Ministry for Primary Industries
Manatū Ahu Matua

Marine high-risk site surveillance

Annual report for all ports and marinas 2011/2012 (Project 12099)

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Executive Summary

The Marine High-Risk Site Surveillance programme of targeted surveillance for non-indigenous marine species (NIS), delivered by NIWA under contract to the Ministry for Primary Industries (MPI), is designed to detect the presence of a group of five primary and four secondary target non-indigenous or potentially invasive marine animals and plants that MPI have identified as presenting a significant risk of arriving and establishing in New Zealand. It also aims to monitor changes in the distribution of established non-indigenous or pest species.

This annual report details the targeted surveillance surveys in the 11 ports and marinas covered by the programme during the periods June - September 2011 (the Winter 2011 round of surveys) and November - March 2012 (the Summer 2011-2012 round).

Target numbers of locations sampled met the target on all but three occasions, and all were within 96% of target or higher. Failure to achieve target was often due to loss of traps by, for example, theft.

The four secondary target species were all detected:

- *Eudistoma elongatum* was recorded during the following surveys: Opua (Winter 2011, Summer 2011-2012), Whangarei (Winter 2011, Summer 2011-2012).
- *Musculista senhousia* was recorded during the following surveys: Auckland (Winter 2011, Summer 2011-2012), Tauranga (Winter 2011, Summer 2011-2012), Whangarei (Winter 2011, Summer 2011-2012).
- *Sabella spallanzanii* was recorded during the following surveys: Auckland (Winter 2011, Summer 2011-2012), Lyttelton (Winter 2011).
- *Styela clava* was recorded during the following surveys: Auckland (Winter 2011, Summer 2011-2012), Dunedin (Winter 2011, Summer 2011-2012), Nelson (Winter 2011, Summer 2011-2012), Opua (Winter 2011, Summer 2011-2012), Tauranga (Summer 2011-2012 – range extension), Whangarei (Winter 2011, Summer 2011-2012).

Numbers of specimens sent to MITS per survey ranged from none to 11, and the total number of specimens sent were 25 for the Winter 2011 round and 33 for the Summer 2011-2012 round. Nine of the specimens sent to MITS from the Winter 2011 survey were NIS, including *Caprella mutica* (from the hull of a resident yacht in Bluff), *Sabella spallanzanii* (Lyttelton), *Grateloupia turuturu* (Nelson and New Plymouth) and *Styela clava* (Nelson). None of them were new records and only *C. mutica* represented a range extension. Seven of the specimens from the Summer 2011-2012 survey were NIS, including *Grateloupia turuturu* (New Plymouth) and *Styela clava* (Tauranga), the latter representing a range extension. Three specimens of the penaeid prawn *Metapenaeus bennettae* and three of the hippollytid prawn *Lysmata californica* were collected in Whangarei in Summer 2011-2012. *M. bennettae* has previously been recorded only in Waitemata Harbour, where it was first detected in August 2009. The incomplete head of a specimen of *L. californica* was collected during the Summer 2009-2010 surveillance of Whangarei, but could not be identified to species because of lack of material. The more recent specimens confirm that the previous individual was most probably of the same species and represented the first record of this species in New Zealand or the western Pacific. Two of the specimens of *L. californica* were gravid.

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Introduction

The Marine High-Risk Site Surveillance programme of targeted surveillance for non-indigenous marine species is part of the Ministry for Primary Industries (MPI) wider marine biosecurity programme. The targeted surveillance programme, currently delivered by NIWA under contract to MPI, repeats surveillance work developed and undertaken in 2002-2004, 2005-2006 and 2008-present, also by NIWA, at 11 major ports and marinas around the country (Figure 1). The surveillance is designed to detect the presence of a group of non-indigenous and potentially invasive marine flora and fauna that MPI have identified as presenting a significant risk of arriving and establishing in New Zealand. It also aims to allow changes in the distribution of established non-indigenous or pest species to be monitored. The majority of marine pests targeted by the surveillance programme are listed on the New Zealand register of Unwanted Organisms under the Biosecurity Act 1993.

This annual report details the targeted surveillance in the 11 ports and marinas covered by the programme in the winter of 2011 and summer of 2011-2012.

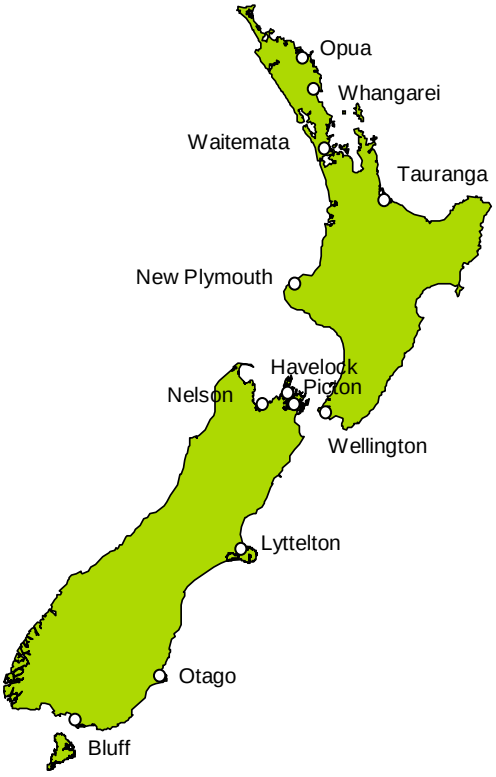

Figure 1 Locations of the 11 ports and marinas covered by the targeted surveillance programme.

OBJECTIVES OF THE MARINE HIGH-RISK SITE SURVEILLANCE PROGRAMME

The primary objective of the targeted surveillance programme is to detect incursions of five primary target marine species (see below).

The secondary objectives were to:

- Detect incursions of non-target non-indigenous or cryptogenic species not previously recorded in New Zealand
- Detect incursions of established non-indigenous or cryptogenic species which are exhibiting invasive characteristics (i.e. range extensions of established organisms)

TARGET SPECIES

MPI has identified five **primary target species** which are listed on the Unwanted Organisms register. These are:

1. the northern Pacific seastar *Asterias amurensis*
2. the European green crab *Carcinus maenas*
3. the green alga *Caulerpa taxifolia*
4. the Chinese mitten crab *Eriocheir sinensis*
5. the Asian clam *Potamocorbula amurensis*

Additionally, four **secondary target organisms**[1] have been identified that are not necessarily listed as unwanted organisms but are known to be established in New Zealand's coastal waters. These include:

1. the Australian droplet tunicate *Eudistoma elongatum*
2. the Asian date mussel *Musculista senhousia*
3. the Mediterranean fanworm *Sabella spallanzanii*
4. the clubbed tunicate *Styela clava*

Dates of surveys

The targeted surveillance surveys of the 11 ports and marinas covered by the programme took place during the periods June - September 2011 (the Winter 2011 round of surveys) and November - March 2012 (the Summer 2011-2012 round). Dates for each survey are given in Table 1.

MPI: contacts

The targeted marine surveillance programme is administered and funded by MPI's Compliance and Response directorate. Queries relating to this programme should be directed to MPI.

The MPI contact person for all marine surveillance activity is Tim Riding (daytime telephone 04 894 3462, fax 04 894 5552, email tim.riding@mpi.govt.nz). Alternatively, the Biosecurity Surveillance Group Manager can be contacted at the following email address: NZBiosecuritySurveillance@maf.govt.nz.

The surveillance team: contact person and personnel

The surveillance programme was designed by Graeme Inglis (daytime telephone 03 348 8987, fax 03 348 5548, email g.inglis@niwa.co.nz) and Don Morrisey (daytime telephone 03 548 1715, fax 03 548 1716, email d.morrisey@niwa.co.nz), and implemented by the personnel listed in the *Communications logs and field team lists* submitted to MPI prior to each survey.

The contacts for each individual survey are shown in Table 1.

[1] *Didemnum* sp. was removed from the list of secondary target species by MPI in December 2008 (email from Brendan Gould, MPI, to Don Morrisey, NIWA, 12 December 2008).

Table 1 Dates for the Winter 2011 and Summer 2011-2012 surveys.

Port	Dates Winter 2011	Dates Summer 2011-2012
Auckland	5 – 16 September 2011	23 January – 3 February 2012
Bluff	15 – 19 August 2011	13 – 17 February 2012
Dunedin	18 – 22 July 2011	21 – 25 November 2011
Lyttelton	4 – 8 July 2011	31 October – 4 November 2011
Nelson	13 – 17 June 2011	5 – 9 March 2012
New Plymouth	8 – 12 August 2011	28 November – 2 December 2011
Opua	22 – 26 August 2011	12 – 18 December 2011
Picton / Havelock	20 – 24 June 2011	19 – 23 March 2011
Tauranga	13 – 17 June 2011	12 – 16 March 2012
Wellington	25 – 29 July 2011	14 – 18 November 2011
Whangarei	20 – 24 June 2011	20 – 24 February 2012

Results

SAMPLE COLLECTION

Sampling used a variety of techniques designed to sample a range of habitat types encompassing soft and hard surface habitats such as mud and gravel bottoms, intertidal rocky shores, and artificial structures, including marina pontoons, pilings, moorings, jetties and commercial vessel berths. The sampling techniques used were: crab condo lines, crab box traps, epibenthic sled tows, and diver and shore searches. The habitats and species targeted by each sampling technique are shown in Appendix 1 (appendices are in a separate volume).

Total numbers of locations surveyed in each survey round (Winter 2011 and Summer 2011-2012) in each port are shown in Table 2. Target numbers of locations sampled met the target on all but three occasions, and all were within 96% of target or higher. Failure to achieve target was often due to loss of traps by, for example, theft. Numbers of locations sampled with each method in each port are shown in Appendix 2, by sampling round. The sample locations for each technique are shown in Appendix 3.

Sample locations for crab box trap lines, epibenthic tows, and diver searches were pre-assigned prior to the survey by using a grid overlaid on the survey area in GIS. Where a pre-allocated sampling point was not accessible at the time the survey was done (for example, because a berth was occupied by a vessel), the sample was moved to a nearby location and the new coordinates recorded on the data sheet (or notepad computer, as appropriate). Field teams also noted any sampling locations that were not appropriate so that these could be removed from the grid of potential sampling locations for future surveys. Such locations included areas where high vessel traffic makes diving too hazardous or deployment of traps impossible, areas that are not suitable for trapping because they dry at low tide, and cable zones and other restricted areas.

Table 2 Summary of target and achieved numbers of locations sampled in each port in each survey.

Location	Sampling round	Target number of locations	Actual number of locations	% of target achieved
Auckland	Winter 2011	486	495	102
	Summer 2011-2012	486	487	100
Bluff	Winter 2011	243	233	96
	Summer 2011-2012	243	242	100
Dunedin	Winter 2011	243	244	100
	Summer 2011-2012	243	242	100
Lyttelton	Winter 2011	243	243	100
	Summer 2011-2012	243	244	100
Nelson	Winter 2011	243	244	100
	Summer 2011-2012	243	259	106
New Plymouth	Winter 2011	243	245	101
	Summer 2011-2012	243	246	101
Opua	Winter 2011	243	252	104
	Summer 2011-2012	243	244	100
Picton / Havelock	Winter 2011	243	244	100
	Summer 2011-2012	243	243	100
Tauranga	Winter 2011	243	243	100
	Summer 2011-2012	243	244	100
Wellington	Winter 2011	243	240	99
	Summer 2011-2012	243	240	99
Whangarei	Winter 2011	243	243	100
	Summer 2011-2012	243	243	100

TARGET SPECIES COLLECTION

Primary target species detected[1]: None
Secondary target species detected[2]: *Eudistoma elongatum*, *Musculista senhousia*, *Sabella spallanzanii* and *Styela clava* were recorded during both rounds of surveys (see below)

[1] *Asterias amurensis, Carcinus maenas, Caulerpa taxifolia, Eriocheir sinensis, Potamocorbula amurensis*
[2] *Eudistoma elongatum, Musculista senhousia, Sabella spallanzanii, Styela clava*

- *Eudistoma elongatum* was recorded during the following surveys: Opua (Winter 2011, Summer 2011-2012), Whangarei (Winter 2011, Summer 2011-2012).
- *Musculista senhousia* was recorded during the following surveys: Auckland (Winter 2011, Summer 2011-2012), Tauranga (Winter 2011, Summer 2011-2012), Whangarei (Winter 2011, Summer 2011-2012).
- *Sabella spallanzanii* was recorded during the following surveys: Auckland (Winter 2011, Summer 2011-2012), Lyttelton (Winter 2011).
- *Styela clava* was recorded during the following surveys: Auckland (Winter 2011, Summer 2011-2012), Dunedin (Winter 2011, Summer 2011-2012), Nelson (Winter 2011, Summer 2011-2012), Opua (Winter 2011, Summer 2011-2012), Tauranga (Summer 2011-2012 – range extension), Whangarei (Winter 2011, Summer 2011-2012).

NUMBER OF SPECIMENS COLLECTED AND SENT TO MITS

Numbers of specimens sent to MITS per survey ranged from none to 11, and the total number of specimens sent were 25 for the Winter 2011 round and 33 for the Summer 2011-2012 round (Table 3 and Table 4).

Nine of the specimens sent to MITS from the Winter 2011 survey were NIS (Table 5), including *Caprella mutica* (from the hull of a resident yacht in Bluff), *Sabella spallanzanii* (Lyttelton), *Grateloupia turuturu* (Nelson and New Plymouth) and *Styela clava* (Nelson). None of them were new records and only *C. mutica* represented a range extension. Seven of the specimens from the Summer 2011-2012 survey were NIS (Table 6), including *Grateloupia turuturu* (New Plymouth) and *Styela clava* (Tauranga), the latter representing a range extension. Three specimens of the penaeid prawn *Metapenaeus bennettae* and three of the hippollytid prawn *Lysmata californica* were collected in Whangarei in Summer 2011-2012. *M. bennettae* has previously been recorded only in Waitemata Harbour, where it was first detected in August 2009. The incomplete head of a specimen of *L. californica* was collected during the Summer 2009-2010 surveillance of Whangarei, but could not be identified to species because of lack of material. The more recent specimens confirm that the previous individual was most probably of the same species and represented the first record of this species in New Zealand or the western Pacific. Two of the specimens of *L. californica* were gravid.

Table 3 Summary of numbers and types of specimens collected and sent to MITS during the Winter 2011 round of surveys.

Port	Auckland	Bluff	Lyttelton	Nelson	New Plymouth	Opua	Otago	Picton / Havelock	Tauranga	Wellington	Whangarei	Total	% of total
Algae				1	2			2		2		7	28.0
Amphipods	1	1										2	8.0
Ascidians				1						4		5	20.0
Barnacles												0	0.0
Bivalves										1		1	4.0
Bryozoans												0	0.0
Crabs	1											1	4.0
Decapods					1							1	4.0
Echinoderms	1											1	4.0
Fish					1							1	4.0
Gastropods												0	0.0
Hydroids										2		2	8.0
Nudibranchs						1						1	4.0
Sea anemones												0	0.0
Sponges												0	0.0
Worms			1							2		3	12.0
Total	3	1	1	2	4	1	0	2	0	11	0	25	100.0

Table 4 Summary of numbers and types of specimens collected and sent to MITS during the Summer 2011-2012 round of surveys.

Port	Auckland	Bluff	Lyttelton	Nelson	New Plymouth	Opua	Otago	Picton / Havelock	Tauranga	Wellington	Whangarei	Total	% of total
Algae				2	2			5		2		11	33.3
Amphipods												0	0.0
Ascidians			1	1			1		1			4	12.1
Barnacles						1						1	3.0
Bivalves	1							1				2	6.1
Bryozoans												0	0.0
Crabs						1						1	3.0
Decapods											3	3	9.1
Echinoderms										1		1	3.0
Fish					1							1	3.0
Gastropods								1				1	3.0
Hydroids												0	0.0
Nudibranchs			1									1	3.0
Sea anemones												0	0.0
Sponges										1		1	3.0
Worms						1		1		4		6	18.2
Total	1	0	2	3	3	3	1	8	1	8	3	33	100.0

Table 5 Specimens collected and sent to MITS from each port during the Winter 2011 survey (non-indigenous species in bold type).

Taxonomic group	Species	Sample number	MITS ID code	Date	Location	Method
AUCKLAND						
Crab	*Nepinnotheres atrinocola*	AKL13141	70057	19/08/2011	AKL13141	Benthic sled
Echinoderm	*Stegnaster inflatus*	AKL13405	70058	27/09/2011	AKL13405	Diver search
Amphipod	*Amaryllis* sp.	AKL13482	70056	19/08/2011	AKL13482	Shore search
BLUFF						
Amphipod	***Caprella mutica***	BLU13249	70049	40780	BLU13249	Shore search
DUNEDIN						
None						
LYTTELTON						
Worm	***Sabella spallanzanii***	LYT13210a	70028	04/07/2011	LYT13210	Diver search
NELSON						
Alga	***Grateloupia turuturu***	NSN13183	70024	14/06/2011	NSN13183	Diver search
Ascidian	***Styela clava***	NSN13184	70025	14/06/2011	NSN13184	Diver search
NEW PLYMOUTH						
Fish	*Tewara cranwellae*	NPL13006	70045	08/08/2011	NPL13006	Benthic sled
Crustacean	*Acutigebia danai*	NPL13015	70046	08/08/2011	NPL13015	Benthic sled
Alga	***Grateloupia turuturu***	NPL13190	70048	09/08/2011	NPL13190	Diver search
Alga	***Grateloupia turuturu***	NPL13205	70047	09/08/2011	NPL13205	Diver search
OPUA						
Mollusc	*Janolus novozealandicus*	OPX13207	70050	23/08/2011	OPX13207	Diver search
PICTON						
Alga	*Aeodes nitidissima*	PCN13202	70027	21/06/2011	PCN13202	Diver search
Alga	*Aeodes nitidissima*	PCN13207	70026	21/06/2011	PCN13207	Diver search
TAURANGA						
None						
WELLINGTON						
Bivalve	*Pratulum pulchellum*	WLG13028	70030	27/07/2011	WLG13028	Benthic sled
Ascidian	***Botryllus tuberatus***	WLG13182a	70038	28/07/2011	WLG13182	Diver search
Ascidian	***Ciona intestinalis***	WLG13182b	70039	28/07/2011	WLG13182	Diver search
Ascidian	*Botrylloides magnicoecum*	WLG13187	70037	26/07/2011	WLG13187	Diver search
Sponge	Porifera	WLG13188	70035	26/07/2011	WLG13188	Diver search
Sponge	Porifera	WLG13191	70036	26/07/2011	WLG13191	Diver search
Hydroid	*Coryne eximia*	WLG13237	70032	25/07/2011	WLG13237	Shore search
Ascidian	*Didemnum vexillum*	WLG13237	70034	25/07/2011	WLG13237	Shore search
Hydroid	***Obelia geniincludinculata***	WLG13244	70033	25/07/2011	WLG13244	Shore search
Worm	*Euchone* sp.	WLG13260a	70055	28/07/2011	WLG13260	Diver search
Worm	*Bispira bispira*-A	WLG13260a	70029	28/07/2011	WLG13260	Diver search
Alga	*Haraldiophyllum crispatum*	WLG13257	70031	26/07/2011	WLG13257	Shore search
Alga	*Myriogramme gattyana*	WLG13257	70043	26/07/2011	WLG13257	Shore search
WHANGAREI						
None						

Table 6 Specimens collected and sent to MITS from each port during the Summer 2011-2012 survey (non-indigenous species in bold type).
[1] Central disc section only, unidentifiable beyond Order, [2] Tube worm, tubes only, unidentifiable beyond Genus.

Taxonomic group	Species	Sample number	MITS ID code	Date	Location	Method
AUCKLAND						
Bivalve	*Mytilus galloprovincialis*	AKL14402	70144	1/02/2012	AKL14402	Shore search
BLUFF						
None						
DUNEDIN						
Ascidian	*Botrylloides leachi*	DUD14187	70106	22/11/2011	DUD14187	Diver search
LYTTELTON						
Ascidian	*Botrylloides leachi*	LYT14186a	70096	31/10/2011	LYT14186	Diver search
Mollusc	*Galeojanolus* n. sp. 1	LYT14210a	70097	01/11/2011	LYT14210	Diver search
NELSON						
Ascidian	*Pyura subuculata*	NSN14182	70168	5/03/12	NSN14182	Diver search
Alga	*Grateloupia stipitata*	NSN14209	70161	5/03/12	NSN14209	Diver search
Alga	*Grateloupia stipitata*	NSN14191	70162	5/03/12	NSN14191	Diver search
NEW PLYMOUTH						
Fish	*Notoclinus fenestratus* (current status)	NPL14116	70107	29/11/2011	NPL14116	Crab box trap
Alga	***Grateloupia turuturu*** (current status)	NPL14197	70109	28/11/2011	NPL14197	Diver search
Alga	***Grateloupia turuturu*** (current status)	NPL14206	70108	28/11/2011	NPL14206	Diver search
OPUA						
Worm	*Chaetopterus chaetopterus*-A	OPX14032	70122	13/12/2011	OPX14032	Benthic sled
Bivalve	*Corbula zelandica*	OPX14051	70121	13/12/2011	OPX14051	Benthic sled
Crab	*Pilumnus novaezealandiae*	OPX14053	70120	15/12/2011	OPX14053	Benthic sled
PICTON						
Alga	*Grateloupia stipitata*	PCN14196	70156	20/03/2012	PCN14196	Diver search
Alga	Halymeniaceae	PCN14201	70157	20/03/2012	PCN14201	Diver search
Alga	*Grateloupia stipitata*	PCN14225	70158	19/03/2012	PCN14225	Shore search
Worm	*Nicolea* sp.	PCN14072	70165	20/03/2012	PCN14072	Benthic sled
Alga	*Grateloupia stipitata*	PCN14230	70159	20/03/2012	PCN14230	Shore search
Alga	Halymeniaceae	PCN14234	70160	21/03/2012	PCN14234	Shore search
Gastropod	*Zemelanopsis trifasciata*	PCN14216	70166	22/03/2012	PCN14216	Crab condo
Bivalve	*Mytilis galloprovincialis*	PCN14045	70167	21/03/2012	PCN14045	Benthic sled
TAURANGA						
Ascidian	***Styela clava***	TRG14204	70153	14/03/2012	TRG14204	Diver search
WELLINGTON						
Echinoderm	Brisingida [1]	WLG14140	70098	14/11/2011	WLG14140	Shore search
Worm	*Pectinaria* [2]	WLG14152	70099	16/11/2011	WLG14152	Shore search
Sponge	*Halichondria* n. sp. 1	WLG14181	70100	15/11/2011	WLG14181	Diver search
Worm	*Megalomma suspiciens*	WLG14185	70101	15/11/2011	WLG14185	Diver search
Alga	***Griffithsia crassiuscula***	WLG14190	70102	15/11/2011	WLG14190	Diver search
Worm	*Galeolaria hystrix*	WLG14204	70103	15/11/2011	WLG14204	Diver search
Worm	*Spirobranchus latiscapus*	WLG14204	70104	15/11/2011	WLG14204	Diver search
Alga	*Medeiothamnion lyallii*	WLG14207	70105	15/11/2011	WLG14207	Diver search
WHANGAREI						
Decapod	***Lysmata californica***	WRE14162	70149	23/02/2012	WRE14162	Crab box trap

Taxonomic group	Species	Sample number	MITS ID code	Date	Location	Method
Decapod	*Metapenaeus bennettae*	WRE14163	70150	23/02/2012	WRE14163	Crab box trap
Decapod	*Metapenaeus bennettae*	WRE14176	70151	23/02/2012	WRE14176	Crab box trap

DISTRIBUTION OF TARGET AND NON-TARGET SPECIES

Distribution maps were plotted for target species and for non-target species in the following categories: new records for New Zealand; those that have expanded their ranges; and those that currently have a restricted distribution (Appendix 3). The maps show locations where each species was recorded (as red dots) and also locations where it was absent, based on appropriate sampling methods for each species (see Appendix 1). Species plotted (and the sampling methods) are: *Acentrogobius pflaumii* (epibenthic sled); *Arenigobius bifrenatus* (epibenthic sled); *Caprella mutica* (shore search); *Charybdis japonica* (epibenthic sled, crab trap, crab condos, diver search, shore search); *Clavelina lepadiformis* (diver search, shore search); *Eudistoma elongatum* (epibenthic sled, diver search, shore search); *Ficopomatus enigmaticus* (diver search, shore search); *Grateloupia turuturu* (diver search, shore search); *Griffithsia crassiuscula* (diver search); *Limaria orientalis* (epibenthic sled); *Lysmata californica* (crab trap); *Metapenaeus bennettae* (epibenthic sled, crab trap, diver search); *Musculista senhousia* (epibenthic sled, crab trap, shore search); *Pyromaia tuberculata* (epibenthic sled, crab trap); *Sabella spallanzanii* (epibenthic sled, crab trap, diver search, shore search); *Sarsia eximia* (shore search); *Styela canopus* (diver search); *Styela clava* (epibenthic sled, diver search, shore search); *Theora lubrica* (epibenthic sled); and *Undaria pinnatifida* (epibenthic sled, crab trap, diver search, shore search). Records are shown for the Winter 2011 and Summer 2011-2012 surveys.

Secondary target species

Eudistoma elongatum

Eudistoma elongatum was recorded in both surveys of Opua and Whangarei Harbour. Distributions within each harbour were as follows:

- Opua: widespread in the marina and wharf in Opua and at locations along the coast towards Paihia and south of Russell in both surveys.
- Whangarei Harbour: found in the Portland Arm during both surveys, and on Limestone Island in the summer survey.

Musculista senhousia

Musculista senhousia was recorded in both surveys of Auckland, Tauranga and Whangarei Harbours. Distributions within each harbour were as follows:

- Auckland Harbour: at the harbour entrance and in the middle harbour during both surveys.
- Tauranga Harbour: in the channel south (upstream) of the Tauranga Bridge during both surveys.
- Whangarei Harbour: throughout the harbour, from the Town Basin to Marsden Point, including the Portland Arm and Marsden Cove Marina. In Marsden Cove Marina, *M. senhousia* has invaded the new part of the marina above the lock system.

Sabella spallanzanii

The single specimen of *S. spallanzanii* collected from the Viaduct Basin during the 2009 winter survey was the first record from Auckland and the first outside the Port of Lyttelton (where it was first discovered during the Summer 2007-2008 survey in March 2008).

S. spallanzanii was found in Auckland Harbour during both surveys and Lyttelton Harbour in the winter survey:

- Auckland Harbour: throughout the port, Orakei, Westhaven, Bayswater and Westpark Marinas, Devonport, the channel between the Harbour Bridge and Kauri Point and in the upper harbour (the upper harbour in the winter survey only). During the winter survey it was recorded at all but four of the 60 diver search locations and all but six in the summer survey. It was abundant at all locations where it occurred (up to an estimated 100 individuals per m^2 in Westhaven Marina).
- Lyttelton Harbour: in stark contrast to Auckland Harbour, only one individual was detected during the winter survey (on the moored pontoons at the junction of Gladstone Pier and Z Berth), and was not detected during the summer survey.

Styela clava

Styela clava was found during both surveys of Auckland, Dunedin, Lyttelton, Nelson, Opua and Whangarei Harbours and during the summer survey of Tauranga Harbour:

- Auckland Harbour: throughout the port, Orakei, Westhaven, Bayswater and Westpark Marinas, Devonport, the channel between the Harbour Bridge and Kauri Point and in the upper harbour (the upper harbour in the winter survey only). During the winter survey *S. clava* was found in almost all dive searches and many shore searches throughout the harbour, but most of the individuals seen appeared to be old and in poor condition. It occurred in fewer diver searches (43 out of 60) in the summer survey and individuals again appeared to be in poor condition.
- Dunedin: on the rocky reef under the main public-access wharf in Port Otago during the winter survey and at three locations in Port Otago during the summer survey.
- Lyttelton Harbour: at numerous locations throughout the port and along the northern shore of the harbour to the west of the port as far as Governors Bay, including Magazine Bay Marina.
- Nelson: three specimens were collected during the winter survey from the Marina / Dickson Basin area, and two during the summer survey from the Lay-up Berth South / Sealord factory area.
- Opua: throughout Opua Marina and Wharf and at Russell in the winter survey, and at Opua and isolated locations nearby in the summer survey.
- Whangarei Harbour: in Marsden Cove Marina and, for the first time, outside the marina at Marsden Wharves during the winter survey. It was recorded at these locations again in the summer survey.

Non-target, non-indigenous species

Acentrogobius pflaumii

Recorded during the winter and summer surveys of Auckland Harbour, and the winter surveys of Opua and Whangarei. In Auckland Harbour it occurred in the port, Westhaven Marina, Meola Reef and in the channel just upstream of the Harbour Bridge. In Opua it was collected at two locations among swing moorings to the south of the marina, and in Whangarei at a single location on the Town Wharf.

Arenigobius bifrenatus

Recorded in the summer survey in the Town Basin in Whangarei Harbour.

Caprella mutica

Recorded in large numbers on the hull of a locally-registered yacht moored in the channel near Green Point during the winter survey of Bluff Harbour. This was the first record from Bluff but the species has previously been recorded in Otago Harbour and other locations in New Zealand.

Charybdis japonica

Recorded during the winter and summer surveys of Auckland and Whangarei Harbours, as follows:

- Auckland: throughout the port, at Devonport, in Orakei, Bayswater, Westhaven and Westpark Marinas, and in the channels in the upper, middle and lower harbour. Only one specimen of the native paddle crab, *Ovalipes catharus* was captured during the winter survey (at North Head) and none during the summer survey.
- Whangarei Harbour: around the Town Wharf, Limestone Island, Portland Arm, Parua and Munro Bays during both surveys. An individual was captured in Marsden Cove Marina in the summer survey. Abundances during the summer survey were the highest yet seen in Whangarei Harbour.

Clavelina lepadiformis

To date, this species has only been recorded in Nelson Marina, where it was first noted in November 2008. In contrast to previous surveys, when it had become widespread in the marina, it was only recorded at a single location in the Winter 2011 survey and at three locations in the Summer 2011-2012 survey. It has become more widespread again since the summer survey (Mike Page, NIWA, pers. comm. June 2012).

Ficopomatus enigmaticus

This species was recorded during the summer (but not the winter) survey in the Town Basin at Whangarei, where it has been recorded previously.

Grateloupia turuturu

Specimens resembling *Grateloupia turuturu* were collected during the Winter 2011 and Summer 2011-2012 surveys of Nelson (marina), New Plymouth (inside the Lee and Main Breakwalls) and Picton, and sent to MITS for identification. The identification of these specimens proved to be difficult and a review of the Genera *Grateloupia* and *Halymenia* in New Zealand, and molecular information are required to confirm them (Wendy Nelson, NIWA, pers. comm. to Serena Wilkens, MITS). The current status of these and previously-collected specimens indicates that *G. turuturu* is present in Nelson and New Plymouth (Table 7), and is also known to occur in Wellington Harbour.

Table 7 Summary of the current status of identifications of specimens resembling *Grateloupia turuturu* collected during the Winter 2011 and Summer 2011-2012 surveys.

MITS ID code	Port	Date	Sample number	Identity
70024	Nelson	14/6/11	NSN13183	*Grateloupia turuturu*
70026	Picton	21/6/11	PCN13207	*Aeodes nitidissima*
70027	Picton	21/6/11	PCN13202	*Aeodes nitidissima*
70047	New Plymouth	9/8/11	NPL13205	*Grateloupia turuturu*

70048	New Plymouth	9/8/12	NSN13190	*Grateloupia turuturu*
70108	New Plymouth	28/11/11	NPL14206	*Grateloupia turuturu*
70109	New Plymouth	28/11/11	NPL14197	*Grateloupia turuturu*
70156	Picton	20/3012	PCN14196	*Grateloupia stipitata*
70157	Picton	20/3/12	PCN14201	Hymeniaceae
70158	Picton	19/3/12	PCN14225	*Grateloupia stipitata*
70159	Picton	20/3/12	PCN14230	*Grateloupia stipitata*
70160	Picton	21/3/12	PCN14234	Hymeniaceae
70161	Nelson	5/3/12	NSN14209	*Grateloupia stipitata*
70162	Nelson	5/3/12	NSN14191	*Grateloupia stipitata*

Griffithsia crassiuscula

Recorded in the inner port in Wellington Harbour during the summer survey. Previously recorded in this harbour at this location during the port baseline surveys.

Limaria orientalis

Recorded in Auckland Harbour during the winter and summer surveys, Opua during the summer survey (off the northern end of the commercial wharf) and Whangarei during the winter survey (at Marsden Point). In Auckland Harbour it occurs in the main channel in the outer and middle harbours, including the port and Devonport.

Lysmata californica

Three specimens were collected in a crab trap by the Town Wharf in Whangarei Harbour during the summer survey, representing the second record in Whangarei Harbour (and New Zealand). A partial specimen (head only) was collected during the Summer 2009-2010 (December 2009) surveillance of Whangarei (again from the Town Wharf) but could not be identified to species because of lack of material. The more recent specimens confirm that the previous individual was most probably of the same species and represented the first record of this species in New Zealand or the western Pacific. A specimen of the related species *L. vittata* (also non-indigenous) was also collected during the Summer 2009-2010 survey of Whangarei (in the Portland Arm) and has been recorded from other locations in the North Island.

Metapenaeus bennettae

This species was first recorded in New Zealand during the Winter 2009 survey of Auckland Harbour (outside Bayswater Marina). By the Summer 2010-2011 survey it was recorded throughout the port, Orakei and Westpark Marinas, Birkenhead, Chelsea Wharf and Kauri Point. It was recorded in the Viaduct Basin, at Devonport, Westpark Marina and near Kauri Point during the Winter 2011 survey and in the port during the Summer 2011-2012 survey. In Summer 2011-2012, it was recorded for the first time in Whangarei Harbour, in a crab trap at the Town Wharf.

Pyromaia tuberculata

Recorded in Auckland and Whangarei Harbours during both surveys and in Opua (commercial wharf) and Tauranga Harbour (two locations between the railway and State Highway 29 bridges) during the summer survey. In Auckland Harbour it occurred in the main channel of the middle and outer harbour and in Whangarei Harbour in the Portland Arm and Limestone Island.

Sarsia eximia

Recorded in Chaffers Marina, Wellington Harbour during the winter survey.

Styela canopus

Recorded in Dickson Basin, Nelson during the Summer 2011-2012 survey.

Theora lubrica

This species occurs in soft, muddy sediments throughout Auckland, Lyttelton, New Plymouth, Nelson, Opua, Picton, Tauranga, Wellington and Whangarei Harbours.

Undaria pinnatifida

Widespread in Auckland, Bluff, Dunedin, Lyttelton, Nelson, New Plymouth, Picton and Wellington Harbours. Also present in Tauranga Harbour.

- Auckland: the port, Viaduct, Westpark Marina and outer harbour. As in previous years, its distribution was more restricted during the summer survey (January 2012).
- Bluff: western side of the harbour, including the port, and Tiwai Wharf and in the eastern arm during the summer survey.
- Dunedin: throughout the harbour.
- Lyttelton: throughout the harbour.
- Nelson: marina, port and inside the Boulder Bank.
- New Plymouth: throughout the port.
- Picton: throughout the port, Waimahana Wharf (Shakespeare Bay) and Waikawa Marina.
- Tauranga: two locations in the port, opposite Sulphur Point, in the winter survey and at Sulphur Point, the southern end of the port and on the south side of Mount Maunganui in the summer survey.
- Wellington: throughout the harbour.

ENVIRONMENTAL DATA COLLECTION

Environmental data were recorded at most survey locations (the principal aim of these records is to develop a database of environmental conditions for each port in the surveillance programme, rather than conditions associated with each individual sample). The following parameters were measured: water depth, salinity, temperature, secchi depth, wind direction and speed, and time of sampling (to allow determination of tidal stage). Wind direction was allocated to one of eight compass directions (north, northeast, east, etc.). It should also be noted that the wind speed measured at a given sampling location (for example, against a sheltered wharf) may not be representative of general conditions prevailing at the time of the survey.

PROBABILITIES OF DETECTION

Estimates of probability of detection of primary target species were derived for Opua using Stochastic Scenario Tree (SST) models and used to optimise the allocation of sampling effort at this location as reported in the Revised Design Report for Opua Marina and Waikare Inlet (Morrisey et al. 2012). Optimised sampling in Opua will begin with the Winter 2012 survey (7-11 May 2012).

In May 2012 a workshop with NIWA and MPI staff was held to determine parameters for SST models for each of the other ports and marinas in the programme

Conclusions

The Winter 2011 and Summer 2011-2012 rounds of marine high-risk site surveillance surveys met the project objectives. The survey location targets were met in all but three cases (but all surveys achieved >96% of their target) and 58 specimens were collected and sent to MITS for identification. No primary target species were detected during the survey but the four secondary target species were all recorded: *Eudistoma elongatum* (Opua and Whangarei); *Musculista senhousia* (Auckland, Tauranga and Whangarei); *Sabella spallanzanii* (Auckland and Lyttelton); and *Styela clava* (Auckland, Dunedin, Nelson, Opua, Tauranga and Whangarei). All of these target species have been recorded at these respective locations during previous surveys apart from *S. clava* in Tauranga, which represents a range extension (although a specimen of *S. clava* was previously found on the hull of a barge that arrived in Tauranga in 2006 and was sent back to Auckland for cleaning after the discovery).

The following non-target, non-indigenous species were also recorded: *Acentrogobius pflaumii*; *Arenigobius bifrenatus*; *Caprella mutica*; *Charybdis japonica*; *Clavelina lepadiformis*; *Ficopomatus enigmaticus*; *Grateloupia turuturu*; *Griffithsia crassiuscula*; *Limaria orientalis*; *Lysmata californica*; *Metapenaeus bennettae*; *Pyromaia tuberculata*; *Sarsia eximia*; *Styela canopus*; *Theora lubrica*; and *Undaria pinnatifida.*

All *Charybdis* specimens caught in crab traps were measured and euthanized. All *Styela clava* found in Dunedin, Nelson and Tauranga were collected and either preserved and sent to MITS or disposed of to landfill.

Problems encountered:

Problems during sampling

During the Winter 2011 survey of Bluff Harbour, strong westerly / north-westerly winds necessitated the moving of some preallocated crab trap sites from exposed to more sheltered sites around the main shipping / wharf areas, and prevented the setting of traps in the shallow areas north and south of Green Point.

Several crab-trapping sites were adversely affected by the spring tides and associated heavy tidal flow during the Summer 2011-2012 survey of Tauranga Harbour. This had the effect of submerging buoys, especially when the lines were weighed down with *Ulva* (also very prolific in the harbour at this time). Subsequent sites were moved to reduce this effect, by placing the traps in areas of lower current speeds or in shallower water. During the same survey many crab trap and dive sites had to be relocated in the eastern port and Sulphur Point areas due to exceptionally heavy vessel movements at almost every available berth in the port (possibly due to industrial action in Ports of Auckland).

See comments below regarding security in Auckland Harbour during the Rugby World Cup and International Boat Show.

Difficulties encountered in meeting minimum monitoring requirements

None.

Problems encountered in reporting surveillance results

None.

Management actions taken to reduce problems

Where pre-assigned sampling locations could not be accessed because of, for example, the presence of a vessel on the wharf, the sample was taken as close as possible to the pre-assigned location and GPS coordinates were recorded.

Stakeholder engagement, public awareness and media contact:

The response from stakeholders contacted prior to the survey to inform them and obtain permission was rapid, and no problems were encountered with regard to access to sample sites.

The summer survey of Auckland Harbour took place during the opening weeks of the 2011 Rugby World Cup and the Auckland International Boat Show 15 -18 September in the Viaduct. Although this had no real effect on the survey (apart from delaying entry to the Viaduct area until the second week), the reporting to stakeholders was at a higher level than on previous surveys. During this period, the Auckland Maritime Police, rather than the Auckland Harbourmaster, had final say as to which areas we could access and when. However, all stakeholders, including the Police, Ports of Auckland and Ferry Operators/Auckland Transport, were supportive and helpful to the field teams.

Due to operations within the Devonport Navy Base (but not Kauri Point) during the summer survey of Auckland Harbour (12-23 September 2012), sampling within the Base was delayed until 27-28 September. The MPI liaison was notified of this change prior to the start of the survey.

A media release was sent out by MPI (then MAF) prior to the some of the surveys and local media made contact and (with approval from MPI) interviewed members of the field team during the summer survey of Bluff. A report on the survey appeared in the Southland Times on 15th February 2012 (http://www.stuff.co.nz/southland-times/news/6419378/Niwa-hunting-down-unwanted-aliens). Don Morrisey was also contacted by CueTV in Invercargill asking for an interview but this could not be fitted into the schedule of work and the time required to get approval from MPI.

Casual enquiries from members of the public and marina operators/owners were responded to by the field-team leader as per the short-term communications policy between MPI and NIWA.

As in previous rounds of surveys, local members of staff from MPI and regional councils joined the field team to help with and observe the work during some surveys.

Recommendations

Substitution of additional crab box traps for the starfish traps used in previous surveys has made deployment faster but has not had any observable effect on the types or numbers of organisms caught, and we recommend continuing with this innovation. Trials of electronic data recording continue. We recommend that distribution of sampling effort in Opua be modified as proposed in the revised design report (Morrisey et al. 2012).

Acknowledgements

We thank the stakeholders for facilitating the surveys, the enthusiastic and efficient field-team members, and Chris Woods for reviewing a draft version of this report.

References

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Appendix 1. Summary of sampling methods, target species and habitats.

Underlined species have been collected using this method during the present or previous target-species surveillance programmes.

Method	Target species	Non-target species	Habitat	Spatial coverage	Effectiveness	Cost effectiveness	Feasibility	Previous surveillance in NZ?	Previous surveillance overseas?
Epibenthic sled tows	*Asterias amurensis* *Eudistoma elongatum* *Musculista senhousia* *Potamocorbula amurensis* *Sabella spallanzanii* *Styela clava*	*Acentrogobius pflaumii* *Chaetopterus* sp. *Charybdis japonica* *Didemnum* sp. *Grateloupia turuturu* *Hypnea* sp. *Pyromaia tuberculata* *Theora lubrica*	Subtidal soft sediments. Particular focus on known shellfish beds (for *Asterias*) and areas next to public access (e.g. wharves, boat ramps, marinas, etc. *Caulerpa*, *Sabella*).	Narrow width but 50 m tow length and high replication (100+ per location) enables a reasonably large area to be sampled (ca 2500m^2 per location).	Reliable sample collection including asteroids, infaunal and epifaunal bivalves and polychaetes and macroalgae.	Processing of sled contents can be time consuming.	Feasible on all soft-sediment habitats under reasonable weather conditions. Can be limited by the presence of large amounts of benthic macroalgae or soft mud that fill mouth of sled.	Yes	Yes

Method	Target species	Non-target species	Habitat	Spatial coverage	Effectiveness	Cost effectiveness	Feasibility	Previous surveillance in NZ?	Previous surveillance overseas?
Box (crab) traps	*Asterias amurensis* *Carcinus maenas* *Eriocheir sinensis*	*Acentrogobius pflaumii* *Charybdis japonica* *Pyromaia tuberculata*	Adjacent to wharf pilings and other artificial habitats. Intertidal and shallow subtidal rocky shores, breakwalls and saltmarsh. Particular focus on habitats with complex physical structure (e.g. mussel beds, seagrass beds)	Sampled area is dependent on dispersion of bait odour. High replication possible.	Effectively sample other species of crabs (*Ovalipes*, *Macrophthalmus*, *Charybdis*).	Quick to deploy and recover, so high replication possible.	Most locations and weather conditions.	Yes	Yes (Hewitt & Martin 2001, May & Brown, 2001 Thresher et al. 2003, Yamada et al. 2001)
Crab condos	*Carcinus maenas* *Eriocheir sinensis*	*Acentrogobius pflaumii* *Charybdis japonica* *Pyromaia tuberculata*	Intertidal and shallow subtidal banks of rivers. Particular focus on brackish water habitats with complex physical structure (e.g. saltmarsh or fringing vegetation).	High replication possible. Availability of suitable estuarine habitat may limit deployment.	Effectively sample other species of crabs (*Helice*, *Macrophthalmus*). Higher rates of detection of crabs than bated traps in muddy river banks (Veldhuizen 2000).	Quick to deploy and recover, so high replication possible.	High – access problems at some sites (shallow water, deep mud, private land).	Yes	Yes (Veldhuizen 2000)

Method	Target species	Non-target species	Habitat	Spatial coverage	Effectiveness	Cost effectiveness	Feasibility	Previous surveillance in NZ?	Previous surveillance overseas?
Shoreline searches	*Carcinus maenas* *Eriocheir sinensis* *Eudistoma elongatum* *Musculista senhousia* *Sabella spallanzanii* *Styela clava*	*Chaetopterus* sp. *Charybdis japonica* *Clavelina lepadiformis* *Didemnum* sp. *Grateloupia turuturu* *Hypnea* sp. *Pyromaia tuberculata*	Sloping sandy shorelines, intertidal rocky reefs and areas where drift material is likely to accumulate. Prevailing winds on preceding days are a useful guide to where material may accumulate.	Wide – can cover long stretches of intertidal habitat quickly.	Used effectively in delimitation studies of *Styela.*	High	High – access to intertidal areas may be limiting.	Yes	Yes
Diver searches	*Asterias amurensis* *Carcinus maenas* *Eudistoma elongatum* *Sabella spallanzanii* *Styela clava*	*Chaetopterus* sp. *Charybdis japonica* *Clavelina lepadiformis* *Didemnum* sp. *Grateloupia turuturu* *Hypnea* sp. *Pyromaia tuberculata*	Wharf piles, marina piles and pontoons and other artificial structures, intertidal and shallow subtidal reefs.	Good – large numbers of piles or lengths of hard substratum can be searched in detail.	Dependent on water clarity and level of biofouling.	Cost effective in reasonable water clarity, can be time-consuming under poor conditions.	Feasibility dependent on water currents, weather, water clarity and safety issues for divers.	Yes	Yes

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Appendix 2. Summaries of achieved versus target sample numbers for Winter 2011 and Summer 2011-2012.

[1] 3 condos per line; [2] 3 traps per line

AUCKLAND

Sampling method	Target number of locations	Actual number of locations	% of target achieved
ALL AUCKLAND WINTER 2011			
Crab condo lines[1]	16	16	100
Crab (box) trap lines[2]	160	159	99
Epibenthic sled tows	200	201	101
Diver searches	60	60	100
Shore searches	50	59	118
Sample total	**486**	**495**	**102**
WAITEMATA WINTER 2011			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	32	30	94
Epibenthic sled tows	91	84	92
Diver searches	4	1	25
Shore searches	20	22	110
Sample total	**155**	**145**	**94**
PORT OF AUCKLAND WINTER 2011			
Crab condo lines[1]			
Crab (box) trap lines[2]	28	35	125
Epibenthic sled tows	37	45	122
Diver searches	15	15	100
Shore searches			
Sample total	**80**	**95**	**119**
VIADUCT/HOBSON WEST WINTER 2011			
Crab condo lines[1]			
Crab (box) trap lines[2]	13	18	138
Epibenthic sled tows	15	16	107
Diver searches	15	13	87
Shore searches	10	8	80
Sample total	**53**	**55**	**104**
WESTHAVEN WINTER 2011			
Crab condo lines[1]			
Crab (box) trap lines[2]	11	19	173
Epibenthic sled tows	24	26	108
Diver searches	15	12	80
Shore searches	9	9	100
Sample total	**59**	**66**	**112**
BAYSWATER MARINA WINTER 2011			
Crab condo lines[1]			
Crab (box) trap lines[2]	13	13	100
Epibenthic sled tows	12	12	100
Diver searches	5	4	80
Shore searches	6	4	67
Sample total	**36**	**33**	**92**
WESTPARK MARINA WINTER 2011			
Crab condo lines[1]			

Sampling method	Target number of locations	Actual number of locations	% of target achieved
Crab (box) trap lines[2]	13	10	77
Epibenthic sled tows	1	1	100
Diver searches	3	3	100
Shore searches	3	2	67
Sample total	**20**	**16**	**80**
ORAKEI / HOBSON MARINA WINTER 2011			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	10	20	200
Epibenthic sled tows	5	9	180
Diver searches	3	3	100
Shore searches	2	4	200
Sample total	**28**	**44**	**157**
DEVONPORT NAVAL BASE AND PUBLIC WHARF WINTER 2011			
Crab condo lines[1]			
Crab (box) trap lines[2]	11	11	100
Epibenthic sled tows	12	12	100
Diver searches	6	6	100
Shore searches	0	0	#DIV/0!
Sample total	**29**	**29**	**100**
KAURI POINT WINTER 2011			
Crab condo lines[1]			
Crab (box) trap lines[2]	3	3	100
Epibenthic sled tows	3	3	100
Diver searches	2	2	100
Shore searches			
Sample total	**8**	**8**	**100**
ALL AUCKLAND SUMMER 2011-2012			
Crab condo lines[1]	16	16	100
Crab (box) trap lines[2]	160	160	100
Epibenthic sled tows	200	201	101
Diver searches	60	60	100
Shore searches	50	50	100
Sample total	**486**	**487**	**100**
WAITEMATA SUMMER 2011-2012			
Crab condo lines[1]	8	4	50
Crab (box) trap lines[2]	31	26	84
Epibenthic sled tows	86	88	102
Diver searches	4	1	25
Shore searches	21	19	90
Sample total	**150**	**138**	**92**
PORT OF AUCKLAND SUMMER 2011-2012			
Crab condo lines[1]			
Crab (box) trap lines[2]	26	35	135
Epibenthic sled tows	42	43	102
Diver searches	12	16	133
Shore searches	6		0
Sample total	**86**	**94**	**109**
VIADUCT/HOBSON WEST SUMMER 2011-2012			
Crab condo lines[1]			
Crab (box) trap lines[2]	14	19	136
Epibenthic sled tows	18	16	89
Diver searches	18	12	67

Sampling method	Target number of locations	Actual number of locations	% of target achieved
Shore searches	5	1	20
Sample total	**55**	**48**	**87**
WESTHAVEN SUMMER 2011-2012			
Crab condo lines[1]			
Crab (box) trap lines[2]	12	20	167
Epibenthic sled tows	28	26	93
Diver searches	15	13	87
Shore searches	13	12	92
Sample total	**68**	**71**	**104**
BAYSWATER MARINA SUMMER 2011-2012			
Crab condo lines[1]			
Crab (box) trap lines[2]	13	13	100
Epibenthic sled tows	15	12	80
Diver searches	5	4	80
Shore searches	6	6	100
Sample total	**39**	**35**	**90**
WESTPARK MARINA SUMMER 2011-2012			
Crab condo lines[1]			
Crab (box) trap lines[2]	13	10	77
Epibenthic sled tows	4	0	0
Diver searches	3	3	100
Shore searches	1	4	400
Sample total	**21**	**17**	**81**
ORAKEI / HOBSON MARINA SUMMER 2011-2012			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	11	24	218
Epibenthic sled tows	7	6	86
Diver searches	3	4	133
Shore searches	3	6	200
Sample total	**32**	**48**	**150**
DEVONPORT NAVAL BASE AND PUBLIC WHARF SUMMER 2011-2012			
Crab condo lines[1]			
Crab (box) trap lines[2]	11	11	100
Epibenthic sled tows	13	11	85
Diver searches	6	6	100
Shore searches	0	0	#DIV/0!
Sample total	**30**	**28**	**93**
KAURI POINT SUMMER 2011-2012			
Crab condo lines[1]			
Crab (box) trap lines[2]	3	3	100
Epibenthic sled tows	1	1	100
Diver searches	2	2	100
Shore searches			
Sample total	**6**	**6**	**100**

BLUFF

Sampling method	Target number of locations	Actual number of locations	% of target achieved
WINTER 2011			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	55	68.75
Epibenthic sled tows	100	109	109
Diver searches	30	30	100
Shore searches	25	31	124
Sample total	**243**	**233**	**96**
SUMMER 2011-2012			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	79	98.75
Epibenthic sled tows	100	100	100
Diver searches	30	30	100
Shore searches	25	25	100
Sample total	**243**	**242**	**100**

DUNEDIN

Sampling method	Target number of locations	Actual number of locations	% of target achieved
WINTER 2011			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	80	100
Epibenthic sled tows	100	100	100
Diver searches	30	30	100
Shore searches	25	26	104
Sample total	**243**	**244**	**100**
SUMMER 2011-2012			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	79	98.75
Epibenthic sled tows	100	100	100
Diver searches	30	30	100
Shore searches	25	25	100
Sample total	**243**	**242**	**100**

LYTTELTON

Sampling method	Target number of locations	Actual number of locations	% of target achieved
WINTER 2011			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	80	100
Epibenthic sled tows	100	100	100
Diver searches	30	30	100
Shore searches	25	25	100
Sample total	**243**	**243**	**100**
SUMMER 2011-2012			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	79	98.75
Epibenthic sled tows	100	102	102
Diver searches	30	30	100
Shore searches	25	25	100
Sample total	**243**	**244**	**100**

NELSON

Sampling method	Target number of locations	Actual number of locations	% of target achieved
WINTER 2011			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	80	100
Epibenthic sled tows	100	100	100
Diver searches	30	31	103
Shore searches	25	25	100
Sample total	**243**	**244**	**100**
SUMMER 2011-2012			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	80	100
Epibenthic sled tows	100	116	116
Diver searches	30	30	100
Shore searches	25	25	100
Sample total	**243**	**259**	**106**

NEW PLYMOUTH

Sampling method	Target number of locations	Actual number of locations	% of target achieved
WINTER 2011			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	80	100
Epibenthic sled tows	100	100	100
Diver searches	30	30	100
Shore searches	25	27	108
Sample total	**243**	**245**	**101**
SUMMER 2011-2012			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	81	101
Epibenthic sled tows	100	101	101
Diver searches	30	30	100
Shore searches	25	26	104
Sample total	**243**	**246**	**101**

OPUA

Sampling method	Target number of locations	Actual number of locations	% of target achieved
WINTER 2011			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	86	108
Epibenthic sled tows	100	100	100
Diver searches	30	30	100
Shore searches	25	28	100
Sample total	**243**	**252**	**104**
SUMMER 2011-2012			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	80	100
Epibenthic sled tows	100	100	100
Diver searches	30	30	100
Shore searches	25	26	100
Sample total	**243**	**244**	**100**

PICTON / HAVELOCK

Sampling method	Target number of locations	Actual number of locations	% of target achieved
TOTAL PICTON / HAVELOCK WINTER 2011			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	80	100
Epibenthic sled tows	100	100	100
Diver searches	30	31	103
Shore searches	25	25	100
Sample total	**243**	**244**	**100**
PICTON / SHAKESPEARE BAY WINTER 2011			
Crab condo lines[1]	0	0	
Crab (box) trap lines[2]	35	33	94
Epibenthic sled tows	60	60	100
Diver searches	15	16	107
Shore searches	9	9	100
Sample total	**119**	**118**	**99**
WAIKAWA WINTER 2011			
Crab condo lines[1]	0	0	
Crab (box) trap lines[2]	20	20	100
Epibenthic sled tows	20	20	100
Diver searches	7	7	100
Shore searches	8	8	100
Sample total	**55**	**55**	**100**
HAVELOCK WINTER 2011			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	25	28	112
Epibenthic sled tows	20	20	100
Diver searches	8	8	100
Shore searches	8	8	100
Sample total	**69**	**72**	**104**
TOTAL PICTON / HAVELOCK SUMMER 2011-2012			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	79	99
Epibenthic sled tows	100	100	100
Diver searches	30	31	103
Shore searches	25	25	100
Sample total	**243**	**243**	**100**
PICTON / SHAKESPEARE BAY SUMMER 2011-2012			
Crab condo lines[1]	0	0	
Crab (box) trap lines[2]	35	34	97
Epibenthic sled tows	60	60	100
Diver searches	15	15	100
Shore searches	9	8	89
Sample total	**119**	**117**	**99**
WAIKAWA SUMMER 2011-2012			
Crab condo lines[1]	0	0	
Crab (box) trap lines[2]	20	19	95
Epibenthic sled tows	20	20	100
Diver searches	7	7	100
Shore searches	8	8	100
Sample total	**55**	**54**	**98**

Sampling method	Target number of locations	Actual number of locations	% of target achieved
HAVELOCK 2011-2012			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	25	26	130
Epibenthic sled tows	20	20	100
Diver searches	8	8	100
Shore searches	8	7	88
Sample total	**69**	**69**	**100**

TAURANGA

Sampling method	Target number of locations	Actual number of locations	% of target achieved
WINTER 2011			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	80	100
Epibenthic sled tows	100	100	100
Diver searches	30	30	100
Shore searches	25	25	100
Sample total	**243**	**243**	**100**
SUMMER 2011-2012			
Crab condo lines[1]	8	7	88
Crab (box) trap lines[2]	80	81	101
Epibenthic sled tows	100	100	100
Diver searches	30	30	100
Shore searches	25	26	104
Sample total	**243**	**244**	**100**

WELLINGTON

Sampling method	Target number of locations	Actual number of locations	% of target achieved
WINTER 2011			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	77	96
Epibenthic sled tows	100	100	100
Diver searches	30	30	100
Shore searches	25	25	100
Sample total	**243**	**240**	**99**
SUMMER 2011-2012			
Crab condo lines[1]	8	7	88
Crab (box) trap lines[2]	80	78	98
Epibenthic sled tows	100	100	100
Diver searches	30	30	100
Shore searches	25	25	100
Sample total	**243**	**240**	**99**

WHANGAREI

Sampling method	Target number of locations	Actual number of locations	% of target achieved
WINTER 2011			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	80	80	100
Epibenthic sled tows	100	99	99
Diver searches	30	30	100
Shore searches	25	26	104
Sample total	**243**	**243**	**100**
SUMMER 2011-2012			
Crab condo lines[1]	8	8	100
Crab (box) trap lines[2]	20	80	400
Epibenthic sled tows	100	100	100
Diver searches	30	30	100
Shore searches	25	25	100
Sample total	**243**	**243**	**100**

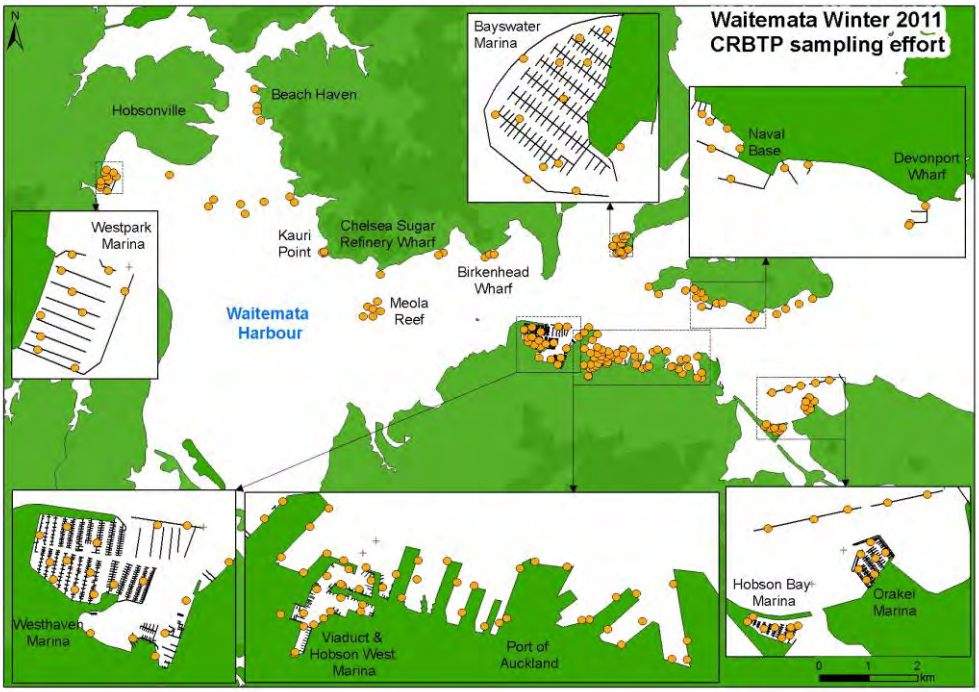
Appendix 3. Maps showing locations sampled in Winter 2011 and Summer 2011-2012.

