Mimiwhangata Marine Park Draft Report 2002
Historic Marine Monitoring Update.

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A Report to Northland Conservancy, Department of Conservation, Whangarei
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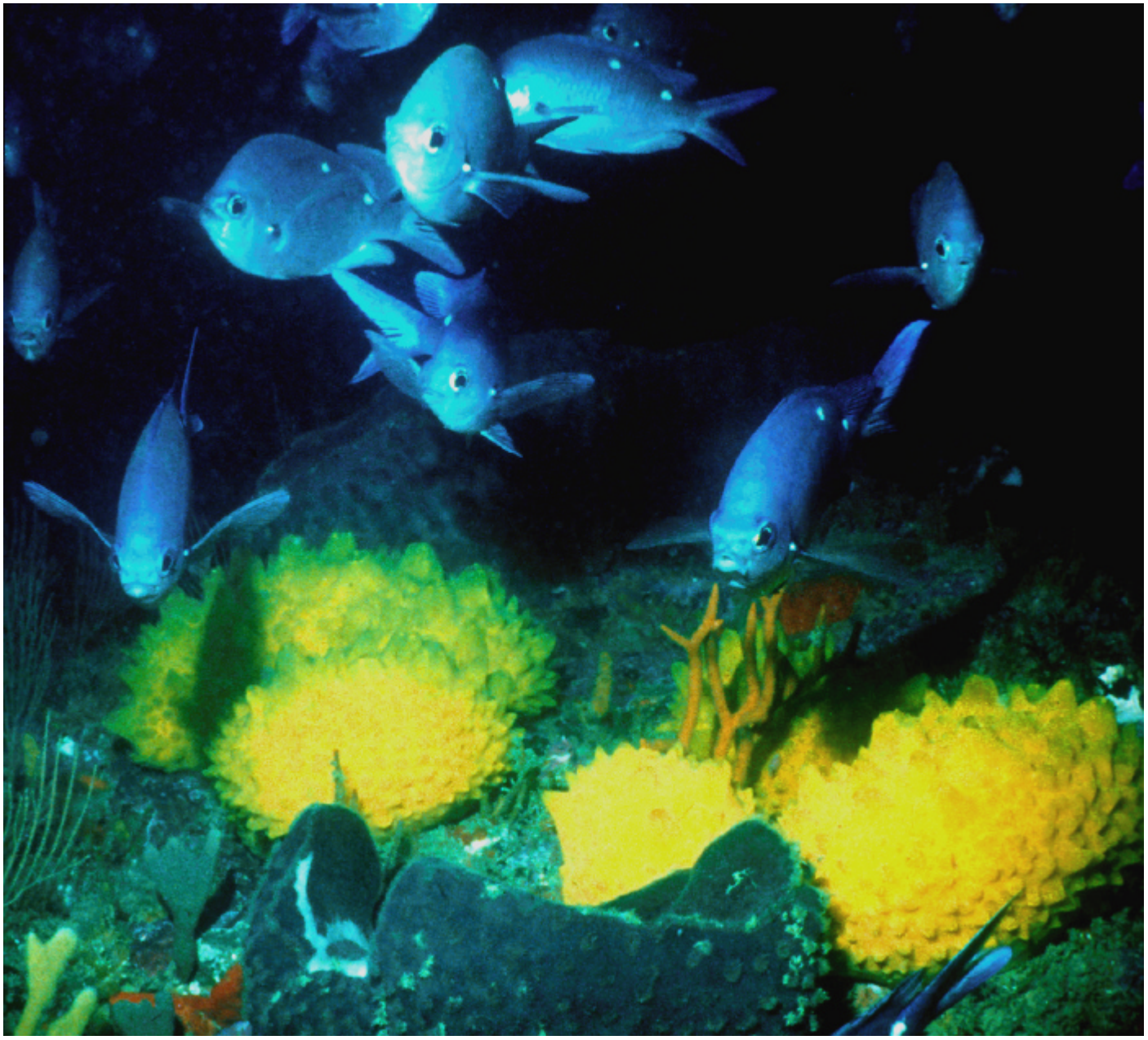

Damoiselle and sponge community photo by Roger Grace

Figure 1 Historic survey sites Mimiwhangata

Abstract

Historic monitoring of marine species established at Mimiwhangata in 1976 was repeated at the original sites. The original methods of data collection were also followed. The species surveyed are; fish, kina, crayfish, rock oysters, tuatua and scallops. Results of this study show that overall no improvements in the marine species studied has taken place over the period the Marine Park fisheries regulations have been in place and there is concern over continued decline in some habitats notably the algal forests of shallow subtidal areas. There is some evidence that some species are continuing to decline, notably snapper, tuatua, packhorse crayfish, rock oyster.

