbosulus*	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	1
Crustacea	Brachyura	Hymenosomatidae	*Hymenosoma*	*depressum*	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
Crustacea	Thoracica	Balanidae	*Austrominius*	*modestus*	N	1	1	1	1	1	1	0	1	1	1	1	0	0	0	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	1	0	0	0	0	0	0	0	0
Demospongiae	Dictyoceratida	Dysideidae	*Euryspongia*	*n. sp. 2 (pale blue bushy encrusting)*	C2	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
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	1	0
Demospongiae	Haplosclerida	Chalinidae	*Haliclona*	*cf. punctata*	N	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
Demospongiae	Poecilosclerida	Mycalidae	*Mycale (Carmia)*	*tasmani*	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
Gastropoda	Littorinimorpha	Calyptraeidae	*Sigapatella*	*tenuis*	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
Gastropoda	Littorinimorpha	Littorinidae	*Risellopsis*	*varia*	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
Gastropoda	Neogastropoda	Muricidae	*Xymene*	*plebeius*	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
Gastropoda	Nudibranchia	Dorididae	*Archidoris*	*nanula*	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
Gastropoda	Patellogastropoda	Lottiidae	*Notoacmea*	*helmsi*	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
Gastropoda	Vetigastropoda	Fissurellidae	*Scutus*	*breviculus*	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

*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	1																		3						
					Pile replicate	1							2									MISC		1						2
					Pile position	IN			OUT				IN			OUT								IN				OUT		IN
Class	Orders	Family	Genus	Species	*Status	1	2	3	1	2	3	4	1	2	3	1	2	3	4	MISC	MISC	1	2	3	4	1	2	3	4	1
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	0	0	0	0	0
Gymnolaemata	Cheilostomata	Arachnopusiidae	*Arachnopusia*	*unicornis*	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
Gymnolaemata	Cheilostomata	Beaniidae	*Beania*	*n. sp. [whitten]*	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
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*neritina*	A	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
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*flabellata*	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
Gymnolaemata	Cheilostomata	Candidae	*Caberea*	*zelandica*	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
Gymnolaemata	Cheilostomata	Cryptosulidae	*Cryptosula*	*pallasiana*	A	0	1	1	0	1	0	1	0	1	0	0	1	0	1	0	0	1	0	1	1	1	1	0	0	1
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
Gymnolaemata	Cheilostomata	Romancheinidae	*Escharoides*	*excavata*	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
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
Gymnolaemata	Cheilostomata	Watersiporidae	*Watersipora*	*subtorquata*	A	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	0	1	1
Hydrozoa	Hydroida	Plumulariidae	*Plumularia*	*setacea*	C1	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
Hydrozoa	Hydroida	Sertulariidae	*Symplectoscyphus*	*johnstoni*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	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
Malacostraca	Amphipoda	Caprellidae	*Caprella*	*mutica*	A	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
Malacostraca	Amphipoda	Corophiidae	*Meridiolembos*	*sp.*	SI	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
Malacostraca	Amphipoda	Corophiidae	*Monocorophium*	*acherusicum*	A	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
Malacostraca	Amphipoda	Corophiidae	*Apocorophium*	*acutum*	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
Malacostraca	Amphipoda	Cyproideidae	*Peltopes*	*peninsulae*	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
Malacostraca	Amphipoda	Dexaminidae	*Paradexamine*	*pacifica*	N	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Dexaminidae	*Polycheria*	*sp. aff. P. obtusa*	C2	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
Malacostraca	Amphipoda	Eusiridae	*Eusiroides*	*monoculoides*	N	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
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis*	*sp. aff. typica*	C2	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
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis*	*typica*	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
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis*	*dentifera*	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
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
Malacostraca	Amphipoda	Ischyroceridae	*Jassa*	*slatteryi*	A	0	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	1
Malacostraca	Amphipoda	Liljeborgiidae	*Liljeborgia*	*hansoni*	N	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
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia*	*stephenseni*	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
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia*	*vesca*	N	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia*	*angusta*	N	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Lysianassidae	*Orchomene*	*aahu*	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
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia*	*sp. aff. angusta*	C2	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
Malacostraca	Amphipoda	Lysianassidae	*Stomacontion*	*sp. aff. S. pungpunga*	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
Malacostraca	Amphipoda	Oedicerotidae	*Oedicerotidae n.gen.*	*n. sp.*	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
Malacostraca	Amphipoda	Podoceridae	*Podocerus*	*manawatu*	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
Malacostraca	Amphipoda	Podoceridae	*Podocerus*	*cristatus*	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
Malacostraca	Amphipoda	Podoceridae	*Podocerus*	*karu*	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
Malacostraca	Amphipoda	Stenothoidae	*Stenothoe*	*moe*	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
Malacostraca	Isopoda	Anthuridae	*Mesanthura*	*?affinis*	SI	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0
Malacostraca	Isopoda	Holognathiidae	*Cleantis*	*tubicola*	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
Malacostraca	Isopoda	Paranthuridae	*Paranthura*	*cf. flagellata*	N	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
Malacostraca	Isopoda	Sphaeromatidae	*Cilicaea*	*canaliculata*	N	0	1	1	0	0	1	0	0	1	1	0	0	1	1	0	0	0	0	1	0	0	0	1	0	0
Malacostraca	Isopoda	Sphaeromatidae	*Pseudosphaeroma*	*campbellense*	N	1	1	0	1	0	0	0	1	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Isopoda	Sphaeromatidae	*?Cilicaea*	*sp*	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
Malacostraca	Mysida	Mysidae	*Siriella*	*sp.*	SI	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
Malacostraca	Tanaidacea	Tanaidae	*Zeuxoides*	*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
Ophiuroidea	Ophiurida	Amphiuridae	*Amphipholis*	*squamata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0
Phaeophyceae	Ectocarpales	Ectocarpaceae	*Hincksia*	*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
Phaeophyceae	Laminariales	Alariaceae	*Undaria*	*pinnatifida*	A	0	0	1	0	1	1	1	0	0	0	0	0	1	1	1	0	1	0	0	0	0	1	0	0	0
Phaeophyceae	Sphacelariales	Sphacelariaceae	*Sphacelaria*	*sp*	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
Polychaeta	Eunicida	Dorvilleidae	*Dorvillea*	*australiensis*	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
Polychaeta	Eunicida	Dorvilleidae	*Schistomeringos*	*loveni*	N	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	Lumbrineridae	*Lumbrineris*	*sphaerocephala*	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

*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	1																3								
					Pile replicate	1							2								MISC	1								2
					Pile position	IN			OUT				IN			OUT						IN				OUT				IN
Class	Orders	Family	Genus	Species	*Status	1	2	3	1	2	3	4	1	2	3	1	2	3	4	MISC	MISC	1	2	3	4	1	2	3	4	1
Polychaeta	Phyllodocida	Hesionidae	*Ophiodromus*	*angustifrons*	N	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1	0	0	0	0	1	0	0
Polychaeta	Phyllodocida	Nereididae	*Platynereis*	*Platynereis_australis_group*	SI	0	0	1	0	1	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	1	1	0
Polychaeta	Phyllodocida	Nereididae	*Nereis*	*falcaria*	N	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
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*camiguinoides*	N	0	1	0	0	1	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1
Polychaeta	Phyllodocida	Nereididae	*Neanthes*	*kerguelensis*	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
Polychaeta	Phyllodocida	Nereididae	*Neanthes*	*Neanthes-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
Polychaeta	Phyllodocida	Nereididae	*Neanthes*	*cricognatha*	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
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*amblyodonta*	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
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
Polychaeta	Phyllodocida	Phyllodocidae	*Eulalia*	*Eulalia-NIWA-2*	SI	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	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
Polychaeta	Phyllodocida	Phyllodocidae	*Eulalia*	*microphylla*	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
Polychaeta	Phyllodocida	Phyllodocidae	*Nereiphylla*	*castanea*	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
Polychaeta	Phyllodocida	Polynoidae	*Lepidonotus*	*polychromus*	N	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
Polychaeta	Phyllodocida	Polynoidae	*Lepidastheniella*	*comma*	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
Polychaeta	Phyllodocida	Polynoidae	*Lepidonotus*	*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
Polychaeta	Phyllodocida	Syllidae	*Syllis*	*Syllis-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
Polychaeta	Phyllodocida	Syllidae	*Amblyosyllis*	*granosa*	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
Polychaeta	Phyllodocida	Syllidae	*Eusyllin-unknown*	*Eusyllin-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
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
Polychaeta	Phyllodocida	Syllidae	*Syllidae*	*Indet*	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
Polychaeta	Sabellida	Sabellidae	*Branchiomma*	*curta*	N	0	0	1	0	0	0	1	0	0	0	0	1	1	1	0	0	1	0	1	1	0	0	1	1	0
Polychaeta	Sabellida	Sabellidae	*Demonax*	*aberrans*	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
Polychaeta	Sabellida	Sabellidae	*Megalomma*	*kaikourense*	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
Polychaeta	Sabellida	Sabellidae	*Sabellidae*	*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
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	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	0	0	0	0	0	0
Polychaeta	Sabellida	Serpulidae	*Serpulidae*	*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
Polychaeta	Scolecida	Orbiniidae	*Scoloplos*	*simplex*	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
Polychaeta	Spionida	Spionidae	*Boccardia*	*chilensis*	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
Polychaeta	Terebellida	Cirratulidae	*Timarete*	*anchylochaetus*	N	0	0	1	0	0	1	1	0	1	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
Polychaeta	Terebellida	Cirratulidae	*Protocirrineris*	*nuchalis*	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
Polychaeta	Terebellida	Cirratulidae	*Cirratulidae*	*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
Polychaeta	Terebellida	Flabelligeridae	*Flabelligera*	*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
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
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	0	0	0	0	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
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
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	0
Pycnogonida	Pantopoda	Ammotheidae	*Achelia*	*assimilis*	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
Rhodophyceae	Acrochaetiales	Acrochaetiaceae	*Audouinella*	*sp.*	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
Rhodophyceae	Bangiales	Bangiaceae	*Porphyra*	*sp.*	SI	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
Rhodophyceae	Bangiales	Bangiaceae	*Bangia*	*sp.*	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
Rhodophyceae	Ceramiales	Ceramiaceae	*Ceramium*	*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
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	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Antithamnionella*	*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
Rhodophyceae	Ceramiales	Ceramiaceae	*Ceramium*	*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
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	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Griffithsia*	*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
Rhodophyceae	Ceramiales	Deleseriaceae	*Myriogramme*	*denticulata*	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
Rhodophyceae	Ceramiales	Deleseriaceae	*Schizoseris*	*griffithsia*	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
Rhodophyceae	Ceramiales	Delesseriaceae	*Delesseriaceae*	*sp.*	SI	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
Rhodophyceae	Ceramiales	Delesseriaceae	*Erythroglossum*	*sp.*	SI	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	Delesseriaceae	*Schizoseris*	*dichotoma*	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