NOTE THAT NUMBERS OF LOCATIONS PLOTTED MAY APPEAR SMALLER THAN THOSE SHOWN IN APPENDIX 2 DUE TO POINTS PLOTTING ON TOP OF EACH OTHER AS A RESULT OF THE SPATIAL RESOLUTION OF THESE MAPS

AUCKLAND (WAITEMATA HARBOUR)

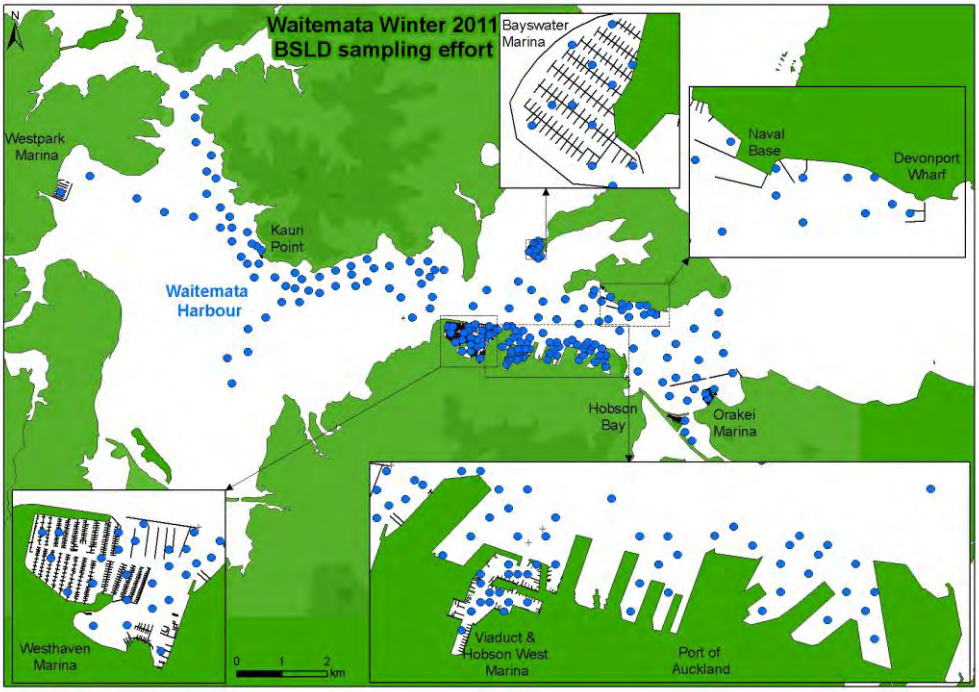
Winter 2011

Crab (box) trapping locations

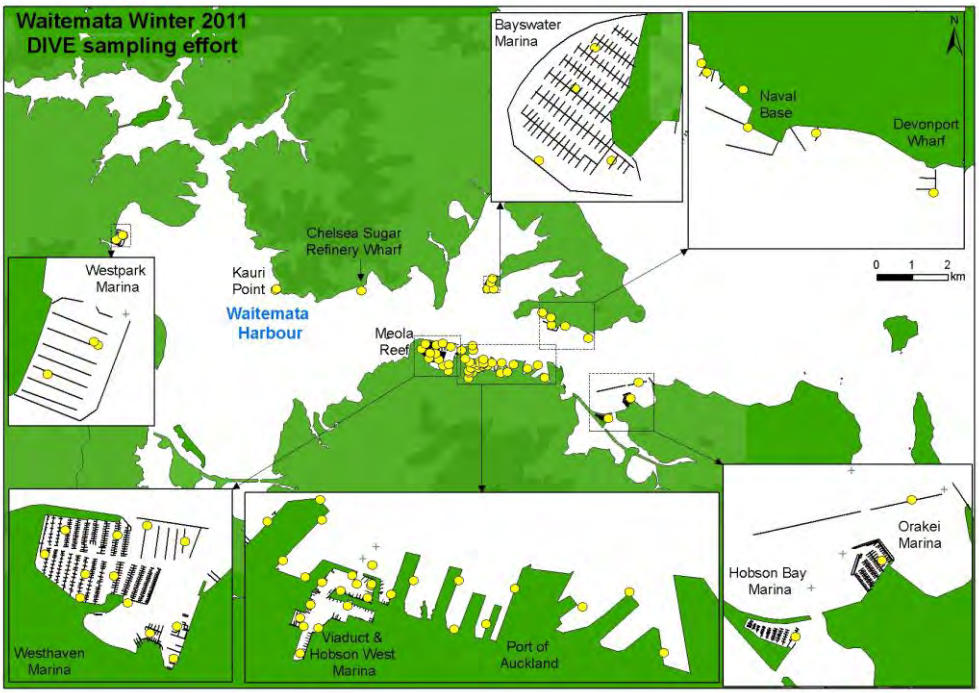


Crab condo locations

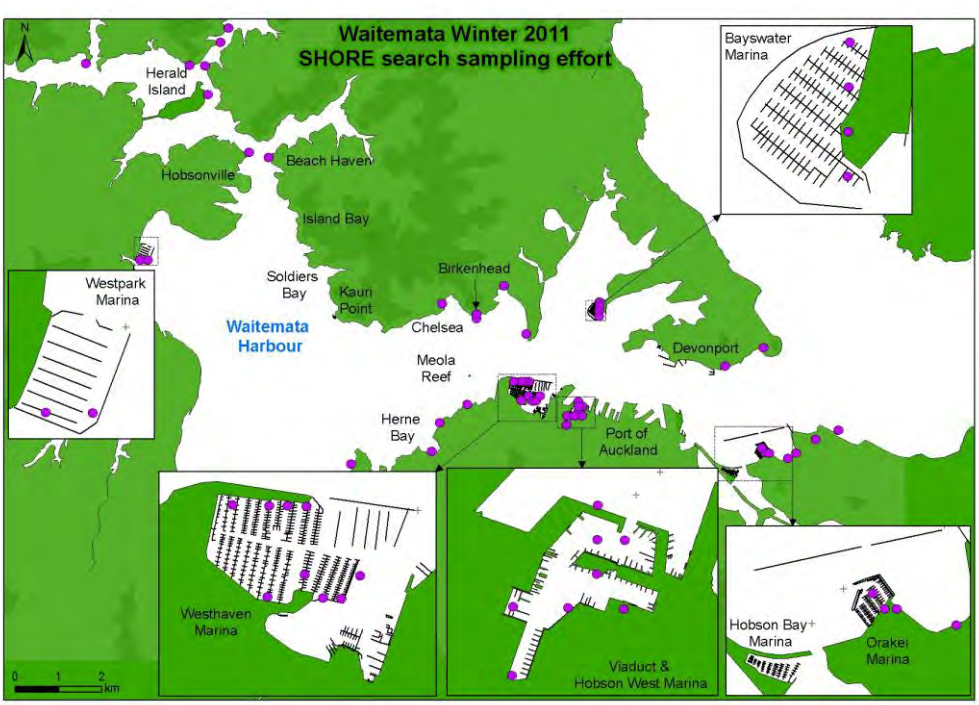
Sledding locations



Dive search locations

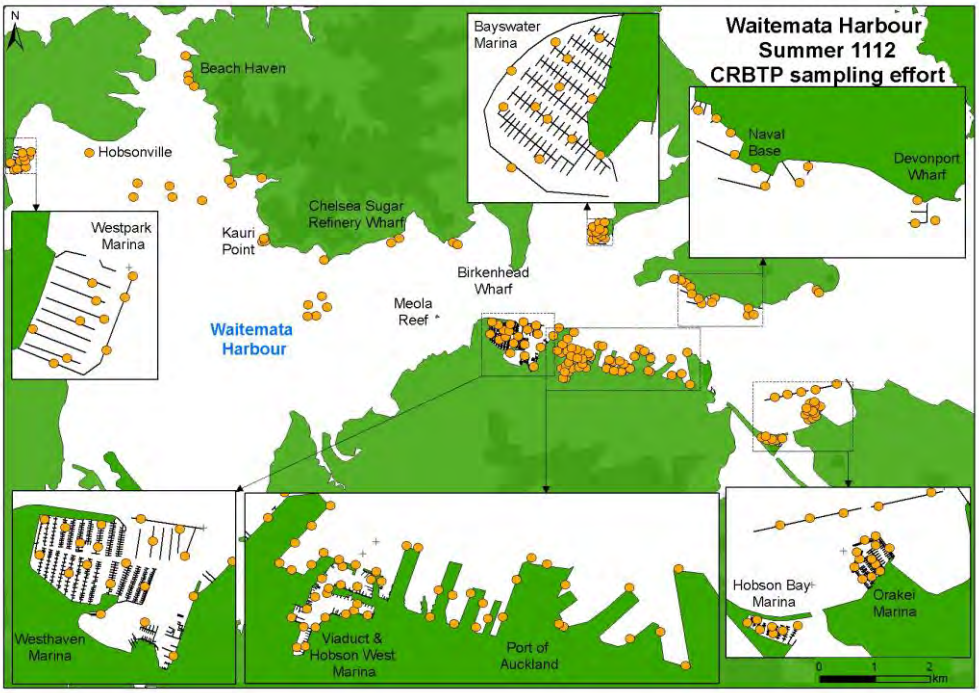


Shore search locations



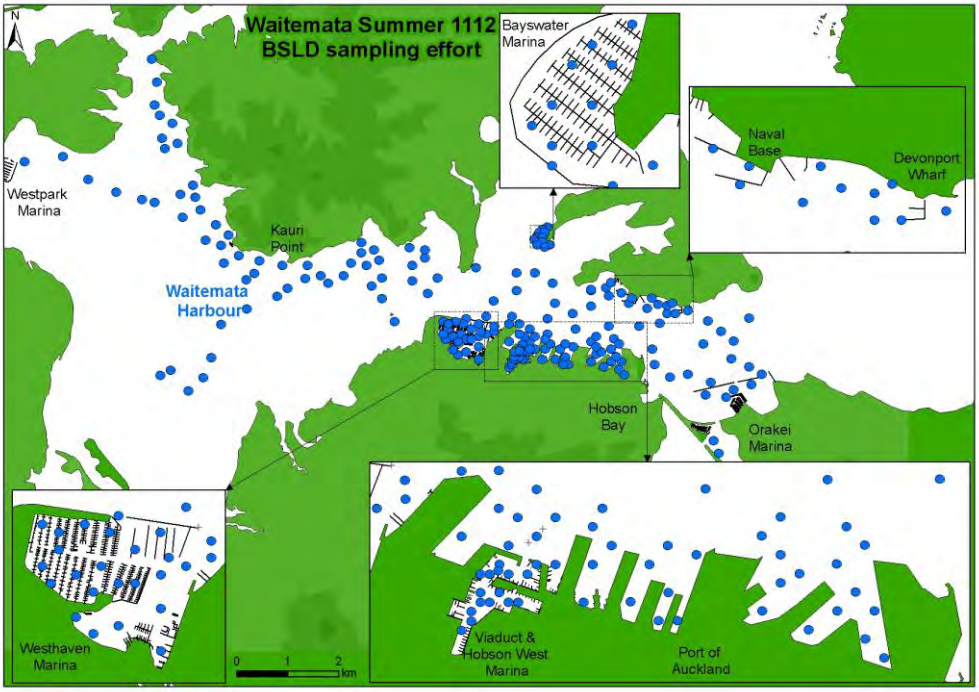
Summer 2011-2012

Crab (box) trapping locations

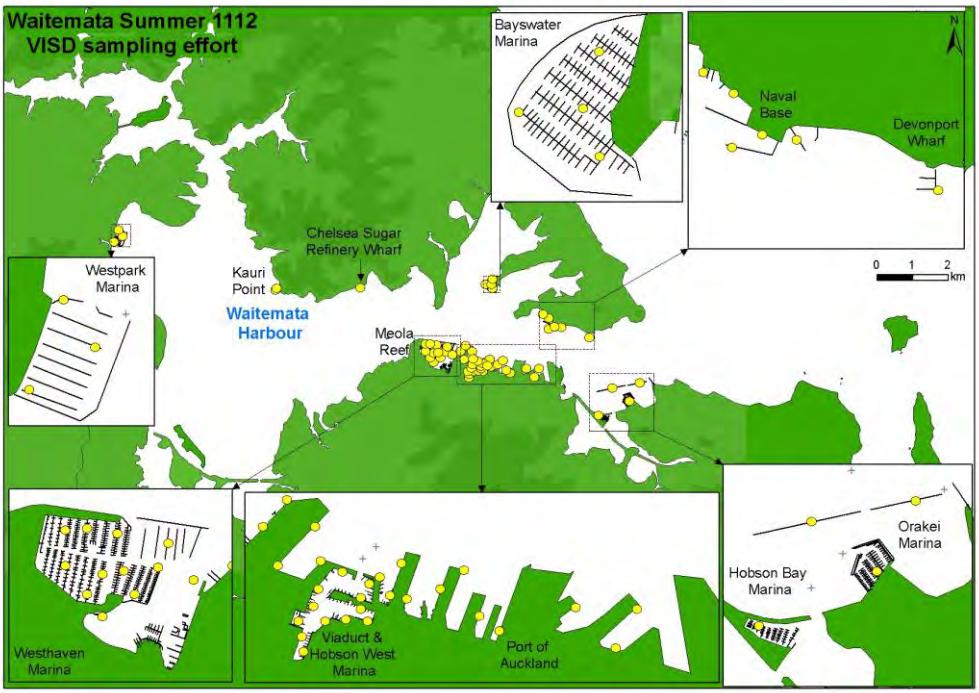


Crab condo locations

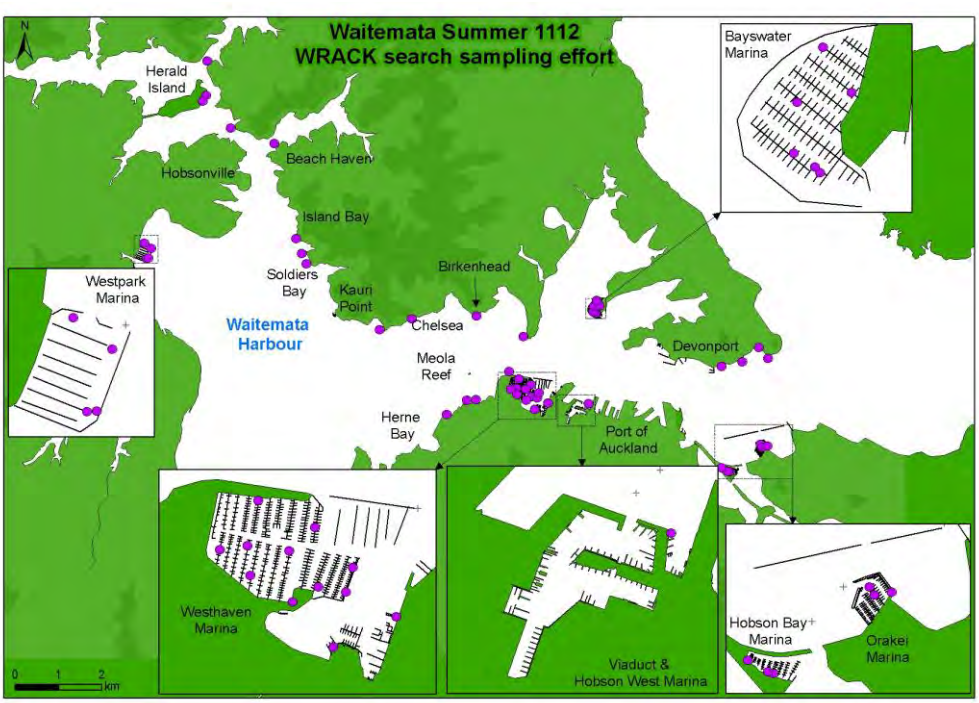
Sledding locations



Dive search locations



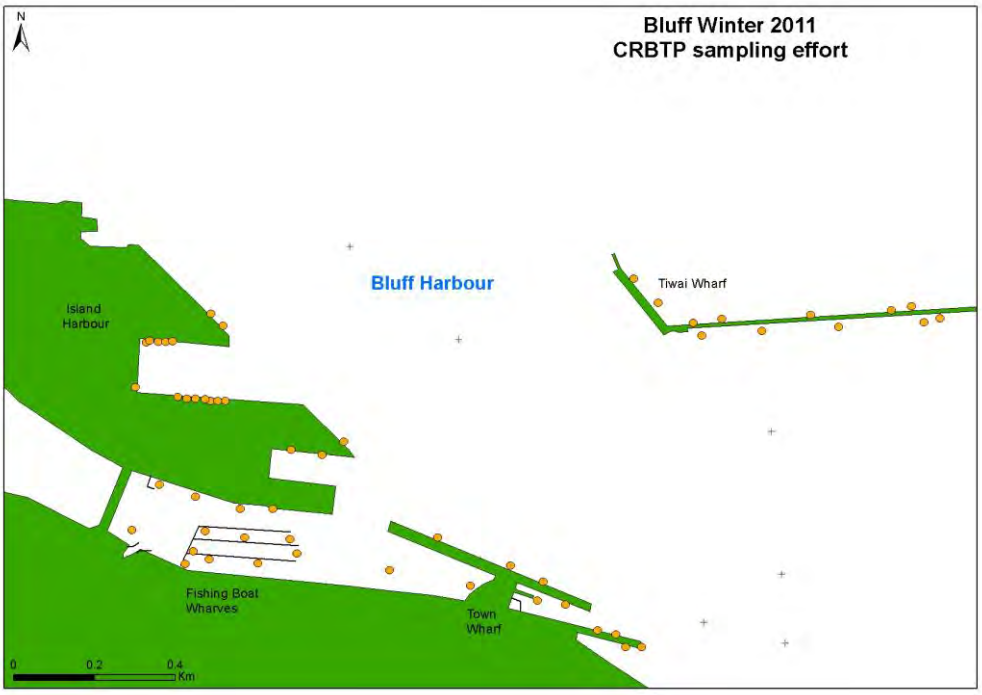
Shore search locations



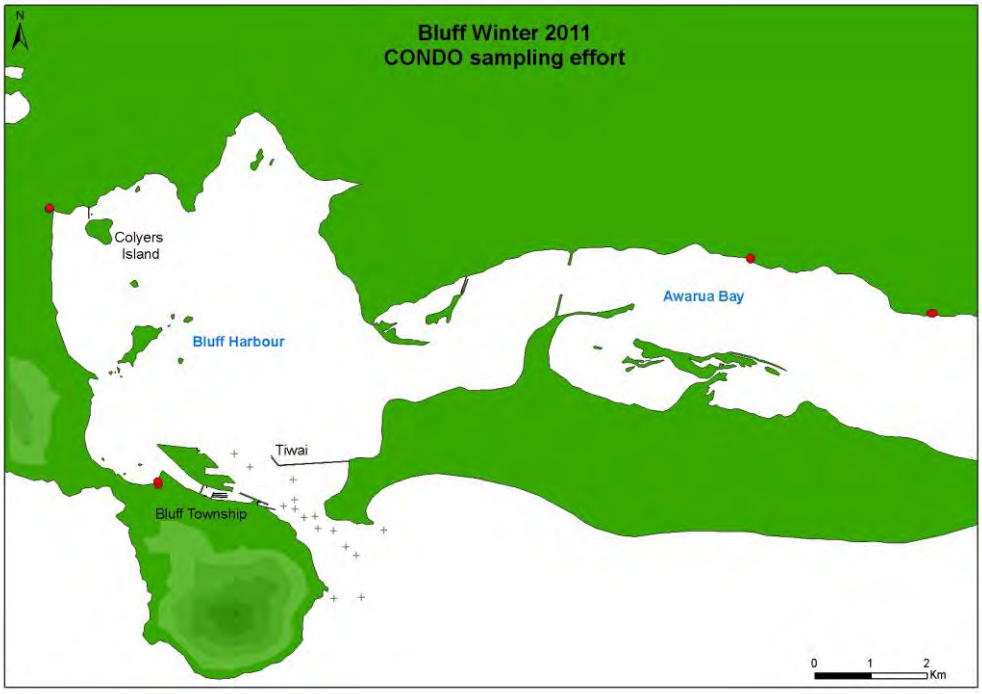
BLUFF HARBOUR

Winter 2011

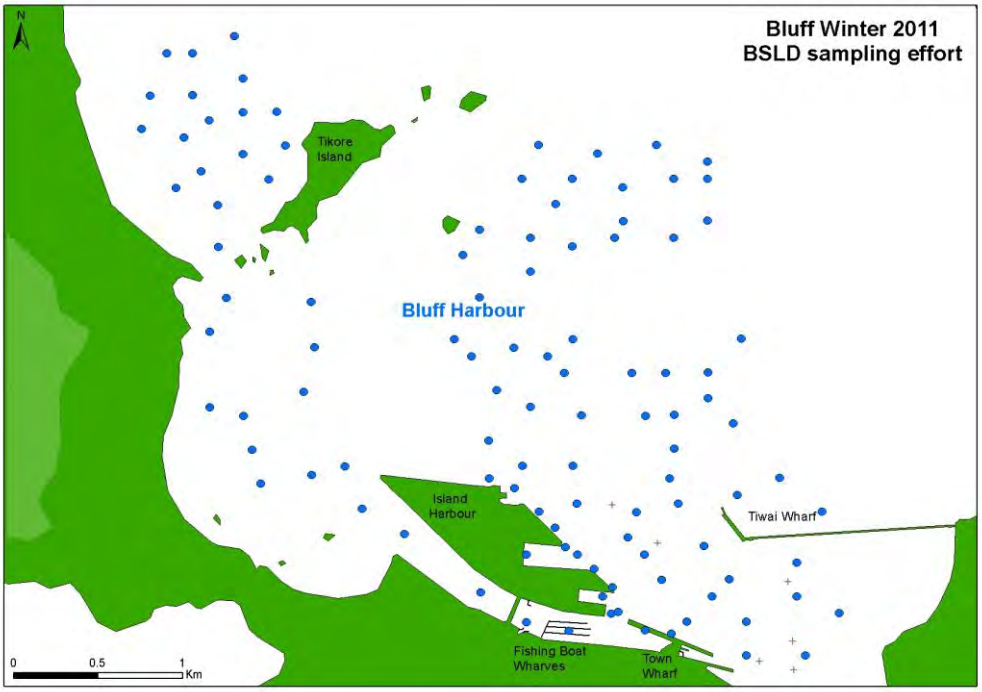
Crab (box) trapping locations



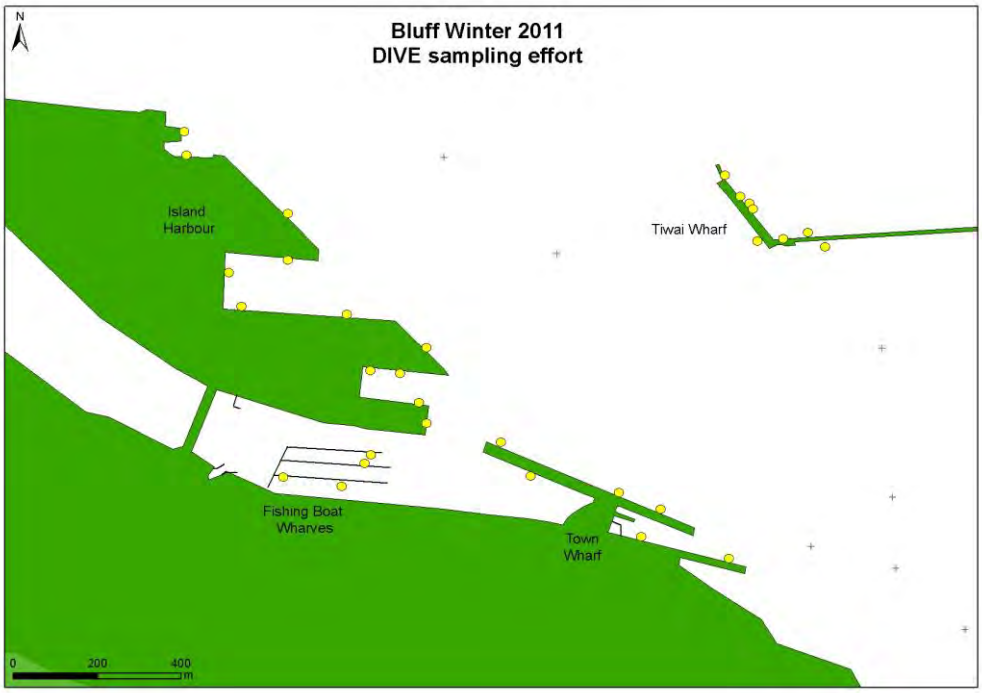
Crab condo locations



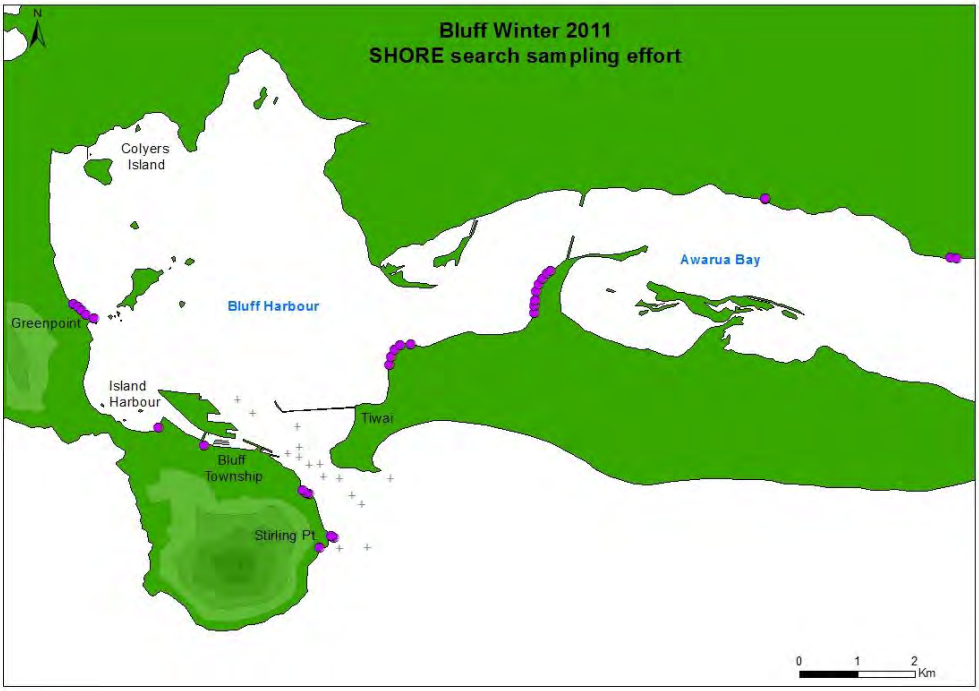
Sledding locations



Dive search locations

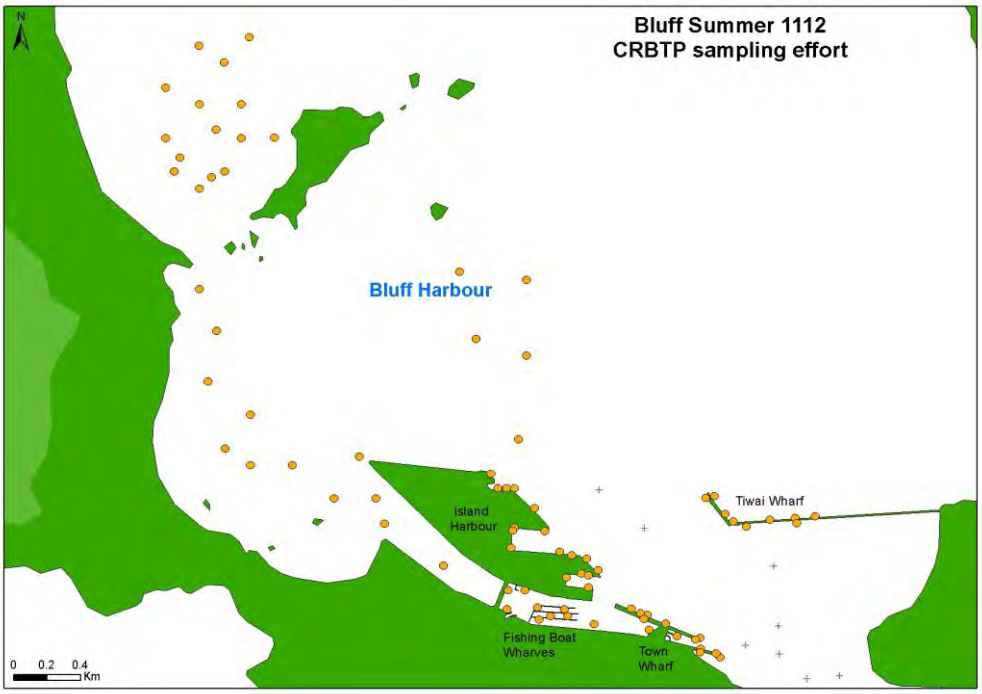


Shore search locations

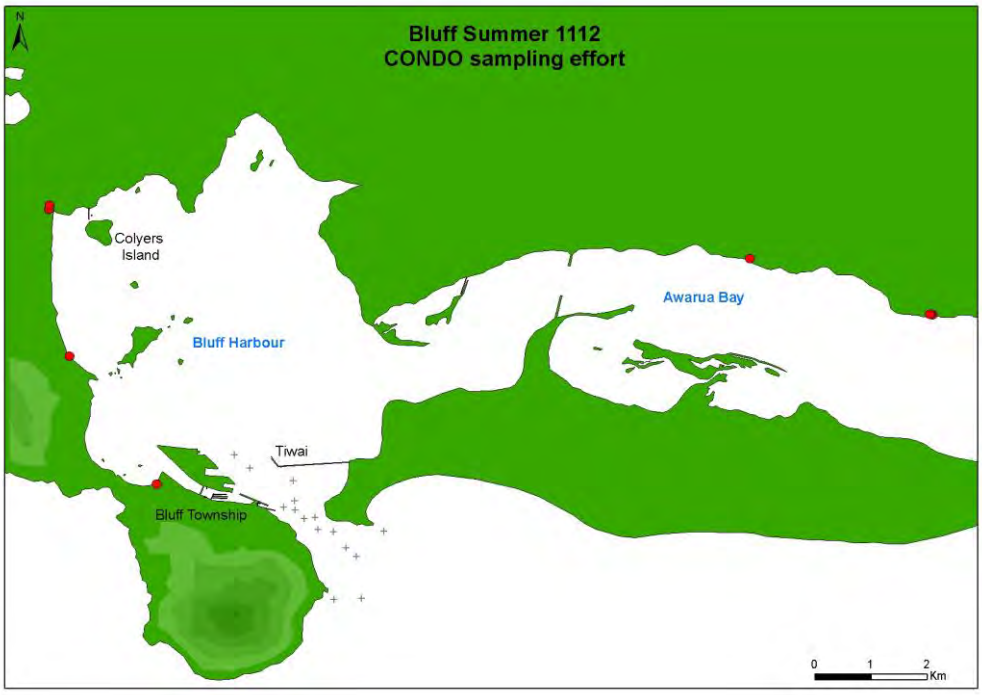


Summer 2011-2012

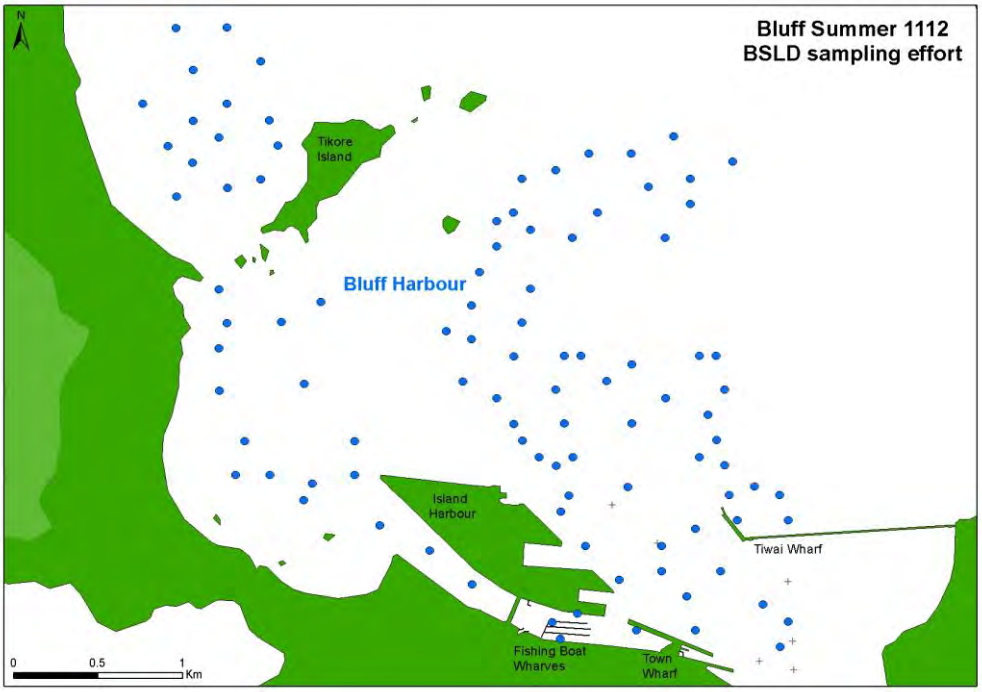
Crab (box) trapping locations



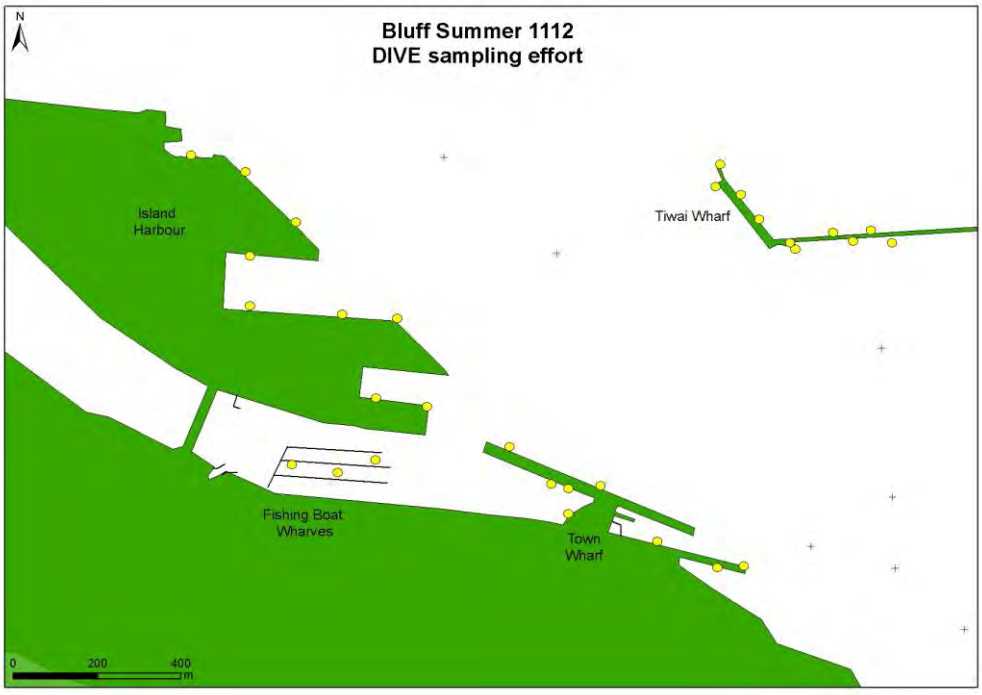
Crab condo locations



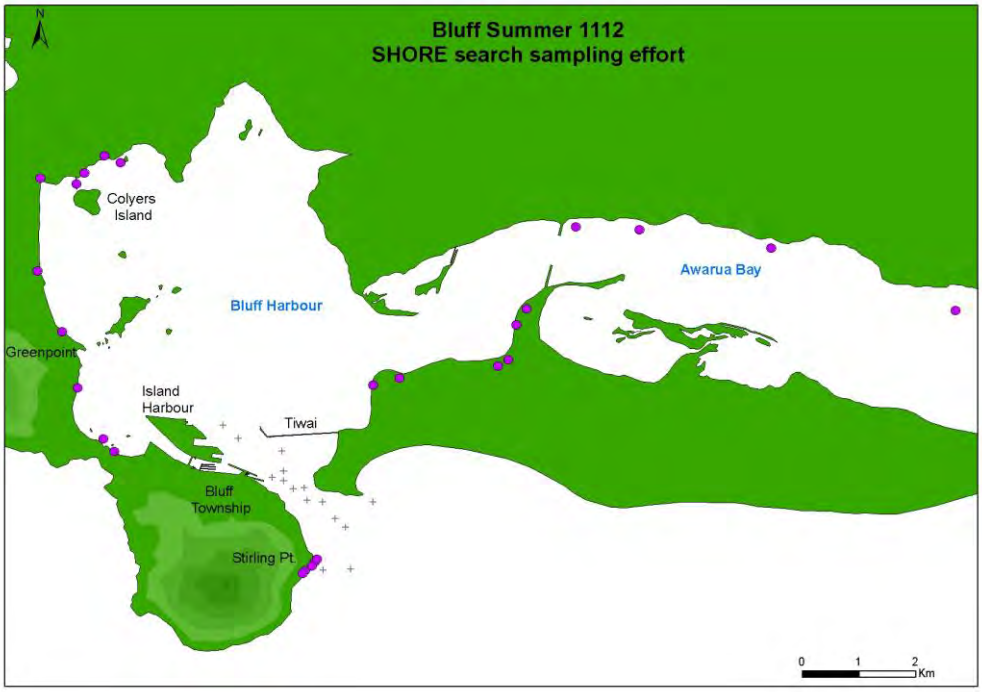
Sledding locations



Dive search locations



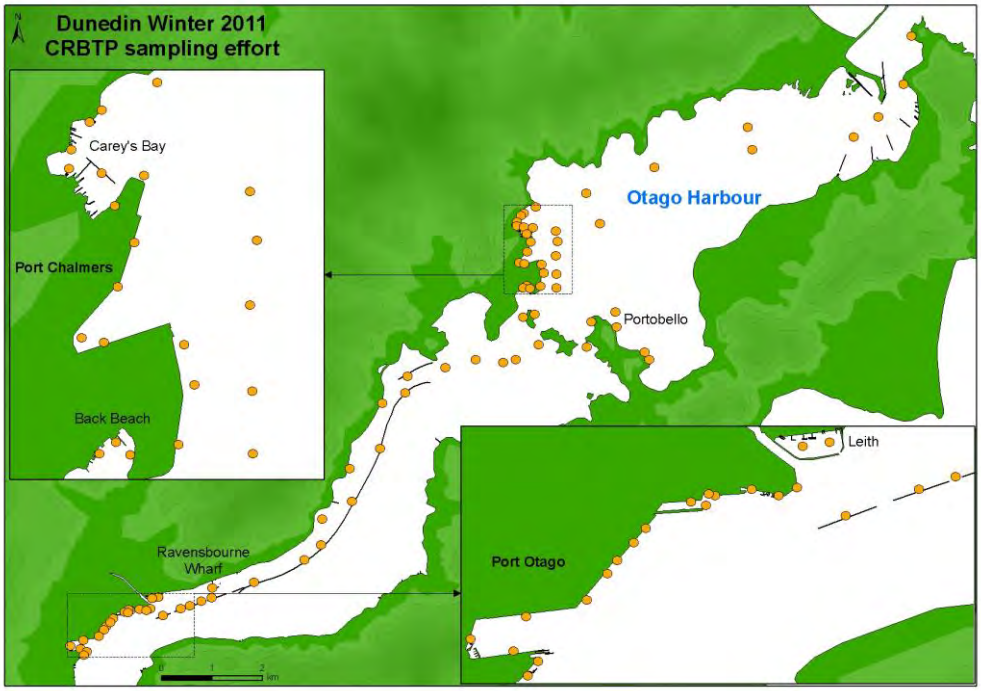
Shore search locations



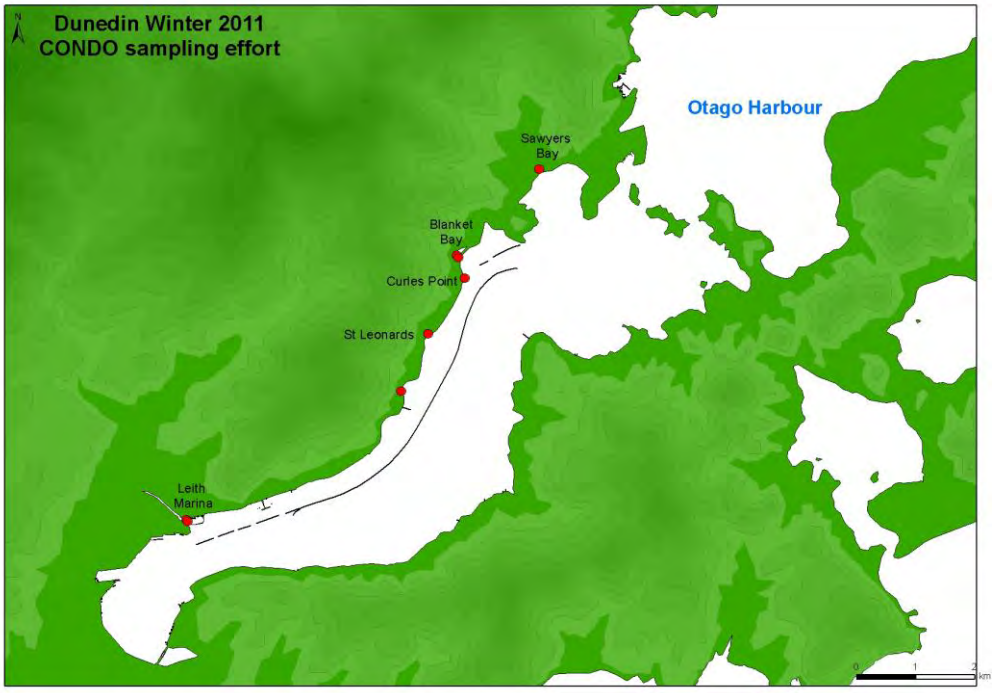
DUNEDIN (OTAGO HARBOUR)

