Mangawhai Historic Wharf Resource Consent Application

Appendix 9:

Inter-tidal Zone and Shorebird Surveys

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Historic Mangawhai Wharf Re-Establishment Proposal - Intertidal Habitat Characteristics and Preliminary Bird Use Observations.

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Historic Mangawhai Wharf Re-Establishment Proposal - Intertidal Habitat Characteristics and Preliminary Bird Use Observations.

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Cover Illustration: Oioi & flax. Photograph by L. Drummond

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2020 REVISION AND REVIEW:

Introduction

This report has been prepared for the Mangawhai Historic Wharf Trust (MHWT). The Trust was established in 2018 to promote, re-establish and operate a public wharf based on the design of the original historic wharf at Moir Street, Mangawhai for the benefit of the public and in particular, the Mangawhai Community.

The purpose of this report is to assess the likely impact of the wharf development and its operations on intertidal biota and bird use. It was prepared by Graham Don and Yusuf Qureshi of Bioresearches. Both have since left Bioresearches. Simon West has reviewed the report as an expert on estuarine ecology with 29 years of experience. Relevant qualifications and experience include MSc in zoology from the University of Auckland. Simon has 29 years' experience in ecological survey, monitoring and management. His skills include taxonomic investigations and peer review. He has appeared as an expert witness in Local Council hearings, Environment courts in New Zealand, and before the New Zealand Environmental Protection Agency Board of Inquiry. He has managed an impressive range of projects which include resource evaluation, Roads of National Significance, marinas, marine dredging and disposal, sewage treatment plant upgrades and industrial waste discharges. He has also designed and managed long-term monitoring programmes for industry and regional councils.

The report was prepared in 22 January 2018 and reviewed and revised in 20 February 2020. It was prepared on the basis of consideration of the fieldwork undertaken to qualify the biota present in the area of the proposed wharf and counts of the birds using the harbour area adjacent to the proposed wharf.

Summary of Findings

Six biota samples were collected along the line of the proposed wharf within 30 metres of the shore, with a further three samples taken at the wider terminal end of the proposed wharf. A sample consisted of a 130 mm diameter to 150 mm depth sample core, which was then washed through 0.5 mm mesh sieves and the biota remaining identified to family level and counted. In addition, the surrounding intertidal habitats were described.

Hourly counts of bird use of the proposed wharf footprint, the area 30m either side and to the opposite channel edge were conducted on 7 November 2018 from just prior to high tide to just after low tide. The survey was targeted to occur in the fairy tern breading season, expected to be the peak use period. Additional surveys have been conducted for other groups within the Mangawhai estuary over a broader time period and at different times of the year, unfortunately they were not available for inclusion in this report. In addition, incidental observations of bird use were recorded throughout the survey period with a particular focus on fairy tern.

The upper intertidal rush marsh habitat consisted mainly of oioi and flax, punctuated with pohutukawa trees, knobby sedge and *Machaerina juncea*. A small population of oysters were found on the remnants of the historic wharf. The intertidal biota in the soft sediments from the area of the proposed wharf comprised relatively few species/taxa at relatively low abundances, with cockles, nereid worms, spionid worms and sea anemones the most abundant.

Only a small number of birds was recorded, and birds were absent until about half tide falling. In total the limited "footprint area" used in the survey was utilised by a maximum of five individuals and four species noting, however, that three species have national conservation ratings – caspian tern (threatened), NZ dotterel (at risk) and variable oystercatcher (at risk). Although no fairy tern were recorded using the survey footprint in the hourly counts, three instances of feeding activities in the channel in the vicinity of the proposed wharf were recorded over a brief period at about HW+5 hours. These observations confirm that the low tide channel in the vicinity of the terminal end of the proposed wharf is part of the feeding habitat of fairy tern during its breeding season. Fairy tern has a national conservation status of threatened (nationally critical).

Impacts to the intertidal biota will be low and given the biota are common throughout the harbour will have negligible effects.