*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	1																	3								
					Pile replicate	1							2								MISC		1								2
					Pile position	IN			OUT				IN			OUT							IN				OUT				IN
Class	Orders	Family	Genus	Species	*Status	1	2	3	1	2	3	4	1	2	3	1	2	3	4	MISC	MISC	1	2	3	4	1	2	3	4	1
Rhodophyceae	Ceramiales	Rhodomelaceae	*Bostrychia*	*harveyi*	N	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Polysiphonia*	*sp.*	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
Rhodophyceae	Ceramiales	Rhodomelaceae	*Polysiphonia*	*subtilissima*	A	0	0	0	0	1	0	0	0	0	0	0	1	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
Rhodophyceae	Gigartinales	Kallymeniaceae	*Callophyllis*	*calliblepharoides*	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
Rhodophyceae	Rhodymeniales	Champiacea	*Lomentaria*	*secunda*	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
Rhodophyceae	Rhodymeniales	Lomentariaceae	*Lomentaria*	*umbellata*	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
Rhodophyceae	Rhodymeniales	Rhodomeniaceae	*Rhodymenia*	*leptophylla*	N	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	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	0	0	0	0	0	1	0	0
Rhodophyceae		Delesseriaceae	*Unidentifiable*	*Delesseriaceae*	SI	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
Rhodophyceae			*Unidentifiable*	*red*	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
Turbellaria	Polycladida		*Indet genus*	*indet sp.*	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
Ulvophyceae	Cladophorales	Wittrockiellaceae	*Wittrockiella*	*salina*	N	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
Ulvophyceae	Ulvales	Ulvaceae	*Ulva*	*sp.*	SI	0	0	0	1	1	1	0	0	0	0	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0
Ulvophyceae	Ulvales	Ulvaceae	*Enteromorpha*	*sp.*	SI	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ulvophyceae	Ulvales	Ulvaceae	*Enteromorpha*	*intestinalis*	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

*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									FISH										NTH MOLE			
					Pile replicate								MISC	1					2					1			
					Pile position				OUT					IN		OUT			IN		OUT			IN			
Class	Orders	Family	Genus	Species	*Status	2	3	4	1	2	3	4	MISC	1	2	1	2	3	1	2	1	2	3	1	2	3	4
Anthozoa	Actiniaria	Acontiophoridae	*Mimetridium*	*sp.*	SI	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Anthozoa	Actiniaria	Diadumenidae	*Diadumene*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Anthozoa	Actiniaria	Diadumenidae	*Diadumenidae*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthozoa	Actiniaria	Sagartiidae	*Sagartiidae*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthozoa	Actiniaria	Sagartiidae	*Anthothoe*	*sp.*	SI	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthozoa	Actiniaria	Sagartiidae	*Anthothoe*	*vagrans*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthozoa	Actiniaria	Sagartiidae	*Actinothoe*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthozoa	Actiniaria		*Acontiaria*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Aplousobranchia	Cionidae	*Ciona*	*intestinalis*	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Ascidiacea	Aplousobranchia	Didemnidae	*Didemnum*	*sp.*	SI	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Ascidiacea	Aplousobranchia	Polyclinidae	*Aplidium*	*phortax*	C1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Ascidiacea	Aplousobranchia	Polyclinidae	*Aplidium*	*adamsi*	N	0	0	0	0	0	1	1	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0
Ascidiacea	Aplousobrancia	Holoziodae	*Hypsitozoa*	*fasmeriana*	N	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	1	1	0	0	0	0	0	0	1	0	0
Ascidiacea	Stolidobranchia	Botryllinae	*Botrylliodes*	*leachii*	C1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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	1	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*pachydermatina*	N	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*cancellata*	N	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*lutea*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*pulla*	N	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*carnea*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Asterocarpa*	*cerea*	C1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*nisiotus*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*bicornuta*	N	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*	*sp.*	A	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*otagoensis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Asteroidea	Forcipulata	Asteriidae	*Allostichaster*	*polyplax*	N	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Asteroidea	Valvatida	Asterinidae	*Patiriella*	*regularis*	N	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	Myoida	Hiatellidae	*Hiatella*	*arctica*	N	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Bivalvia	Mytiloida	Mytilidae	*Aulacomya*	*atra maoriana*	N	0	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	1	0	1	1	0	0
Bivalvia	Mytiloida	Mytilidae	*Mytilus*	*galloprovincialis*	C1	0	0	0	1	1	0	0	1	0	0	1	1	0	0	0	1	1	1	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
Bivalvia	Mytiloida	Mytilidae	*Xenostrobus*	*pulex*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	Ostreoida	Ostreidae	*Ostrea*	*chilensis*	N	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Bivalvia	Veneroida	Lasaeidae	*Lasaea*	*hinemoa*	N	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	1	0	0
Bivalvia	Veneroida	Veneridae	*Irus*	*reflexus*	N	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Bivalvia	Veneroida	Veneridae	*Ruditapes*	*largillierti*	N	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryopsidophyceae	Bryopsidales	Bryopsidaceae	*Bryopsis*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cladophorophyceae	Cladophorales	Cladophoraceae	*Cladophora*	*sp.*	SI	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*	*elongatus*	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Cancridae	*Cancer*	*gibbosulus*	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Crustacea	Brachyura	Hymenosomatidae	*Hymenosoma*	*depressum*	N	0	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	1	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	1	1	0	1	0	1
Crustacea	Thoracica	Balanidae	*Notomegabalanus*	*decorus*	N	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Dictyoceratida	Dysideidae	*Euryspongia*	*n. sp. 2 (pale blue bushy encrusting)*	C2	0	0	0	0	0	0	1	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	1	0	0	0	0	0	0	0	0	0
Demospongiae	Haplosclerida	Chalinidae	*Haliclona*	*cf. punctata*	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Poecilosclerida	Mycalidae	*Mycale (Carmia)*	*tasmani*	N	1	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*	*tenuis*	N	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	0	0	0	0	1	0	0	0	0	0	0
Gastropoda	Neogastropoda	Muricidae	*Xymene*	*plebeius*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gastropoda	Nudibranchia	Dorididae	*Archidoris*	*nanula*	N	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Gastropoda	Patellogastropoda	Lottiidae	*Notoacmea*	*helmsi*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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

