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INTERTIDAL BIOTA AND WASHUP AT AHIPARA AND HEREKINO, NORTHLAND WEST COAST

**Bruce W. Hayward¹, Margaret S. Morley², Hugh R. Grenfell¹, Rowan
Carter³, Glenys C. Hayward⁴, Wilma M. Blom², Doug Rogan⁵**

¹Geomarine Research, 49 Swainston Rd, St Johns, Auckland,

²Auckland War Memorial Museum, Private Bag 92018, Auckland, ³North Shore City Council, Auckland,

⁴19 Debron Ave, Remuera, Auckland, ⁵Canterbury Museum, Christchurch

SUMMARY

Three hundred and twenty-nine species are recorded from the Ahipara and Herekino Harbour shores of north-west Northland. These include 178 species of gastropods, 56 species of bivalves, 29 species of seaweeds, 14 species of crabs, 10 species each of chitons and barnacles, 9 species of echinoderms, 6 species each of anemones and polychaete worms. These records extend the recorded range of 12 mostly small gastropods. When the present observations are added to others from both coasts of northern New Zealand, we conclude that the boundary between the Cookian and Aupourian Marine Provinces would be better placed at the northern tip of Northland rather than near Ahipara.

INTRODUCTION

This study is one of several recently undertaken by the authors to document the poorly known diversity and biogeographic distribution of intertidal and shallow subtidal organisms along the west coast of the North Island of New Zealand. These are from north to south (Fig. 1):

1. Ahipara and Herekino Harbour (this study);
2. Whangape Harbour (Hayward et al., 1994);
3. Waimamaku Estuary (Hayward & Hollis, 1993);
4. Kawerua (Hayward, 1971, 1974, 1975, 1979, Hayward et al., 1995);
5. Waitakere Ranges (Hayward & Morley, in press);
6. Raglan Harbour area (Hayward et al., 2002);
7. Kawhia Harbour area (Morley et al., 1997);
8. Awakino to New Plymouth, north Taranaki (Hayward et al., 1999);
9. New Plymouth (Hayward & Morley, 2002).

Previous studies

We know of no previous study that documents the intertidal life of the Ahipara or Herekino Harbour coast. Powell (1927) recorded 51 species of molluscs and described five new species from a fish trawl from 42 m depth (23 fathoms) off Ahipara, and Morley (1995) recorded the first west coast occurrence of *Theora lubrica* from Herekino Harbour.

Ahipara and Herekino Harbour

Ahipara and Herekino Harbour (35° 10' S) are situated on the west coast of northern Northland, west of Kaitaia (Fig. 1). Ahipara, at the south end of Ninety Mile Beach, has a broad sandy beach (Shipwreck Bay) with considerable shelter from the prevailing swells provided by Tauroa Pt. The intertidal rocky shore on either side of Mokurau Beach is also relatively sheltered, but exposure increases towards Tauroa (Reef) Point. The wide intertidal rocky platform along the west coast south of Tauroa Pt is fully exposed to the ferocity of Tasman Sea swells and storms. 15 km south of Tauroa Pt is the 200 m-wide entrance to the 6 km long, 0.4-1 km wide Herekino Harbour, clearly a drowned former stream valley. The shore on the north side of the harbour is largely sandy, but the southern coast near the entrance

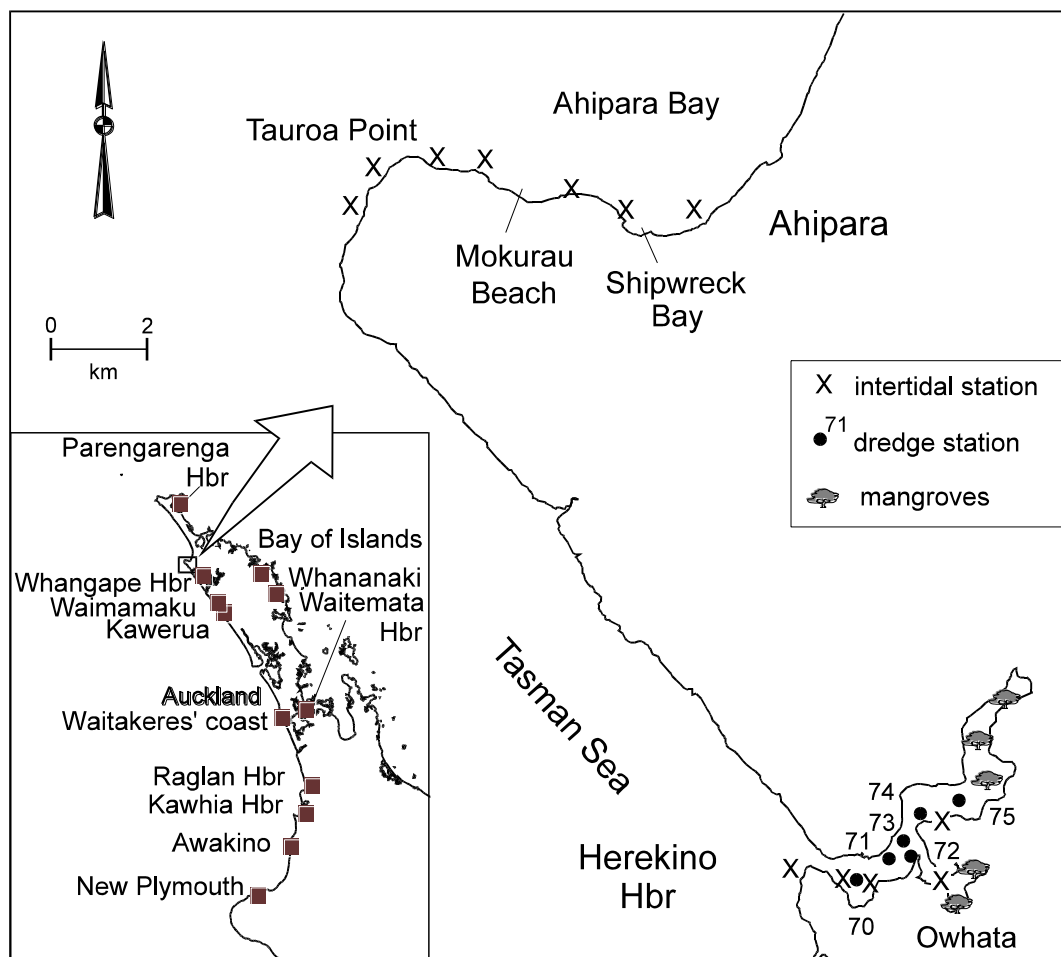


Fig. 1. Location of intertidal and dredge study sites at Ahipara and Herekino, west Northland.

consists of a relatively sheltered, rocky shore. The two branches of the upper harbour are largely composed of intertidal mud and sand flats surrounded by mangrove forest. At low tide the Hokianga Harbour is largely empty of water, with only a shallow subtidal entrance channel.

Field work

Field work was undertaken by all the authors (except MM and DR) during three days of spring low tide in April 1999. The results of these studies have been supplemented by observations made by MM.

SPECIES LIST

Mollusc nomenclature follows Spencer et al. (2002) and Marshall (2003).