Introduction

The marine area of Mimiwhangata has been the subject of considerable scientific interest since the early 1970's. For over a decade up until 1986 extensive habitat and species monitoring programmes were set up and developed. This work is well documented, (see references). After a lengthy process the Marine Park was set up in 1984 with fishing restrictions established under the Fisheries Act.

The Mimiwhangata Marine Monitoring Programme was established in Winter 1976. The Programme was designed to provide long-term stocktaking information on the marine resources, particularly popular edible species, to facilitate their management. The earlier detailed survey of the marine resources, presented in the Marine Report (1973), provided essential background information on which to base the design of the present Monitoring Programme.

The marine monitoring programme showed that, following opening of the park to the public, many abuses of fishery regulations occurred. Many sack loads of kina were taken away from newly accessible areas, and the incidence of illegal removal of oysters sky-rocketed. Despite these problems, the Marine Park was finally established in 1984. Commercial fishing was immediately reduced to long-lining and cray-potting, which was allowed to continue for another 10 years. The Marine Park concept aimed to allow recreational fishing and shellfishing for types of marine life which could stand some fishing pressure, but prohibits the taking of species which would be depleted rapidly even by a small amount of fishing. The intention of the somewhat complex fishery regulations was to tightly control recreational fishing to certain methods and species, and to protect everything else.

Over the 18 years of the Marine Park's existence there has been much confusion over the fisheries regulations. Enforcement of the regulations has been virtually non-existent over the period leading to a very poor public support for the regulations. Effectively what we have now is a Marine Park in which no commercial fishing has occurred since 1994, but recreational fishing continued with limited but apparently unenforceable controls. Thus we have an opportunity to test the effects of recreational fishing in the absence of commercial fishing.

This study has attempted to repeat the monitoring at Mimiwhangata established in 1976, using the original site locations and methods.

Methods

Location of each sampling station was influenced by the following considerations:

known established beds of popular shellfish;
ease of access from land or sea;
likely focal points of activity for visitors to Mimiwhangata;
range of habitats suitable for each species.

The locations of permanent monitoring stations are indicated on the map in this report (Fig. 1.). Site locations are described in Table 1 below.

Waypoint Comment	Waypoint Description	New Zealand Grid Eastings	New Zealand Grid Northings
D	Mussel next out -middle of rock	2640567	6639411
E	Mussel, inner most middle - top of rock	2640556	6639404
F1	Pa Point	2638949	6639092
F2	Grey Rock	2639375	6640315
F3	Lunch Bay	2640656	6640479
F4	Awash Rock	2640992	6641222
F5	Cocker's Rock Gut	2641635	6641016
F6	Porae Point	2641337	6640144
F7	Black Beach Reef	2640452	6640720
F8	Flax Bush Bay	2641469	6640734
F9	Taukawau Point	2640917	6639824
F10	Suicide Cove	2636956	6639919
Mussels	Ngahau Stream	2637414	6639009
Mussels	Ngahau North	2637354	6639171
Oyster	Mimiwhangata South Lichen Rock	2639063	6638938
Oyster	Mimiwhangata South level peg	2639077	6638978
Oyster	Mimiwhangata South Oysters (actually .5 m west of snad level peg)	2639076	6638982
Oyster	Ngahau Oyster Platform	2637401	6639219
P1	Pa Point	2638955	6639027
P2	Komakoraia Island	2640463	6637532
P3	Flax Bush Bay East	2641620	6640842
P4/1	Kina Pools (Outer Pool)	2640500	6638331
P4/2	Kina Pools	2640489	6638326
P4/3	Kina Pools	2640490	6638326
P4/4	Kina Pools	2640490	6638324
P4/5	Kina Pools	2640482	6638325
P4/6	Kina Pools	2640482	6638331
P4/7	Kina Pools	2640471	6638324
P4/8	Kina Pools	2640465	6638308
P5	Mooring Point N.	2639802	6639920
P6	Whale Bay	2639790	6639999
R1	Waikahoa Bay West	2638742	6638782
R10	Flax Bush Bay West	2641432	6640647
R11	Flax Bush Bay East	2641616	6640835

R2	Pa Point	2638952	6639035
R3	Mimiwhangata South	2639077	6638982
R4	Mimiwhangata North	2639925	6639778
R5	Taukawau Point North	2640862	6639857
R6	Taukawau Point South	2640745	6639722
R7	Okupe Island	2640446	6638267
R8	Komakoraia Island	2640449	6637507
R9	Barn Yard Point	2640400	6637282
Rockpool	Boat Shed Point	2637417	6639397
T2	Mimiwhangata North	2640011	6639652
T2	Mimiwhangata North	2640020	6639652
T4	Mimiwhangata Shed	2639900	6639419
T4	Mimiwhangata Shed	2639923	6639401
T5	Ngahau	2637401	6638912
T6	Mimiwhangata Middle	2639668	6639175
T6	Mimiwhangata Middle	2639687	6639146
Tl	Mimiwhangata South	2639176	6638933

Table 1 Survey sites Mimiwhangata Monitoring 2002

Although initially carried out on a regular basis, monitoring became more irregular and intermittent through the early 1980's, and the last comprehensive monitoring was in 1986. Since that time no formal monitoring was carried out until 2001 - a gap of approximately 17 years!