Winter 2011

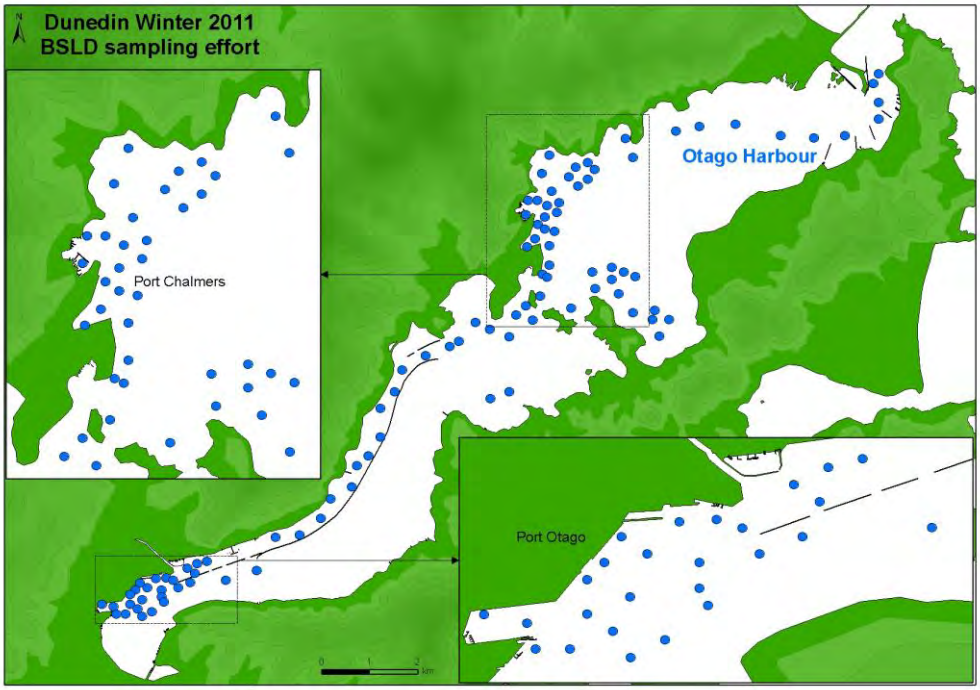
Crab (box) trapping locations



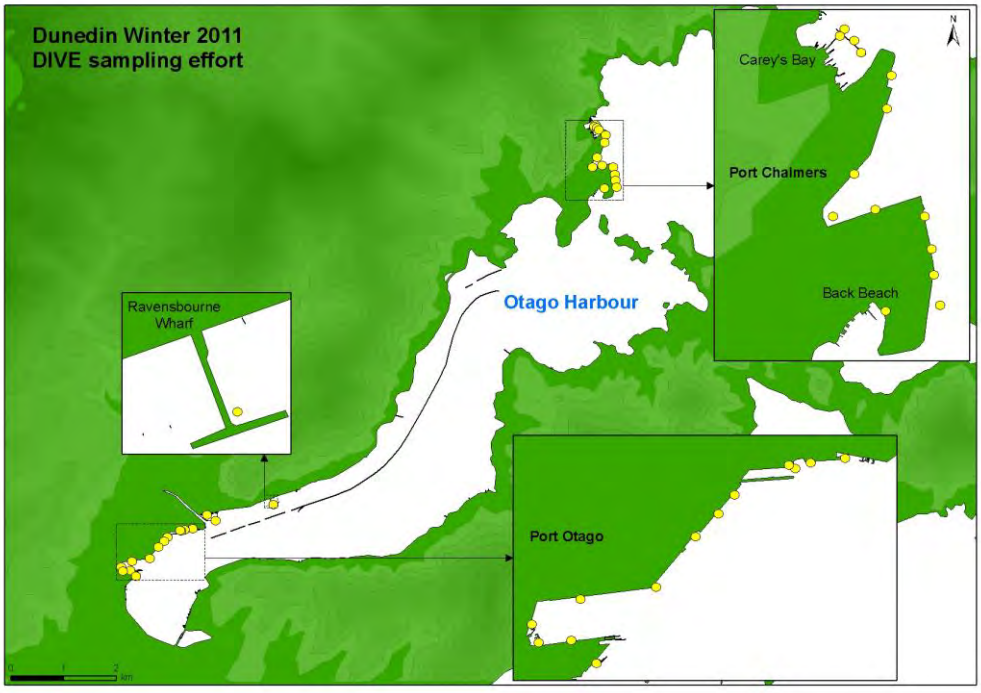
Crab condo locations



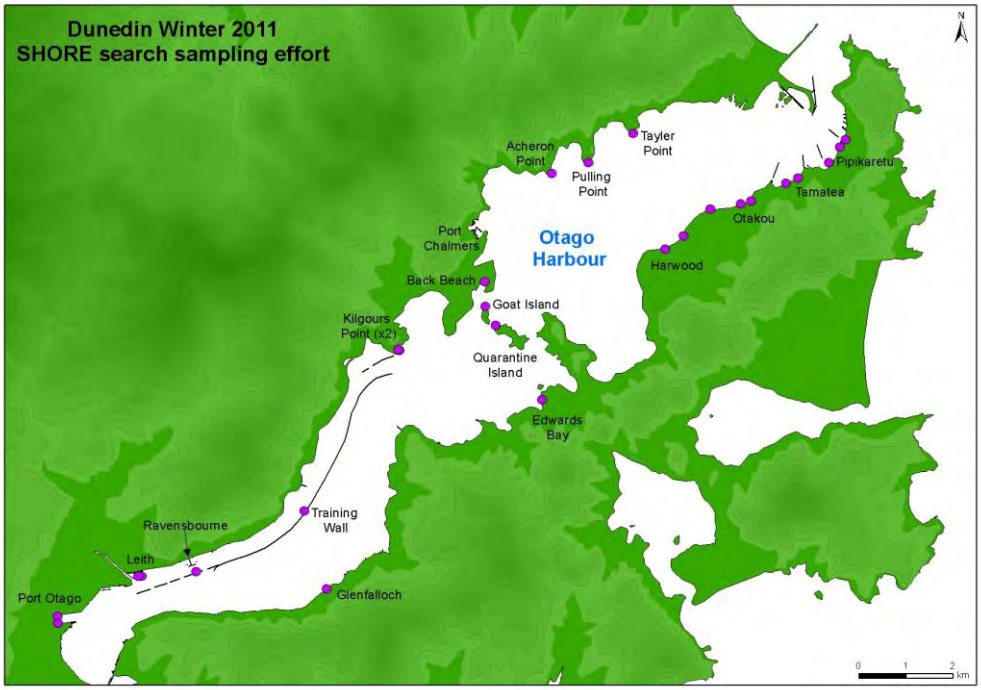
Sledding locations



Dive search locations

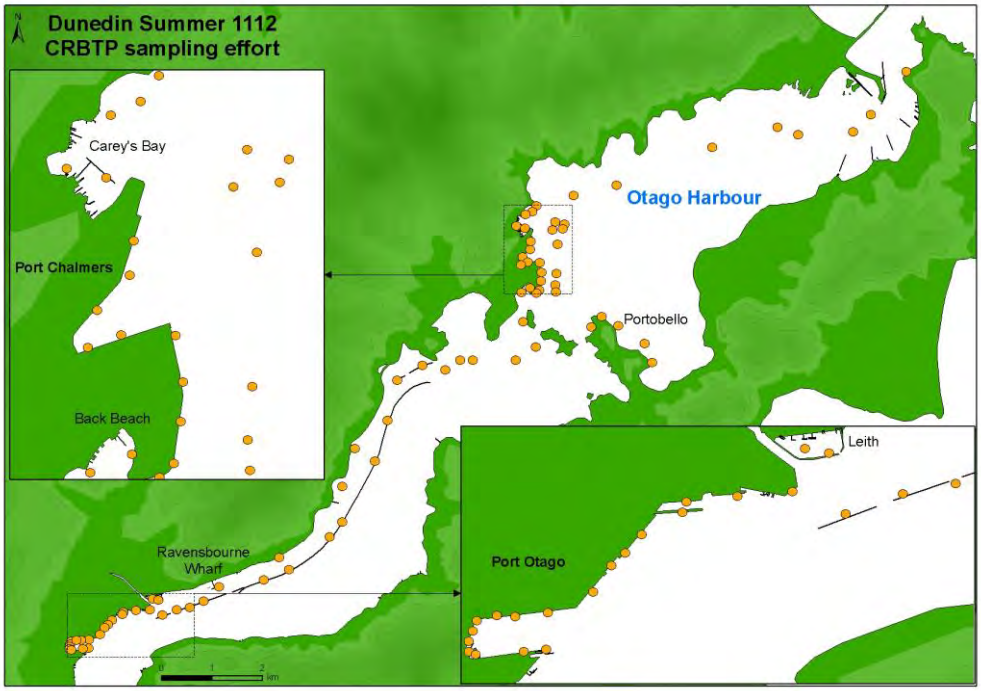


Shore search locations

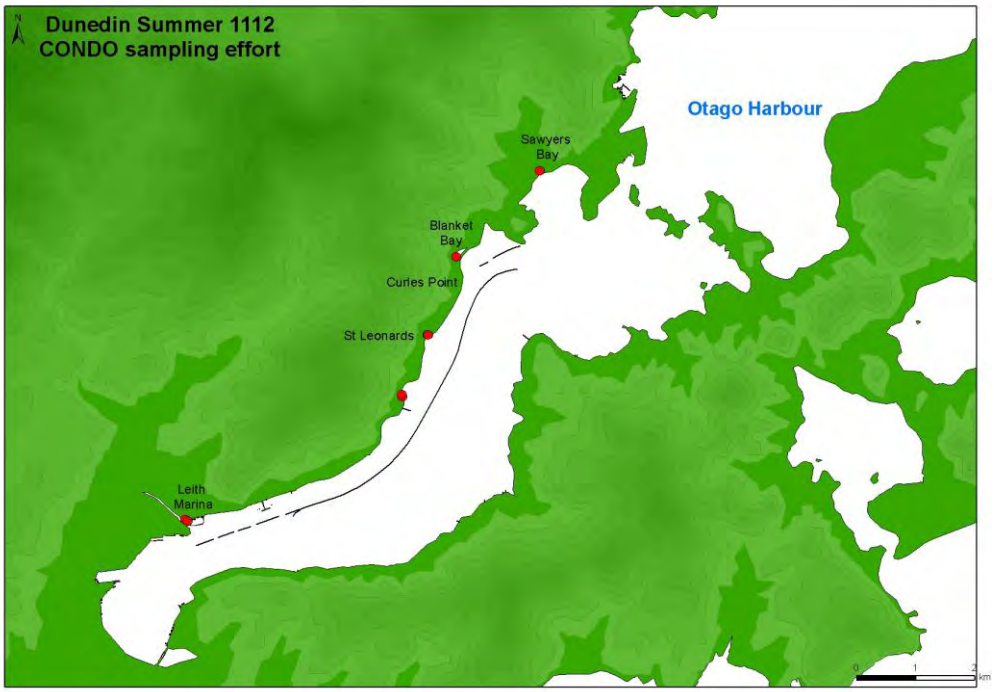


Summer 2011-2012

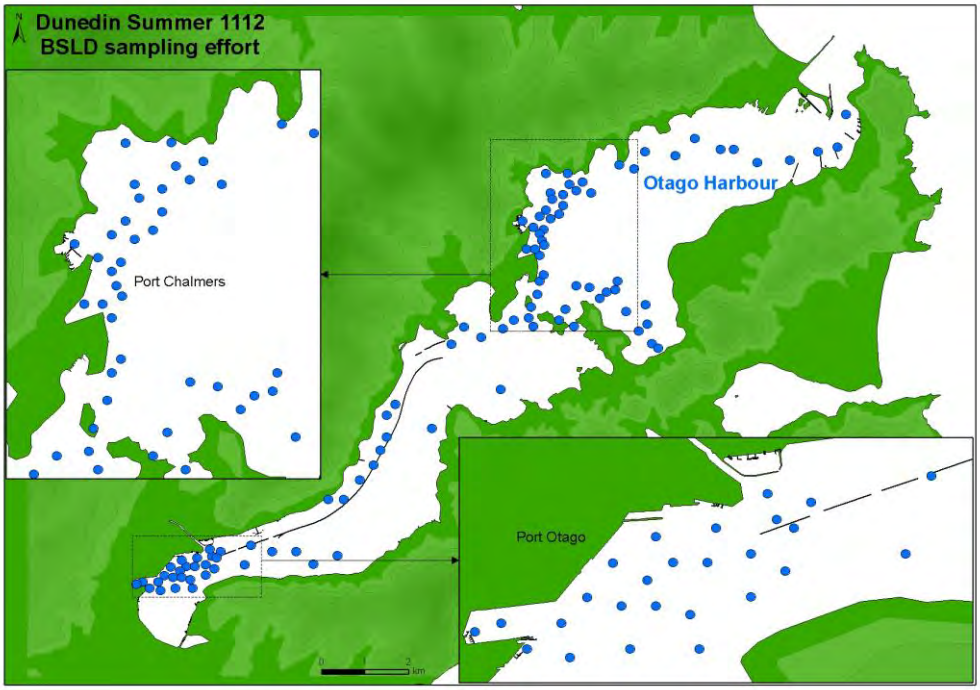
Crab (box) trapping locations



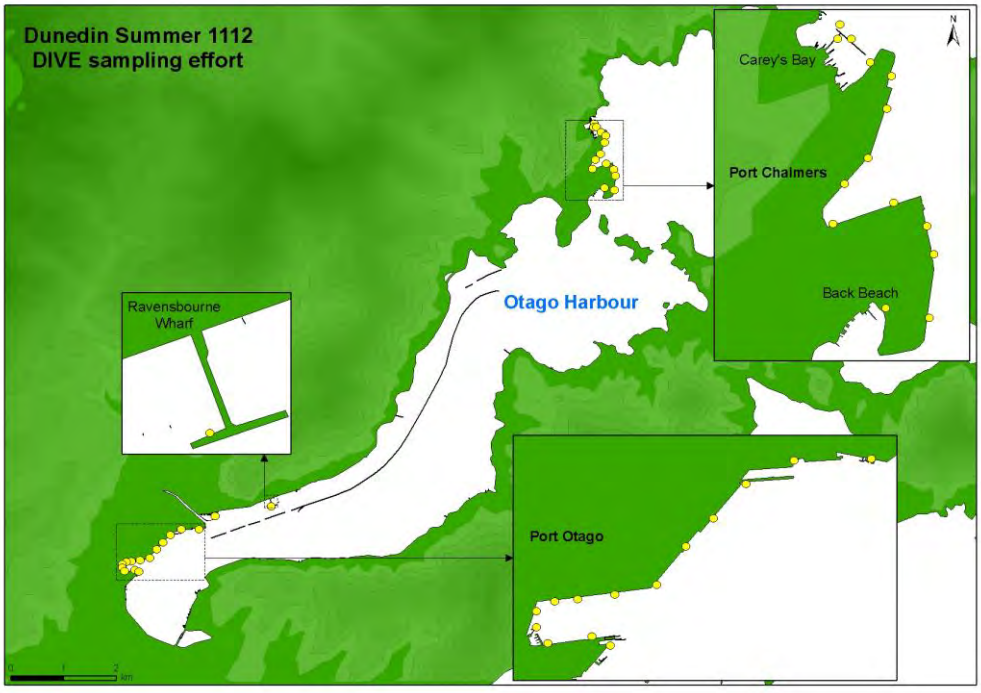
Crab condo locations



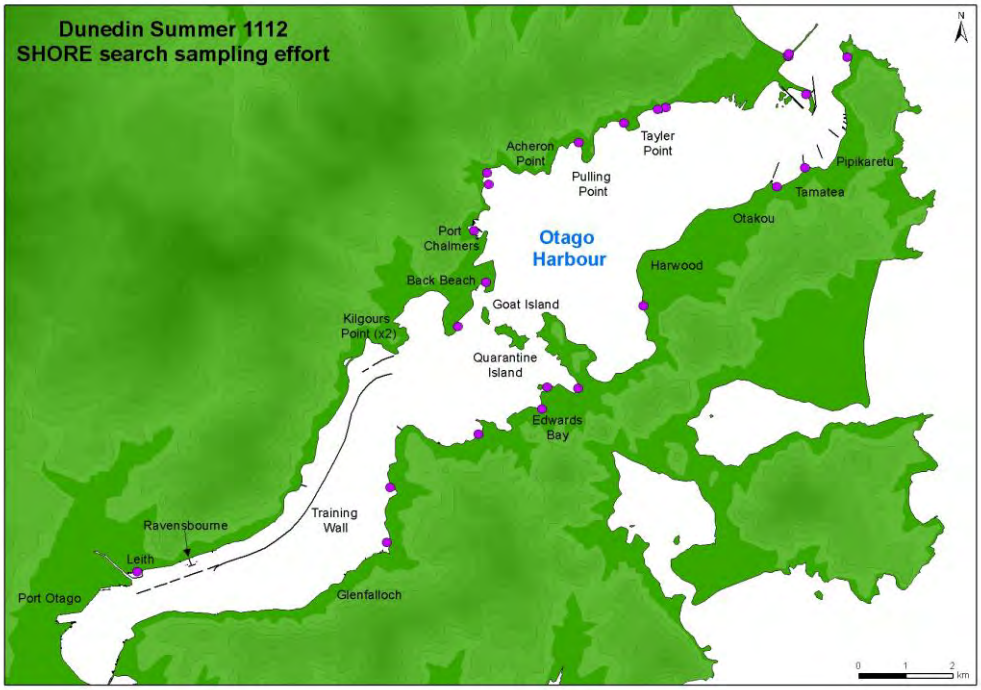
Sledding locations



Dive search locations



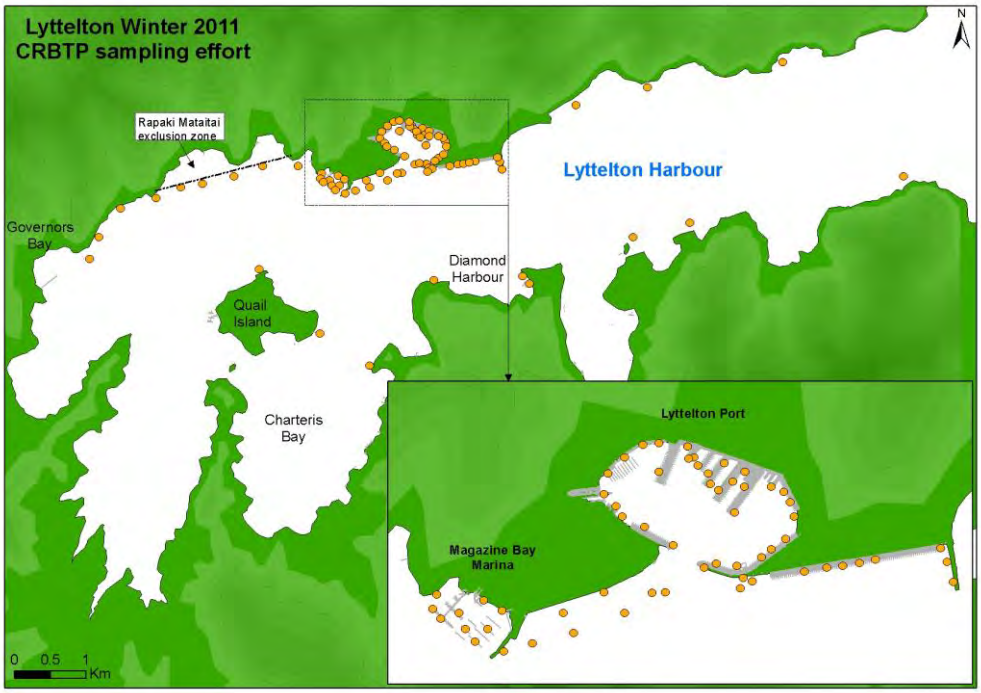
Shore search locations



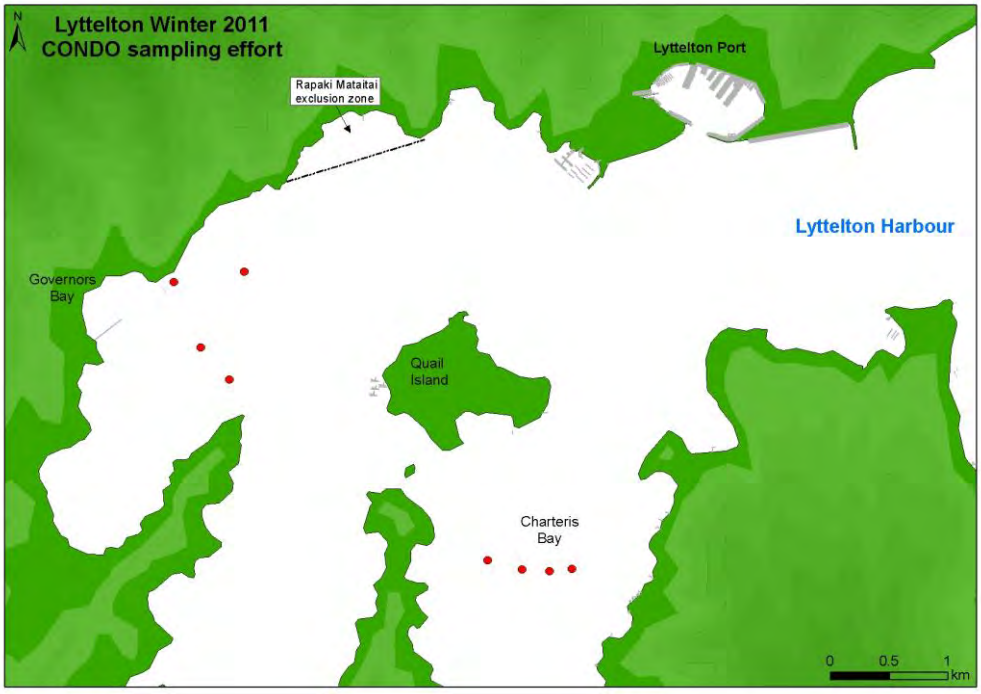
LYTTELTON HARBOUR

Winter 2011

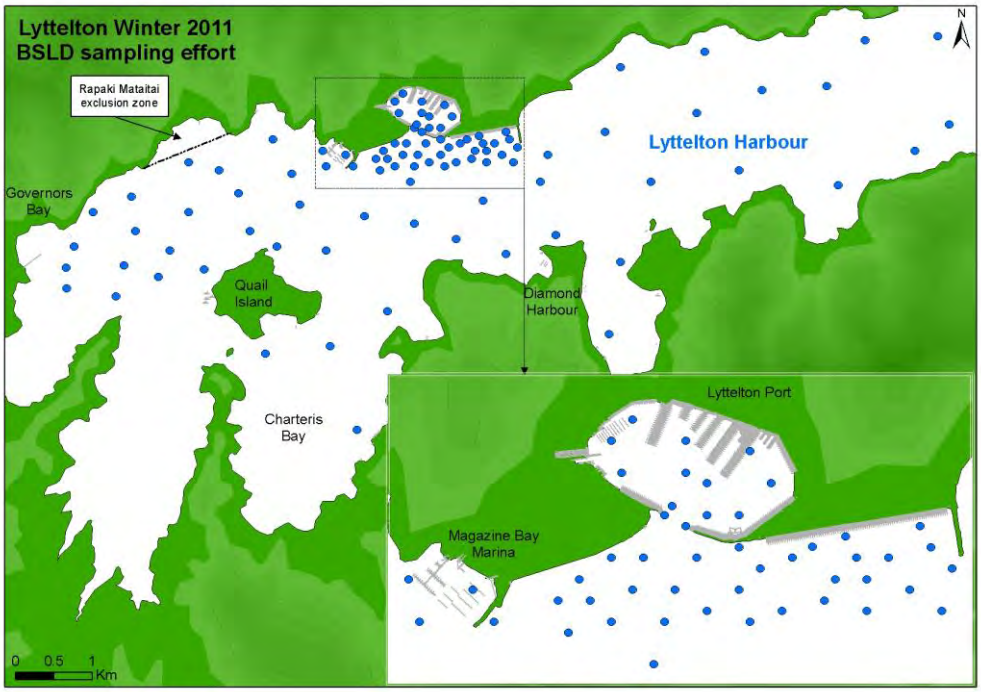
Crab (box) trapping locations



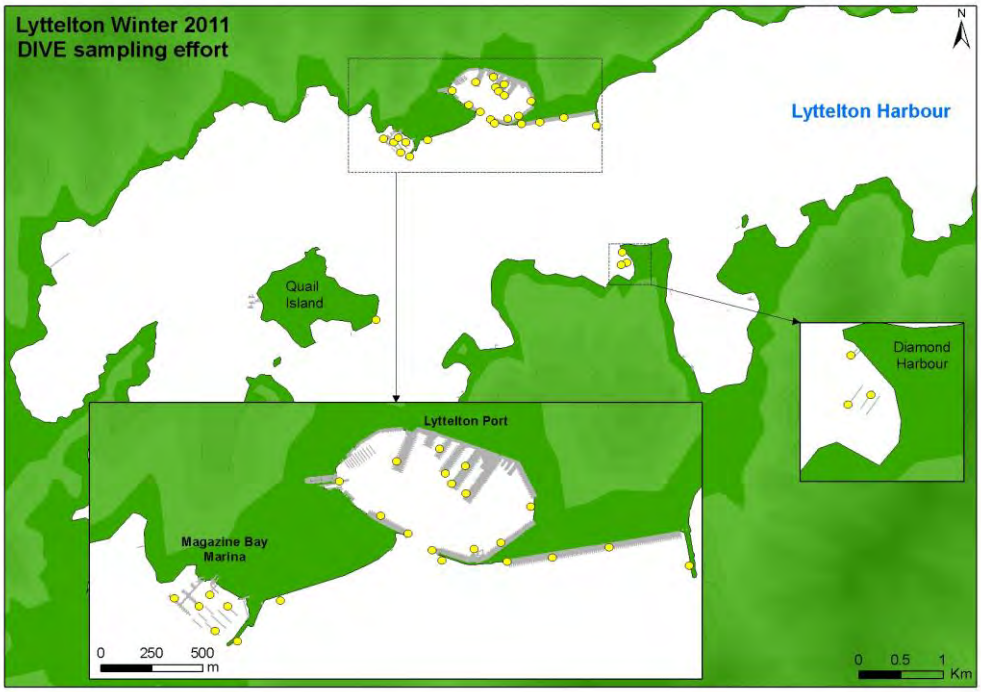
Crab condo locations



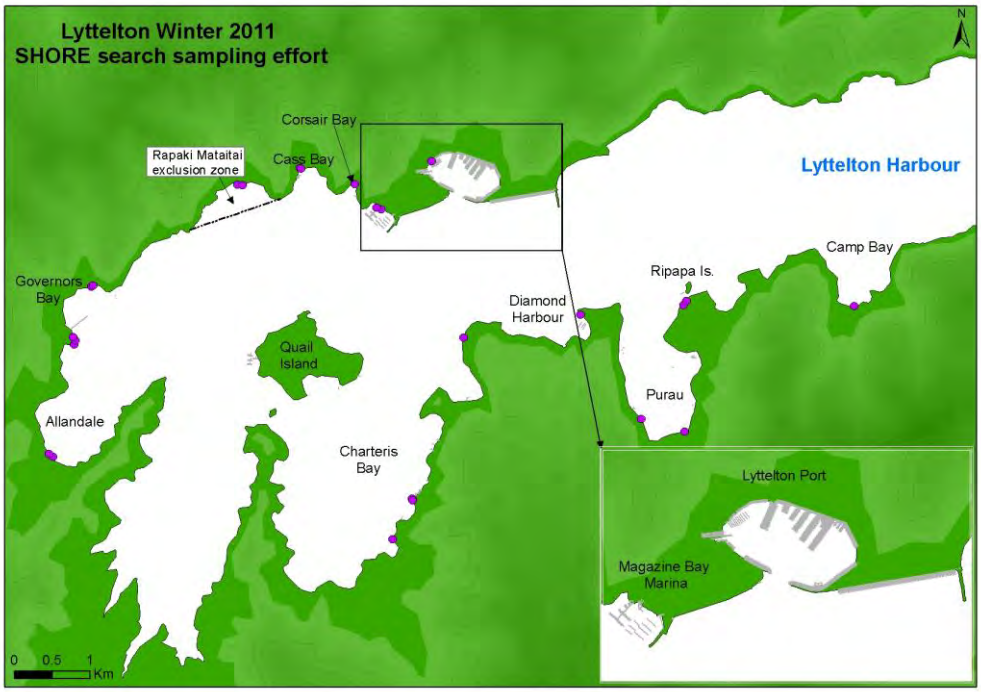
Sledding locations



Dive search locations

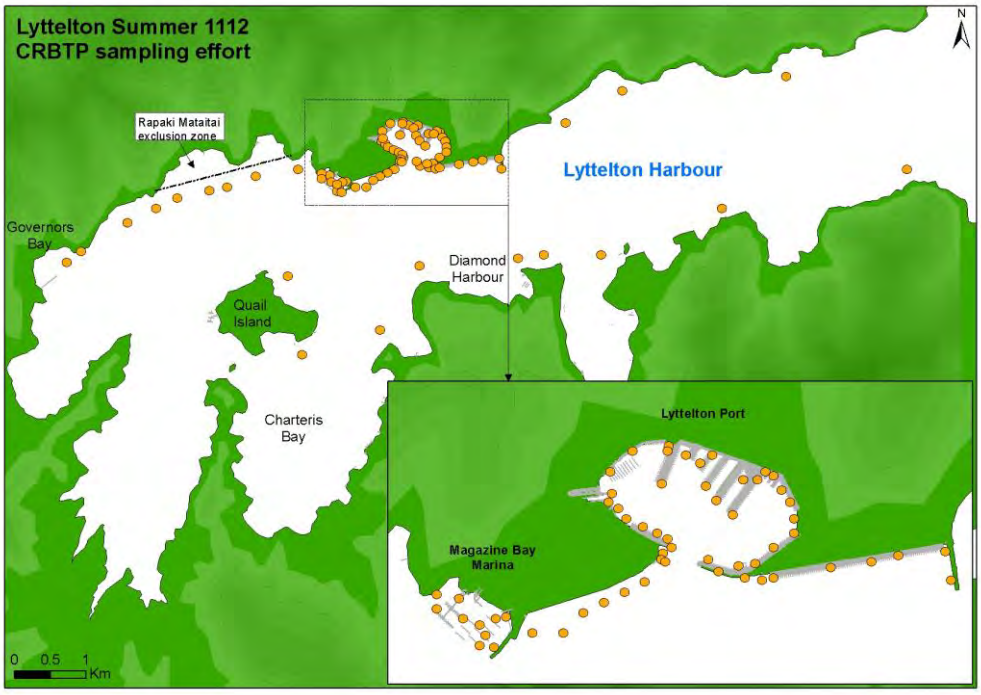


Shore search locations

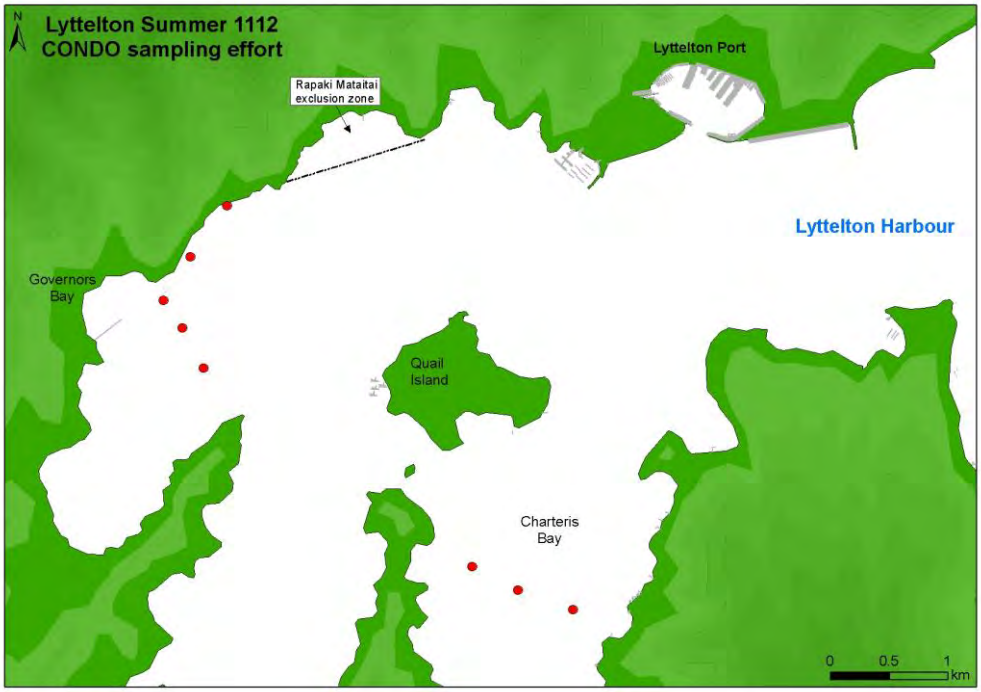


Summer 2011-2012

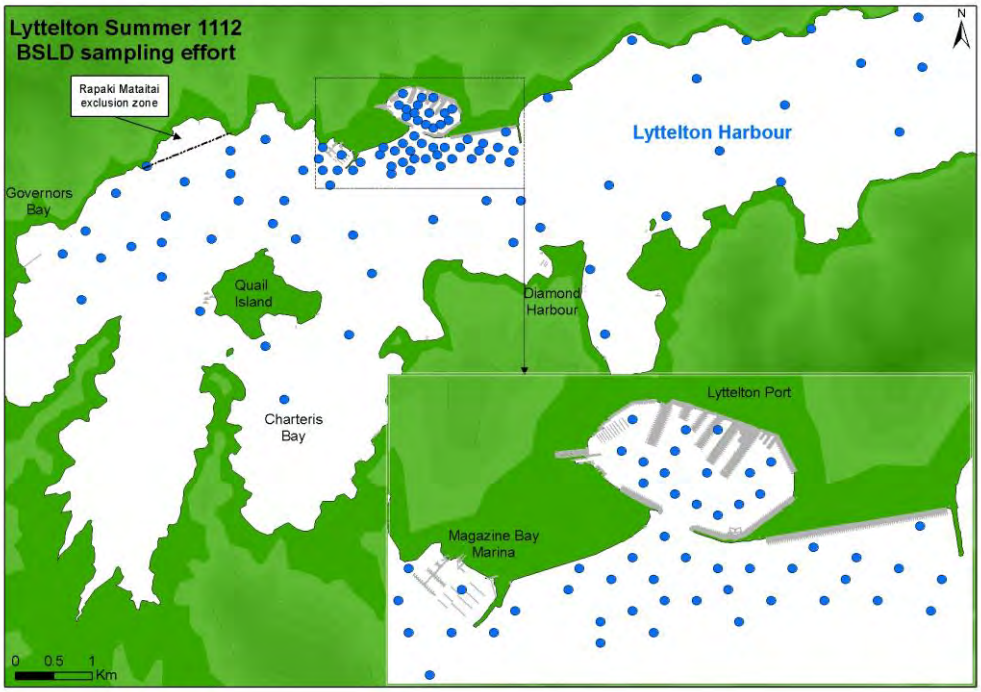
Crab (box) trapping locations



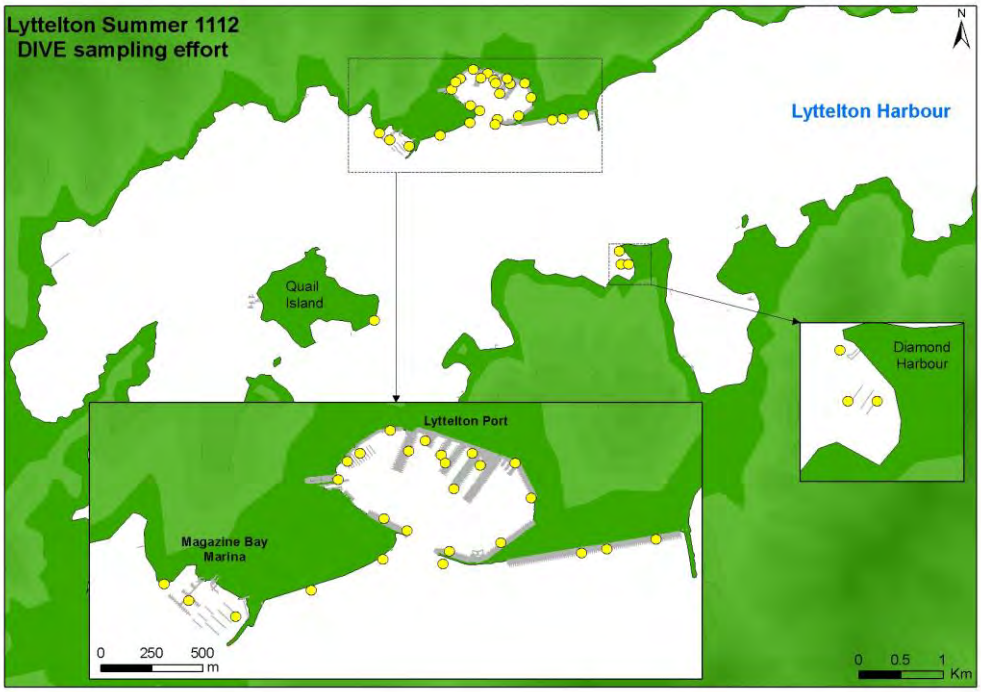
Crab condo locations



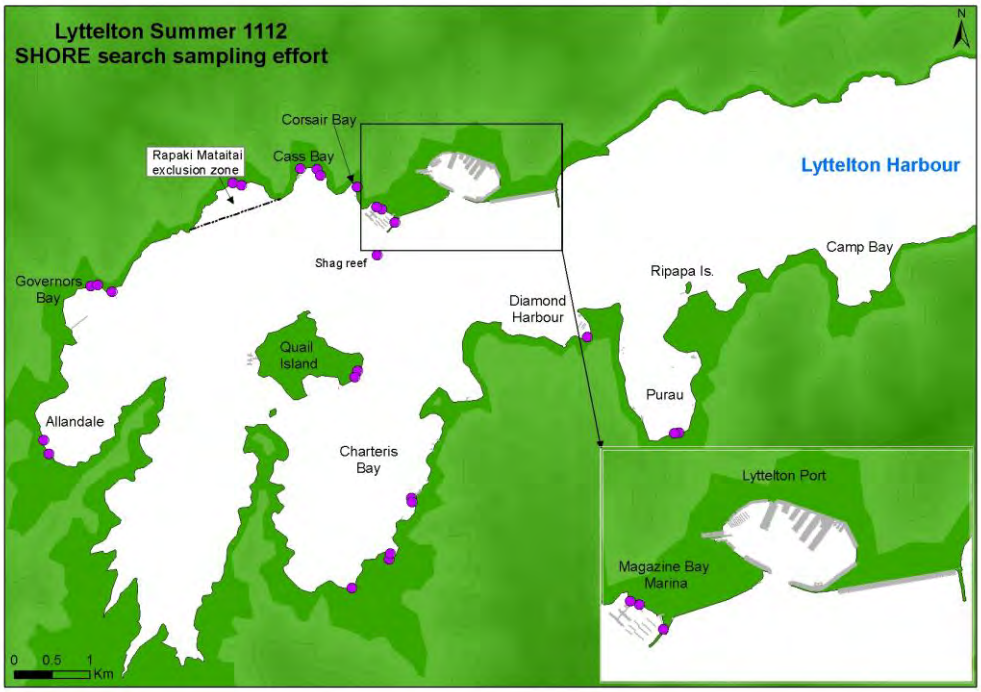
Sledding locations



Dive search locations



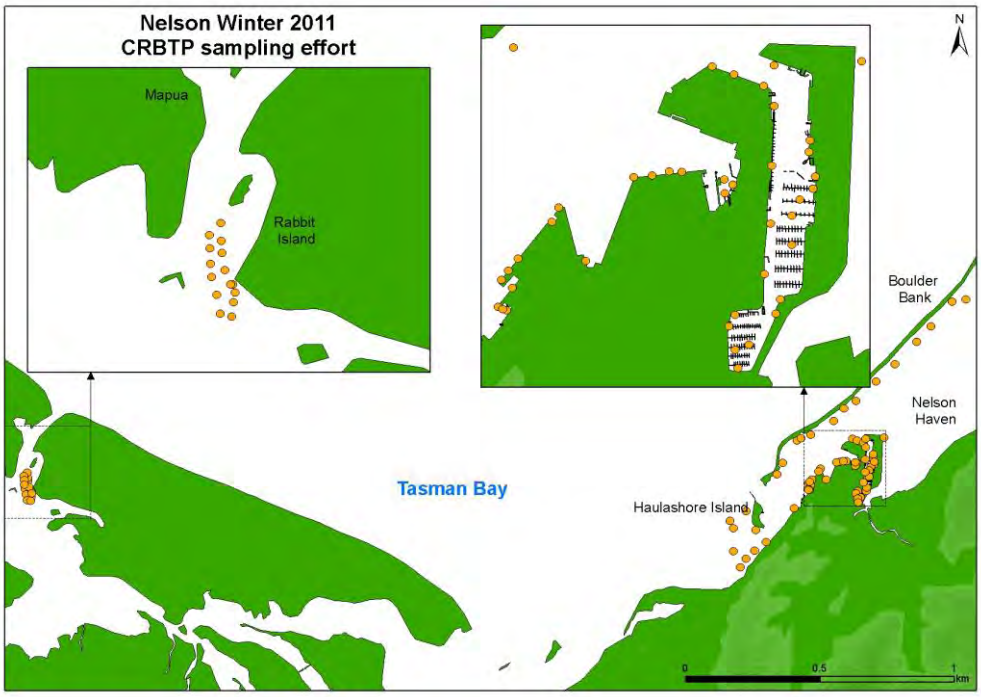
Shore search locations



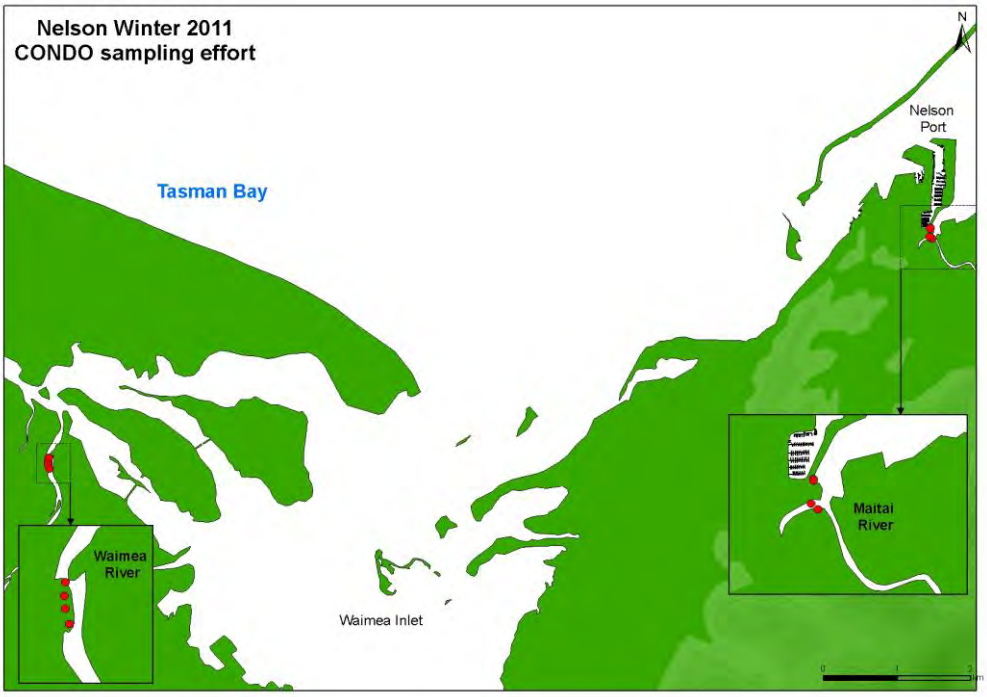
NELSON

Winter 2011

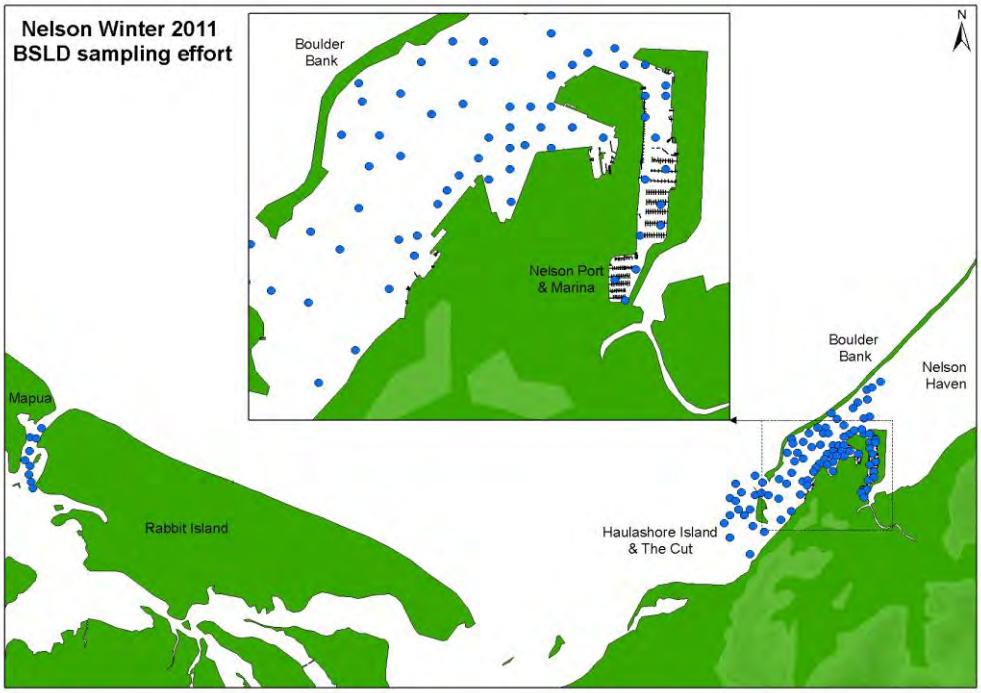
Crab (box) trapping locations



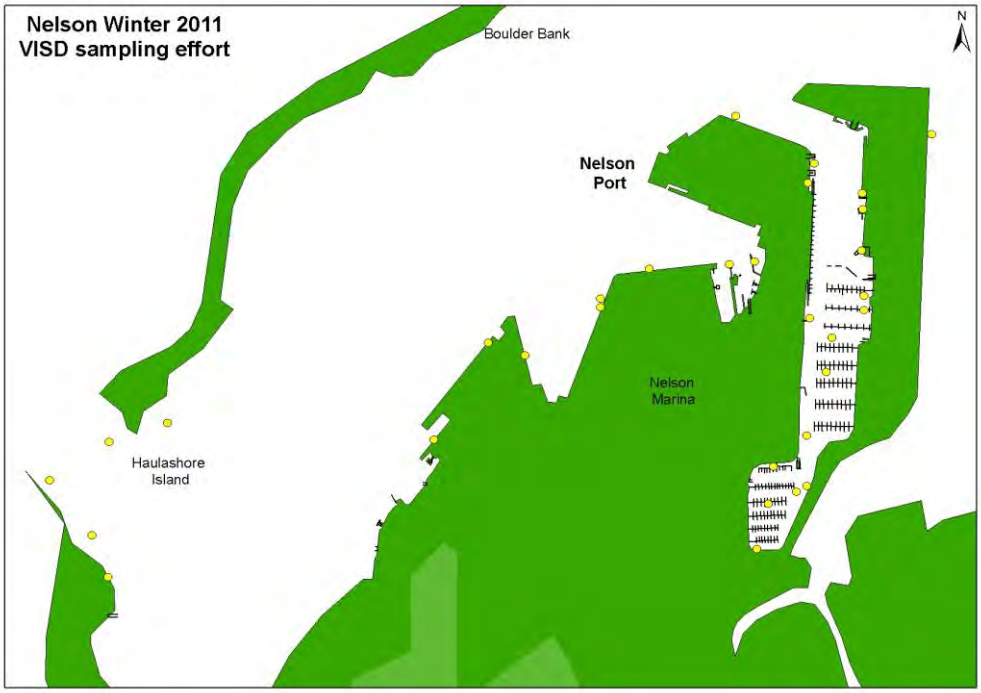
Crab condo locations



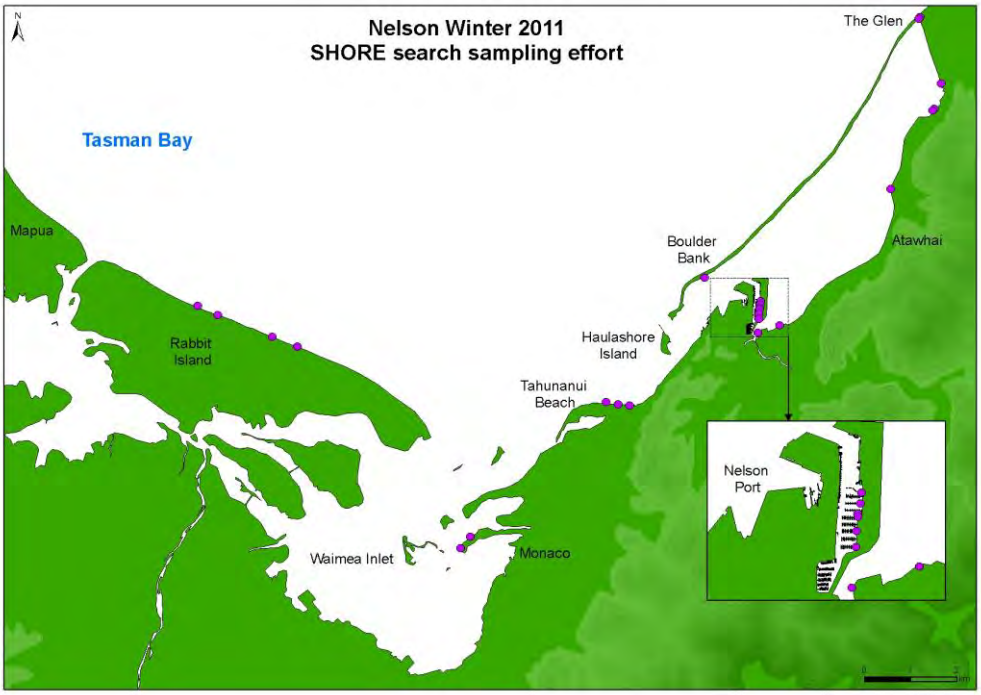
Sledding locations



Dive search locations

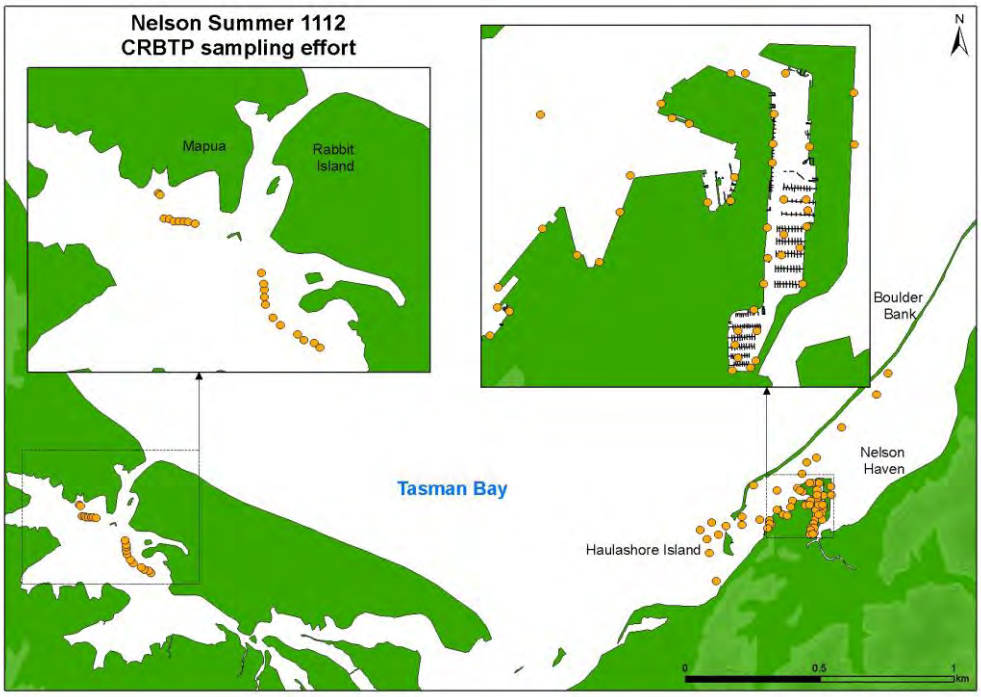


Shore search locations

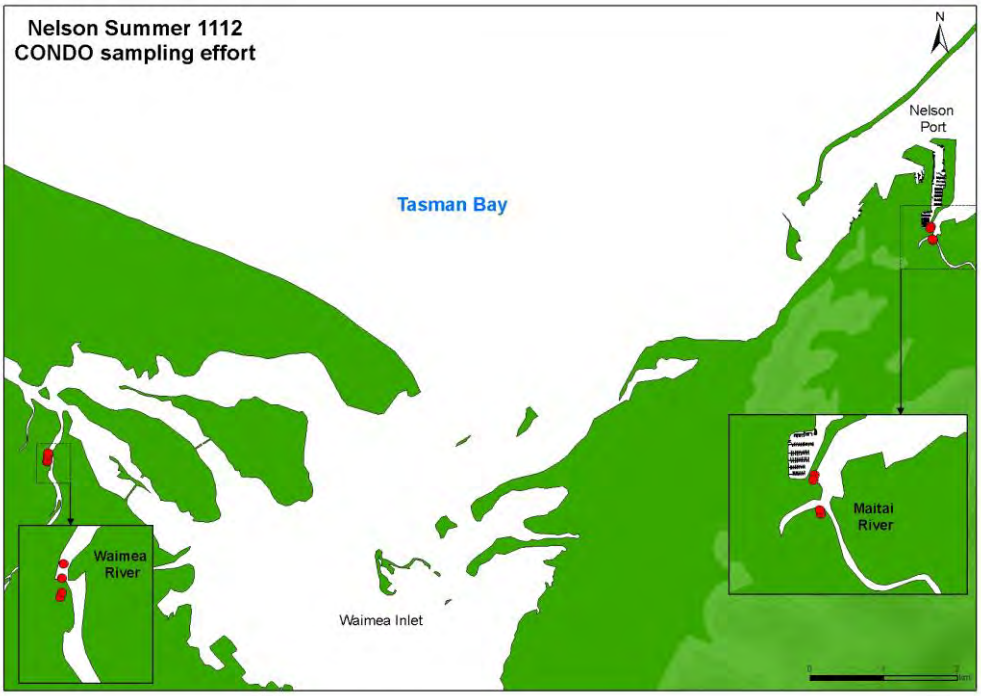


Summer 2011-2012

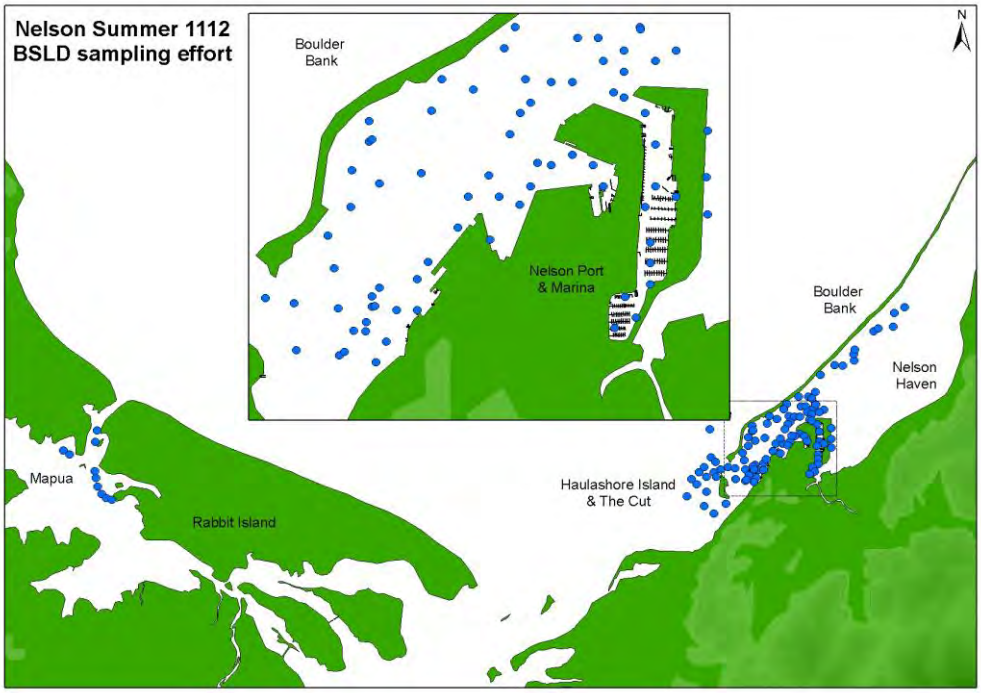
Crab (box) trapping locations



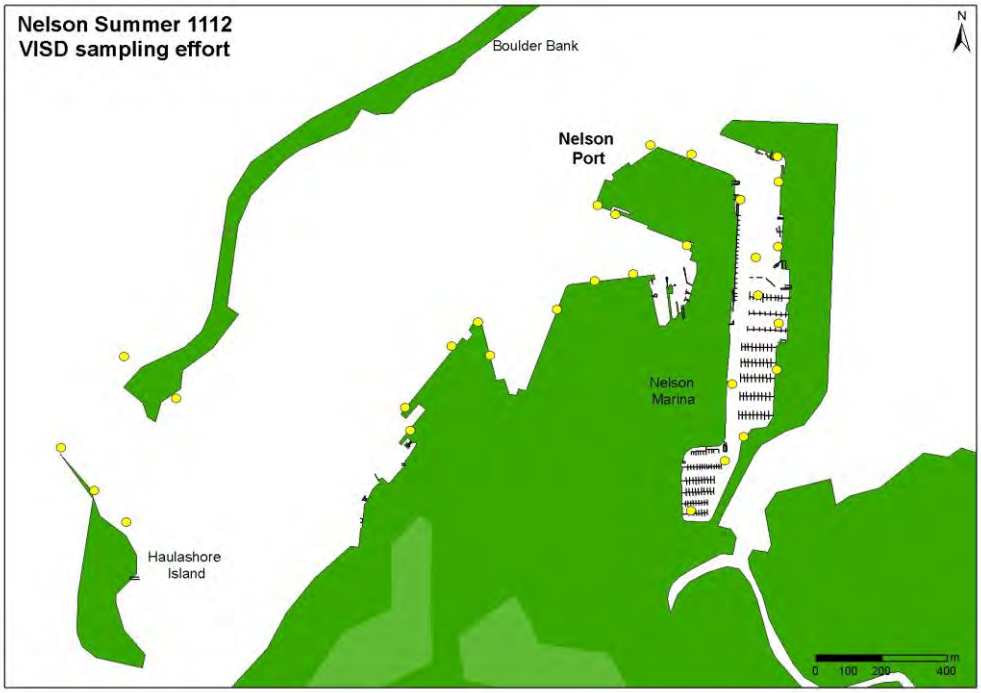
Crab condo locations



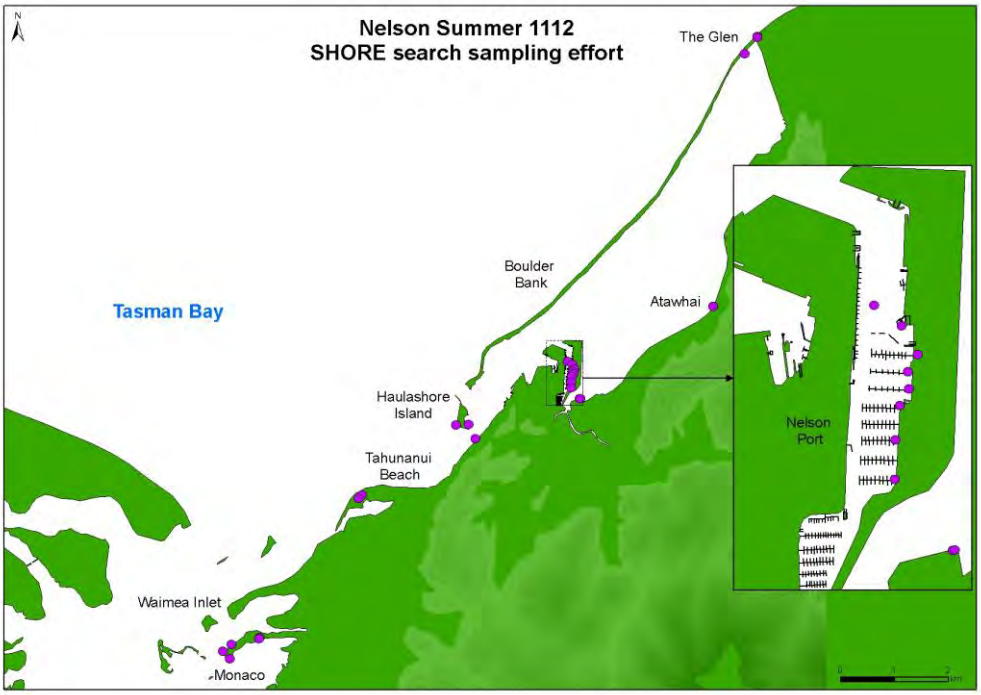
Sledding locations



Dive search locations



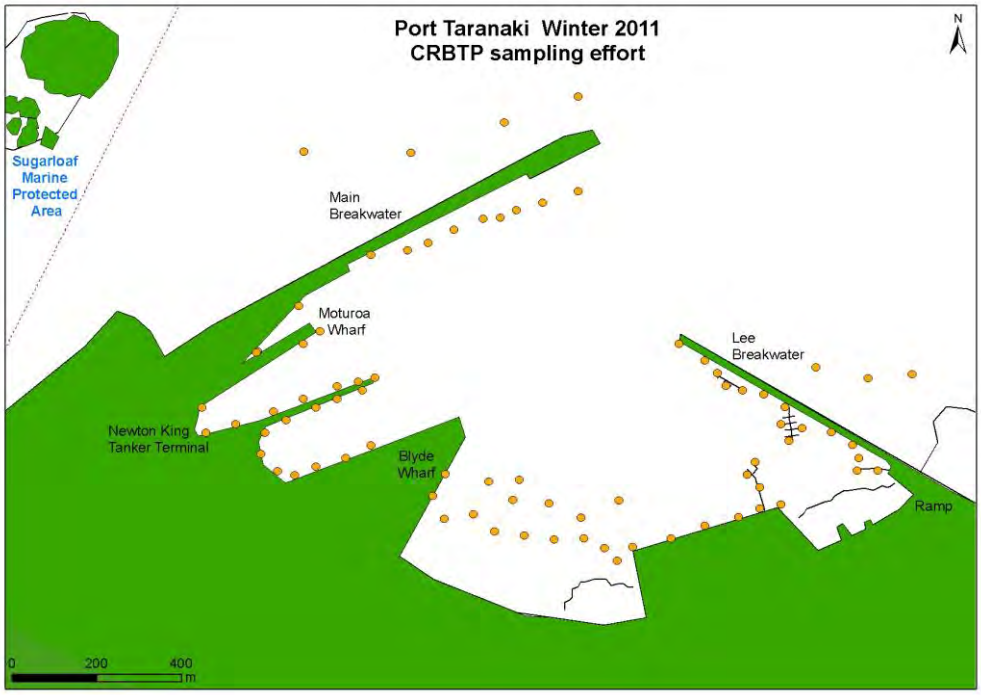
Shore search locations



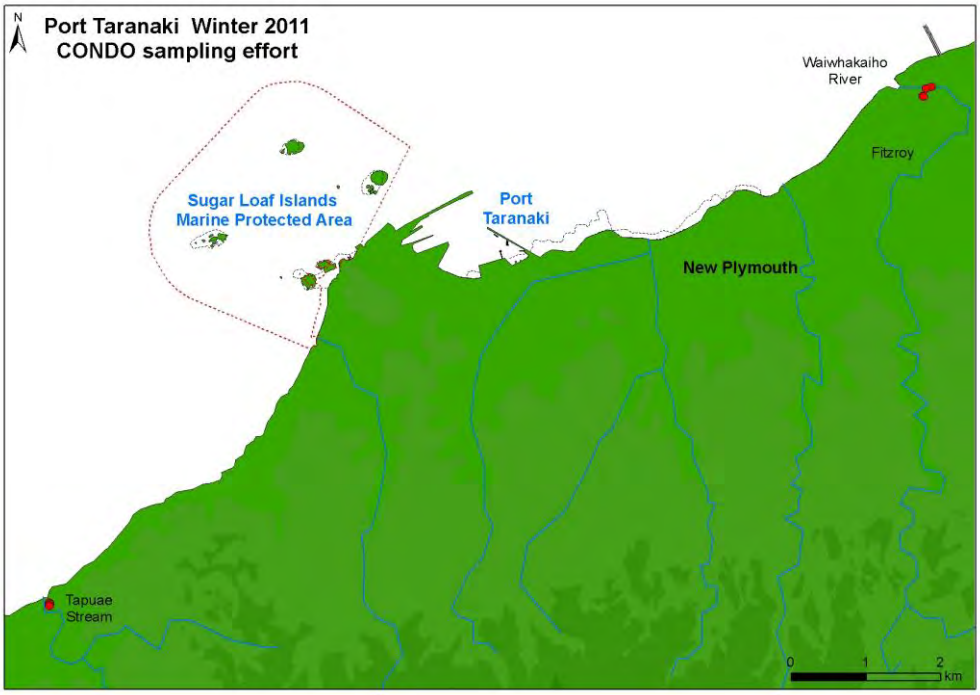
NEW PLYMOUTH

Winter 2011

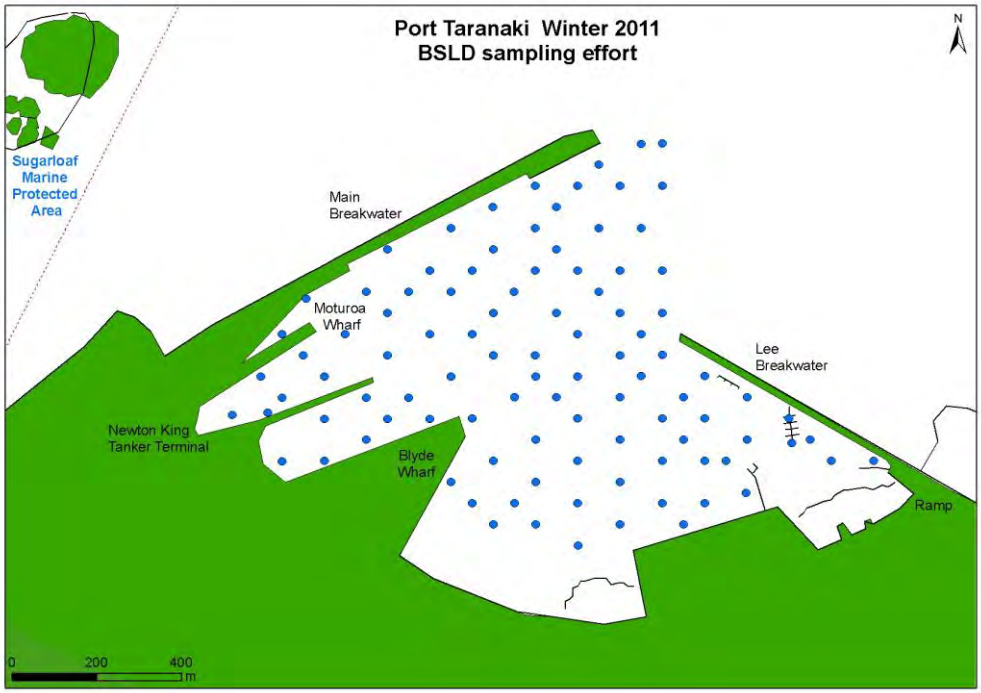
Crab (box) trapping locations



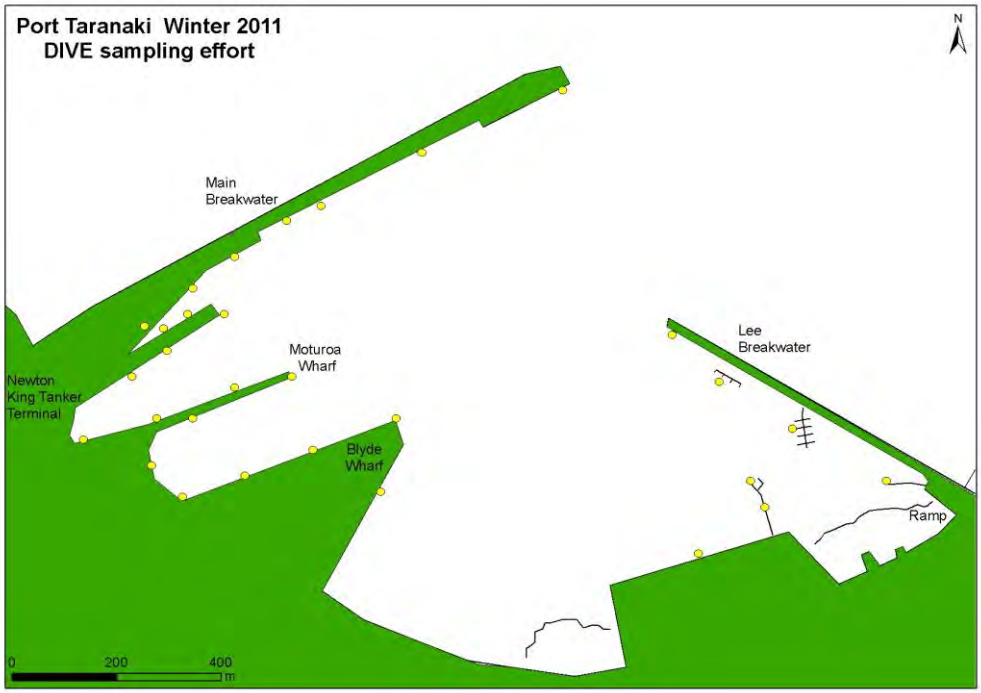
Crab condo locations



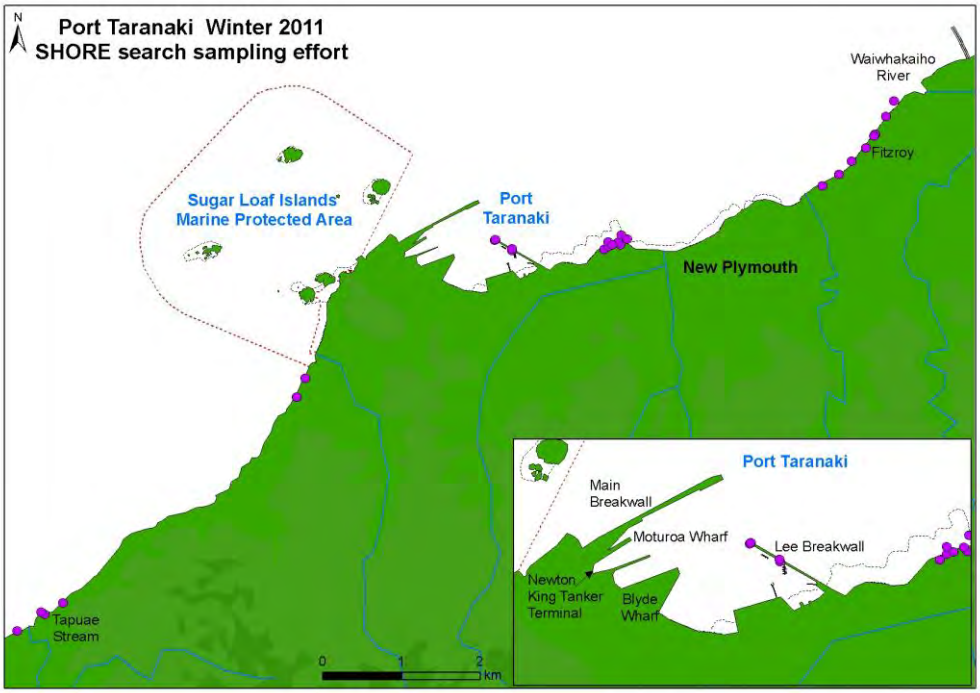
Sledding locations



Dive search locations

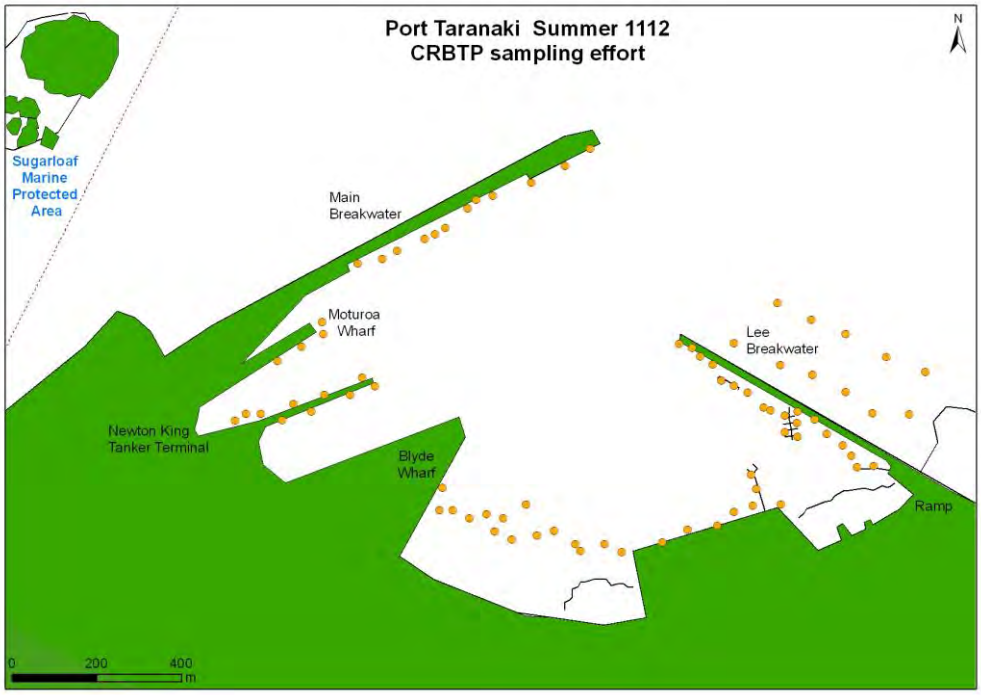


Shore search locations

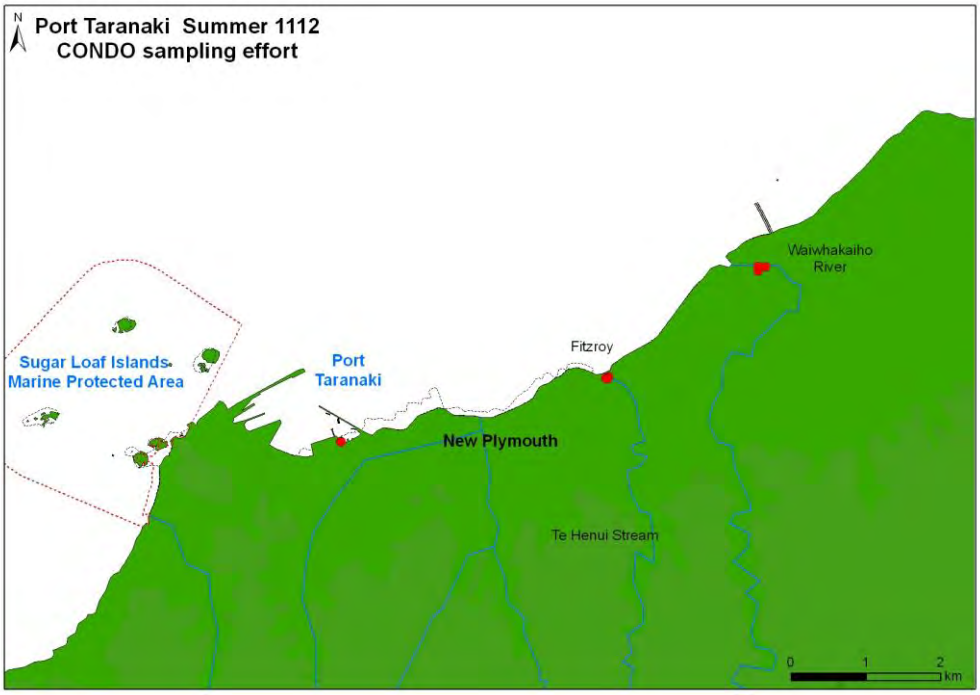


Summer 2011-2012

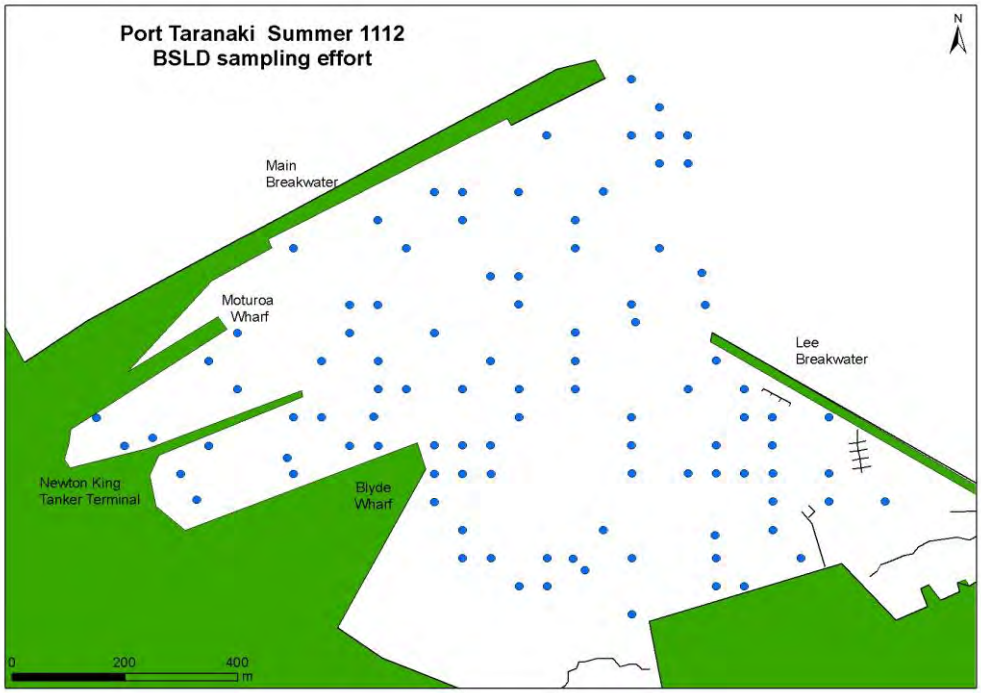
Crab (box) trapping locations



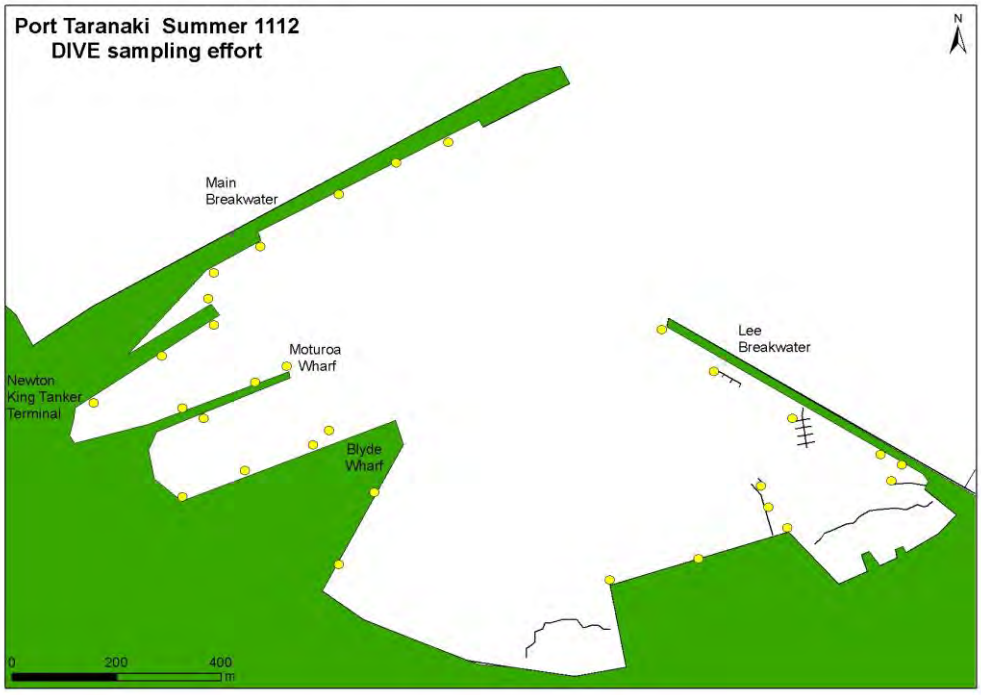
Crab condo locations



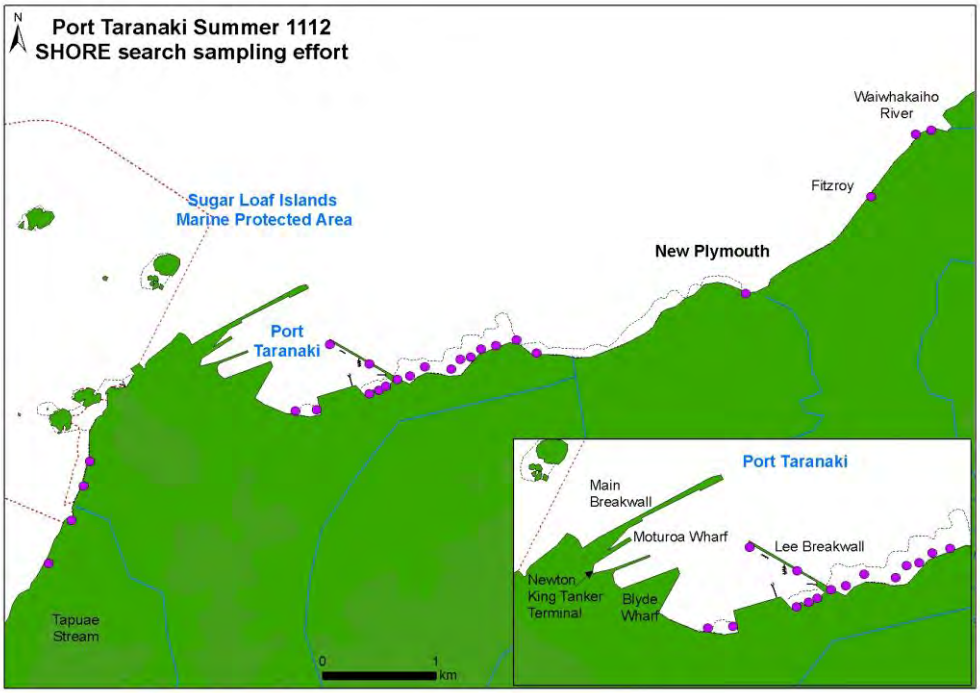
Sledding locations



Dive search locations



Shore search locations

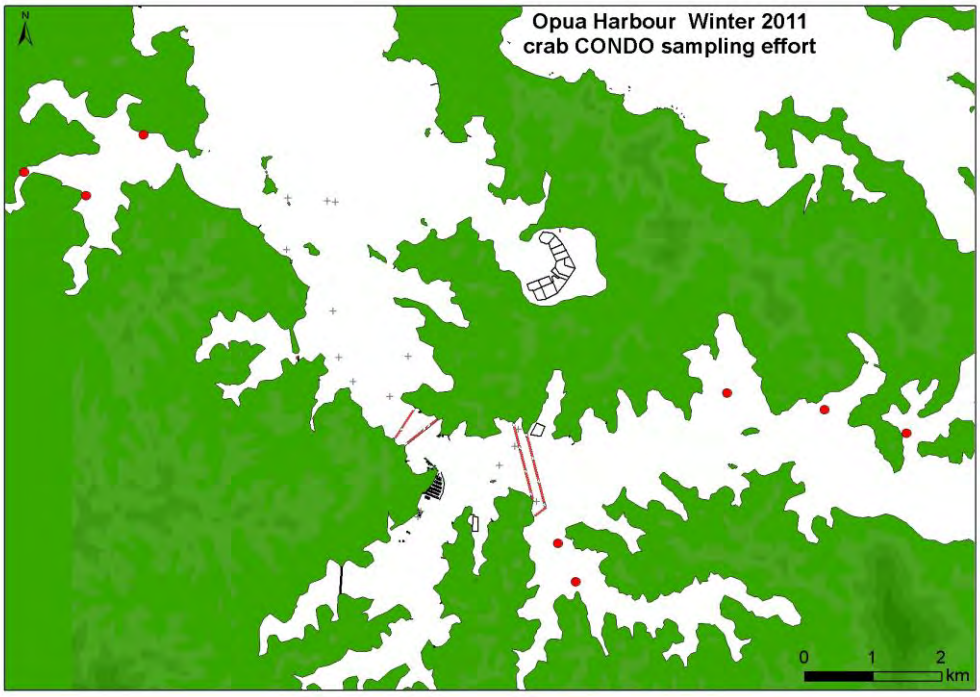


OPUA

Winter 2011

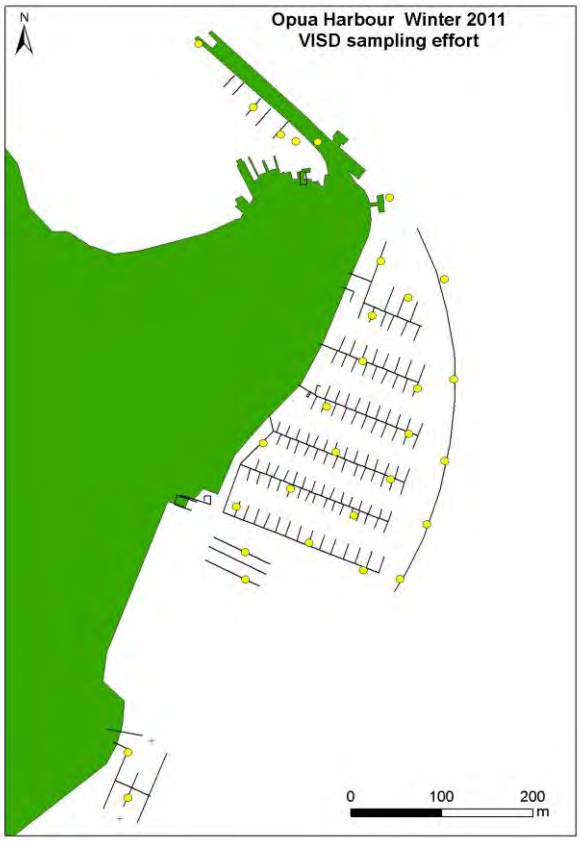
Crab (box) trapping locations

Crab condo locations

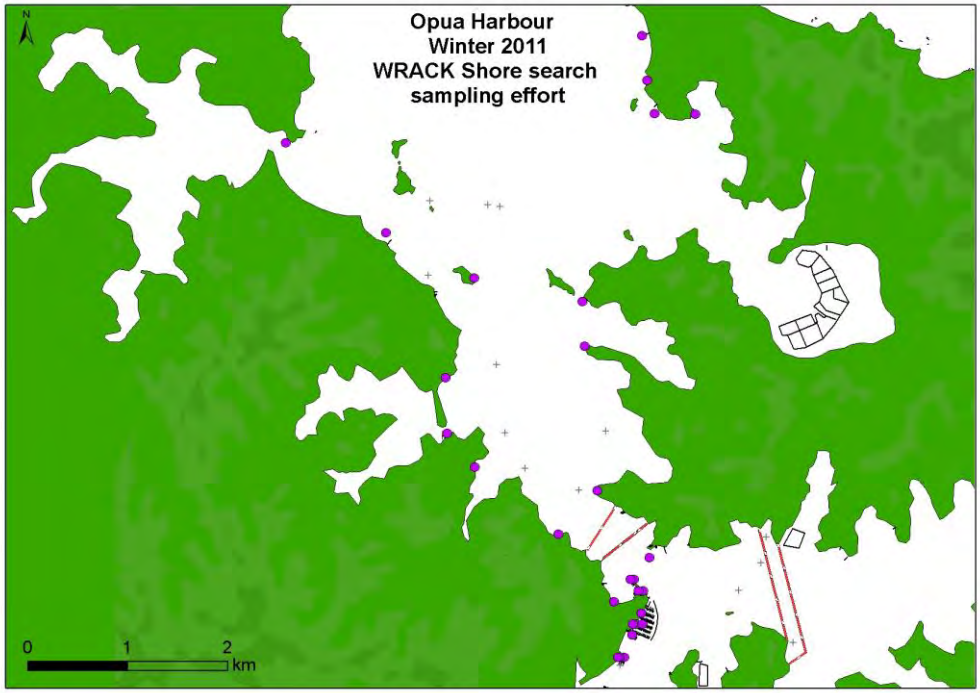


Sledding locations

Dive search locations



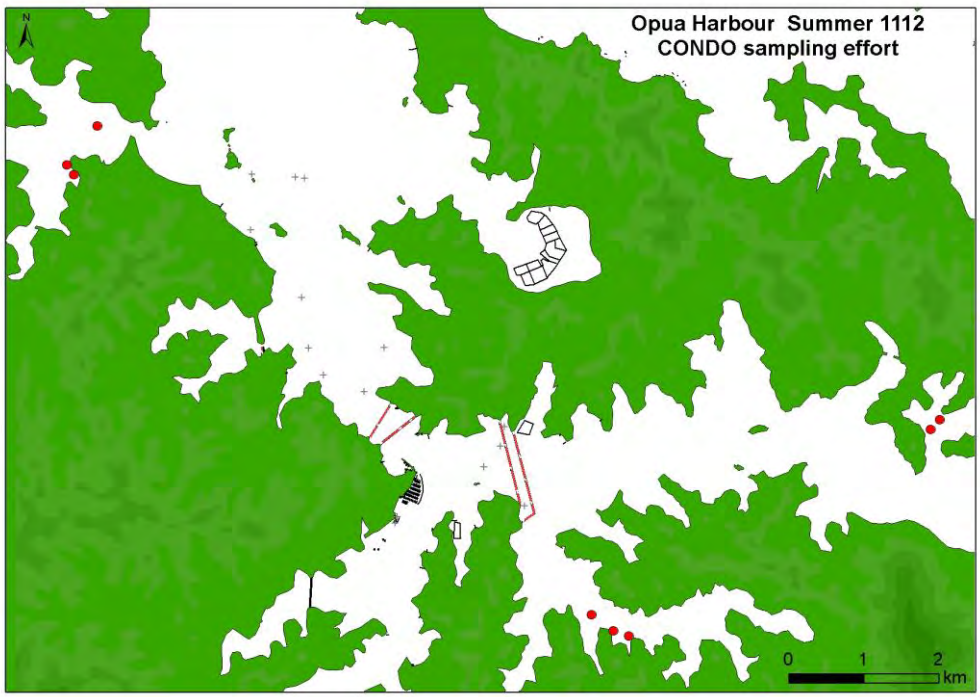
Shore search locations



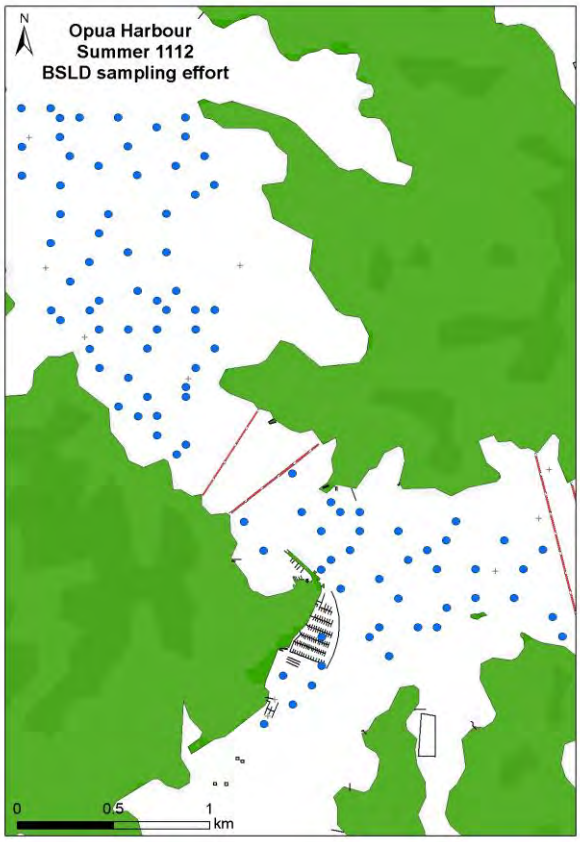
Summer 2011-2012

Crab (box) trapping locations

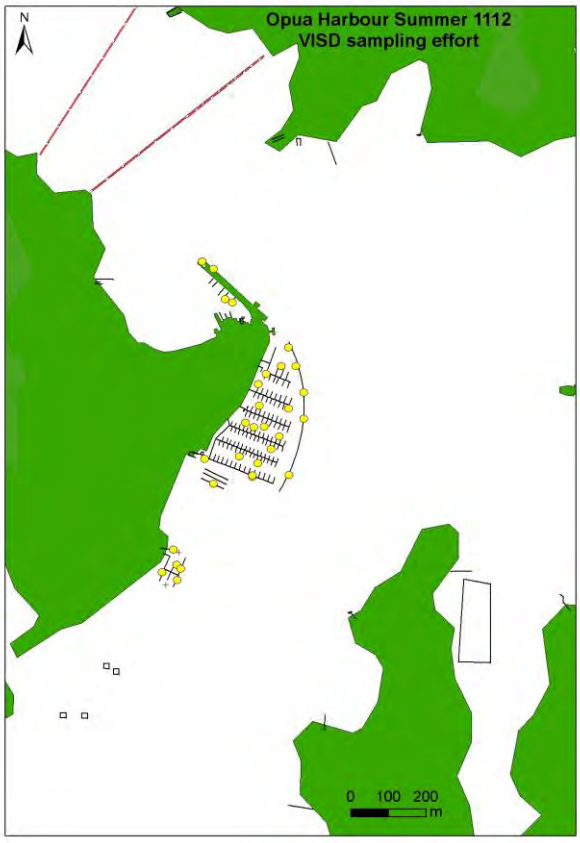
Crab condo locations



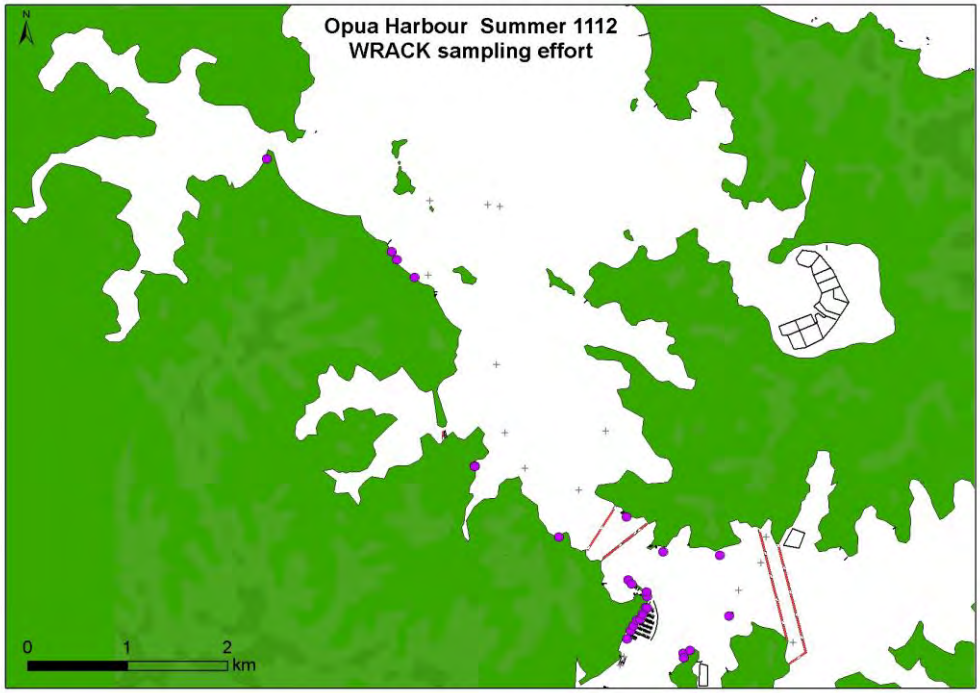
Sledding locations



Dive search locations



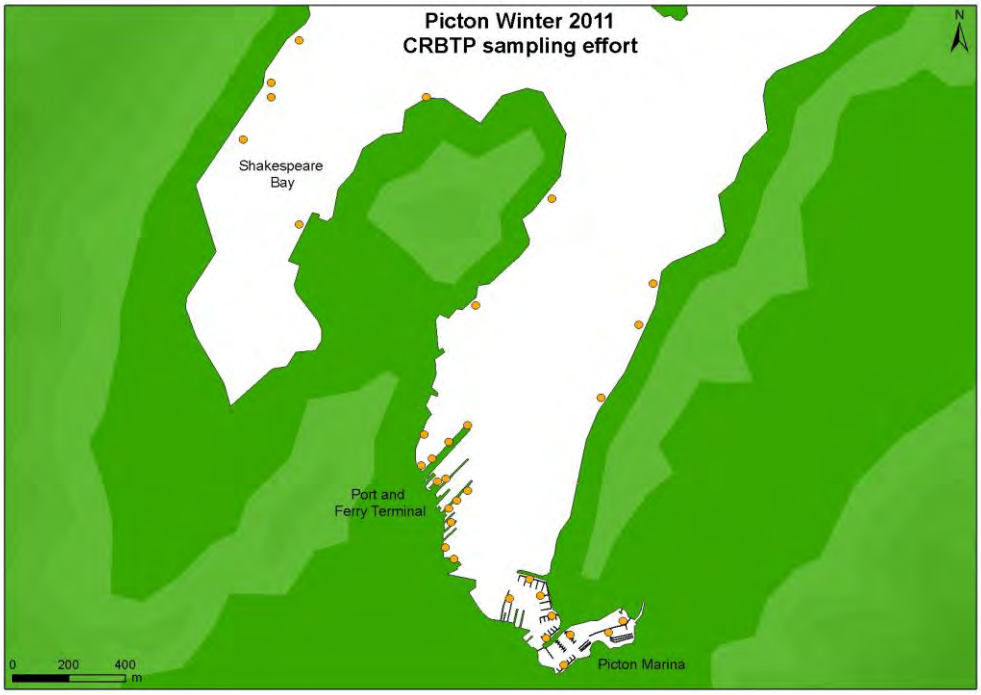
Shore search locations



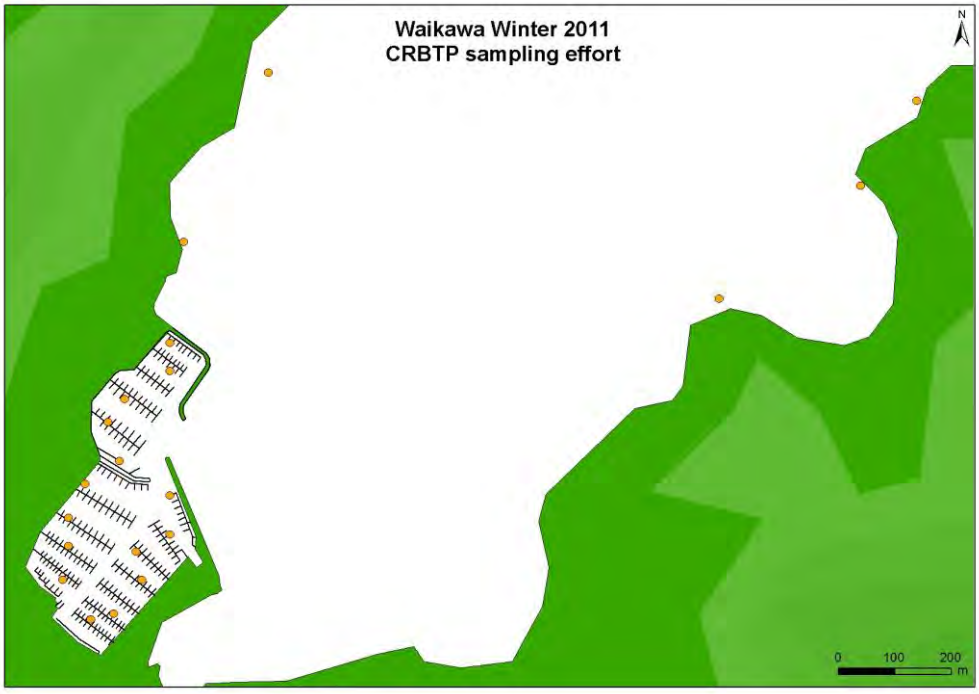
PICTON / HAVELOCK

Winter 2011

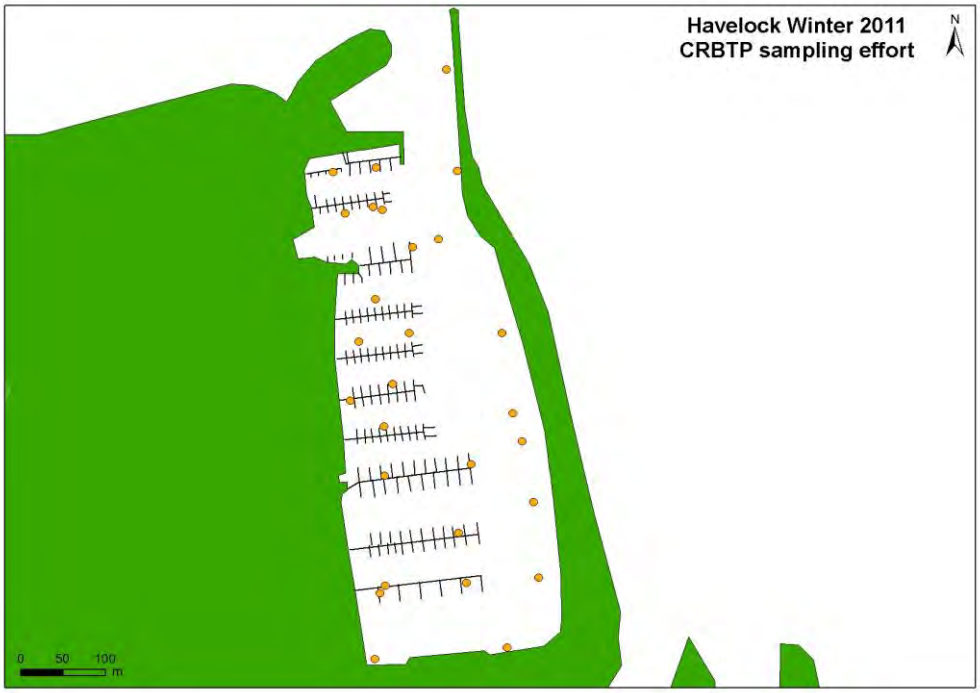
Crab (box) trapping locations (Picton Harbour)



