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Tane 37: 171-199 (1999)

MARINE BIOTA OF THE NORTH TARANAKI COAST, NEW ZEALAND

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SUMMARY

Four hundred and six species (including 12 chitons, 115 gastropods, 68 bivalves, 46 polychaetes, 11 echinoderms, 32 reptantia, 29 amphipods, 12 isopods, 8 cumaceans, 7 barnacles, 6 fish and 32 seaweeds) of intertidal and subtidal organisms are recorded from the previously little-studied coast of north Taranaki. These records extend southwards the previously known geographic range of six molluscs - *Anabathron (Scrobs) ovatus, Eatonina micans, Eulima perspicua, Haliotis virginea crispata, Maoricolpus roseus manukauensis* and *Zerotula ammonitoides*. We provide the first North Island west coast records of five molluscs - *Amphithalamus semens, Anabathron (Scrobs) hedleyi, Orbitestella parva, Philobrya munita* and *Sinezona brevis*.

Over 270 species live on the exposed rocky shores of north Taranaki. In the north, around Mokau, diversity is low (56 species), but increases southwards (Pukearuhe - 109 species, Airedale Reef - 124 species, New Plymouth - 180 species) as the coast becomes more sheltered from Cape Egmont and the substrates are harder and more stable with a greater range of microhabitats. The exposed sandy beaches and small river mouth estuaries support particularly low diversity biotas. Offshore, clean fine sand, at 6 - 22 m depth, is dominated by the amphipods *Heterophoxus* sp., *Photis brevicaudata*, *Gammaropsis* sp. and *Hippomedon hake*, the small decapod *Ogyrides delli,* small cumacean crustacea, the molluscs *Nucula nitidula*, *Mactra ordinaria*, *Scalpomactra scalpellum* and *Austrofusus glans*, and the polychaetes *Aglaophamus macroura, Amphicteis philippinarum*, and *?Sthenolepis* sp.

The isopod and amphipod fauna living among intertidal seaweeds of north Taranaki is mediocre compared with other areas studied further north. The greatest diversity occurs at Pukearuhe where the seaweed fringe is dominantly composed of *Carpophyllum* spp.

Keywords: Taranaki; Awakino; Mokau estuary; Tongaporutu; Pukearuhe; Urenui; Airedale Reef; New Plymouth; Mollusca; Crustacea; ecology; biogeography.

INTRODUCTION

The biogeographic distribution of many groups of marine invertebrates is poorly documented for the west coast of the North Island of New Zealand. This has been partly addressed on Northland's west coast with species lists of molluscs and echinoderms prepared for Kawerua (Hayward 1975, 1990, Hayward et al. 1995) and small ecologic distribution studies undertaken in Waimamaku Estuary and Whangape Harbour (Hayward & Hollis 1993, Hayward et al. 1994). Several studies have been undertaken documenting the ecological distribution patterns of marine invertebrates in various parts of the large Manukau Harbour, on the west coast of Auckland (Powell 1937, Grange 1979, 1982, Henriques 1980), and an extensive list of molluscs, echinoderms and crustacea has been recorded from the Kawhia Harbour area, 60 -120 km north of this study area (Morley et al. 1997). This study provides further useful biogeographic information on the marine biota on the west coast of the North Island, from an area further south than these earlier studies.

In this study we examined a selection of habitats and sites along a 60 km length of north Taranaki coastline stretching from Awakino River mouth (latitude 38°40'S, longitude 174°37'E) in the north to New Plymouth (latitude 39°03'S, longitude 174°02'E) in the south (Fig. 1). The northern part of the area can be classified as an exposed coast commonly pounded by surf with only a few calm days per month. Moving south the coast becomes progressively more sheltered by Cape Egmont and as a consequence the pounding swells are lower and the seas more frequently calmer. At New Plymouth, the Port Taranaki breakwaters and Sugar Loaf Islands provide added shelter creating the calmest section of coast in the study area.

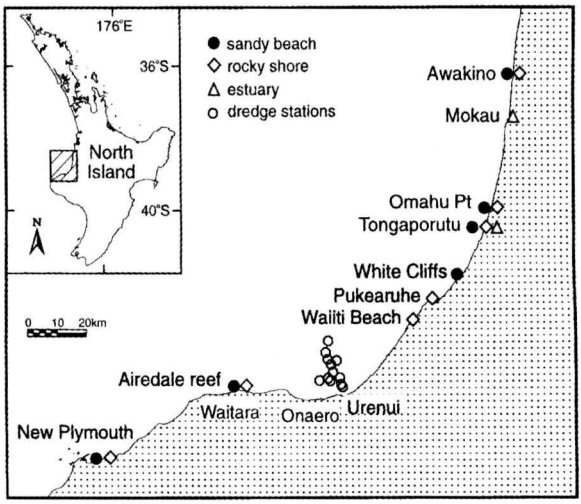

Fig. 1. Study areas on the north Taranaki coastline, on the west coast of the North Island, New Zealand.

Beaches

This section of coast is mainly backed by rapidly eroding cliffs of soft Miocene, Pliocene and Quaternary sandstone, siltstone (northern half, Fig. 2) and volcanic laharic breccia (southern half). The sea reaches all the way to the base of these cliffs at high tide but in many places is separated from them by a strip of intertidal sandy, surf beach at low tide. Along the southern section, south-west of Onaero the beaches become progressively more gravelly with bouldery shorelines in front of parts of New Plymouth.

Rocky shoreline

In the north, between Awakino and Urenui, the shoreline is punctuated by sporadic, often relatively smooth intertidal reefs made of the more resistant sandstone lithologies. At Pukearuhe and 500 m north of Waiiti Beach, more cemented sandstone and conglomerate form two more prominent reefs with more varied, irregular topography and habitats. In the south, between Onaero and New Plymouth, there are a number of low, bouldery, intertidal reefs that jut out 100 - 200 m into the sea. These are formed by the coarser, more resistant, andesite boulder and cobble laharic breccia layers (e.g., Airedale Reef and New Plymouth swimming pool reef).

Estuaries

A number of moderate-sized rivers flow out to the north Taranaki coast. Most have elongate tidal estuaries at their mouths extending only 1-2 km upstream. Estuaries in the north (e.g., Awakino, Mokau, Tongaporutu) are relatively pristine, whereas those in the south (e.g., Waitara) are commonly modified.

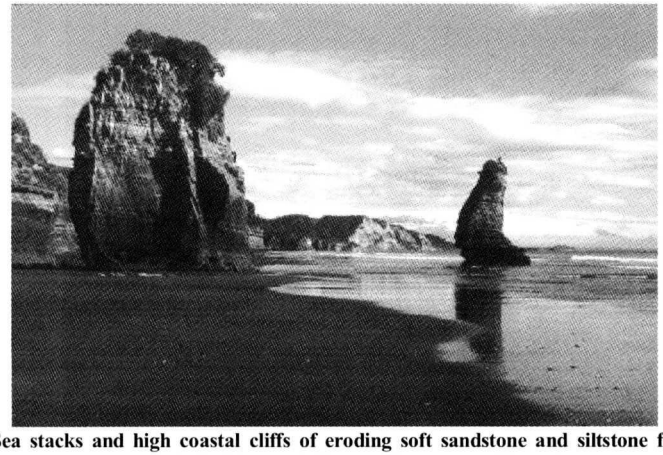

Fig. 2. Sea stacks and high coastal cliffs of eroding soft sandstone and siltstone fronted by an intertidal sandy beach are typical of the north Taranaki coast near Tongaporutu.

Offshore

Between Awakino and Onaero the seafloor immediately off the coast is gently sloping and mostly draped in fine to medium sand with occasional subtidal, flat-lying sandstone reefs several hundred metres offshore along the line of the last interglacial cliffs, which also indicate the amount of Holocene cliff erosion there has been.

METHODS

This paper records all marine taxa that were found along the north Taranaki coast on a five day Auckland Museum field trip by the authors during a period of spring low tides (0 - 0.2 m low tides) in March 1997. Field work included extensive intertidal searching of the range of habitats present along the coast and in several estuaries, beach combing along the shore and a number of dredge hauls of sediment from the subtidal bed of Mokau Estuary (Figs. 1, 3) and from the sea floor (6 - 22 m depth), 0.5 - 5 km off Urenui. Dredge samples were passed through a 1 mm sieve and all live animals retained were later picked and identified. Samples of low tidal seaweed and specimens from the underside and sediment beneath cobbles on several reefs were also taken and the associated biota picked and identified. Specific detail on dredge samples and intertidal study sites is presented in Appendix 1.

All records are supported by voucher specimens in the collections of the Auckland Museum (AK).

Fig. 3. The mouth of Mokau River estuary at full tide.

SPECIES LIST

Habitat where found:
R = exposed and partly sheltered intertidal rocky shores
B = sandy beaches
E = estuaries
O = subtidal sediment (6 – 22 m depth)

Study sites:
R1 = exposed rocky shores at Awakino River mouth, Omahu Pt and Tongaporutu Beach (L24002,3,4,14)
R2 = exposed rocky shores at Pukearuhe and north of Waiiti Beach (L24009-12,19)
R3 = exposed rocky shore at Airedale Reef, Waitara (L23221, 24007,8,39)
R4 = exposed and moderately sheltered rocky reef at New Plymouth swimming baths (L24038)
E = intertidal and subtidal Awakino, Tongaporutu and Mokau River estuaries (L24006,13,16-18,26-30)
B1 = exposed sandy beaches at Awakino, Mokau, Omahu Pt and Tongaporutu (L24001,5,15)
B2 = exposed sandy beaches at White Cliffs and Waiiti Beach (L19501,2,6)
B3 = sheltered sandy beach inside Port Taranaki breakwater, New Plymouth (L24038)
O = seafloor sediments offshore from Urenui (L24021-25,24031-37)
K = previously recorded from Kawhia area (Morley et al. 1997)
N = previously recorded from Kawerua area, Northland (Hayward et al. 1995)

d = only seen dead
l = seen alive
Double letter = common

Mollusc nomenclature follows Spencer and Willan (1996).