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

				Berth code										FISH											NTH MOLE		
				Pile replicate									MISC	1					2						1		
				Pile position					OUT					IN		OUT			IN		OUT				IN		
Class	Orders	Family	Genus	Species	*Status	2	3	4	1	2	3	4	MISC	1	2	1	2	3	1	2	1	2	3	1	2	3	4
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	0	0
Gymnolaemata	Cheilostomata	Arachnopusiidae	*Arachnopusia*	*unicornis*	N	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*	*n. sp. [whitten]*	N	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*	*neritina*	A	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	1	1
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*flabellata*	A	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	1	1	1	0	0	1
Gymnolaemata	Cheilostomata	Candidae	*Caberea*	*zelandica*	N	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	1	0	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	0	0
Gymnolaemata	Cheilostomata	Romancheinidae	*Escharoides*	*angela*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0
Gymnolaemata	Cheilostomata	Romancheinidae	*Escharoides*	*excavata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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	1	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Watersiporidae	*Watersipora*	*subtorquata*	A	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1
Hydrozoa	Hydroida	Plumulariidae	*Plumularia*	*setacea*	C1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrozoa	Hydroida	Sertulariidae	*Symplectoscyphus*	*johnstoni*	N	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	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Caprellidae	*Caprella*	*mutica*	A	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	1	0	1	1	1
Malacostraca	Amphipoda	Corophiidae	*Meridiolembos*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Malacostraca	Amphipoda	Corophiidae	*Monocorophium*	*acherusicum*	A	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Malacostraca	Amphipoda	Corophiidae	*Apocorophium*	*acutum*	A	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Cyproideidae	*Peltopes*	*peninsulae*	N	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	1	0	0	0	0	0	0	0	0	1	0	0
Malacostraca	Amphipoda	Dexaminidae	*Polycheria*	*sp. aff. P. obtusa*	C2	1	1	0	0	1	1	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Eusiridae	*Eusiroides*	*monoculoides*	N	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis*	*sp. aff. typica*	C2	1	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis*	*typica*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis*	*dentifera*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis*	*sp. 1*	SI	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Ischyroceridae	*Jassa*	*slatteryi*	A	0	1	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	1	0	1	1	0
Malacostraca	Amphipoda	Liljeborgiidae	*Liljeborgia*	*hansoni*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia*	*stephenseni*	N	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	0	1
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia*	*vesca*	N	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia*	*angusta*	N	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Lysianassidae	*Orchomene*	*aahu*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia*	*sp. aff. angusta*	C2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Lysianassidae	*Stomacontion*	*sp. aff. S. pungpunga*	C2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Oedicerotidae	*Oedicerotidae n.gen.*	*n. sp.*	C2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Malacostraca	Amphipoda	Podoceridae	*Podocerus*	*manawatu*	N	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Podoceridae	*Podocerus*	*cristatus*	N	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Podoceridae	*Podocerus*	*karu*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Stenothoidae	*Stenothoe*	*moe*	N	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Isopoda	Anthuridae	*Mesanthura*	*?affinis*	SI	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Isopoda	Holognathiidae	*Cleantis*	*tubicola*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Malacostraca	Isopoda	Paranthuridae	*Paranthura*	*cf. flagellata*	N	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	*Cilicaea*	*canaliculata*	N	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	1	0	1	1	1
Malacostraca	Isopoda	Sphaeromatidae	*Pseudosphaeroma*	*campbellense*	N	0	0	0	1	0	0	0	0	1	0	1	0	0	1	0	1	1	0	0	0	0	0
Malacostraca	Isopoda	Sphaeromatidae	*?Cilicaea*	*sp*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Mysida	Mysidae	*Siriella*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Tanaidacea	Tanaidae	*Zeuxoides*	*sp.*	SI	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Ophiuroidea	Ophiurida	Amphiuridae	*Amphipholis*	*squamata*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Phaeophyceae	Ectocarpales	Ectocarpaceae	*Hincksia*	*sp*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phaeophyceae	Laminariales	Alariaceae	*Undaria*	*pinnatifida*	A	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
Phaeophyceae	Sphacelariales	Sphacelariaceae	*Sphacelaria*	*sp*	SI	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Eunicida	Dorvilleidae	*Dorvillea*	*australiensis*	N	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
Polychaeta	Eunicida	Lumbrineridae	*Lumbrineris*	*sphaerocephala*	N	1	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									FISH											NTH MOLE			
					Pile replicate								MISC	1					2						1			
					Pile position				OUT					IN		OUT			IN		OUT				IN			
Class	Orders	Family	Genus	Species	*Status	2	3	4	1	2	3	4	MISC	1	2	1	2	3	1	2	1	2	3		1	2	3	4
Polychaeta	Phyllodocida	Hesionidae	*Ophiodromus*	*angustifrons*	N	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	0		0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Platynereis*	*Platynereis_australis_group*	SI	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	1		0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Nereis*	*falcaria*	N	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	1		0	1	1	0
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*camiguinoides*	N	0	0	0	1	0	0	0	0	0	0	1	0	1	0	0	1	0	0		0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Neanthes*	*kerguelensis*	N	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Neanthes*	*Neanthes-A*	SI	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	*Neanthes*	*cricognatha*	N	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*	*amblyodonta*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*pseudocamiguina*	N	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	*Eulalia*	*Eulalia-NIWA-2*	SI	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0		0	0	0	1
Polychaeta	Phyllodocida	Phyllodocidae	*Pirakia*	*Pirakia-A*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		0	0	0	0
Polychaeta	Phyllodocida	Phyllodocidae	*Eulalia*	*microphylla*	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		0	0	0	0
Polychaeta	Phyllodocida	Phyllodocidae	*Nereiphylla*	*castanea*	N	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	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
Polychaeta	Phyllodocida	Polynoidae	*Lepidastheniella*	*comma*	N	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*	*Indet*	SI	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-B*	SI	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0		0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Amblyosyllis*	*granosa*	N	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*	*Eusyllin-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
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
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
Polychaeta	Sabellida	Sabellidae	*Branchiomma*	*curta*	N	0	1	1	1	0	1	1	0	0	0	0	1	1	0	0	0	0	1		0	1	1	1
Polychaeta	Sabellida	Sabellidae	*Demonax*	*aberrans*	N	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*	*kaikourense*	N	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	*Sabellidae*	*Indet*	SI	0	0	0	0	0	0	1	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	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	0	0	0
Polychaeta	Sabellida	Serpulidae	*Serpulidae*	*Indet*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
Polychaeta	Scolecida	Orbiniidae	*Scoloplos*	*simplex*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	1	0
Polychaeta	Spionida	Spionidae	*Boccardia*	*chilensis*	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		0	0	0	0
Polychaeta	Terebellida	Cirratulidae	*Timarete*	*anchylochaetus*	N	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0		0	1	1	0
Polychaeta	Terebellida	Cirratulidae	*Protocirrineris*	*nuchalis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
Polychaeta	Terebellida	Cirratulidae	*Cirratulidae*	*Indet*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0		0	0	0	0
Polychaeta	Terebellida	Flabelligeridae	*Flabelligera*	*affinis*	N	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	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	0	1	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	1	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
Polyplacophora	Ischnochitonina	Chitonidae	*Sypharochiton*	*pelliserpentis*	N	0	0	0	0	0	0	0	0	0	0	1	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	0	1	1
Rhodophyceae	Acrochaetiales	Acrochaetiaceae	*Audouinella*	*sp.*	SI	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
Rhodophyceae	Bangiales	Bangiaceae	*Porphyra*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
Rhodophyceae	Bangiales	Bangiaceae	*Bangia*	*sp.*	SI	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*	*apiculatum*	N	0	0	0	0	1	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	1	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Antithamnionella*	*sp*	SI	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*	*sp.*	SI	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	*Griffithsia*	*crassiuscula*	A	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	*Griffithsia*	*sp.*	SI	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	1	1	0	0	0	0	0	0	0	0	0	0	0	0		0	1	0	0
Rhodophyceae	Ceramiales	Deleseriaceae	*Schizoseris*	*griffithsia*	N	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	1	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
Rhodophyceae	Ceramiales	Delesseriaceae	*Erythroglossum*	*sp.*	SI	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
Rhodophyceae	Ceramiales	Delesseriaceae	*Schizoseris*	*dichotoma*	N	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									FISH										NTH MOLE			
					Pile replicate								MISC	1					2					1			
					Pile position				OUT					IN		OUT			IN		OUT			IN			
Class	Orders	Family	Genus	Species	*Status	2	3	4	1	2	3	4	MISC	1	2	1	2	3	1	2	1	2	3	1	2	3	4
Rhodophyceae	Ceramiales	Rhodomelaceae	*Bostrychia*	*harveyi*	N	0	0	0	0	0	0	0	0	1	0	0	1	0	1	1	1	0	1	0	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Polysiphonia*	*sp.*	SI	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Polysiphonia*	*subtilissima*	A	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*	*sp.*	SI	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Gigartinales	Kallymeniaceae	*Callophyllis*	*calliblepharoides*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Rhodymeniales	Champiacea	*Lomentaria*	*secunda*	N	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*	*umbellata*	N	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*	*leptophylla*	N	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	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Rhodophyceae		Delesseriaceae	*Unidentifiable*	*Delesseriaceae*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae			*Unidentifiable*	*red*	SI	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	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
Ulvophyceae	Cladophorales	Wittrockiellaceae	*Wittrockiella*	*salina*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ulvophyceae	Ulvales	Ulvaceae	*Ulva*	*sp.*	SI	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Ulvophyceae	Ulvales	Ulvaceae	*Enteromorpha*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ulvophyceae	Ulvales	Ulvaceae	*Enteromorpha*	*intestinalis*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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