Monitoring of intertidal sites was carried out in winter 2001, then a full survey of intertidal and subtidal sites occurred in summer 2002.

Sampling Methods

Rock oysters
Rock oysters were monitored by two methods:

1) Photographic transects
A metric measuring tape was laid in a straight line between permanent markers at each end of the transect. Photographs were then taken covering 0.5 metre intervals along the tape. Direct comparison of individual oysters between sampling times was possible by this method. The total area covered by each of these transects varied from 1.0 square metre for a 3-metre transect, to 1.7 square metre for a 5-metre transect.
2) Counting transects
A metric tape was laid in a straight line in a specified direction from one of the photographic transect markers. In a one-metre wide strip parallel to the tape, counts were made of the following categories of dead oysters:
(i) Dead oyster, but with upper valve of shell still attached to the basal shell at the hinge. Inferred cause of death is natural
(ii) Fresh white base shell exposed. Indicates recent death and is typical of artificial removal
(iii) Basal shell exposed as in (i) above, but weathering of shell surface indicates that death did not occur recently
(iv) Basal shell exposed as in (i) and (ii) above, but heavy weathering indicates that death occurred quite some time ago, generally more than six months previously

Tuatuas
At each station, samples were taken at intervals down the beach, usually 5 metres apart. Each sample consisted of a quadrat (small defined area, usually 1 square metre) which was dug over and passed through a sieve to separate the tuatuas, which were then counted. This gave quantitative information on the distribution of tuatuas down the beach.

Sampling was continued into the sublittoral area off the beach by diving, to a distance of 200 metres from the marker at the top of the transect. Sublittoral samples were generally dug by hand, and only in the early sampling periods was an attempt made to sieve the sand underwater. Sieving underwater proved to be very difficult because of surge caused by waves approaching the beach.

Growth of tuatuas was monitored by measuring about 150 individuals from the densest part of the tuatua bed. Shift in the mode (most frequent length) of tuatuas between sampling times reflected the growth of the tuatua population.

Sea Urchins
Intertidal sea urchins.
All sea urchins were carefully removed from the pool, counted and individually measured across their width. All sea urchins were replaced in the pool, giving them sufficient time to attach firmly to the rocks before the tide returned.
Sublittoral sea urchins.
Sea urchins were measured from the same stations as fishes. A sample of 50 sea urchins was collected from a small specified area on or near the fish transect. Care was taken to collect all the sea urchins from a small area, rather than collecting only the large conspicuous specimens (Fig. 2). Each sea urchin was then measured. After measurement, all urchins were returned to the area from which they were collected.

Scallops
A 100-metre transect line was laid out in a specified direction from the zero point. The sea bed was carefully examined in an estimated 2-metre wide strip on each side of the transect line; a total area of 400 square metres. Scallops were collected, and on board the boat were counted and measured across their greatest width. They were then returned to the general area of the transect.

Crayfish
Crayfish were counted at the same stations as reef fishes. A 50-metre transect line was laid out in a specified direction from the zero mark. The rocky sea bed was carefully examined in an estimated 5-metre wide strip on each side of the transect line. Crayfish were identified as either red or green, (packhorse crayfish) type and counted, distinguishing "undersize" crayfish from those large enough to be legally taken for food.

Fishes
Fifty-metre transects were set up as for crayfish counts. Fishes were counted within an estimated 5-metre strip on either side of the transect line. In practice, two divers swam along one side of the transect line counting fishes within the specified area, then swam back along the other side of the line counting fishes as before. One diver concentrated on fish species which swim in open water, while the other diver concentrated on fish species (and crayfish) which live in holes. This led to more accurate counts than if each diver tried to count all fishes.

Results

Winter Sampling 2001

Rock Oysters
Rock oyster stations had not been photographed officially since the summer of 1986. A set of photos had been taken on a private visit, however, in the summer of 1994.

In winter 2001, stations R1, R2, R3, R4, R5, R6, R7, R8, R10 and R11 were photographed only. See separate sheets for oyster photographs.