Habitat where found:

- A = Shipwreck & Mokurau Bch, washup
- B = Shipwreck to Tauroa Pt, on rocks
- C = south of Tauroa Pt, on rocks & washup
- D = offshore, 40-45 m, dredged
- E = Herekino Hbr, mangrove forest
- F = Herekino Hbr, Owhata, rocks & sand
- G = Herekino Hbr entrance, rocks
- H = Herekino Hbr, dredged subtidal

Qualitative assessment of abundance:

- a = abundant
- c = common
- f = frequent
- o = occasional
- r = rare
- d = only seen dead
- x = previous record
- * = extension of range

	A	B	C	D	E	F	G	H		A	B	C	D	E	F	G	H	
CHITONS									<i>Eatonina subflavescens</i>	.	.	o	.	.	.	.	.
<i>Callochiton crocinus</i>	.	.	d	.	.	.	.	.	<i>Emarginula striatula</i>	.	.	d	.	.	.	.	.	.
<i>Chiton glaucus</i>	.	o	f	.	.	f	f	.	<i>Epitonium bucknilli</i>	.	.	.	x	.	.	.	.	.
<i>Cryptoconchus porosus</i>	.	r	r	.	.	.	r	.	<i>Epitonium jukesianum</i>	x	d	d	.	.	.	.	.	.
<i>Eudoxochiton nobilis</i>	.	r	.	.	.	.	r	.	<i>Epitonium minorum</i>	.	.	.	x	.	.	.	.	.
<i>Ischnochiton maorianus</i>	.	f	f	.	.	r	o	.	<i>Haliotis australis</i>	.	.	r	.	.	.	d	.	.
<i>Leptochiton inquinatus</i>	.	o	.	.	.	.	.	.	<i>Haliotis iris</i>	d	.	d	.	.	.	d	.	.
<i>Notoplax violacea</i>	.	.	r	.	.	.	.	.	<i>Haliotis virginea</i>	.	.	o	.	.	.	.	.	.
<i>Plaxiphora caelata</i>	.	d	r	.	.	.	.	.	<i>Haminoea zelandiae</i>	.	.	d	.	.	.	.	.	.
<i>Rhyssoplax stangeri</i>	.	.	r	.	.	.	.	.	<i>Haustrum haustorium</i>	.	o	f	.	.	.	o	.	.
<i>Sypharochiton pelliserpentis</i>	.	c	f	.	r	f	c	.	<i>Herpetopoma bella</i>	.	.	d	.	.	.	.	.	.
GASTROPODS									<i>Herpetopoma larochei</i> *	.	.	d	.	.	.	.	.	.
<i>Acteon cratericulatus</i>	.	.	.	x	.	.	.	.	<i>Incisura lytteltonensis</i>	x	.	.	.	.	.	.	.	.
<i>Aeneator attenuatus</i>	.	.	.	x	.	.	.	.	<i>Janthina exigua</i>	.	.	d	.	.	.	.	.	.
<i>Alcithoe fissurata</i>	.	.	.	x	.	.	.	.	<i>Lamellaria ophione</i>	.	.	d	.	.	.	o	.	.
<i>Amalda australis</i>	d	.	.	.	.	.	.	d	<i>Larochella alta</i> *	.	.	d	.	.	.	.	.	.
<i>Amalda mucronata</i>	d	.	.	.	.	.	.	.	<i>Lepsiella scobina</i>	.	a	f	.	.	.	f	.	.
<i>Amalda novaezelandiae</i>	<i>Leuconopsis obsoleta</i>	.	.	d	.	.	.	.	.	.
<i>Amphibola crenata</i>	a	d	.	.	<i>Linopyrga rugata rugata</i>	.	.	d	.	.	.	.	.	.
<i>Amphithalamus falsestea</i>	.	o	.	.	.	.	o	.	<i>Lodderena formosa</i>	.	.	d	.	.	.	.	.	.
<i>Anabathron hedleyi</i>	.	c	c	.	.	.	.	.	<i>Lucerapex angustatus</i>	.	.	.	x	.	.	.	.	.
<i>Antimelatoma ahiparana</i>	.	.	.	x	.	.	.	.	<i>Macrozafra subabnormis</i>	.	.	d	.	.	.	.	.	.
<i>Antisolarium egenum</i>	d	<i>Maoricrypta costata</i> *	.	.	r	.	.	.	.	.	.
<i>Apelodoris luctuosus</i>	.	.	x	.	.	.	.	.	<i>Maoricrypta monoxyla</i>	.	o	o	.	.	.	r	.	.
<i>Aplysia dactylomela</i>	.	o	.	.	.	.	.	.	<i>Maoricolpus roseus manukauensis</i>	d	r	.	.	.	.	.	.	.
<i>Asteracmea suteri</i>	.	d	d	.	.	.	.	.	<i>Marinula filholi</i>	.	.	d	.	.	.	.	.	.
<i>Austrofuscus glans</i>	d	.	d	.	.	.	d	.	<i>Melagraphia aethiops</i>	.	.	d	.	c	o	.	.	.
<i>Austrolittorina antipoda</i>	.	a	c	.	.	f	f	.	<i>Merelina compacta</i> *	.	.	d	.	.	.	.	.	.
<i>Austrolittorina cincta</i>	.	c	f	.	.	o	o	.	<i>Merelina lyalliana</i>	.	.	d	.	.	.	.	d	.
<i>Austromitra rubiginosa</i>	.	o	d	.	.	.	.	.	<i>Merelina taupoensis</i> *	.	.	d	.	.	.	.	.	.
<i>Hypermastus bulbula</i>	.	.	.	x	.	.	.	.	<i>Mesoginella larochei</i>	.	d	d	x	.	.	.	.	.
<i>Boreoscala zeledori</i>	d	.	.	x	.	.	.	.	<i>Mesoginella pygmaea</i>	.	d	d	.	.	.	.	.	.
<i>Bouchettriphora pallida</i>	.	.	d	.	.	.	.	.	<i>Micrelenchus huttonii</i>	.	.	.	.	.	.	.	d	.
<i>Brookula finlayi</i>	<i>Micrelenchus sanguineus</i>	.	.	d	.	.	.	o	r	.
<i>Buccinulum linea</i>	.	.	d	.	.	.	.	.	<i>Micrelenchus huttoni</i>	d	.	.	.	.	.	.	.	.
<i>Buccinulum vittatum vittatum</i>	.	d	d	.	.	.	o	.	<i>Microvoluta marginata</i>	.	.	.	x	.	.	.	.	.
<i>Cabestana spengleri</i>	.	o	d	.	.	.	.	.	<i>Neoguraleus amoenus</i>	.	.	d	.	.	.	.	.	.
<i>Caecum digitulum</i>	.	.	d	.	.	.	.	.	<i>Neoguraleus lyallensis</i>	.	.	.	.	.	.	.	d	.
<i>Calliostoma punctulatum</i>	d	.	d	.	.	.	d	.	<i>Neoguraleus murdochi</i>	.	.	d	.	.	.	.	.	.
<i>Cantharidella tessellata</i>	.	c	c	.	.	.	c	f	<i>Nerita atramentosa</i>	.	o	o	.	o	o	o	.	.
<i>Cantharidus purpureus</i>	.	.	d	.	.	.	.	d	<i>Notoacmea elongata</i>	.	.	f	.	.	.	.	d	.
<i>Cellana ornata</i>	.	o	o	.	.	.	f	.	<i>Notoacmea helmsi</i>	.	.	.	.	f	f	.	d	.
<i>Cellana radians</i>	.	c	f	.	.	f	c	.	<i>Notoacmea parviconoidea</i>	d	o	d	.	.	.	o	.	.
<i>Cerithiella stiria</i>	.	.	d	.	.	.	.	.	<i>Notoacmea pileopsis pileopsis</i>	.	f	d	.	.	.	.	.	.
<i>Chemnitzia</i> spp.	.	.	d	.	.	.	.	d	<i>Notoacmea helmsi</i> f. <i>scapha</i>	.	.	d	.	.	.	.	.	.
<i>Cirsonella</i> aff. <i>laxa</i> *	d	<i>Notoacmea scopulina</i>	.	.	.	.	.	.	x	.	.
<i>Cominella adspersa</i>	d	.	.	.	.	o	.	.	<i>Notoacmea subtilis</i>	.	.	d	.	.	.	.	.	.
<i>Cominella glandiformis</i>	.	.	.	o	f	d	f	.	<i>Nozeba emarginata</i>	.	.	.	.	.	.	.	d	.
<i>Cominella maculosa</i>	.	.	r	.	.	.	.	.	<i>Odostomia takapunaensis</i>	.	d	d	.	.	.	.	.	.
<i>Cominella quoyana quoyana</i>	.	.	d	.	.	.	.	.	<i>Onchidella nigricans</i>	.	.	.	.	r	.	.	.	.
<i>Cominella virgata virgata</i>	.	d	d	.	.	.	d	.	<i>Onoba fumata</i>	.	.	d	.	.	.	.	.	.
<i>Cookia sulcata</i>	.	.	o	.	.	.	.	.	<i>Ophicardelus costellaris</i>	.	.	.	.	f	.	.	.	.
<i>Crepidula youngi</i>	d	.	.	.	.	.	.	.	<i>Paratrophon cheesemani</i>	.	o	.	.	.	.	.	.	.
<i>Crosseola vesca</i>	.	.	d	.	.	.	.	.	<i>Paratrophon quoyi</i>	.	.	x	.	.	.	.	.	.
<i>Cuvierina colummella</i>	.	.	.	x	.	.	.	.	<i>Patelloida corticata</i>	.	o	o	.	.	.	o	.	.
<i>Cylichna thetidis</i>	.	.	.	x	.	.	.	.	<i>Penion sulcatus</i>	.	.	d	.	.	.	.	.	.
<i>Cymatium parthenopeum</i>	.	o	.	.	.	o	.	.	<i>Pervicacia tristis</i>	.	d	o	.	.	.	.	.	.
<i>Dentomargo amoena</i>	.	.	.	x	.	.	.	.	<i>Phenatoma rosea</i>	d	.	.	.	.	.	.	.	.
<i>Dentomargo cairoma</i>	.	.	d	.	.	.	.	.	<i>Pisinna rekoahuana</i>	.	d	.	.	.	.	.	.	.
<i>Dicathais orbita</i>	.	c	o	.	.	.	f	.	<i>Pisinna semiplicata</i> *	.	.	d	.	.	.	.	.	.
<i>Diloma bicanaliculata</i>	.	.	r	.	.	.	.	.	<i>Pisinna zosterophila</i>	.	a	d	.	.	.	d	d	.
<i>Diloma coracina</i>	.	.	d	.	.	.	.	.	<i>?Pleurobranchea maculata</i>	.	.	.	.	.	.	r	.	.
<i>Diloma subrostrata</i>	.	d	d	.	c	f	.	d	<i>Potamopyrgus estuarinus</i>	.	.	.	.	a	.	.	.	.
<i>Diloma zelandica</i>	.	.	d	.	.	.	.	.	<i>Proxiuber australe</i>	.	.	d	.	.	.	.	d	.
<i>Doriopsis flabellifera</i>	.	x	x	.	.	.	.	.	<i>Pupa kirki</i>	.	.	.	x	.	x	.	.	.
<i>Eatoniella albocolumella</i>	.	d	o	.	.	.	.	.	<i>Pusillina hamiltoni</i> *	.	.	o	.	.	.	.	.	.
<i>Eatoniella flammulata</i>	.	d	d	.	.	.	.	.	<i>Radiacmea inconspicua</i>	.	d	.	.	.	.	.	d	.
<i>Eatoniella limbata</i>	.	o	.	.	.	.	.	.	<i>Ranella australasia</i>	.	.	.	.	.	.	d	.	.
<i>Eatoniella mortoni</i>	.	.	d	.	.	.	.	.	<i>Retusa oruaensis</i>	x	.	d	.	.	.	.	.	.
<i>Eatoniella notalabia</i>	.	d	.	.	.	.	.	.	<i>Risellopsis varia</i>	.	d	o	.	.	.	.	.	.
<i>Eatoniella olivacea</i>	.	c	d	.	.	o	.	.	<i>Rissoella cystophora</i>	.	.	o	.	.	.	.	.	.
<i>Eatoniella pfefferi</i>	.	c	.	.	.	.	.	.	<i>Rissoella elongatospira</i> *	.	.	o	.	.	.	.	.	.
<i>Eatoniella roseospira</i>	.	.	d	.	.	.	.	.	<i>Rissoella rissoaformis</i> *	.	.	d	.	.	.	.	.	.
<i>Eatonina crassicarinata?</i>	.	.	d	.	.	.	.	.	<i>Rissoina chathamensis</i>	.	d	d	.	.	.	.	.	.