					Berth code										
					Pile replicate					2					
					Pile position	OUT				IN			OUT		
Class	Orders	Family	Genus	Species	*Status	1	2	3	4	1	2	3	1	2	3	4
Anthozoa	Actiniaria	Acontiophoridae	*Mimetridium*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0
Anthozoa	Actiniaria	Diadumenidae	*Diadumene*	*sp.*	SI	0	0	0	0	0	1	1	0	0	0	0
Anthozoa	Actiniaria	Diadumenidae	*Diadumenidae*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0
Anthozoa	Actiniaria	Sagartiidae	*Sagartiidae*	*sp.*	SI	0	0	0	0	0	0	0	0	1	0	0
Anthozoa	Actiniaria	Sagartiidae	*Anthothoe*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0
Anthozoa	Actiniaria	Sagartiidae	*Anthothoe*	*vagrans*	N	0	0	0	0	0	0	0	0	0	0	0
Anthozoa	Actiniaria	Sagartiidae	*Actinothoe*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0
Anthozoa	Actiniaria		*Acontiaria*	*sp.*	SI	0	0	1	0	0	0	0	0	0	0	0
Ascidiacea	Aplousobranchia	Cionidae	*Ciona*	*intestinalis*	A	0	1	1	0	0	0	0	0	0	1	0
Ascidiacea	Aplousobranchia	Didemnidae	*Didemnum*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	1
Ascidiacea	Aplousobranchia	Polyclinidae	*Aplidium*	*phortax*	C1	0	1	1	1	0	1	1	0	1	1	0
Ascidiacea	Aplousobranchia	Polyclinidae	*Aplidium*	*adamsi*	N	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Aplousobrancia	Holoziodae	*Hypsitozoa*	*fasmeriana*	N	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
Ascidiacea	Stolidobranchia	Botryllinae	*Botrylliodes*	*leachii*	C1	0	0	0	0	0	0	0	0	1	0	0
Ascidiacea	Stolidobranchia	Molgulidae	*Molgula*	*mortenseni*	N	0	1	0	0	0	0	0	0	0	1	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*pachydermatina*	N	0	0	1	0	0	0	1	0	1	1	1
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*cancellata*	N	0	1	1	0	0	0	0	0	1	0	0
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*lutea*	N	0	1	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
Ascidiacea	Stolidobranchia	Pyuridae	*Pyura*	*carnea*	N	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Asterocarpa*	*cerea*	C1	0	1	0	0	0	0	1	0	1	1	1
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*nisiotus*	N	0	0	0	0	0	0	1	0	1	0	1
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*bicornuta*	N	0	0	0	0	0	0	0	0	0	0	1
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*sp.*	A	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*otagoensis*	N	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	0
Asteroidea	Valvatida	Asterinidae	*Patiriella*	*regularis*	N	0	0	0	0	0	0	0	0	0	0	1
Bivalvia	Myoida	Hiatellidae	*Hiatella*	*arctica*	N	0	0	0	1	0	0	1	0	1	0	0
Bivalvia	Mytiloida	Mytilidae	*Aulacomya*	*atra maoriana*	N	0	0	0	0	0	0	1	0	0	0	0
Bivalvia	Mytiloida	Mytilidae	*Mytilus*	*galloprovincialis*	C1	1	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	1
Bivalvia	Mytiloida	Mytilidae	*Xenostrobus*	*pulex*	N	1	0	0	0	0	0	0	0	0	0	0
Bivalvia	Ostreoida	Ostreidae	*Ostrea*	*chilensis*	N	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	Veneroida	Lasaeidae	*Lasaea*	*hinemoa*	N	1	0	0	0	0	0	0	0	1	0	0
Bivalvia	Veneroida	Veneridae	*Irus*	*reflexus*	N	0	0	0	0	0	0	1	0	0	1	0
Bivalvia	Veneroida	Veneridae	*Ruditapes*	*largillierti*	N	0	1	1	0	0	0	0	0	0	1	0
Bryopsidophyceae	Bryopsidales	Bryopsidaceae	*Bryopsis*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0
Cladophorophyceae	Cladophorales	Cladophoraceae	*Cladophora*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Anomura	Porcellanidae	*Petrolisthes*	*elongatus*	N	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Cancridae	*Cancer*	*gibbosulus*	A	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Hymenosomatidae	*Hymenosoma*	*depressum*	N	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Thoracica	Balanidae	*Austrominius*	*modestus*	N	1	1	0	1	1	1	1	0	0	0	0
Crustacea	Thoracica	Balanidae	*Notomegabalanus*	*decorus*	N	0	1	0	0	0	1	0	0	0	0	0
Demospongiae	Dictyoceratida	Dysideidae	*Euryspongia*	*n. sp. 2 (pale blue bushy encrusting)*	C2	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
Demospongiae	Haplosclerida	Chalinidae	*Haliclona*	*cf. punctata*	N	0	0	0	0	0	0	1	0	0	0	0
Demospongiae	Poecilosclerida	Mycalidae	*Mycale (Carmia)*	*tasmani*	N	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Littorinimorpha	Calyptraeidae	*Sigapatella*	*tenuis*	N	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
Gastropoda	Neogastropoda	Muricidae	*Xymene*	*plebeius*	N	0	0	0	0	0	0	0	0	1	0	1
Gastropoda	Nudibranchia	Dorididae	*Archidoris*	*nanula*	N	0	1	0	0	0	0	0	0	0	0	0
Gastropoda	Patellogastropoda	Lottiidae	*Notoacmea*	*helmsi*	N	1	0	0	0	0	0	0	0	0	0	0
Gastropoda	Vetigastropoda	Fissurellidae	*Scutus*	*breviculus*	N	0	0	0	0	0	0	0	0	0	0	0

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

					Berth code											
					Pile replicate					2						
					Pile position	OUT				IN			OUT			
Class	Orders	Family	Genus	Species	*Status	1	2	3	4	1	2	3	1	2	3	4
Gastropoda	Vetigastropoda	Trochidae	*Micrelenchus*	*tenebrosus*	N	0	0	1	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Arachnopusiidae	*Arachnopusia*	*unicornis*	N	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Beaniidae	*Beania*	*n. sp. [whitten]*	N	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*neritina*	A	0	0	1	1	0	0	0	0	1	0	0
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*flabellata*	A	0	0	0	0	0	0	0	0	1	0	0
Gymnolaemata	Cheilostomata	Candidae	*Caberea*	*zelandica*	N	0	0	0	1	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Cryptosulidae	*Cryptosula*	*pallasiana*	A	0	0	0	0	1	1	0	0	1	0	0
Gymnolaemata	Cheilostomata	Romancheinidae	*Escharoides*	*angela*	N	0	0	0	0	0	0	1	0	0	0	0
Gymnolaemata	Cheilostomata	Romancheinidae	*Escharoides*	*excavata*	N	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	1	0	0
Gymnolaemata	Cheilostomata	Watersiporidae	*Watersipora*	*subtorquata*	A	0	0	0	1	1	1	1	1	1	0	0
Hydrozoa	Hydroida	Plumulariidae	*Plumularia*	*setacea*	C1	0	1	0	1	0	0	0	0	1	0	0
Hydrozoa	Hydroida	Sertulariidae	*Symplectoscyphus*	*johnstoni*	N	0	1	0	0	1	1	0	0	0	0	0
Malacostraca	Amphipoda	Aoridae	*Haplocheira*	*barbimana*	N	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Caprellidae	*Caprella*	*mutica*	A	0	0	1	0	0	0	1	0	1	1	1
Malacostraca	Amphipoda	Corophiidae	*Meridiolembos*	*sp.*	SI	0	0	0	0	0	0	1	0	0	1	1
Malacostraca	Amphipoda	Corophiidae	*Monocorophium*	*acherusicum*	A	0	0	0	0	0	0	1	0	1	0	0
Malacostraca	Amphipoda	Corophiidae	*Apocorophium*	*acutum*	A	0	0	0	0	0	0	0	0	0	1	0
Malacostraca	Amphipoda	Cyproideidae	*Peltopes*	*peninsulae*	N	0	0	0	1	0	0	0	1	1	0	0
Malacostraca	Amphipoda	Dexaminidae	*Paradexamine*	*pacifica*	N	0	0	1	1	0	0	0	0	1	0	1
Malacostraca	Amphipoda	Dexaminidae	*Polycheria*	*sp. aff. P. obtusa*	C2	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Eusiridae	*Eusiroides*	*monoculoides*	N	0	0	0	0	0	0	0	0	1	1	0
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis*	*sp. aff. typica*	C2	0	0	0	0	0	0	1	0	0	0	1
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis*	*typica*	N	0	0	0	0	0	0	0	0	0	1	0
Malacostraca	Amphipoda	Isaeidae	*Gammaropsis*	*dentifera*	N	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
Malacostraca	Amphipoda	Ischyroceridae	*Jassa*	*slatteryi*	A	0	0	1	0	0	0	1	0	1	0	0
Malacostraca	Amphipoda	Liljeborgiidae	*Liljeborgia*	*hansoni*	N	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia*	*stephenseni*	N	0	0	0	1	0	0	0	0	0	1	1
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia*	*vesca*	N	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia*	*angusta*	N	0	0	0	0	0	0	1	0	0	0	0
Malacostraca	Amphipoda	Lysianassidae	*Orchomene*	*aahu*	N	0	0	0	0	0	0	1	0	0	1	0
Malacostraca	Amphipoda	Lysianassidae	*Parawaldeckia*	*sp. aff. angusta*	C2	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Lysianassidae	*Stomacontion*	*sp. aff. S. pungpunga*	C2	0	0	0	0	0	0	0	0	1	0	0
Malacostraca	Amphipoda	Oedicerotidae	*Oedicerotidae n.gen.*	*n. sp.*	C2	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Podoceridae	*Podocerus*	*manawatu*	N	0	0	1	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Podoceridae	*Podocerus*	*cristatus*	N	0	0	0	0	0	0	0	1	1	0	0
Malacostraca	Amphipoda	Podoceridae	*Podocerus*	*karu*	N	0	0	0	0	0	0	1	0	0	0	0
Malacostraca	Amphipoda	Stenothoidae	*Stenothoe*	*moe*	N	0	0	0	0	0	0	0	0	0	0	1
Malacostraca	Isopoda	Anthuridae	*Mesanthura*	*?affinis*	SI	0	0	0	0	0	0	0	0	1	0	0
Malacostraca	Isopoda	Holognathiidae	*Cleantis*	*tubicola*	N	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Isopoda	Paranthuridae	*Paranthura*	*cf. flagellata*	N	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Isopoda	Sphaeromatidae	*Cilicaea*	*canaliculata*	N	0	0	1	0	0	0	1	0	1	1	0
Malacostraca	Isopoda	Sphaeromatidae	*Pseudosphaeroma*	*campbellense*	N	1	0	0	0	0	0	0	1	0	0	0
Malacostraca	Isopoda	Sphaeromatidae	*?Cilicaea*	*sp*	SI	0	1	0	0	0	0	0	0	0	0	0
Malacostraca	Mysida	Mysidae	*Siriella*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Tanaidacea	Tanaidae	*Zeuxoides*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0
Ophiuroidea	Ophiurida	Amphiuridae	*Amphipholis*	*squamata*	N	0	1	1	1	0	1	1	0	1	0	0
Phaeophyceae	Ectocarpales	Ectocarpaceae	*Hincksia*	*sp*	SI	0	0	0	0	0	0	0	0	1	0	0
Phaeophyceae	Laminariales	Alariaceae	*Undaria*	*pinnatifida*	A	0	1	0	0	0	0	0	0	1	1	0
Phaeophyceae	Sphacelariales	Sphacelariaceae	*Sphacelaria*	*sp*	SI	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Eunicida	Dorvilleidae	*Dorvillea*	*australiensis*	N	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
Polychaeta	Eunicida	Lumbrineridae	*Lumbrineris*	*sphaerocephala*	N	0	0	0	0	0	0	0	0	0	0	0