	R1	R2	R3	R4	E	B1	B2	B3	O	K	N
POLYPLACOPHORA											
Acanthochitona violacea (Quoy & Gaimard 1835)				ll							N
Acanthochitona zelandica (Quoy & Gaimard 1835)	l		l	l							N
Chiton glaucus Gray 1828		ll	l	l						K	N
Cryptoconchus porosus (Burrow 1815)		l								K	N
Eudoxochiton nobilis (Gray 1843)		l	l							K	N
Ischnochiton maorianus Iredale 1914		l	ll	l						K	N
Leptochiton inquinatus (Reeve 1847)		l	ll	l						K	N
Plaxiphora caelata (Reeve 1847)		l								K	N
Plaxiphora obtecta (Carpenter 1893)	ll	l	l							K	

	R1	R2	R3	R4	E	B1	B2	B3	O	K	N
Rhyssoplax aerea (Reeve 1847)									l		N
Rhyssoplax stangeri (Reeve 1847)				l						K	
Sypharochiton pelliserpentis (Quoy & Gaimard 1835)	l	ll	ll	l						K	N
GASTROPODA											
Alcithoe arabica (Gmelin 1791)						d	l			K	N
Amalda mucronata (Sowerby 1830)			d			d	d		d	K	
Amphibola crenata (Gmelin 1791)					ll	dd				K	N
Amphithalamus semen (Odhner 1924)			l	ll							
Anabathron hedleyi (Suter 1908)			l	ll							
Anabathron ovatus (Powell 1927)				d							N
Antisolarium egenum (Gould 1849)									d		
Argobuccinum pustulosum tumidum (Dunker 1862)						d	d				N
Asteracmea suteri (Iredale 1915)				d				d			
Astraea heliotropium (Martyn 1784)				d							
Atalacmea fragilis (Sowerby 1823)				d							
Austrofusus glans (Roding 1798)						d	dd		ll	K	N
Brookula polypleura (Hedley 1904)				d							
Buccinulum linea (Martyn 1784)				l			d			K	N
Buccinulum vittatum (Quoy & Gaimard 1833)				d						K	N
Caecum digitulum Hedley 1904				l						K	N
Calliostoma punctulatum (Martyn 1784)		l		d		d	d			K	N
Calliostoma selectum (Dillwyn 1817)						d					N
Cantharidella tesselata (A.Adams 1851)	l	l	ll	ll					d	K	N
Cantharidus opalus (Martyn 1784)				d						K	
Cellana ornata (Dillwyn 1817)		l	l	ll						K	N
Cellana radians (Gmelin 1791)	l	ll	ll	ll				d		K	N
Cellana stellifera (Gmelin 1791)				l							N
Cerithiopsidae 2 spp.									d		
Chemnitzia spp.				l			d	d		K	N
Cominella adspersa (Bruguiere 1789)			l			d	d	l		K	N
Cominella glandiformis (Reeve 1847)	l		l			d				K	N
Cominella maculosa (Martyn 1784)			l					l		K	N
Cookia sulcata (Gmelin 1791)		l	l	ll						K	N
Crepidula monoxyla (Lesson 1831)		l								K	N
Cymatium parthenopeum (Salis 1793)							d				
Dicathais orbita (Gmelin 1791)	ll	ll	l	l		d	d				N
Diloma arida (Finlay 1927)		l	l	ll			d				N
Diloma bicanaliculata lenior (Finlay 1927)			l	l						K	N
Diloma coracina (Philippi 1851)	l	l	l				d			K	N
Diloma nigerrima (Gmelin 1791)			l								N
Diloma subrostrata (Gray 1835)								l		K	N
Diloma zelandica (Quoy & Gaimard 1834)		l		l						K	N
Eatoniella albocolumella Ponder 1965		l	l	ll	l					K	N
Eatoniella olivacea (Hutton 1882)			l	ll	l						N
Eatonina atomaria (Powell 1933)				l						K	
Eatonina micans (Webster 1905)	d										
Epitonium jukesianum (Forbes 1852)			d	d			l				N
Eulima perspicua (Oliver 1915)				l							
Gadinia conica Angas 1867				d						K	N
Haliotis australis Gmelin 1791		d		l							N

	R1	R2	R3	R4	E	B1	B2	B3	O	K	N
Haliotis iris Gmelin 1791		l	l	ll		d					N
Haliotis virginea crispata Gould 1847				l							
Haminoea zelandiae (Gray 1843)							l	l		K	N
Haustrum haustorium (Gmelin 1791)			l	l						K	N
Herpetopoma bella (Hutton 1873)				l							
Incisura rosea (Hedley 1904)				d							
Janthina exigua Lamarck 1822						d				K	
Lamellaria ophione Gray 1850				l							
Lepsiella albomarginata (Deshayes 1839)	ll	ll	ll	ll	l					K	
Lepsiella scobina (Quoy & Gaimard 1833)			l								N
Leuconopsis obsoleta (Hutton 1878)								d		K	N
Maoricolpus roseus manukauensis Powell 1931				d			d		d	K	
Melagraphia aethiops (Gmelin 1791)		ll	ll	ll			d			K	N
Micrelenchus sanguineus sanguineus (Gray 1843)			d	d						K	N
Micrelenchus tenebrosus (A.Adams 1853)	d	l								K	
Neoguraleus amoenus (E.A.Smith 1884)									l		
Neoguraleus sinclairi (Gillies 1882)				d							N
Nerita atramentosa Reeve 1855		l		l						K	N
Nodilittorina antipodum (Philippi 1847)	ll	l	l	ll	l					K	N
Nodilittorina cincta (Quoy & Gaimard 1833)	l	ll		ll						K	N
Notoacmea elongata (Quoy & Gaimard 1834)		l	d					d		K	
Notoacmea helmsi (E.A.Smith 1894)	l	l	l		ll		d	l		K	
Notoacmea parviconoidea (Suter 1907)		l	l								N
Notoacmea pileopsis (Quoy & Gaimard 1834)		l		l						K	N
Nozeba emarginata (Hutton 1885)									d	K	
Odostomia incidata Suter 1908									l	K	N
Onchidella nigricans (Quoy & Gaimard 1832)	ll	ll		l						K	N
Onoba fumata (Suter 1898)				d							N
Orbitestella parva (Finlay 1924)				d							
Paratrophon cheesemani cheesemani (Hutton 1882)		l								K	N
Paratrophon cheesemani exsculptus Powell 1933		d	l				d	d	d	K	
Patelloida corticata (Hutton 1880)		l		ll						K	N
Penion sulcatus (Lamarck 1816)				d			d			K	N
Pervicacia tristis (Deshayes 1859)									l	K	N
Phenatoma rosea (Quoy & Gaimard 1833)									l	K	N
Philine auriformis Suter 1909									l		
Philine sp.									l	K	
Pisinna zosterophila (Webster 1905)			l	d							
Pleurobranchaea maculata (Quoy & Gaimard 1832)				l						K	N
Potamopyrgus estuarinus Winterbourn 1971				ll						K	
Pupa kirki (Hutton 1873)									ll		
Radiacmea inconspicua (Gray 1843)		l		l						K	N
Ranella australasia (Perry 1811)							d			K	N
Risellopsis varia (Hutton 1873)		l	d	d				d		K	N
Rissoella micra (Finlay 1924)				d							
Rissoina chathamensis (Hutton 1873)			l	l						K	N
Scutus antipodes Montfort 1810		ll	l							K	N
Semicassis pyrum (Lamarck 1822)					d	d				K	N
Sigapatella novaezelandiae (Lesson 1831)		l				d	d		d	K	N

	R1	R2	R3	R4	E	B1	B2	B3	O	K	N
Sinezona brevis (Finlay 1924)					l						
Siphonaria australis Quoy & Gaimard 1833		l	l							K	N
Siphonaria propria Jenkins 1983						l	d		l	K	N
Struthiolaria papulosa (Martyn 1784)	l	l	d	l				d			N
Tanea zelandica (Quoy & Gaimard 1832)				d		d			ll		N
Trichosirius inornatus (Hutton 1873)				d					d		
Trochus tiaratus Quoy & Gaimard 1834				l					l	K	
Trochus viridis Gmelin 1791				l					l		
Tubbreva exigua (Ponder 1965)				l						K	
Tugali suteri (Thiele 1916)				l							N
Turbo smaragdus Gmelin 1791		ll	ll	ll						K	N
Xymene plebeius (Hutton 1873)		d								K	N
Xymene pusillus (Suter 1907)									d	K	
Xymene traversi (Hutton 1873)	l	l	ll	l					d	K	N
Zaclys sarissa (Murdoch 1905)					d					K	
Zeacolpus vittatus (Hutton 1873)									d		
Zeacumantus subcarinatus (Sowerby 1855)			l	l				d		K	N
Zegalerus tenuis (Gray 1867)	l	d				d			ll	K	
Zerotula ammonitoides Powell 1940				d							
BIVALVIA											
Acar sandersonae Powell 1933									d		
Anomia trigonopsis Hutton 1877				l						K	
Arthritica crassiformis Powell 1933		d		d							
Atrina pectinata zelandica (Gray 1835)						d				K	
Austrovenus stutchburyi (Gray 1828)					ll	dd		l	d	K	N
Bankia australis (Calman 1920)					l						N
Barbatia novaezelandiae (E.A.Smith 1915)			d				d		d	K	N
Barnea similis (Gray 1835)	l	d								K	N
Bassina yatei (Gray 1835)						d	d		d	K	N
Borniola reniformis (Suter 1908)		d	d	l					l	K	N
Cardita aoteana Finlay 1927				l							
Chlamys zelandiae (Gray 1843)			d	ll			d		dd	K	N
Corbula zelandica Quoy & Gaimard 1835								d	l	K	N
Crassostrea gigas (Thunberg 1793)	l	l	l	ll	l	dd	dd			K	N
Cyclomactra ovata (Gray 1843)					d					K	
Diplodonta striatula (Finlay 1926)	l									K	N
Divaricella huttoniana (Vanatta 1901)						d			dd	K	N
Dosina zelandica Gray 1835			d				d		d	K	
Dosinia anus (Philippi 1848)						dd	d		d	K	N
Dosinia subrosea (Gray 1835)						d			l	K	N
Felaniella zelandica (Gray 1835)				l						K	N
Gari lineolata (Gray 1835)						d			d		N
Glycymeris modesta (Angas 1879)							d		d	K	
Hiatella arctica (Linne 1767)	l	d	d	d					d	K	N
Irus elegans (Deshayes 1854)	d	d								K	
Irus reflexus (Gray 1843)	l	d	d	d					d	K	N
Lasaea hinemoa Finlay 1928				l							N
Leptomya retiaria (Hutton 1885)						d			d	K	N
Lyrodus pedicellatus (Quatrefages 1849)						l					
Macomona liliana (Iredale 1915)					d	d		l		K	N
Mactra discors Gray 1837						dd				K	

