

Estuarine vegetation survey : Whangapoua Harbour

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Estuarine Vegetation Survey Whangapoua Harbour

June 2010

Prepared for Waikato Regional Council
(Environment Waikato)



NATURAL SOLUTIONS

Marine & Terrestrial Ecologists Ltd

Estuarine Vegetation Survey – Whangapoua Harbour, June 2010

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1. Introduction

A 1997 pilot study of Whangamata, Wharekawa, and Otahu estuaries determined that it is feasible to map vascular estuarine vegetation from aerial photography together with field surveys. The success of this work encouraged Environment Waikato to continue with this method. The estuarine vegetation of Tairua, Coromandel, Te Kouma, Manaia, Whitianga Port Waikato, Raglan, Aotea, Kawhia harbours and the inner Firth of Thames have since been surveyed and mapped. Of these surveyed harbours, Whangamata, Wharekawa, Otahu, Tairua, Coromandel, Te Kouma, Manaia and Whitianga have been now been re-surveyed to determine changes in vegetation communities over time.

The mapped vegetation is within the Coastal Marine Area (CMA) and includes the spatial cover of mangrove, seagrass, sea meadow, saltmarsh and estuarine weed communities. The results of the estuarine vegetation surveys are included in Environment Waikato's Geographic Information System (GIS) database, and are used for State of the Environment investigations and assessing consent applications that may affect estuarine vegetation.

This report details the results from the first survey of estuarine vegetation of Whangapoua Harbour. Comments are included on the threats to estuarine vegetation, and other field notes of interest. This report is accompanied by digitised aerial maps of the survey site with vegetation community overlays.

2. Methodology

The field survey was undertaken over 18 days between June and August 2010. The survey was undertaken using a combination of boating and walking. The same methodology for mapping saltmarsh, mangrove, seagrass and weed communities was followed as that previously used to map Coromandel Peninsula estuaries (e.g. see Graeme, 1998a), except that a personal digital assistant (PDA) loaded with 2006/2007

aerial photographs of the survey sites were used as the primary mapping device. The PDA replaced the use of colour pen notations on hard copy aerial photographs, although hard copy aerials were used as a backup for when the PDA battery ran out, or sun lighting made it too difficult to see the PDA screen clearly in the field. Coded polygons were drawn directly onto the PDA aerial photographs to define the spatial extent of wetland vegetation types as they were ground-truthed in the field.

The upper saltwater influence is usually indicated by the upstream limit of oioi, saltwater paspalum and/or saltmarsh ribbonwood. The upper tidal limit of these plants determined the inland/upstream boundary of the survey.

Field notes were made of estuarine wetland characteristics and their vulnerability to particular threats.

1.1 Wetland vegetation classification

Estuarine wetland vegetation of the Waikato Region is split into four groups:

1. **Saltmarsh** - a multi-species community in which three sub-communities are distinguishable in the Waikato Region. They are:
 - a) 'Rush/sedgeland community' – This is generally sea rush (*Juncus kraussii* subsp. *australiensis*), oioi (*Apodasmia similis*), and occasionally three-square sedge (*Schoenoplectus pungens*). Marsh clubrush (*Bolboschoenus fluviatilis*) is commonly found up streams and rivers at the upper estuarine limit in some harbours, although it is not mapped within this survey as it is a species of brackish-freshwater.
 - b) 'Saltmarsh ribbonwood community' - Saltmarsh ribbonwood (*Plagianthus divaricatus*) dominates this zone, although rushes are often common giving a patchy appearance compared with the uniformity of the 'rush/sedge community'. Small areas of sea primrose (*Samolus repens*), remuremu (*Selliera radicans*), the

coast spear grass (*Austrostipa stipoides*), and glasswort (*Sarcocornia quinqueflora*) can also be present.

c) 'Sea meadow community' - This is devoid of tall plants such as rushes and saltmarsh ribbonwood, with the exception of coast spear grass. The sea meadow community can include sea primrose, remuremu, glasswort, slender clubrush (*Isolepis cernua*), and arrow grass (*Triglochin striata*), and in more brackish areas bachelor's button (*Cotula coronopifolia*), leptinella (*Leptinella doica*) and sharp spike-sedge (*Eleocharis acuta*).

2. Mangrove (*Avicennia marina* subsp. *australasica*) – This is usually a monospecific community although seagrass, spartina (*Spartina* spp.), saltwater paspalum (*Paspalum vaginatum*) and sea meadow beds can sometimes be found underneath mature mangrove stands.