Use of the actual proposed wharf footprint by coastal birds is relatively low in the context of the wider harbour; the area is small.

The majority of habitat use occurs at or around low tide. Because of its conservation status, the use of the channel in the vicinity of the proposed wharf by fairy tern is significant, noting that fairy tern also utilises similar habitat in the wider Harbour. It is understood that most of the feeding activity occurs north of the end of the Riverside mangrove fringe, however, the remainder of the Harbour is also utilised.

Construction activities would result in displacement of other coastal birds from the immediate area but that would be a minor, temporary effect with no longer term implications. However, construction of the proposed wharf should not coincide with the breeding period of fairy tern, to limit impacts to the fairy terns usage of the area.

1. INTRODUCTION

The following report contains information on the characteristics of intertidal biota at the proposed wharf site. The level of detail has followed advice provided to the Society by Northland Regional Council.

Secondly, the report presents the results of observations of bird use of the proposed wharf footprint in early November 2018 when overseas migrant wading birds and fairy tern were present in the Harbour environment, but New Zealand migrant species were not.

A second assessment is scheduled in February/March 2019 as part of the wider Sand Island assessment between the Molesworth Drive causeway and Riverside.

2. INTERTIDAL HABITAT CHARACTERISTICS

2.1 Methodology

2.1.1 Location

The ecological values and environmental risks to the area potentially affected by the construction of the proposed wharf were assessed via intertidal biota samples along the proposed wharf site, located off Moir Street in Mangawhai.

2.1.2 Infauna

Six biota samples were collected along the line of the proposed wharf within 30 metres of the shore, with a further three samples taken at the wider terminal end of the wharf. A sample consisted of a 130 mm diameter to 150 mm depth sample core, which was then collected, bagged and labelled. The samples were subsequently sieved as soon as practicable by washing each whole sample through 0.5 mm mesh sieves with seawater. All samples were sieved within six hours of collection. The materials retained on the sieves were transferred to a fresh clean polyethylene zip lock bag, and preserved with a 10% glyoxal, 70% ethanol and sea water solution, sealed, placed in a second clean polyethylene zip lock bag and packed into a labelled plastic container, for transportation to the laboratory. Biota samples were sorted and analysed in the laboratory, with organisms identified down to family level. Any shellfish observed were identified and measured.

2.1.3 Epifauna/flora

Detailed descriptions of the surrounding upper intertidal rush marsh, and hard substrates were taken, along with various photographs. For any unidentified flora, samples were collected and identified in the laboratory.

2.1.4 Sediment quality

Sediment grain size samples were collected; each sample being made up of three small sediment cores of approximately 40 mm diameter by 50 mm depth collected within a 2m² area of the benthic biota samples. In order to reduce costs, samples were held in storage but no analyses were performed. If required analysis would take place.

Contaminant analysis was deemed unnecessary as levels will be low in the surrounding areas, hence no related samples were collected.

2.2 Results

Sample collection was carried out on the 19th of December, at 10:45 am, with a low tide at 11:01am. Descriptions of rush marsh habitat and hard substrates were taken simultaneously.

The substrate found adjacent to the rush marsh habitat consisted of rock rubble, sand, and broken shells. Further from shore, approximately two metres out and onwards, the substrate was hard pan with a relatively thin covering layer of mud, around five to ten cm deep.

2.2.1 Infauna

The results of the benthic biota core sampling are shown in Table 2.1. Average diversity (number of species/taxa) was 7.9 per core, n=9; SD= 2.6. This is considered low, when compared to a high quality intertidal habitat, such as Marsden Point within Whangarei Harbour; where the average species/taxa was 14 (n=9; SD=4.3) (Bioresearches, 2010).