	R1	R2	R3	R4	E	B1	B2	B3	O	K	N
Mactra murchisoni Deshayes 1854			d			dd	d				N
Mactra ordinaria (E.A.Smith 1898)						d			ll	K	
Modiolus areolatus Gould 1850				l							
Moerella huttoni (E.A.Smith 1885)									l		
Myadora antipodum E.A.Smith 1880									d		
Myadora striata (Quoy & Gaimard 1835)						d	d		d	K	N
Myadora subrostrata E.A.Smith 1880									d		
Myllitella vivens vivens Finlay 1926						d				K	N
Neolepton antipodum (Filhol 1880)				l							N
Nucula hartvigiana Pfeiffer 1864			l					d		K	N
Nucula nitidula A.Adams 1856								l	ll	K	N
Panopea zelandica (Quoy & Gaimard 1835)						d					
Paphies australis (Gmelin 1791)					ll	dd		ll		K	N
Paphies donacina (Spengler 1793)						d					
Paphies subtriangulata (Gray 1828)						dl	d	d		K	N
Pecten novaezelandiae Reeve 1853						d	d			K	N
Perna canaliculus (Gmelin 1791)	l	l	ll	l		dd	d			K	N
Peronaea gaimardi (Iredale 1915)						dd	d			K	N
Philobrya ?modiolus Suter 1913				d							
Philobrya munita (Finlay 1930)				d							N
Pholadidea suteri Lamy 1926	ll	l		l			d			K	N
Pholadidea tridens (Gray 1843)	l										N
Pododesmus zelandicus (Gray 1843)										K	
Protothaca crassicosta (Deshayes 1835)			d	d			d				N
Pseudoarcopagia disculus (Deshayes 1855)				d						K	
Rexithaerus spenceri (Suter 1907)						d			l		
Resania lanceolata Gray 1852						dd					
Ruditapes largillierti (Philippi 1849)								l	l	K	
Scalpomactra scalpellum (Reeve 1854)									ll		N
Spisula aequilatera (Deshayes 1854)						dd	d			K	N
Tawera spissa (Deshayes 1835)							d		dd	K	
Tellinota edgari (Iredale 1915)									l	K	
Trimusculus barbatus (Reeve 1858)				l							
Tucetona laticostata (Quoy & Gaimard 1835)									d		N
Xenostrobus pulex (Lamarck 1819)	ll	ll	l	ll			d			K	N
Zelithophaga truncata (Gray 1843)		l	l			d			l	K	
Zenatia acinaces (Quoy & Gaimard 1835)						d			d		
SCAPHOPODA											
Antalis nana (Hutton 1873)									d	K	
CEPHALOPODA											
Spirula spirula (Linne 1758)					d	d	d			K	N
ECHINODERMATA											
Allostichaster polyplax (Muller & Troschel 1844)				l							
Coscinasterias calamaria Verril 1864		l	l	ll						K	
Echinocardium caudatum (Pennant 1777)				l					ll	K	N
Evechinus chloroticus (Valenciennes 1846)		l	ll	ll						K	N
Fellaster zelandiae (Gray 1855)						d	d			K	
Ocnus calcarea (Dendy 1896)									l		
Ophionereis fasciata Lutken 1859				ll						K	
Ophiopteris antipodum Smith 1877				l					l	K	
Patiriella regularis (Verrill 1867)		l	l	ll						K	N

	R1	R2	R3	R4	E	B1	B2	B3	O	K	N
Stegnaster inflatus Sladen 1889				I							
Stichaster australis (Verrill 1867)		I	II	I						K	N
REPTANTIA											
Australeremus cooki (Filhol 1883)		I		I							
Cancer novaezelandiae (Jaquinot 1853)	I	I				d				K	
Cyclograpsus lavauxi Milne Edwards 1853				I	I					K	
Cyclohombronia depressa Jacquinot 1842									I		
Elamena producta Kirk 1879				I							
Halicarcinus sp.		I	I								
Halicarcinus cookii (Filhol 1885)		I	I	I						K	
Halicarcinus innominatus Richardson 1949	II	I		I						K	
Halicarcinus tongi Melrose 1975									I		
Helice crassa Dana 1851	I				II						
Hemigrapsus crenulatus (Milne Edwards 1837)			I	I	II						
Hemigrapsus edwardsi (Hilgendorf 1882)				I						K	
Heterozius rotundifrons Milne Edwards 1867				II							
Leptograpsus edwardsi (Hilgendorf 1883)			II	I							
Leptograpsus variegatus (Fabriius 1793)	I	I	I								
Liocarcinus corrugatus (Pennant 1777)		I								K	
Macrophthalmus hirtipes (Heller 1862)					I					K	
Neohymenicus pubescens (Dana 1851)			I	I							
Notomithrax peronii (Milne Edwards 1843)		I									
Notomithrax ursus (Herbst 1788)		I	I	I						K	
Ovalipes sp.				d		d	I				
Ovalipes catharus (White 1843)						I			I	K	
Ozius truncatus Milne Edwards 1834			I	I						K	
Paguristes pilosus (Milne Edwards 1836)									II	K	
Pagurus novizelandiae (Dana 1852)	I	I	II	I						K	
Pagurus sp.				I					I	K	
Petrocheles spinosus Miers 1876				II							
Petrolisthes elongatus (Milne Edwards 1837)	I	II	I	II	I					K	
Petrolisthes novaezelandiae Filhol 1885				I					I		
Pilumnus lumpinus Bennett 1964				I							
Pilumnus novaezelandiae Filhol 1886		I		I						K	
Plagusia chabrus (Linnaeus 1764)	I	I	II	II		d				K	
DECAPODA											
Alope spinifrons Milne Edwards 1837		I	I	I							
Alpheus socialis Heller 1865				I						K	
Callianassa sp.									I	K	
Ogyrides delli Yaldwyn 1971									II		
AMPHIPODA											
Ampelisca sp.		I									
Aora maculata (Thomson 1879)			II							K	
Bathymedon neozelanicus Barnard 1930											
Caprella sp.	I		I							K	
Gammaropsis sp.				I					II	K	
Gondogeneia rotorua Barnard 1972	I									K	
Heterophoxus sp.									II		
Hippomedon hake Lowry & Stoddart 1983									II		
Hyale grenfelli Chilton 1916	I	I	II	II						K	
Hyale hirtipalma (Dana 1852)	I										

	R1	R2	R3	R4	E	B1	B2	B3	O	K	N
Hyale maroubrae Stebbing 1899		I									
Iphimidia haurakiensis Hurley 1954									I		
Ischyrocerus longimanus (Haswell 1880)		I								K	
Jassa falcata (Montagu 1808)								II			
Liljeborgia barhami Hurley 1954									II		
Maera incerta Chilton 1883				I							
Melita awa Barnard 1972		I	II						I	K	
Melita inaequistylis (Dana 1852)				II	I					K	
Oradarea novaezelandiae (Thomson 1879)		I									
Paradexamine pacifica (Thomson 1879)									I	K	
Paramoera chevreuxi (Stephenson 1927)				II					II		
Paramoera fasciculata (Thomson 1880)	I	I	I	I	I	I					
Paraperioculodes sp.									II	K	
Parawaldeckia dabita Lowry & Stoddart 1983	I	I									
Parawaldeckia vesca Lowry & Stoddart 1983			I								
Photis brevicaudata Stebbing 1888					I				II		
Podocerus wanganui Barnard 1972	I									K	
Protophoxus australis (Barnard 1930)		I							I	K	
Torridoharpinia hurleyi Barnard 1958									I		
ISOPODA											
Amphoroidea media Hurley & Jansen 1974		I								K	
Batedotea elongata Miers 1876		I								K	
Cleantis sp.				I							
Euiodotea durvillei Poore & Lew Ton 1993		I									
Exosphaeroma obtusum Dana 1853		I									
Exosphaeroma planulum Hurley & Jansen 1971					II						
Iathrippa longicauda Chilton 1884				I					I		
Isocladus armatus (Milne Edwards 1840)	I	I								K	
Isocladus inaccuratus Hurley & Jansen 1977		I	I			II					
Pseudoaega punctata Thomson 1884						II					
Scutuloidea maculata Chilton 1883		I								K	
Sphaeroma quoyanum (Milne Edwards 1840)	I					II					
CUMACEA											
Cyclaspis argus Zimmer 1902									I		
Cyclaspis elegans Calman 1907									I		
Cyclaspis levis Thomson 1892									I		
Diastylis insularum (Calman 1908)									II		
Diastylis neozealanica Thomson 1892									I		
Diastylopsis crassior Calman 1911									II		
Diastylopsis elongata Calman 1911					I				II		
Diastylopsis thileniusi (Zimmer 1902)									II		
MYSIDA									I		
TANAIDACEA								II			
CIRRIPEDIA											
Balanus decorus Darwin 1854	I									K	
Balanus vestitus				I							
Chamaesipho brunnea Moore 1944		I	I	I						K	
Chamaesipho columna (Spengler 1790)	II	II	II	II						K	
Elminius modestus Darwin 1854	I			II	II					K	
Epopella plicata (Gray 1843)	II	II	II	I						K	
Tetraclita purpurascens (Wood 1815)		I	II	I							