3. Seagrass (*Zostera capricorni*) – This is usually a monospecific community, and is the vegetation which occurs at the lowest level in the tide.

4. 'Weed community' - In the Waikato Region the most significant estuarine weeds are the grasses saltwater paspalum and spartina. They generally grow in the open estuary, trapping sediment and greatly increasing the harbour's infilling rate. These weeds also compete with the native wetland communities.

There are other weed species such as tall fescue (*Schedonorus phoenix*) which can tolerate a degree of salt influence, but for clarity of mapping they have not been included in the survey due to their presence above the spring high tide mark.

Additional vegetation mapping categories have also been added to indicate the occurrence of wide-spread 'mixed' vegetation communities. Saltwater paspalum in particular is spreading and mixing with rush/sedge, sea meadow and saltmarsh ribbonwood communities. Where vegetation is found under the canopy of mangroves (e.g. seagrass or saltwater paspalum under mangroves) this is also mapped as a 'mixed' community.

Table 1 lists common estuarine plant species and their associated estuarine vegetation community mapped during the survey.

Table 1: Check list of common estuarine plant species found in Whangapoua Harbour.

Common name	Scientific name	Estuarine vegetation community
arrow grass	<i>Triglochin striata</i>	sea meadow
coast spear grass	<i>Austrostipa stipoides</i>	sea meadow
glasswort	<i>Sarcocornia quinqueflora</i>	sea meadow
mangrove	<i>Avicennia marina</i> subsp. <i>australasica</i>	mangrove
oioi	<i>Apodasmia similis</i>	rush/sedgeland
remuremu	<i>Selliera radicans</i>	sea meadow
saltmarsh ribbonwood	<i>Plagianthus divaricatus</i>	saltmarsh ribbonwood
saltwater paspalum *	<i>Paspalum vaginatum</i>	weed
sea primrose	<i>Samolus repens</i>	sea meadow
sea rush	<i>Juncus krausii</i> subsp. <i>australiensis</i>	rush/sedgeland
seagrass	<i>Zostera capricorni</i>	seagrass
slender clubrush	<i>Isolepis cernua</i>	sea meadow
spartina/cord grass *	<i>Spartina spp.</i>	weed

* denotes an exotic species

3. Field notes

1.2 Summary

The following observations provide a general overview of estuarine vegetation in the Whangapoua Harbour following the field survey.

- Large intertidal seagrass beds cover a significant portion of the central mudflats. Small areas of subtidal seagrass were also present, particularly up the Mapauriki arm.
- Mangroves occur around the whole harbour and dominate the more sheltered upper harbour arms (Mapauriki and Owera). An area of current mangrove expansion was identified in the shelter of the islands beside the Whangapoua causeway road.
- Wide beds of sea rush and oioi are common around the harbour. Rush/sedgeland expansion (mainly oioi) was noted in various places around the harbour, particularly in the shelter of the islands beside the Whangapoua causeway road.
- Saltmarsh ribbonwood communities vary in size from thin bands where land use has extended out into the coastal marine area (CMA), to extensive undisturbed areas around the mouth of the Opitonui River and the chenier islands out from the Whangapoua causeway road.
- Sea meadow communities are scattered along the banks of the watercourses, in patches amongst rush/sedgeland, and along the rush/sedgeland-saltmarsh ribbonwood interface. The species that are present include sea primrose, remuremu, glasswort and coast spear grass.
- Saltwater paspalum has not yet formed extensive and dense beds in Whangapoua Harbour as has occurred in other Coromandel harbours. However saltwater paspalum is present in small-medium patches amongst rush/sedgeland, sea meadow and saltmarsh ribbonwood communities at various points around the harbour particularly where there has been mechanical or stock disturbance.
- Small patches of spartina were found in the wetland abutting the Matarangi golf course and remnants from DoC's spraying programme were found seaward of the Whangapoua causeway road. A few unsprayed patches were also found both sides of the Whangapoua causeway road.