	A	B	C	D	E	F	G	H		A	B	C	D	E	F	G	H
<i>Rissoina zonata</i>	.	.	d	.	.	.	.	.	<i>Nucula nitidula</i>	.	.	d	.	.	.	.	.
<i>Sagenotriphora ampulla</i>	.	.	d	.	.	.	.	.	<i>Panopea zelandica</i>	d	.	.	.	.	.	.	.
<i>Scutus breviculus</i>	.	o	f	.	.	.	o	.	<i>Paphies australis</i>	.	.	d	.	.	c	d	a
<i>Seila cincta</i>	.	.	d	.	.	.	.	.	<i>Paphies subtriangulata</i>	d	.	d	.	.	.	d	.
<i>Semicassis pyrum</i>	.	.	d	.	.	.	d	.	<i>Paphies ventricosa</i>	d	.	.	.	.	.	.	.
<i>Serrata mustelina</i> *	.	.	d	.	.	.	.	.	<i>Perna canaliculus</i>	.	a	o	.	.	.	o	.
<i>Sigapatella novaezelandiae</i>	d	.	o	.	.	.	o	.	<i>Peronaea gaimardi</i>	d	.	.	.	.	.	.	.
<i>Siphonaria australis</i>	d	d	d	.	.	.	.	.	<i>Philobrya munita</i>	.	.	d	.	.	.	.	.
<i>Siphonaria propria</i>	d	.	d	.	.	.	o	.	<i>Protothaca crassica</i>	d	d	d	.	.	.	d	.
<i>Splendrillia otagoensis</i> *	.	.	.	x	.	.	.	.	<i>Pseudoarcompagia disculus</i>	x	.	d	.	.	.	.	.
<i>Stephopoma rosea</i>	.	o	d	.	.	.	.	.	<i>Resania lanceolata</i>	d	.	.	.	.	.	.	.
<i>?Striodostomia orewa</i>	.	d	.	.	.	.	.	.	<i>Ruditapes largillierti</i>	x	d	.	.	.	.	.	.
<i>Struthiolaria papulosa</i>	d	.	.	.	.	.	.	.	<i>Saccella bellula</i>	x	.	.	.	.	.	.	.
<i>Syrnola crawfordi</i>	.	.	.	x	.	.	.	.	<i>Scalpomactra scalpellum</i>	.	d	.	.	.	.	.	.
<i>Tanea zelandica</i>	d	.	.	.	.	.	.	.	<i>Soletellina nitidula</i>	d	.	.	.	.	.	.	.
<i>Taron dubius</i>	.	o	d	.	.	.	o	.	<i>Spisula aequilatera</i>	d	.	d	.	.	.	d	.
<i>Terelimella aoupouria</i>	.	.	.	x	.	.	.	.	<i>Talochlamys zelandiae</i>	.	.	d	.	.	.	r	.
<i>Thoristella carmesina</i>	.	.	d	.	.	.	.	.	<i>Tawera spissa</i>	d	.	.	.	.	.	.	.
<i>Thoristella oppressa</i>	.	.	o	.	.	.	.	.	<i>Theora lubrica</i>	.	.	.	.	.	x	.	.
<i>Trimusculus conicus</i>	.	.	d	.	.	.	d	.	<i>Trichomusculus barbatus</i>	.	.	d	.	.	.	.	.
<i>Trivia merces</i>	.	.	d	x	.	.	.	.	<i>Xenostrobus pulex</i>	d	a	a	.	r	.	a	d
<i>Trochus viridis</i>	.	.	d	.	.	.	d	.	<i>Zenatia acinaces</i>	d	.	.	.	.	.	.	.
<i>Tugali elegans</i>	.	.	x	.	.	.	d	.	SCAPHOPODS	.	.	.	.	.	.	.	.
<i>Tugali suteri</i>	d	.	d	.	.	.	.	.	<i>Antalis nana</i>	.	.	d	x	.	.	.	.
<i>Turbo smaragdus</i>	.	f	f	.	r	o	.	d	CEPHALOPODS	.	.	.	.	.	.	.	.
<i>Uttleya ahiparana</i>	.	.	.	x	.	.	.	.	<i>Argonauta argo</i>	.	.	d	.	.	.	.	.
<i>Volvulella nesentus</i>	.	.	.	x	.	.	.	.	<i>Spirula spirula</i>	d	.	d	.	.	.	.	.
<i>Xymene traversi</i>	.	d	f	.	.	.	c	.	ECHINODERMS	.	.	.	.	.	.	.	.
<i>Zaclys sarissa</i>	.	.	d	.	.	.	.	.	<i>Allostichaster polyplax</i>	.	.	r	.	.	.	.	.
<i>Zalipais lissa</i>	.	.	.	.	.	.	.	r	<i>Astropecten polyacanthus</i>	r	.	.	.	.	.	.	.
<i>Zeacolpus ahiparanus</i>	d	.	.	x	.	.	.	.	<i>Coscinasterias muricata</i>	.	o	o	.	.	.	.	.
<i>Zeacumantus lutulentus</i>	.	.	.	.	.	f	.	c	<i>Echinocardium caudatum</i>	.	.	.	.	.	.	.	.
<i>Zeacumantus subcarinatus</i>	.	a	f	.	.	.	f	d	<i>Evechinus chloroticus</i>	.	o	o	.	.	.	r	.
<i>Zebittium exile</i>	.	.	x	.	.	.	.	.	<i>Fellaster zelandiae</i>	.	.	.	.	.	d	.	o
<i>Zegalerus tenuis</i>	.	d	d	.	.	.	.	d	<i>Ophionereis fasciata</i>	.	r	.	.	.	.	r	.
<i>Zemitrella choava</i>	.	.	d	.	.	.	o	.	<i>Patriella regularis</i>	.	o	f	.	.	.	o	.
<i>Zemitrella fallax</i>	.	.	d	.	.	.	.	.	<i>Stichaster australis</i>	.	o	r	.	.	.	r	.
<i>Zemitrella laevirostris?</i>	.	.	o	.	.	.	.	.	CRABS	.	.	.	.	.	.	.	.
<i>Zemitrella stephanophora</i>	.	.	d	.	.	.	.	.	<i>Cyclograpsus lavauxi</i>	.	.	.	.	f	f	.	.
<i>Zemitrella sp.</i>	.	.	d	.	.	.	.	.	<i>Halicarcinus whitei</i>	.	.	.	.	.	x	.	.
<i>Zeradina odhneri</i>	.	.	.	x	.	.	.	.	<i>Helice crassa</i>	.	.	.	.	c	.	.	.
<i>Zethalia zelandica</i>	d	d	.	.	.	.	.	d	<i>Hemigrapsus crenulatus</i>	.	.	.	.	f	.	.	.
BIVALVES	.	.	.	.	.	.	.	.	<i>Hemigrapsus edwardsi</i>	.	.	r	.	.	o	o	.
<i>Acar sandersonae</i>	.	.	x	.	.	.	.	.	<i>Heterozius rotundifrons</i>	.	.	.	.	.	.	r	.
<i>Acar sociella</i>	.	.	d	.	.	.	.	.	<i>Leptograpsus variegatus</i>	.	f	r	.	.	o	.	.
<i>Anomia trigonopsis</i>	.	r	.	.	.	.	r	.	<i>Macrophthalmus hirtipes</i>	.	.	.	.	f	.	.	.
<i>Arthritica bifurca</i>	.	.	.	.	.	.	.	d	<i>Notomithrax ursus</i>	x	.	.	.	.	.	.	.
<i>Austrovenus stutchburyi</i>	d	.	.	.	.	.	.	a	<i>Ovalipes catharus</i>	.	.	.	.	.	d	.	.
<i>Bankia australis</i>	.	.	.	.	f	.	.	.	<i>Ozius truncatus</i>	.	f	f	.	.	o	.	.
<i>Barbatia novaezelandiae</i>	.	.	d	.	.	.	.	.	<i>Pagurus novizelandiae</i>	.	c	f	.	.	o	f	.
<i>Barnea similis</i>	d	.	.	.	.	.	.	.	<i>Petrolisthes elongatus</i>	.	f	f	.	.	o	f	.
<i>Bassina yatei</i>	d	.	.	.	.	.	.	.	<i>Plagusia chabrus</i>	.	f	o	.	.	.	.	.
<i>?Benthocardiella obliquata</i>	.	.	d	.	.	.	.	.	BARNACLES	.	.	.	.	.	.	.	.
<i>Borniola reniformis</i>	.	.	d	.	.	.	.	.	<i>Austrominius modestus</i>	.	r	.	.	c	o	.	c
<i>Cardita aoteana</i>	.	.	d	.	.	.	.	.	<i>Balanus variegatus</i>	.	.	d	.	.	.	.	.
<i>Crassostrea gigas</i>	.	o	o	.	f	f	o	.	<i>Calantica spinosa</i>	.	r	d	.	.	.	.	.
<i>Divarilucina cumingii</i>	d	.	.	.	.	.	.	.	<i>Chamaesipho brunnea</i>	.	a	a	f	.	.	c	.
<i>Dosinia anus</i>	d	.	.	.	.	.	.	.	<i>Chamaesipho columna</i>	.	a	a	.	.	.	a	.
<i>Dosinia subrosea</i>	d	.	.	.	.	.	.	.	<i>Epopella plicata</i>	.	c	f	.	.	o	.	.
<i>Gari lineolata</i>	d	.	.	.	.	.	.	.	<i>Lepas sp.</i>	.	.	d	.	.	.	.	.
<i>Hiatella arctica</i>	.	d	d	x	.	.	.	.	<i>Notomegabalanus decorus</i>	.	d	d	.	.	.	r	.
<i>Irus reflexus</i>	.	o	d	.	.	.	r	.	<i>Platylepas hexastylus</i>	x	.	.	.	.	.	.	.
<i>Lasaea hinemoa</i>	.	.	d	.	.	.	.	.	<i>Tetraclitella depressa</i>	.	o	o	.	.	.	.	.
<i>Leptomya retiaria</i>	d	.	.	.	.	.	.	.	COELENTERATES	.	.	.	.	.	.	.	.
<i>Macomona liliana</i>	.	.	d	.	d	.	d	c	<i>Actinothoe albocincta</i>	.	o	.	.	.	.	o	.
<i>Macra murchisoni</i>	d	.	.	.	.	.	.	.	<i>Amphisbetia bispinosa</i>	d	.	d	.	.	.	.	.
<i>Melliteryx parva</i>	.	.	d	.	.	.	.	.	<i>Anthopleura aureoradiata</i>	.	.	.	.	.	.	.	c
<i>Modiolarca impacta</i>	.	r	.	.	.	.	d	.	<i>Diadumene neozelanica</i>	.	.	r	.	.	.	.	.
<i>Modiolus areolatus</i>	.	.	d	.	.	.	d	.	<i>Isactinia olivacea</i>	.	c	o	.	.	r	o	.
<i>Moerella huttoni</i>	.	.	.	x	.	.	.	.	<i>Isocradactis magna</i>	.	f	r	.	.	o	.	.
<i>Montacuta semiradiata neozelanica</i>	.	.	d	.	.	.	.	.	<i>Isoparactis ferax</i>	.	.	.	.	.	.	r	.
<i>Myadora striata</i>	d	.	.	.	.	.	.	.	POLYCHAETES	.	.	.	.	.	.	.	.
<i>Myllita stowei</i>	.	.	d	.	.	.	.	.	<i>Flabelligera bicolor</i>	.	o	o	.	.	.	.	.
<i>Myllitella vivens vivens</i>	d	.	x	.	.	.	.	.	<i>Neosabellaria kaiparaensis</i>	.	.	f	.	.	.	.	.
<i>Neolepton antipodum</i>	.	d	o	.	.	.	.	.	<i>Pectinaria australis</i>	.	.	.	.	.	.	d	.
<i>Nucula hartvigiana</i>	.	.	d	.	.	.	.	c	<i>Salmacina australis</i>	.	o	o	.	.	.	.	.