	R1	R2	R3	R4	E	B1	B2	B3	O	K	N
LEPTOSTRACA									l		
OSTRACODA											
Leuroleberis zealandica (Baird)									ll		
Schleroconcha sp.									l		
BRACHIOPODA											
Calloria inconspicua (Sowerby 1846)		l							d		
COELENTERATA											
Actinia tenebrosa Farquhar 1898	l	l									
Amphisbetia bispinosa Gray 1843	l					d					
Diadumene neozelanica Carlgren 1924	l			l							
Edwardsia tricolor Stuckey 1908									l		
Isactinia olivacea Hutton 1878		l	l	l							
Isocradactis magna (Stuckey 1909)	l	ll	l	l							
Physalia physalis Linnaeus 1758						d					
POLYCHAETA											
Aglaophamus macroura (Schmarda 1861)								l	ll		
Amphicteis philippinarum Grube 1878									ll		
Apistobranchus sp.									l		
Armandia maculata (Webster 1884)			l						l		
Bradabyssa sp.									l		
Capitellidae									l		
Cheilonereis peristomialis Benham 1916	l										
Euchone sp.									ll		
Euphione squamosa (Quatrefages 1865)				l							
Eupholoe sp.				l							
Euratella sp.				l							
Galeolaria hystrix (Mörch 1863)			l	l							
Glycera lamellipodia Knox 1960			l						l		
Glycinde dorsalis Ehlers 1904									l		
Goniada littorea Hartman 1950									l		
Idanthyrsus pennatus (Peters 1854)				l							
Lepidonotus polychromus Schmarda 1861	l			l							
Lumbrineridae									l		
Lumbrineris brevicirra (Schmarda 1861)									l		
Lumbrineris coccinea (Renieri 1804)	l	l		l					l		
Magelona papillicornis Müller 1858									l		
?Malacoceros sp.					l						
Maldanidae									l		
Marphysa depressa (Schmarda 1861)		l									
Megalomma sp.				l							
Nereidae	ll		ll	l	l			l	l		
Onuphis aucklandensis Augener 1924									l		
Paraprionospio sp.									l		
Pectinaria australis Ehlers 1904									l		
Pherusa parmata (Grube 1878)			ll						l		
Phyllodocidae	l	l	l						l		
Pomatoceros caeruleus (Schmarda 1861)		l		l							
Prionospio aucklandica Augener 1924									l		
Sabellaria antipoda Augener 1926	l										
Sabellaria kaiparaensis Augener 1926	ll		ll								
Sabellidae				l							

	R1	R2	R3	R4	E	B1	B2	B3	O	K	N
Salmacina dysteri (Huxley 1855)				d							
Scolecolepides sp.					1				1		
Serpula sp.				1							
Spiophanes sp.									1		
?Sthenolepis sp.									11		
Streblosoma gracile Caullery 1944			1								
Syllidae	1			1					1		
Terebellanice sp.	1		1								
Terebellidae				1							
Timarete sp.		1									
PLATYHELMINTHES											
Indet.	1		1						1		
Stylochoplana sp.				1							
Thysanozoon brochii (Risso)				1							
NEMERTEA	1		1	1	1				1		
SIPUNCULA											
Dendrostomum aeneum (Baird 1868)	1	1	11					1	1		
PORIFERA											
Callyspongia ramosa (Gray)		1									
Tethya aurantium (Pallas)		1		1							
Tethya ingalli (Bowerbank)		1		1							
ASCIDIACEA											
Corella eumyota (Traustedt 1882)	1			1							
Pyura sp.			1								
PISCES											
Blennodon dorsale (Clarke 1879)						1					
Diplocrepis puniceus (Richardson 1846)				1							
Gastroscyphus hectoris (Gunther 1876)		1		1							
Ruanoho decemdigitatus (Clarke 1879)				1							
Trachelochismus pinnulatus (Bloch & Schneider 1801)										1	
Trachelochismus sp.				1							
ALGAE											
Carpophyllum angustifolium J.Agardh			1								
Carpophyllum flexuosum (Esper) Grev.			1								
Carpophyllum maschalocarpum (Turner) Grev.			1								
Centroceras clavulatum (C.Agardh) Mont.			1								
Ceramium apiculatum J.Agardh				1							
Champia novae-zelandiae (Hook.f. & Harv.) J.Agardh			1								
Cladophoropsis herpestica (Mont.) Howe			1								
Corallina officinalis L.			1								
Cystophora torulosa (R.M.Br.) J.Agardh				1							
Durvillaea antarctica (Cham.) Har.			1								
Ecklonia radiata (C.Agardh) J.Agardh			1								
Enteromorpha ?intestinalis (L.) Nees			1								
Gigartina atropurpurea (J.Agardh) J.Agardh			1								
Gigartina circumcincta J.Agardh			1								
Gigartina clavifera J.Agardh			1								
Gigartina decipiens (Hook.f. & Harv.) Hook.f. & Harv.			1								
Gigartina livida (Turner) J.Agardh			1								
Glossophora kunthii (C.Agardh) J.Agardh			1								

	R1	R2	R3	R4	E	B1	B2	B3	O	K	N
Gracilaria chilensis C.J.Bird, McLachlan & E.C.Oliveira			1								
Gratelocepis urvilleana (Mont.) P.G.Parkinson			1								
Gymnogongrus torulosus (Hook.f. & Harv.) Schmitz			1								
Halopteris cf. *funicularis* (Mont.) Sauv.				1							
Halopteris platycena auct.				1							
Hormosira banksii (Turner) Descaisne				1							
Iridaea sp.			1								
Leathesia difformis (L.) Arech.				1							
Pachymenia ?laciniata J.Agardh			1								
Pterocladia lucida (Turner) J.Agardh			1								
Pugetia delicatissima R.E.Norris			1								
Splachnidium rugosum (L.) Grev.				1							
Ulva lactuca L.			1								
Ulva sp.			1								

ECOLOGICAL NOTES

Exposed intertidal rocky coast (Fig. 4)

We identified over 270 species of plants and animals on the intertidal reefs of north Taranaki. On the more exposed, northern intertidal reefs and cliffs, biodiversity is low (56 species recorded). This is partly because of the exposure to pounding surf, partly because of scouring by the shifting sand of the immediately adjacent beaches and partly because of the relatively soft substrate of sandstone and siltstone ("papa rock"). At Pukearuhe and near Waiiti Beach there are two units of harder, more cemented sandstone and conglomerate which form more prominent intertidal reefs with a more varied array of habitats. These reefs have a much higher biodiversity (109 species) than on the nearby softer substrates. Moving southwards the shore becomes more sheltered, the waves less fierce, and in places the substrate consists of harder, laharic breccia and andesite boulders with a greater variety of microhabitats than the reefs to the north. Consequently biodiversity increases moving south down the coast (Airedale Reef - 124 species) with the highest diversity occuring on the most sheltered reefs off New Plymouth swimming pool (180 species).

The softer sandstone intertidal rocks on the exposed northern coast (Fig. 2) in most places have a limited fauna dominated by abundant flea mussels, *Xenostrobus pulex*. Two filter-feeding barnacles, *Chamaesipho columna* and *Epopella plicata*, are sometimes prominent. Of the grazing molluscs, the most common are the shell-less *Onchidella nigricans*, the splash zone periwinkle *Nodilittorina antipodum* and the large low-tidal chiton *Plaxiphora obtecta*. Several carnivorous snails are commonly present, especially *Dicathais orbita* and *Lepsiella albomarginata*.

Of the polychaetes, the tube-building sandworm *Sabellaria kaiparaensis* occurs in sporadic clumps about 0.5 m in size, with some nereid worms also present. At Omahu Point, the sandstone at low tide is riddled with the borings of the bivalve *Pholadidea suteri*, with *P. tridens* and *Barnea similis* being less common. The most

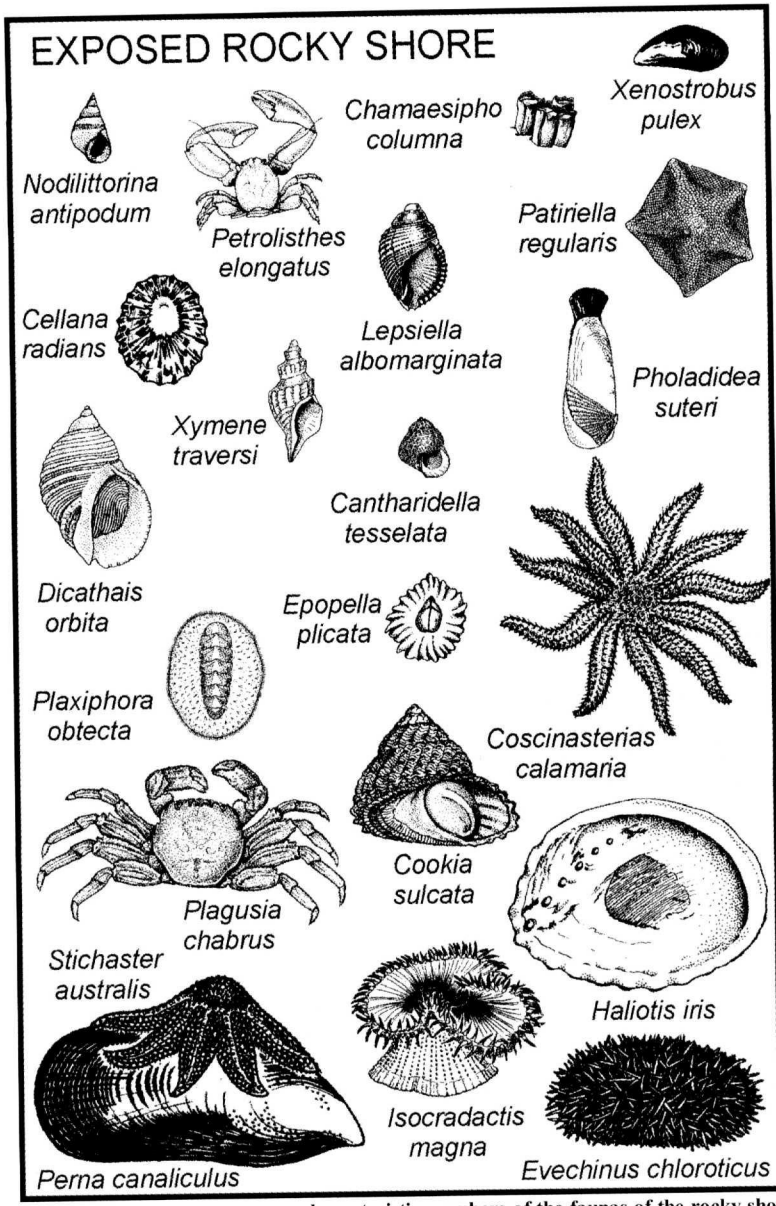

Fig. 4. Some of the more common or characteristic members of the faunas of the rocky shores of north Taranaki. Specimens drawn by Margaret Morley, Powell (1987) and Morton & Miller (1968).

common anenomes are the brightly coloured *Isocradactis magna* and the smaller orange and white *Diadumene neozelanica*.