- Active and relict chenier ridges are a feature of the harbour. Saltmarsh ribbonwood, knobby rush, *Baumea juncea*, pohuehue, flax, manuka, *Coprosma propinqua*, coastal daisy and ngaio are commonly found on large relict ridges.
- Coastal edge weed species were predominantly pampas, scattered wilding pines and exotic grasses such as kikuyu and buffalo grass.
- Farming and urban activities have disrupted most natural wetland sequences around the harbour, mainly impacting freshwater vegetation communities.
- A few significant coastal vegetation remnants stand out. Firstly is the extensive coastal wetland at the base of the Matarangi Spit. This estuarine-freshwater wetland is largely intact but with some pampas infestation and an un-natural eucalyptus canopy. The second significant remnant is the mature taraire/puriri/kanuka floodplain forest behind the estuarine wetland at the Waitekuri River mouth. A third significant (and protected) coastal sequence is the 'estuarine wetland - freshwater wetland - coastal forest' sequence behind the Whangapoua causeway road.
- Stock access to the CMA is a wide spread and a serious problem around the harbour. The damage to the coastal edge by stock is the most extensive seen in all of the harbour surveys in the Waikato Region.
- Many of the stream banks upstream of the CMA are also not adequately fenced to protect against bank erosion and agricultural water pollution. However a few landowners are leading the way with appropriate fencing of waterways and freshwater wetland areas.

1.3 Site description

Figure 1 provides a map showing the site names and figure numbers mentioned below. A table of GPS points of the figure locations is in Appendix 1. True left bank (TLB) and true right bank (TRB) refer to the side of a river when facing downstream.

Estuarine vegetation in Whangapoua Harbour is concentrated along the land edge, at the head of tidal embayments or associated with chenier ridges (mobile or relict sand/shell banks). The exception to this is the dense and expansive band of seagrass that dominates the mid-tidal reaches of the open flats. The following provides a description of the estuarine vegetation of the harbour in a clockwise direction from the harbour entrance.

The western end of the **Matarangi Spit** is characterised by dune vegetation only, until estuarine vegetation begins at a relict chenier where it joins to the spit. The most seaward mangroves are found on the outer side of the chenier (Figure 2) and the chenier provides shelter on its landward side for more mangroves and the beginning of a rush/sedgeland band that stretches towards the Matarangi boat ramp. A large area of dead mangroves was noted within the shelter of the chenier (Figure 3). It was not clear what had killed the trees but a possibility could be that a lot of freshwater became impounded, drowning the mangroves. A couple of patches of healthy spartina also occur within this dead mangrove zone (Figure 4). Saltwater paspalum is present on the chenier near where it had been breached by a channel (Figure 5). Gambusia (previously known as 'mosquito fish') were noted within pools of standing water around rushes and mangroves north west of the Matarangi boat ramp. There are some large cats eye snails (pupu) amongst mangroves (Figure 6). Sparse patches of seagrass were common, scattered amongst the outer mangrove edge but within the shelter of mangroves and/or pneumatophores.

South east of the mangrove band, the Matarangi foreshore is eroded (Figure 7 and Figure 8) until protection is again afforded by mangroves east of the **Matarangi boat ramp**. Much of the estuarine side of the Matarangi Spit has been affected by infilling. There is a remnant embayment south east of the boat ramp (Figure 9), however the natural tidal movement has been affected by bunding and drainage. This has resulted in ponded areas with markedly different water levels either side of the bund. Sea rush and some oioi and mangroves are present in the ponds. Stock have access to this estuarine embayment and upper edges of rush/sedgeland and saltmarsh ribbonwood that have been fenced within paddocks.

A highly significant **coastal (eucalyptus) wetland** east of the Matarangi urban development and paddocks encompasses estuarine communities grading into freshwater wetland communities (Figure 10). An un-natural eucalyptus canopy exists although this does not greatly detract from the high wetland values. Estuarine to freshwater wetland sequences such as these are rare and/or highly fragmented on the Coromandel Peninsula.

Out from the coastal eucalyptus wetland oioi occurs between mature sea rush and the outer mangrove communities (Figure 11). The oioi is quite short, possibly indicating that this is a new oioi population infilling open unvegetated areas. Titiko occur in the open rush and mangroves areas at this site. Extensive rush/sedgeland extends all the way up to the Mapauriki road bridge (Figure 12). Banded rail and fernbird were heard near the Mapauriki island.

Tall mangroves (~5m) line the **Mapauriki Stream** channel with large areas of short (0.5-1m) mangroves away from the channel edge (Figure 13). Upstream of the road bridge, young regenerating coastal forest dominates the TRB of the Mapauriki stream, while stock have access to some wetland areas along the TLB above the road bridge. A large coastal daisy was noted along the stream bank (Figure 14). This species is uncommon around Matarangi and the Mapauriki Stream area. A banded rail was disturbed along the old fragmented stopbank (Figure 15) downstream (TLB) of the Matarangi causeway road.