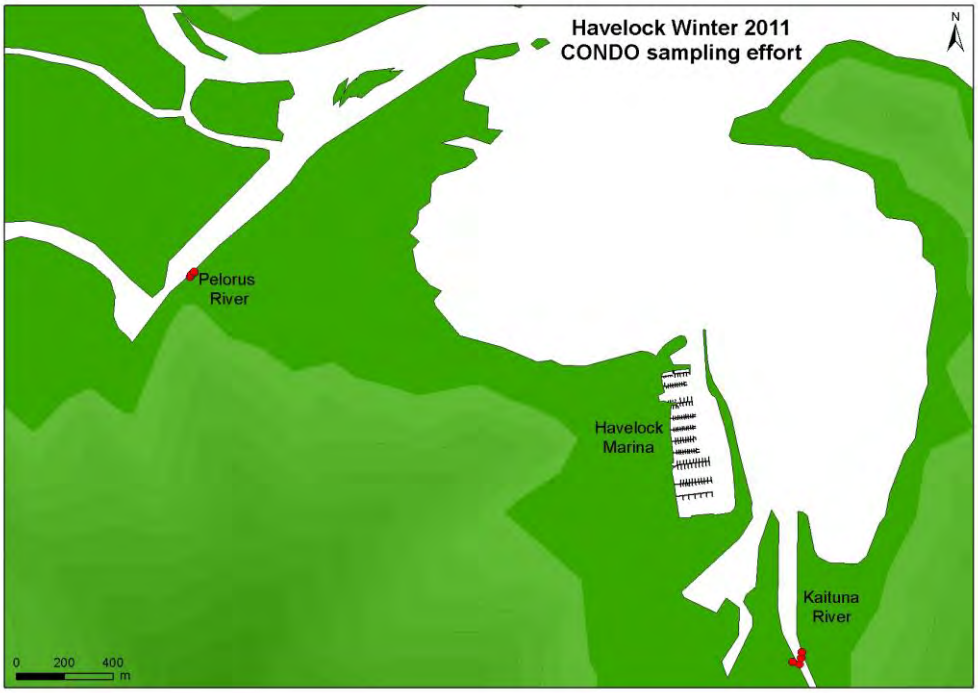
Crab (box) trapping locations (Waikawa Marina)



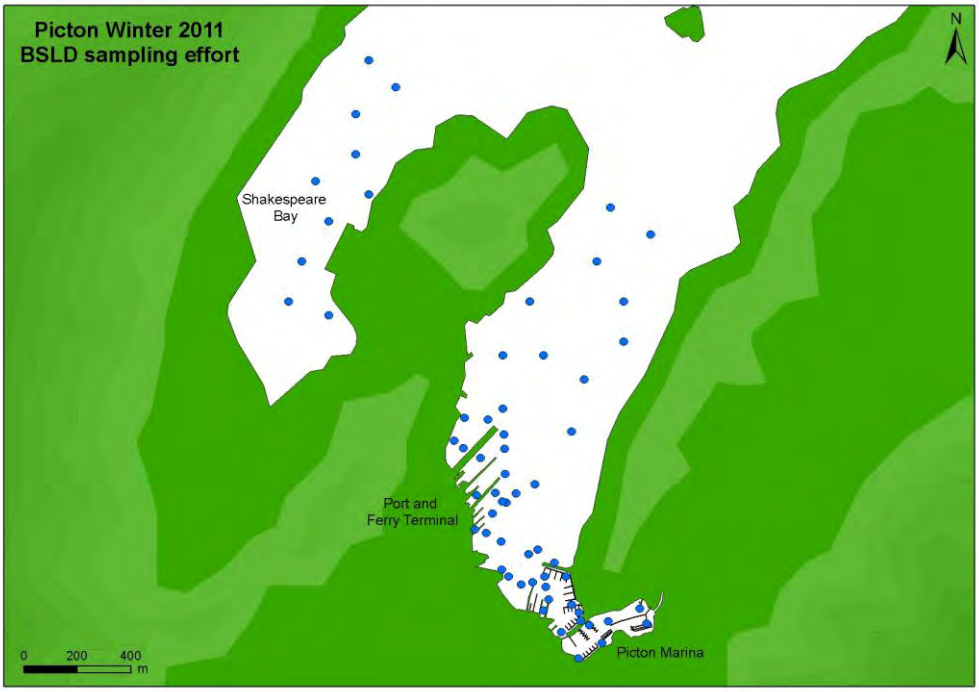
Crab (box) trapping locations (Havelock Harbour)



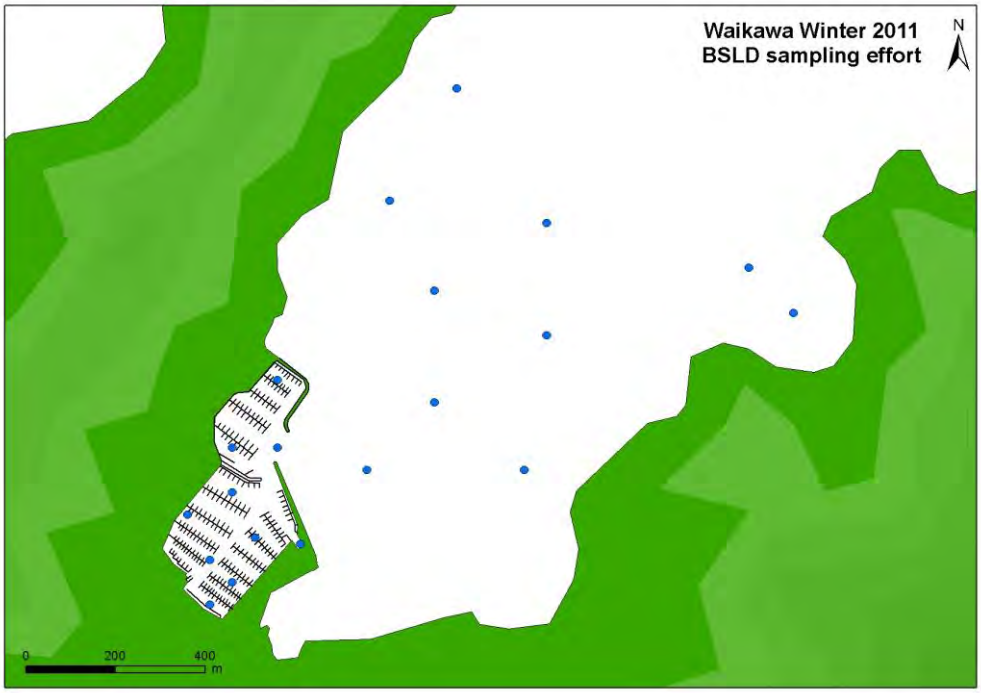
Crab condo locations (Havelock Harbour)



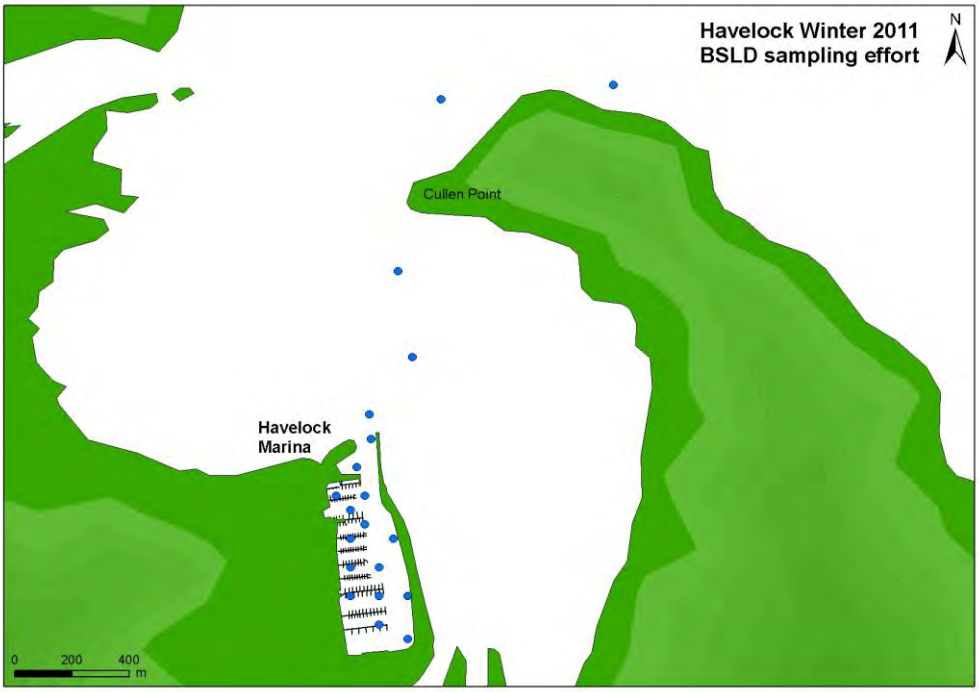
Sledding locations (Picton Harbour)



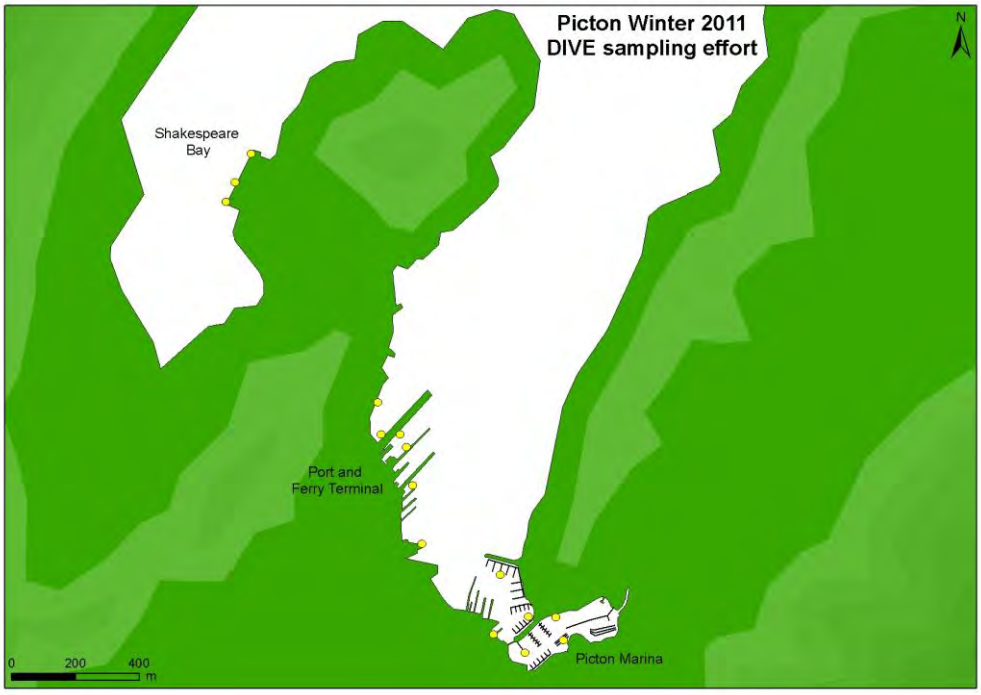
Sledding locations (Waikawa Marina)



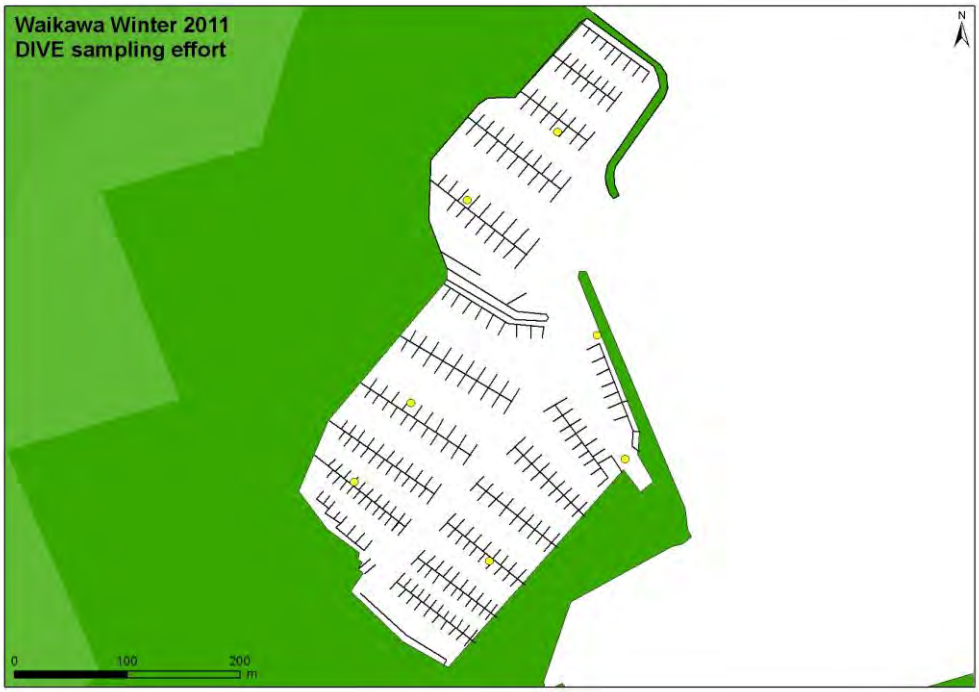
Sledding locations (Havelock Marina)



Dive search locations (Picton Harbour)

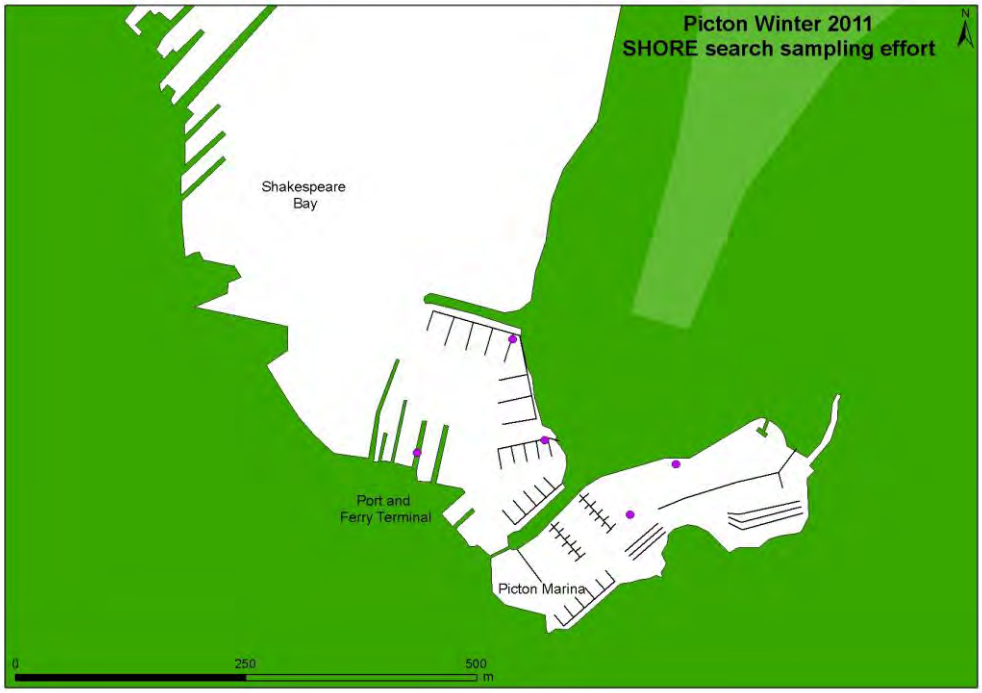


Dive search locations (Waikawa Marina)

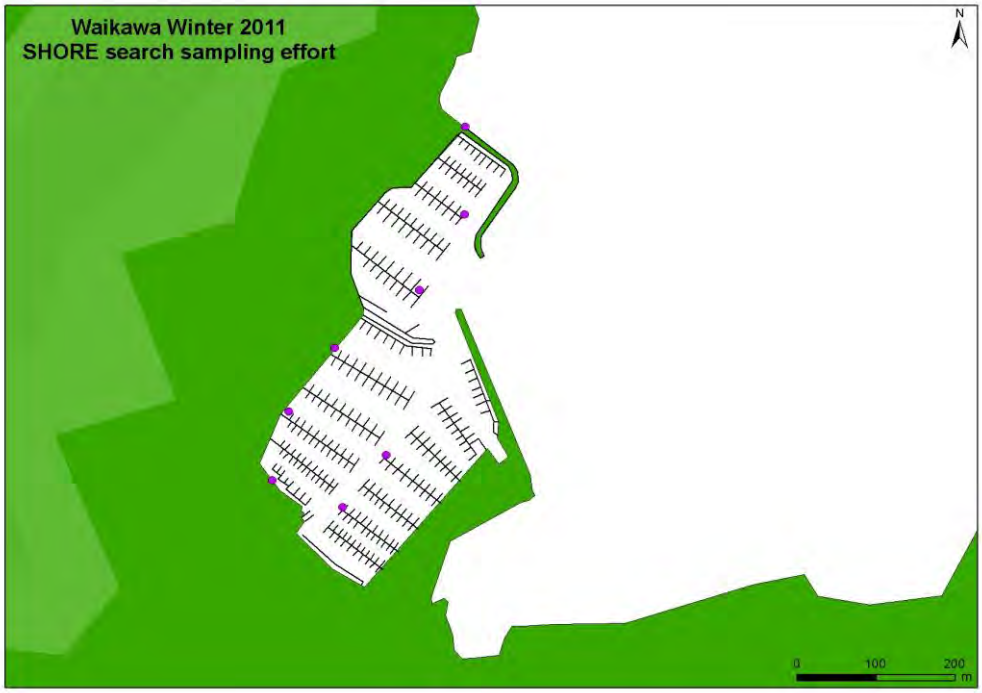


Dive search locations (Havelock Harbour)

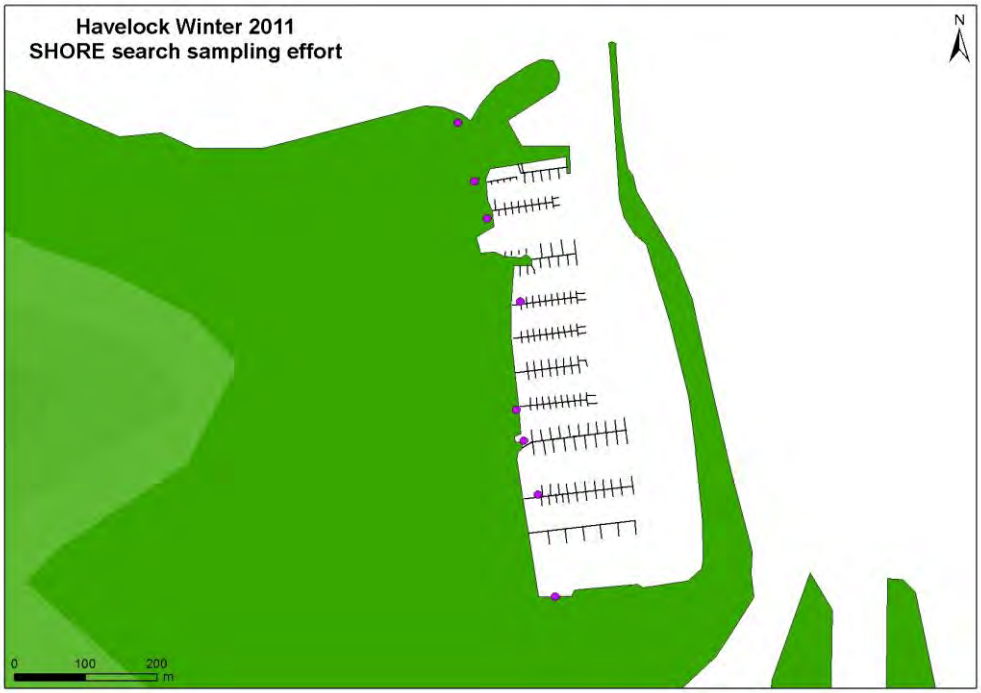
Shore search locations (Picton Harbour)



Shore search locations (Waikawa Marina)

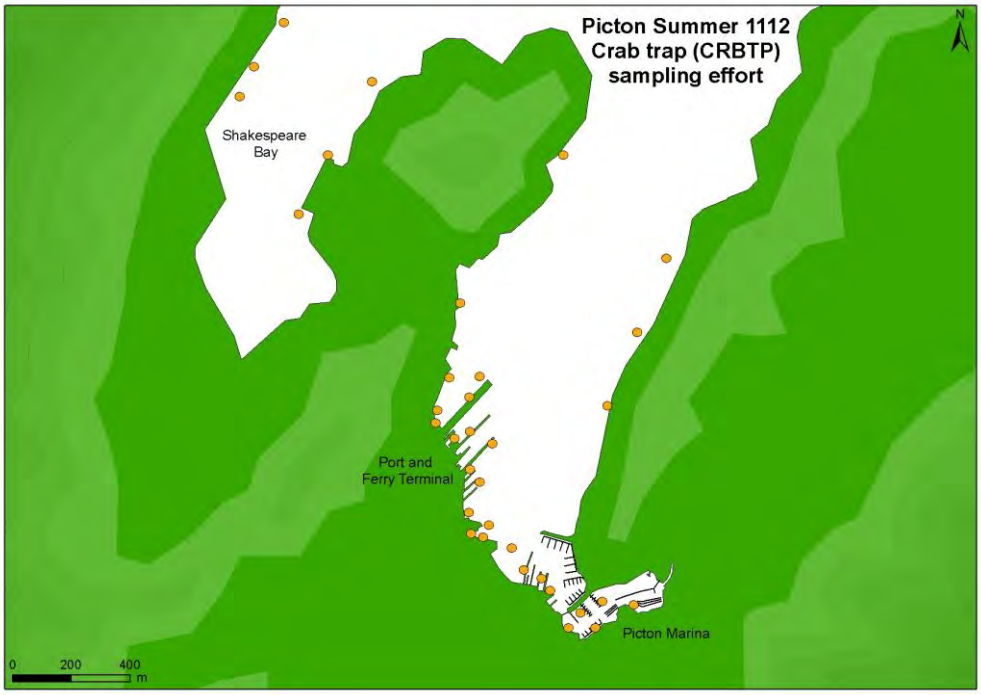


Shore search locations (Havelock Harbour)

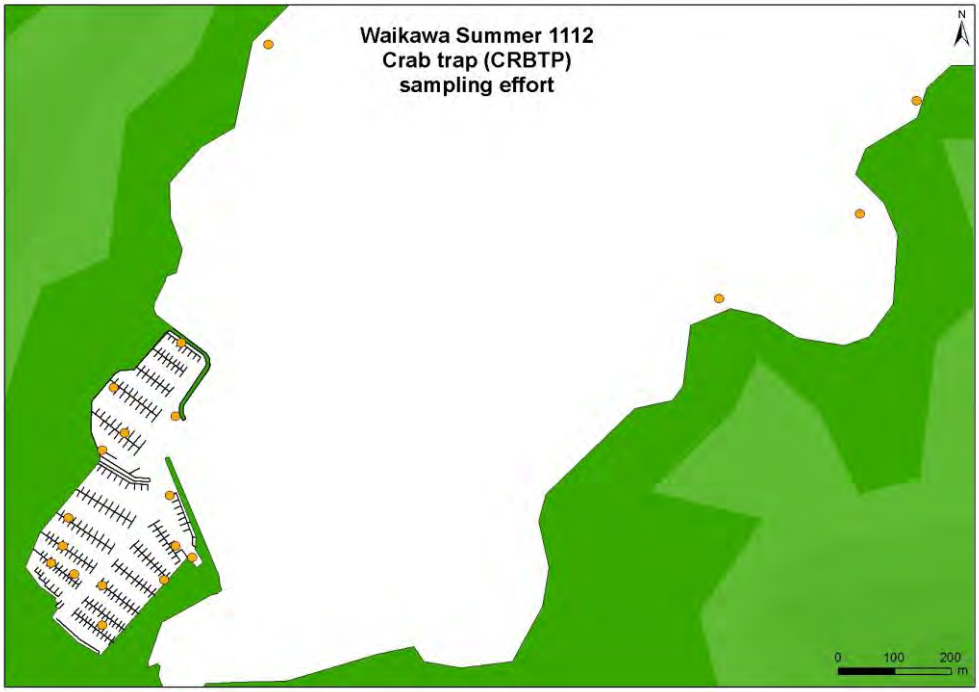


Summer 2011-2012

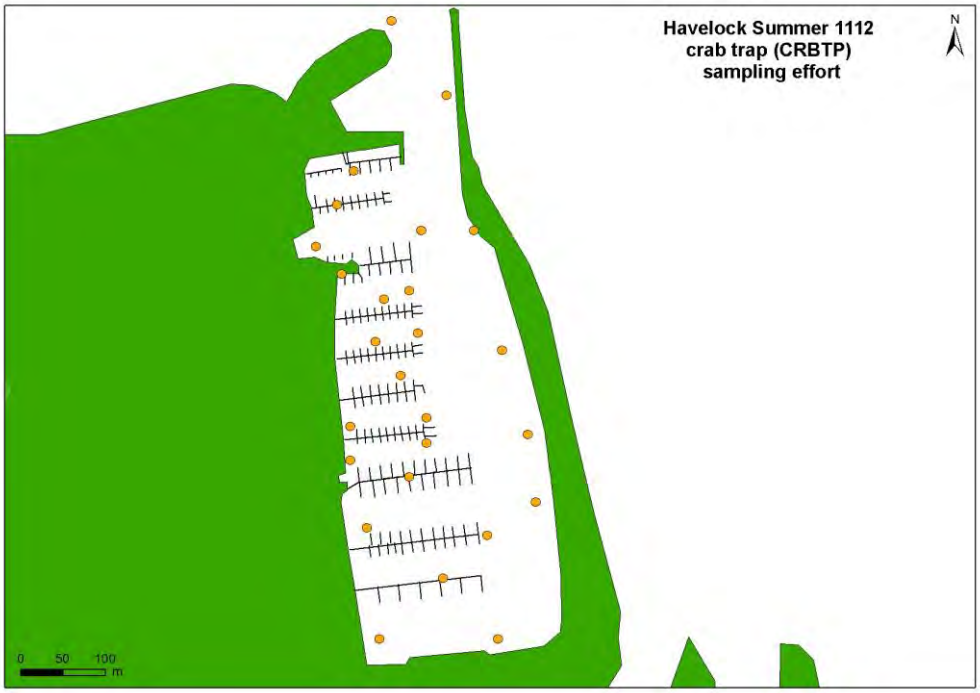
Crab (box) trapping locations (Picton Harbour)



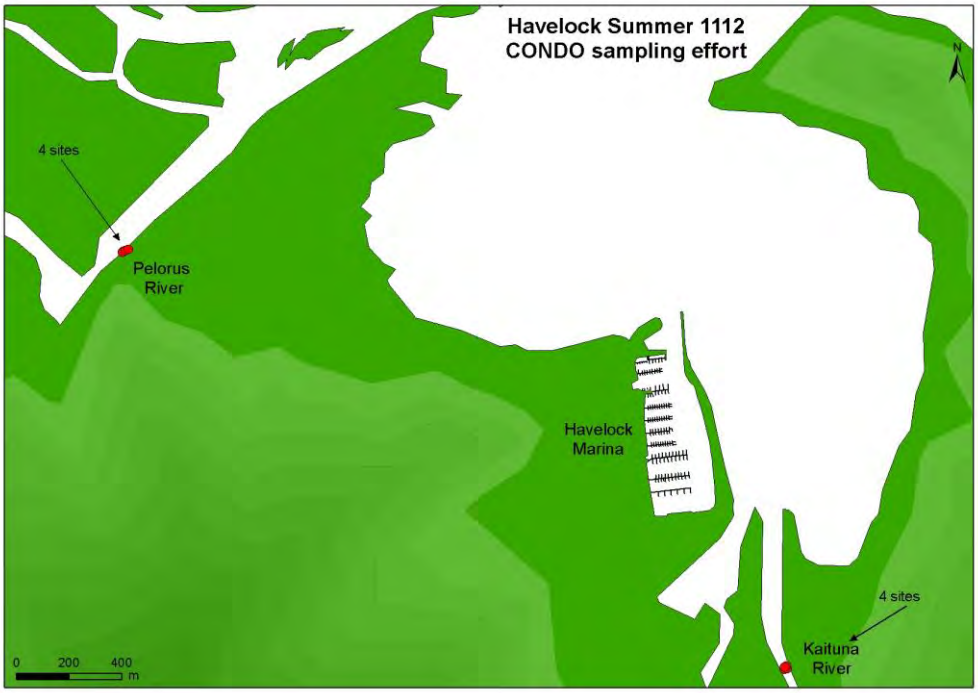
Crab (box) trapping locations (Waikawa Marina)



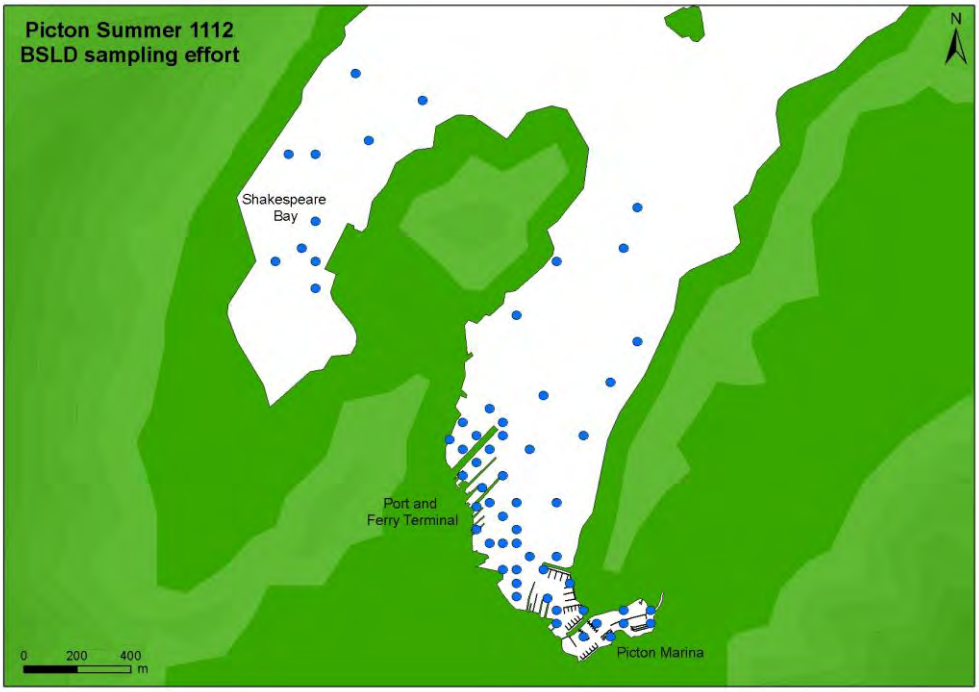
Crab (box) trapping locations (Havelock Harbour)



Crab condo locations (Havelock Harbour)

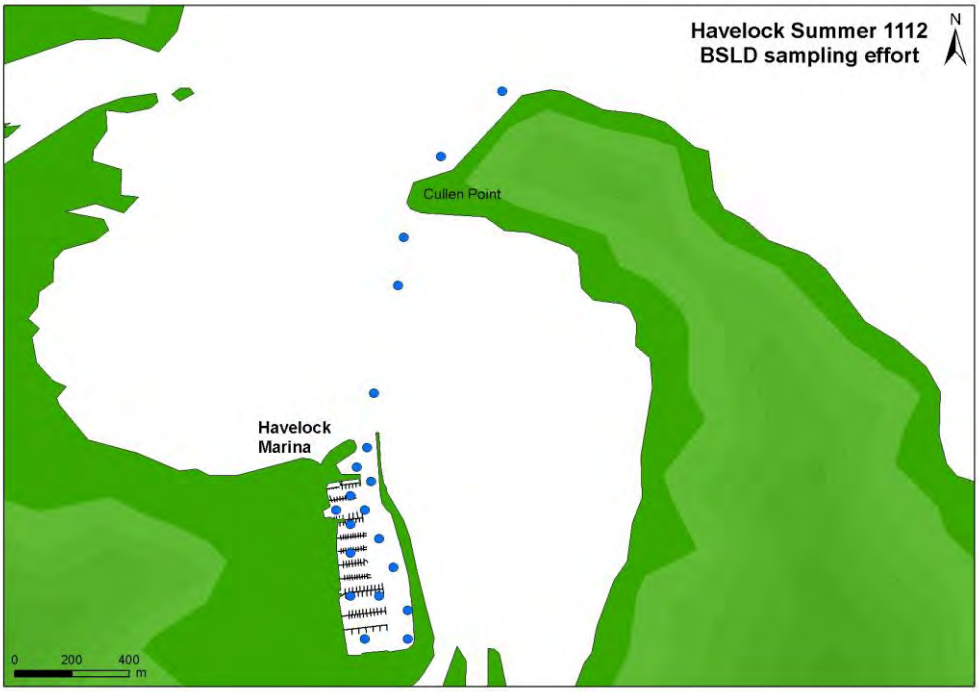


Sledding locations (Picton Harbour)

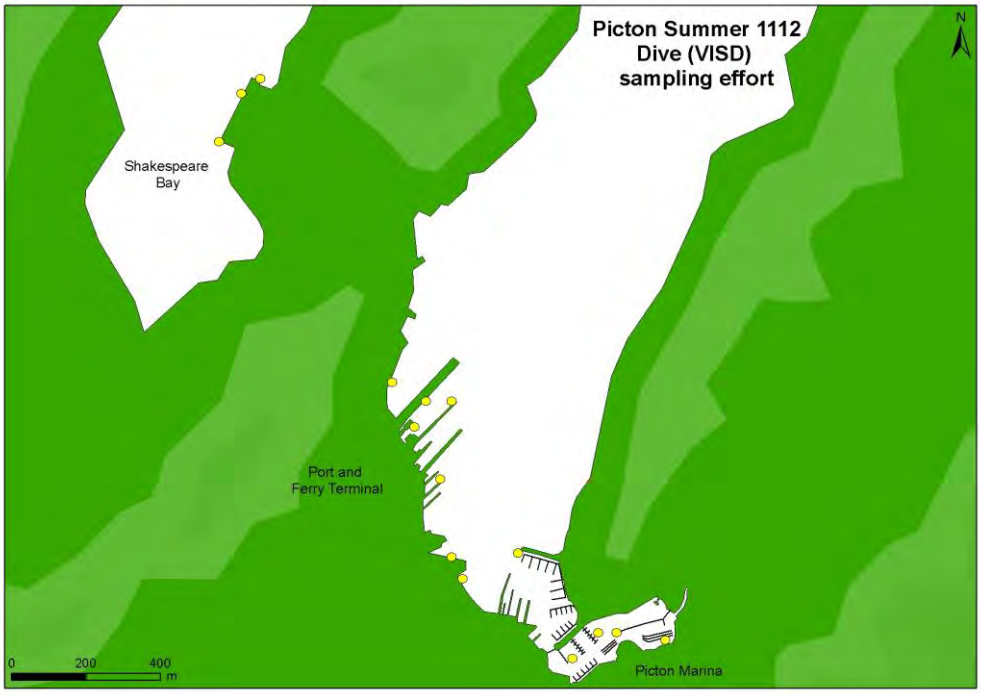


Sledding locations (Waikawa Marina)

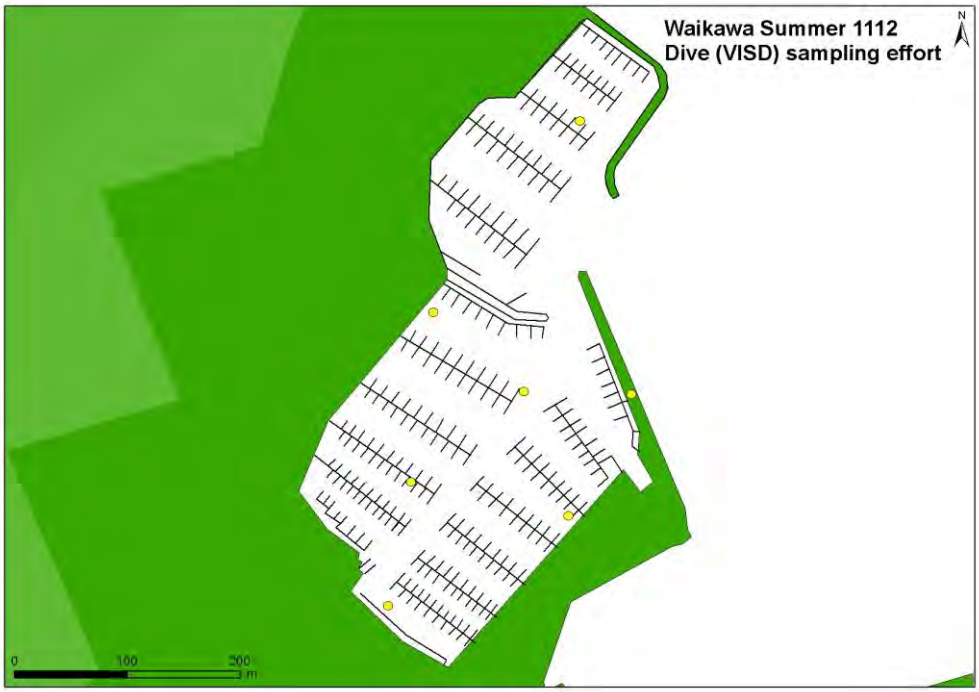
Sledding locations (Havelock Marina)



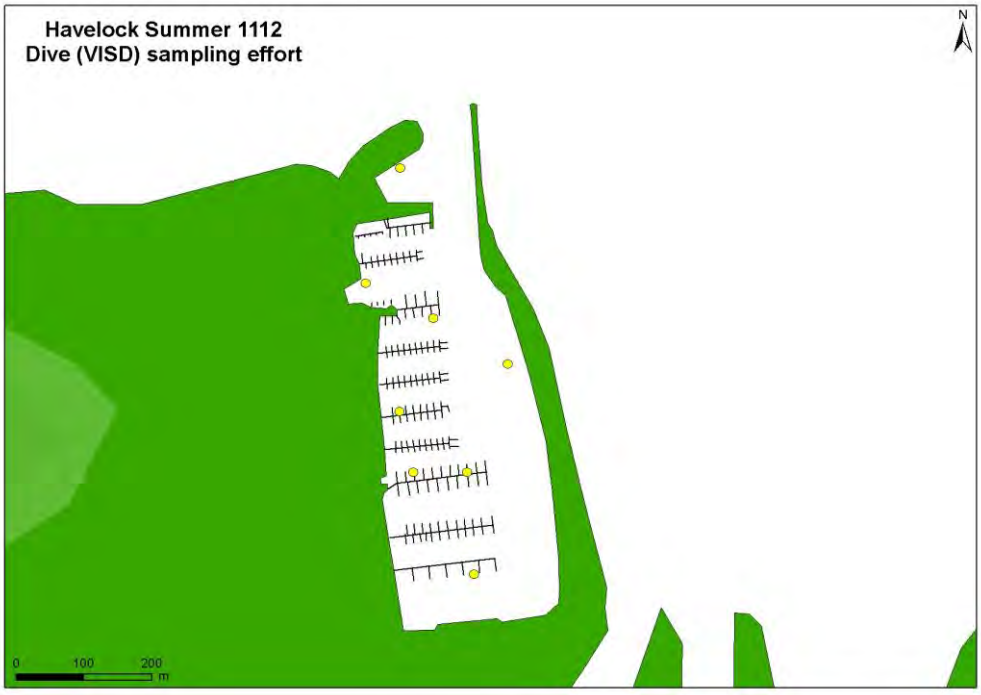
Dive search locations (Picton Harbour)



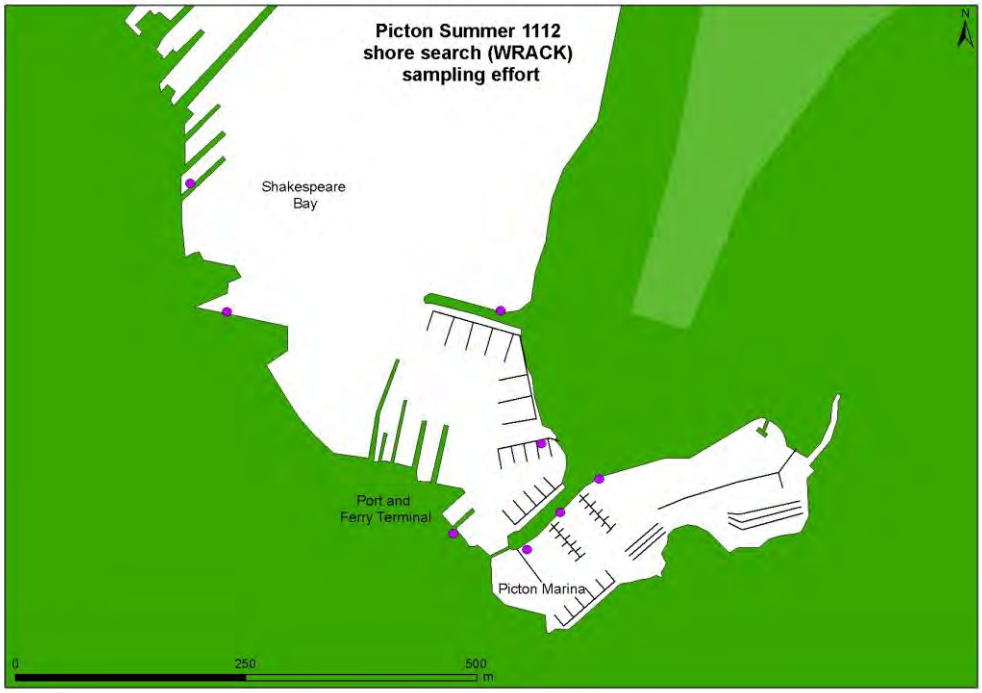
Dive search locations (Waikawa Marina)



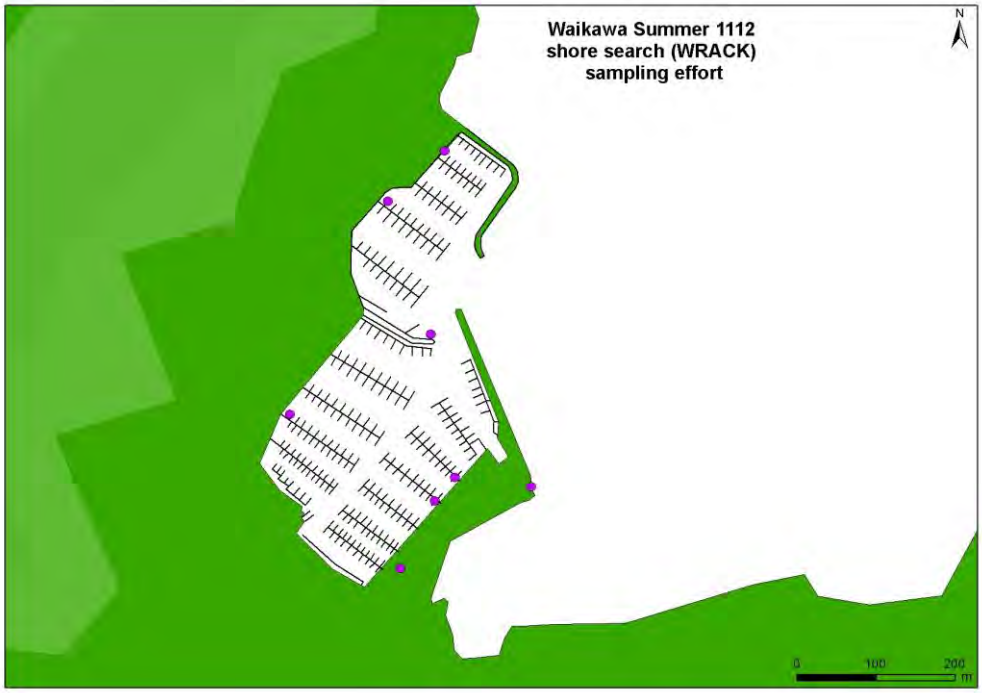
Dive search locations (Havelock Harbour)



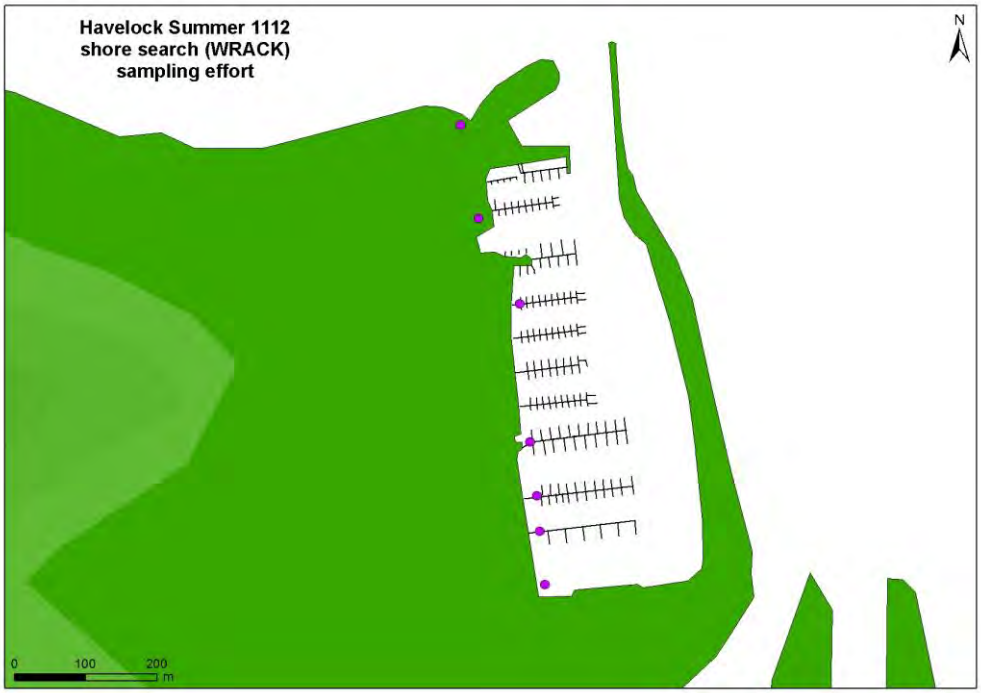
Shore search locations (Picton Harbour)



Shore search locations (Waikawa Marina)



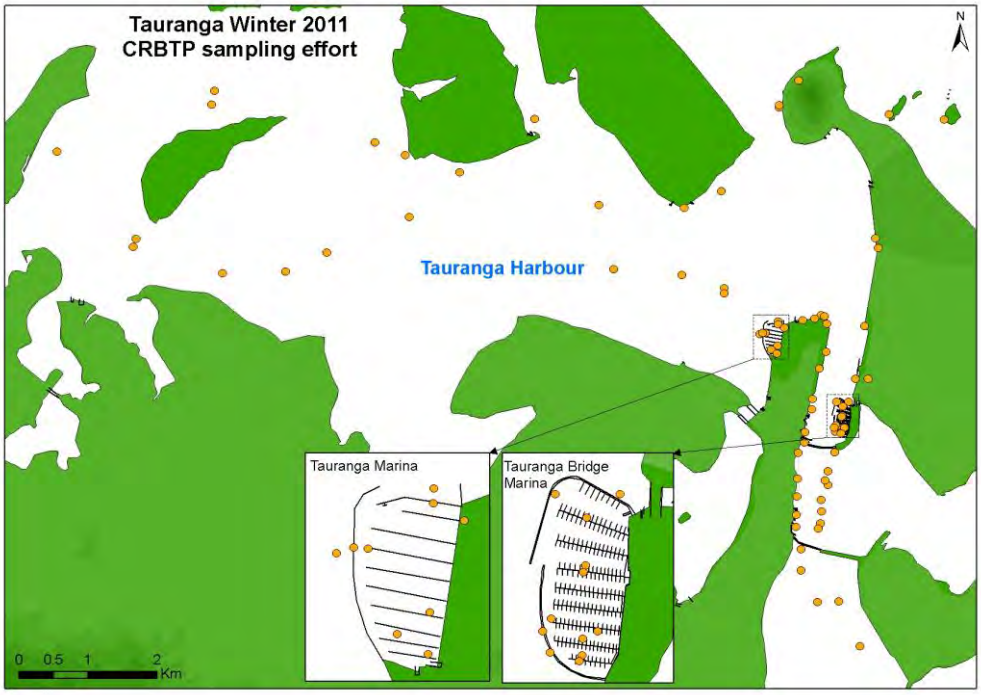
Shore search locations (Havelock Harbour)