Seaweeds, other than *Corallina* paint, are conspicuous by their absence on these sandstone reefs.

The harder, cemented sandstone and conglomerate reefs of Pukearuhe (Fig. 5) and north Waiiti Beach support most of the organisms found on the softer sandstone substrates, but here there are numerous additions. Pholad rock-borers were absent, but the rock-boring mussel *Zelithopaga truncata* is found together with a rock-dwelling flabelligerid polychaete, *Pherusa parmata*. This worm with its gritty cephalic shield and lined burrows, was quite common in the hard rock; in fact Pukearuhe is the only locality from which it was recorded. The harder substrates develop various sizes of relatively stable cobbles and boulders on the foreshore which provide shelter for common green (*Chiton glaucus*) and snakeskin chitons (*Sypharochiton pelliserpentis*), half crabs *Petrolisthes elongatus*, and the caridean shrimp *Alope spinifrons*. Grazing gastropods are more common and diverse, particularly the limpet *Cellana radians*, cat's eye *Turbo smaragdus* and topshell *Melagraphia aethiops*.

Fig. 5. Hard, cemented sandstone at Pukearuhe forms a substantial reef jutting out into the Tasman Sea.

Other additions are the barnacles *Tetraclita purpurescens* and *Chamaesipho brunnea*, golf ball sponges of the genus *Tethya*, paua *Haliotis iris* and occasional small pink brachiopods *Calloria inconspicua* (attached beneath low tide boulders at Pukearuhe). Particularly common under low tide boulders at Pukearuhe is the sea slug *Scutus antipodes* which here have grey bodies rather than the usual black of further north. A subtidal fringe of brown algae grows around these harder reefs and provides shelter for many isopods and amphipods and the masking crabs *Notomithrax*. The limpet *Cellana radians* is common at high tide level on shady cliff faces, sharing this uncommon habitat with the limpet *Notoacmea parviconoidea*.

Further south on the more sheltered boulder-strewn Airedale Reef, there is a 100 - 300 m wide intertidal reef flat interspersed with tide pools and loose boulders (Fig. 6). It supports a greatly increased diversity of seaweeds with the usual dense subtidal fringe of brown *Carpophyllum* spp., *Ecklonia radiata* and *Durvillea antarctica*. Most of the common organisms on the harder reefs further north are also abundant here. More noticeably abundant at Airedale Reef, however, are the crabs *Plagusia chabrus, Leptograpsus edwardsi* and hermit *Pagurus novizelandiae*, the green-lipped mussel *Perna canaliculus* and its predator the large orange starfish *Stichaster australis*, kina *Evechinus chloroticus*, two chitons that shelter under boulders *Leptochiton inquinatus* and *Ischnochiton maorianus*, and the seaweed-dwelling amphipods *Aora maculata, Hyale grenfelli* and *Melita awa*. The polychaete worms also show an increase in diversity, with more species recorded here (13) than at any of the other intertidal sites, although no one taxon is particularly abundant.

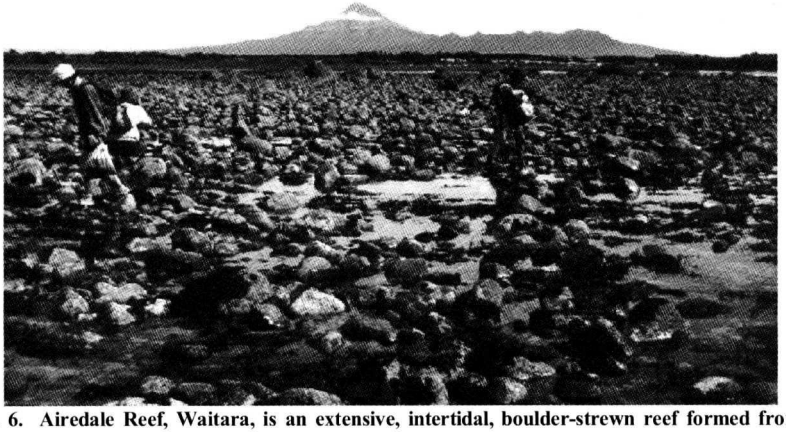

Fig. 6. Airedale Reef, Waitara, is an extensive, intertidal, boulder-strewn reef formed from an eroding lahar deposit from Mt Taranaki volcano (background).

The most sheltered and stable reef, off the New Plymouth swimming pool, appears to have the richest and most diverse rocky shore intertidal fauna anywhere along the coast of north Taranaki. In addition to the organisms living further north, here we found under low tide cobbles common brittle stars *Ophionereis fasciatus* and *Ophiopteris antipodum*, crabs *Heterozius rotundifrons*, *Petrocheles spinosus*, chitons *Acanthochitona violacea*, fan shells *Chlamys zelandiae*, the colourful cushion star *Stegnaster inflatus*, and limpets *Cellana ornata* and *Patelloida corticata*. Here also the more sheltered shore acorn barnacle *Elminius modestus* grows abundantly on the rocks at mid-high tide level and this is the only place we found Neptune's necklace *Hormosira banksii* and a number of other seaweeds (see species list). Here there is a markedly increased diversity of micromolluscs compared with the rest of the north Taranaki coast. The most common micromolluscs on and under stable cobbles are *Amphithalmus semen* and *Anabathron hedleyi* and grazing on seaweed are *Cantharidella tesselata* and *Eatoniella olivacea*.

The record of *Petrocheles spinosus* at New Plymouth reef is of special interest. McLay (1988) has suggested that this crab is restricted to deeper water and "absent from littoral records in the North Island" because it is a cold-temperate species. Its occurrence here as a permanent intertidal resident is supported by good collecting evidence and extends the species' ecological range in the north, although it is not inconsistent with the suggested preference for cooler habitats.

Exposed beaches (Fig. 7)

The exposed sandy beaches, like those elsewhere, have an extremely limited number of organisms that live on or within it. Recorded live in low numbers were the swimming crab *Ovalipes catharus*, tuatua *Paphies subtriangulata*, and gastropods *Alcithoe arabica, Struthiolaria papulosa* and *Epitonium jukesianum*. Numerous shells are washed up on these beaches reflecting the composition of the fauna just offshore mostly in the shallow subtidal surf zone - these include abundant surf clams *Mactra discors, M. murchisoni, Dosinia anus, Peronaea gaimardi, Spisula aequilatera* and *Resania lanceolata* and the sand dollar *Fellaster zelandiae*. Also washed up is a wide range of less common species from slightly further offshore (e.g., gastropods *Austrofusus glans, Amalda mucronata, Semicassis pyrum, Tanea zelandica, Maoricolpus roseus manukauensis*, and bivalves *Bassina yatei, Myadora striata, Pecten novaezelandiae, Atrina zelandica, Divaricella huttoniana, Dosinia subrosea, Gari lineolata, Glycymeris modesta, Panopea zelandica, Paphies donacina, Tawera spissa, Zenatia acinaces*).

Sheltered beach (Fig. 7)

The sheltered fine sandy beach inside the breakwaters of Port Taranaki has a markedly different fauna to the exposed beaches. Pipi *Paphies australis*, cockle *Austrovenus stutchburyi* and the wedge shell *Macomona liliana* are all common at