Seaward of the **main stopbanks** that extend from the Matarangi Road towards the Otanguru Stream, the harbour vegetation is in a fairly natural state (Figure 16), but degraded by stock where wetland has been included within paddocks (Figure 17). Saltwater paspalum is prevalent in grazed and pugged sea rush paddocks in the area. Along the harbour edge here, sea rush generally extends inland to the toe of a terrace or grades into freshwater rush/sedgeland. These degraded wetland areas would be relatively easy to restore. A bittern was disturbed in this area. Seaward of the stopbanks, sea rush is the dominant species together with scattered areas of *Baumea* sedge, and oioi along the seaward edge at the interface with mangroves. Titiko were common amongst the rush/sedgeland and mangroves. Banded rail footprints were also noted in these two vegetation communities. A few areas of fencing in poor repair were associated with stock sign (tracking, browse, faecal matter) along the harbour fringe.

Mangroves dominate the lower **Otanguru Stream** and the dense pneumatophores provide a solid edge to the deep channel (Figure 18). Figure 19 shows mangroves along the TRB and old remnant pohutukawa on the TLB where the stream channel abuts the land edge. A large mangrove-rush/sedgeland embayment along the TRB of the Otanguru Stream has an old breached stopbank across its front. A raupo wetland still remains at the head of the embayment and a fringe of saltmarsh ribbonwood and manuka occur where stock have been fenced from the edge of the harbour (Figure 20). Fernbird were heard in this area. Further upstream along the TRB, Figure 21 shows where stock had grazed within the harbour but have been since been fenced out of the intertidal area. A couple of sites were noted where rubbish has been dumped over the steep stream bank and also into the mangrove edge. The upper tidal reaches along the TRB of the Otanguru are generally unfenced with grazed estuarine vegetation, and have sediments and faecal matter from stock entering the harbour (Figure 22, Figure 23 and Figure 24). The majority of the TLB of the Otanguru Stream embayment is well fenced and has good riparian vegetation (Figure 25 and Figure 26) except for a few small areas (e.g. Figure 27).

Leaving the Otanguru Stream embayment, the **Koruakomako headland** is lined by a stopbank and associated drains. Scattered plants of saltmarsh ribbonwood occur along the lower edges of the stopbank with flax, pampas and manuka higher up. There are a

few areas where the dead root mass of sea rush is found immediately seaward of the stopbank (Figure 28), but it was not clear what was causing the die-back. Banded rail footprints were found in the area. There is saltwater *Paspalum* along the seaward edge of the headland, often associated with stopbank drainage works (Figure 29). The rush/sedgeland and mangrove zone thins and disappears at the most northern and exposed tip of the headland. Saltwater *Paspalum* dominates along the stopbank foreshore with scattered knobby rush and pampas. Areas of exposed organic bed pan are common, making an unsuitable base for mangroves to establish in (Figure 30). There were loose clumps of oysters along the seaward edge of the exposed bed pan.

Near the TRB of the **Owera Stream** mouth there are active and relict chenier ridges. The relict cheniers have a diverse flora with mangroves, rush/sedgeland, sea meadow and saltmarsh ribbonwood, taupata, coastal daisy, manuka and flax. Pampas is also common. Fernbird are present in the area. Figure 31 and Figure 32 shows an active chenier at this site which provides an important high tide roost for wading birds. About 30 pied stilt were using the roost during the survey.

Saltwater *Paspalum* is common on the banks up the Owera Stream past the farm house until the wide mangal and rush/sedgeland zone is reached. Scattered sea grass patches are present in the house bay and along the outermost mangrove edge. Tall mature mangroves (varying from 4-6m tall) form islands and winding channels along the TRB of the Owera Stream channel (Figure 33). Behind the mangal, sea rush and oioi grades into *Baumea* rush/sedgeland with saltmarsh ribbonwood, giant umbrella sedge and flax behind. Figure 34 shows a fenced riparian edge, however this must be in disrepair as stock have entered the CMA at some point and damaged the estuarine edge. This riparian fencing extends upstream until the farm driveway is reached. Stock have unobstructed access into the harbour here and small scale infilling was also noted in a number of places (Figure 35). Small populations of saltwater *Paspalum* were associated with earthworks in the CMA. As stock only seem to use the driveway when moving between paddocks the stock access issue could easily be fixed with a one or two wire fence. Once the road and land rises more steeply from the harbour there is a riparian edge of old mature pohutukawa and other coastal shrubs. *Spartina* occurs along the rush/sedgeland boundary with mangroves below a line of old gum trees. Further upstream a small peninsula extends out into the harbour. Much of this has no stock fencing and hence a degraded estuarine edge (Figure 36 and Figure 37) except for a stretch with good fencing that allows a narrow band of riparian vegetation to exist and restricts stock access to the harbour. Figure 38 shows a large expanse (~3ha) of grazed mangroves (with tall mangroves in background lining the edge of the Owera Stream), eroded banks and loss of riparian vegetation. The Owera Stream then swings in to abut the steep land edge. Where the river swings away from the higher land, there is a low-lying grazed area of wetland that extends to the State Highway. Mangroves line the river bank, saltmarsh ribbonwood is found on slightly elevated land with rush/sedgeland and sea meadow in-between. Where the land is high enough some pasture grass exists along with old *Macrocarpa* trees. Above the State Highway road bridge, an expanse of rush/sedgeland extends up along a side branch of the Owera Stream and grades into freshwater wetland further upstream. Riparian fencing is progressively being put in here with the upper freshwater wetland fenced from stock and portions of the lower