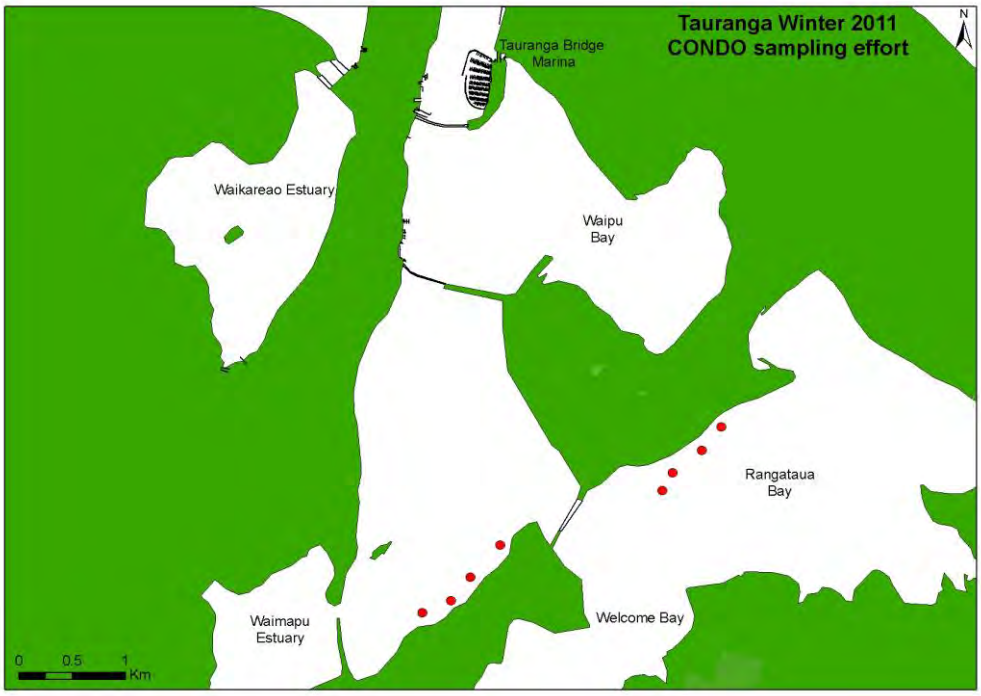
TAURANGA HARBOUR

Winter 2011

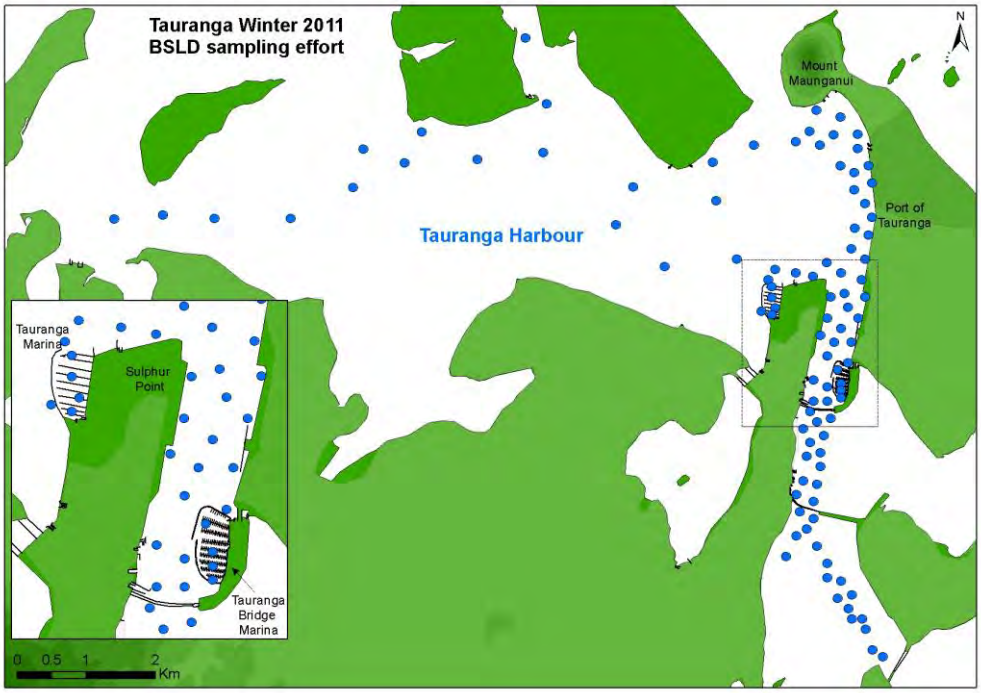
Crab (box) trapping locations



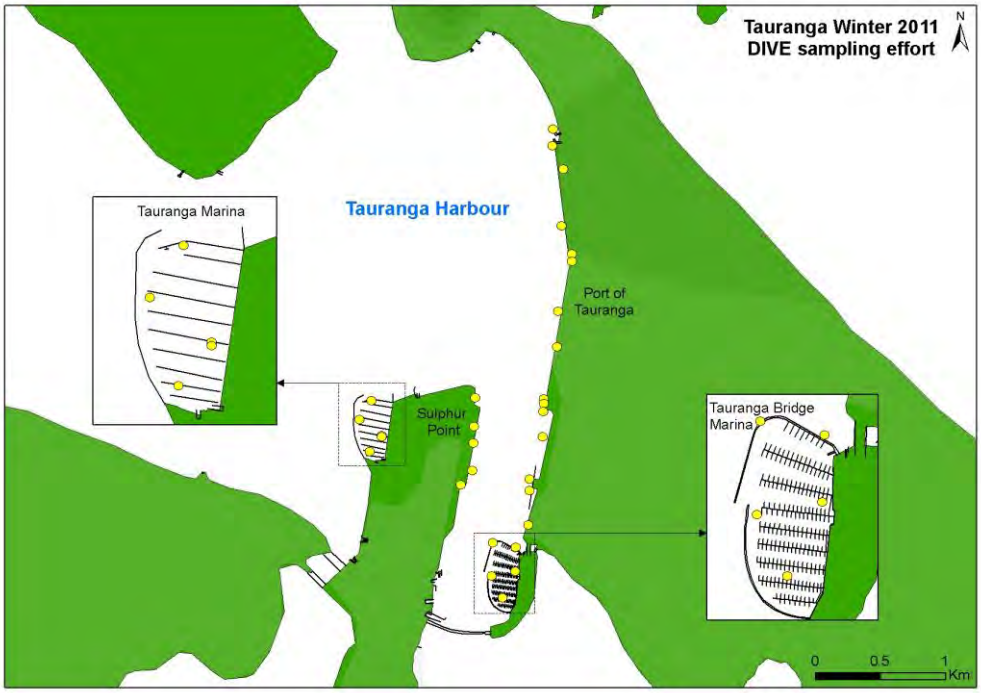
Crab condo locations



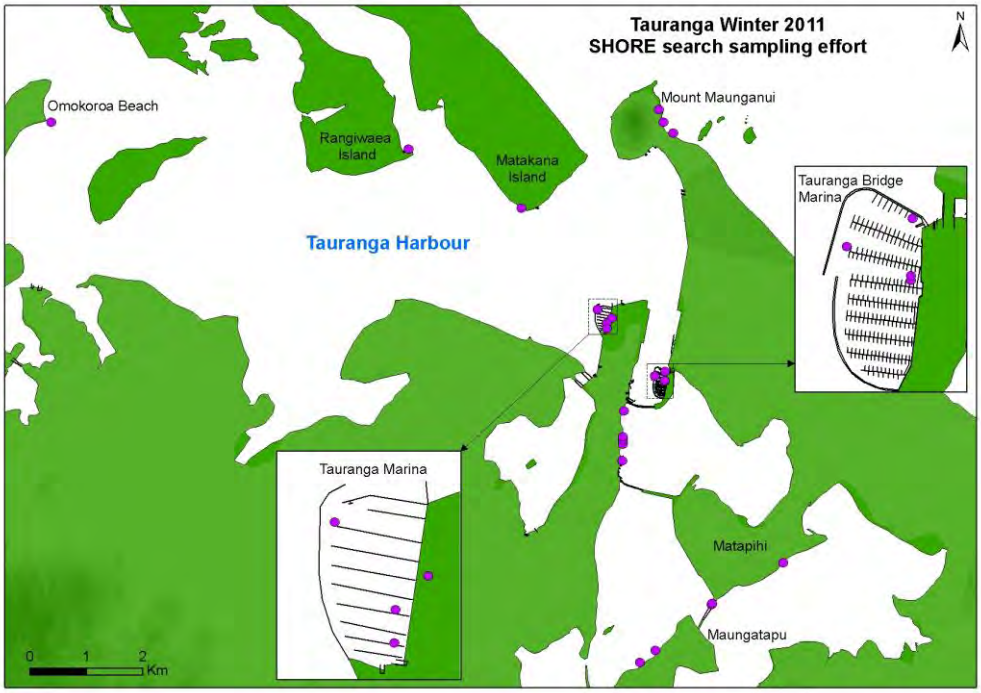
Sledding locations



Dive search locations

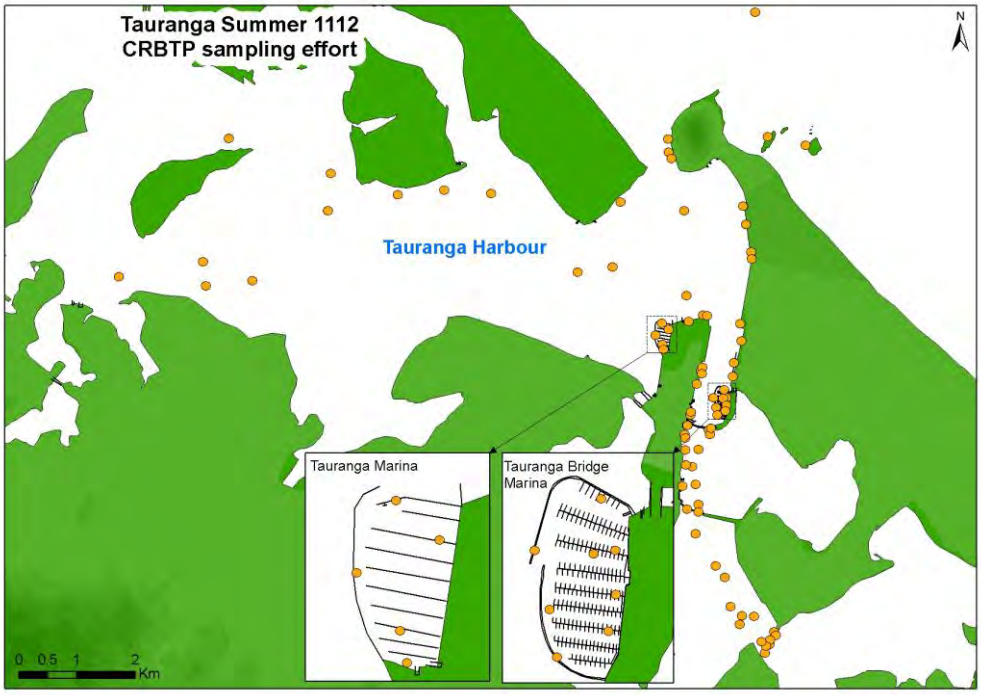


Shore search locations

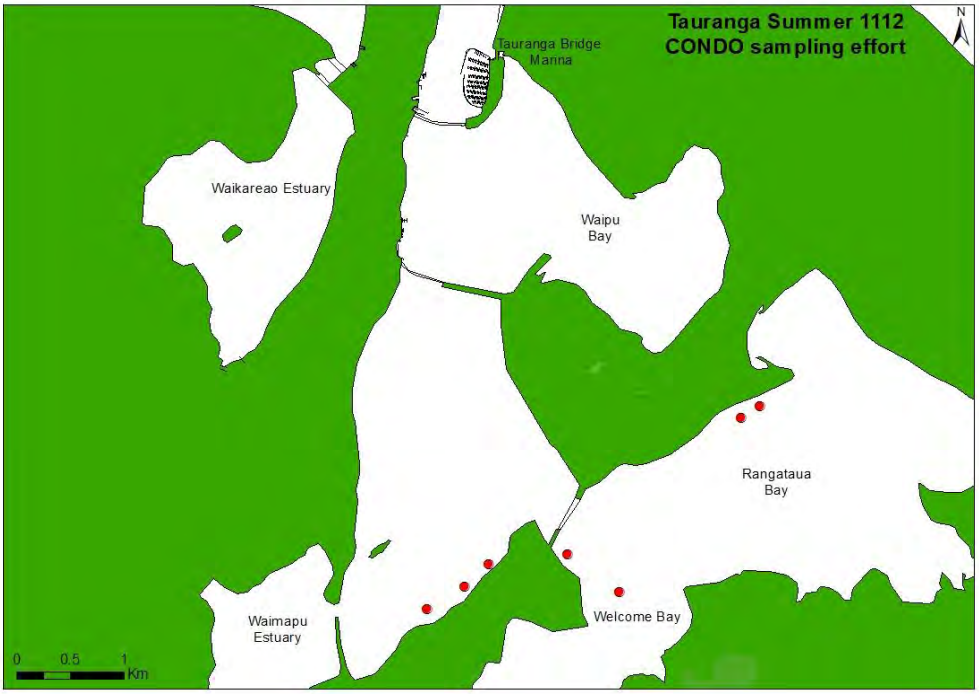


Summer 2011-2012

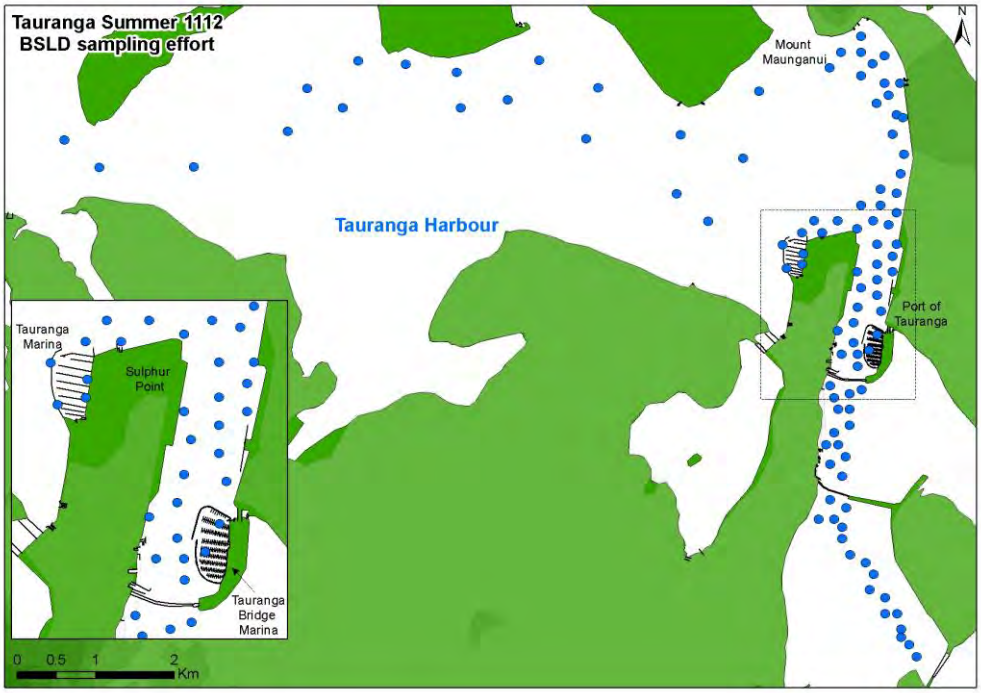
Crab (box) trapping locations



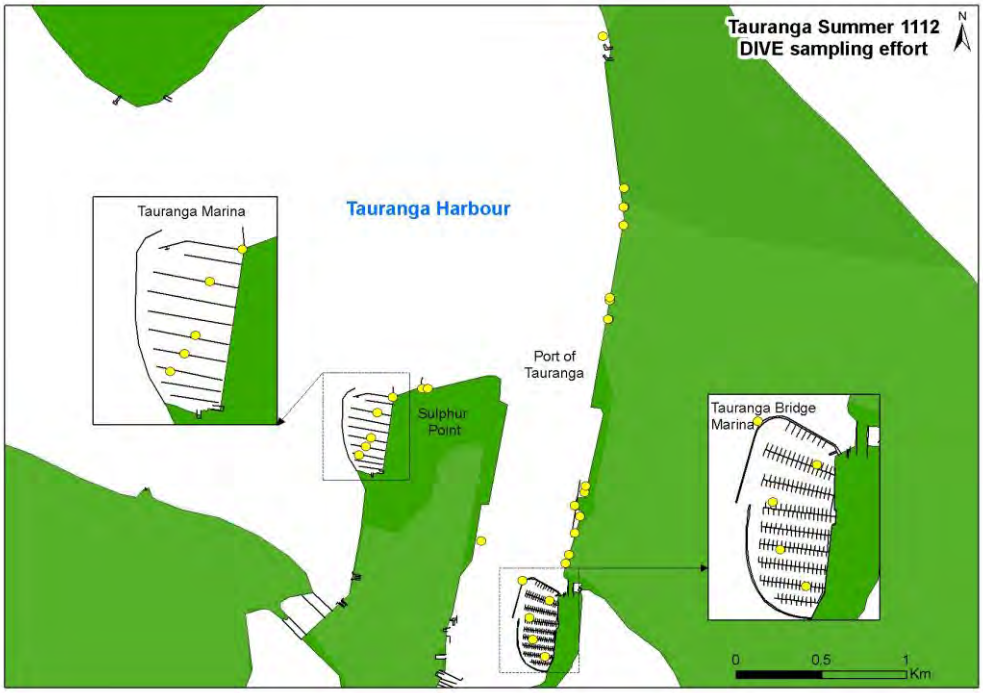
Crab condo locations



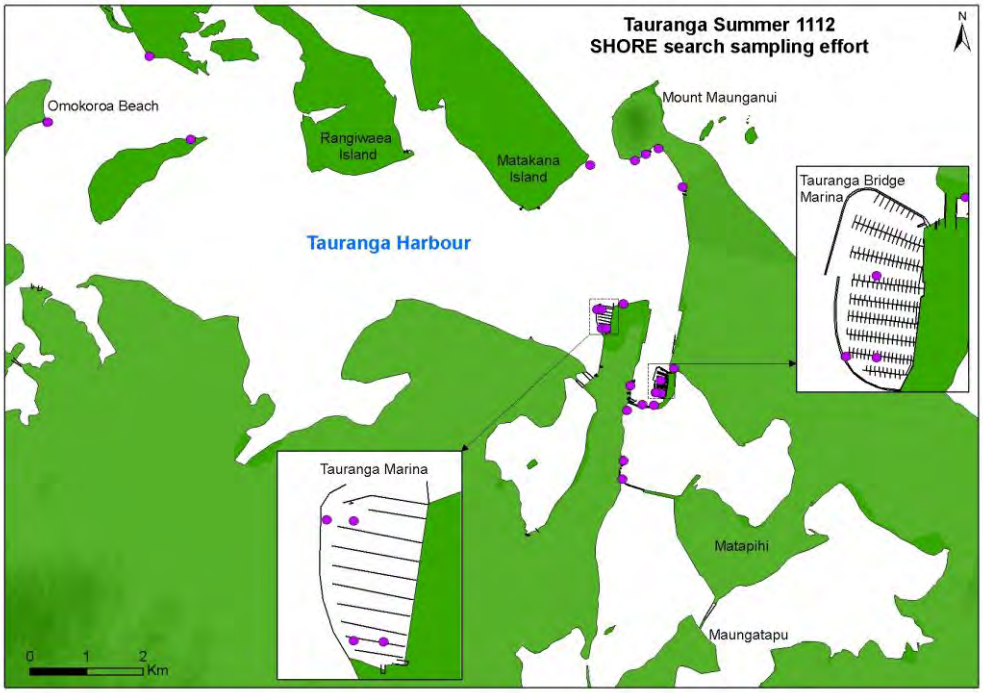
Sledding locations



Dive search locations



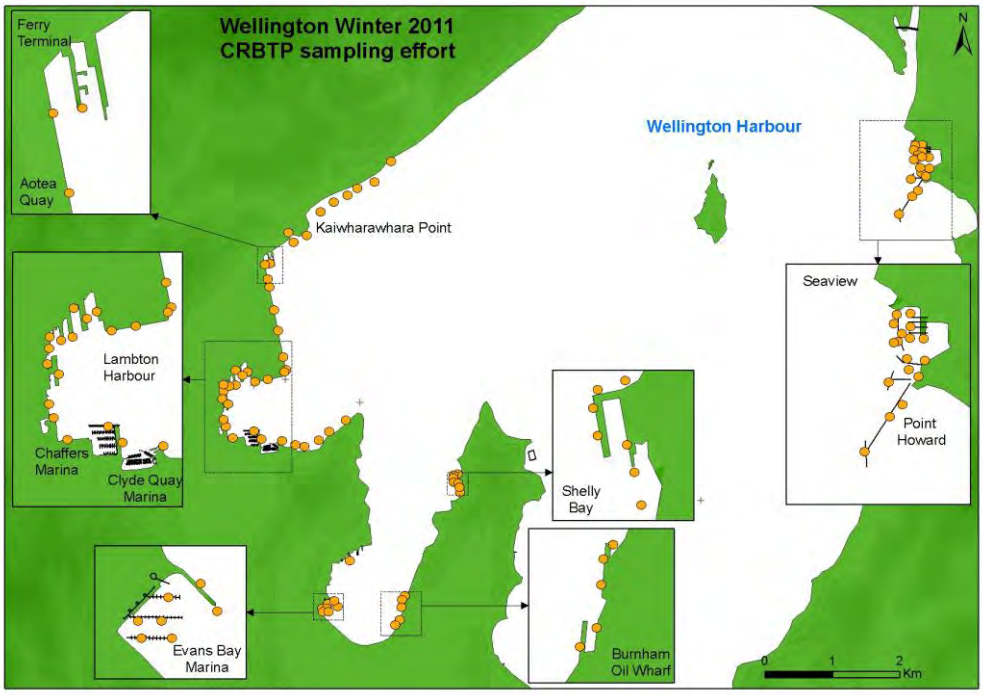
Shore search locations



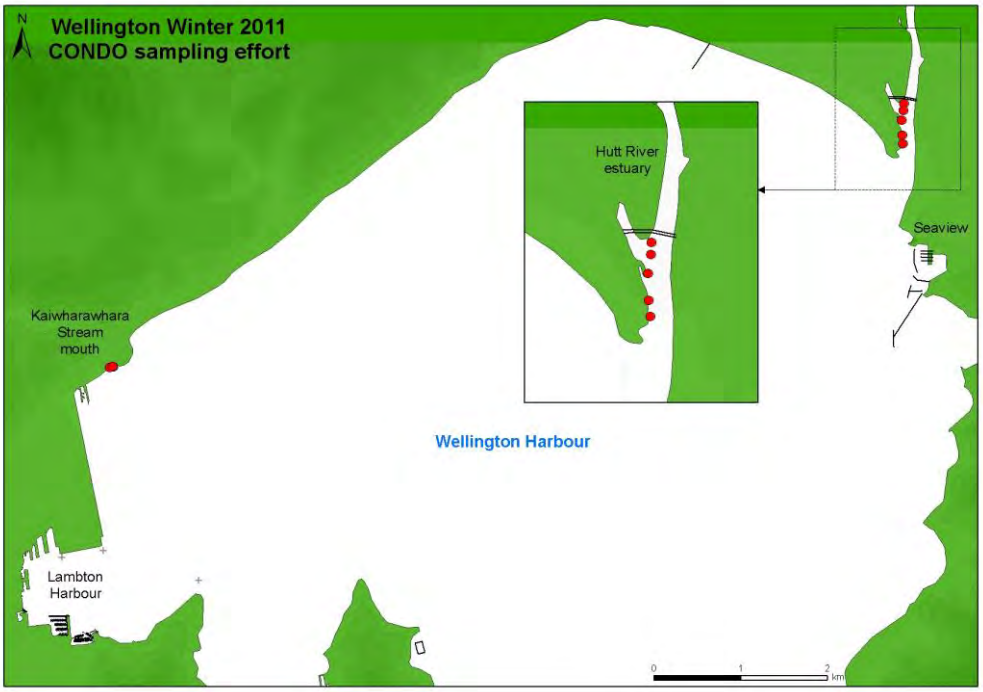
WELLINGTON HARBOUR

Winter 2011

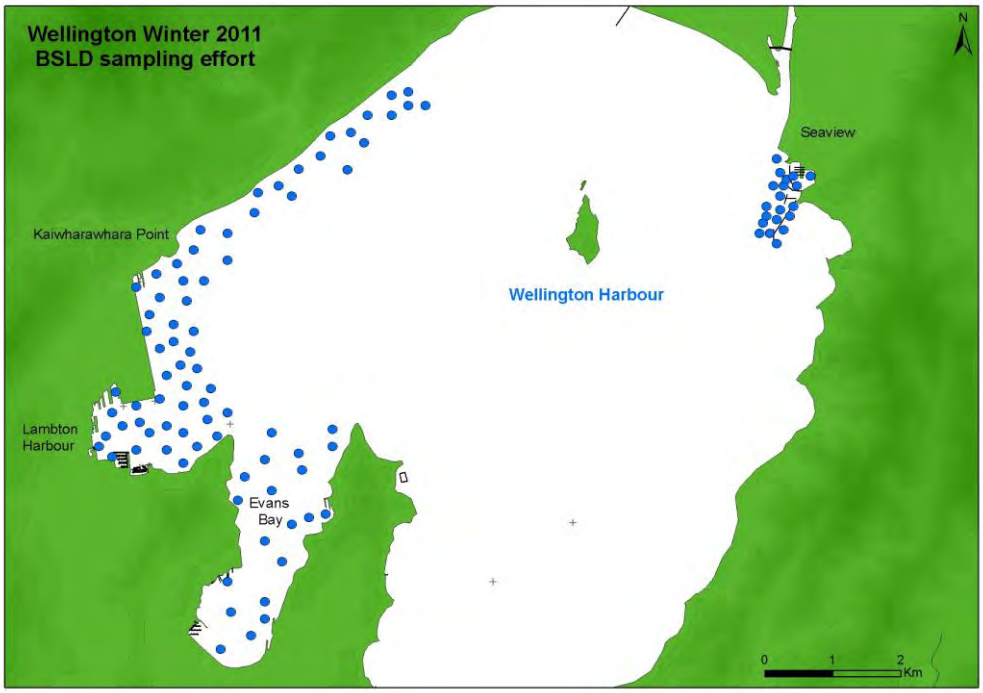
Crab (box) trapping locations



Crab condo locations



Sledding locations



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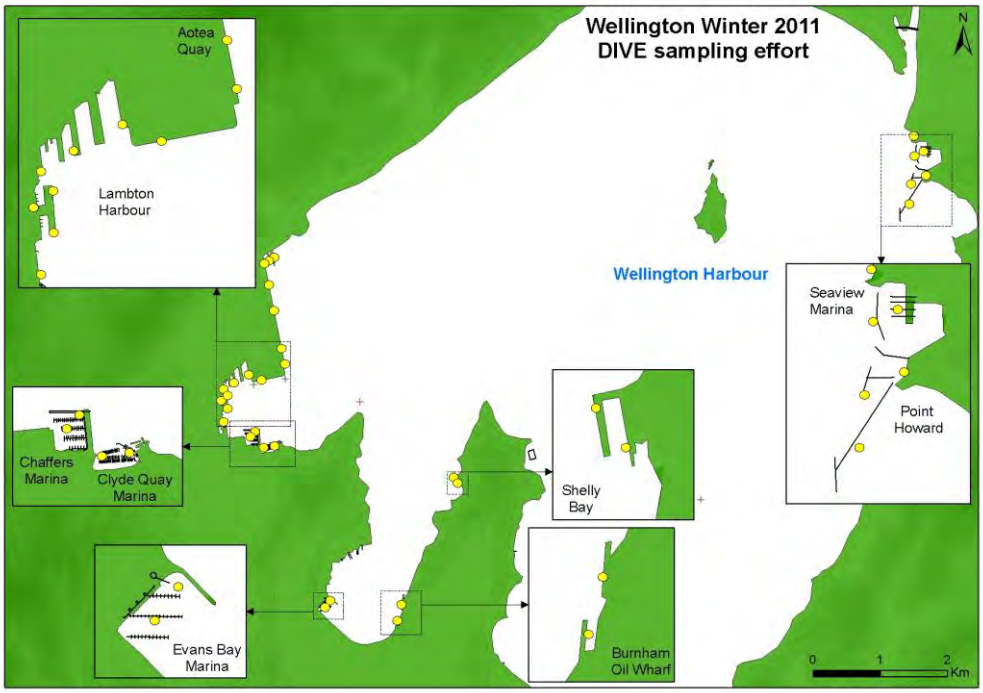
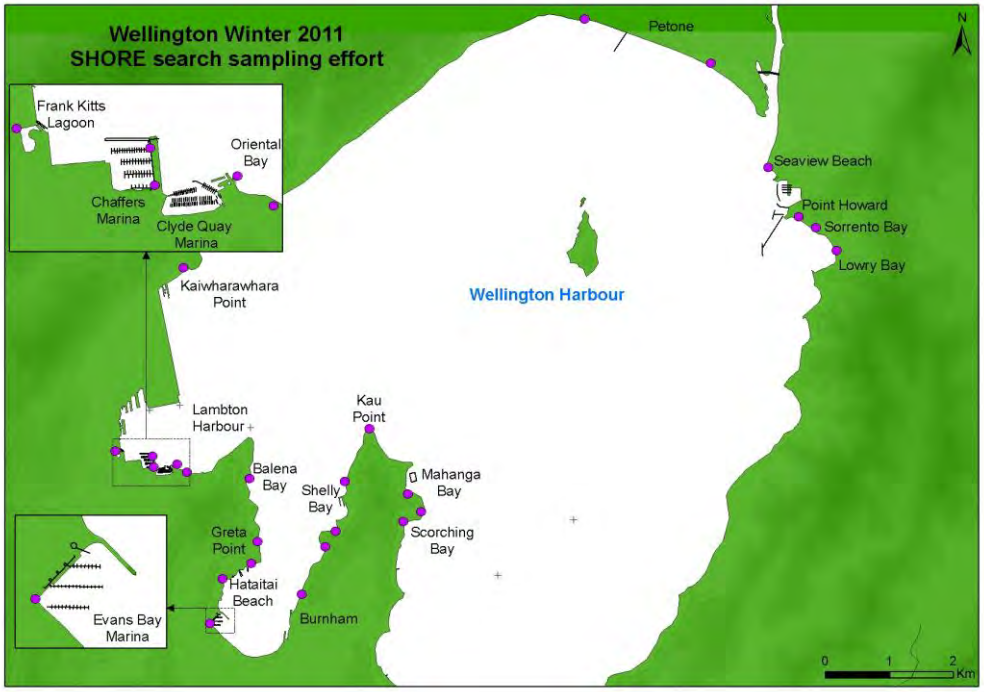
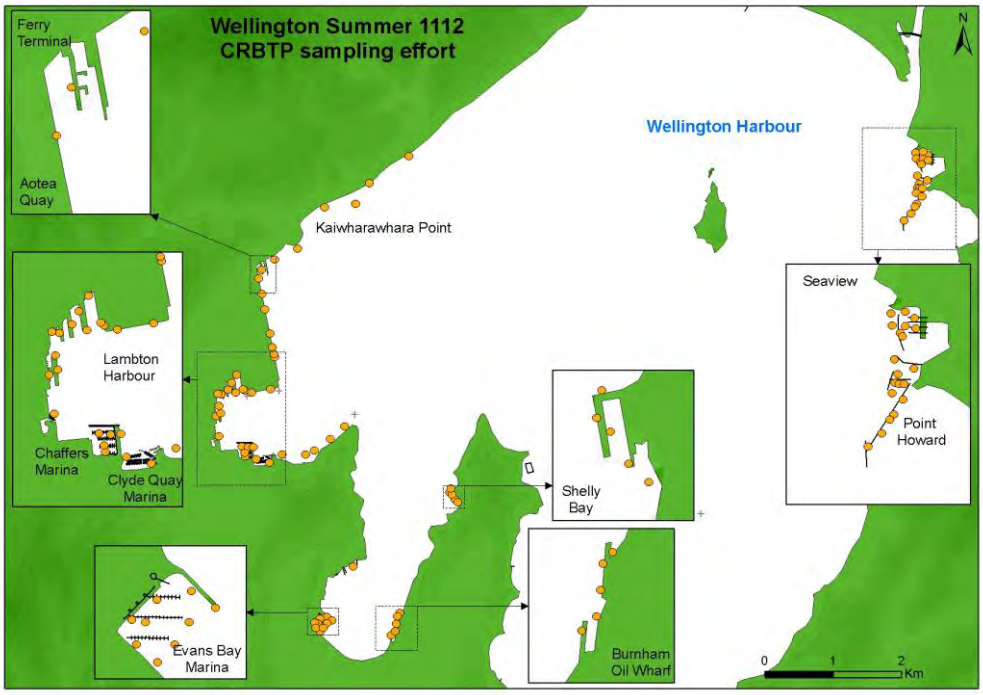


Shore search locations

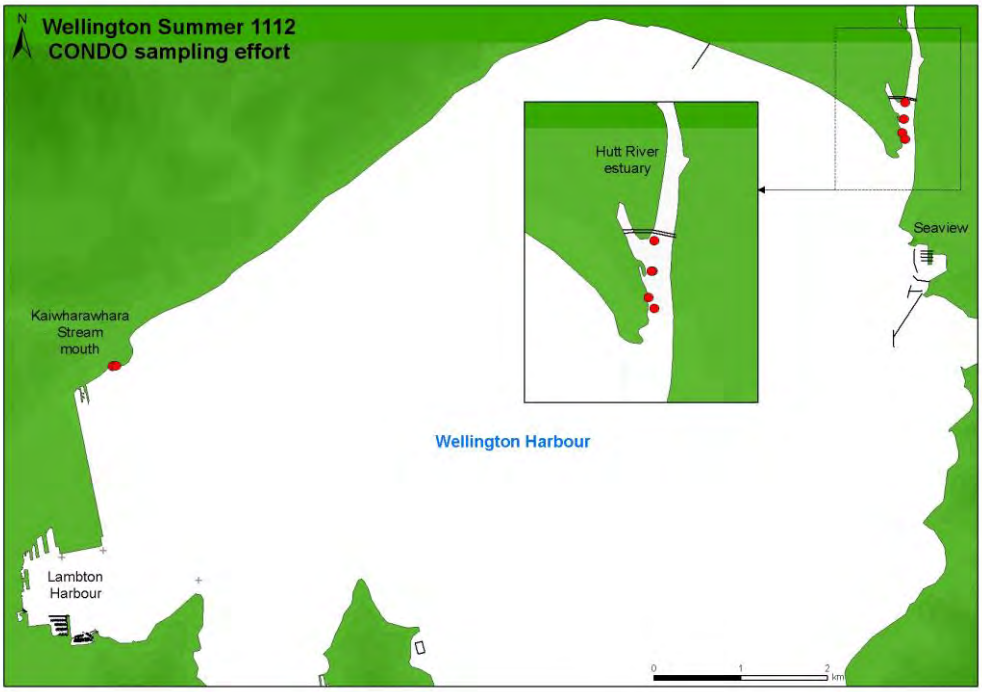


Summer 2011-2012

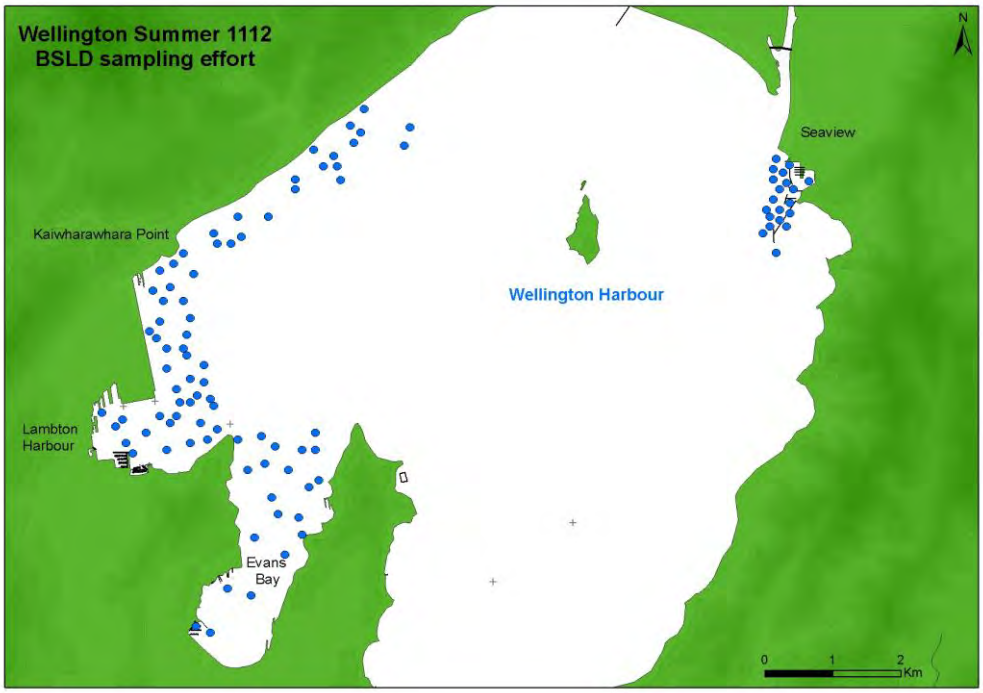
Crab (box) trapping locations



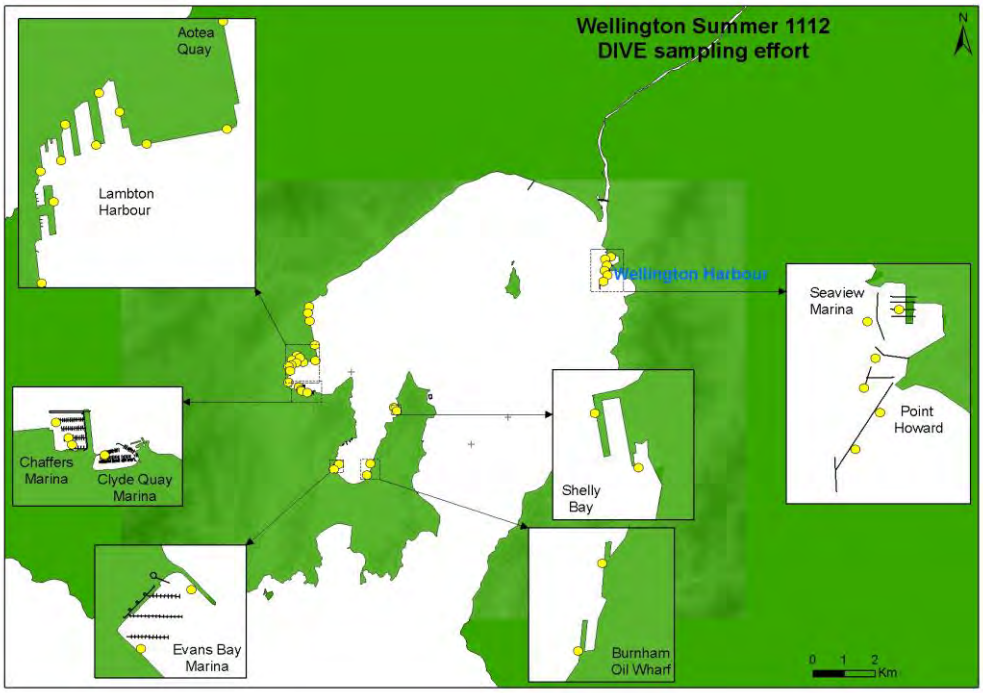
Crab condo locations



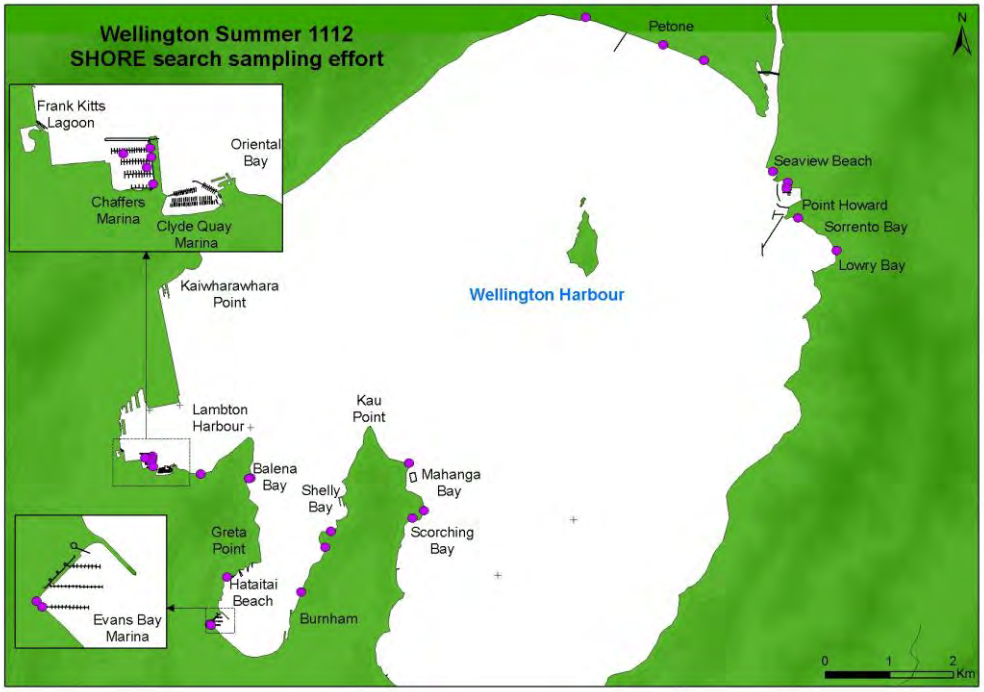
Sledding locations



Dive search locations



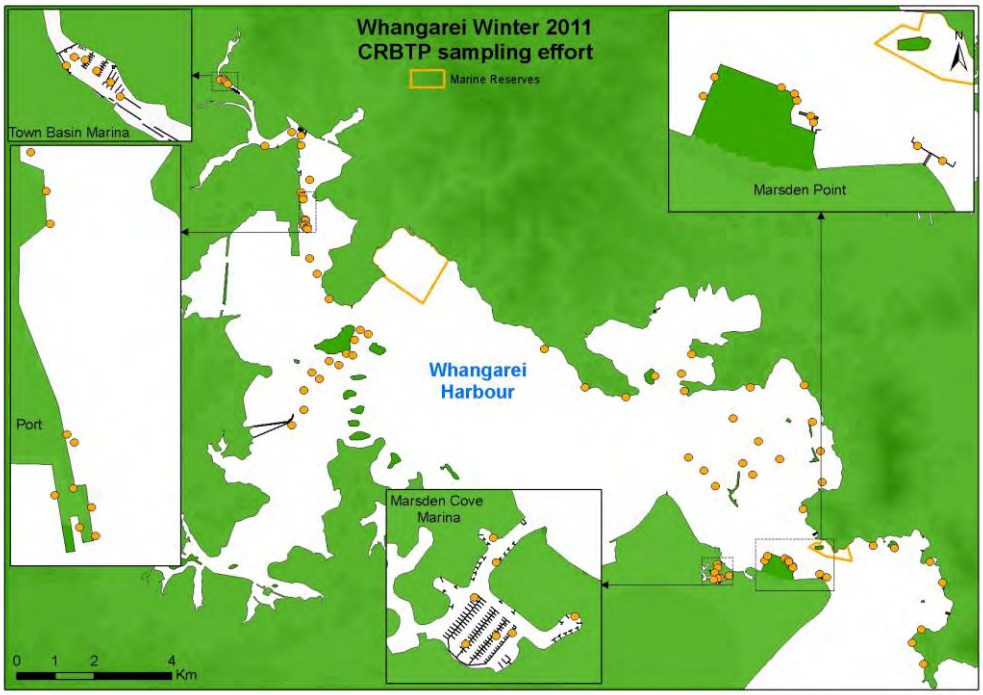
Shore search locations



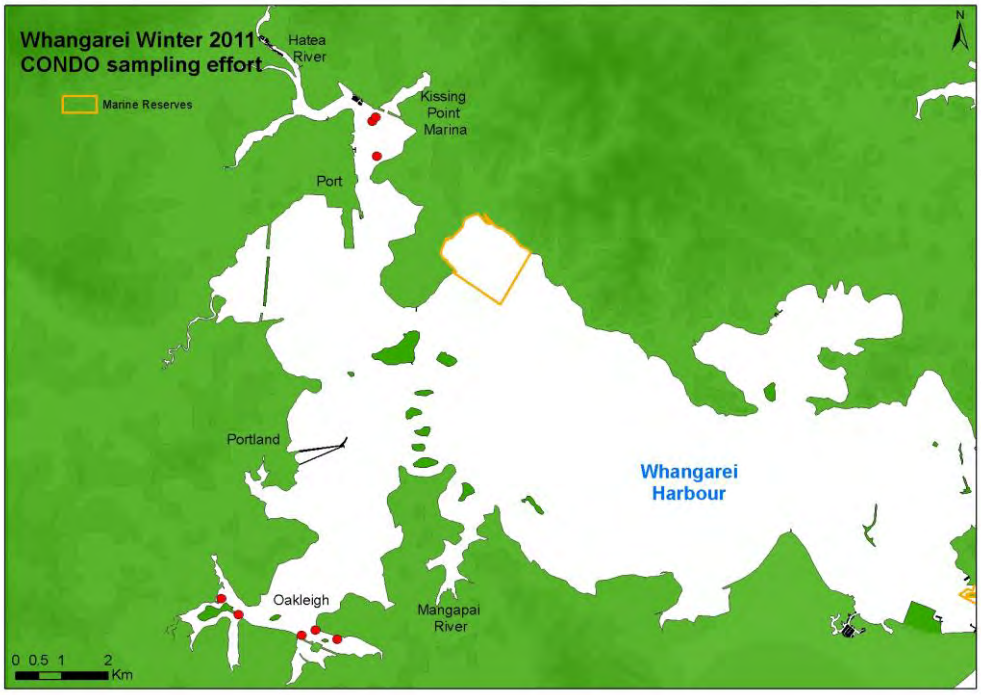
WHANGAREI HARBOUR

Winter 2011

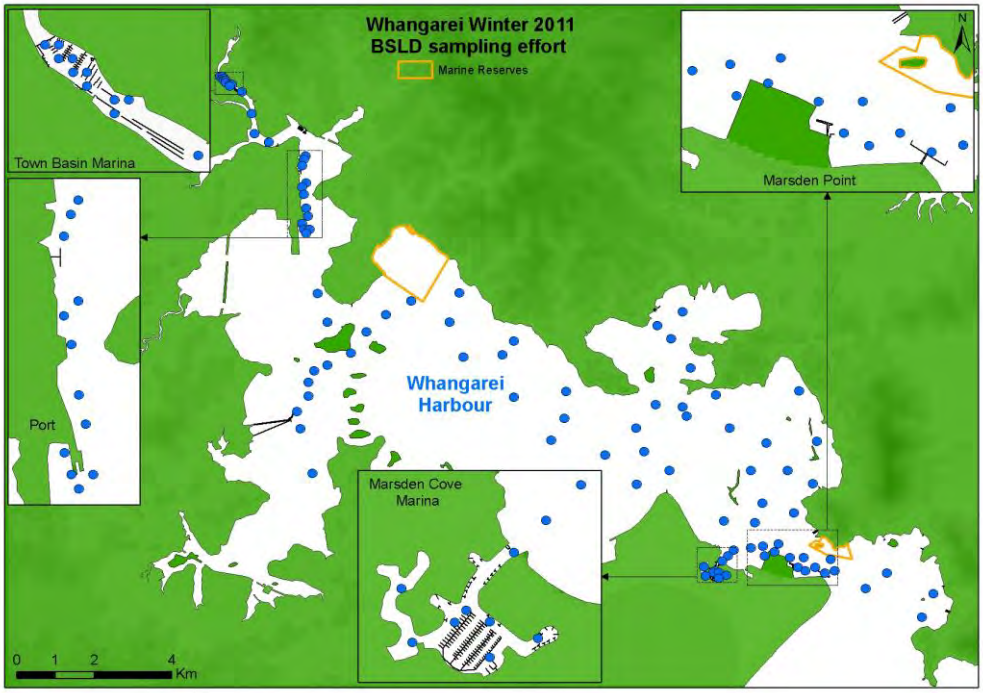
Crab (box) trapping locations



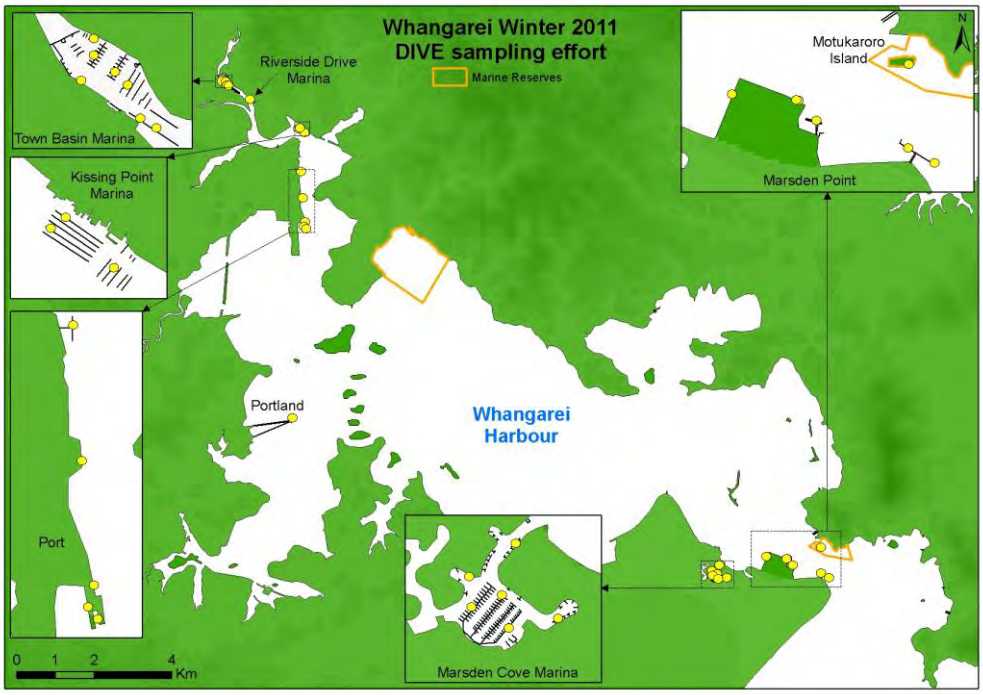
Crab condo locations



Sledding locations



Dive search locations



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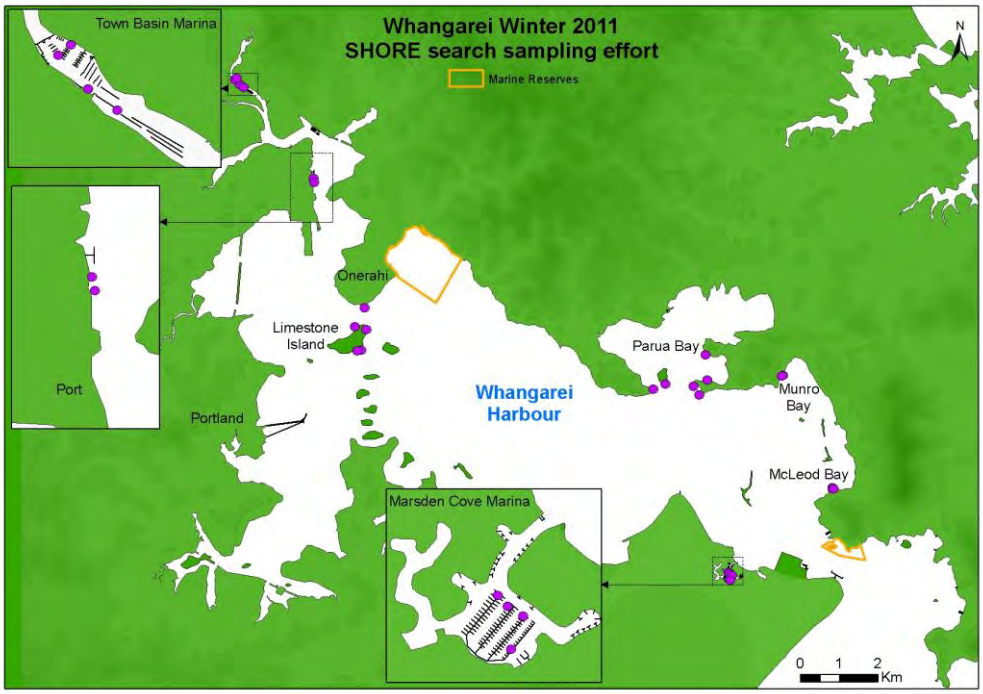
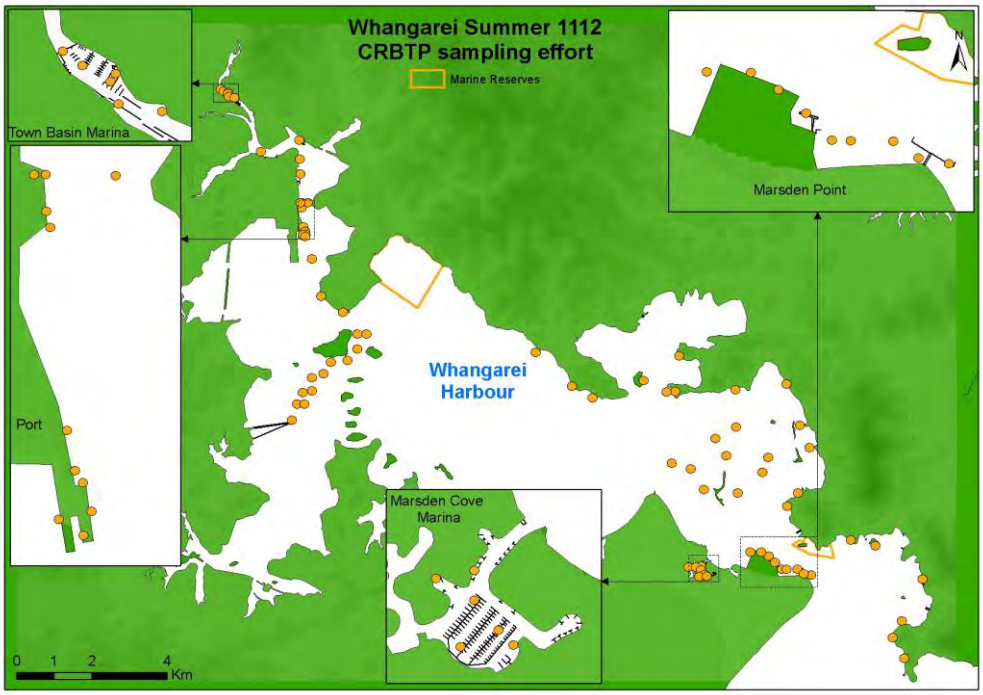
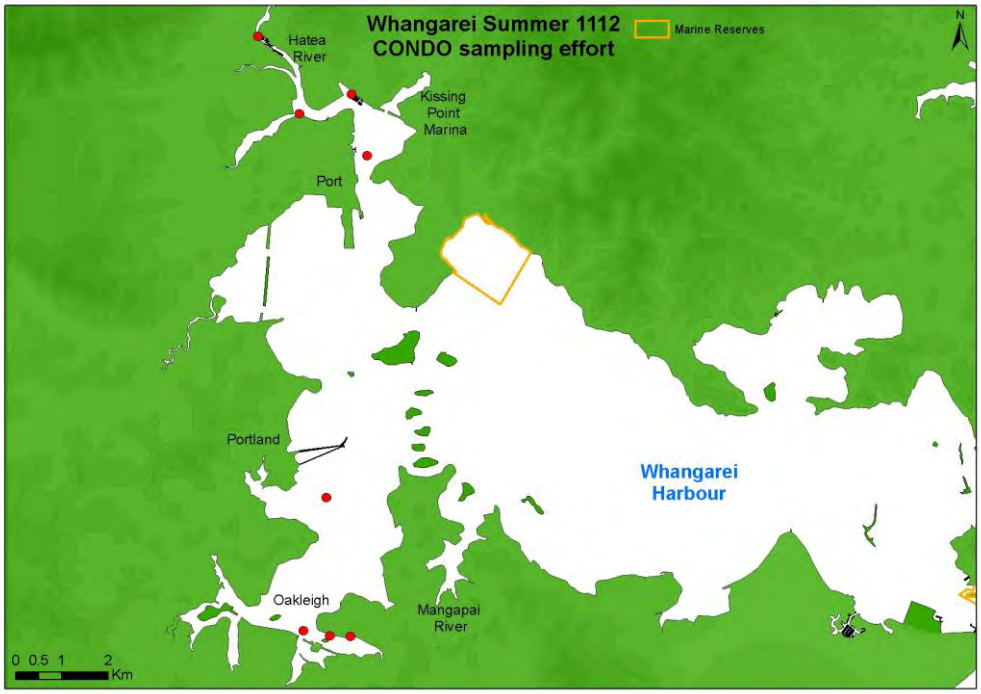


Summer 2011-2012

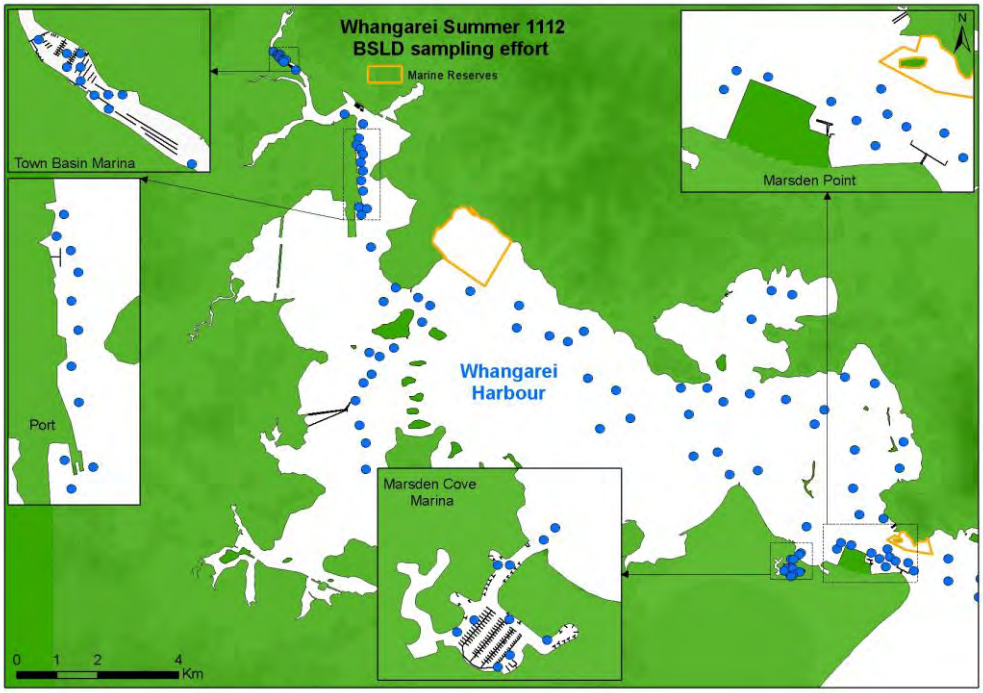
Crab (box) trapping locations



Crab condo locations



Sledding locations



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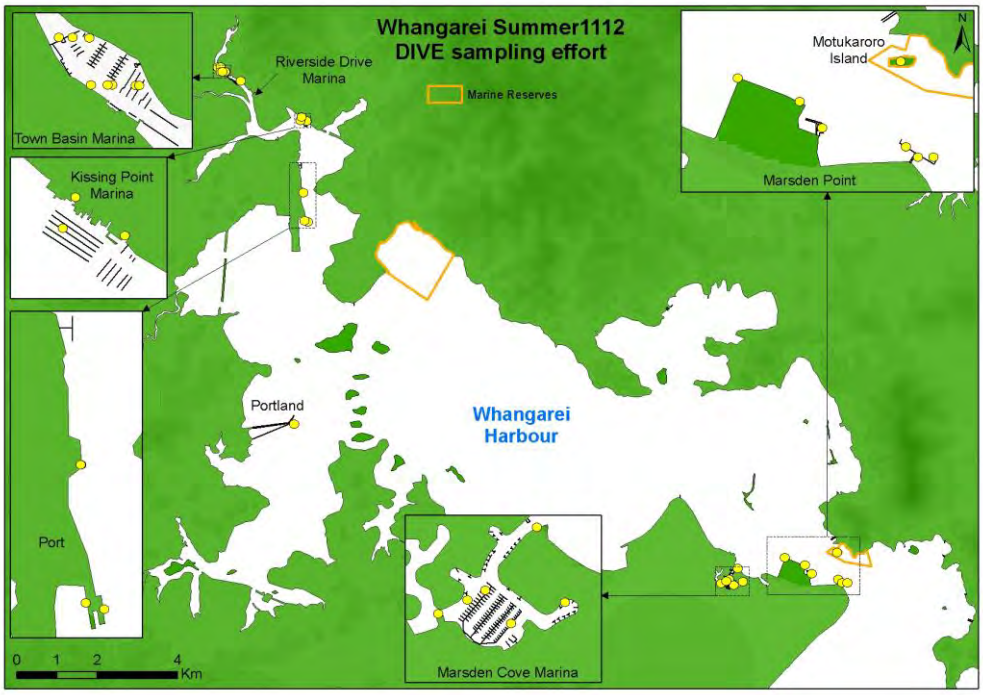

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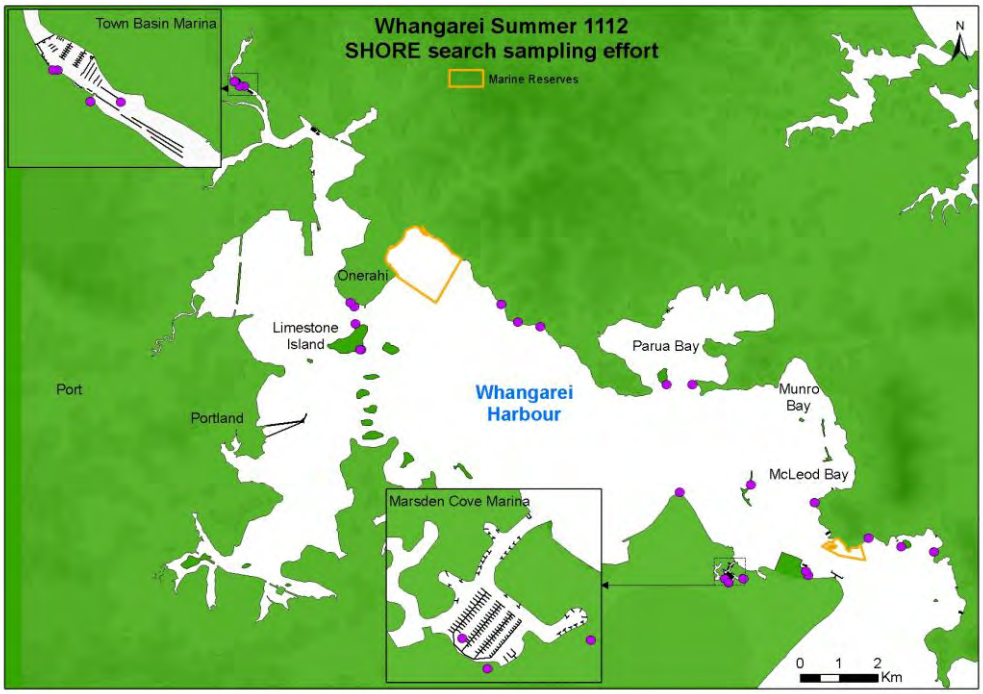
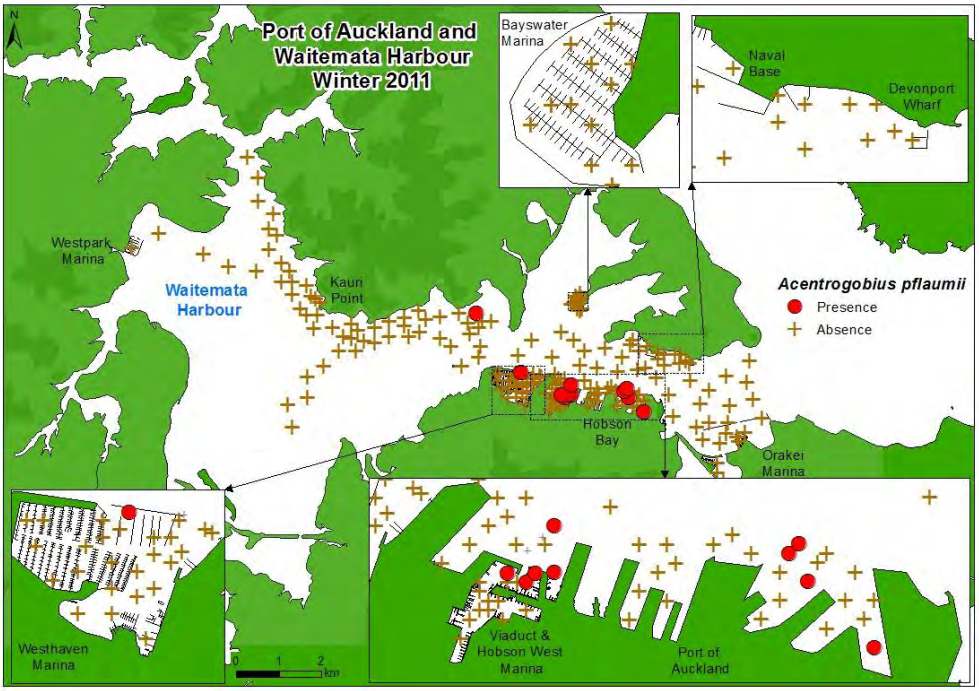


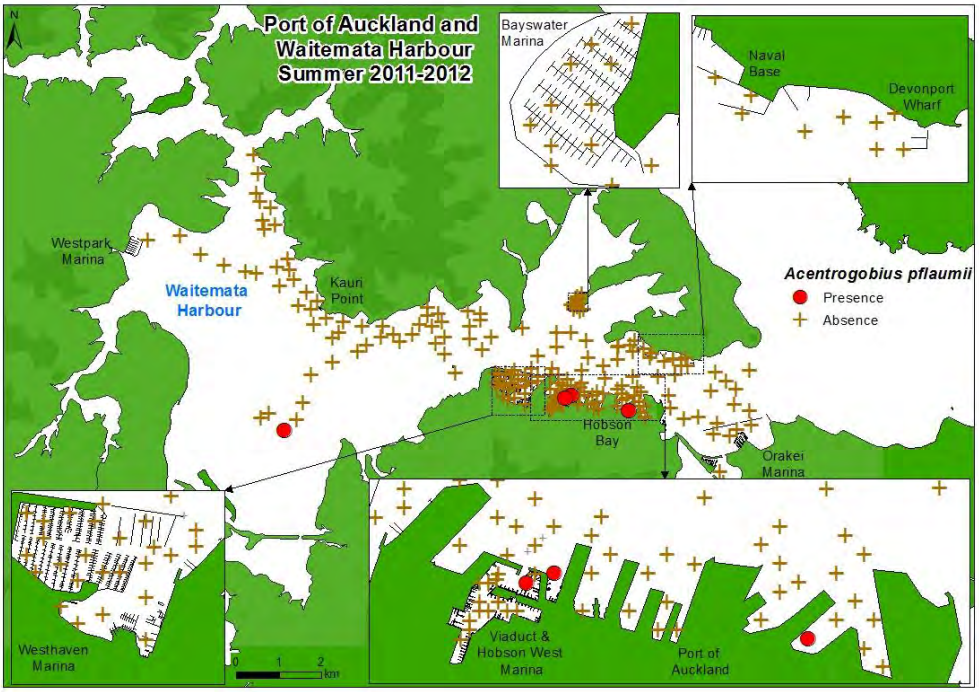
Appendix 3. Distribution maps for target and selected non-target species in Winter 2011 and Summer 2011-2012.