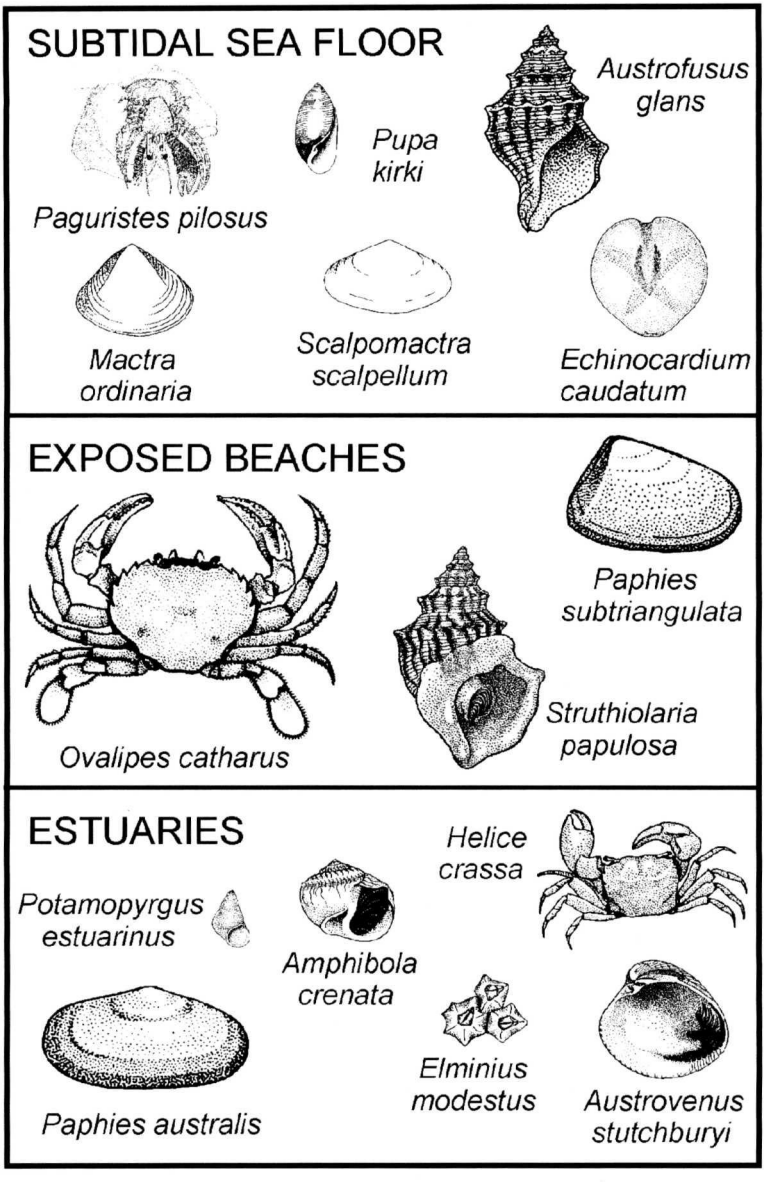

Fig. 7. Some of the more common or characteristic members of soft sediment substrates along the north Taranaki coast. Specimens drawn by Margaret Morley, Brett Stephenson, Powell (1987) and Morton & Miller (1968).

mid to low tide level. Nearer low tide two other infaunal bivalves are present - the small nut shell *Nucula nitidula* and the oblong Venus shell *Ruditapes largillierti.*

Common gastropods living on the beach are the whelks *Cominella adspersa* and *C. maculosa*, the topshell *Diloma subrostrata*, and the bubble shell *Haminoea zelandiae.* Living interstitially around low tide level are the amphipod *Jassa falcata* and numerous tanaidaceans.

Estuaries (Fig. 7)

The estuaries have a low biotic diversity. Living on or in the muddy sand of the fringing high tidal salt marshes are abundant mud snails *Amphibola crenata* and small estuarine snails *Potamopyrgus estuarinus*. The burrow openings of the mud crabs *Helice crassa* and *Hemigrapsus crenulatus* are common throughout the intertidal zone. Two bivalves are particularly abundant - cockles mostly intertidally and numerous pipi, especially in the subtidal channel sediments. The numerous dead cockle shells that form intertidal drifts support an epifauna of acorn barnacles *Elminius modestus*, small limpets *Notoacmea helmsi* and, in places, Pacific oysters *Crassostrea gigas*. Found living together with the subtidal pipi are the small burrowing crab *Macrophthalmus hirtipes* and a commonly encountered complement of estuarine amphipods and isopods. Polychaete worms were poorly represented in the estuarine sediments, with just a few spionids and some nereids found in muddy shelly, fine, channel sands.

The north Taranaki estuaries have a high iron-sand component in their sediments and somewhat different hydrological conditions when compared to many of the estuarine harbours we have studied elsewhere (ie. high-energy onshore waves, strong tidal scouring and freshwater river currents). We attribute the relatively low diversity of crustaceans (e.g., no shrimps nor hermit crabs) in the north Taranaki estuaries compared with Kawhia Harbour (Morley et al. 1997) to these circumstances. These crustaceans are, however, not entirely absent from the region, as *Halicarcinus* spp., *Pagurus novizelandiae, Alpheus socialis* and *Callianassa* sp. occur at other Taranaki localities.

Although numerous samples of low tidal mud were sieved from a range of likely habitats, the small introduced bivalve *Theora lubrica* was not found.

Subtidal offshore seafloor

Most of the seafloor offshore from Urenui is gently sloping and covered in clean fine sand. The fauna is relatively uniform in composition (see Appendix II), and is numerically dominated by the amphipods *Heterophoxus* sp., *Photis brevicaudata*, *Gammaropsis* sp. and *Hippomedon hake*, and the small decapod *Ogyrides delli.* Small cumacean crustacea are abundant throughout these sediments, particularly *Diastylopsis elongata*, *D. thileniusi, Diastylis* spp., and *Cyclaspis* spp. Polychaete worms are diverse and abundant, particularly a typical inhabitant of soft sandy substrates, the nephthyid *Aglaophamus macroura*, the

ampharetid *Amphicteis philippinarum* and a sigalionid scale-worm, probably a *Sthenolepis* sp. The most common bivalves are infaunal nut shells *Nucula nitidula*, as well as *Mactra ordinaria*, and *Scalpomactra scalpellum* (depths > 17 m). The live gastropods are dominated by *Austrofusus glans* with frequent *Neoguraleus amoenus* (depths > 17 m), *Pupa kirki* (depths > 17 m), and *Tanea zelandica*. Other commonly occurring species are the large ostracods *Leuroleberis zealandica* and *Schleroconcha* sp., and the hermit crab *Paguristes pilosus* (mostly in *Austrofusus* shells). The amphipod *Paramoera chevreuxi* is only present in a sample at 9 m depth, in which it is abundant. Also of interest is the presence of live scaphopods, *Antalis nana,* at the deepest station (22 m depth).

A distinctly different fauna lives amongst coarse shell gravel at 10 m depth off Urenui. Three amphipods not recorded elsewhere in our survey are *Paradexamine pacifica, Iphimidia haurakiensis* and *Melita awa* plus the isopod *Iathrippa longicauda*. Crabs are common with live hermits *Pagurus* sp., half (*Petrolisthes novaezelandiae*) and pill-box (*Halicarcinus tongi*) crabs. Algal grazers are the snail *Trochus viridis* and chiton *Rhyssoplax aerea*.

Very little has been written about the ecology of the New Zealand cumaceans and yet they have a prevalence and diversity in these Taranaki sediments which indicate the presence of a community of considerable richness. Jones (1963) suggests from a review of various coastal collections that they are often confined to softer deposits of muddy sand, sand of various grades or fine gravel. Certainly none are present in our coarse shell gravel sample. Perhaps this is too simplistic a view of cumacean habitat preferences as they have not occurred any more than occasionally in many of the soft harbour sediments we have reported recently (Hayward et al. 1994, 1997; Morley et al. 1997). Personal field experience has shown, however, that they are well represented in fine sand in the Bay of Islands and Parengarenga Harbour. *Diastylopsis elongata* is the most frequent cumacean in our Taranaki sediments, in all stations from 6 to 22 m depth, with a peak of numbers at 12 -17 m. Summary data from Jones (1963) indicates it is common on other North Island coasts in sediments ranging from glutinous mud to fine sand down to about 50 m depth. A close relative, *Diastylopsis thileniusi,* appears to replace *D. elongata* in somewhat deeper water (17 - 22 m) off Taranaki but in Jones (1963) it is seemingly the reverse *(D. thileniusi* is the shallower). At two of our deep stations there is greater cumacean diversity. More diverse communities like these are known from other regions at similar depths (Jones 1963).

ISOPODS AND AMPHIPODS ON SEAWEED

Intertidal seaweeds are often home to a rich community of sphaeromatid and idoteid isopods, although there is some variability in their density and diversity

as a function of latitude (Hurley & Jansen 1977), exposure (Jansen 1971) or seaweed species (Stephenson & Riley 1996). In north Taranaki, even the richest of seaweed cover seemingly has an isopod fauna that is little more than mediocre - 8 sphaeromatids from a likely total of *c.* 40 shallow water species. These results are, at least, consistent with nearby Kawhia Harbour (Morley et al. 1997). The greatest isopod richness in the seaweed infauna is at Pukearuhe, where the subtidal algal fringe is almost entirely composed of *Carpophyllum* species. Markedly fewer isopods occur with seaweeds on the more sheltered reefs at Airedale and New Plymouth, both of which have far greater seaweed diversity. The isopod faunas of the Taranaki coast are the least documented in New Zealand. In their summary document, Hurley & Jansen (1977) list six species. *Isocladus armatus* and *Sphaeroma quoyanum* were re-collected by us, but four others *(Dynamenella condita, Cassidina typa, Cymodoce iocosa, C. hodgsoni)* were not recorded in our survey.

Pukearuhe seaweeds also show a strong gammarid amphipod fauna and a somewhat typical community dominated by *Ischyrocerus longimanus,* together with *Hyale* spp., *Melita awa* and *Paramoera fasciculata.* Fewer amphipods occur at Airedale Reef and New Plymouth and the somewhat more sheltered conditions influence the principal community contributors - *Hyale maroubrae and Ischyroceras longimanus* are absent; *M. awa* and *P. fasciculata* of Pukearuhe give way to *Melita inaequistylis* and *Paramoera chevreuxi* respectively; *Aora maculata* is relatively frequent at Airedale Reef. Our records confirm Barnard's (1972) inference that Taranaki would show a transition between amphipods of cooler affinities *(P. chevreuxi, P. fasciculata)* to those of warm-temperate preferences *(H. maroubrae, M. awa).*

MOLLUSCAN BIOGEOGRAPHIC NOTES

The Taranaki records of 19 mollusc species, listed below, extend their geographic ranges. Powell's published ranges have been used when commenting on range extensions, because Spencer & Willan (1996) give zoogeographic provinces only. These provinces (Powell 1955) are used here to summarise the known range of each species (A = Aupourian, C = Cookian, F = Forsterian, M = Moriorian, An = Antipodean). Additional records from the collections of the Auckland Museum (AK), and Margaret Morley (MM), are cited where they also extend the published range.

**Amphithalamus semen* (Odhner 1924) - previously recorded from Cape Maria van Diemen to Banks Peninsula, Christchurch. The Taranaki specimen (AK135368), in low tidal algal wash, is the first record from the west coast. The range for *A. semen* is now A, C and M provinces (Spencer & Willan 1996, MM).