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

					Berth code											
					Pile replicate					2						
					Pile position	OUT				IN			OUT			
Class	Orders	Family	Genus	Species	*Status	1	2	3	4	1	2	3	1	2	3	4
Polychaeta	Phyllodocida	Hesionidae	*Ophiodromus*	*angustifrons*	N	0	1	1	1	0	0	0	0	0	1	1
Polychaeta	Phyllodocida	Nereididae	*Platynereis*	*Platynereis_australis_group*	SI	0	1	1	0	0	0	0	0	1	1	1
Polychaeta	Phyllodocida	Nereididae	*Nereis*	*falcaria*	N	0	1	1	1	0	0	0	0	0	1	0
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*camiguinoides*	N	0	0	0	0	0	0	0	1	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Neanthes*	*kerguelensis*	N	0	0	0	0	0	1	0	0	0	1	1
Polychaeta	Phyllodocida	Nereididae	*Neanthes*	*Neanthes-A*	SI	0	1	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Neanthes*	*cricognatha*	N	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Perinereis*	*amblyodonta*	N	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
Polychaeta	Phyllodocida	Phyllodocidae	*Eulalia*	*Eulalia-NIWA-2*	SI	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Phyllodocidae	*Pirakia*	*Pirakia-A*	N	0	1	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	0
Polychaeta	Phyllodocida	Phyllodocidae	*Nereiphylla*	*castanea*	N	0	0	0	0	0	0	0	0	0	0	1
Polychaeta	Phyllodocida	Polynoidae	*Lepidonotus*	*polychromus*	N	0	0	0	1	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Polynoidae	*Lepidastheniella*	*comma*	N	0	0	1	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Polynoidae	*Lepidonotus*	*Indet*	SI	0	0	0	0	0	1	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Syllis*	*Syllis-B*	SI	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Amblyosyllis*	*granosa*	N	0	0	0	0	0	0	0	0	1	0	0
Polychaeta	Phyllodocida	Syllidae	*Eusyllin-unknown*	*Eusyllin-unknown-A*	SI	0	0	0	0	0	0	0	1	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Eusyllis*	*Eusyllis-B*	SI	0	0	0	0	0	0	1	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Syllidae*	*Indet*	SI	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Sabellidae	*Branchiomma*	*curta*	N	0	1	1	1	0	1	1	0	1	1	1
Polychaeta	Sabellida	Sabellidae	*Demonax*	*aberrans*	N	0	0	0	0	0	0	0	0	0	1	0
Polychaeta	Sabellida	Sabellidae	*Megalomma*	*kaikourense*	N	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Sabellidae	*Sabellidae*	*Indet*	SI	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Serpulidae	*Galeolaria*	*hystrix*	N	0	0	0	0	0	1	0	0	0	0	0
Polychaeta	Sabellida	Serpulidae	*Neovermilia*	*sphaeropomatus*	N	0	1	0	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Serpulidae	*Serpulidae*	*Indet*	SI	0	0	0	1	0	0	0	0	0	0	0
Polychaeta	Scolecida	Orbiniidae	*Scoloplos*	*simplex*	N	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Spionida	Spionidae	*Boccardia*	*chilensis*	N	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Terebellida	Cirratulidae	*Timarete*	*anchylochaetus*	N	0	1	1	0	0	1	0	0	0	1	0
Polychaeta	Terebellida	Cirratulidae	*Protocirrineris*	*nuchalis*	N	0	0	0	0	0	0	0	0	1	0	0
Polychaeta	Terebellida	Cirratulidae	*Cirratulidae*	*Indet*	SI	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Terebellida	Flabelligeridae	*Flabelligera*	*affinis*	N	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
Polychaeta	Terebellida	Terebellidae	*Streblosoma*	*toddae*	N	0	1	0	0	0	0	0	0	0	1	0
Polychaeta	Terebellida	Terebellidae	*Terebellidae*	*Indet*	SI	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	1
Polyplacophora	Ischnochitonina	Chitonidae	*Sypharochiton*	*pelliserpentis*	N	0	0	0	0	0	0	0	0	0	0	0
Pycnogonida	Pantopoda	Ammotheidae	*Achelia*	*assimilis*	N	0	1	1	0	0	1	1	1	1	0	1
Rhodophyceae	Acrochaetiales	Acrochaetiaceae	*Audouinella*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Bangiales	Bangiaceae	*Porphyra*	*sp.*	SI	0	0	0	0	0	0	0	1	0	0	0
Rhodophyceae	Bangiales	Bangiaceae	*Bangia*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Ceramium*	*apiculatum*	N	0	1	1	0	0	0	0	0	0	1	1
Rhodophyceae	Ceramiales	Ceramiaceae	*Pterothamnion*	*sp.*	SI	0	1	1	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Antithamnionella*	*sp*	SI	0	0	0	0	0	0	0	0	1	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Ceramium*	*sp.*	SI	0	0	0	0	0	0	0	0	1	0	0
Rhodophyceae	Ceramiales	Ceramiaceae	*Griffithsia*	*crassiuscula*	A	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	1
Rhodophyceae	Ceramiales	Deleseriaceae	*Myriogramme*	*denticulata*	N	0	0	1	0	0	0	0	0	1	1	1
Rhodophyceae	Ceramiales	Deleseriaceae	*Schizoseris*	*griffithsia*	N	0	1	1	0	0	0	0	0	0	1	0
Rhodophyceae	Ceramiales	Delesseriaceae	*Delesseriaceae*	*sp.*	SI	0	0	0	0	0	0	0	0	1	0	0
Rhodophyceae	Ceramiales	Delesseriaceae	*Erythroglossum*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Delesseriaceae	*Schizoseris*	*dichotoma*	N	0	1	0	0	0	0	0	0	0	1	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	2										
					Pile replicate											
					Pile position	OUT				IN			OUT			
Class	Orders	Family	Genus	Species	*Status	1	2	3	4	1	2	3	1	2	3	4
Rhodophyceae	Ceramiales	Rhodomelaceae	*Bostrychia*	*harveyi*	N	1	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Polysiphonia*	*sp.*	SI	0	0	0	0	1	0	0	0	1	0	0
Rhodophyceae	Ceramiales	Rhodomelaceae	*Polysiphonia*	*subtilissima*	A	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
Rhodophyceae	Gigartinales	Kallymeniaceae	*Callophyllis*	*calliblepharoides*	N	0	0	0	0	0	0	0	0	0	0	1
Rhodophyceae	Rhodymeniales	Champiacea	*Lomentaria*	*secunda*	N	0	0	0	0	0	1	0	0	1	0	0
Rhodophyceae	Rhodymeniales	Lomentariaceae	*Lomentaria*	*umbellata*	N	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae	Rhodymeniales	Rhodomeniaceae	*Rhodymenia*	*leptophylla*	N	0	1	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
Rhodophyceae		Delesseriaceae	*Unidentifiable*	*Delesseriaceae*	SI	0	0	0	0	0	0	0	0	0	0	0
Rhodophyceae			*Unidentifiable*	*red*	SI	0	0	0	0	0	0	0	0	0	0	0
Turbellaria	Polycladida		*Indet genus*	*indet sp.*	SI	0	0	0	0	0	0	0	0	0	0	0
Ulvophyceae	Cladophorales	Wittrockiellaceae	*Wittrockiella*	*salina*	N	0	0	0	0	0	0	0	0	0	0	0
Ulvophyceae	Ulvales	Ulvaceae	*Ulva*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	1
Ulvophyceae	Ulvales	Ulvaceae	*Enteromorpha*	*sp.*	SI	0	0	0	0	1	0	0	1	1	0	0
Ulvophyceae	Ulvales	Ulvaceae	*Enteromorpha*	*intestinalis*	N	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 5b. Results from the benthic grab samples.