At station R1 Waikahoa Bay West, the rock supporting the zero peg had broken away, only the bottom of the drilled hole remaining as evidence of the precise location of the peg The hole was drilled deeper and a red plastic rawl plug hammered in, then a stainless steel screw was inserted into the plug as a replacement marker. I had been unable to find the same materials I had used successfully in 1976 to mark the sites, so had to devise another marking system. The 5-metre peg could not be found and proved later to have been covered with a growing oyster, hence the 5-metre end of the photo transect was placed approximately only. Subsequently (Summer 2002) I found the peg, and the photo transect I had taken was only 5cm away from the peg at the 5-metre end.

At station R4 Mimiwhangata North, the original 3.5m plug had gone, leaving only a hole in the rock.

At station R6 Taukawau South, the grey PVC zero peg had dropped out leaving only the outer tube flush with the rock surface. The 4m peg was broken off at rock level.

At station R7 Okupe Island, neither peg could be found so the photos were taken only approximately along the position of the transect. (In summer 2002 the two pegs were subsequently found).

At station R9 Barn Yard Point, I mistakenly searched on the wrong rock. The station was correctly relocated in summer 2002.

At station R11 Flax Bush Bay West on Rimariki Island, the 3.5m peg had completely disappeared, probably along with a piece of rock that had broken out. Two sets of photos were taken approximately along the line of the original transect.

The only evidence of removal of oysters was seen near Mooring Point, where a group of about 8 recently exposed base shells suggested oyster poaching.

At the Ngahau North oyster platform, the steel stake marking the edge of the platform had disappeared, leaving just the remains of the hole it was in. A count of all the dead oysters on the platform was carried out:

Category	Number
0 (lids)	15
1	17 (no chips)
2	127
3	252
Total	411

Sea Urchins.

(a) Intertidal Pools

Station	Location	Winter 2001	Summer 1986
P1	Pa Point	10	80
P2	Komakoraia Is.	36	32
P3	Flax Bush Bay East	174	113
P4(1)	Okupe Pool 1	ND	15
P4(2)	Okupe Pool 2	2	6
P4(3)	Okupe Pool 3	0	2
P4(4)	Okupe Pool 4	0	3
P4(5)	Okupe Pool 5	ND	68
P4(6)	Okupe Pool 6	62	63
P4(7)	Okupe Pool 7	31	120
P4(8)	Okupe Pool 8	ND	67
P5(N)	Mooring Point N	2	4
P5(S)	Mooring Point S	8	8
P6(1)	Whale Bay 1st drain	94	3
P6(2)	Whale Bay 2nd drain	85	52
P6(3)	Whale Bay SW	59	44
P7(E)	Boatshed Point E	52	44
P7(W)	Boatshed Point W	177	193

Sea Urchin Size Frequency (intertidal pools)

Formal size data for pools P3, P4(2), P5(N), P5(S), P6(1) and P7(E) only.
Rough size estimates only for the following pools:

P1 Pa Point; average about 50mm, one at about 70mm
P2 Komakoraia Island; average about 40-50mm
P4(6) Okupe Pool 6; average 60-70mm
P4(7) Okupe Pool 7; average 30-40mm

(mm)	P3	P4(2)	P5(N)	P5(S)	P6(1)	P7(W)
85-90						
80-85	1					
75-80	1				1	
70-75	6				1	
65-70	16				1	
60-65	43			3	5	2
55-60	43		2	3	19	11
50-55	32			1	16	8
45-50	11	1			26	7
40-45	10				11	9
35-40	6				2	10
30-35	4			1		5
25-30	1					
20-25		1			1	
15-20						

10-15						
5 - 10						
Total	174	2	2	8	83*	52

* It was difficult to get an accurate count while measuring the kina. 83 were measured, but a separate count indicated a truer total of 94 kina.

Tuatuas

Station	Location	Sampling status
T1	Mimiwhangata South	not sampled
T2	Mimiwhangata North	not sampled
T3	Okupe Beach	not sampled
T4	Mimiwhangata Red Shed	sampled
T4	Ngahau Beach	not sampled

Distance from datum (fence)	No. and sizes of tuatua in 0.25 sq.m.
0	Fence
26.5	Dune crest
28	Toe of dune
36	Approx. high tide today
55	Nil
60	1 (27mm)
70	1 (33mm)
75	Nil
80	Nil (quite shelly)
90	2 (46,31mm)
100	Approx. low water today. Nil
110	1 (3mm juvenile)

General collection of tuatua around 80m down beach:

Lengths: 53,49,40,30,27,24mm

Green Shell Mussels

Okupe Rocks

Tide was too high for examination. Later, in September, the Park Ranger's wife checked the rocks and there were no obvious mussels.

Ngahau Mussel Rock

Very few mussels were present. 32 were counted from the prescribed area, ranging from about 20 to about 70mm, mostly 30 to 40mm in length.