estuarine wetland fenced too. Upstream of this side branch, the estuarine vegetation along the Owera Stream edge is limited to a thin band. The upper tidal reaches along the TRB are well fenced and planted, and the TLB is fenced but not planted.

Downstream of the State Highway bridge, the **TLB of the Owera Stream** is fenced until the land peninsula adjoins the tidal flats. Here stock have grazed and pugged a large area (~2ha) of rush/sedgeland, mangroves, saltmarsh ribbonwood and manuka-covered islands (Figure 39 and Figure 40). Banded rail footprints were seen and fernbird heard here. A bittern was also disturbed. Stock access to the CMA continues around the coastline into the embayments with freshwater wetlands at their head (e.g. Figure 41). *Gambusia* were noted in pools within the rush/sedgeland opposite Owera Road. Rubbish has been dumped into CMA here. A number of Maori middens were visible where stock have eroded banks along the harbour edge. Figure 42 shows an earth dam built across the top of an estuarine arm that causes ponding of water around the upstream mangroves. It is unlikely the mangroves will survive in this ponded environment.

Further west in the next embayment the coastal edge is mostly fenced and planted, however stock must have access at some point as a dead cow was found in the rushes. Figure 43 shows *Cypruss* planted along the coastal edge with seedlings found in the rush/sedgeland. A gum seedling was also present. Bulldozer tracks occur through rush/sedgeland where a channel had been dug through the rushes to extend the drainage out into the CMA. Fernbird were heard along the saltmarsh ribbonwood margin. The south-western corner of the embayment is bordered by pines along the State Highway, and has a good example of a natural sequence of mangroves – sea rush and oioi – manuka/*Baumea*/flax/raupo freshwater wetland (Figure 44). The only unnatural feature in this sequence is the willow invading the freshwater wetland.

Moving west towards **Owera Head**, the farmed land has a good riparian cover of manuka and kanuka, although this vegetation is not fenced from stock. There is a new track which if fenced to exclude stock would provide an excellent vegetated buffer to the harbour. There was plenty of sign of stock having been in the estuary (Figure 46) including a dead cow (Figure 45). Banded rail footprints were seen in this area.

Further out towards Owera Head, oysters occur on exposed areas of bedrock. Cattle have grazed the mangroves (Figure 47). At the head of the next small embayment there has been extensive storm and/or animal disturbance of the upper tidal vegetation (Figure 48 and Figure 49). Other than the disturbed open ground, saltwater *paspalum* is dominant here and extends over the rush/sedgeland and into the fringes of several unfenced freshwater seepages. At Owera Head where the mangal ends, the coastline becomes more exposed and eroded (Figure 50).

Out on the harbour flats between the Koruakomako peninsula and Owera Head is an oyster farm (Figure 51). Figure 52 shows a seagrass patch along the oyster farm channel (TLB). Mangrove seedlings have settled in the seagrass but are unlikely to survive.

Around **Owera Head**, the coastal edge is exposed with no mangrove protection and eroding, particularly where it is unprotected from stock (Figure 53). Significant freshwater seepage wetlands occur at the foot of the slopes and include giant umbrella

sedge, manuka, *Baumea* sedge, *Isolepis prolifera* and swamp coprosma. Remnant riparian manuka and kanuka occurs on the steeper coastal faces, although most of this has recently been killed by herbicide. A new fenceline is being built which would protect the immediate coastal edge from stock damage (Figure 54). Note in Figure 54 the lack of rush/sedgeland along the harbour edge where fencing does not currently exclude stock from the harbour compared with the next paddock in the background. The rush/sedgeland fringe contains a few old chenier ridges and saltwater paspalum is prevalent along this edge. Stock have access to the harbour from both the Oweria Head and Opitonui River ends (Figure 55). Wide bare sand flats extend out into the main harbour (Figure 56) to the extensive seagrass bands.