					Berth code	1					3			FISH			NTH MOLE		
Class	Order	Family	Genus	Species	*Status	1	2	3	4	5	1	2	3	1	2	3	1	2	3
Anthozoa	Actiniaria	Sagartiidae	*Actinothoe*	*sp.*	SI	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthozoa	Actiniaria		*Acontiaria*	*sp.*	SI	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Ascidiacea	Phlebobranchia	Rhodosomatidae	*Corella*	*eumyota*	C1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Solidobranchia	Pyuridae	*Pyura*	*sp. (new?)*	C2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	Myoida	Hiatellidae	*Hiatella*	*arctica*	N	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	Nuculoida	Nuculidae	*Linucula*	*sp.*	SI	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Bivalvia	Veneroida	Lasaeidae	*Arthritica*	*bifurca*	N	1	0	0	0	0	1	0	1	0	0	0	0	0	0
Bivalvia	Veneroida	Lasaeidae	*Lasaea*	*hinemoa*	N	0	0	0	0	0	1	0	1	0	0	0	0	0	1
Bivalvia	Veneroida	Semelidae	*Leptomya*	*retiaria*	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Bivalvia	Veneroida	Veneridae	*Ruditapes*	*largillierti*	N	0	0	0	0	0	1	0	0	1	0	0	0	0	0
Bivalvia	Veneroida	Veneridae	*Irus*	*reflexus*	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Cancridae	*Cancer*	*gibbosulus*	A	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Hymenosomatidae	*Hymenosoma*	*depressum*	N	0	1	0	0	0	0	0	0	0	0	0	0	1	0
Crustacea	Brachyura	Ocypodidae	*Macrophthalmus*	*hirtipes*	N	1	0	0	1	0	1	0	0	1	0	0	1	0	0
Crustacea	Thoracica	Balanidae	*Notomegabalanus*	*decorus*	N	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Demospongiae	Haplosclerida	Callyspongiidae	*Callyspongia*	*n. sp. 1 (spikey surface)*	C2	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Demospongiae	Haplosclerida	Callyspongiidae	*Chalinopsilla*	*n. sp. 1 (yellow pillow)*	C2	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Demospongiae	Poecilosclerida	Ancinoiidae	*Crella (Pytheas)*	*incrustans*	C1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Neogastropoda	Muricidae	*Xymene*	*plebeius*	N	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Neogastropoda	Muricidae	*Xymene*	*pusillus*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*flabellata*	A	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Cryptosulidae	*Cryptosula*	*pallasiana*	A	1	1	0	1	1	0	0	0	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Romancheinidae	*Escharoides*	*angela*	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Gymnolaemata	Cheilostomata	Watersiporidae	*Watersipora*	*subtorquata*	A	1	1	0	1	1	0	0	1	1	1	0	1	0	0
Hydrozoa	Hydroida	Plumulariidae	*Plumularia*	*setacea*	C1	1	0	0	1	1	0	0	0	0	0	0	1	0	0
Hydrozoa	Hydroida	Sertulariidae	*Symplectoscyphus*	*johnstoni*	N	1	1	0	0	1	0	0	0	0	0	0	0	0	0
Hydrozoa	Hydroida	Sertulariidae	*Amphisbetia*	*bispinosa*	N	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Corophiidae	*Meridiolembos*	*sp.*	SI	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Malacostraca	Amphipoda	Dexaminidae	*Paradexamine*	*pacifica*	N	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Hyalidae	*Hyale*	*grandicornis*	N	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	Amphipoda	Phoxocephalidae	*Torridoharpinia*	*hurleyi*	N	1	0	0	0	0	0	0	0	1	0	1	0	0	0
Malacostraca	Isopoda	Sphaeromatidae	*Cilicaea*	*canaliculata*	N	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiuroidea	Ophiurida	Amphiuridae	*Amphipholis*	*squamata*	N	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Eunicida	Dorvilleidae	*Schistomeringos*	*loveni*	N	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Eunicida	Onuphidae	*Onuphis*	*aucklandensis*	N	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Glyceridae	*Glycera*	*ovigera*	N	0	0	0	0	1	0	0	0	1	1	0	0	0	0
Polychaeta	Phyllodocida	Glyceridae	*Glycera*	*lamelliformis*	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Polychaeta	Phyllodocida	Glyceridae	*Hemipodus*	*simplex*	N	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Polychaeta	Phyllodocida	Goniadidae	*Glycinde*	*dorsalis*	N	0	0	0	1	0	1	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Hesionidae	*Ophiodromus*	*angustifrons*	N	1	1	0	0	0	0	0	0	0	1	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Platynereis*	*Platynereis_australis_group*	SI	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Sigalionidae	*Labiosthenolepis*	*laevis*	N	1	0	0	1	1	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Syllidae*	*Indet*	SI	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Syllidae	*Syllis*	*Syllis-C*	SI	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Oweniidae	*Owenia*	*petersenae*	N	0	0	0	0	0	1	0	0	1	0	0	0	0	0
Polychaeta	Sabellida	Sabellidae	*Euchone*	*limnicola*	A	1	1	0	0	0	1	0	1	0	0	1	1	1	0
Polychaeta	Sabellida	Sabellidae	*Branchiomma*	*curta*	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Polychaeta	Scolecida	Capitellidae	*Barantolla*	*lepte*	A	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Polychaeta	Scolecida	Maldanidae	*Asychis*	*Asychis-B*	SI	1	1	0	1	1	1	0	1	0	0	0	0	1	0
Polychaeta	Scolecida	Opheliidae	*Armandia*	*maculata*	N	1	1	0	0	0	1	0	0	1	1	0	0	0	0
Polychaeta	Scolecida	Orbiniidae	*Scoloplos*	*cylindrifer*	N	1	0	0	0	0	0	0	0	1	0	0	1	0	0
Polychaeta	Scolecida	Orbiniidae	*Scoloplos*	*simplex*	N	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Polychaeta	Spionida	Spionidae	*Scolecolepides*	*benhami*	N	1	1	0	1	1	1	0	1	0	1	1	1	1	0
Polychaeta	Spionida	Spionidae	*Prionospio*	*aucklandica*	N	1	1	0	0	0	0	0	0	1	1	0	1	0	0
Polychaeta	Spionida	Spionidae	*Paraprionospio*	*Paraprionospio-A [pinnata]*	SI	0	0	0	0	0	1	0	1	0	0	0	1	1	0
Polychaeta	Spionida	Spionidae	*Prionospio*	*multicristata*	N	0	1	0	0	0	0	0	0	0	0	0	1	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 5b. Results from the benthic grab samples.

				Berth code	1					3			FISH			NTH MOLE		
Class	Order	Family	Genus	Species	*Status	1	2	3	4	5	1	2	3	1	2	3	1	2	3
Polychaeta	Spionida	Spionidae	*Boccardia*	*lamellata*	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Polychaeta	Spionida	Spionidae	*Rhynchospio*	*Rhynchospio-A*	SI	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Polychaeta	Terebellida	Ampharetidae	*Ampharete*	*kerguelensis*	N	0	0	0	0	0	1	0	0	0	1	0	1	1	0
Polychaeta	Terebellida	Cirratulidae	*Protocirrineris*	*nuchalis*	N	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Polychaeta	Terebellida	Cirratulidae	*Cirratulus*	*Cirratulus-A*	SI	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Polychaeta	Terebellida	Cirratulidae	*Timarete*	*anchylochaetus*	N	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Polychaeta	Terebellida	Pectinariidae	*Pectinaria*	*australis*	N	0	0	0	1	0	1	0	1	0	0	0	0	0	0
Polychaeta	Terebellida	Terebellidae	*Amaeana*	*antipoda*	N	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Pycnogonida	Pantopoda	Ammotheidae	*?Tanystylum*	*sp. nov. B*	C2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Pycnogonida	Pantopoda	Ammotheidae	*Achelia*	*assimilis*	N	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Pycnogonida	Pantopoda	Ammotheidae	*Achelia*	*sp. cf. A. australiensis*	C1	1	0	0	0	0	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 5c. Results from the benthic sled samples.