There were, however, lots of green shell mussels on the lower part of rocks at the stream outlet. Most were 40 - 50mm, with many about 30mm and a few around 60mm. One blue mussel was seen 40mm.

The green shell mussels appear to fall into at least two year classes. There were many small black mussels *Xenostrobus* at a slightly higher tidal level.

Summer Sampling 2002

Rock Oysters
Stations R1, R2, R3, R5, R6, R7, R8, and R9 were photographed only. See separate sheets for oyster photographs.

Sand was covering most of the Mimiwhangata South (R3) transect.

No oysters were present on the following photographic transects: R3,R6 and R9.

There was no evidence of oyster removal near any of the photo transects visited. There was also no recent recruitment of oyster spat.

Original transect marker pegs, mostly installed in 1976, are still present at both ends of the photo transects at the following stations: R2, R3, R5, R7, R8, R9, R11. At R7, however, the zero peg is broken off at ground level, as is the 5m peg at R5, and the 4m peg at R6.

At R1 a new zero peg was installed in winter 2001 after the old peg disappeared along with the rock knob it was embedded in. The base of the drilled hole was still visible so the new peg could easily be accurately positioned. The 5m peg was difficult to find because an oyster was growing and partly obscuring it.

At R6 the peg has dropped out at zero (this occurred some years ago), leaving just the drilled hole visible. At R10 the 3.5m peg has gone along with the rock it was embedded in.

R4 was the very first station set up in 1976. It was originally marked with short stubs of plastic tube of about 12mm diameter but these dropped out after a few years. The zero end was then marked with the normal grey PVC plugs as used on the other transects. The north end of the transect is now marked only by the original 12mm hole which has now filled in with a growing oyster and could not be found in winter 2001.

Evidence of interference with oysters in summer 2002 was seen on 24 January near the eastern end of Rimariki Island, far from any of the monitoring stations. Here about 50 oysters had recently been taken from a shallow reef area, noted during a snorkel visit. In March on the Ngahau North oyster platform four recently exposed oyster base shells were seen, with scratch marks consistent with removal with a pocket knife or similar. This low incidence of oyster poaching contrasts with some earlier years of the monitoring programme when considerable numbers of oysters were taken from several sites.

Sea Urchins.

(a) Intertidal Pools

Station No.	Location	Su. 2002	(W 2001)	(Su. 1986)
P1	Pa Point	47	10	80
P2	Komakoraia Is.	39	36	32
P3	Flax Bush Bay East	ND	174	113

P4(1)	Okupe Pool 1	12	ND	15
P4(2)	Okupe Pool 2	0	2	6
P4(3)	Okupe Pool 3	0	0	2
P4(4)	Okupe Pool 4	1	0	3
P4(5)	Okupe Pool 5	69	ND	68
P4(6)	Okupe Pool 6	64	62	63
P4(7)	Okupe Pool 7	44	31	120
P4(8)	Okupe Pool 8	19	ND	67
P5(N)	Mooring Point N	5	2	4
P5(S)	Mooring Point S	8	8	8
P6(1)	Whale Bay 1st drain	93	94	3
P6(2)	Whale Bay 2nd drain	104	85	52
P6(3)	Whale Bay SW	72	59	44
P7(E)	Boatshed Point E	ND	52	44
P7(W)	Boatshed Point W	ND	177	193

Sea Urchin Size Frequency (intertidal pools)

(mm)	Frequency										
	P1	P2	P3 ND	P4.1	P4.2	P4.3	P4.4	P4.5	P4.6	P4.7	P4.8
91-95											
86-90											
81-85				3							
76-80				1							
71-75	1			3				3			1
66-70	2			3				26		2	
61-65	6	3		1				19		8	2
56-60	7	9						14		11	2
51-55	9	8						3		7	4
46-50	4	3		1				2		7	1
41-45	6	7					1	1		6	6
36-40	7	5						1		1	2
31-35	2	3									
26-30	2									2	
21-25	1	1									
16-20											1
11-15											
6 -10											
Total	47	39	ND	12	0	0	1	69	64	44	19

continued....