	A	B	C	D	E	F	G	H		A	B	C	D	E	F	G	H
<i>Spirorbis</i> sp.	.	f	f	.	.	.	.	.	<i>Halopteris virgata</i>	.	o	o	.	.	.	.	.
<i>Spirobranchus cariniferus</i>	.	c	a	.	.	c	c	.	<i>Hormosira banksii</i>	.	o	f	.	.	.	o	.
PLATYHELMINTHES	.	r	r	.	.	.	.	.	<i>Landsburgia quercifolia</i>	.	o	o	.	.	.	.	.
SPONGES									<i>Laurencia thyrsoifera</i>	.	.	o	.	.	.	.	.
<i>Tethya aurantium</i>	.	o	.	.	.	.	.	.	<i>Lessonia variegata</i>	.	o	.	.	.	.	.	.
ASCIDIANS	<i>Melanthalia abscissa</i>	.	o	o	.	.	.	o	.
<i>Corella eumyota</i>	o	.	<i>Osmundaria colensoi</i>	.	f	.	.	.	.	o	.
<i>Pyura</i> sp.	.	.	o	.	.	.	o	.	<i>Plocamium costatum</i>	.	o	.	.	.	.	o	.
SEAWEEDS									<i>Pterocladia capillacea</i>	.	.	o	.	.	.	o	.
<i>Apophlaea sinclairii</i>	.	.	c	.	.	.	f	.	<i>Pterocladia lucida</i>	.	.	o	.	.	.	o	.
<i>Carpophyllum maschalocarpum</i>	.	o	o	.	.	.	o	.	? <i>Rivularia</i> sp.	.	.	o	.	.	.	.	.
<i>Cheilosporum sagittatum</i>	.	.	o	.	.	.	.	.	<i>Scytothamnus australis</i>	.	o	o	.	.	.	o	.
? <i>Cladophora</i> sp.	.	o	.	.	.	.	.	.	<i>Splachnidium rugosum</i>	.	.	.	.	.	.	o	.
<i>Codium convolutum</i>	.	r	r	.	.	.	o	.	<i>Ulva lactuca</i>	.	o	.	.	.	.	.	.
<i>Codium dimorphum</i> ?	.	.	o	.	.	.	.	.	<i>Ulva</i> sp.	.	.	.	.	.	.	o	.
<i>Codium fragile</i>	o	.	<i>Xiphophora chondrophylla</i>	.	o	o	.	.	.	f	.
<i>Colpomenia sinuosa</i>	o	.	INTERTIDAL LICHENS								
<i>Corallina officinalis</i>	.	c	c	.	.	.	c	.	<i>Lichina confinis</i>	.	.	.	.	.	.	r	.
<i>Durvillaea antarctica</i>	d	r	r	.	.	.	.	.	INTERTIDAL VASCULAR PLANTS								
<i>Ecklonia radiata</i>	.	o	o	.	.	.	.	.	<i>Avicennia marina</i> var. <i>australasica</i>	.	.	.	.	a	.	.	.
<i>Endarachne binghamiae</i>	.	o	.	.	.	.	o	.	<i>Zostera muellerii</i>	.	.	r	.	.	.	.	.
<i>Gigartina alveata</i>	f	.									