In the embayment at the mouth of the **Opitonui River**, fernbird are common throughout the saltmarsh ribbonwood/rush/sedgeland. Banded rail footprints are also common in the mangroves. There are extensive areas of saltmarsh ribbonwood, although the extent of this community is severely restricted by stock grazing where it is not fenced (Figure 57). Saltwater paspalum is not found in the undisturbed saltmarsh ribbonwood and rush/sedgeland but is common in estuarine areas where stock have access. The outer fringes of the wetland vegetation are pugged, tracked and grazed and faecal matter is common (Figure 58). Mangroves are not prevalent in this area due to the grazing pressure. Figure 59 shows a sheltered seaward fringe of oioi that seems to be relatively new, similar to that noted in the main Matarangi rush/sedgeland. This oioi is in a healthy state (apart from where trampled by stock) and appears to be advancing seaward. In comparison, the exposed edges of the Opitonui/Waingaro/Waitekuri wetland complex are retreating (Figure 60). The higher ground within this wetland complex is commonly vegetated with manuka, mingimingi, coastal daisy and pampas.

The TRB of the **Waingaro Stream** is either poorly fenced or unfenced (Figure 61), with very little riparian vegetation remaining above the estuarine zone. A large area of saltwater paspalum was found invading the rush/sedgeland (Figure 62). Drainage and pasture development has removed most of the original vegetation along the TRB bank of the Waingaro Stream; however there are some notable remnant estuarine (Figure 63) and freshwater (Figure 64) areas. Willow and pampas are weeds here. Saltwater paspalum is common around this coastal edge where stock have access from a number of points. Mangroves are generally 75cm high except for the odd tall one (3-4m) alongside channels.

A channel divides the wetland of the TLB of the Waingaro Stream from the wetland on the TRB of the **Waitekuri River** mouth. Mangroves are almost absent from the TLB of the Waitekuri due to intense stock browsing (Figure 65). Sea rush, saltmarsh ribbonwood and coastal daisy are also severely grazed and sea meadow is severely pugged. A significant remnant of floodplain forest occurs at the mouth of the Waitekuri River, dominated by tarairi, puriri and kanuka (Figure 66). Remuremu and the creeping herb *Leptinella* (*L. squalida?*) is found in low-lying depressions beneath kanuka along the lower river edge.

The estuarine vegetation of the TLB of the Waitekuri River is heavily influenced by grazing, with saltwater paspalum common and palatable species absent where stock

access is not restricted (Figure 67 and Figure 68). Figure 69 shows the mouth of the smaller **Horongaherehere Stream** smothered by kikuyu. The estuarine vegetation of the TLB of the Horongaherehere Stream is affected by drainage but not by stock access. Saltmarsh ribbonwood and remnant coastal wetland species can be seen from the Whangapoua Road (Figure 70).

The wetland to the north of the Horongaherehere Stream is characterised by a wide rush/sedgeland with scattered areas of saltmarsh ribbonwood beside the **Whangapoua causeway road**, and an extensive mangal that stretches from the Opitonui and Waitekuri river mouths out alongside the main river channel towards the relict chenier islands beside the causeway bridge. The mangroves vary in height from mature tall trees generally 2-4m high to young seedlings that are beginning to fill in the open flats between the main mangal and the causeway (Figure 71).

Figure 72 shows a large patch of sprayed spartina at the mangrove and rush/sedgeland boundary that has a raised but decaying root base. This has encouraged the settlement of mangroves and also seems to be enhancing the growth of oioi. Titiko were also present (Figure 73). A few scattered patches of live spartina were found. Along the seaward side of the causeway, a healthy patch of spartina was found in a drain beside the Whangapoua Road (Figure 74). Fernbird and banded rail were noted within the rush/sedgeland, mangroves and saltmarsh ribbonwood seaward of the causeway. Vehicle access from the causeway road out onto the harbour is an issue (Figure 75).

Distinct rush 'patches' are found towards the northern end of the rush/sedgeland community. Scattered mangroves have established in the shelter of these 'patches' (Figure 76). There are areas of new oioi growth along the edges of the rush/sedgeland (Figure 77). Approximately 22 Northern New Zealand dotterel were seen feeding out on the semi-open flats seaward of the rush 'patches' where the scattered mangrove cover starts to become denser towards the Opitonui/Waitekuri channel edge. A diseased mangrove was observed (Figure 78). A patch of estuarine periwinkle were found with titiko around the seaward side of an outer small rush island.