ACENTROGOBIUS PFLAUMII

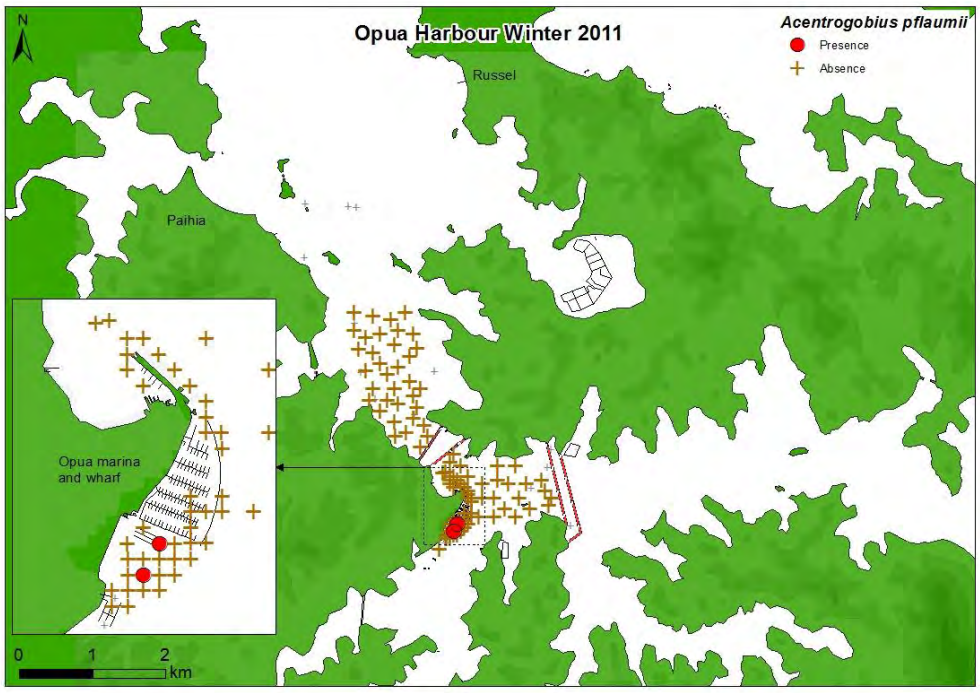
Waitemata Harbour Winter 2011



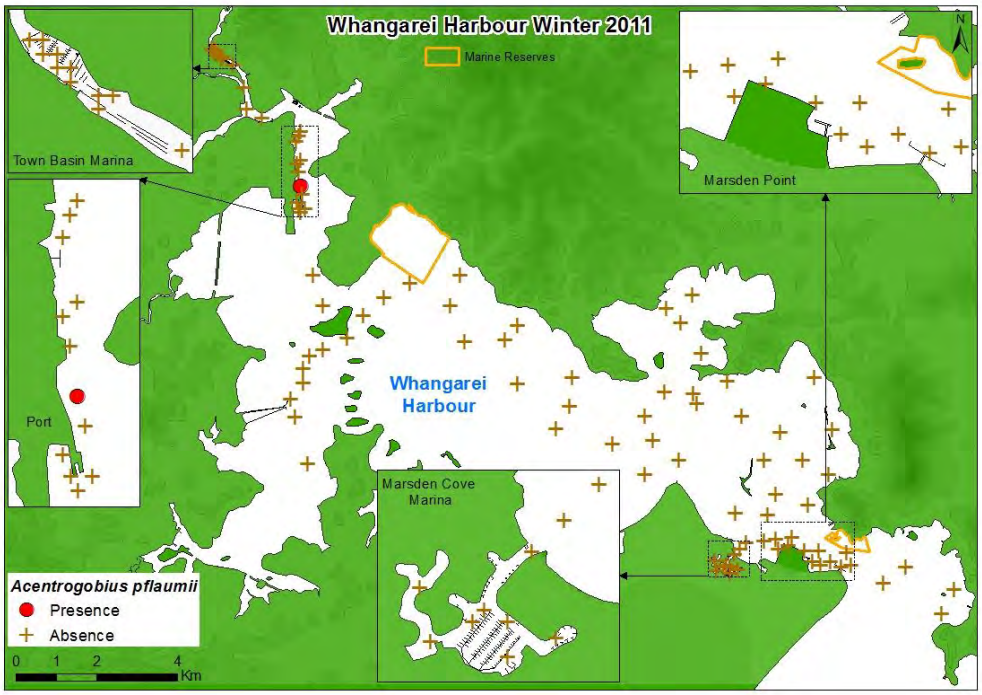
Waitemata Harbour Summer 2011-2012



Opua Winter 2011

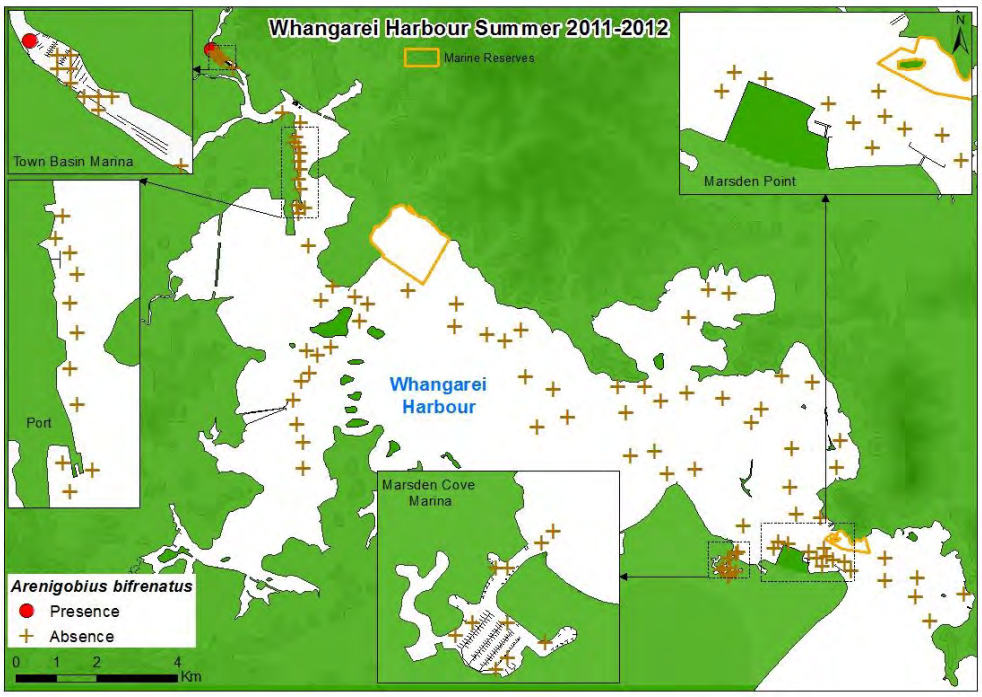


Whangarei Harbour Winter 2011



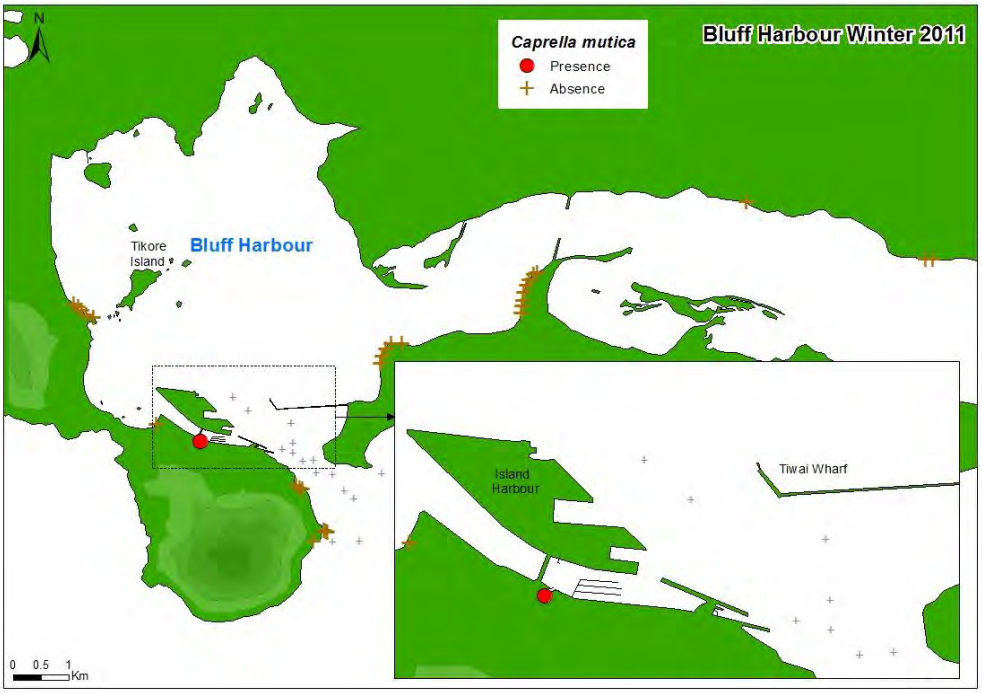
ARENIGOBIUS BIFRENATUS

Whangarei Harbour Summer 2011-2012



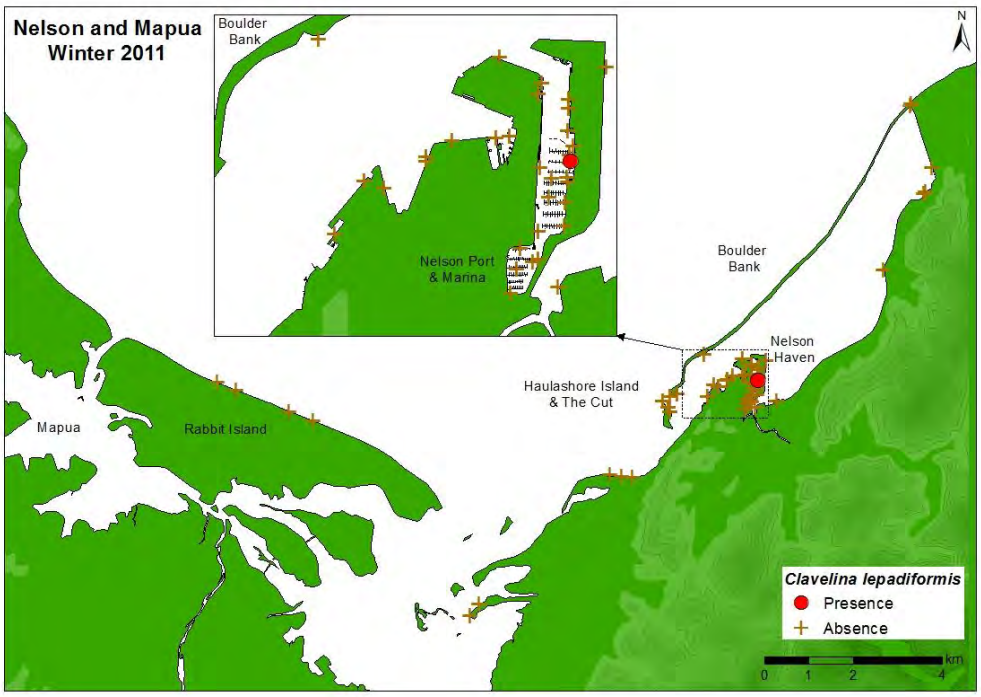
CAPRELLA MUTICA

Bluff Harbour Winter 2011

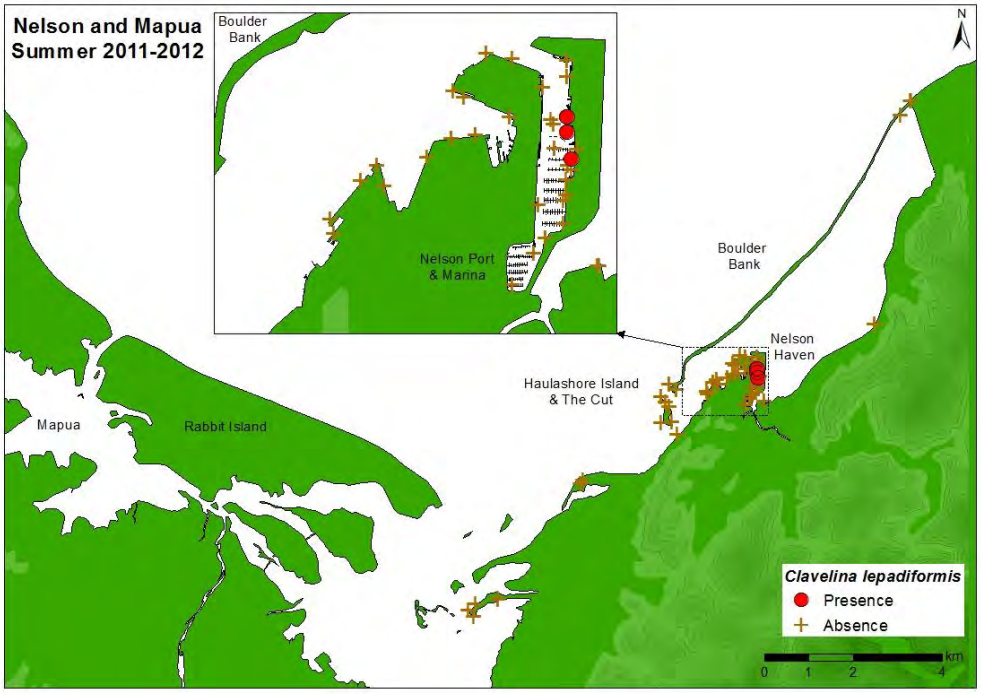


CLAVELINA LEPADIFORMIS

Nelson Winter 2011

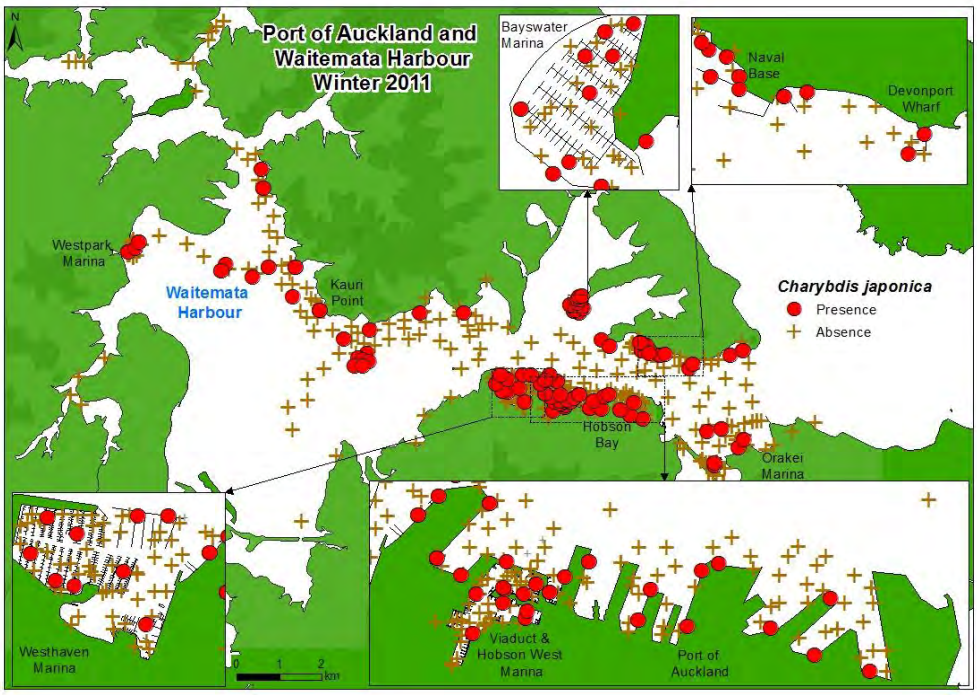


Nelson Summer 2011-2012

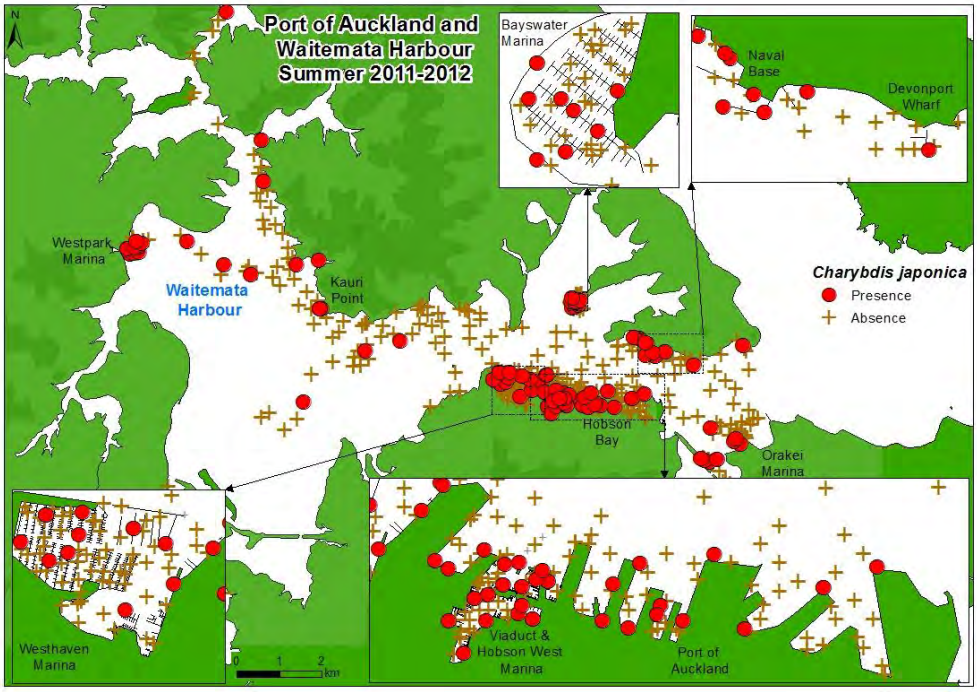


CHARYBDIS JAPONICA

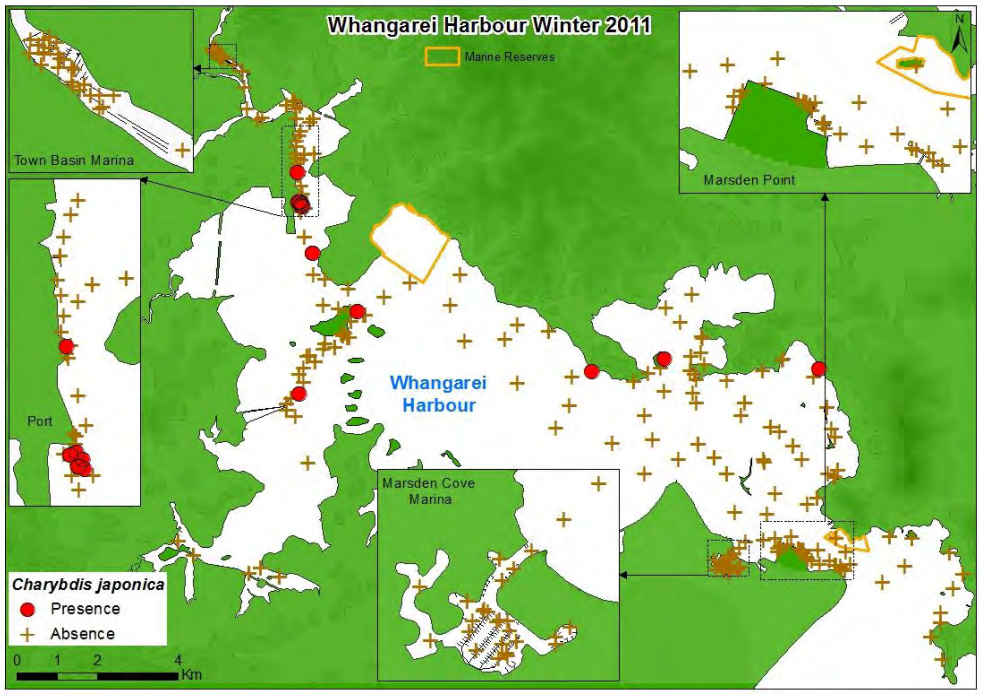
Waitemata Harbour Winter 2011



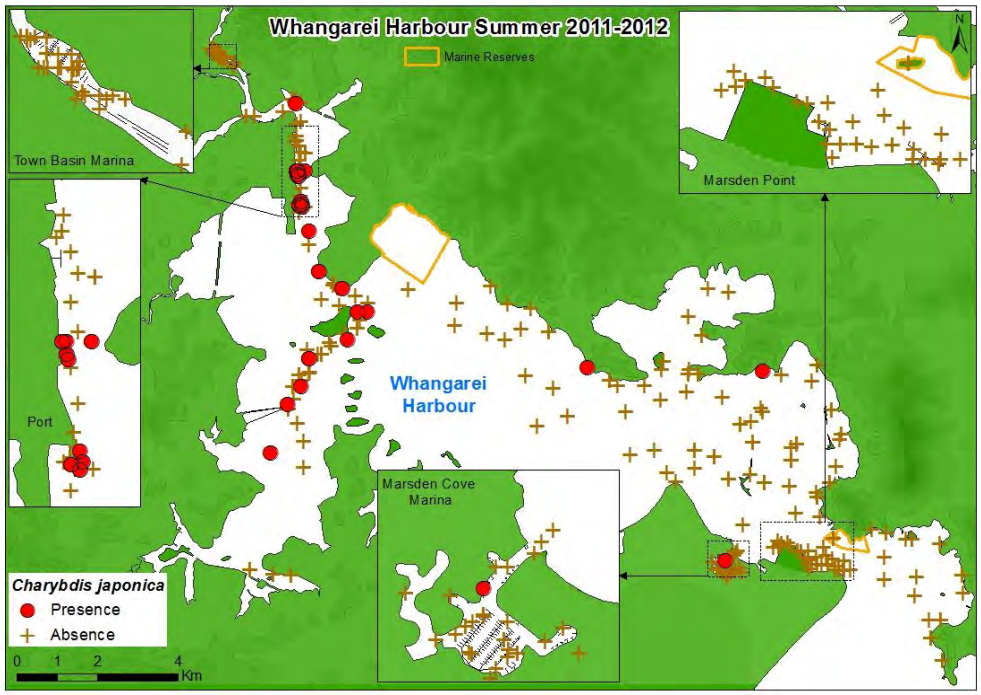
Waitemata Harbour Summer 2011-2012



Whangarei Harbour Winter 2011

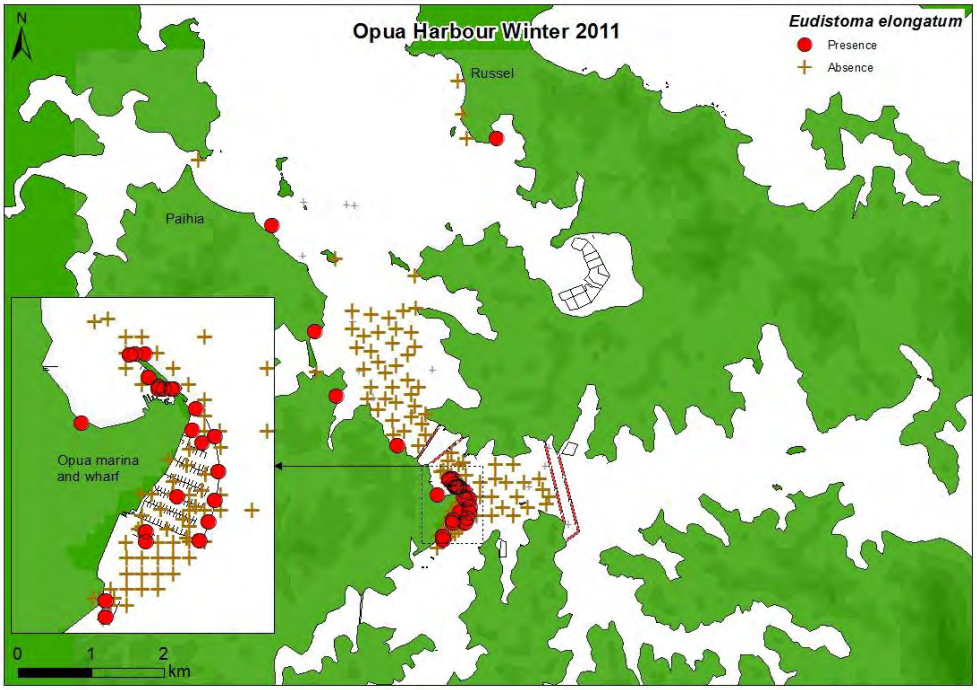


Whangarei Harbour Summer 2011-2012

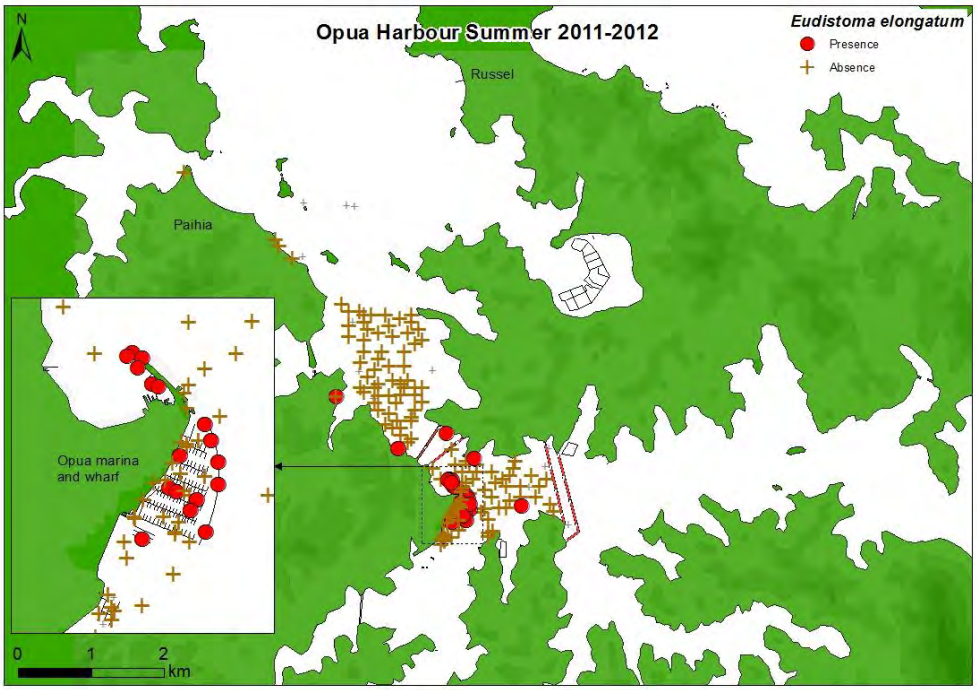


EUDISTOMA ELONGATUM

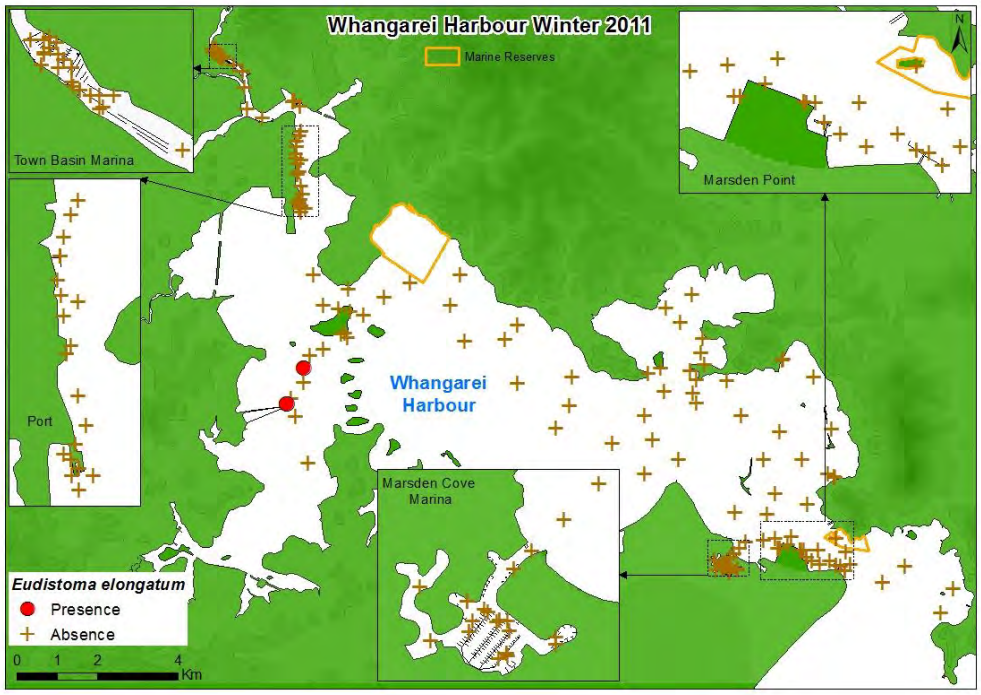
Opua Winter 2011



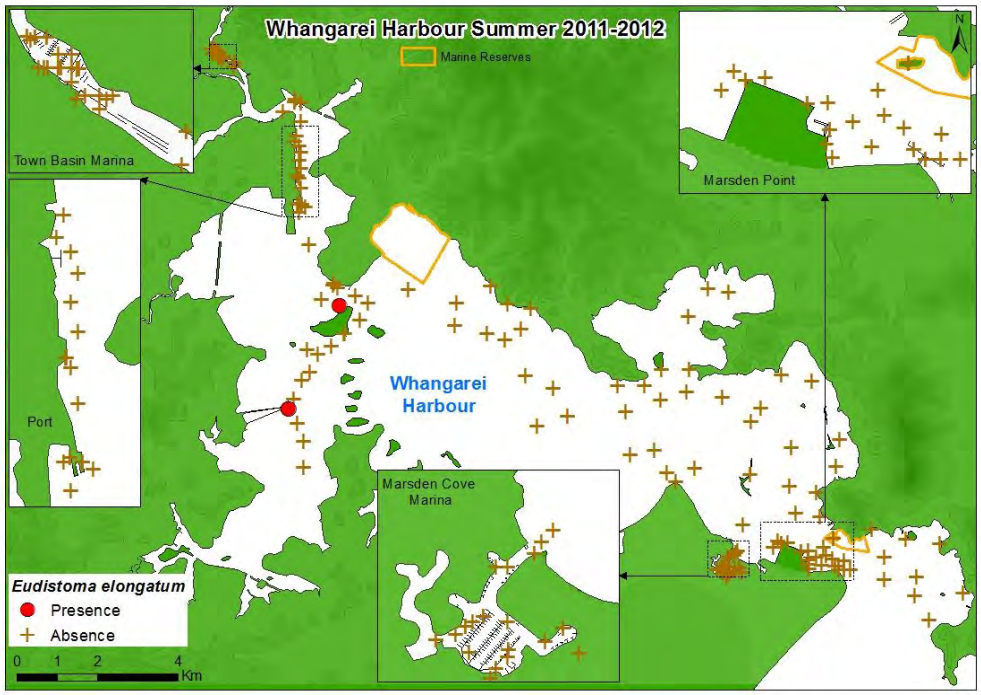
Opua Summer 2011-2012



Whangarei Harbour Winter 2011

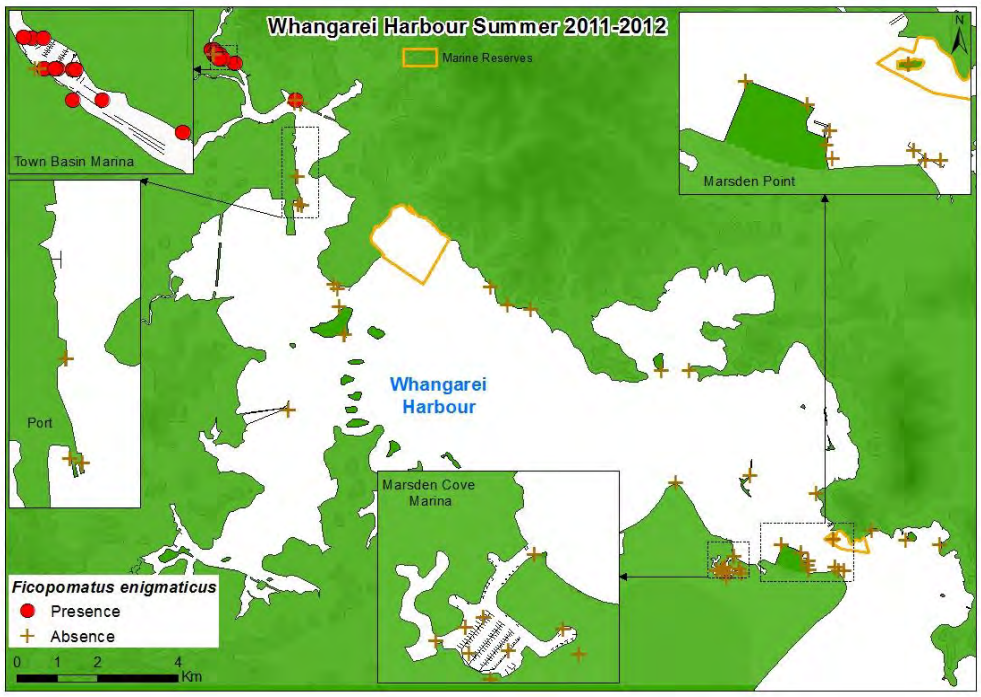


Whangarei Harbour Summer 2011-2012



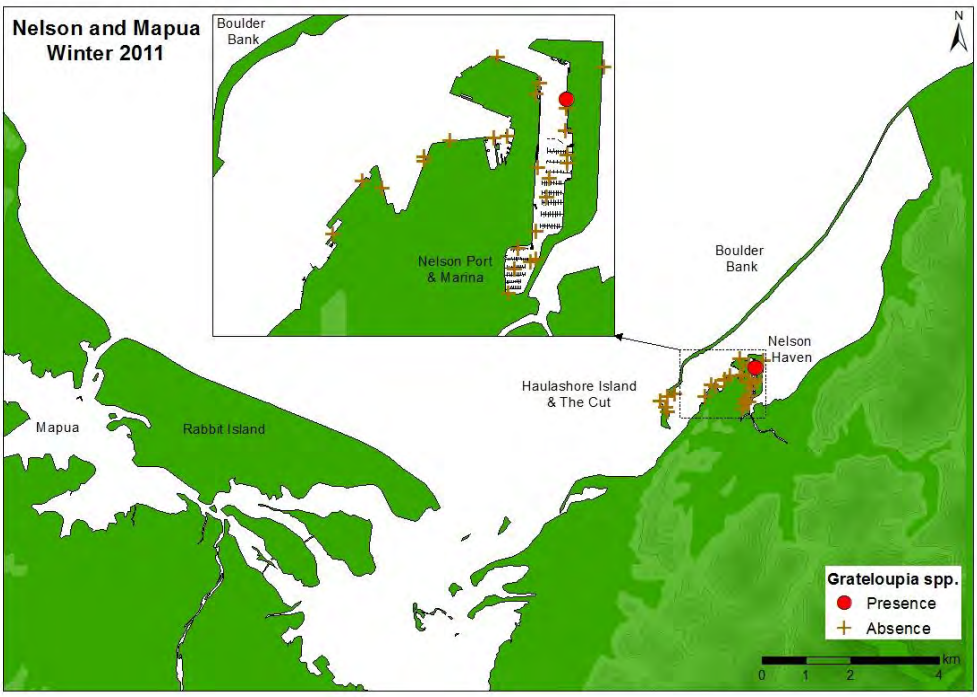
FICOPOMATUS ENIGMATICUS

Whangarei Harbour Summer 2011-2012

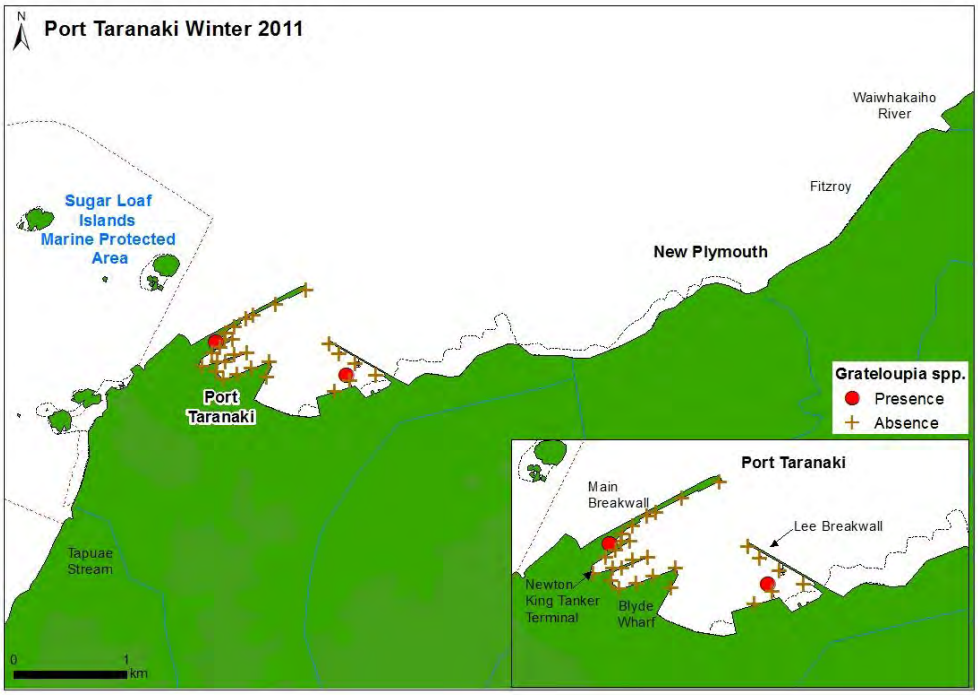


GRATELOUPIA TURUTURU

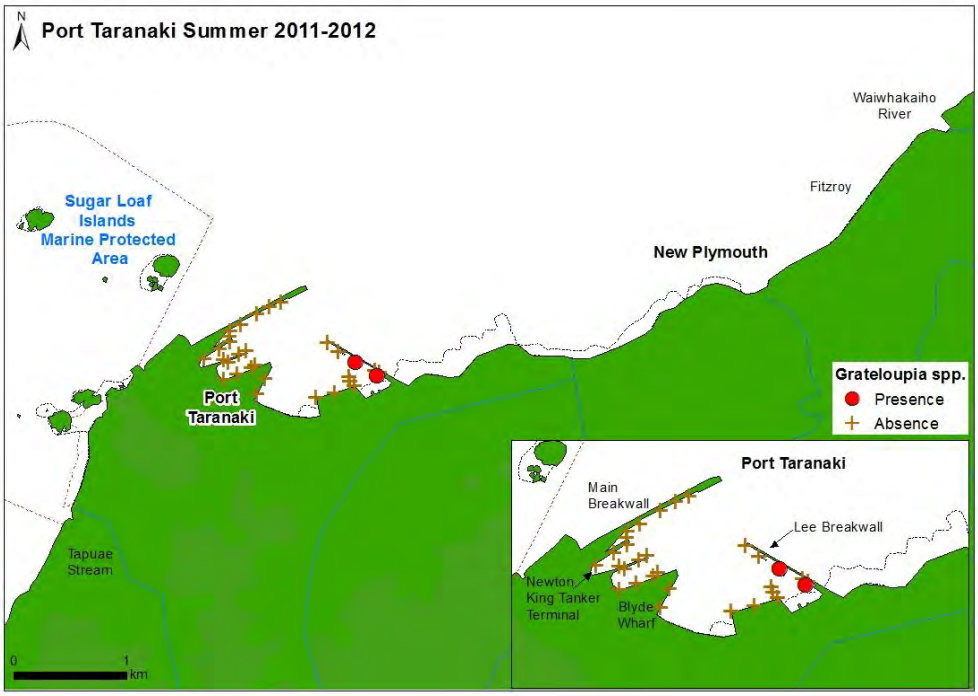
Nelson Winter 2011



New Plymouth Winter 2011-

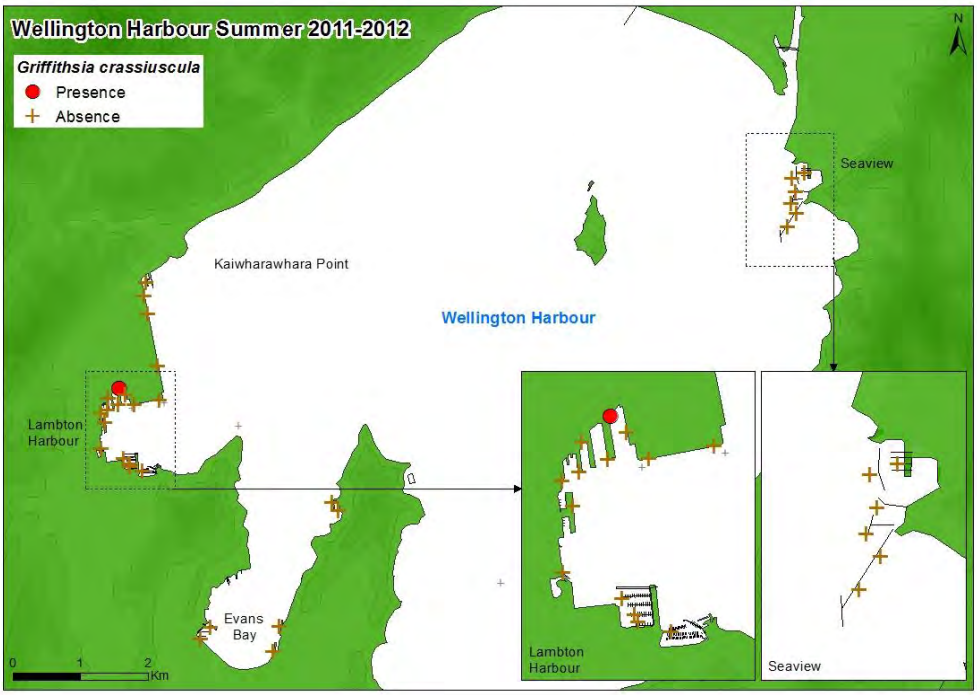


New Plymouth Summer 2011-2012



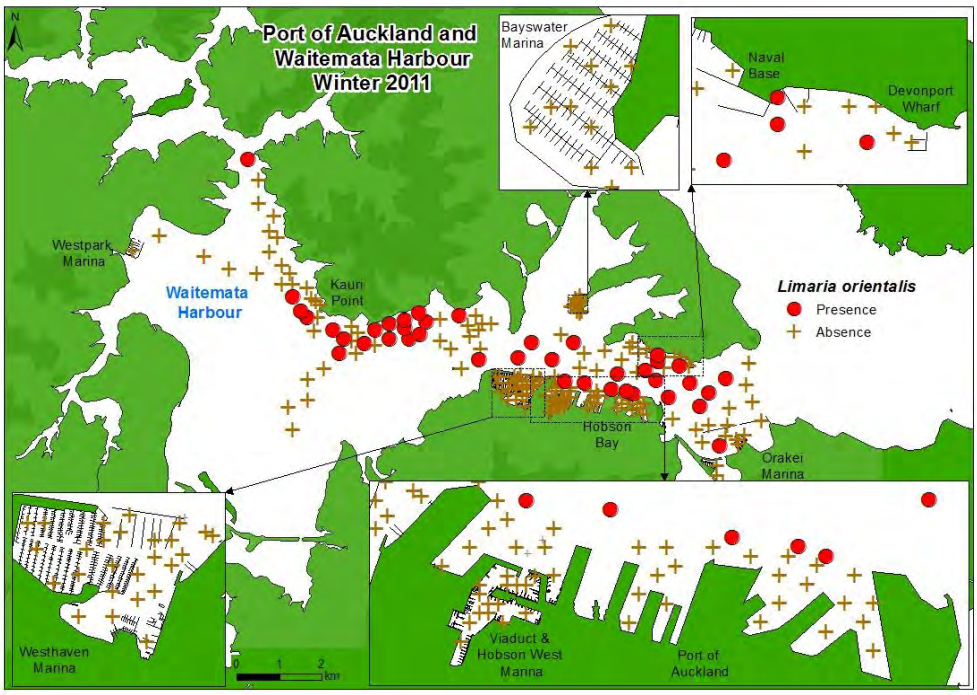
GRIFFITHSIA CRASSIUSCULA

Wellington Summer 2011-2012

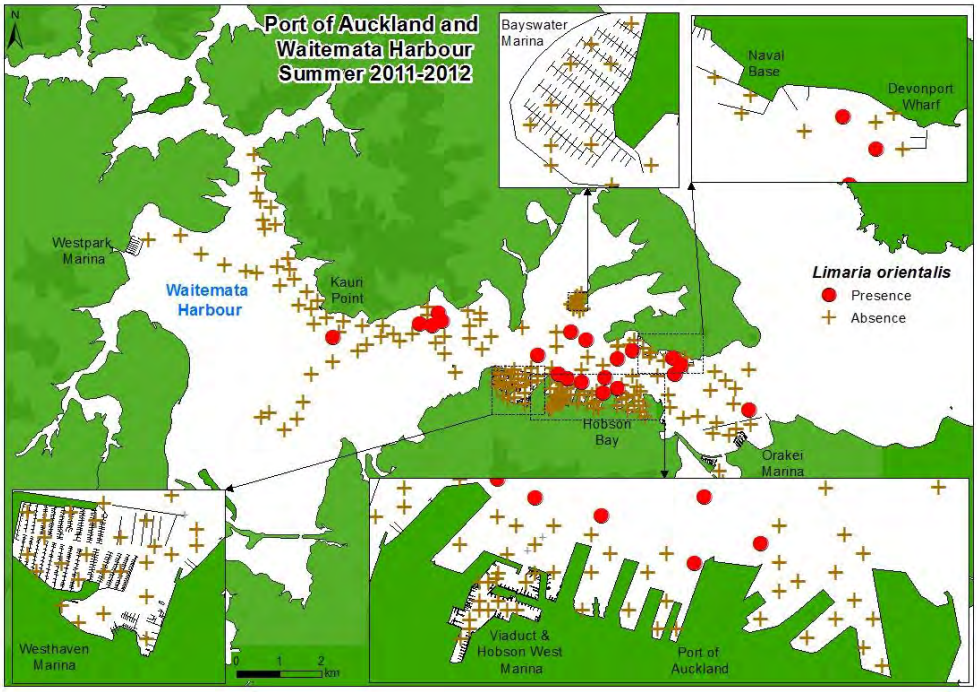


LIMARIA ORIENTALIS

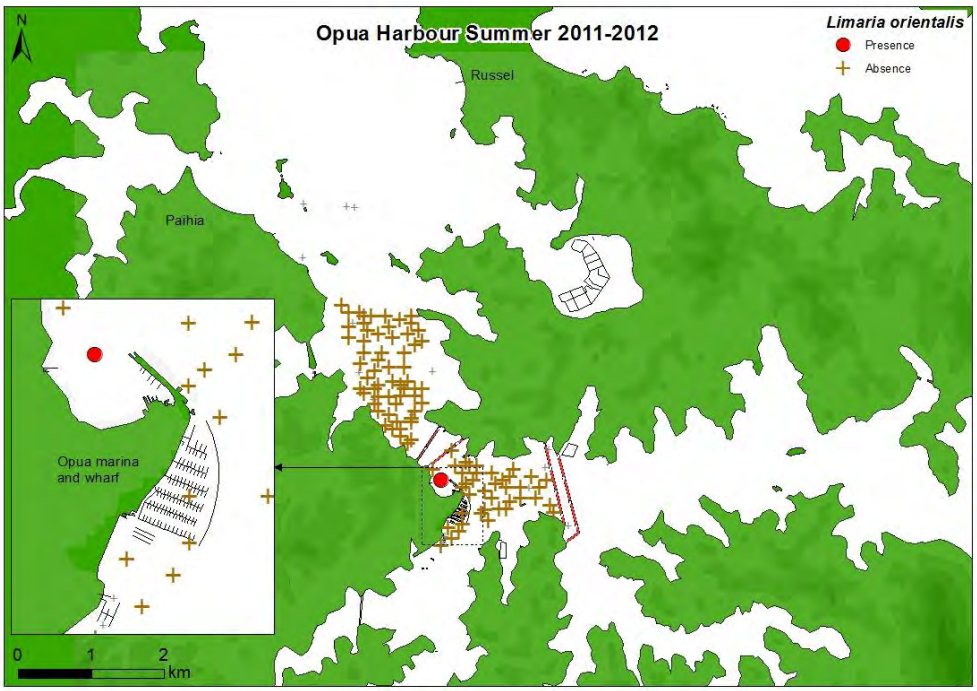
Waitemata Harbour Winter 2011



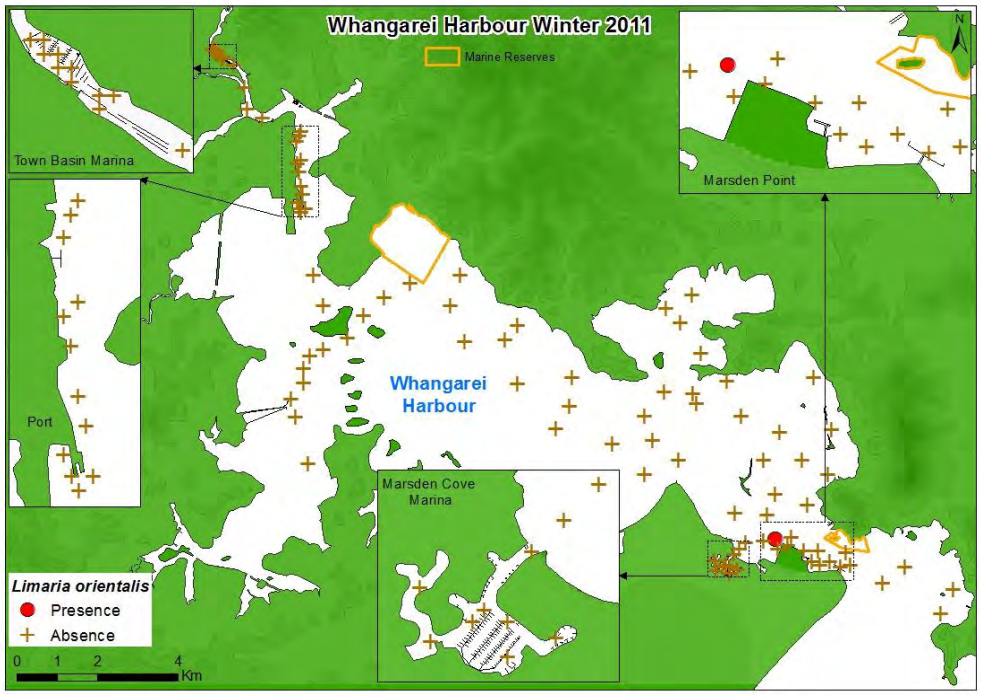
Waitemata Harbour Summer 2011-2012



Opua Summer 2011-2012

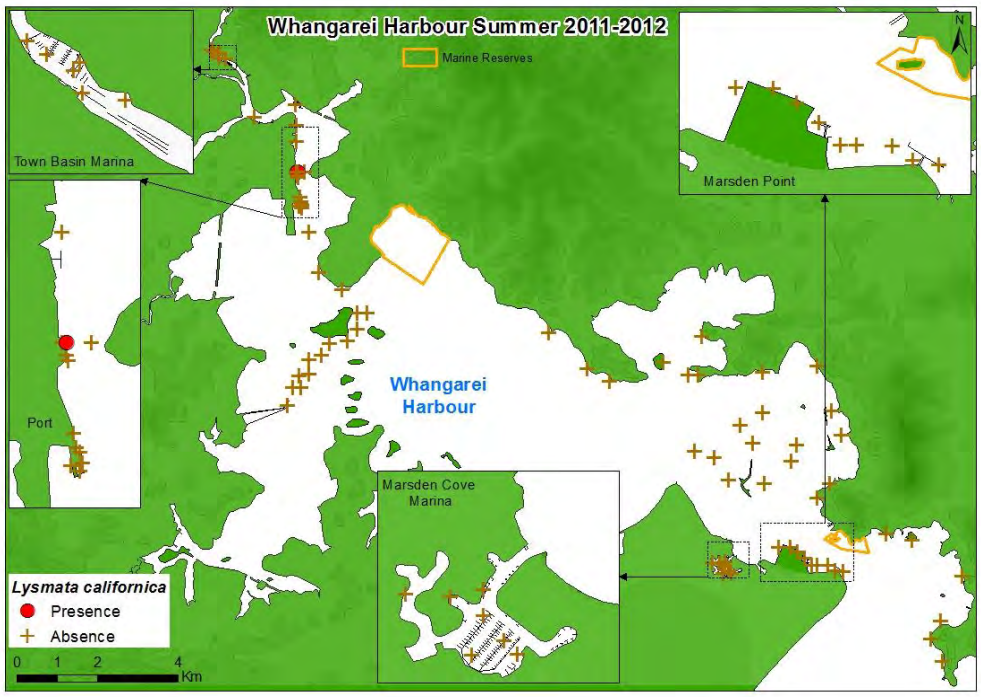


Whangarei Harbour Winter 2011



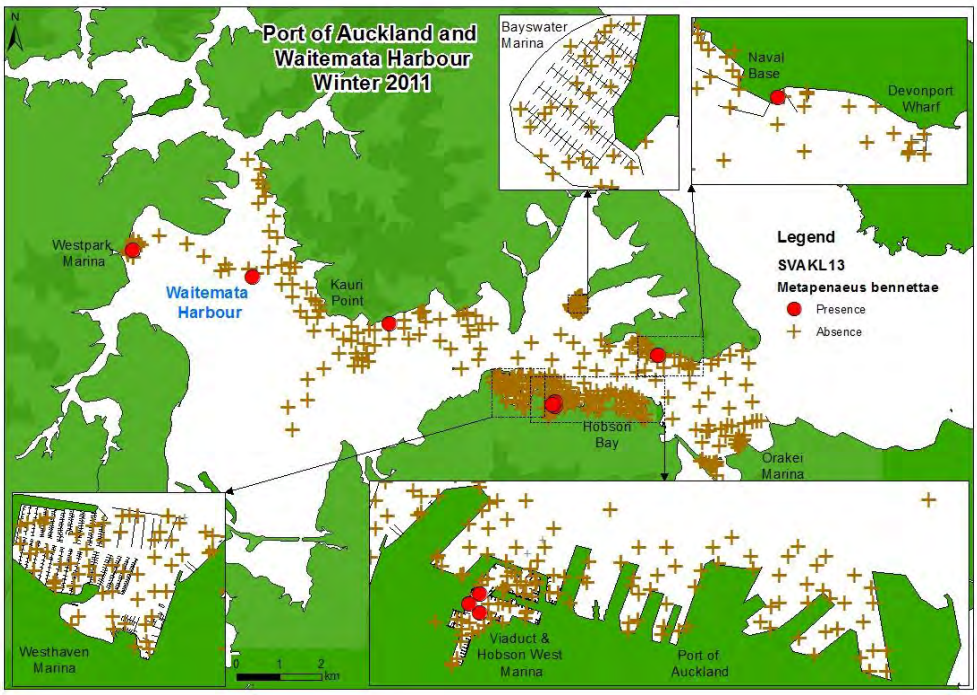
LYSMATA CALIFORNICA