HABITAT NOTES

Herekino Harbour

The mid to high tidal mangrove forest that fills the upper reaches of both arms of Herekino Harbour supports the usual range of marine invertebrates. Most common invertebrates are the mud snail *Amphibola crenata*, topshells *Melagraphia aethiops* and *Diloma subrostrata*, and mud crab *Helice crassa*. Commonly attached to the trunks, lower branches and aerial roots are the acorn barnacle *Austrominius modestus* and rarer Pacific oyster *Crassostrea gigas* and flea mussel *Xenostrobus pulex*, while algal grazers in the branches include rare *Nerita atramentosa*, *Turbo smaragdus*, *Onchidella nigricans*, and *Sypharochiton pelliserpentis*. Among rushes around the upper fringes of the mangroves are common *Potamopyrgus estuarinus* and less frequent *Ophicardellus costellaris*.

Thirteen invertebrate taxa were recorded living on and in the unvegetated fine to medium sand floor of Herekino Harbour and 20 more were present as dead shells (Appendix 1). Pipi *Paphies australis*, and cockle *Austrovenus stutchburyi*, are the dominant molluscs living both subtidally and intertidally (Fig. 2). The small sea anemone *Anthopleura aureoradiata*, are commonly attached to these two shallow-burrowing, infaunal bivalves, together with the acorn barnacle. Other common infaunal bivalves are the wedge shell *Macomona liliana*, nut shell *Nucula hartvigiana*, and occasional *Theora lubrica*. Common bivalves living on the sand surface are the horn shell *Zeacumantus lutulentus*, whelk *Cominella glandiformis*, and small topshell *Cantharidella tessellata*.

Ninety-two rock-inhabiting taxa (81 living) were recorded from on and under rocks along the southern shore of Herekino Harbour between the road end at Owata and the harbour entrance (Fig. 1). Zone forming organisms on the rocky shore are the periwinkle *Austrolittorina antipoda*, barnacles *Chamaesipho brunnea* and *C. columna*, the flea mussel *Xenostrobus pulex*, tube worm *Spirobranchus cariniferus*, and the algae *Apophlaea sinclairii*, *Gigartina alveata*, *Xiphophora chondrophylla*, and *Corallina* turf. Common grazers on the rocky shore include the limpets *Cellana radiata* and *C. ornata*, and the small seaweed-inhabiting *Cantharidella tessellata*, and carnivores include the white rock shell *Dicathais orbita*, oyster borer *Lepsiella scobina*, smaller *Xymene traversi*, and occasional specimens of the large *Cymatium parthenopeum* (Fig. 2). Fifteen additional species of seaweed were also recorded on the rocks, especially around the low tidal fringe.

A rich fauna lives in the protection provided beneath low tidal cobbles, and includes numerous half crabs *Petrolisthes elongatus*, chitons *Chiton glaucus* and *Ischnochiton maorianus*, occasional gastropods *Buccinum vittatum*, *Taron dubius*, soft-bodied *Scutus*



Fig. 2. Common intertidal and dredged species Herekino Harbour. Drawings by Powell (1987) and Margaret Morley.

breviculus, sea squirt *Corella eumyota*, crabs *Ozius truncatus* and *Hemigrapsus edwardsi*, and brittlestar *Ophionereis fasciata*.

Open coast beaches

Fifty-five species, mostly mollusc shells, were recorded washed up on the sand at the southern end of Ninety Mile Beach around Ahipara. Some of these are bivalves that live in the subtidal surf zone just offshore (e.g., *Bassina yatei*, *Dosinia anus*, *Mactra purchisoni*, *Paphies subtriangulata*, *Spisula aequilatera*); others have been washed in from deeper water during storms (e.g., *Amalda mucronata*, *Antalis nana*, *Austrofuscus glans*, *Gari lineolata*, *Myadora boltoni*, *Resania lanceolata*, *Soletellina nitidula*, *Tanea zelandica*, *Zeacolpus ahiparanus*); some are pelagic (e.g., *Spirula spirula*); some are intertidal rock-inhabiting taxa (e.g., *Calliostoma punctulatum*, *Haliotis iris*, *Tugali suteri*); or have been carried by the tide out of