					Berth code	1		2		3		IN NTH MOLE		MOLE		OUT NTH MOLE	
Class	Order	Family	Genus	Species	*Status	1	2	1	2	1	2	1	2	1	2	1	2
Actinopterygii	Perciformes	Eleotridae	*Grahamichthys*	*radiatus*	N	1	0	0	0	1	0	0	0	1	0	0	1
Actinopterygii	Perciformes	Trypterigiidae	*Blennodon*	*dorsale*	N	0	0	0	0	0	0	0	1	0	0	0	0
Actinopterygii	Perciformes	Trypterigiidae	*Grahamina*	*gymnota*	N	0	0	1	0	0	0	0	0	0	0	0	0
Actinopterygii	Tetradontiformes	Tetraodontidae	*Contusus*	*richiei*	N	0	0	0	0	0	0	0	0	1	0	0	0
Anthozoa	Actiniaria	Diadumenidae	*Diadumene*	*sp.*	SI	0	0	1	1	0	0	0	0	0	0	0	0
Anthozoa	Actiniaria	Diadumenidae	*Diadumene*	*neozelandica*	N	1	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Phlebobranchia	Rhodosomatidae	*Corella*	*eumyota*	C1	1	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Asterocarpa*	*cerea*	C1	0	0	0	0	0	0	0	0	0	1	0	0
Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa*	*nisiotus*	N	0	0	1	0	0	0	0	0	0	0	0	0
Asteroidea	Valvatida	Asterinidae	*Patiriella*	*regularis*	N	0	0	1	0	0	1	0	0	0	0	0	0
Bivalvia	Nuculoida	Nuculidae	*Linucula*	*sp.*	SI	0	0	1	0	0	0	1	0	0	0	1	0
Bivalvia	Veneroida	Mactridae	*Cyclomactra*	*ovata*	N	0	0	1	1	0	0	0	0	0	0	0	0
Bivalvia	Veneroida	Semelidae	*Leptomya*	*retiaria*	N	0	0	1	0	0	0	0	0	0	0	0	0
Crustacea	Anomura	Porcellanidae	*Petrolisthes*	*novaezelandiae*	N	0	0	0	0	0	0	1	0	0	0	0	0
Crustacea	Brachyura	Hymenosomatidae	*Hymenosoma*	*depressum*	N	1	1	1	1	1	1	1	1	1	0	1	1
Crustacea	Brachyura	Ocypodidae	*Macrophthalmus*	*hirtipes*	N	1	1	0	1	0	1	1	1	1	1	1	1
Crustacea	Caridea	Crangonidae	*Pontophilus*	*australis*	N	0	0	0	0	0	0	1	0	0	0	0	1
Demospongiae	Haplosclerida	Callyspongiidae	*Callyspongia*	*cf. fistulosa*	N	0	0	0	0	0	0	0	0	0	1	1	0
Demospongiae	Haplosclerida	Callyspongiidae	*Callyspongia*	*n. sp. 1 (spikey surface)*	C2	0	0	0	0	0	0	0	1	0	0	0	0
Demospongiae	Haplosclerida	Callyspongiidae	*Chalinopsilla*	*n. sp. 1 (yellow pillow)*	C2	0	0	0	0	0	0	0	1	0	0	0	0
Demospongiae	Poecilosclerida	Ancinoiidae	*Crella (Pytheas)*	*incrustans*	C1	0	0	0	0	0	0	0	1	0	0	1	1
Demospongiae	Poecilosclerida	Microcionidae	*Axociella*	*n. sp. 1 (dubious id)*	C2	0	0	0	0	0	0	0	0	0	0	1	0
Gastropoda	Cephalaspidea	Aglajidae	*Melanochlamys*	*cylindrica*	N	0	0	1	0	0	0	0	0	0	0	0	0
Gastropoda	Neogastropoda	Muricidae	*Xymene*	*plebeius*	N	1	0	0	1	1	0	1	1	1	0	1	1
Gastropoda	Neogastropoda	Turridae	*Neoguraleus*	*sp.*	SI	0	0	0	0	0	0	0	0	0	1	0	0
Gastropoda	Vetigastropoda	Fissurellidae	*Scutus*	*breviculus*	N	0	0	0	0	0	1	0	0	0	0	0	0
Gastropoda	Vetigastropoda	Trochidae	*Micrelenchus*	*tenebrosus*	N	0	0	1	0	1	0	1	0	0	0	0	0
Gastropoda	Vetigastropoda	Trochidae	*Micrelenchus*	*sanguineus*	N	0	0	1	0	0	0	1	0	0	0	0	0
Gastropoda	Vetigastropoda	Trochidae	*Trochus*	*tiaratus*	N	0	0	0	0	0	0	1	0	0	0	0	0
Gymnolaemata	Cheilostomata	Bugulidae	*Bugula*	*flabellata*	A	1	0	0	0	0	0	0	0	0	1	0	0
Gymnolaemata	Cheilostomata	Calloporidae	*Odontionella*	*cyclops*	N	0	0	0	0	0	0	0	1	0	0	0	0
Gymnolaemata	Cheilostomata	Calwelliidae	*Calwellia*	*gracilis*	N	0	0	0	0	0	0	1	0	0	0	0	0
Gymnolaemata	Cheilostomata	Cryptosulidae	*Cryptosula*	*pallasiana*	A	0	0	1	0	0	1	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Microporellidae	*Fenestrulina*	*disjuncta*	N	0	0	0	0	0	1	0	0	0	0	0	0
Gymnolaemata	Cheilostomata	Romancheinidae	*Escharoides*	*angela*	N	0	0	0	0	0	0	0	0	0	1	0	0
Gymnolaemata	Cheilostomata	Watersiporidae	*Watersipora*	*subtorquata*	A	1	1	0	0	1	1	1	0	1	1	1	0
Gymnolaemata	Ctenostomata	Flustrellidridae	*Elzerina*	*binderi*	N	0	0	0	0	0	0	1	0	0	0	0	0
Hydrozoa	Hydroida	Plumulariidae	*Plumularia*	*setacea*	C1	1	0	1	1	1	0	0	0	0	0	0	0
Hydrozoa	Hydroida	Sertulariidae	*Symplectoscyphus*	*johnstoni*	N	1	1	1	1	0	0	1	1	0	0	1	0
Hydrozoa	Hydroida	Sertulariidae	*Amphisbetia*	*bispinosa*	N	1	0	0	0	0	0	1	0	0	0	1	0
Hydrozoa	Hydroida	Sertulariidae	*Sertularia*	*unguiculata*	N	1	0	0	0	0	0	0	0	0	0	1	0
Hydrozoa	Hydroida	Sertulariidae	*Amphisbetia*	*?bipsinosa*	SI	0	0	0	0	0	0	0	1	0	0	0	0
Hydrozoa	Hydroida	Sertulariidae	*Amphisbetia*	*fasciculata*	N	1	0	0	0	0	0	0	0	0	0	0	0
Hydrozoa	Hydroida	Sertulariidae	*Amphisbetia*	*trispinosa*	N	0	0	0	0	0	0	1	0	0	0	0	0
Hydrozoa	Hydroida	Sertulariidae	*Stereotheca*	*elongata*	N	0	0	0	0	0	0	0	0	0	0	1	0
Hydrozoa	Hydroida	Sertulariidae	*Symplectoscyphus*	*subarticulatus*	N	0	0	0	0	0	0	0	1	0	0	0	0
Hydrozoa	Hydroida	Syntheciidae	*Synthecium*	*elegans*	N	0	0	0	0	0	0	0	0	0	0	1	0
Malacostraca	Amphipoda	Corophiidae	*Meridiolembos*	*sp.*	SI	0	0	0	0	0	0	1	1	0	0	0	0
Malacostraca	Amphipoda	Corophiidae	*Meridiolembos*	*sp. aff. M. pertinax*	C2	0	0	0	0	0	0	1	0	0	0	0	0
Malacostraca	Amphipoda	Eusiridae	*Oradarea*	*novaezealandiae*	N	0	0	0	0	0	0	1	0	0	0	0	0
Malacostraca	Amphipoda	Eusiridae	*Paramoera*	*rangitira*	N	0	0	0	0	0	0	1	0	0	0	0	0
Malacostraca	Amphipoda	Isaeidae	*Photis*	*sp. aff. P. nigrocula*	C2	0	0	0	0	0	0	0	1	0	0	0	0
Malacostraca	Amphipoda	Melitidae	*Melita*	*inaequistylis*	N	0	0	0	0	0	0	1	0	0	0	0	0
Malacostraca	Amphipoda	Phoxocephalidae	*Torridoharpinia*	*hurleyi*	N	1	0	1	0	1	0	1	1	0	1	0	0
Malacostraca	Decapoda		*Shrimp*	*sp.*	SI	1	1	1	1	0	0	0	0	1	0	0	0
Malacostraca	Mysida	Mysidae	*Tenogomysis*	*sp. 1*	SI	1	1	1	1	1	0	0	1	1	1	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	1		2		3		IN NTH MOLE		MOLE		OUT NTH MOLE	
Class	Order	Family	Genus	Species	*Status	1	2	1	2	1	2	1	2	1	2	1	2
Malacostraca	Mysida	Mysidae	*Tenogomysis*	*producta*	N	1	1	1	1	0	0	0	0	0	1	0	0
Malacostraca	Mysida	Mysidae	*Tenogomysis*	*macropsis*	N	0	0	0	1	0	0	0	0	0	1	0	0
Ophiuroidea	Ophiurida	Amphiuridae	*Amphipholis*	*squamata*	N	0	0	0	1	0	0	0	0	0	0	0	0
Phaeophyceae	Ectocarpales	Scytosiphonaceae	*Colpomenia*	*sp.*	SI	0	0	0	0	0	0	0	1	0	0	0	0
Phaeophyceae	Laminariales	Alariaceae	*Ecklonia*	*sp*	SI	0	0	1	0	0	0	0	1	0	0	0	0
Phaeophyceae	Laminariales	Alariaceae	*Undaria*	*pinnatifida*	A	0	0	0	1	0	0	0	0	0	0	1	0
Polychaeta	Eunicida	Dorvilleidae	*Schistomeringos*	*loveni*	N	0	0	1	0	0	0	0	0	0	0	0	0
Polychaeta	Phyllodocida	Goniadidae	*Glycinde*	*dorsalis*	N	0	0	0	0	0	1	0	0	1	0	0	1
Polychaeta	Phyllodocida	Hesionidae	*Ophiodromus*	*angustifrons*	N	0	0	1	1	0	0	1	0	0	0	0	0
Polychaeta	Phyllodocida	Nereididae	*Platynereis*	*Platynereis_australis_group*	SI	0	0	1	0	0	0	1	0	0	0	0	0
Polychaeta	Phyllodocida	Sigalionidae	*Labiosthenolepis*	*laevis*	N	1	1	0	0	0	1	0	1	1	0	0	0
Polychaeta	Phyllodocida	Sigalionidae	*Sthenelais*	*novaezealandiae*	N	0	0	0	1	0	0	0	0	0	0	0	0
Polychaeta	Sabellida	Sabellidae	*Euchone*	*limnicola*	A	1	1	1	1	0	0	0	0	1	1	1	1
Polychaeta	Sabellida	Sabellidae	*Branchiomma*	*curta*	N	1	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	Scolecida	Maldanidae	*Asychis*	*Asychis-B*	SI	1	0	0	1	0	0	0	0	0	0	0	0
Polychaeta	Scolecida	Opheliidae	*Armandia*	*maculata*	N	0	0	1	0	0	0	0	0	0	0	0	0
Polychaeta	Scolecida	Orbiniidae	*Scoloplos*	*simplex*	N	0	0	0	0	0	0	0	0	0	0	1	0
Polychaeta	Spionida	Spionidae	*Paraprionospio*	*Paraprionospio-A [pinnata]*	SI	0	1	0	0	0	0	0	1	0	0	1	0
Polychaeta	Spionida	Spionidae	*Boccardia*	*syrtis*	N	1	0	0	0	0	0	0	0	0	0	1	0
Polychaeta	Spionida	Spionidae	*Prionospio*	*multicristata*	N	0	0	0	0	0	0	0	0	0	0	1	1
Polychaeta	Terebellida	Ampharetidae	*Ampharete*	*kerguelensis*	N	1	0	0	1	0	0	0	1	1	1	1	0
Polychaeta	Terebellida	Cirratulidae	*Timarete*	*anchylochaetus*	N	0	0	0	0	0	0	0	0	1	0	0	0
Polychaeta	Terebellida	Pectinariidae	*Pectinaria*	*australis*	N	0	0	1	0	0	0	0	0	1	0	1	0
Pycnogonida	Pantopoda	Ammotheidae	*?Tanystylum*	*sp. nov. B*	C2	0	0	1	0	0	0	0	1	0	0	0	0
Pycnogonida	Pantopoda	Ammotheidae	*Achelia*	*assimilis*	N	0	0	1	0	0	0	0	0	0	0	0	0
Pycnogonida	Pantopoda	Ammotheidae	*Ammothea*	*magniceps*	N	0	0	0	0	0	0	1	0	0	0	0	0
Pycnogonida	Pantopoda	Callipallenidae	*Pallenopsis*	*obliqua*	N	0	0	0	0	0	0	0	1	0	0	0	0
Rhodophyceae	Ceramiales	Deleseriaceae	*Myriogramme*	*denticulata*	N	0	0	1	0	0	0	0	0	0	0	0	0
Rhodophyceae	Corallinales	Corallinaceae	*Corallina*	*officinalis*	N	0	0	0	0	0	0	1	1	0	0	0	0
Rhodophyceae	Gigartinales	Gigartinaceae	*Gigartina*	*decipiens*	N	0	0	0	0	0	0	0	0	1	0	0	0
Rhodophyceae	Gigartinales	Phyllophoraceae	*Stenogramme*	*interrupta*	N	0	0	1	0	0	0	0	1	1	0	0	0
Rhodophyceae	Rhodymeniales	Rhodomeniaceae	*Rhodymenia*	*leptophylla*	N	0	0	1	0	0	0	0	0	1	0	0	0
Rhodophyceae	Rhodymeniales	Rhodomeniaceae	*Rhodymenia*	*sp.*	SI	0	0	0	1	1	0	0	0	0	0	0	0
Rhodophyceae	Rhodymeniales	Rhodomeniaceae	*Rhodymenia*	*novazelandica*	N	0	0	0	0	0	0	0	0	1	0	0	0
Ulvophyceae	Ulvales	Ulvaceae	*Ulva*	*sp.*	SI	0	0	1	0	0	0	1	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 5d. Results from the dinoflagellate cyst core samples.