An embayment which is cut off from the main harbour by the causeway has a complete sequence of estuarine to freshwater vegetation (mangroves - rush/sedgeland – coastal freshwater wetland – coastal forest). The mangroves are actively spreading following the removal of stock and also presumably assisted by a build up of sediment and lack of frosts. A historic stopbank has been breached in a number of places which has allowed the tide to extend further inland with the resulting death of manuka along the outer edge of the coastal freshwater wetland (Figure 79). This highly significant coastal wetland is dominated by manuka, *Baumea juncea* and swamp coprosma (*Coprosma tenuicaulis*). Fernbird are common within this coastal wetland and banded rail were heard and footprints seen in the estuarine wetland. There is spartina mixed with oioi and searush (Figure 80).

In the main harbour, titiko are common on the open flats (with scattered small mangroves) north of the rush/sedgeland 'patches' (Figure 81) and into the thicker band of mangroves south of the larger islands near the causeway bridge. Titiko however did not overlap with the large horn shells which seem to occupy a lower tidal range.

Three large relict chenier islands are a major feature of the western side of the harbour near the Whangapoua causeway road bridge. Actively-growing patches of oioi and to a lesser extent sea rush and *Baumea juncea* were a particular feature of the islands (see Figure 82, Figure 83, Figure 84 and Figure 85). Small areas of rush die-back were also noted but in general these areas were limited to frontal edges of chenier ridges. Mixed rush and sea meadow sometimes occur at both the lower and upper edges of rush/sedgeland (Figure 97).

Saltwater paspalum is common along the outer exposed edges of the larger islands (Figure 91 and Figure 92). One island also has buffalo grass which has spread out into the saltmarsh ribbonwood and sea rush (Figure 96). Figure 86 shows an area of sprayed spartina that has monitoring pegs around it. A few live spartina plants are found nearby within the mangrove pneumatophores of a shallow channel.

As mentioned earlier, where chenier ridges are still active there is often an eroding frontal edge (Figure 94 and Figure 90). The chenier ridges are predominantly vegetated with a wide fringe of saltmarsh ribbonwood around coastal daisy, *Coprosma propinqua*, knobby rush, pampas, manuka and flax on the highest ground (Figure 87, Figure 88, Figure 89, Figure 91, Figure 92 and Figure 95). Ngaio was also present on some islands. Banded rail footprints were commonly seen and fernbird heard.

Mangroves are quite dense beside the causeway and out by the Opitonui/Waitekuri channel, although there are sparse areas in between. This mangal is composed of a patchwork of areas of large older trees and shorter more recently established trees. The mangroves extend seaward around of the outer islands, intermingling with the edge of the main western seagrass band (Figure 93).

Between the **causeway bridge** and the nearest chenier island there is a mix of seagrass, Neptune's necklace and mangroves (Figure 98).

North of the causeway bridge, a mangrove with a prostrate form was noted (Figure 99). The harbour edge alongside Whangapoua Road is in a relatively natural state (Figure 100) except where the road (generally lying over top of the historic rail line) has truncated the estuarine vegetation sequence.

Figure 101 shows a recently installed road culvert along Whangapoua Road that is perched higher than the old culvert. Correct culvert placement is vital for fish movement up and down stream. This culvert would be better bedded down into the bed base to allow easy fish passage outside of spring high tides. A banded rail was heard in the rushes here. An old oyster farm and associated structures have provided shelter for a wide band of mangroves to establish along the coastline here. Figure 102 shows a view looking south over the harbour flats with Whangapoua Road to the right. The bed of Neptune's necklace to the left is free-floating but a permanent feature. The seagrass beds can be seen behind the Neptune's necklace in the distance forming an extensive band across the mid-harbour. Saltwater paspalum occurs in scattered areas along the road side fringe, usually mixed with oioi and sea rush and generally where there has been

some disturbance. Towards the boat ramp, scattered small areas of seagrass and Neptune's necklace occur immediately seaward of the narrow mangrove fringe.