Average individuals per core was 47.8 (n=9; SD=36.2), which is low compared to Marsden Point, 258.9 individuals per core (n=9; SD 87.8). The dominant species/taxa found in the core samples were cockles (7 per core), nereid worms (14 per core), spionid worms (10 per core), and sea anemones (Actiniidae) (6 per core). The average size of cockles was 9.8mm, while Macomona bivalves were 17.1mm; only small shellfish were present.

Overall the benthic area proposed for the historic wharf restoration can be classed as low diversity as well as low abundance, while being dominated by a few species.

2.2.2 Epifauna/flora

The surrounding rush marsh habitat consisted mainly of oioi (jointed rush; *Apodasmia similis*), as well as flax (*Phormium tenax*), punctuated with pohutukawa trees, knobby sedge and *Machaerina juncea*. See Figures 2.1 and 2.2 for typical flora found at site

A small population of oysters was found on the remnants of the historic wharf. Various species of mud snails were present on the substrate (thin layer of mud over hard pan), with crab holes seen throughout the area.

Table 2.1: Benthic biota species counts

Taxa	1						2		
	A	B	C	D	E	F	A	B	C
PHYLUM CNIDARIA									
CLASS ANTHOZOA									
Actiniidae	5	8	1		11	13	5	5	7
Edwardsii		1						1	1
PHYLUM MOLLUSCA									
CLASS GASTROPODA									
Buccinidae	1	3	1	1				1	
Pyramidellidae		1							
Turritellidae		4							
Nacellidae					1				
Epitoniidae				1					
CLASS BIVALVIA									
Cardiidae (<2mm)	5	12	4	1	22	13		10	
Donacidae (<2mm)		2		1	4			2	
CLASS POLYPLACOPHORA									
Chitonidae									1
PHYLUM ANNELIDA									
CLASS POLYCHAETA									
Nereididae	40	9	3	4	50	7	4	9	2
Spionidae	11	10		15	18	9	7	10	7
Orbiniidae	16	6	2	6	11	3		4	
PHYLUM ARTHROPODA									
CLASS MALACOSTRACA									
Mysidae	2	1						1	2
CLASS CRUSTACEA									
ORDER ISOPODA									
Sphaeranatidae	1								
ORDER AMPHIPODA									
Amphipoda sp.			1		5	1			
ORDER DECAPODA									
Hymenosomatidae					1				
Varunidae	1				1			2	
TOTAL NUMBER OF TAXA	**9**	**11**	**6**	**7**	**10**	**6**	**3**	**10**	**6**
TOTAL NUMBER OF INDIVIDUALS	**82**	**57**	**12**	**29**	**124**	**46**	**16**	**45**	**20**

Figure 2.1 Knobby sedge (foreground), and flax (background) (left), flowering pohutukawa and Apodasmia similis (right) observed in the area surrounding the historic wharf.

Figure 2.2 Rush marsh habitat adjacent to wharf location, oioi in foreground, with flax located in the background

3. BIRD USE

3.1 Methods

A site specific survey was undertaken on 7 November 2018 from 0800 to 1400 hours. Tidal conditions were as follow:

- High Water 0749 hours 3.3m
- Low Water 1344 hours 0.5m

Hourly counts were completed within the proposed wharf footprint, the area 30m either side and to the opposite channel edge. In addition, incidental observations of bird use were recorded throughout the survey period with a particular focus on fairy tern. The observation point was the inland side of the esplanade reserve (at the bollards) to avoid observer disturbance.

Counts were aided by Nikon Monarch 5 10x42 binoculars and a Kowa TSN-883 Prominar tripod-mounted spotting scope with a 25-60 times zoom eyepiece. Before each hourly count the air temperature was measured using a digi-quartz multi-thermometer; wind speed and barometric pressure were measured with a Silva Alba Summit windwatch and general weather conditions recorded. Habitat use was also recorded according to the following annotations –