OPEN COAST

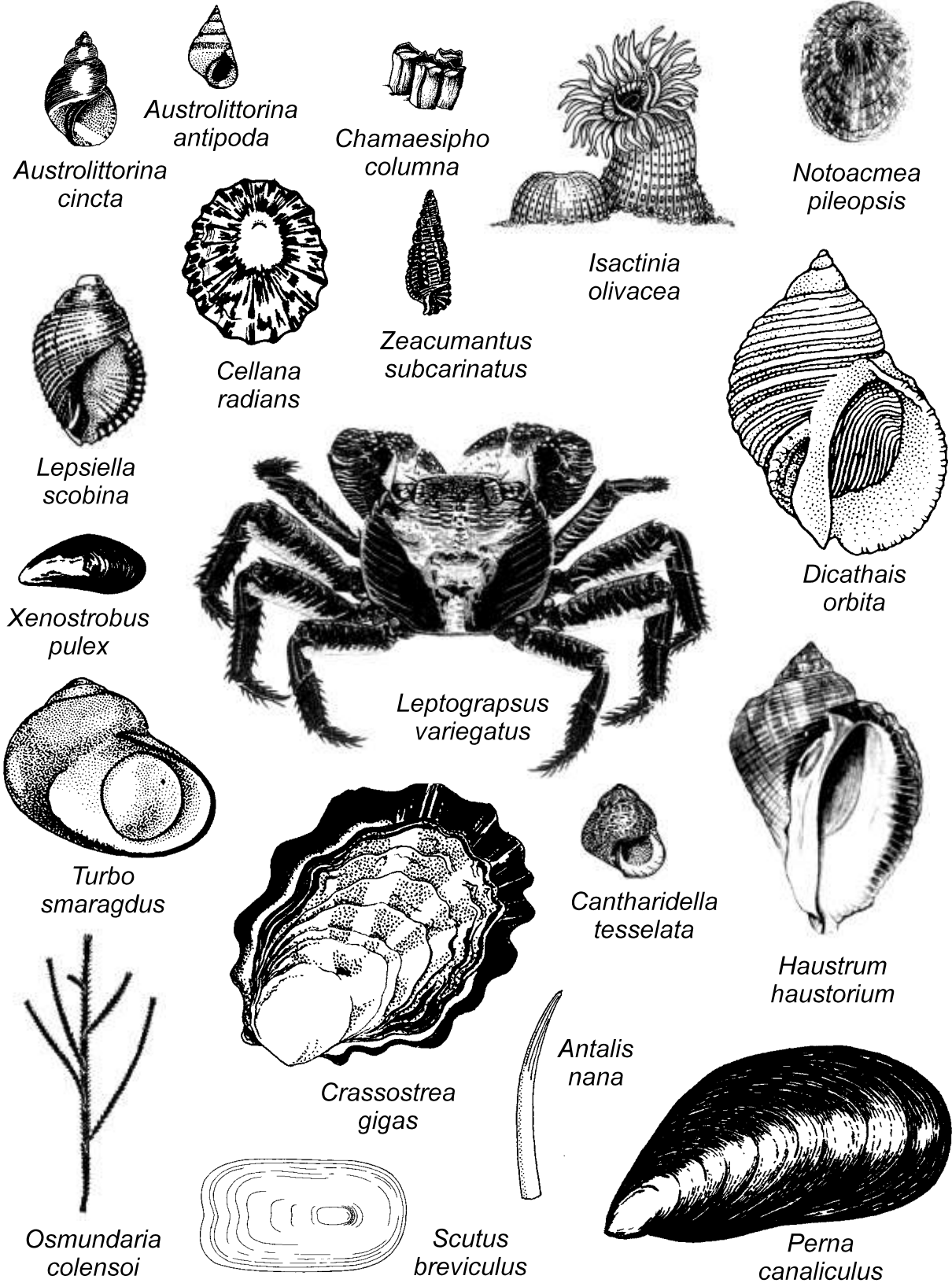


Fig. 3. Common or typical species of the open coast, west of Ahipara. Drawings by Powell (1979, 1987), Morton and Miller (1968) and Margaret Morley.

a sheltered harbour and swept up the coast (e.g., *Austrovenus stutchburyi*, *Cominella adspersa*).

During our visit, there was an unusually rich wash-up of 113 species on the high tidal beach above the low tidal reefs on the outside of Tauroa Pt. These included many of the rarer and unusual molluscs recorded in this study, most were derived from subtidal rock and sediment habitats.

Exposed rocky shore

One-hundred and ten species were recorded live on or under the intertidal rocks from Ahipara round to Tauroa Pt. Grazing on the rocks above high tide are common periwinkles *Austrolittorina antipoda* and *N. cincta*, and on more shaded faces the limpet *Notoacmea pileopsis* (Fig. 3). Slightly lower on the shore are the zoning barnacles *Chamaesipho brunnea*, *C. columna*, and *Epopella plicata*, their predator *Lepsiella scobina*, together with the red leathery seaweed *Apophlaea sinclairii*, and grazers *Cellana radiata* and *Sypharochiton pelliserpentis*. In shallow, mid to high tidal pools are common horn shells *Zeacumantus subcarinatus* and olive anemones *Isactinia olivacea*. Forming patchy zones around mid tide are the flea mussel *Xenostrobus pulex* and tube worm *Spirobranchus cariniferus*. Towards low tide the rocks have a carpet of pink coralline turf and in places dense beds of the green-lipped mussel *Perna canaliculus*, with their predators *Dicathais orbita*, *Haustrum haustorium*, and the orange starfish *Stichaster australis*. Common micromolluscs in the seaweeds include *Pisinna zosterophila*, *Cantharidella tessellata*, *Anabathron hedleyi*, *Eatoniella olivacea*, and *E. pfefferi*. The most common crabs are the red rock crab *Plagusia chabrui* at low tide, the purple intertidal crab *Leptograpsus variegatus*, the black-finger crab *Ozius truncatus*, and half-crab *Petrolisthes elongatus*.

TYPES

Eight species of gastropod were described by Powell from off Ahipara. Seven are still considered valid and the eighth is now considered to be a junior synonym of an earlier described species. These species are:

Off Ahipara 42 m

Aeneator attenuata Powell, 1927

Antimelatoma ahiparana Powell, 1942

Balcis pervegrandis Powell, 1940 = junior synonym of *Hypermastus bulbula* (Murdoch and Suter, 1906)

Finlayola crawfordi (Powell, 1927) as *Syrnola crawfordi*

Uttleya ahiparana (Powell, 1927) as *Rugobela ahiparana*.

Zeradina odhneri Powell, 1927

Zeacolpus ahiparanus (Powell, 1927) as *Turritella (Zeacolpus) ahiparana*

Off Ahipara, 140 m

Nodiscala ahiparana (Powell, 1930) as *Pliciscala (Nodiscala) ahiparana*

MOLLUSCAN BIOGEOGRAPHIC NOTES

The Ahipara and Herekino records of mollusc species extend the geographic ranges of 12 gastropods listed below (Fig. 4). Powell's (1979) published ranges have been used when commenting on extension of range, because [Spencer and Willan \(1996\)](#) give zoogeographic provinces only. These provinces (Powell 1979) are used to summarise the known ranges of each species (A = Aupourian, C = Cookian, F = Forsterian, M = Morioran, An = Antipodian). Additional records from the collections of the Auckland Museum (AK) and Margaret Morley (MM) are cited where they extend the published range.

* *Cirsonella* aff. *laxa* Powell, 1937, Skeneidae - previously recorded from depths of 260 m off the Three Kings, 90 m off the Snares Islands (Powell 1979), and 40 m off Pakiri, Northland (Morley et al. 1997b). The Herekino specimen (AK140828) is the first record from the west coast of the North Island. We have additional records from 90 m off Cape Maria van Diemen. These specimens show variation in the degree of separation of the body whorl and in details of ornamentation. There are 15 lots of *Cirsonella* in the Auckland Museum collections which are not identified to species level, they do not readily separate into the species described in Powell (1979). The Ahipara specimen is loosely coiled, the outer lip is strongly retractive to the suture and the umbilicus is about a third of the diameter of the base, all features of *C. laxa*, but it is smooth without the spiral chords and the body whorl is not completely separated from the aperture as described by Powell (1979). The range for *Cirsonella laxa* is now A and An provinces, including the east and west coasts of Northland.