**Anabathron (Scrobs) hedleyi* (Suter 1908) - previously recorded from Northland east coast to Wellington. The Taranaki specimens (AK136691 and AK135363) were found alive under stones at low tide, and are the first reported West Coast occurrence. The range for *A. hedleyi* is now A, C, F and M provinces (Spencer & Willan 1996, MM, AK).

**Anabathron (Scrobs) ovatus* (Powell 1927) - previously recorded off north east Northland. Its range is considerably extended by this specimen from Taranaki (AK135369). The range for *A. ovatus* is now A and C provinces.

**Caecum digitulum* Hedley 1904 - previously recorded from all provinces, but these Taranaki specimens, found living in *Corallina officinalis* algae in mid tidal pools at New Plymouth (AK135367), extend its North Island west coast range south of Kawhia.

**Diloma bicanaliculata lenior* (Finlay 1927) - previously recorded from Cook Strait to Stewart Island. One of the two Taranaki specimens (AK135360) fits the description for *D. bicanaliculata lenior* with almost smooth cords and a depressed spire, but the larger specimen has nodulose cords and a taller spire, which fits the description for *D bicanaliculata bicanaliculata.*

Examination of 79 lots of *D. bicanaliculata* (AK, MM) shows a mixing of features between the two subspecies. Adult specimens from the north of the North Island tend to have tall spires and closely spaced nodulose spirals. Some specimens, mainly living on open beaches, from the south of the North Island and South Island have more depressed spires, but this is not a consistent feature. Specimens from the south of the South Island and Stewart Island have broad, smooth areas between almost smooth spirals. These observations suggest that the two subspecies are probably just forms of one species.

The Taranaki specimens (AK135360) are the first west coast record of *D. bicanaliculata* south of Kawhia.

**Eatonina micans* (Webster 1905) - previously recorded from the north-east coast of Northland. The Taranaki specimen (AK135797) was found alive under boulders at Airedale Reef. The range of *E. micans* is now A and C provinces.

**Eulima perspicua* (Oliver 1915) - previously recorded from the Northland east coast. The Taranaki specimens (AK135348), found alive under low tide rocks at New Plymouth, are the first west coast records. *E. perspicua* is now known from A and C provinces and is not confined to below spring tides as indicated in Spencer & Willan (1996).

**Haliotis virginea crispata* Gould 1847 - previously recorded from the east coast of Northland and Auckland. The Taranaki specimen (AK136127) was found alive under low tidal rocks at New Plymouth. However examination of 32 lots (AK, MM) shows that many of the specimens cannot be clearly separated into the two subspecies *H. virginea virginea* and *H. virginea*

crispata. Some lots have specimens of both. A larger series of specimens from localities throughout New Zealand need to be examined to determine the validity of the subspecies.

**Maoricolpus roseus manukauensis* Powell 1931 - previously recorded from the Manukau, Raglan and Kawhia Harbours. The Taranaki specimens (AK135352) are the subspecies southernmost records.

**Nozeba emarginata* (Hutton 1885) - this Taranaki specimen (AK135196) dredged off Urenui, provides the first record from the North Island west coast, south of Kawhia.

**Odostomia incidata* Suter 1908 - this Taranaki specimen (AK136562), dredged at 17 m off Urenui, is the first North Island west coast record south of Kawhia.

**Orbitestella parva* (Finlay 1924) - previously recorded from all provinces (Spencer & Willan 1996). This Taranaki specimen (AK135647) is the first North Island west coast record.

**Rissoella (Zelaxitas) micra* (Finlay 1924) - this Taranaki specimen (AK135472), living on algae at New Plymouth, is the first record from the North Island west coast north of Wellington. *R. micra* is now known from A, C, F, M and An provinces (Spencer & Willan 1996, MM).

**Sinezona brevis* (Iredale 1904) - previously recorded from North, South and Chatham Islands. The Taranaki specimens (AK135655), found alive under low tidal boulders, are the first records from the west coast of the North Island. The range for *S. brevis* is now A, C, M, and An provinces.

**Xymene pusillus* (Suter 1907) - already recorded from A, C and F provinces (Spencer & Willan 1996). This Taranaki specimen (AK 136602), dredged off Urenui, is the first North Island west coast record south of Kawhia.

**Zerotula ammonitoides* Powell 1940 - previously known from east Northland, Auckland and Bay of Plenty (MM). The Taranaki specimen (AK136696) from New Plymouth substantially extends the recorded range for *Z. ammonitoides* which is now A and C provinces.

**Irus elegans* (Deshayes 1854) - previously recorded from A, C and F provinces (Morley et al. 1997).

This Taranaki specimen (AK136115) from Omahu Point is the first record on the North Island west coast south of Kawhia.

**Philobrya munita* (Finlay 1930) - previously recorded from the east coast of the North Island south to Wellington. This small bivalve is variable in shape and at times difficult to distinguish from *P. hamiltoni*. This specimen from Taranaki (AK135648) extends its recorded range to the West Coast and we also have specimens from Kaikoura and Curio Bay, Southland (MM). The range for *P. munita* is now A, C and F provinces.

**Philobrya modiolus* Suter 1913 - previously recorded from the Chatham and Subantarctic Islands. The Taranaki specimen (AK135648) is a juvenile and lacks features present in adult shells. Before commenting on extension of range, mature specimens of *P. modiolus* need to be found in Taranaki, by examining algal holdfasts, as it could be another, as yet unnamed, *Philobrya* species known from Northland and the Bay of Plenty (Bruce Marshall pers. comm.).

ACKNOWLEDGEMENTS

We are grateful to Jim Goulstone for company on the field trip; Doug Rogan, Wendy Nelson and Bruce Marshall for assistance with identification of the seaweeds and *Sinezona brevis,* and Fred Brook and Anne Grace for critically reading the manuscript and suggesting improvements.

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APPENDIX I. Study and sample sites along the coast of north Taranaki.

L numbers are the catalogued station localities recorded in Auckland Museum.

Awakino River mouth, 38° 40'S, 174° 37'E, exposed beach, sandstone reefs, estuary mouth, L24001-3.
Mokau River estuary, 38° 43'S 174° 38'E, salt marsh, tidal flats and channel dredgings (1-3m depth), L24013, 6-8, 24026-30.
Omahu Pt, 38° 48'S, 174° 36'E, exposed beach, sandstone rocky shore, L24014-5.
Tongaporutu River mouth, 38° 49'S, 174° 35'E, exposed beach, sandstone rocky shore, estuary mouth, L24004-6.
Pukearuhe - Pariokariwa Pt, 38° 53'S, 174° 31'E, exposed beach, sandstone boulders and reef, seaweed washings, L24009-12.
Waiiti Beach and 1 km to north, 38° 55'S, 174° 29'E, exposed beach, sandstone rocky shore and intertidal tree trunks, L19501, 6, 24019.
Urenui dredgings -
38° 59.1'S, 174° 23.5'E, 0.6 km offshore, 6 m, L24025, medium-fine sand.
38° 58.9'S, 174° 23.3'E, 1 km offshore, 9 m, L24024, shelly fine sand.
38° 58.7'S, 174° 22.5'E, 2 km offshore, 10 m, L24035, coarse rocky gravel.
38° 58.5'S, 174° 23.2'E, 1.5 km offshore, 12 m, L24023, fine sand.
38° 58.6'S, 174° 22.3'E, 2 km offshore, 12 m, L24033, fine sand.
38° 58.7'S, 174° 21.5'E, 2 km offshore, 13 m, L24034, gravelly fine sand.
38° 58.2'S, 174° 22.6'E, 2.5 km offshore, 14 m, L24032, fine sand.
38° 57.5'S, 174° 22.9'E, 3.5 km offshore, 17 m, L24021, fine sand.
38° 57.7'S, 174° 22.5'E, 4 km offshore, 17 m, L24031, fine sand.
38° 57.4'S, 174° 22.2'E, 4 km offshore, 18 m, L24036, muddy fine sand.
38° 57.0'S, 174° 22.0'E, 4.5 km offshore, 20 m, L24037, fine sand.
38° 56.3'S, 174° 22.2'E, 5 km offshore, 22 m, L24022, fine sand.
Waitara - Airedale Reef, 38° 59.1'S, 174° 14.5'E, exposed bouldery reef, seaweed washings, L23221, 24007-8, 24039.
New Plymouth swimming baths, 39° 04'S, 174° 04'E, partly sheltered bouldery reef, L24038.
New Plymouth, Port Taranaki, 39° 04'S, 174° 03'E, sheltered beach, rocky groins, L24020.

APPENDIX II. Census data for 10 litre dredge samples taken offshore from Urenui.

Dredge penetration averaged 0.1m into the sea floor sediment. Live organisms are given in numbers; presence of dead shells is indicated by d.