(mm)	Frequency						
	P5N	P5S	P6.1	P6.2	P6.3	P7E ND	P7W ND
91-95							
86-90							
81-85							
76-80							
71-75		1	1		1		
66-70			2	6	10		
61-65	2	2	5	17	16		
56-60		2	20	17	14		
51-55		1	25	21	12		
46-50	1	2	26	16	8		
41-45	1		7	13	1		
36-40				5	4		
31-35			5	4	2		
26-30			1	1	1		
21-25	1		1	3	3		
16-20				1			
11-15							
6 -10							
Total	5	8	93	104	72	ND	ND

(b) Sublittoral populations

Sea Urchin Size Frequency

(mm)	Frequency									
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
										ND
126-130						2				
121-125						5				
116-120						3				
111-115						6				
106-110	2					11			1	
101-105	2					11				
96-100						7				
91-95	4		1		1	11		1	1	
86-90	7		2	3		4	4	1	3	
81-85	4	1	5	4	3	1	6	6	4	
76-80	13	2	11	11	16	2	11	12	10	
71-75	13	1	17	14	12		15	19	14	
66-70	3	15	9	11	15		12	11	9	
61-65	1	18	3	4	4		1	1	7	
56-60	1	10	2	2			1		2	
51-55		2		1					1	
46-50		1								
41-45										
36-40										
31-35		1						1		
26-30										
21-25										
16-20										
11-15										
6 -10										
n	50	51	50	50	51	63	50	52	52	ND

Tuatuas.

Station	Location	Sampling status
T1	Mimiwhangata South	sampled
T2	Mimiwhangata North	not sampled
T3	Okupe Beach	not sampled
T4	Mimiwhangata Red Shed	sampled
T5	Ngahau Beach	not sampled
T6	Mimiwhangata Middle	sampled

Distance from datum (m)	No. of tuatuas in 0.25sq.m.		
	T1	T4	T6
31	HWM	-	-
40	0	-	-
50	-	0	HWM
60	0	3	-
65	-	0	-
70	3	4	2
75	-	3	-
80	0	5	0
85	-	3	-
90	0	1(LW)	0
100	0(LW)	-	0
110	0	-	0(LW)
120	-	-	0
130	-	-	0

Datum marks:

T1 No marker posts. Zero is 2m behind dune crest, c.20m below the trees.

T4 Zero is fence between dune and paddock.

T6 Zero is isolated strainer post about 8m below the fence and style.

Tuatua sizes.

There were no clear beds of tuatuas on any of the transects. Most tuatuas present were small. For each transect tuatua size data is pooled for all levels on the beach.

Length (mm)	T1	T4	T6
51	-	1	-
37	-	1	-
16	-	1	-
10	-	1	-
9	-	1	-
8	-	1	-
7	-	1	-
6	-	2	-
5	-	-	2
4	-	4	-
3	2	5	-
2	1	1	-

Crayfish

		Number in 500 sq.m. (2 @ 50 x 5 metres)					
		Red crayfish			Green crayfish		
Stn.	Locality	Legal	Sublegal	Total	Legal	Sublegal	Total
F1	Pa Point	0	1	1	0	0	0
F2	Grey Rock	0	0	0	0	0	0
F3	Lunch Bay	10	28	38	0	0	0
F4	Awash Rock	0	1	1	0	0	0
F5	Cockers Rock Gut	0	0	0	0	0	0
F6	Porae Point	2	5	7	0	0	0
F7	Black Beach Reef	0	0	0	0	0	0
F8	Flax Bush Bay	0	0	0	0	0	0
F9	Taukawau Point	2	31	33	0	0	0

Scallops

No formal sampling of scallop transects was carried out, but a diver did a manta-board tow from just west of North Reefs to south of Taukawau Point. This traverse effectively visited four of the established scallop transect sites: S5 (North Reefs West, S7 (Mid-channel), S8 (Tawera Flat) and S9 (Taukawau Point). During the tow two scallops were picked up and two others were seen but not accessed. The two picked up measured 123mm and 115mm.

Reef Fishes

Station	Location	Number of Fish Species
F1	Pa Point	15
F2	Grey Rock	19
F3	Lunch Bay	20
F4	Awash Rock	20
F5	Cockers Rock Gut	19
F6	Porae Point	24
F7	Black Beach Reef	17
F8	Flax Bush Bay	14
F9	Taukawau Point	14

Fish Species Number in 500 sq.m. (2 @ 50 x 5 metres)