* *Herpetopoma larochei* (Powell, 1926), Trochidae - previously recorded from the northeast of the North Island - Taupo Bay, Whangaroa, Great Barrier Island, Mayor Island (Powell 1979), Three Kings, and Whananaki, (AK), and at 1-15 m depth in the Bay of Islands (Morley and Hayward 1999). This Ahipara specimen washed up at Reef Point (AK 140599) is the first record from the west coast of the North Island.

* *Larochella alta* Powell, 1927, Aclididae - previously recorded from Mangonui, Awanui Heads, Rangaunu Bay, on the east coast of northern Northland, in depths of 10-20 m (Powell 1979). Also dredged from the Bay of Islands in 1-5 m (Morley and Hayward 1999). This specimen from Reef Point, Ahipara (AK 140601) is the first west coast record. The range is further extended by a specimen in anchor mud at 15 m depth in Dusky Sound, Fiordland (MM). The range for *Larochella alta* is now A, C and F provinces.

* *Maoricrypta costata* Sowerby, 1824, Calyptraeidae - previously recorded from Cape Maria van Diemen to Bay of Plenty (Powell 1979). Specimens from Reef Point, Ahipara (MM, AK) are the first west coast record. We also know of west coast North Island specimens from Waikawau and Kiritehere (MM) and the Waitakere coast (Hayward and Morley in press). The range is further extended by a specimen from Wharekauri, Chatham Islands (AK). The range for *Maoricrypta costata* is now updated to A, C and M provinces including the west coast of the North Island.

* *Merelina compacta* Powell, 1927, Rissoidae - previously recorded from off Mangonui, Northland in 10-20 m (Powell 1979), and known from Cape Maria van Diemen, Spirits Bay, and Rarawa, Northland; Poor Knights Islands in 40 m (MM) and Tryphena, Great Barrier Island (AK). These Ahipara specimens, washed up at Reef Point (AK140607), provide the first record from the west coast.

* *Merelina taupoensis* Powell, 1939, Rissoidae - this species is common in shell sand and under rocks at low tide on Northland's east coast from Cape Maria to Oneroa, Waiheke Island including Taupo Bay (Powell 1979), Colville (AK), and Great Barrier Island (MM). We have an additional record from algae wash at Sponge Bay, south of East Cape (MM). These Ahipara specimens (AK140610) provide the first west coast record. Thus the known range for *Merelina taupoensis* is now A and C provinces.

* *Pisinna semiplicata* (Powell, 1927), Anabathronidae - previously known from the northeast of the North Island, from Taupo Bay (Powell 1979) and the Bay of Islands (Morley and Hayward 1999). We have additional records from Spirits Bay; Great Barrier Island; Oneroa, Waiheke (MM); Tauranga; and Breaker Bay, Wellington (AK). The range for *Pisinna*

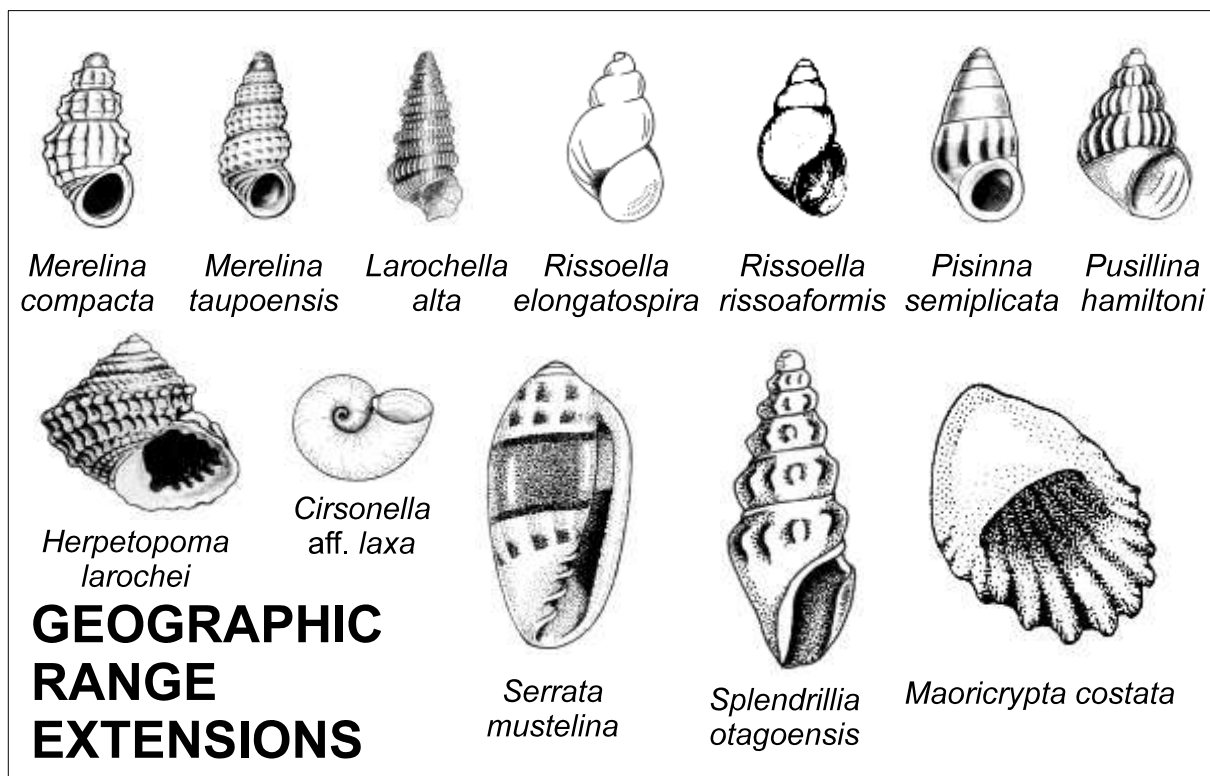


Fig. 4. Gastropods, whose recorded geographical range has been extended by this study. Drawings by Powell (1979, 1987) and Margaret Morley.

semiplicata is now updated to A and C provinces, including the west coast with this record from Reef Point, Ahipara.

* *Pusillina hamiltoni* (Suter, 1898), Rissoidae - previously known from Tom Bowling Bay, Northland; Hauraki Gulf; Lyall Bay, Wellington; Banks Peninsula; Foveaux Strait; Waitangi, Chatham Island (Powell 1979); and the Bay of Islands (Morley and Hayward 2001). There are also specimens collected from East Cape (AK). These Ahipara specimens living on algae (AK140616), provide the first west coast record. This species is known from A, C, F, and M provinces.

* *Rissoella elongatospira* Ponder, 1966, Rissoellidae - previously known from the east coast of the North Island; Wellington west coast; east coast of the South Island; Stewart Island and Chatham Islands (Powell 1979). The range is already recorded from A, C, F, and M provinces (Spencer and Willan 1996) and further updated to include An province (Morley 1996). This specimen from Reef Point, Ahipara (AK 140647) is the first west coast record in Northland.

* *Rissoella rissoaformis* (Powell, 1939), Rissoellidae - previously recorded from the east coast of the North and South Islands, plus Fiordland and Stewart Island (Powell 1979), but was only recorded from C and F provinces by Spencer and Willan (1996). The range for *Rissoella rissoaformis* was previously updated with specimens from Auckland and Snares Islands (Morley 1996). The Ahipara specimens from algal wash (AK140620) are the first west coast record from the North Island. The provinces for *Rissoella rissoaformis* are now updated to A, C, F, and An.

* *Serrata mustelina* (Angas, 1871), Marginellidae - previously recorded from Northland east coast down to East Cape (Powell 1979). We know of specimens from off Raoul, Kermadec Islands in 10-30 m (Brook pers. comm.) and Mahia Peninsula (AK). The Ahipara specimen

was collected at Reef Point. The range for *Serrata mustelina* is now A and C provinces, including the west coast of the North Island.