Whangarei Harbour Summer 2011-2012

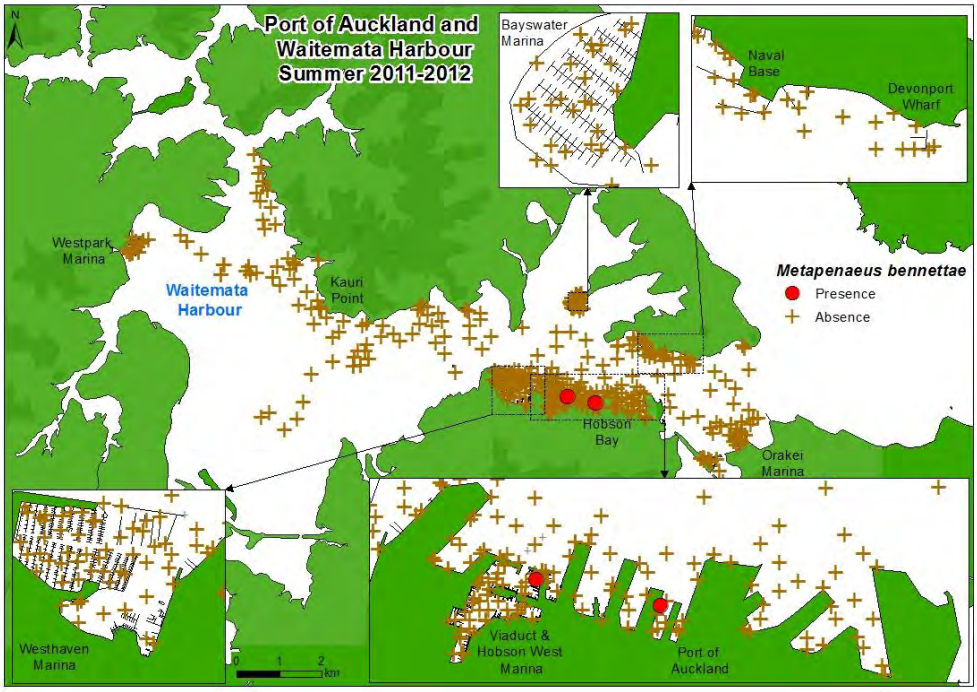


METAPENAEUS BENNETTAE

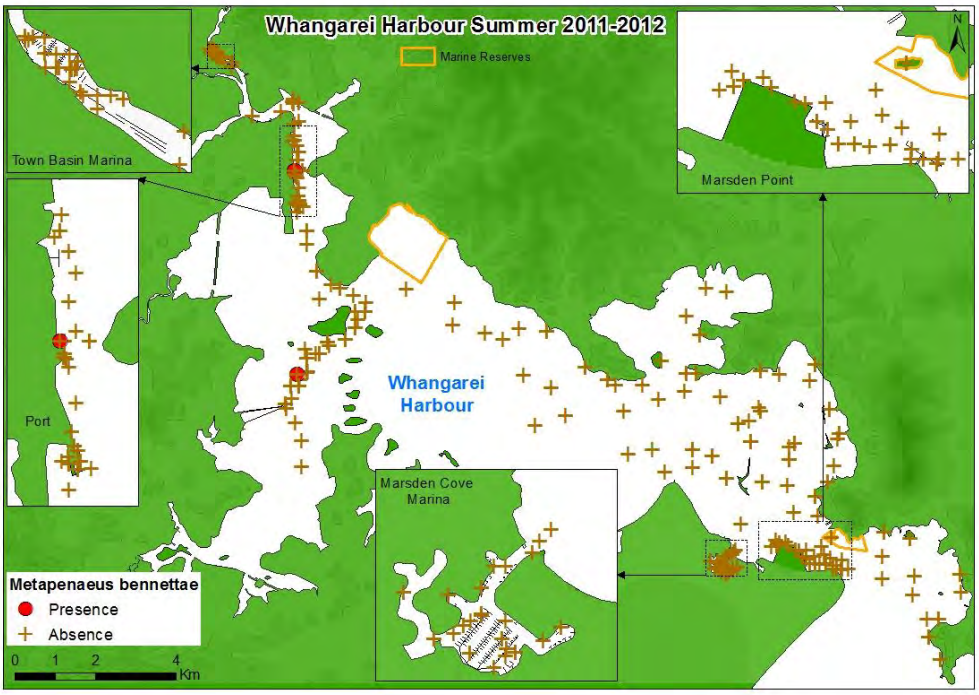
Waitemata Harbour Winter 2011



Waitemata Harbour Summer 2011-2012

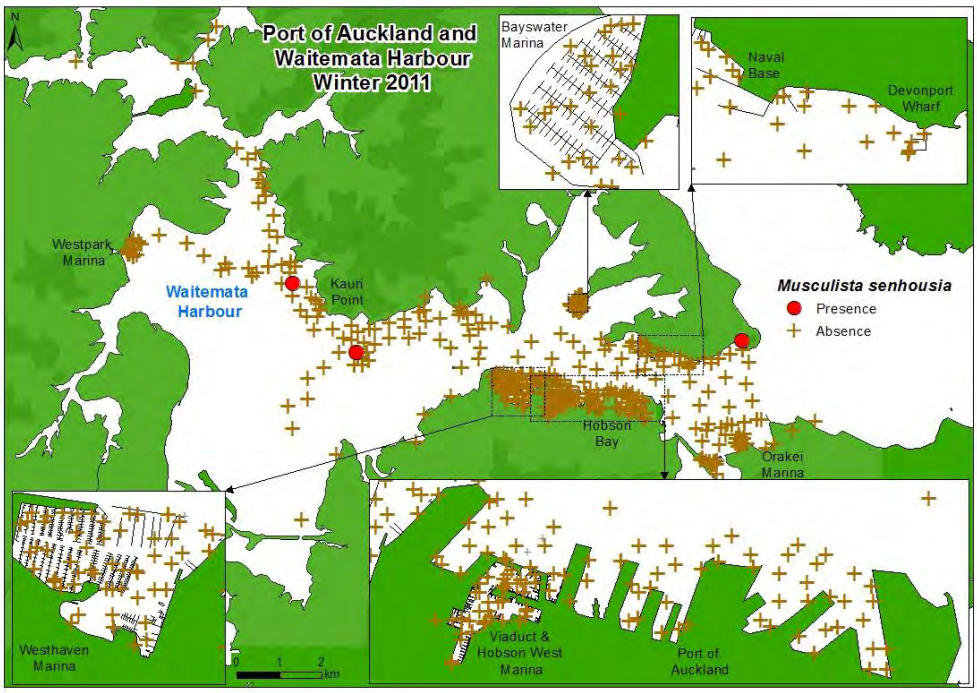


Whangarei Harbour Summer 2011-2012

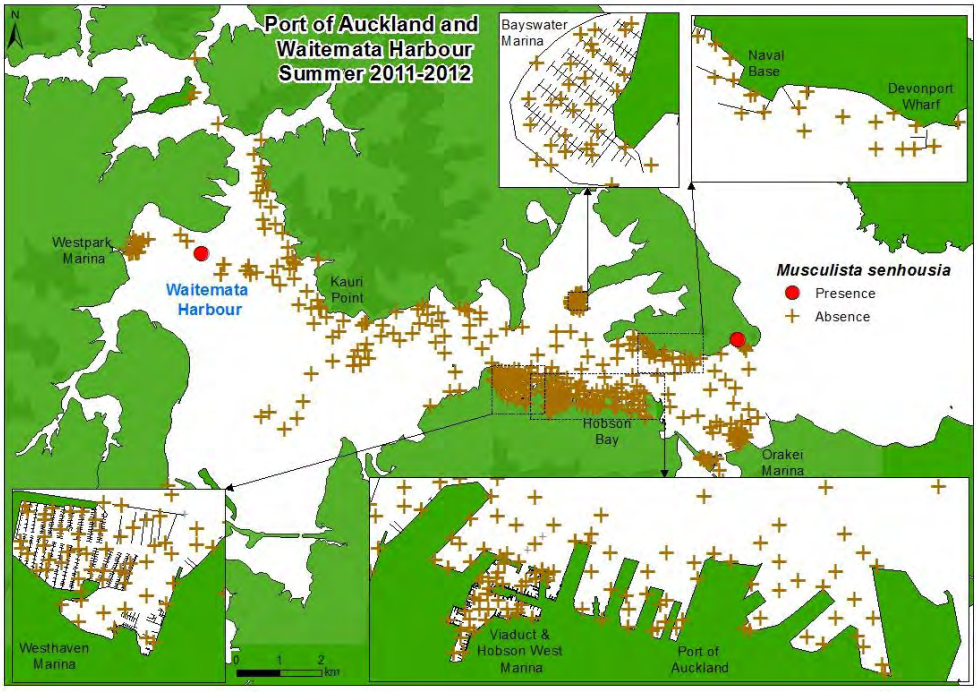


MUSCULISTA SENHOUSIA

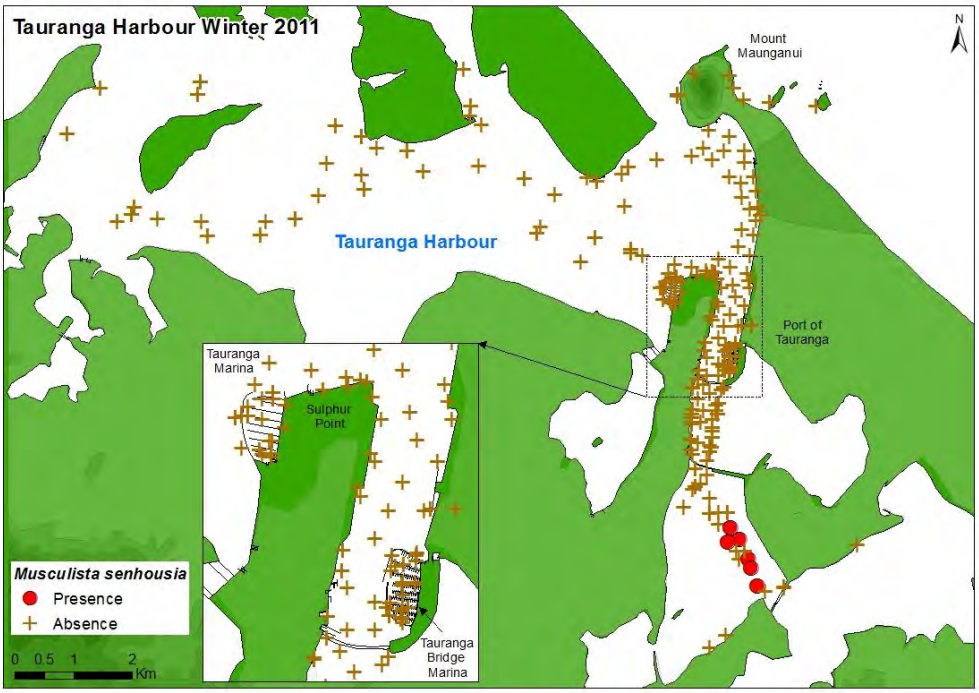
Waitemata Harbour Winter 2011



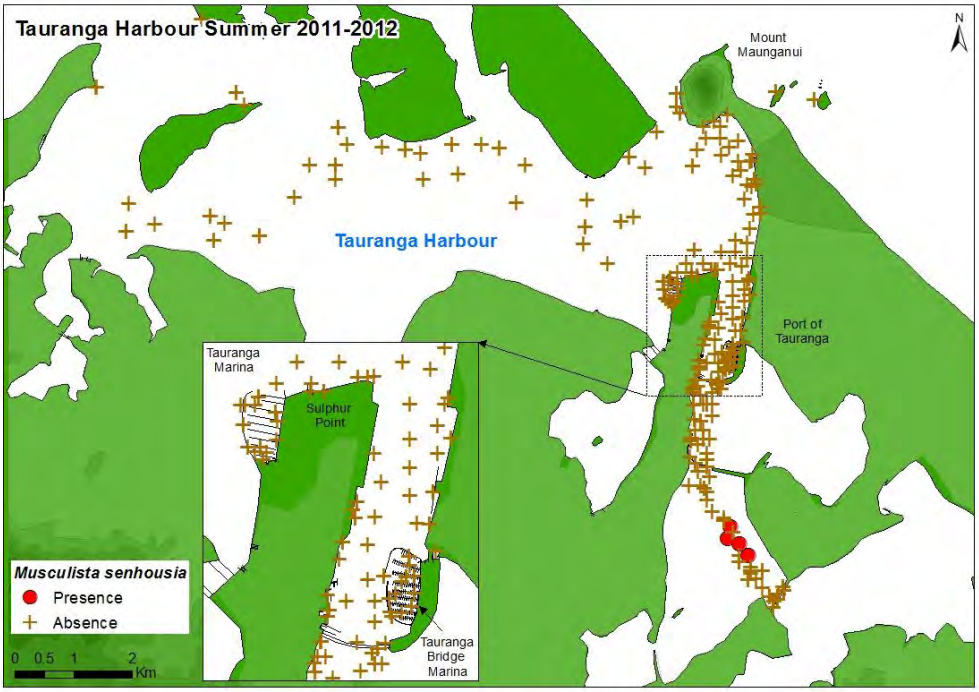
Waitemata Harbour Summer 2011-2012



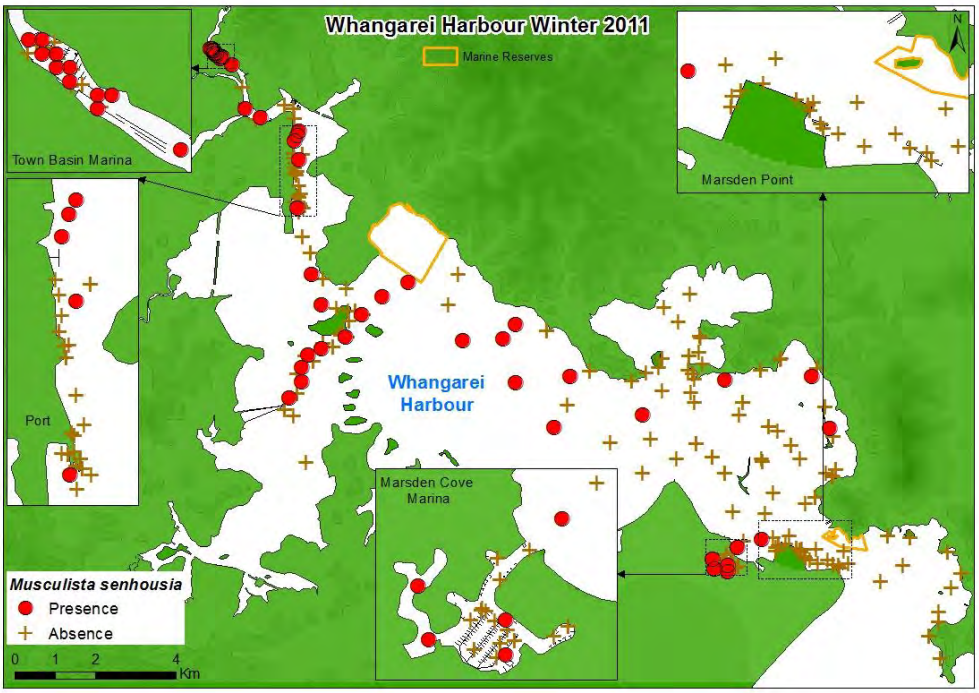
Tauranga Harbour Winter 2011



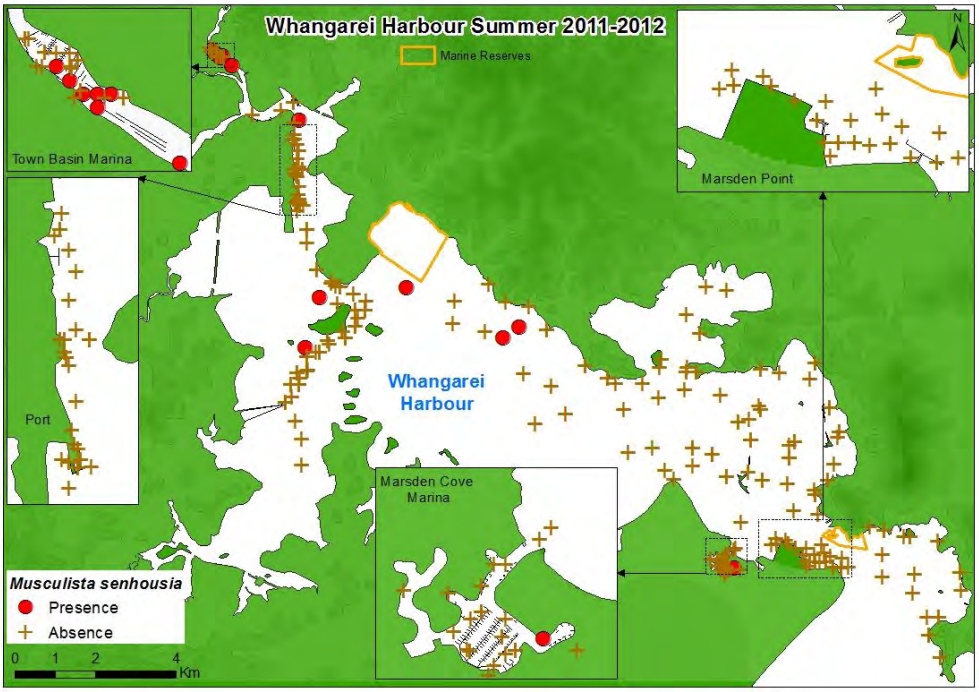
Tauranga Harbour Summer 2011-2012



Whangarei Harbour Winter 2011

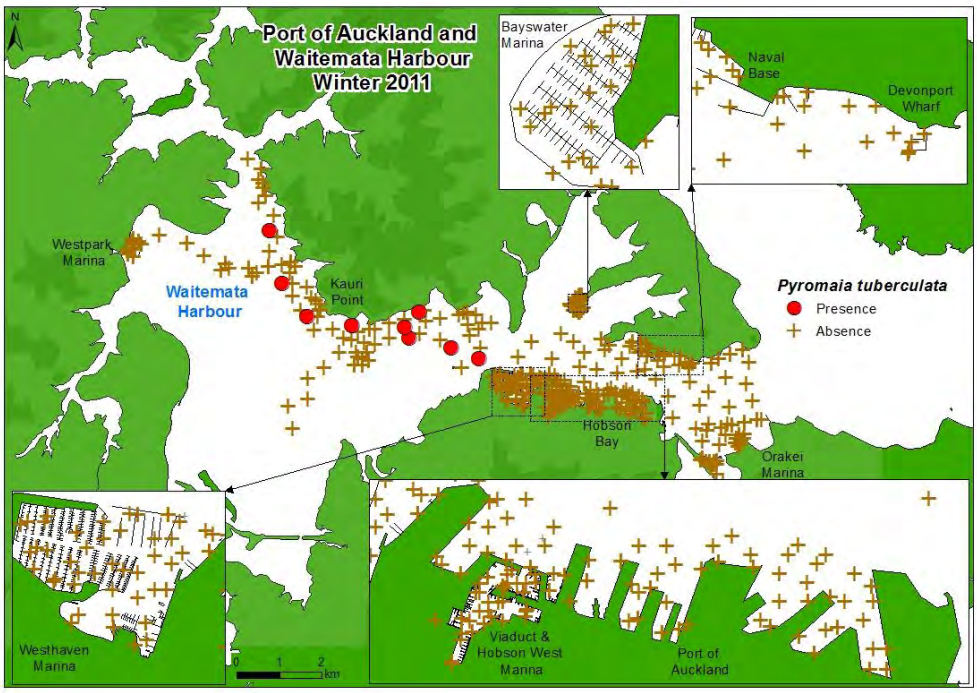


Whangarei Harbour Summer 2011-2012

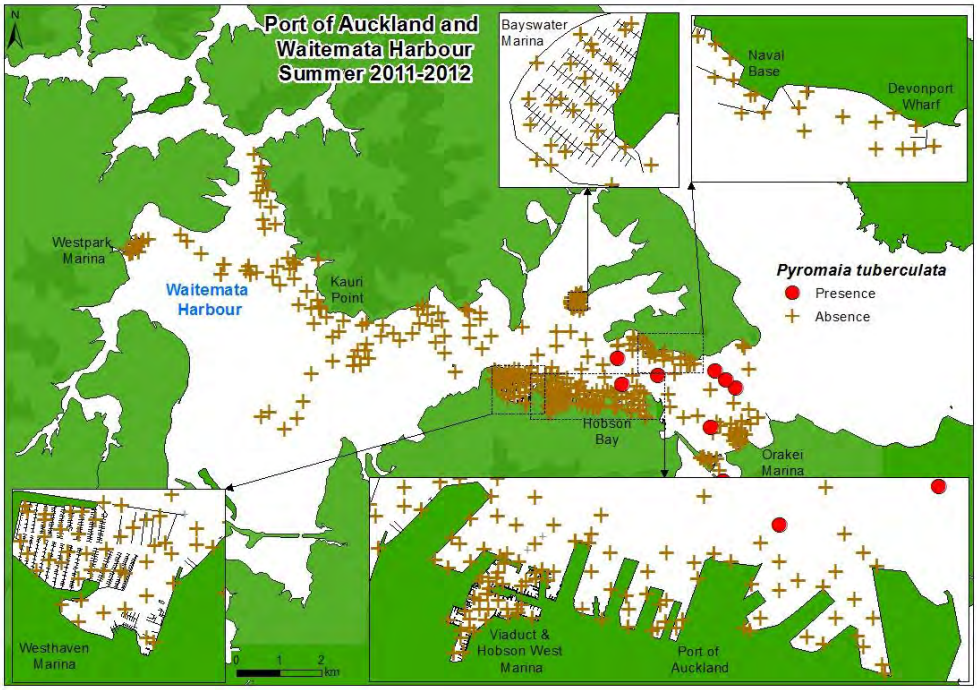


PYROMAIA TUBERCULATA

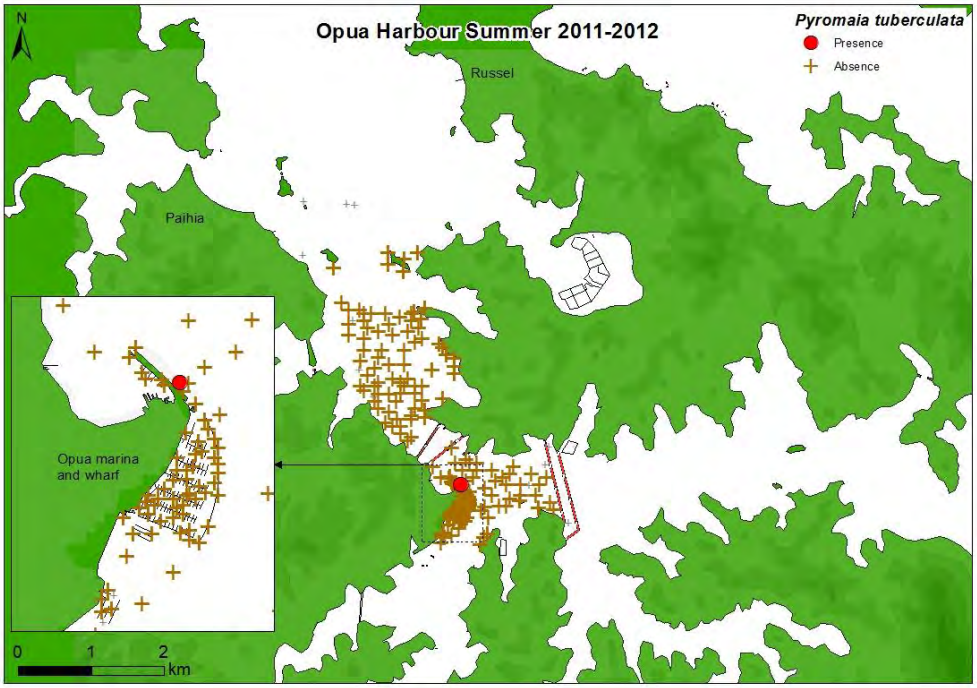
Waitemata Harbour Winter 2011



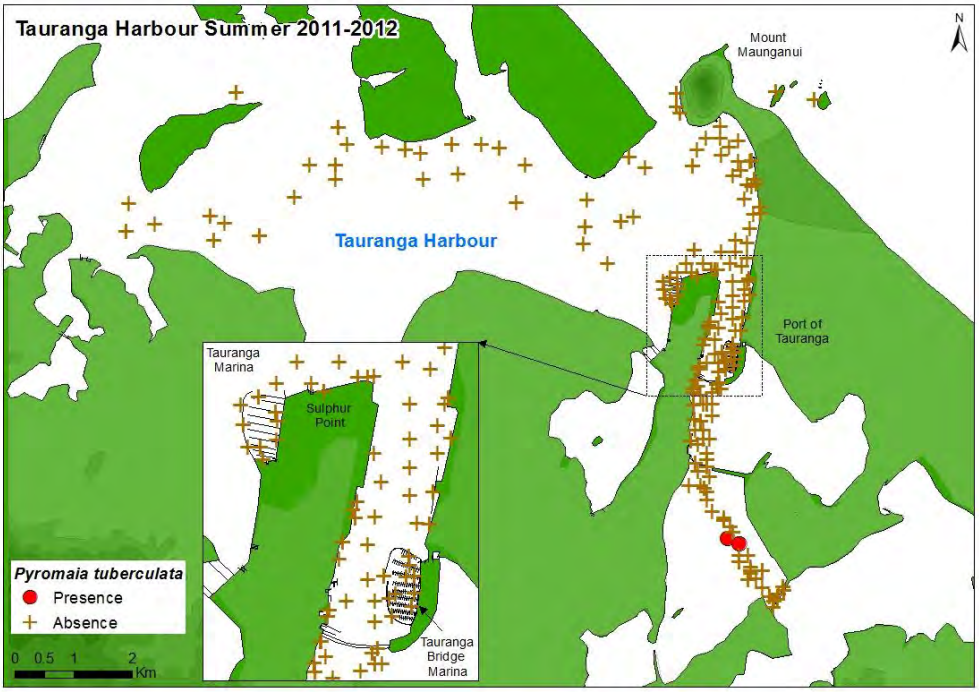
Waitemata Harbour Summer 2011-2012



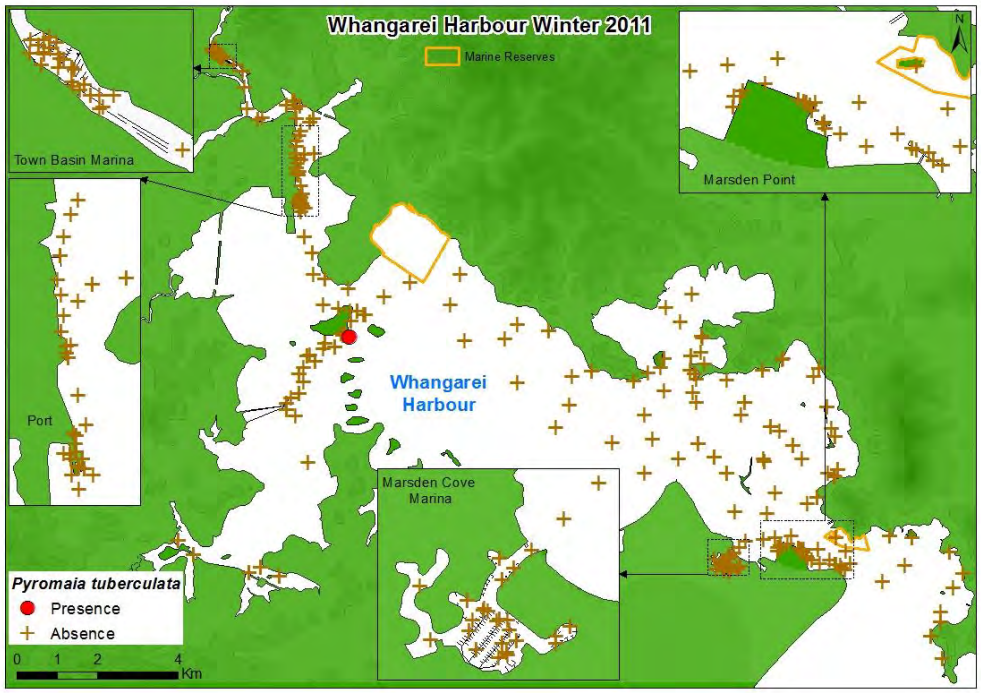
Opua Summer 2011-2012



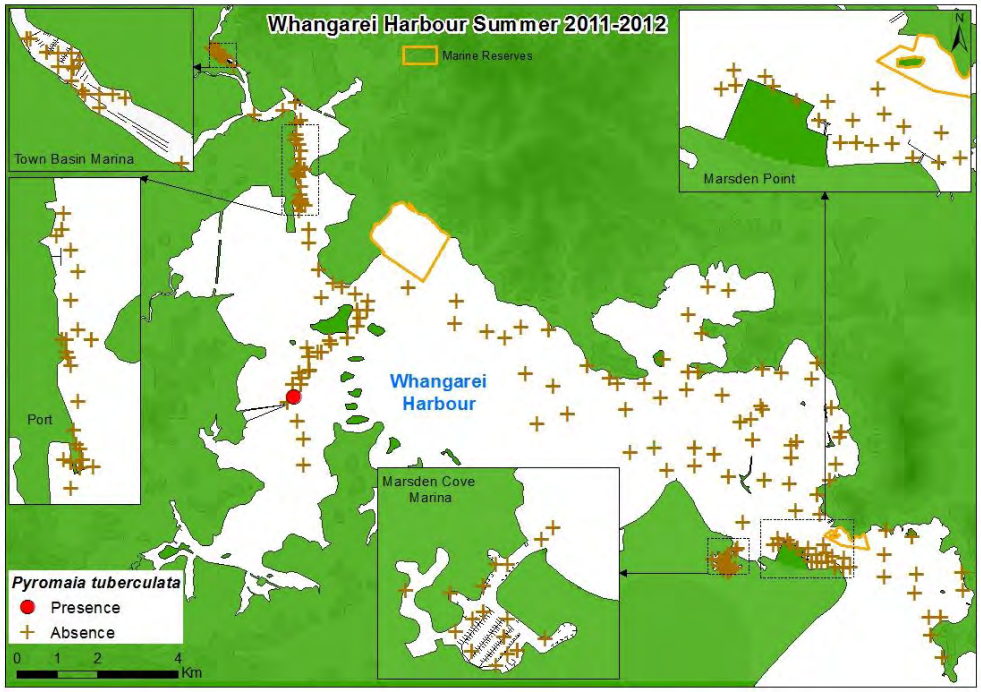
Tauranga Harbour Summer 2011-2012



Whangarei Harbour Winter 2011

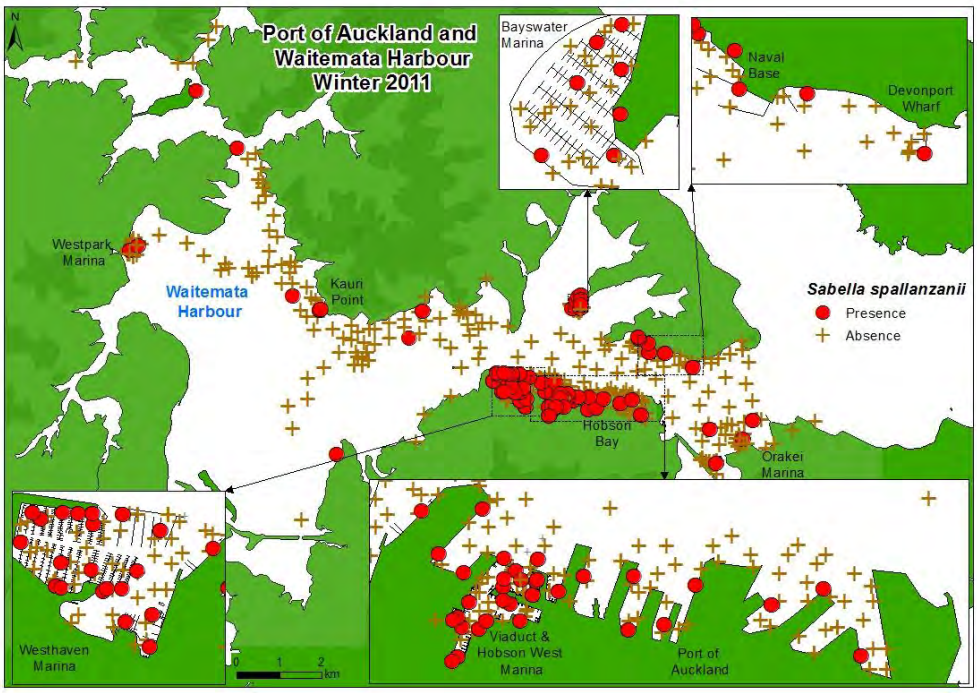


Whangarei Harbour Summer 2011-2012

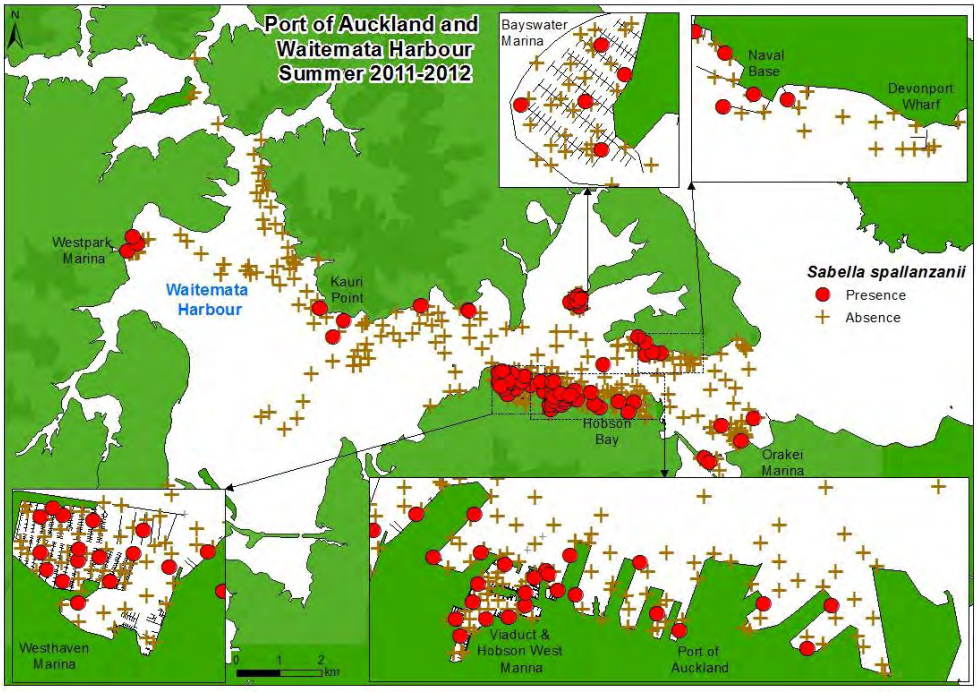


SABELLA SPALLANZANII

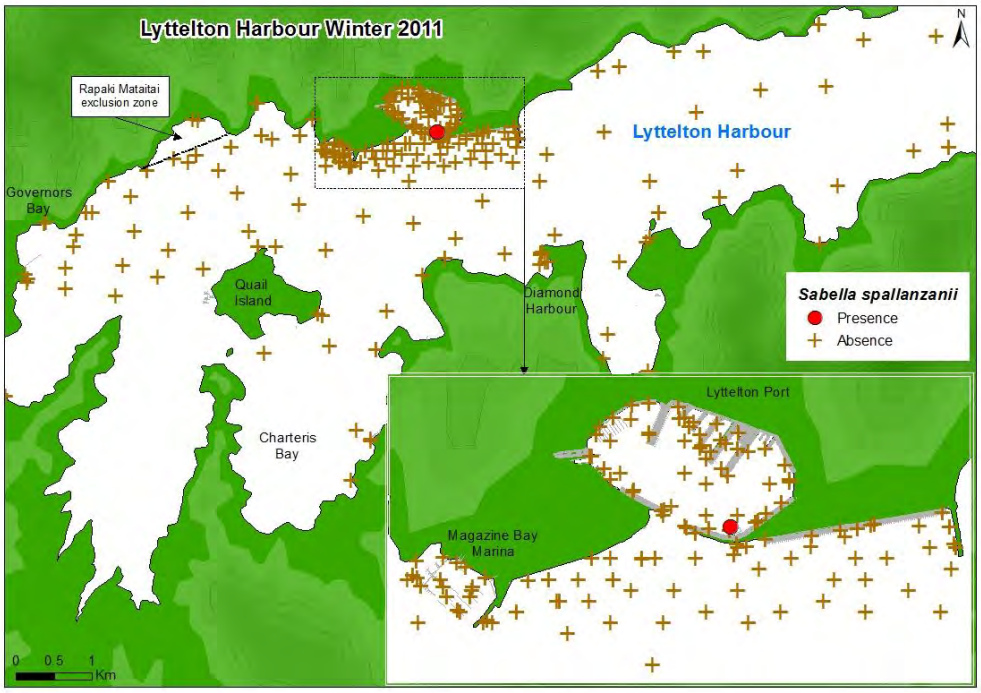
Waitemata Harbour Winter 2011



Waitemata Harbour Summer 2011-2012

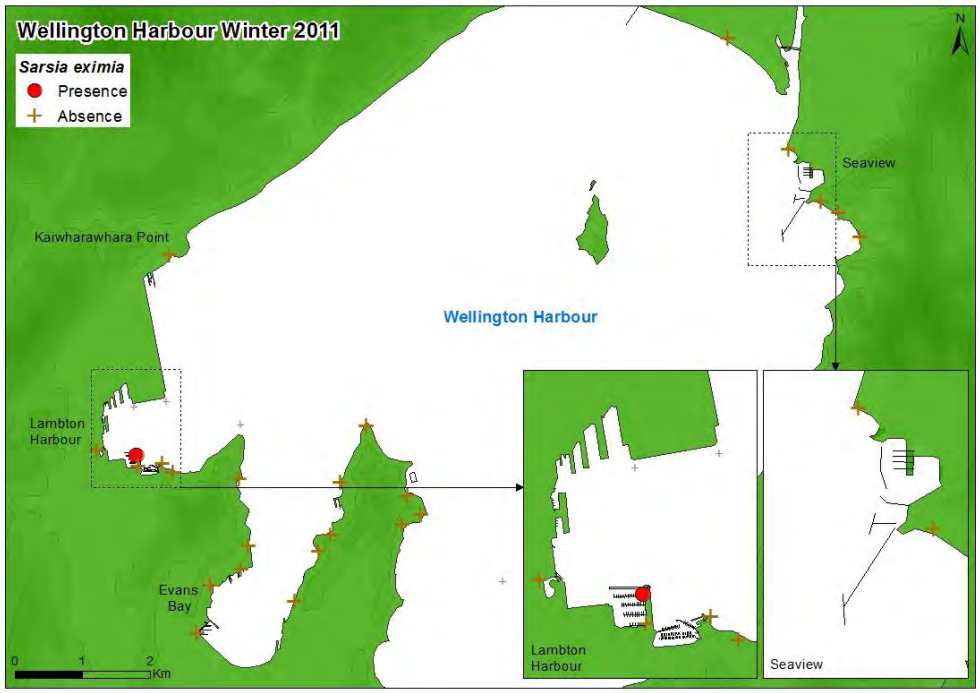


Lyttelton Harbour Winter 2011



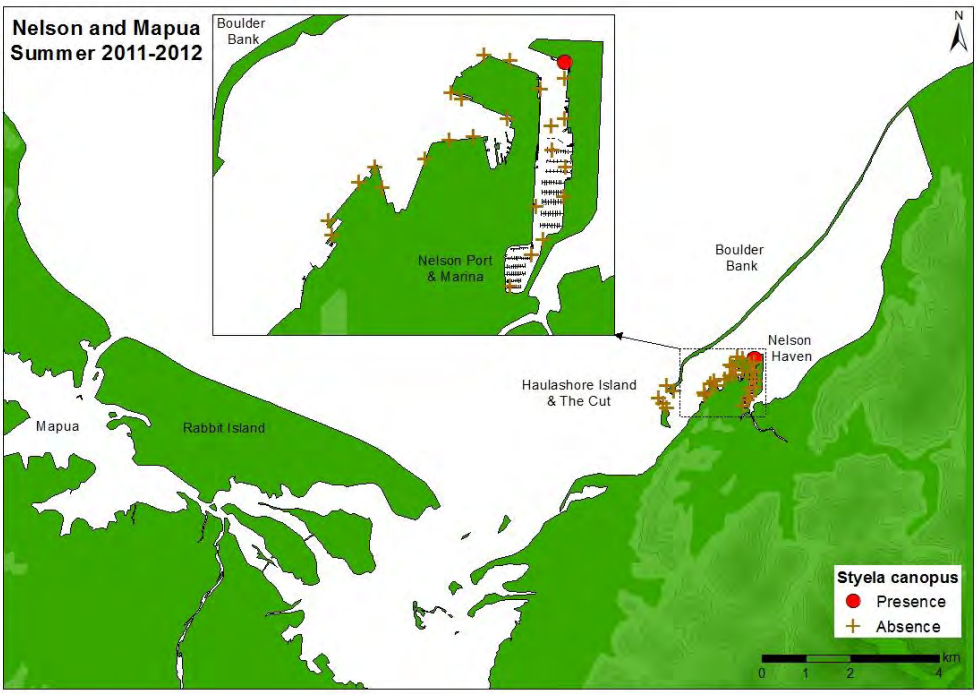
SARSIA EXIMIA

Wellington Harbour Winter 2011



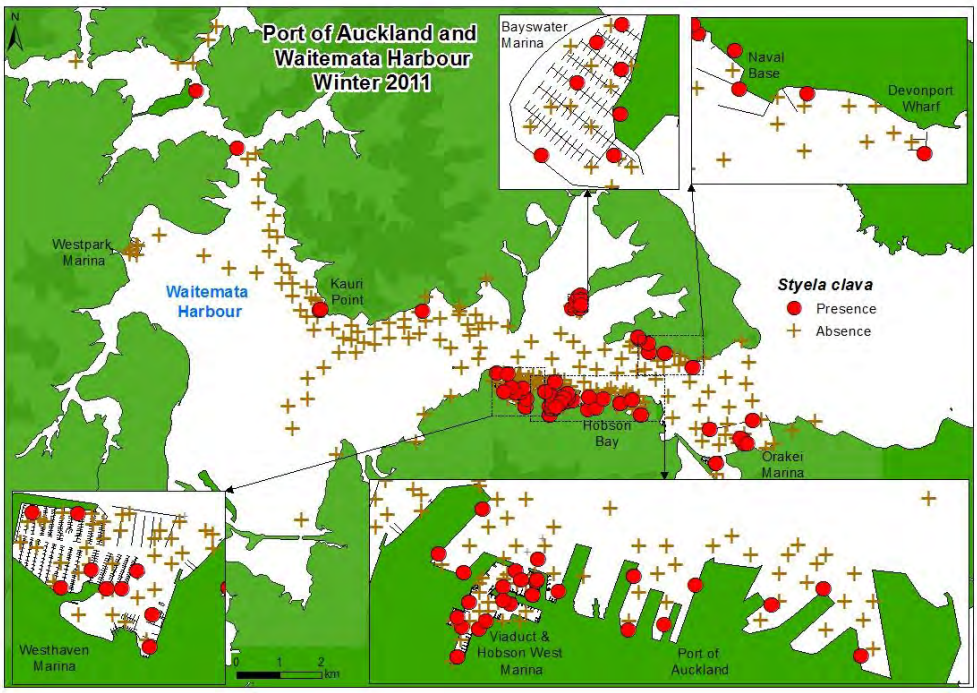
STYELA CANOPUS

Nelson Summer 2011-2012

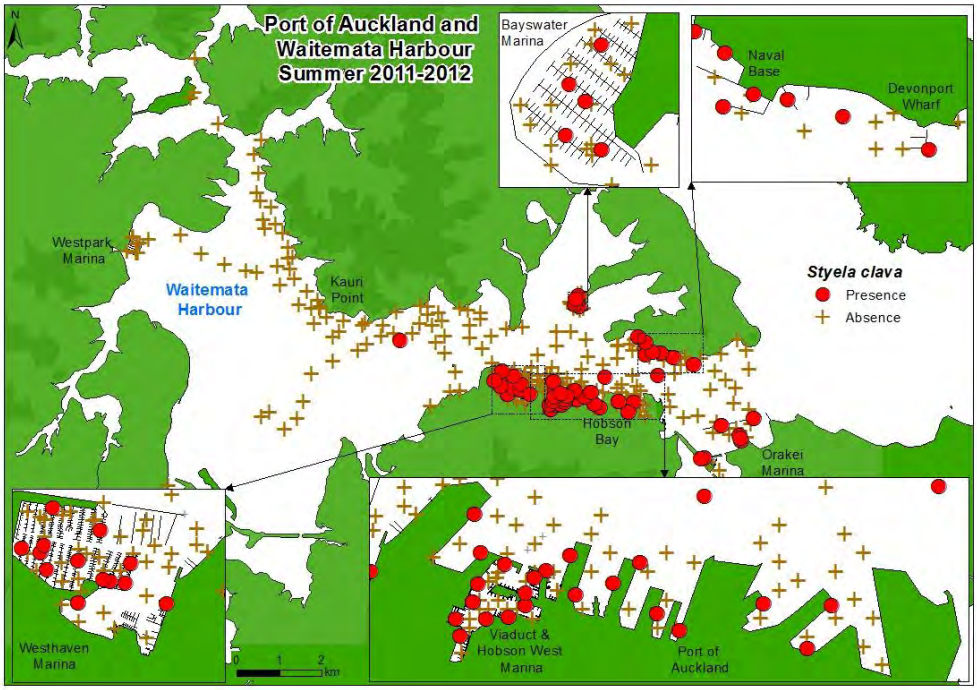


STYELA CLAVA

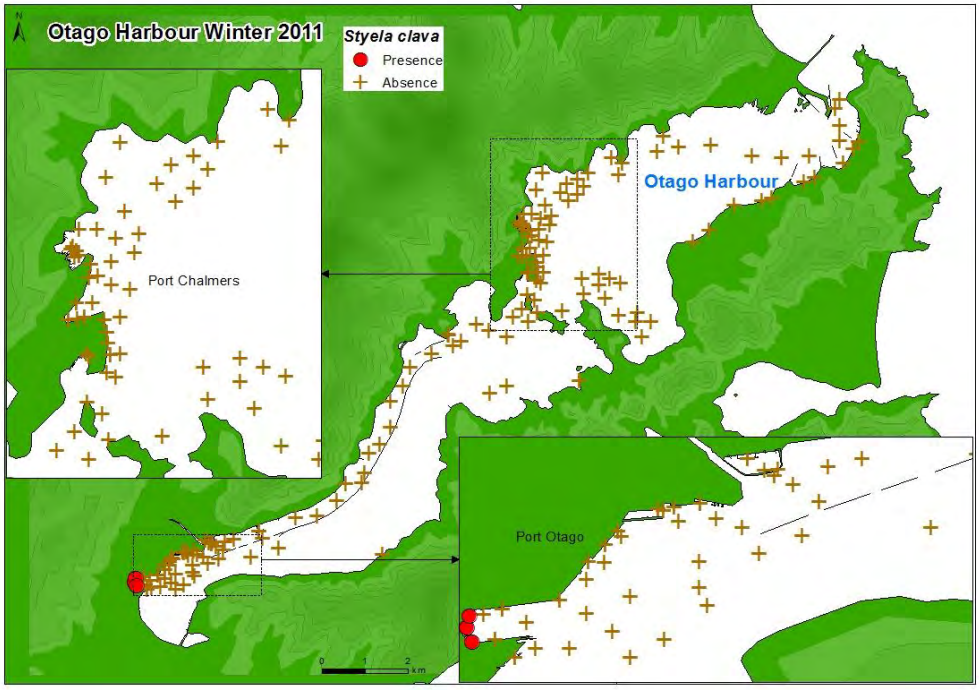
Waitemata Harbour Winter 2011



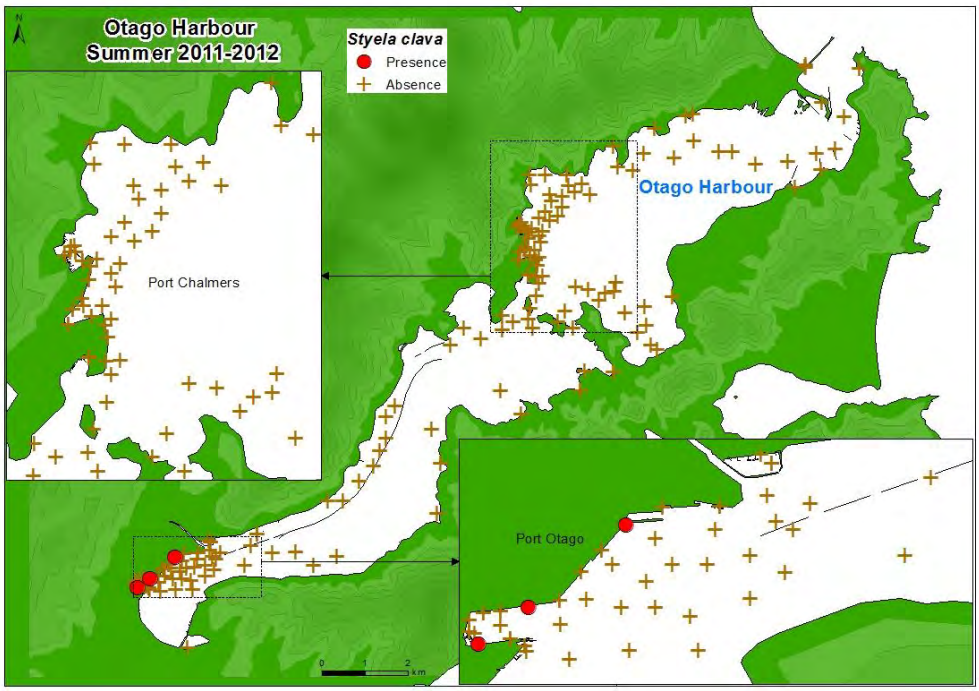
Waitemata Harbour Summer 2011-2012



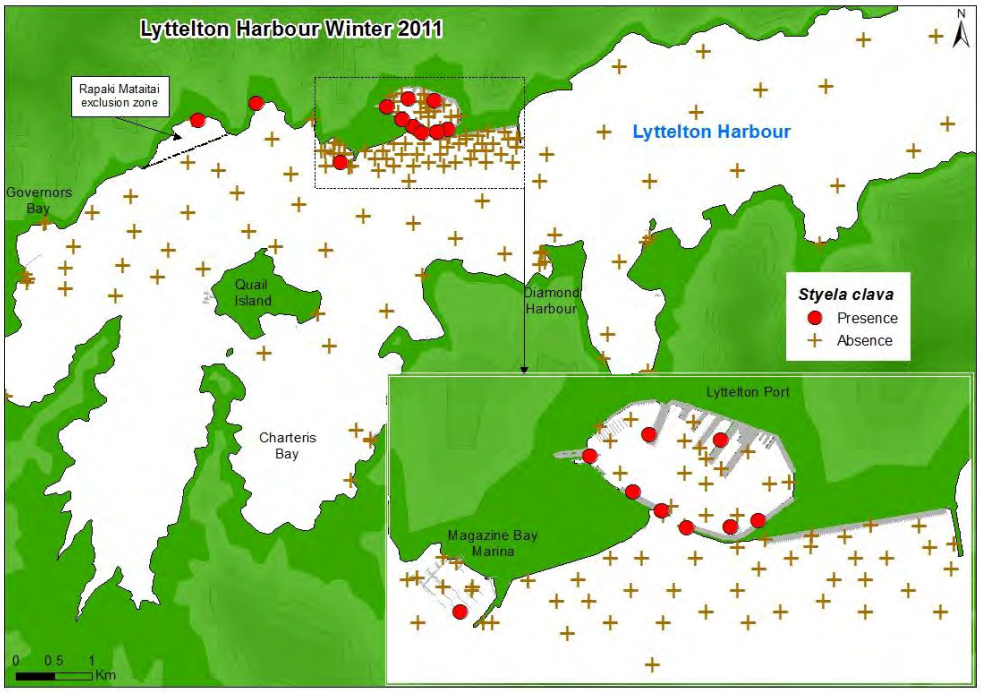
Dunedin (Otago Harbour) Winter 2011



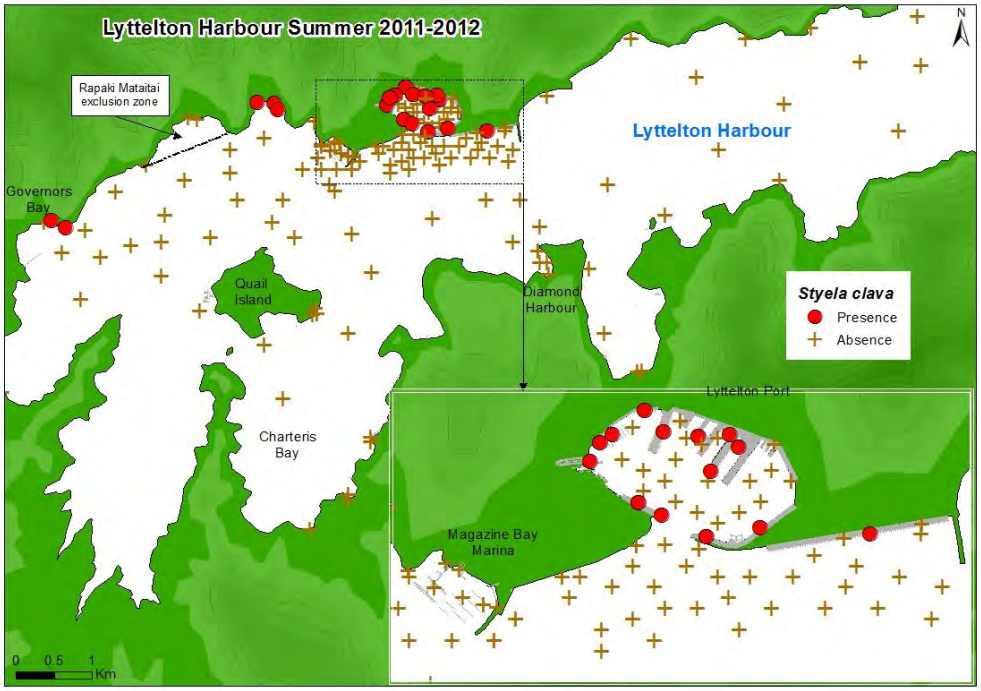
Dunedin (Otago Harbour) Summer 2011-2012