				Berth code	BTWN 1 & 2		BTWN 2 & 3		MID PORT		OUT MID PORT	
Class	Order	Family	Genus	Species	*Status	1	2	1	2	1	2	1	2
Dinophyceae	Gymnodiniales	Polykrikaceae	*Pheopolykrikos*	*sp.*	N	0	1	1	0	1	0	0	0
Dinophyceae	Peridiniales	Peridiniaceae	*Protoperidinium*	*sp.*	N	0	0	0	1	0	1	0	0
Dinophyceae	Peridiniales	Peridiniaceae	*Lingulodinium*	*polyedrum*	N	0	1	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 5e. Results from the fish trap samples.

					Berth code	1				3				IN NTH MOLE				NTH MOLE				OUT NTH MOLE			
					Line No.	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
Actinopterygii	Gadiformes	Moridae	*Pseudophycis*	*bachus*	N	1	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0
Actinopterygii	Mugiliformes	Mugilidae	*Aldrichetta*	*forsteri*	N	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Actinopterygii	Perciformes	Labridae	*Notolabrus*	*celidotus*	N	1	0	0	0	1	1	1	1	0	0	1	0	0	1	1	0	0	1	1	0
Actinopterygii	Perciformes	Trypterigiidae	*Grahamina*	*gymnota*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Chondrichthyes	Squaliformes	Squalidae	*Squalus*	*acanthias*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Crustacea	Brachyura	Cancridae	*Cancer*	*novaezelandiae*	N	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	Brachyura	Majidae	*Notomithrax*	*ursus*	N	0	0	0	0	0	0	0	0	0	0	1	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	1	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 5f. Results from the crab trap samples.

				Berth code	1				3				IN NTH MOLE				NTH MOLE				OUT NTH MOLE			
				Line no.	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
Actinopterygii	Gadiformes	Moridae	*Pseudophycis*	*bachus* N	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	0	0	1	0	0
Actinopterygii	Perciformes	Labridae	*Notolabrus*	*celidotus* N	0	0	0	1	0	1	0	0	0	0	1	1	0	0	0	0	0	1	0	1
Actinopterygii	Perciformes	Trypterigiidae	*Blennodon*	*dorsale* N	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asteroidea	Valvatida	Asterinidae	*Patiriella*	*regularis* N	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1
Cephalopoda	Octopoda	Octopodidae	*Octopus*	*maorum* N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Crustacea	Anomura	Paguridae	*Pagurus*	*novizealandiae* N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Crustacea	Brachyura	Cancridae	*Cancer*	*novaezelandiae* N	1	1	1	1	0	0	1	0	1	0	0	0	1	1	1	1	0	0	1	0
Crustacea	Brachyura	Majidae	*Notomithrax*	*peronii* N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Crustacea	Brachyura	Ocypodidae	*Macrophthalmus*	*hirtipes* N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gastropoda	Neogastropoda	Buccinidae	*Buccinulum*	*pallidum* N	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Hydrozoa	Hydroida	Sertulariidae	*Symplectoscyphus*	*johnstoni* N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Pycnogonida	Pantopoda	Callipallenidae	*Pallenopsis*	*obliqua* N	0	0	0	0	0	0	0	1	0	0	0	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 5g. Results from the starfish trap samples.

					Berth code	1				3				IN NTH MOLE				NTH MOLE				OUT NTH MOLE			
					Line No.	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
Actinopterygii	Gadiformes	Moridae	*Pseudophycis*	*bachus*	N	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	1	0	0	0	1	1	0	0	0	0	0	0	1	0	0
Crustacea	Brachyura	Cancridae	*Cancer*	*novaezelandiae*	N	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	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	1				3				IN NTH MOLE				NTH MOLE				OUT NTH MOLE			
					Line No.	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
Malacostraca	Isopoda	Cirolanidae	*Natatolana*	*rossi*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Gastropoda	Neogastropoda	Muricidae	*Xymene*	*plebeius*	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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.

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).