* *Splendrillia otagoensis* Powell, 1942, Drillidae - previously known from off Oamaru, Otago in 30 m; and Paterson Inlet, Stewart Island in 20 m (Powell 1979). The Ahipara specimen (AK81489) was identified by F. Wells, a turrid expert. He has also identified *S. otagoensis* from Whangaroa in 29-31 m; Deep Water Cove, Bay of Islands, in 55 m; Whangarei Heads in 7 m; off Mangonui, Doubtless Bay in 146 m; and off Mayor Island in 154 m (AK). F. Wells has retained *S. aoteana* as a valid species by identifying specimens from off Cuvier Island and off Little Barrier Island (AK). The range for *Splendrillia otagoensis* is now updated to A and F provinces. This is the first west coast record in the North Island.

BIOGEOGRAPHIC PROVINCES

Six shallow marine biogeographical provinces have been established for the New Zealand region (Powell, 1955): Kermadecian (Kermadec Islands), Aupourian (north-east North Island), Cookian (central New Zealand), Forsterian (southern South, Stewart and Snares Islands), Moriorian (Chatham Islands), and Antipodean (Subantarctic Islands). There are several definitions of a biogeographical province. It may be defined as an area that exhibits a marked percentage of endemism; or the boundary between provinces coincides with the distributional boundaries of a significant number of taxa, or where there is a marked change in the dominant taxa. Some modern workers reject the concept of provinces, as they are clearly artificial human inventions that oversimplify and hide the real complex nature of biogeographical distribution patterns.

The relevance of biogeographical provinces to this Ahipara study lies in the fact that the western boundary between the Aupourian and Cookian Provinces was placed just north of Ahipara by Powell (1937), off Ahipara by Powell (1955), and between Ahipara and Kaipara by [Spencer and Willan \(1996\)](#). This boundary has presumably been placed off the west coast because of the presence of the weak southward-flowing, warm West Northland Current, which theoretically carries species southwards down the coast from the cape. Satellite imagery of water temperature suggests that the strength and distance it flows down the coast before meeting north-flowing currents is highly variable.

The distance south that the province boundary has been placed has presumably been influenced by the recorded occurrences of some largely east coast molluscan species along the northern end of Northland's west coast. Our study adds four, previously east coast-restricted mollusc species (*Herpetopoma larochei*, *Merelina compacta*, *M. taupoensis*, *Serrata mustelina*) to the small list that also occur as far south on the west coast as Ahipara. The total list with Ahipara as their southern limit is short, many have in recent years had their known ranges extended further south down the west coast by our studies, or even to the South Island.

If we examine the list of 728 molluscan species recorded in all our recent intertidal and shallow subtidal studies on both the east and west coasts of northern New Zealand, we find that we have recorded 463 (64%) from both east and west coasts, with a further 200 only recorded from the east coast (27%) and 65 only from the west coast (9%). Going around the top of North Cape Peninsula is where by far the greatest change occurs in the molluscan fauna and it could be argued that this is a more logical place for the Province boundary. In our study data going southwards down the west coast, Ahipara is the southern limit for 40 species, Kawerua for 22 species, the Waitakeres for 52 species, Raglan for 20 species, and Kawhia for 18 species.

Furthermore it could be argued that our intertidal and shallow subtidal records from Ahipara and Herekino have more in common with West Coast North Island (Cookian) than East Coast North Island (Aupourian) localities. The diversity of recorded molluscs from

Ahipara (238 species) is only slightly higher than that recorded from Kawerua (192, [Hayward et al., 1995](#)), the exposed Waitakere coastline (194, [Hayward and Morley, in press](#)), Raglan (192, [Hayward et al., 2002](#)), Kawhia (188, [Morley et al., 1997a](#)) and north Taranaki coast (197, [Hayward et al., 1999](#)), and considerably less than that recorded from similar sections of coast in the Aupourian, such as Whananaki (360, in prep.), Waiheke (340, MM), and even Mahia (334, in prep.). This confirms the observations that a larger proportion of the warm-water Aupourian “endemics” are restricted to the east coast than those that extend down the west coast, and thus it could be argued that the boundary might indeed be more naturally placed at the northern tip of the North Island.

Although many of the more common intertidal species are similar on both coasts, there are some clear differences, with the change occurring around North Cape area. For example, the bull kelp *Durvillaea antarctica*, the large orange starfish *Stichaster australis*, the colourful camouflaged anemone *Isocradactis magna*, and the gastropod *Paratrophon cheesemani*, are characteristic elements of all the exposed shores along the west coast (including Ahipara), but are all but absent from the East Coast. Dense intertidal beds of the green-lipped mussel *Perna canaliculus* are also a dominant zoning element on west coast shores, but they are far less abundant on the east. Two of the more common zoning organisms on east coast shores are the snail *Nerita atramentosa* and the brown seaweed *Xiphophora chondrophylla*, both of which are rare on the west coast with their highest west coast abundances in the north around Ahipara. Two other common molluscs on the east coast that are all but absent on the west are the slipper limpet *Maoricrypta costata* and *Venericardia purpurata*.

As the above discussion confirms, the province boundary is somewhat artificial and drawing it as a thin line hides the fact that the faunal changes are more gradual and spread over a broad zone, reflecting the complex and fluctuating physical oceanographic patterns and the differing tolerance limits and niche requirements of every species.

ACKNOWLEDGMENTS

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Appendix I. Census data for 10 litre dredge samples taken inside Herekino Harbour

Dredge penetration averaged 0.1 m into the sea floor sediment. Live organisms are in numbers of individuals; presence of dead shells is indicated by d. See Fig. 1 for locations.

L261..	70	71	72	73	74	75	L261..	70	71	72	73	74	75
GASTROPODS	<i>Turbo smaragdus</i>	.	.	.	.	d	.
<i>Amalda australis</i>	.	.	.	d	.	.	<i>Zalipais lissa</i>	.	.	.	.	.	1
<i>Antisolarium egenum</i>	.	.	.	d	.	.	<i>Zeacumantus lutulentus</i>	4	d	1	d	3	d
<i>Cantharidella tessellata</i>	11	.	<i>Zeacumantus subcarinatus</i>	.	.	.	.	d	d
<i>Cantharidus purpureus</i>	d	.	<i>Zegalerus tenuis</i>	.	.	.	d	.	.
<i>Chemnitzia</i> spp.	.	.	.	d	d	d	<i>Zethalia zelandica</i>	.	.	.	.	d	d
<i>Cirsonella</i> aff. <i>laxa</i>	d	.	BIVALVES	.	.	.	.	.	.
<i>Cominella glandiformis</i>	.	d	5	1	2	d	<i>Arthritica bifurca</i>	.	.	.	d	d	.
<i>Diloma subrostrata</i>	.	.	.	d	d	d	<i>Austrovenus stutchburyi</i>	193	1	.	d	12	d
<i>Merelina lyalliana</i>	d	.	<i>Macomona liliana</i>	1	.	4	d	d	1
<i>Micrelenchus huttonii</i>	d	d	<i>Nucula hartvigiana</i>	3	.	1	d	1	.
<i>Micrelenchus sanguineus sanguineus</i>	1	<i>Paphies australis</i>	1	1.5	39	19	3	11
<i>Neoguraleus lyallensis</i>	d	.	<i>Xenostrobus pulex</i>	.	.	.	d	d	d
<i>Notoacmea elongata</i>	.	.	.	d	d	.	ECHINODERMS	.	.	.	.	.	.
<i>Notoacmea helmsi</i>	d	d	.	.	.	d	<i>Fellaster zelandiae</i>	.	.	.	.	2	d
<i>Notoacmea parviconoidea</i>	.	.	.	d	1	d	BARNACLES	.	.	.	.	.	.
<i>Nozeba emarginata</i>	.	.	.	d	.	.	<i>Austrominius modestus</i>	.	.	.	6	3	.
<i>Pisina zosterophila</i>	d	d	COELENTERATES	.	.	.	.	.	.
<i>Proxiuber australe</i>	d	.	<i>Anthopleura aureoradiata</i>	.	5	2	4	38	.
<i>Radiacmea inconspicua</i>	d	.							