	F1	F2	F3	F4	F5	F6	F7	F8	F9
Yellow moray		1		2		1			
Scorpionfish	1								
Kahawai	c100		c100				c100		
Red mullet (Goatfish)	121	c16	c32	2	16	15	2	20	14
Silver drummer			1		2		3		1
Parore	c30	13	1	10	c30	12	c58	4	9
Blue maomao		8	5		5	1	c43		c15
Sweep	c40	c70	c130	3	c30	c90	1	18	c60
Black anglefish			8	1	c13	3	5	2	
Demoiselle		c25		c300	c30	1		1	
Kelpfish	11	13	c12	10	3	6	14	7	16
Marblefish		2	1	3	1	2	1	2	4
Red moki	2	c20	c20	3	c10	c10	18	6	18
Porae		1			1	1			
Spotty	c40	c20	c32	12	c20	c34	c35	30	c31
Orange wrasse								1	
Banded wrasse	5	3	5	6	4	3	10		7
Sandagers wrasse				1	1		2		
Red pigfish		2	2	3				1	
Butterfish			1	1		5	5		
Leatherjacket	2	3	4	8	c8	14	1	4	2
Spotted black grouper									1
Conger eel	1								
Red-banded perch					1				
Rock cod	1								
Koheru		7	6	c50		c100			
Jack mackerel	c80	c20	c50			5			
Slender roughy	4	c60		1					1
Bigeye	2	c6	c50	x	x	c45	c20	c31	c43
Trevally			3			c100			
Snapper					c6				
Long-snouted pipefish						3			
Eagleray			1			1			
Short-tail stingray				1				1	
Kingfish						1	3		
Piper									
Oblique-swimming blenny		c25		c350	x				
Anchovy						1			
John dory						1			
Number of species	15	19	20	20	19	24	17	14	14

Other Marine Life

	F1	F2	F3	F4	F5	F6	F7	F8	F9
Centrostephanus	2	15	23	13	5	6	5	16	1
Charonia sp.			1					1	
Octopus								1	1
Broad squid					c100				
Red shrimps		14							
Astrostole scabra	1								

Green Shell Mussels
Large numbers of mussels were present on rocks below the Barn Yard Point oysters site. Larger ones averaged 60 to 70mm, but there were lots of small ones as well.

Okupe Rocks

Not all rocks were accessible. Only rocks C and E were sampled properly.
Rock C: No larger mussels. Some spat settling on *Gigartina alveata* weed.
Rock E: Mostly on *Gigartina alveata*. Generally those less than 35mm long were on the weed, and those larger were on the rocks. Sizes (number): 35-40(1);
30-35(3);25-30(5);20-25(4);15-20(9);10-15(7);5-10(3). N = 31

Ngahau Mussel Rock

Very few mussels present. Sizes (number): 60-65(2);55-60(3);50-55(5);45-50(3);
40-45(1);35-40(2);30-35(2);25-30(1);20-25(1);15-20(1);10-15(1). N = 22

Large numbers of mussels on low rocks near the stream outlet. Generally 40-50mm, but many smaller 30-40mm, and a few up to 60mm. One blue mussel seen c30mm.

Discussion

Oysters
Rock oyster populations declined in the late 1970's and early 1980's due to a lack of recruitment of larvae. In the late 70's Pacific oysters appeared on the scene, having spread naturally from their introduction to the Mahurangi Harbour in the early 1970's. It is not clear whether Pacific oysters had any influence over the native rock oyster.

The situa tion is little changed in 2002, with many oyster transects now being devoid of any oysters at all.

Illegal removal of rock oysters jumped dramatically shortly after the Farm Park was opened to the public in 1981, with 560 oysters taken from 12 localities in the 1981-82 season. Exploitation declined to 20 oysters from 4 locations in 1985-86. In winter 2001, 8 oysters were removed from one site, and in summer 2002 about 50 oysters were taken near the eastern end of Rimariki Island, and 4 from a site near Ngahau.

It seems incidence of illegal removal of oysters peaked immediately after the public gained easy access to Mimiwhangata Coastal Park, but settled down to a low level after that. The major decline in oysters in the late 70's and early 80's seems not to be influenced directly by humans.

Sea urchins
Kina populations in intertidal pools fluctuate within apparently natural limits. Changes seem to relate to the detailed topography of individual pools, influencing the ease with which urchins migrate out of, or into, particular pools. In some pools urchins numbers have stayed almost static over the years. In general, it appears that recruitment to most pools is through settlement of planktonic larvae. When urchins reach a critical size, dependent largely on pool topography, they migrate out of the pool and join their subtidal cousins.

The only pools in which taking of urchins appears to have influenced numbers are on the intertidal rocks around Okupe Island.

The slow spread of subtidal urchins at the expense of the adjacent kelp forest has continued. It is now known that this spread of urchins, which is a widespread phenomenon throughout Northland, the Hauraki Gulf and the Bay of Plenty, is related to a broad regional effect of over fishing of crayfish and snapper.

At Pa Point, in the early 1980's it was noted that kina were beginning to reduce the kelp forest *Carpophyllum flexuosum*. By summer 2002 this kelp forest had completely gone, where in the mid 1970's a lush tall dense forest of kelp occurred. The ecological changes brought about by the loss of the kelp have been dramatic. The rock at Pa Point is now covered in a thin layer of silt, urchins and two species of starfish are abundant, and thousands of the invasive parchment worm inhabit every rock crevice.