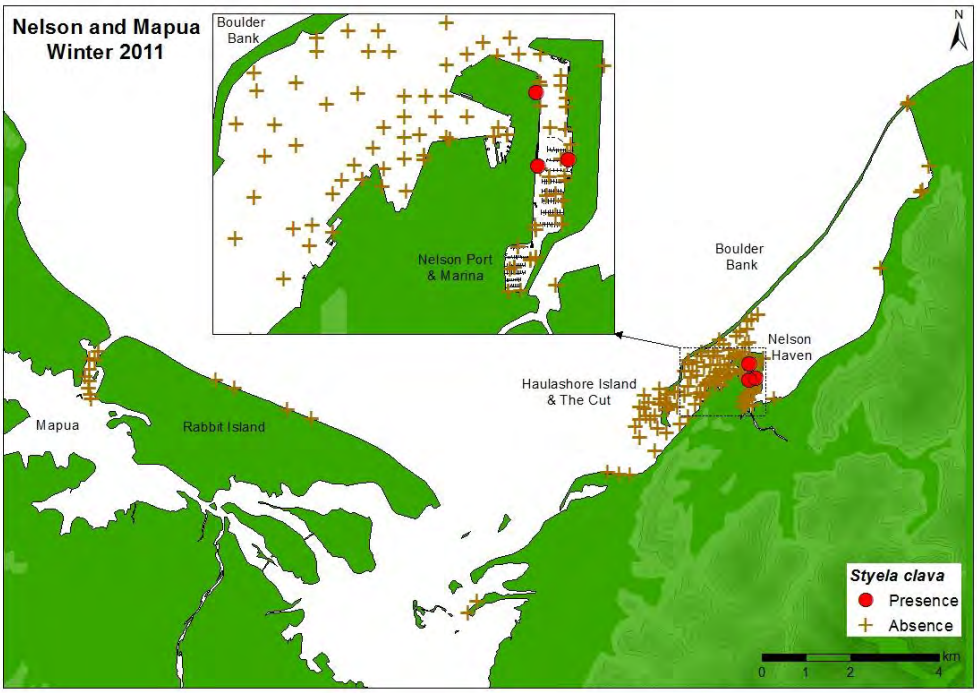
Lyttelton Harbour Winter 2011



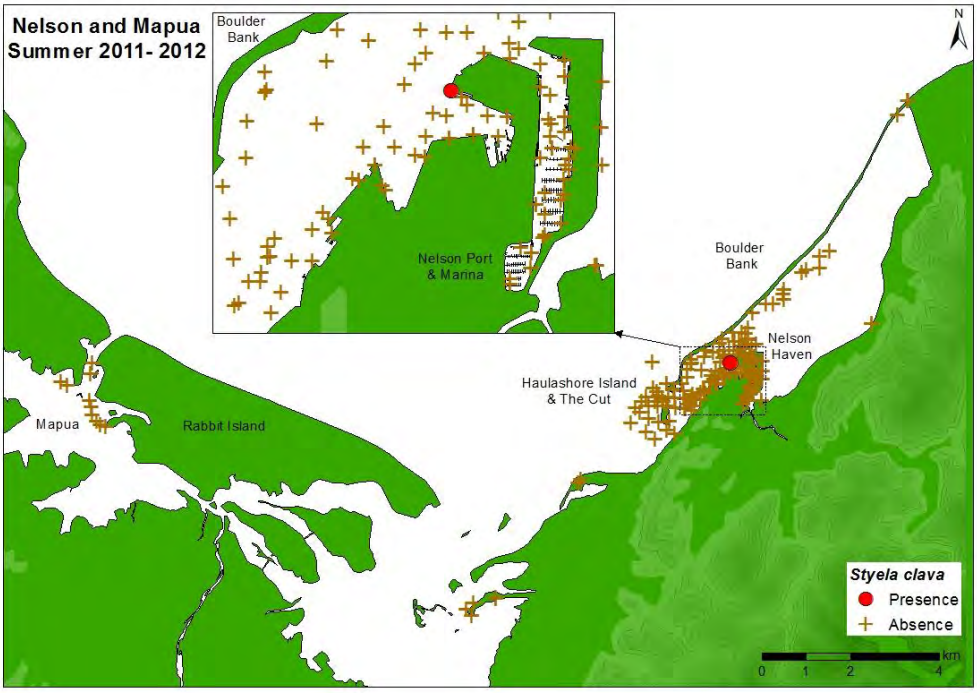
Lyttelton Harbour Summer 2011-2012



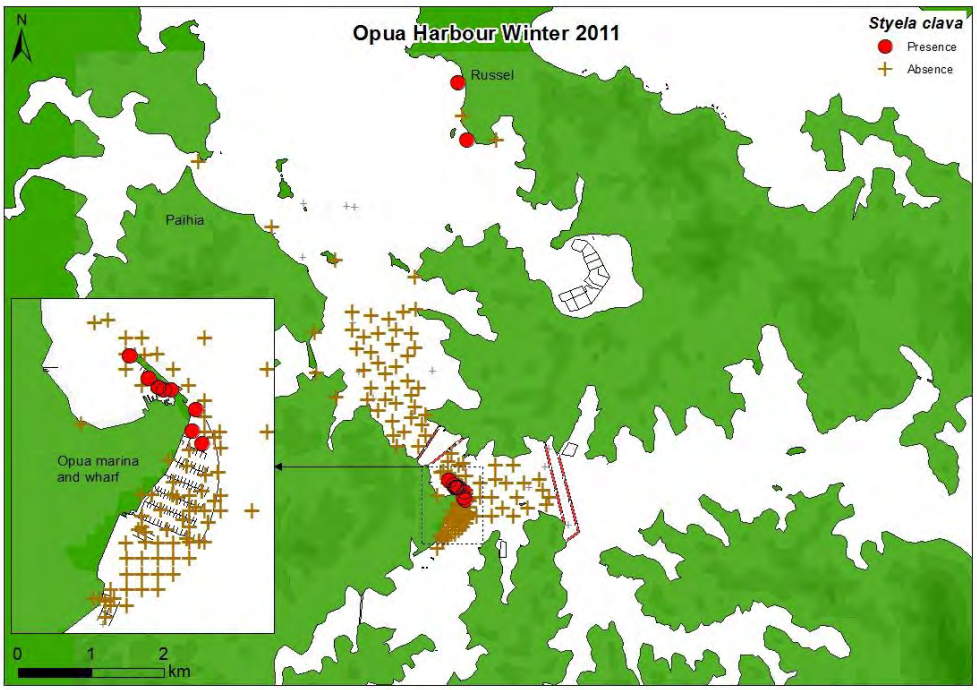
Nelson Winter 2011



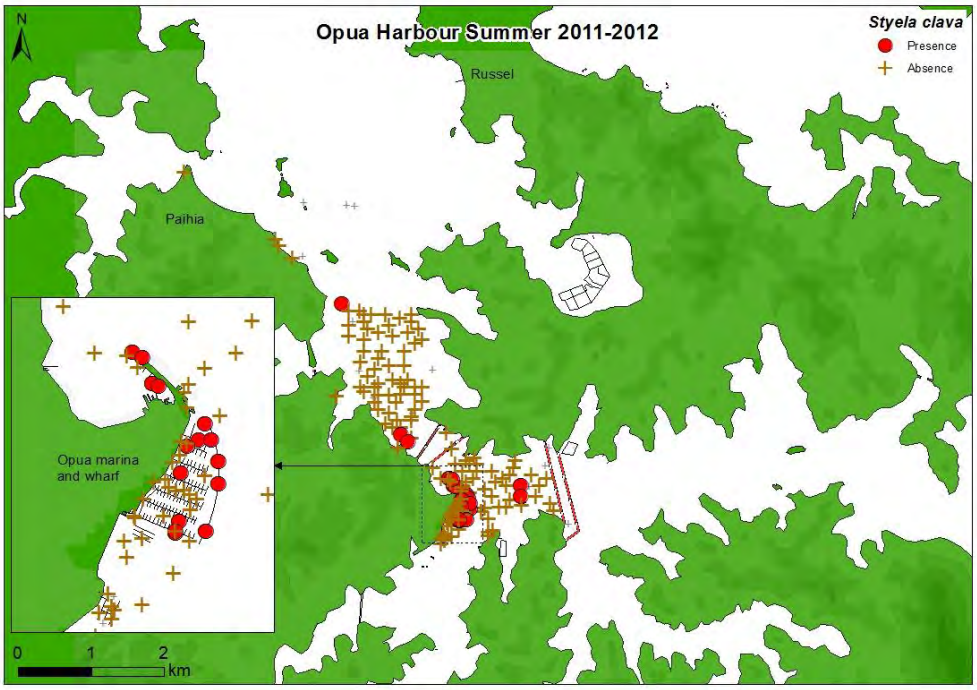
Nelson Summer 2011-2012



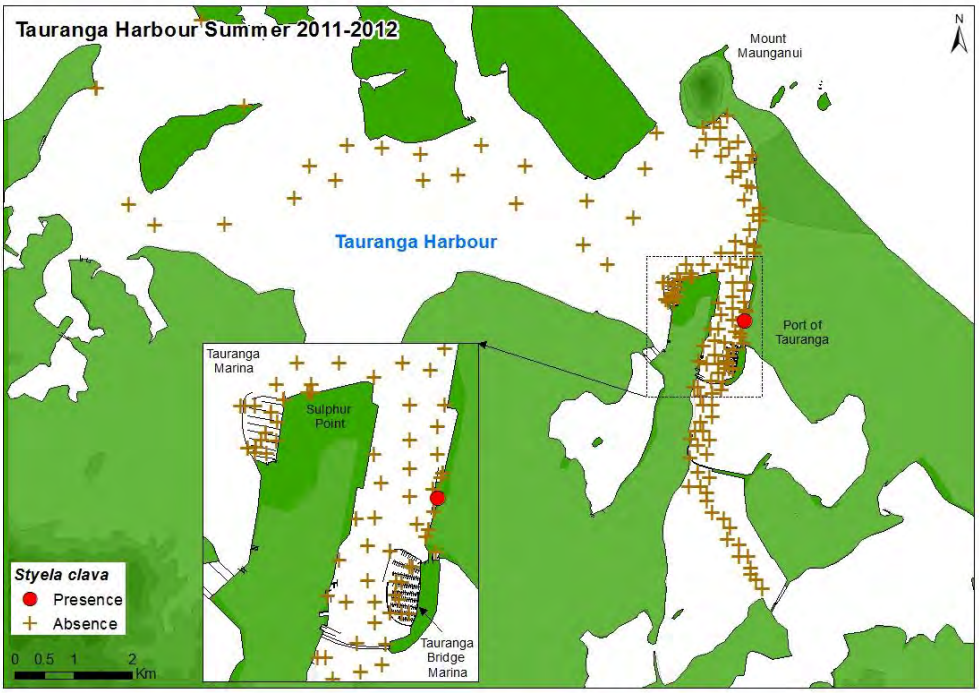
Opua Winter 2011



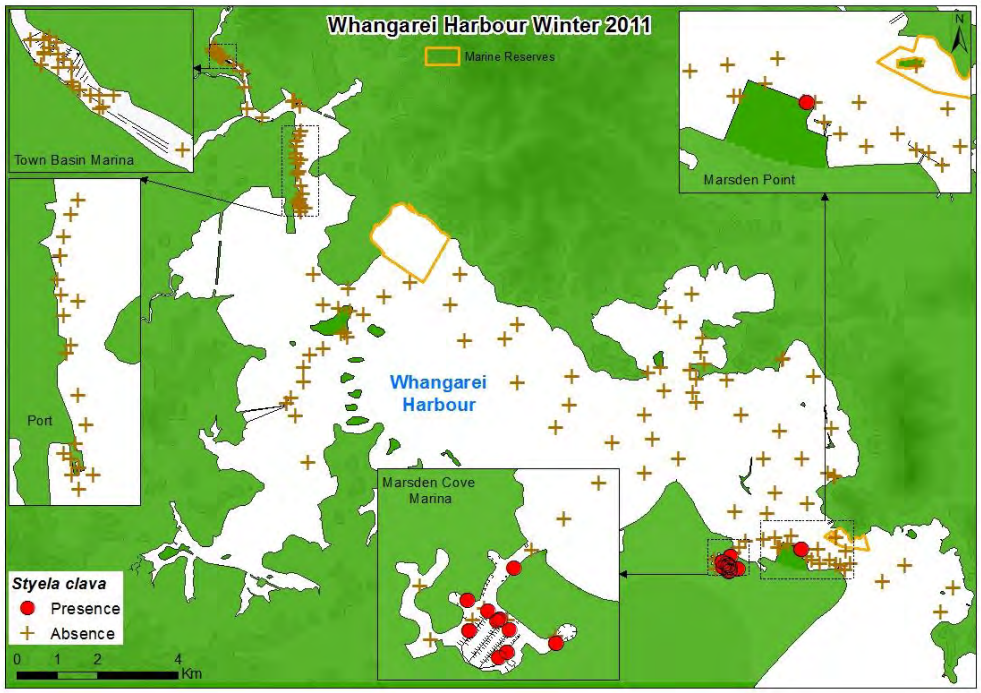
Opua Summer 2011-2012



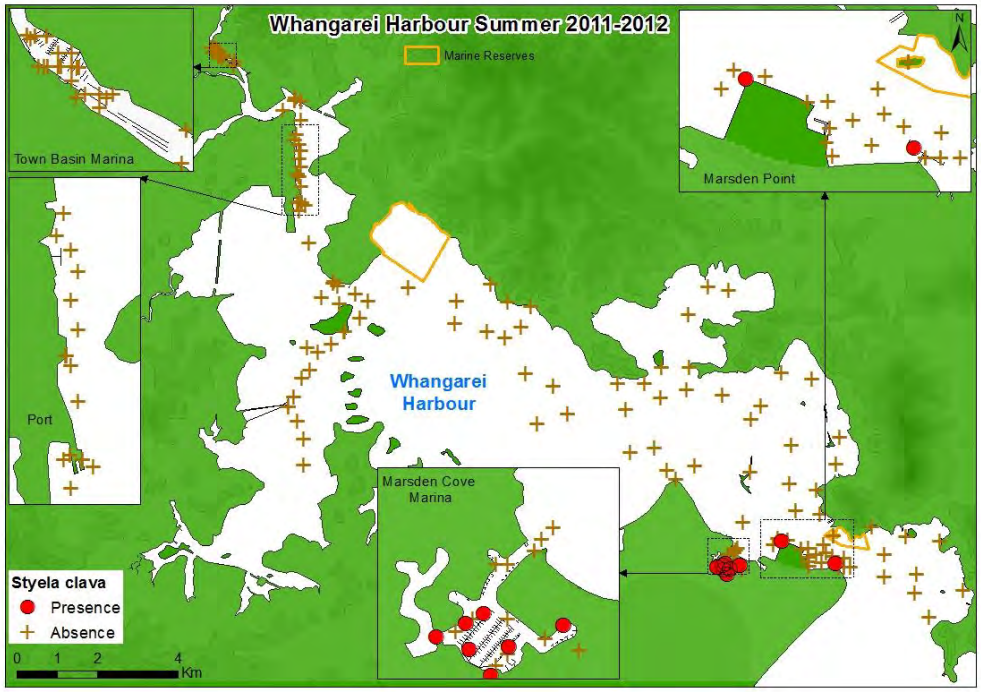
Tauranga Harbour Summer 2011-2012



Whangarei Harbour Winter 2011

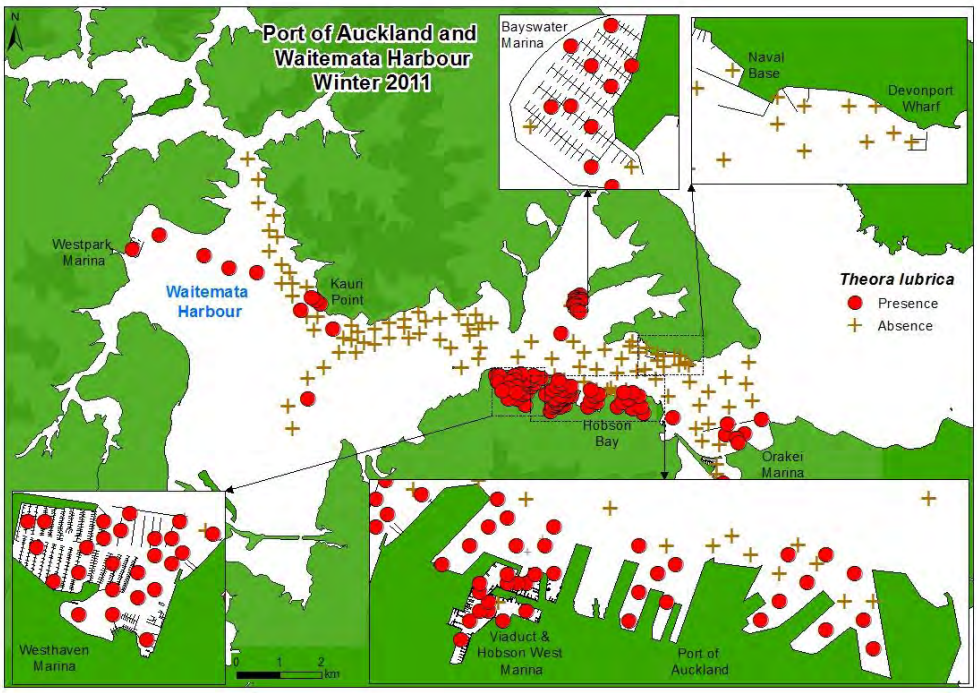


Whangarei Harbour Summer 2011-2012

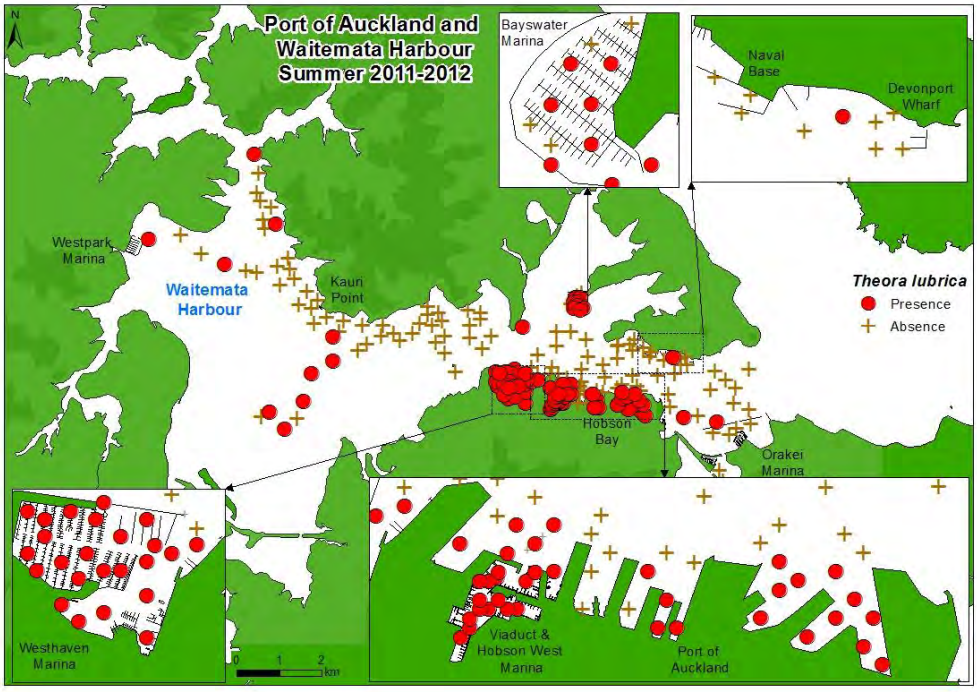


THEORA LUBRICA

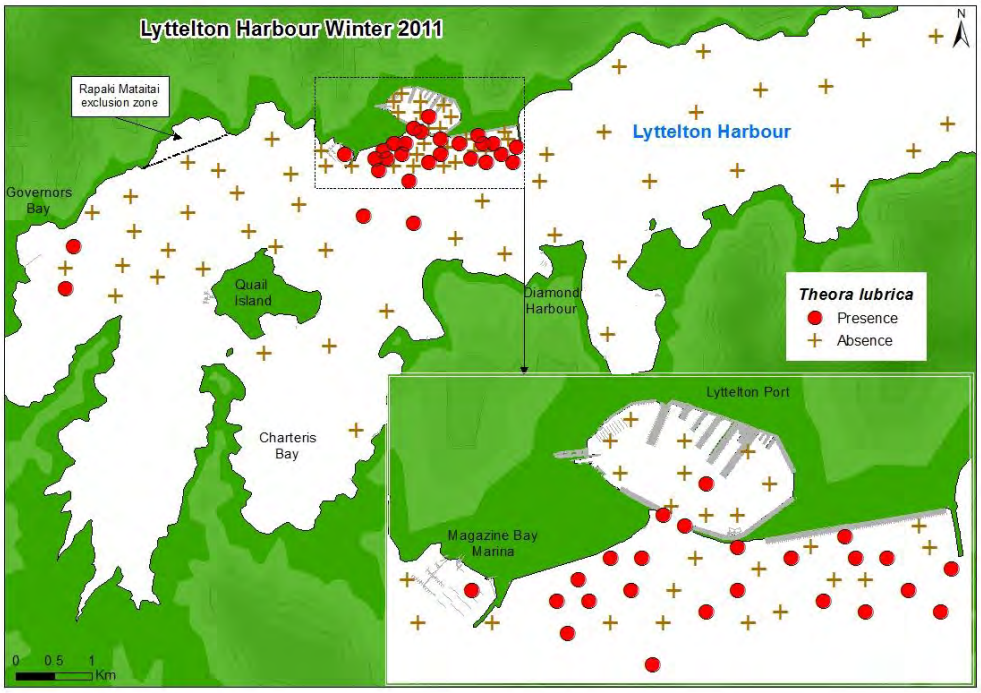
Waitemata Harbour Winter 2011



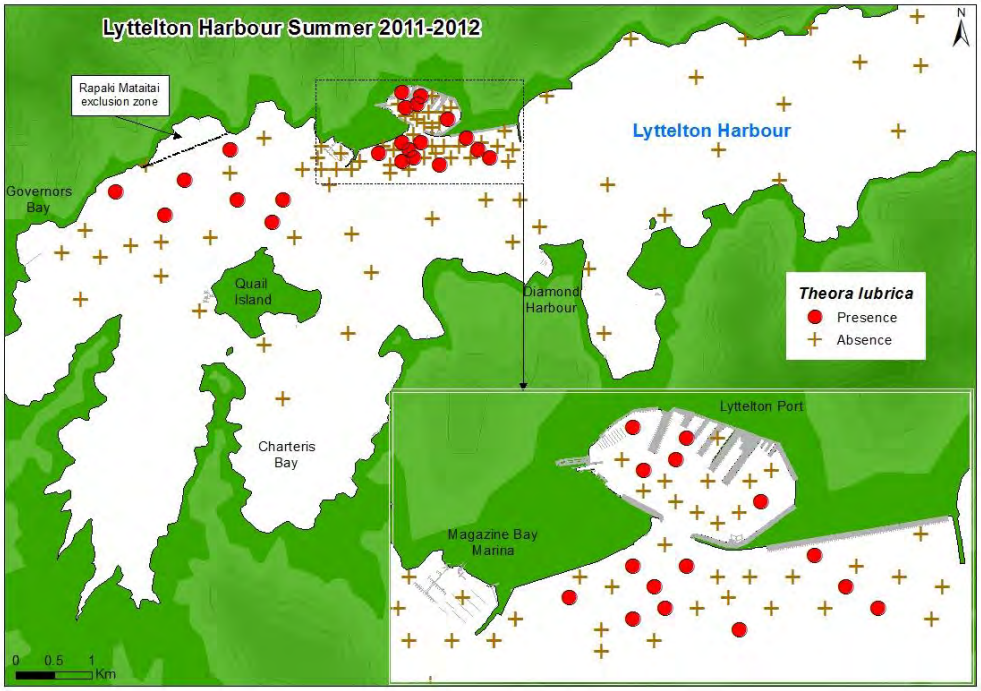
Waitemata Harbour Summer 2011-2012



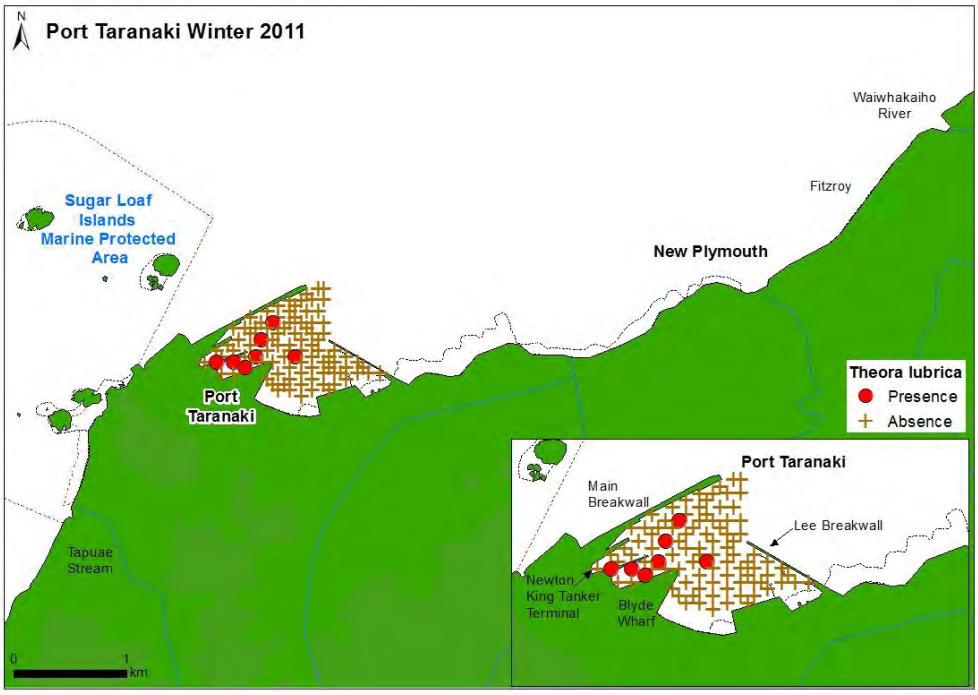
Lyttelton Harbour Winter 2011



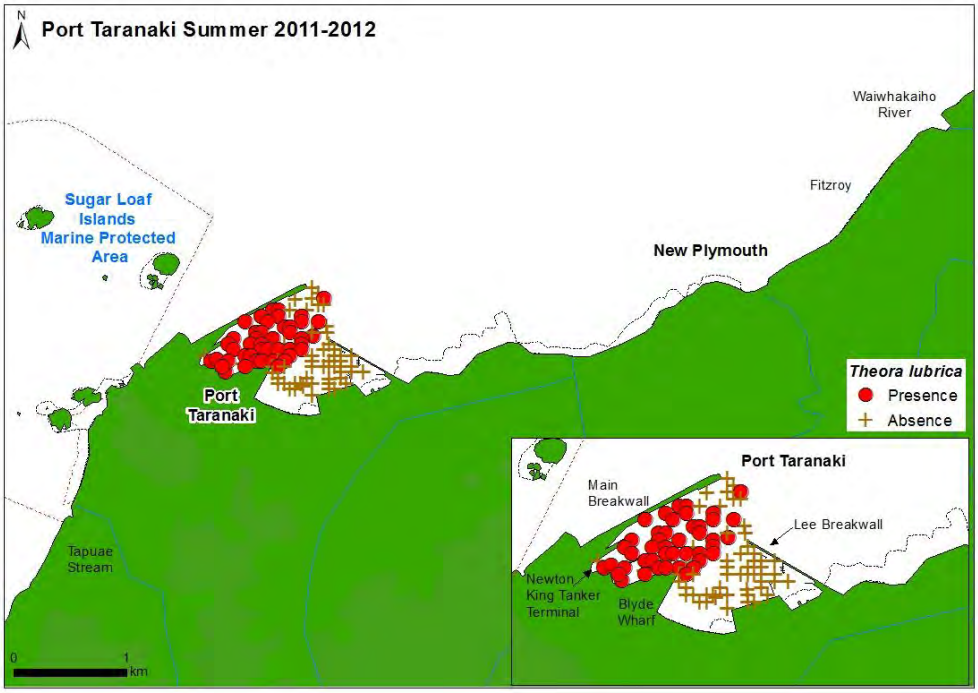
Lyttelton Harbour Summer 2011-2012



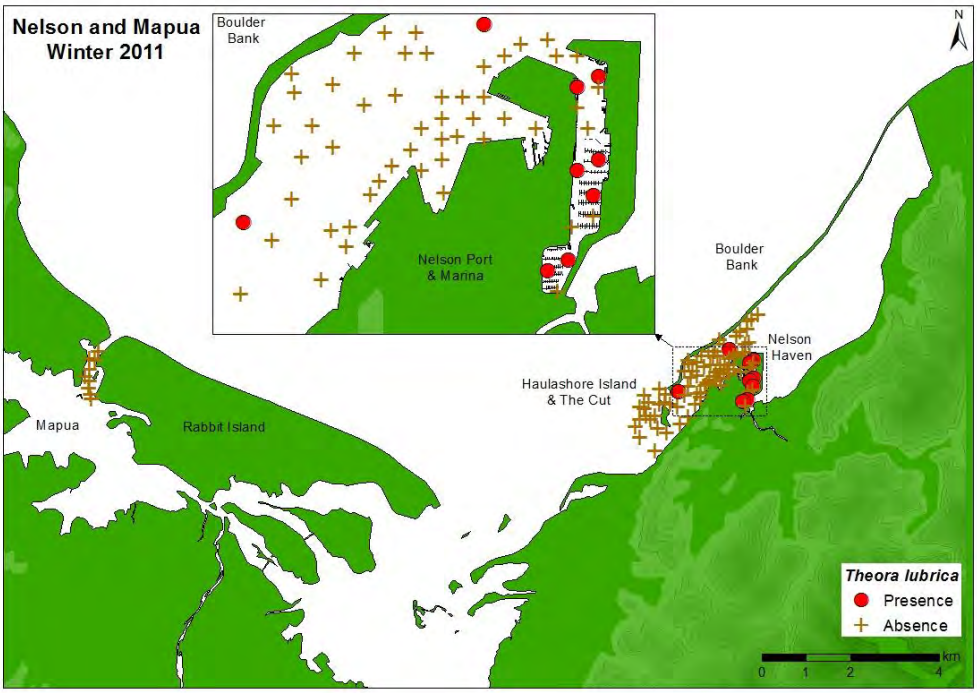
New Plymouth Winter 2011



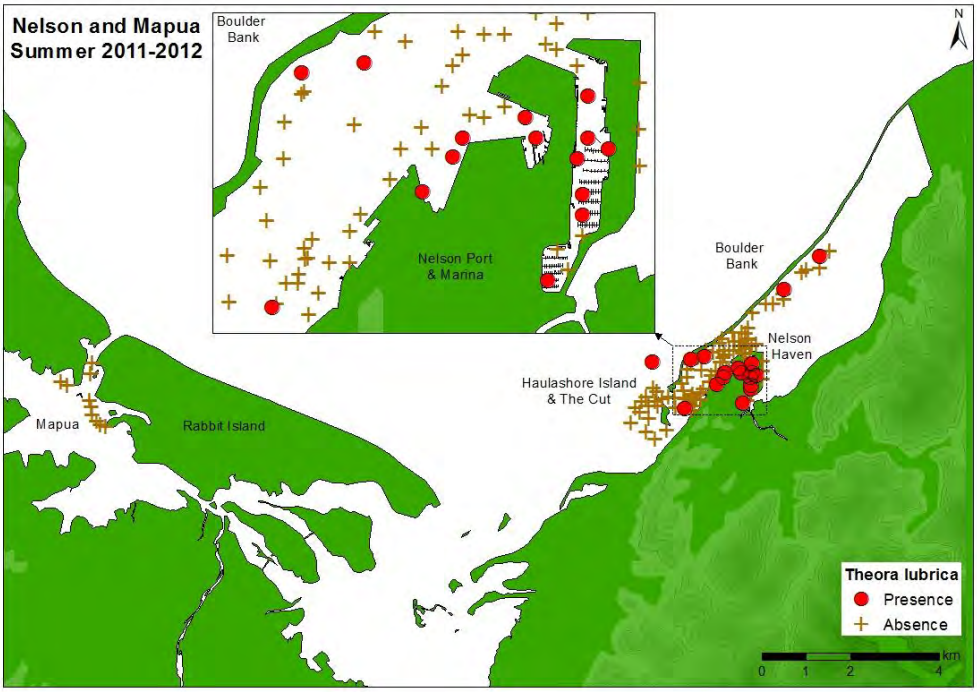
New Plymouth Summer 2011-2012



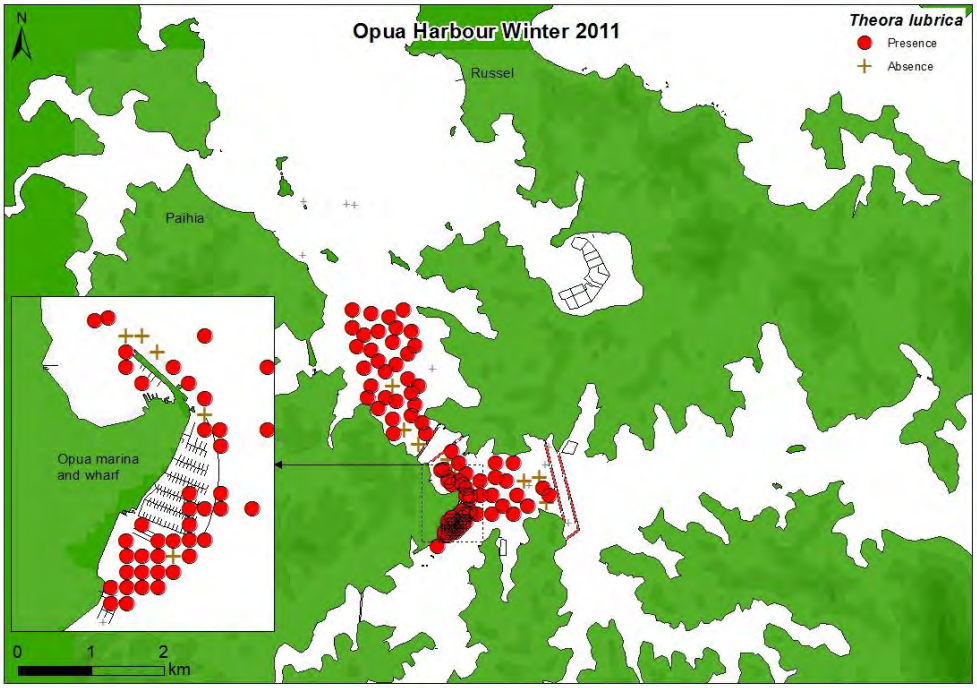
Nelson Winter 2011



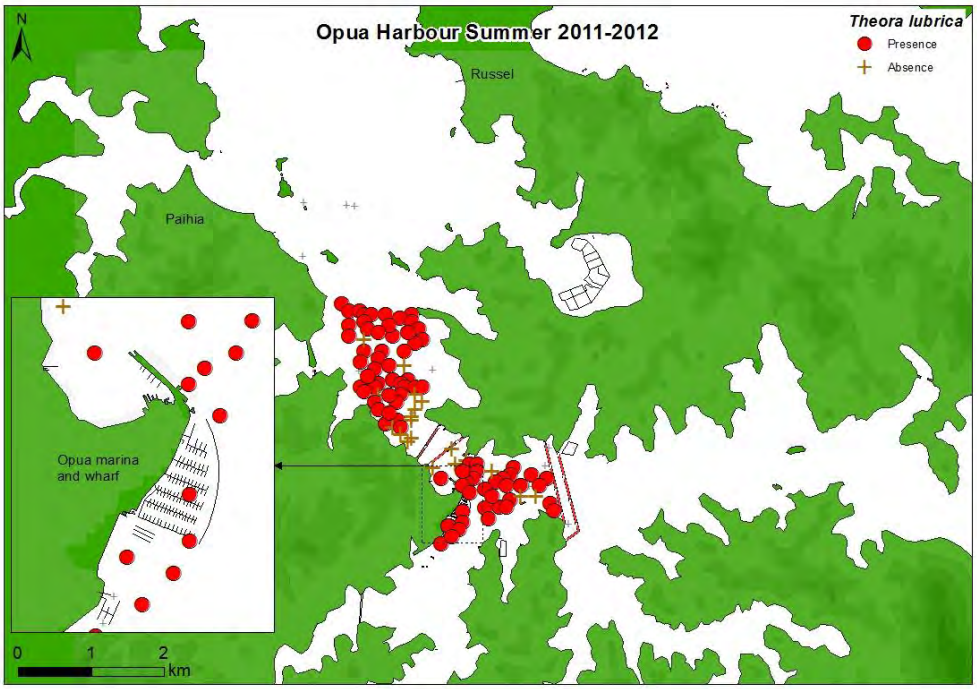
Nelson Summer 2011-2012



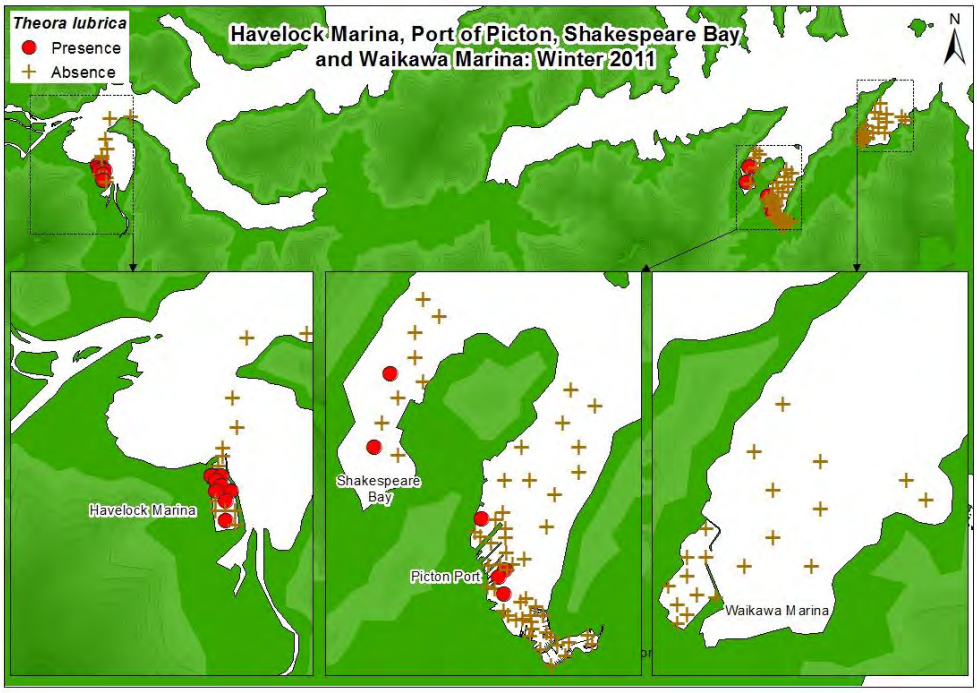
Opua Winter 2011



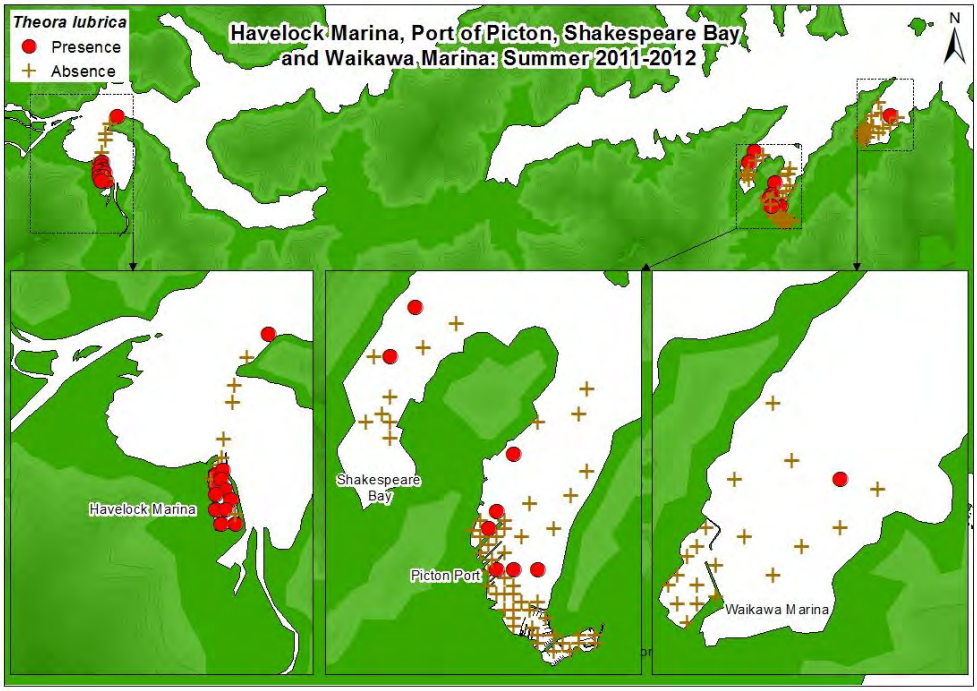
Opua Summer 2011-2012



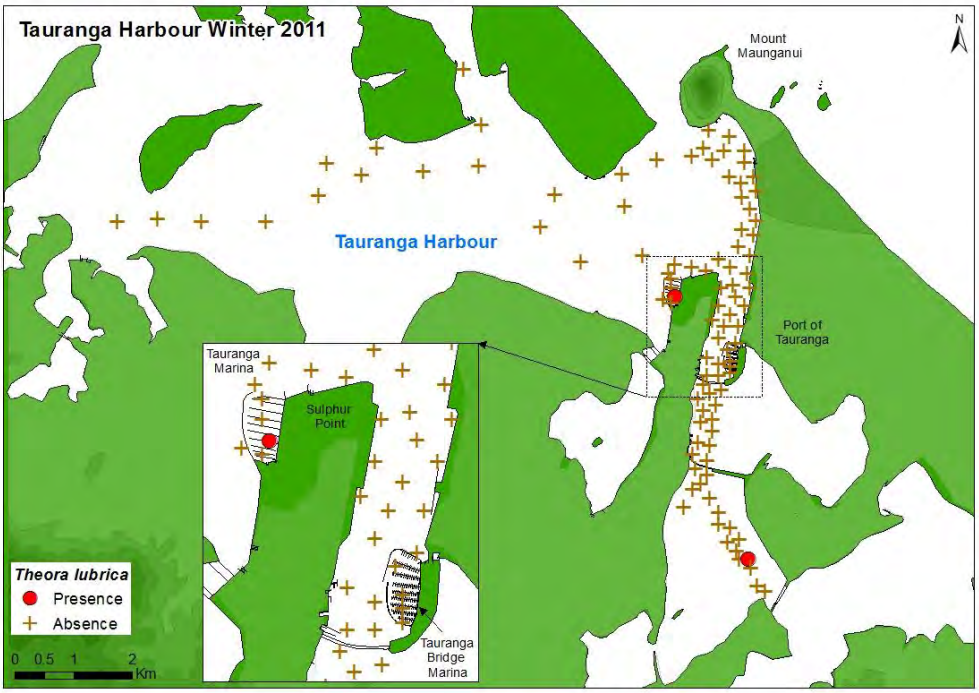
Picton / Havelock Winter 2011



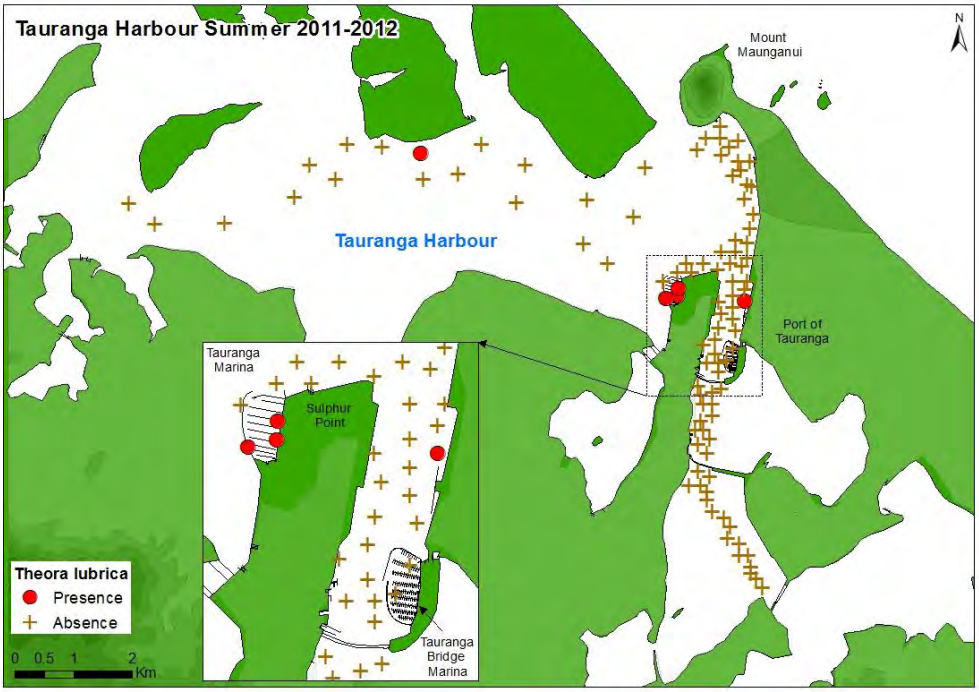
Picton / Havelock Summer 2011-2012



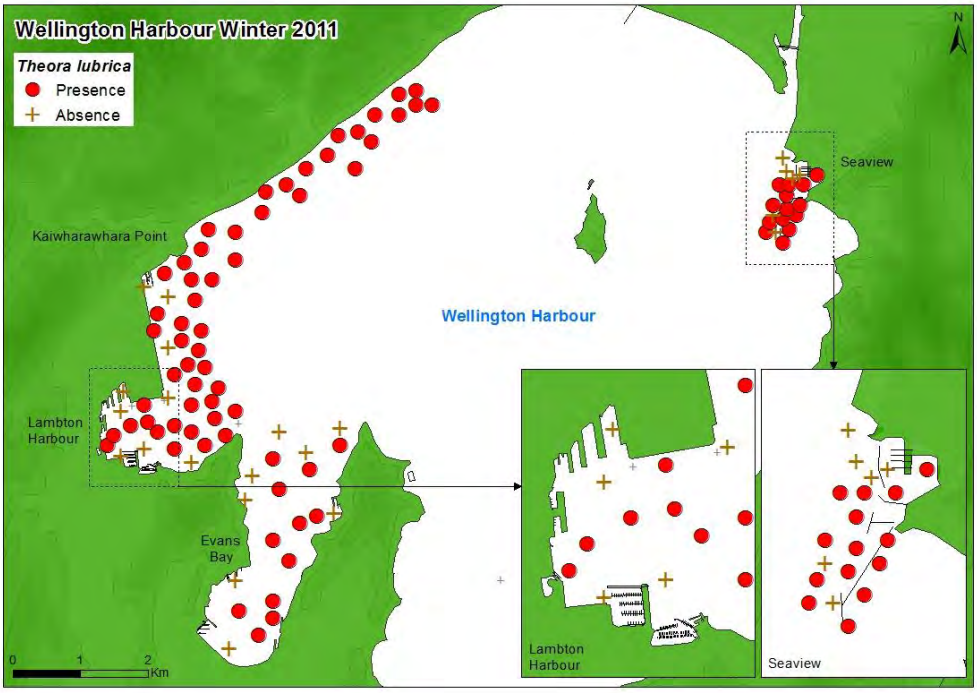
Tauranga Harbour Winter 2011



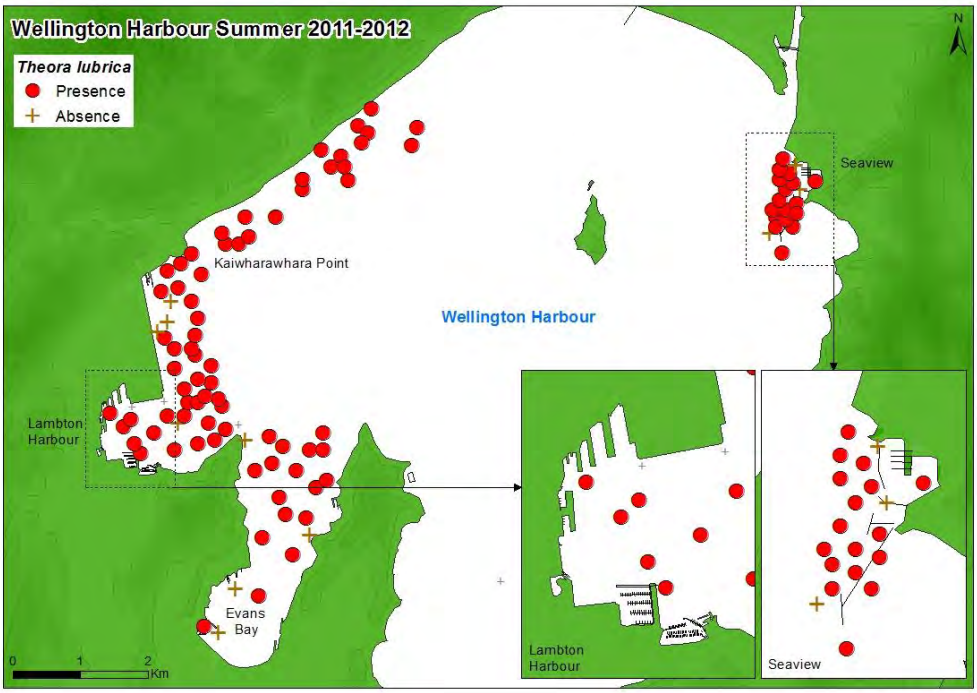
Tauranga Harbour Summer 2011-2012



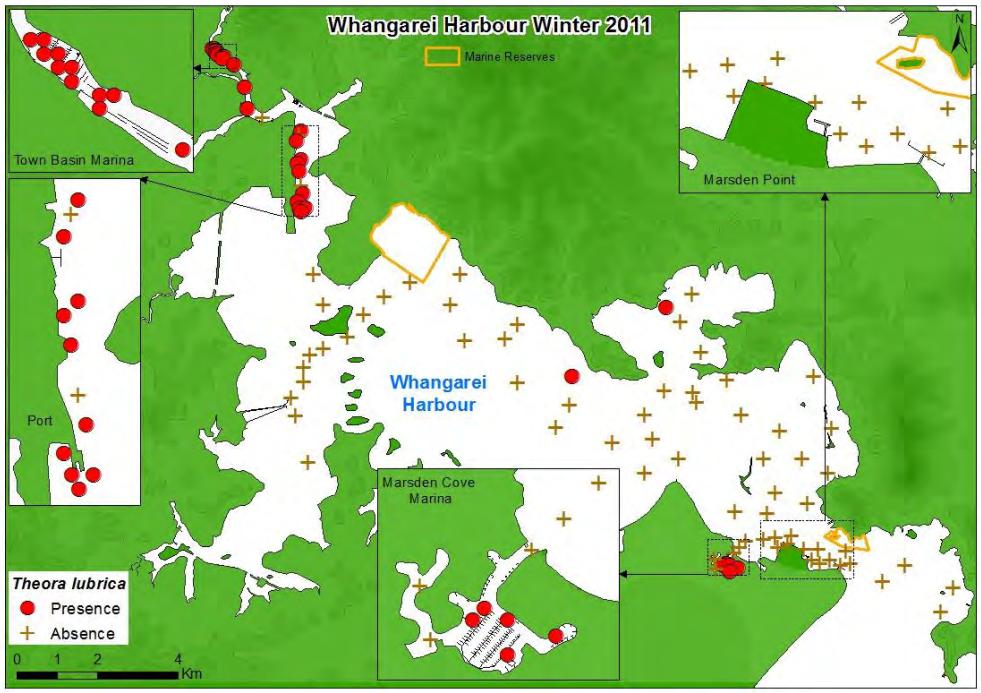
Wellington Harbour Winter 2011



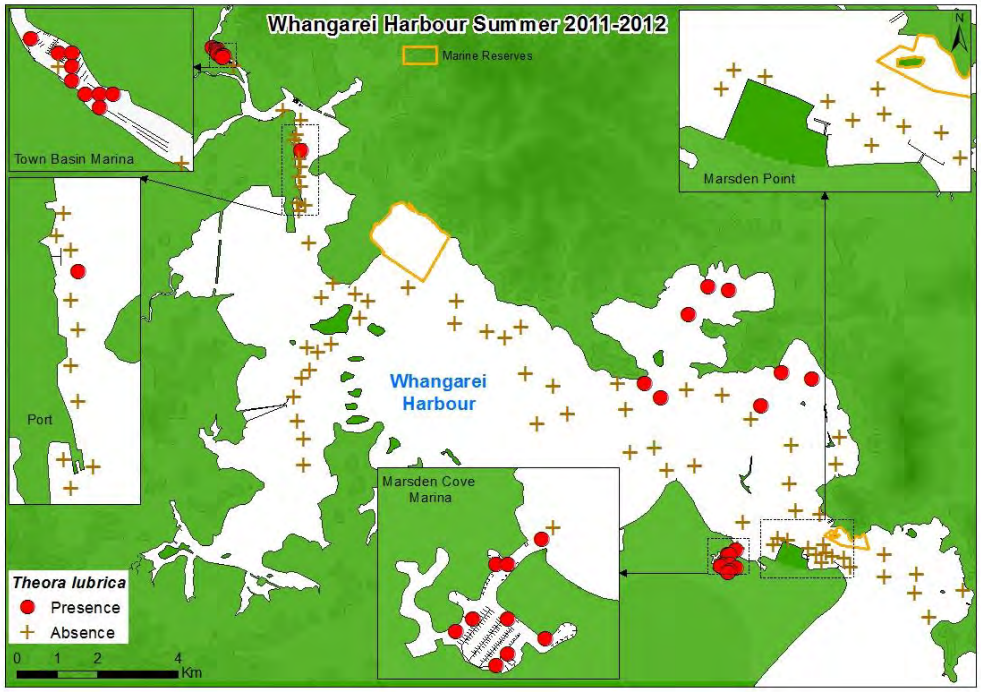
Wellington Harbour Summer 2011-2012



Whangarei Harbour Winter 2011

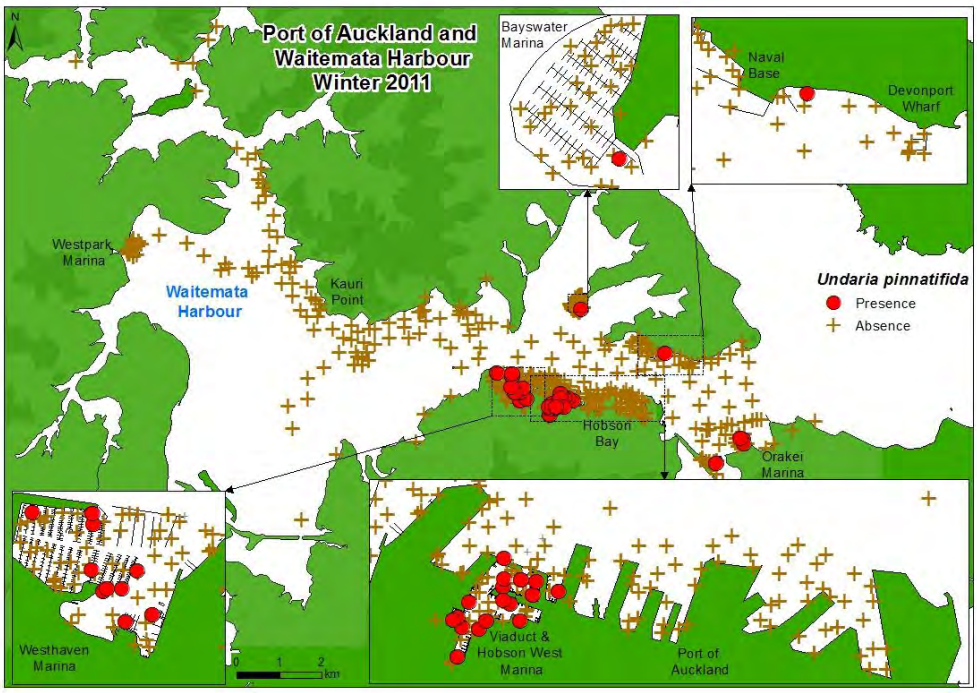


Whangarei Harbour Summer 2011-2012

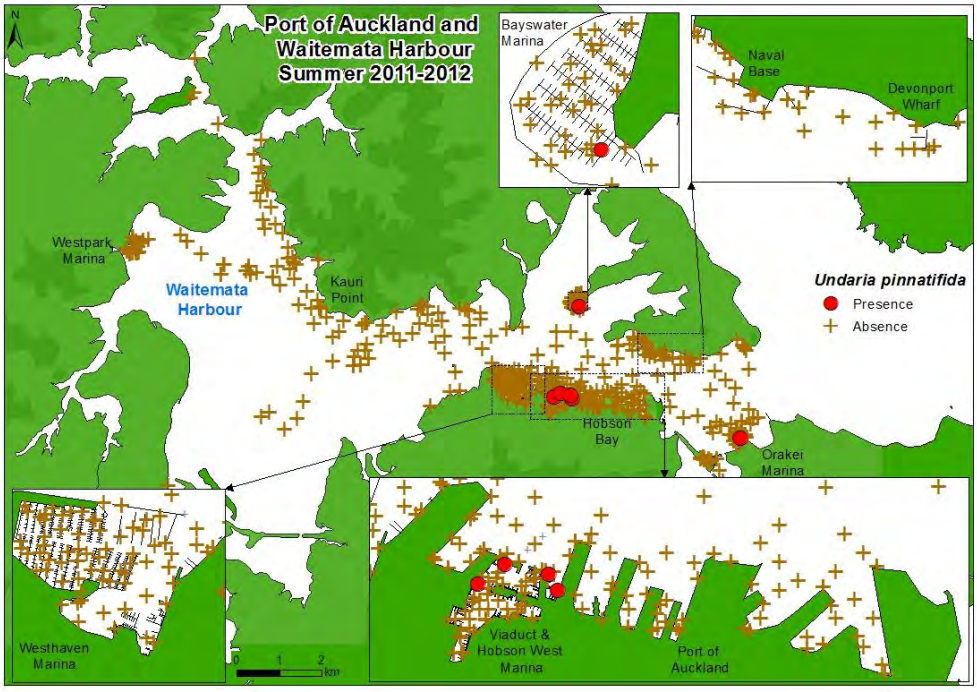


UNDARIA PINNATIFIDA

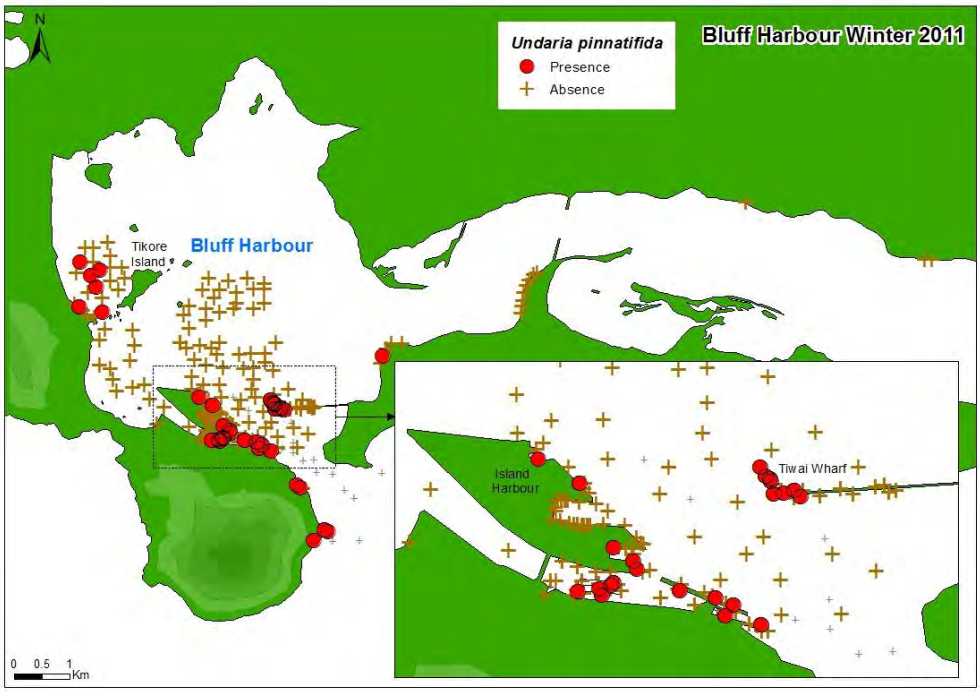
Waitemata Harbour Winter 2011



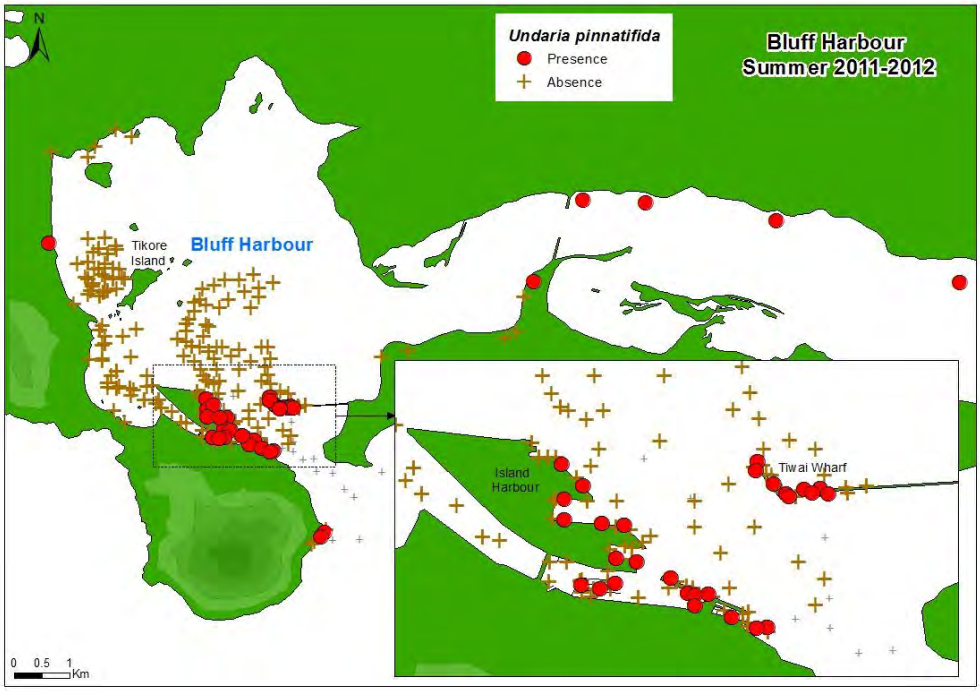
Waitemata Harbour Summer 2011-2012



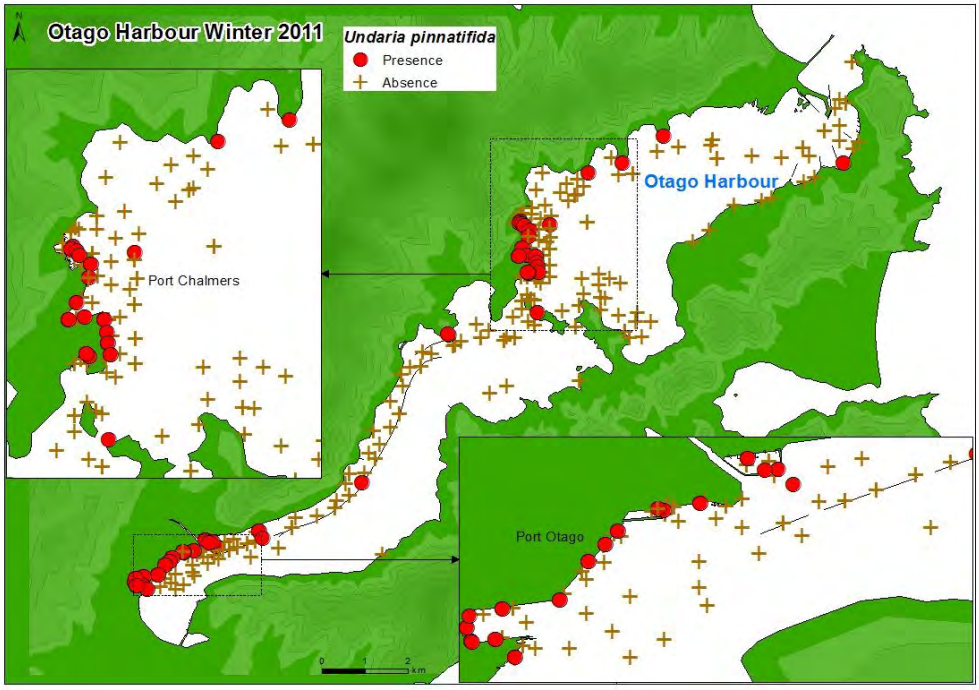
Bluff Harbour Winter 2011



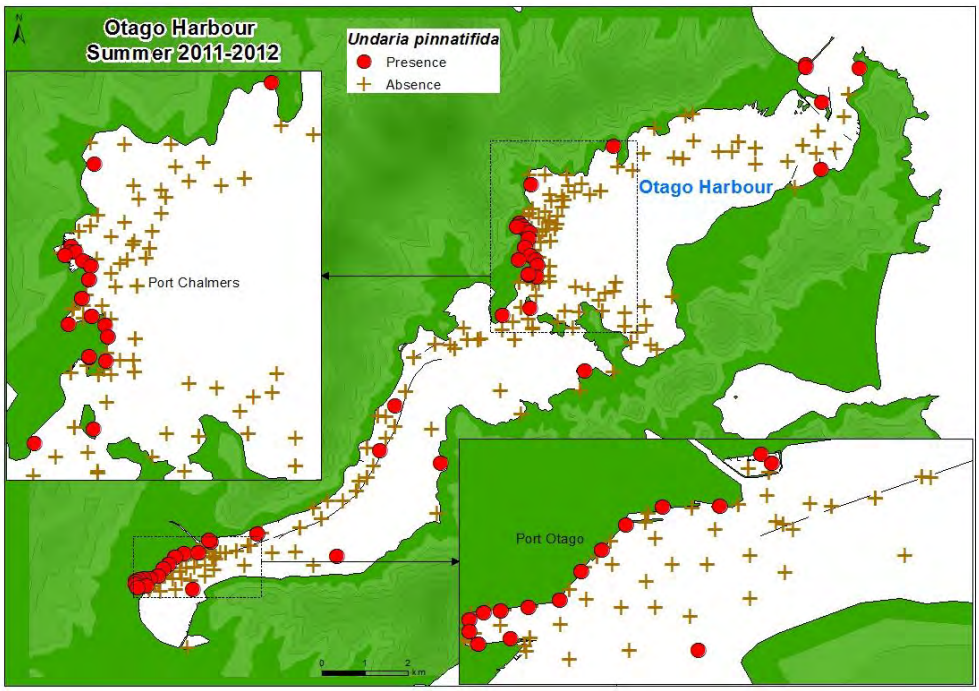
Bluff Harbour Summer 2011-2012



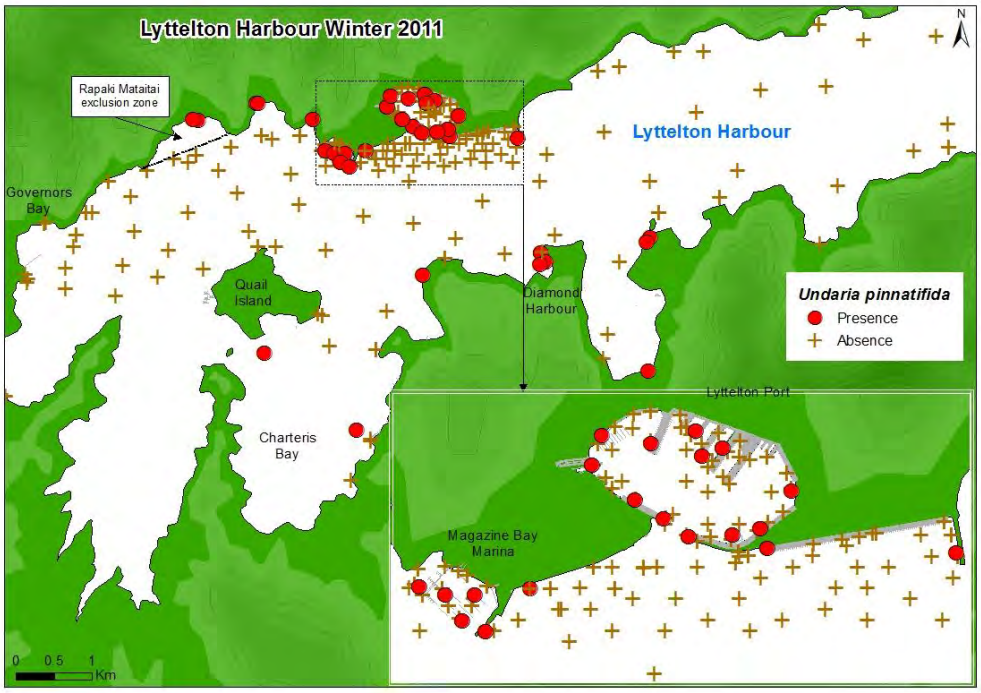
Dunedin (Otago Harbour) Winter 2011



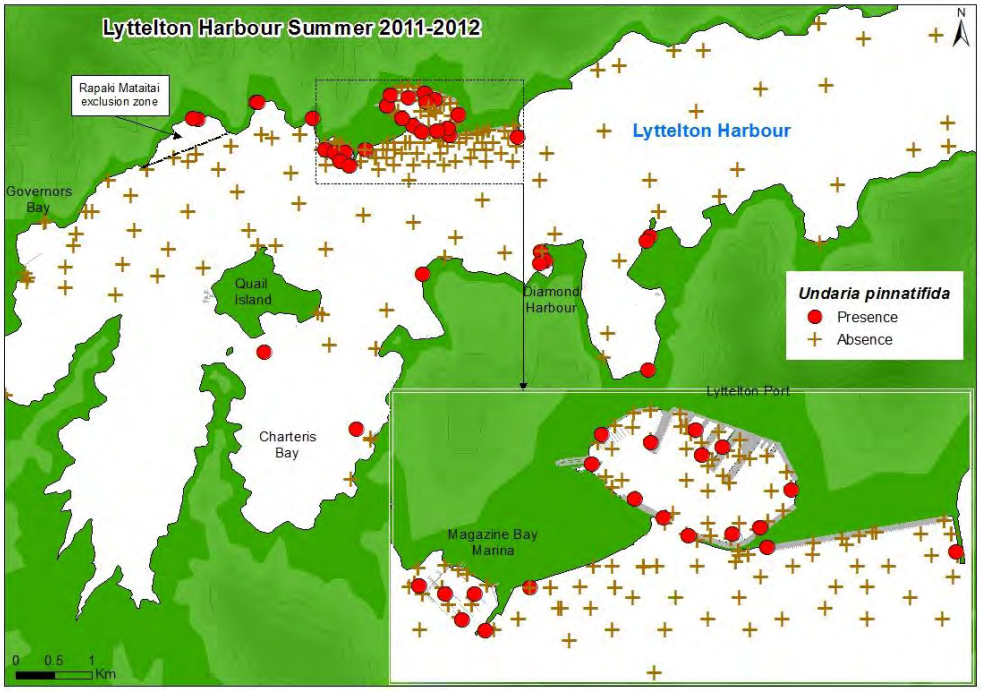
Dunedin (Otago Harbour) Summer 2011-2012



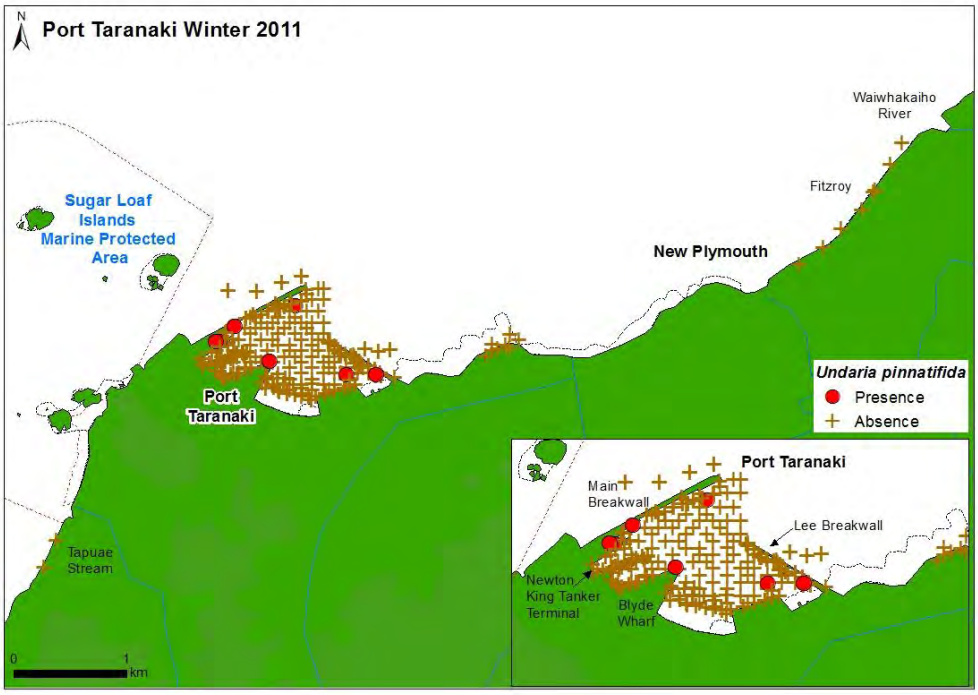
Lyttelton Harbour Winter 2011



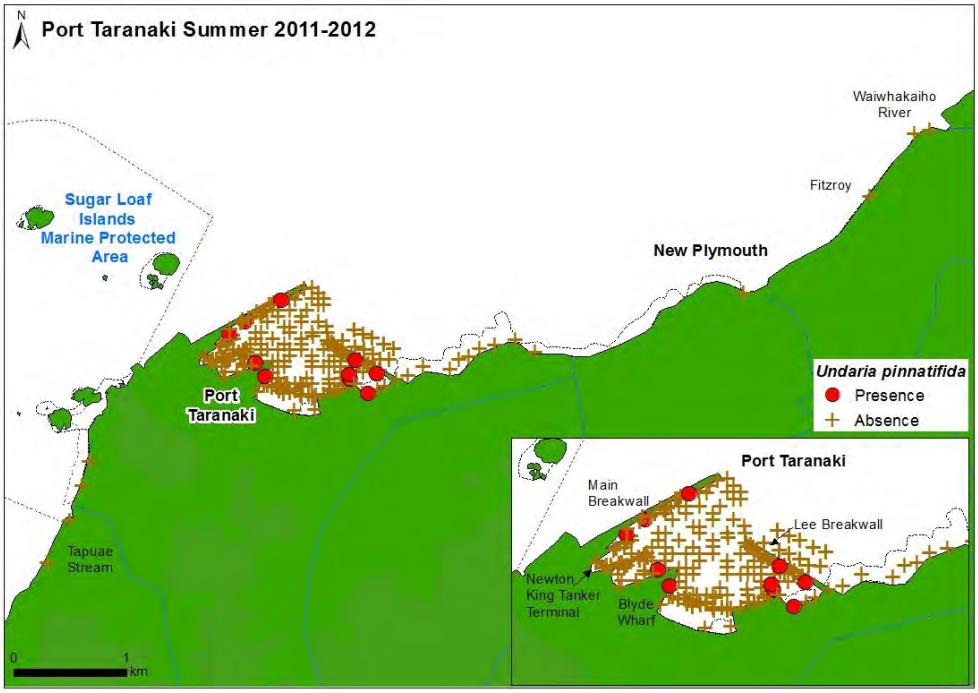
Lyttelton Harbour Summer 2011-2012



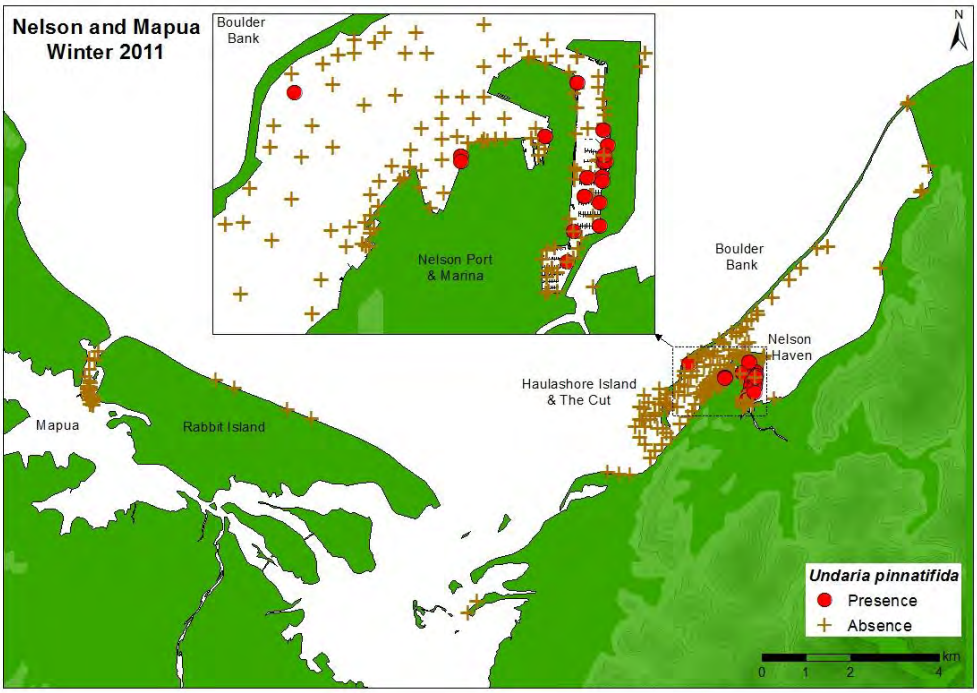
New Plymouth Winter 2011



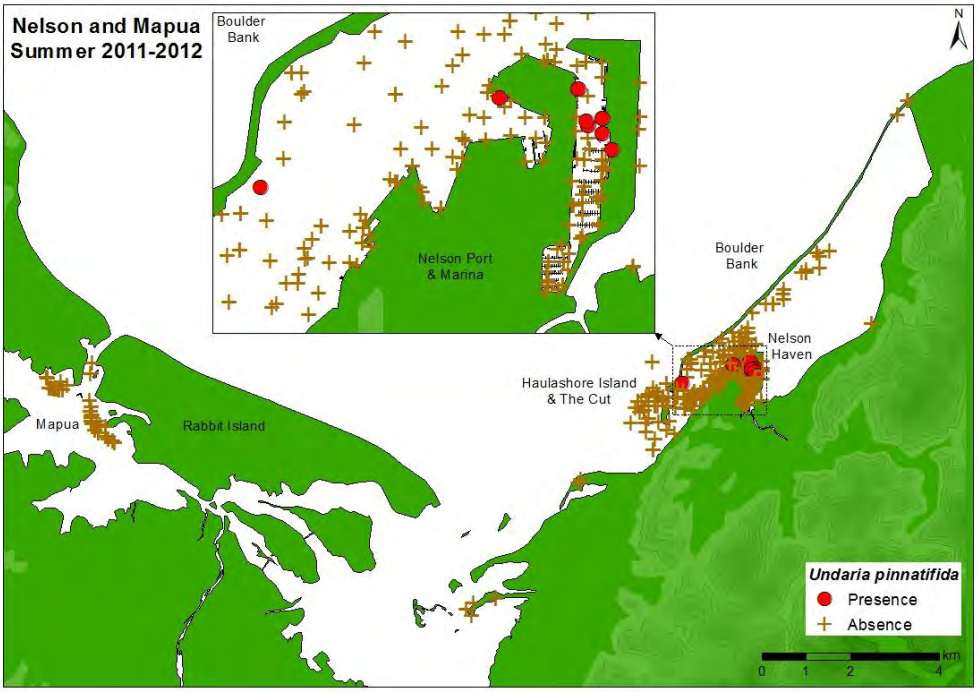
New Plymouth Summer 2011-2012



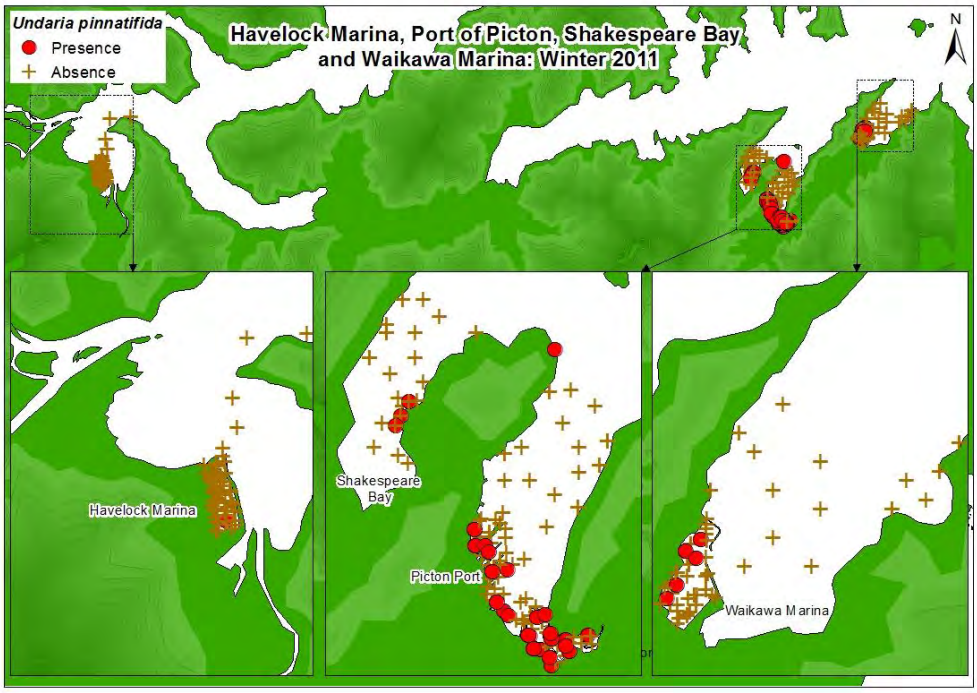
Nelson Winter 2011



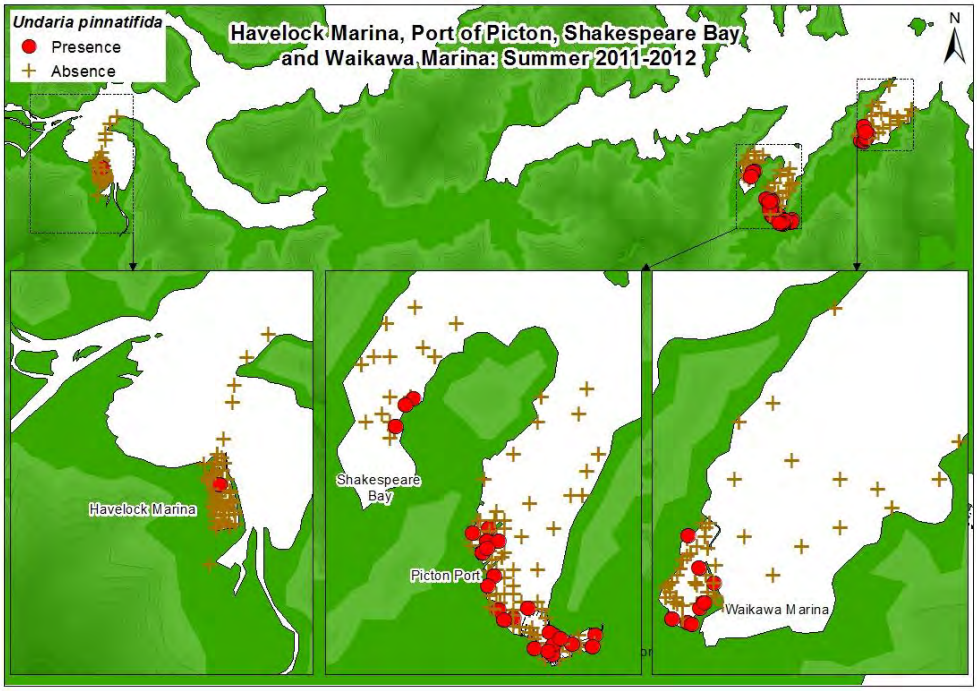
Nelson Summer 2011-2012



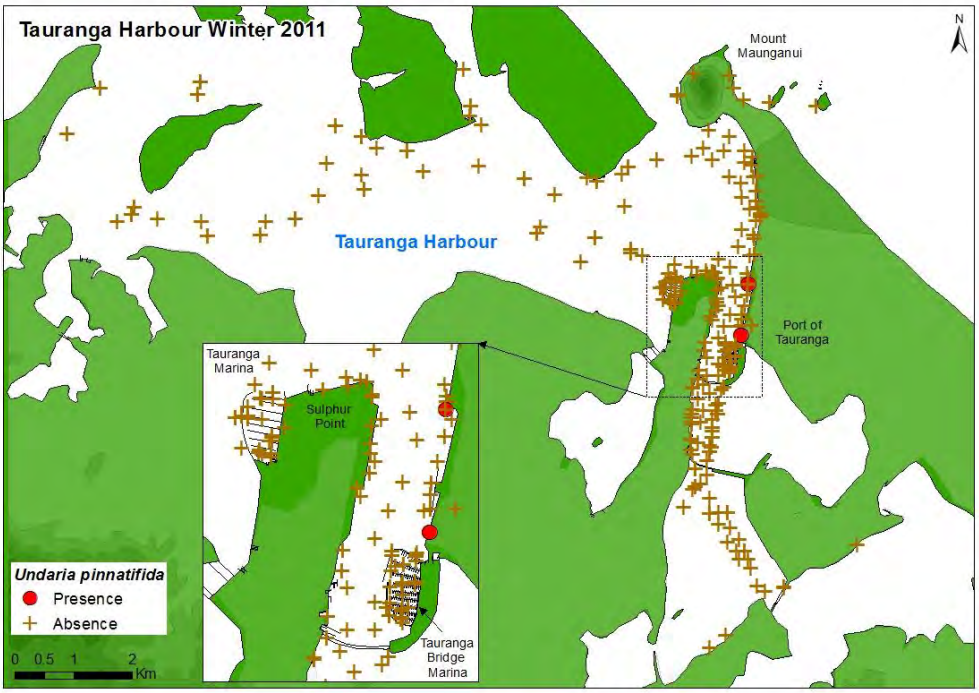
Picton / Havelock Winter 2011



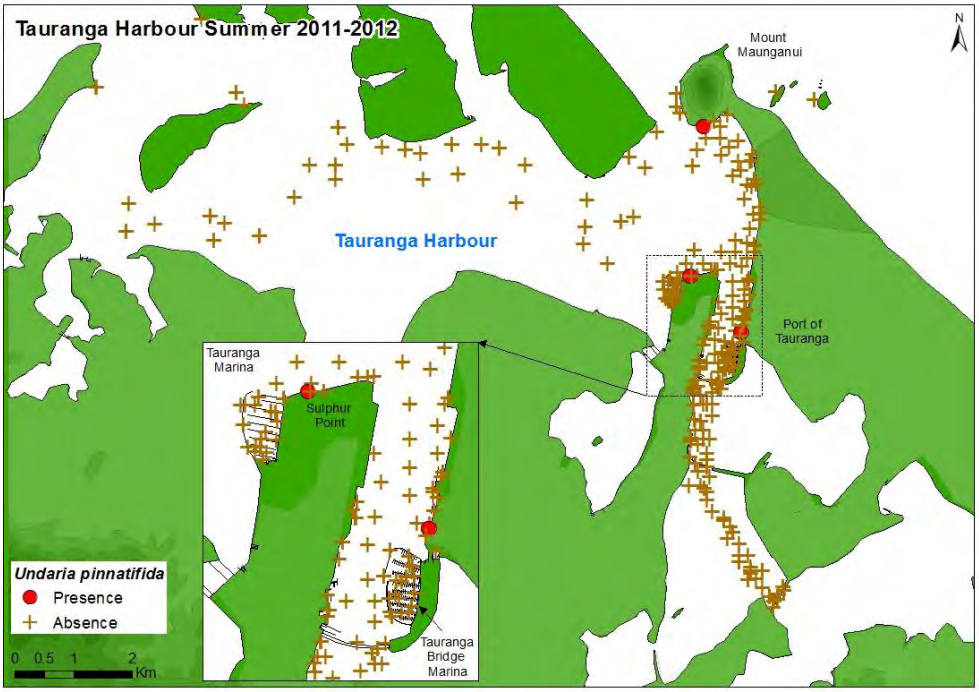
Picton / Havelock Summer 2011-2012



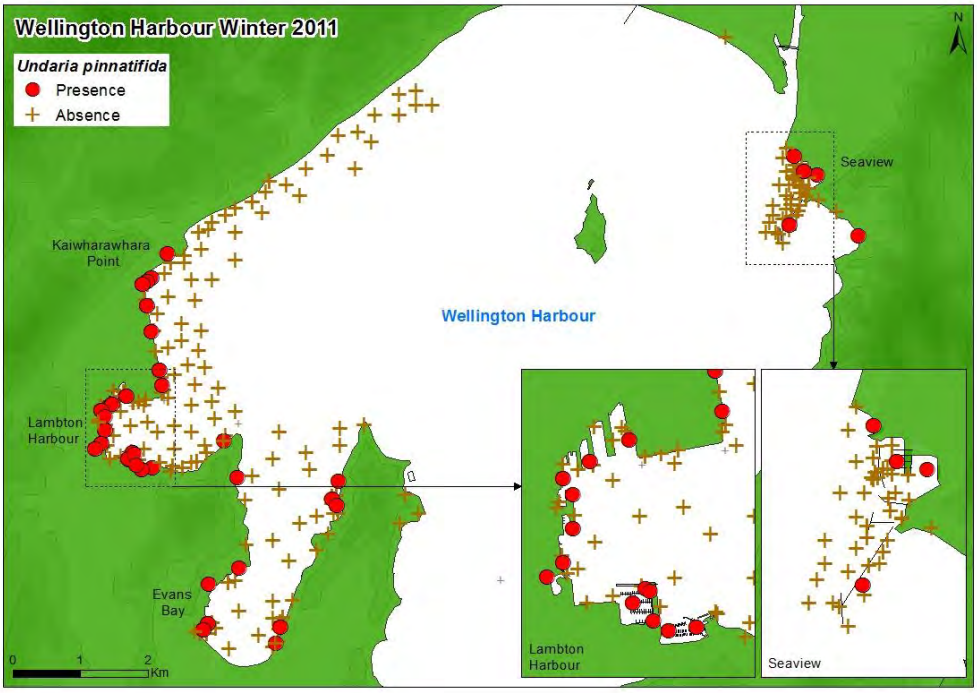
Tauranga Harbour Winter 2011



Tauranga Harbour Summer 2011-2012



Wellington Harbour Winter 2011



Wellington Harbour Summer 2011-2012