FI: Feeding in the intertidal area

FW: Feeding in or over the water

3.2 Results

Site conditions at the times of the hourly counts were as follows –

Table 3.1 Bird counts conditions

Time	Air temperature (°C)	Barometric pressure (hPa)	Wind (Knots)	General weather conditions
0800	17.4	1017	Nil	Dry, sunny with cloud
0900	19.9	1017	E to 3kts	Dry, sunny with cloud
1000	21.0	1016	NE to 5kts	Dry, sunny with cloud
1100	21.1	1016	NE to 7kts	Dry, sunny with cloud
1200	21.4	1017	NE to 6kts	Dry, sunny with cloud
1300	18.8	1017	NE to 6kts	Cloud increase
1400	19.8	1017	NE to 7kts	Dry, sunny with cloud
mean	19.9	1016.7	ENE to 4.9kts	Dry, sunny with cloud

Conditions were ideal to enable a representative assessment for the early November period.
The results of the hourly counts are shown in Table 3.2.

Table 3.2 Hourly Count Results.

Time	0800	0900	1000	1100	1200	1300	1400
Tidal state	c.HW	c.HW+1	c.HW+2	c.HW+3	c.HW+4	c.HW+5	LW
Caspian tern	-	-	-	2FW	-	-	-
NZ dotterel	-	-	-	-	-	-	1FI 1FI*
Variable oystercatcher	-	-	-	-	2FI	2FI	1FI
White-faced heron	-	-	-	-	1FI	-	1FI 1FI*
Total	-	-	-	2	3	2	5

*at opposite channel edge

Only a small number of birds was recorded and birds were absent until about half tide falling. In total the limited "footprint area" used in this survey was utilised by a maximum of five individuals and four species noting, however, that three species have national conservation ratings – caspian tern (threatened), NZ dotterel (at risk) and variable oystercatcher (at risk).

These results should be viewed with reference to the incidental observations outside regular hourly counts to enable total habitat use (Table 3.3) for that period to be understood. Incidental habitat use records are as follows in Table 3.3.

Table 3.3 Incidentals records of birds using the site

Time	Species, number, activity
1042	1x caspian tern FW
1230	1x variable oystercatcher FI (on oysters on western side of site)
1302	1x fairy tern FW (one dive)
1311	1x fairy tern FW (hovering only)
1316	1x fairy tern FW (hovering only)

Although no fairy tern were recorded using the survey footprint in the hourly counts, three instances of feeding activities in the channel in the vicinity of the proposed wharf were recorded over a brief period at about HW+5 hours (No activity occurred between 1326 and 1400 hours and no fairy tern were present in the adjacent wider harbour area). These observations confirm that the low tide channel in the vicinity of the terminal end of the proposed wharf is part of the feeding habitat of fairy tern during its breeding season.

Fairy tern has a national conservation status of threatened (nationally critical) with the qualifiers of "conservation dependant", 'range restricted" and "stable". Nationally critical is the most acute conservation status.

Table 3.4 shows the records of birds passing through the site rather than using its habitats for feeding or resting. Numbers were low but 11 species were recorded. In total 32 flights over the site were recorded at about 5 flights per hour (rounded). Those flights are summarised in Table 3.4.

Table 3.4 Birds recorded passing through the site only

Time	Species and number
0800-0900 (HW to HW+1hr)	
0815	1x black shag
0830	1x pied shag
0840	2x white-faced heron
0844	1x red-billed gull
0900-1000(HW to HW+2hr)	
0914	1x mallard
0916	1x pied shag
0925	1x white-faced heron
0935	1x pied stilt
0948	1x little shag
1000-1100(HW to HW+3hr)	
1009	1x red-billed gull
1016	1x little shag
1028	1x pied stilt
1100-1200(HW to HW+4hr)	
1115	1x red-billed gull
1153	4x little black shag
1154	1x variable oystercatcher
1155	1 caspian tern
1200-1300(HW to HW+5hr)	
1202	1x white-faced heron
1204	1x white-faced heron
1206	1x red-billed gull
1207	6x white-faced heron
1220	1x fairy tern
1300-1400 (HW+5 to LW)	
1326	1x fairy tern

Table 3.5 Summary of flights over site.