The monitoring programme showed that subtidal kina sizes are very site specific, with the mean size of urchins at a particular site remaining very stable over a long time period.
There has been very little exploitation of subtidal kina throughout the years of monitoring.

Tuatuas
In the early 1970's a large settlement of juvenile tuatuas appeared on Mimiwhangata Beach. A small bed of moderate-sized tuatuas was present at the southern end of Mimiwhangata Beach in the mid 1970's, but these died out apparently because they spent too much time at a high level on the beach.

A much larger bed of slightly smaller tuatuas persisted for many years in the northern half of Mimiwhangata Beach. They numbered in the millions (roughly 10 million in 1976), but slowly their numbers dropped as the individuals grew. By 1986 they were approximately 11 years old, mostly 55 to 60mm long, and numbered approximately 0.8 million individuals.

Although there has been intermittent small settlements of tuatua larvae over the years since 1975, none has been sufficiently large to replenish the spectacular bed of shellfish that was present from the late 70's to the mid 80's. In recent years tuatua have been difficult to find on Mimiwhangata Beach, although some people still find a few for a feed. Occasional individual tuatuas may be seen, however, on any of the sandy beaches in the area.

Crayfish
Numbers of juvenile red crayfish steadily increased on several transects during the first few years of the monitoring programme, but did not flow on to a noticeable increase in legal sized crays as they reached a takeable size.

Adult red crayfish numbers fluctuated within normally expected limits under conditions of moderate fishing pressure. Crayfish populations are very site-specific, and some of the transects regularly have crayfish on them, whereas some others have never supported crayfish since the start of the monitoring programme in 1976.

Numbers of red crayfish on the transects in 2002 seem similar to the numbers present in the 1970's and 80's. It is notable that the numbers of legal and larger crayfish are low and have not shown improvement over the monitoring period.

Green crayfish (packhorse) occurred in small numbers on a few transects in the 70's and 80's and were observed to be declining over this period. Anecdotal records in the period prior to the 1970's of this species describe much higher numbers. By 2002 they were absent from all transects. From a biodiversity perspective this raises a particular concern for the packhorse crayfish species, especially so because the Mimiwhangata coastal reefs are typical of the Northeastern coast and have enjoyed a level of protection for this species that other areas haven't had, namely the banning of commercial take since 1994.

Mussels
There is a great variation in settlement of young green-lipped mussels from year to year, and they vary in their choice of settlement localities. Larger mussels occur at a few known sites around Mimiwhangata, but their numbers fluctuate greatly from year to year.

One of the most persistent populations of mussels is around low-tidal rocks near the eastern end of Ngahau Beach. Small numbers are often present at the stream outlet at Ngahau, and sometimes on the rocks east of the beach.

The rocks below the Lodge on Okupe Beach sometimes have small numbers of mussels. Low tidal rocks south of Komakoraia Island sometimes support good numbers of mussels.

In summer of 2002, the best numbers of mussels around 60 to 70mm long were present east of Ngahau, with a smaller but still good population south of Komakoraia Island.

Scallops
In the history of monitoring, scallops have never been a feature of the Mimiwhangata area. At the start of monitoring small numbers of large scallops (eg. 120mm) occurred in the coarse sand sediments between Rimariki Island and the mainland. These rapidly declined and scallops have been rarely seen at Mimiwhangata since then, despite extensive searching on several occasions. The situation remains the same in 2002.

Fishes
The number of species of fishes on the transects has fluctuated from year to year, but commonly is in the range of 14 to 26 species. For an unexplained reason species numbers were low in 1984 (15 to 18

species), but picked up again in 1986 (22 to 26 species). In 2002 species numbers were about average (14 to 24 species).

Settlement of juveniles varies from year to year, and from species to species. In 1986, for example, recruitment of juvenile red moki was the worst on record, with only four juveniles seen on a total of 10 transects. In contrast, he 1981 season produced 19 juveniles on only four transects. In 2002, a total of 21 juveniles were seen on nine transects.

Overall there has been no obvious trend of fish numbers detected from the counts on the fish transects. It is important to note that the visual diver method used here is known to be inadequate for the monitoring of snapper because the larger fish from legal size upwards are diver shy, (Willis, Millar, & Babcock, 2000). An indication of juvenile numbers however can be made with this method. In the 2002 survey snapper were only seen on one transect. This was a group of six 20cm long fish. The observations of 2002 contrast with the records of the 70's and the early 80's where juvenile snapper were consistently seen and groups or schools of larger snapper were occasionally seen. The anecdotal history preceding the 70's that is recorded in the 1982, *Mimiwhangata Marine Park Environmental Impact Report*, describes large snapper being frequently seen and caught at Mimiwhangata and that commercial trawling in close , long lining and set netting was having a significant impact on the snapper in the period leading up to 1970.

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