L240	25	24	35	23	33	34	32	21	31	36	37	22
Depth (m)	6	9	10	12	12	13	14	17	17	18	20	22
MOLLUSCA												
Rhyssoplax aerea	.	1	.	.	.	.	.	.	.	.	.	.
Amalda mucronata	.	.	.	.	.	.	.	d	.	d	d	.
Antisolarium egenum	.	.	.	.	.	.	.	.	.	.	d	.
Austrofusus glans	.	.	1	2	6	.	5	2	1	1	9	.
Cantharidella tesselata	d	.	.	.	.	.	.	.	.	.	.	.
Cerithiopsidae 2 spp.	d	.	.	.	.	.	.	.	.	.	.	.
Maoricolpus roseus manukauensis	d	d	.	.	.	.	.	d	.	.	.	.
Neoguraleus amoenus	.	.	.	.	.	.	2	1	.	1	2	.
Nozeba emarginata	d	.	.	.	.	.	.	.	.	.	.	.
Odostomia incidata	.	.	.	.	.	.	.	1	.	.	.	.
Paratrophon cheesemani exsculptus	.	.	.	.	.	.	.	.	d	.	.	.
Pervicacia tristis	.	.	.	.	.	.	3	d	.	1	d	.
Phenatoma rosea	.	.	.	.	.	.	.	1	.	.	.	.
Philine auriformis	.	.	.	.	2	.	.	1	1	.	.	1
Philine sp.	.	1	.	.	.	.	.	.	.	1	.	1
Pupa kirki	.	.	.	.	.	.	.	2	.	1	4	.
Sigapatella novaezelandiae	.	.	.	.	d	.	.	.	.	.	.	.
Struthiolaria papulosa	.	.	.	.	.	.	.	d	.	d	2	.
Tanea zelandica	.	d	d	d	.	.	1	2	1	.	.	.
Trichosirius inornatus	d	.	.	.	.	.	.	.	.	.	.	.
Trochus tiaratus	1	.	.	.	.	.	.	.	.	.	.	.
Trochus viridis	.	1	.	.	.	.	.	.	.	.	.	.
Xymene pusillus	.	.	.	.	.	.	.	d	.	.	.	.
Xymene traversi	.	d	.	.	.	.	.	.	.	.	.	.
Zeacolpus vittatus	.	.	.	.	.	.	.	d	.	.	.	.
Zegalerus tenuis	.	.	2	.	.	d	.	d	.	d	7	.
Acar sandersonae	.	d	.	.	.	.	.	.	.	.	.	.
Austrovenus stutchburyi	d	.	.	.	.	.	.	.	.	.	.	.
Barbatia novaezelandiae	d	d	.	.	.	.	.	.	.	.	.	.
Bassina yatei	.	.	.	.	.	.	.	.	.	1	d	.
Borniola reniformis	1	.	.	.	.	.	.	.	.	.	.	.
Chlamys zelandiae	d	d	.	.	d	d	.	.	.	.	.	.
Corbula zelandica	d	.	.	.	d	d	.	1	.	.	.	.
Divaricella huttoniana	.	.	d	.	.	d	d	.	.	.	d	.
Dosina zelandica	.	d	.	.	.	.	.	.	.	.	.	.
Dosinia anus	.	.	.	.	.	.	d	.	.	.	.	.
Dosinia subrosea	.	.	d	.	.	d	.	d	.	2	1	.
Gari lineolata	.	.	.	.	.	d	.	d	.	.	.	.
Glycymeris modesta	d	.	d	.	.	.	.	.	.	.	.	.
Hiatella arctica	d	.	.	.	.	.	.	.	.	.	.	.
Irus reflexus	d	.	.	.	.	.	.	.	.	.	.	.
Leptomya retiaria	.	.	.	.	d	.	.	.	.	.	.	.

L240	25	24	35	23	33	34	32	21	31	36	37	22
Depth (m)	6	9	10	12	12	13	14	17	17	18	20	22
Mactra ordinaria	d	.	2	6	.	.	9	10	1	5	d	.
Moerella huttoni	.	.	.	.	.	.	d	.	.	d	2	.
Myadora antipodum	.	.	.	.	.	.	d	.	.	.	.	.
Myadora striata	.	.	.	.	.	d	.	.	.	.	.	.
Myadora subrostrata	.	.	d	.	.	.	.	.	.	.	.	.
Nucula nitidula	d	.	1	7	2	2	2	4	2	4	1	.
Rexithaerus spenceri	.	.	1	.	.	d	.	.	.	.	.	.
Ruditapes largillierti	.	.	.	.	.	.	.	1	.	.	.	.
Scalpomactra scalpellum	.	.	d	d	.	d	4	1	2	10	2	.
Tawera spissa	d	d	d	.	d	d	d	d	.	.	.	.
Tellinota edgari	.	.	.	d	.	.	.	d	.	.	1	.
Tucetona laticostata	.	.	.	.	.	.	d	.	.	.	.	.
Zelithophaga truncata	1	.	.	.	.	.	.	.	.	.	.	.
Zenatia acinaces	.	.	.	.	.	.	.	.	.	1	d	.
Antalis nana	.	.	.	.	.	.	.	.	.	.	4	.
ECHINODERMATA												
Echinocardium caudatum	.	.	5	1	.	13	74	.	3	.	.	.
Ocnus calcarea	.	.	.	.	.	.	.	2	.	.	.	.
Ophiopteris antipodum	.	.	.	.	1	.	.	.	.	.	.	.
REPTANTIA												
Cyclohombronia depressa	.	.	.	.	.	.	.	.	.	.	1	.
Halicarcinus tongi	.	1	.	.	.	.	.	.	.	.	.	.
Ovalipes catharus	.	.	1	.	.	.	.	.	.	.	.	.
Paguristes pilosus	.	.	4	.	.	.	4	2	3	.	4	.
Pagurus sp.	.	3	.	.	.	.	1	.	.	.	.	.
Petrolisthes novaezelandiae	1	.	2	.	.	.	.	.	.	.	.	.
DECAPODA												
Callianassa sp.	.	.	.	.	.	.	.	2	.	.	.	.
Ogyrides delli	1	3	.	5	3	3	2	4	6	32	23	29
AMPHIPODA	.	.	.	.	.	.	.	.	.	.	.	.
Bathymedon neozelanicus	.	.	.	.	.	.	.	.	1	.	.	.
Gammaropsis sp.	.	.	3	7	.	.	8	14	11	30	17	.
Heterophoxus sp.	1	1	.	2	12	20	.	4	22	38	6	41
Hippomedon hake	3	2	.	4	1	.	.	.	2	12	3	11
Iphimidia haurakiensis	.	1	.	.	.	.	.	.	.	.	.	.
Liljeborgia barhami	1	.	3	.	.	.	.	.	.	2	2	.
Melita awa	.	1	.	.	.	.	.	.	.	.	.	.
Paradexamine pacifica	.	2	.	.	.	.	.	.	.	.	.	.
Paramoera chevreuxi	45	.	.	.	.	.	.	.	.	.	.	.
Paraperioculodes sp.	1	.	7	1							3	.
Photis brevicaudata	.	.	5	5	1	.	5	2	36	34	35	.
Protophoxus australis	.	.	.	.	2	.	.	.	.	.	.	.
Torridoharpinia hurleyi	1	.	.	.	1	.	.	.	.	.	.	.
ISOPODA	.	.	.	.	.	.	.	.	.	.	.	.
Iathrippa longicauda	.	2	.	.	.	.	.	.	.	.	.	.
CUMACEA												
Cyclaspis argus	.	.	.	.	.	.	.	.	.	3	2	.
Cyclaspis elegans	.	.	.	1	.	.	.	.	.	.	1	.
Cyclaspis levis	.	.	.	.	1	.	3	.	.	.	.	.

L240	25	24	35	23	33	34	32	21	31	36	37	22
Depth (m)	6	9	10	12	12	13	14	17	17	18	20	22
Diastylis insularum	.	.	.	.	.	.	.	.	.	12	8	.
Diastylis neozealanica	.	.	.	.	.	.	2	1	3	.	.	.
Diastylopsis crassior	.	.	.	12	.	.	.	.	.	3	.	.
Diastylopsis elongata	11	3	.	14	15	7	.	28	13	6	1	7
Diastylopsis thileniusi	.	.	.	.	.	.	6	.	10	8	12	.
MYSIDA	.	.	.	.	.	.	.	1	2	.	.	.
LEPTOSTRACA	.	.	.	.	.	.	.	.	.	.	1	.
OSTRACODA												
Leuroleberis zealandica	.	.	.	.	1	.	5	3	.	1	.	.
Schleroconcha sp.	.	.	.	.	.	.	1	.	1	1	.	.
BRACHIOPODA												
Calloria inconspicua	d	d	.	.	.	.	.	.	.	.	.	.
SIPUNCULA												
Dendrostomum aeneum	.	2	2	.	2	.	1	.	.	.	.	1
NEMERTEA	1	.	.	4	.	.	1	1	.	.	3	1
PLATYHELMINTHES	.	.	.	.	.	.	1.	.	.	.	.	
COELENTERATA												
Edwardsia tricolor	.	.	.	.	.	.	.	.	1	.	.	.
POLYCHAETA												
Aglaophamus macroura	.	.	.	3	6	.	4	2	5	1	5	14
Amphicteis philippinarum	.	.	.	3	3	1	1	3	3	5	3	9
Apistobranchus sp.	.	.	.	1	.	.	.	.	4	.	1	.
Armandia maculata	.	.	.	1	.	1	.	.	.	.	.	.
Bradabyssa sp.	.	.	.	.	.	.	.	.	.	1	1	1
Capitellidae	.	.	.	.	.	.	.	1	.	.	1	.
Euchone sp.	.	.	.	.	15	.	8	.	.	.	.	.
Glycera lamellipodia	.	.	1	3	1	.	2	1	.	1	.	.
Glycinde dorsalis	.	.	.	2	3	1	3	1	3	2	4	1
Goniada littorea	.	.	.	1	2	.	.	4	3	1	1	6
Lumbrineridae	.	.	.	.	.	1	.	.	.	.	.	.
Lumbrineris brevicirra	.	.	1	.	.	.	.	.	.	.	.	.
Lumbrineris coccinea	.	1	.	1	.	.	.	.	.	.	.	.
Magelona papillicornis	1	.	.	.	.	.	.	.	2	.	.	.
Maldanidae	.	.	.	1	.	.	.	.	.	.	.	.
Nereidae	.	.	.	2	.	.	.	.	.	.	.	.
Onuphis aucklandensis	.	.	.	.	.	.	.	2	.	.	.	5
Paraprionospio sp.	.	.	.	.	1	1	.	1	1	5	4	2
Pectinaria australis	.	.	.	.	2	.	.	2	.	2	1	.
Phyllodocidae	.	.	.	1	.	.	.	.	.	1	1	2
Prionospio aucklandica	.	.	.	.	.	.	.	1	.	.	.	1
Scolecolepides sp.	.	.	.	1	.	.	.	.	.	.	.	.
Spiophanes sp.	.	.	.	.	1	.	.	.	.	.	.	.
?*Sthenolepis* sp.	3	.	.	6	.	.	2	1	9	3	2	8
Syllidae	1	.	1	.	.	.	.	.	.	.	.	.