Number of flights	Species
11	white-faced heron
4	little black shag, red-billed gull
3	fairy-tern
2	little shag, pied shag, pied stilt
1	black shag, caspian tern, mallard, variable oystercatcher

As with the level of activity within the site itself, the intensity of bird activity in this part of the Harbour was relatively low overall, however, the presence of fairy tern was clearly significant.

Fairy tern were also present in other parts of the Harbour between Molesworth Drive and Riverside. For completeness those observations are summarised in Table 3.6.

Table 3.6 Fairy tern presence and activity beyond the survey area

Time	Tidal state	Location	Fairy tern numbers & activity
1209	cHW+4hrs	Sand Island	1x fairy tern; resting & preening
1216	cHW+4hrs	Between Sand Island & Moir Point	2x fairy tern; high altitude interaction (territorial dispute?)
1220	cHW+4.5hrs	Bank 500m NE of site	2x fairy tern resting
1251	cHW+5hrs	Between Moir Point and Riverside	1x fairy tern feeding – open intertidal habitat
1306	cHW+5hrs	Between Moir Point and Riverside	1x fairy tern feeding – open intertidal habitat

3.3 Discussion

The assessment of the use of the area by coastal birds has informed the following considerations

(i) Use of the actual proposed wharf footprint by coastal birds is relatively low in the context of the wider harbour; the area is small.

(ii) The majority of habitat use occurs at or around low tide.

(iii) Because of its conservation status (ie acutely low numbers), the use of the channel in the vicinity of the proposed wharf by fairy tern is significant, noting that fairy tern also utilises similar habitat in the wider Harbour. It is understood that most of the feeding activity occurs north of the end of the Riverside mangrove fringe, however, the remainder of the Harbour is also utilised.

(iv) The key consideration is an effect on fairy tern use of the area.

(v) Construction of the proposed wharf does not need to coincide with the breeding period of fairy tern.

(vi) Construction activities would result in displacement of other coastal birds from the immediate area but that would be a minor, temporary effect with no longer term implications.

(vii) It is understood however that the terminal end of the proposed wharf will be floodlit. That has the potential for both positive (eg increasing prey visibility of wading birds) and negative (eg juvenile seabird collision) effects.

(viii) The effects of floodlighting have the potential to extend well beyond the wharf structure. Mitigation is available via light attenuation devices.

(ix) Based on quantitative monitoring data at other locations (eg Marsden Cove, Whangamata) the slow passage of additional vessels in the low tide channel is unlikely to have significant adverse effects on coastal bird species (fairy tern excluded), in terms of their numbers, diversity or habitat use activities.

(x) In contrast, the effect of additional vessels using the low tide channel on the feeding activity of fairy tern is unknown and is a significant deficiency in the information available. While it is understood, at present, most of the vessel movements occur north of Moir Point, where a relatively high intensity of fairy tern feeding occurs, there are no data that would provide assurance that no adverse effect, either direct or cumulative, would result. In our view that issue would require direct observation and data collection.

(xi) Superficially, a useful example of the effects of disturbance on fairy tern is provided by the Rous Head fenced sanctuary that was constructed from dredged spoil at Fremantle Ports, a heavily industrialised site. In the 2017-18 summer the area supported 250 adult pairs. While this example would suggest a tolerance of disturbance by fairy tern,

comparison of several aspects of the New Zealand versus Australian subspecies clearly indicates that the two are not comparable, and that the NZ fairy tern is significantly less tolerant to disturbance than its Australian counterpart. In our view this example does not assist in resolving the issue of a potential increase of disturbance in the low tide channel and the data deficiency remains.

4. REFERENCES

Bioresearches (2010)

Post-commissioning Intertidal and Marina Basin Monitoring Survey No.3 2008-09 45pp (For Marsden Cove Ltd)