Out from the **boat ramp** are the most seaward chenier ridge islands in the harbour. They provide important roosts for wading birds (Figure 103). Mangroves dominate the lee of the islands (Figure 103 and Figure 105). Saltmarsh ribbonwood, coast spear grass, saltwater paspalum, knobby rush, tall fescue and spinifex are common on the higher ridges (Figure 106, Figure 107 and Figure 108). Glasswort is common as a band between mangroves and the higher vegetation (Figure 106 and Figure 107) and a few large patches occur amongst the mangroves flats. Free-floating Neptune's necklace, oysters and blue tubeworm are a feature amongst the mangrove pneumatophores of the northern island (Figure 104).

The frontal edge of the main chenier of the northern island is actively moving through the mangroves in places (Figure 107 and Figure 108). The yellowing leaves on some of the mangroves indicates they are stressed and some mangroves seaward (to left of the picture) are dead, indicating the chenier is moving landward towards the west. Mangroves that survive the passing of the chenier ridge are then exposed to wave erosion as they appear out in front of the chenier (Figure 109).

The Opera Point spit is dominated by open coast dune vegetation (e.g. spinifex, knobby rush and pohuehue).

The main **seagrass beds** within the harbour extend from the harbour edge north of the Whangapoua causeway chenier islands in a band over the harbour flats across to Oweria Head and all the way up the Mapauriki arm. A few areas of subtidal seagrass are found. A couple of large patches of seagrass are found out on the flats between the Oweria Stream and Opitonui River channels however these beds do not extend up these arms of the harbour as occurs in the Mapauriki arm.



Figure 1: Whangapoua Harbour site localities mentioned in this report. The numbers refer to the following figures



Figure 2: This is the seaward extent of mangroves at Matarangi Spit. On the exposed chenier ridge in the foreground is the golden sand coprosma (mid-picture).



Figure 3: A dead mangrove zone behind the main chenier at Matarangi. The mangroves stand in deep sulphur-smelling mud and brown algae is common on the surface.



Figure 4: A few patches of healthy spartina occur within the dead mangrove zone.



Figure 5: Mangroves seaward and landward of the Matarangi chenier ridge complex. Saltwater paspalum is mixed with glasswort, sea primrose and coast spear grass in the foreground on the lee side of the chenier.



Figure 6: A few very large cats eye snails (30-45mm wide) and some sparse seagrass were found amongst mangrove pneumatophores.



Figure 7: The eroding shoreline north west of the Matarangi boat ramp.



Figure 8: The eroding shoreline south east of the Matarangi boat ramp.



Figure 9: This small embayment of the harbour has been bunded and drained resulting in markedly different water levels in the ponding areas either side of the bund.



Figure 10: A wide sea rush band extends from the mangroves (RHS) inland to the manuka edge. The eucalypt trees are an un-natural canopy to an otherwise intact and highly significant coastal freshwater wetland remnant.



Figure 11: Short (young) oioi is common at the sea rush-mangrove interface of the Matarangi side of the Mapauriki arm.



Figure 12: A wide oioi and searush band behind mangroves along the Mapauriki Channel. Manuka with flax and pampas border the rush/sedgeland.



Figure 13: A view up the Mapauriki Stream towards the island near the causeway bridge.



Figure 14: An uncommon large coastal daisy (*Olearia solandri*) amongst mangroves and saltmarsh ribbonwood lining the Mapauriki Stream.



Figure 15: This bare area indicates the remnant line of an old stopbank with patches of higher ground still remaining in places.



Figure 16: Mangroves grade into a mixed mangrove-rush/sedgeland and then into pure rush/sedgeland. Mangroves also line the edge of the stopbank.



Figure 17: A grazed and stop-banked edge of the harbour. Matarangi Road causeway is in the right-hand background.



Figure 18: Dense mangrove pneumatophores provide a stable edge to the lower Otanguru Stream channel. Large oysters occur amongst the pneumatophores.



Figure 19: A view looking upstream along the lower Otanguru Stream. Old remnant pohutukawa line the land edge where stock cannot reach them.



Figure 20: A view from a relict stopbank over a large mangrove-rush/sedgeland embayment, with ribbonwood and manuka along the land edge (RHS) and a raupo swamp (LHS).



Figure 21: An old fence line in the harbour and a new fence line behind the saltmarsh ribbonwood at the toe of the land.



Figure 22: An unfenced edge of the TRB Otanguru River showing stock damage to sea meadow and sea rush. The mangroves line a drain edge.



Figure 23: Another view of unprotected banks of the Otanguru Stream (TRB).



Figure 24: Oioi (TLB) and Mercer grass (TRB) dominate the stream edges at the upper salt limit of the Otanguru Stream. Stock are not fenced from these banks.



Figure 25: An overview of the Otanguru Stream arm. The estuarine vegetation and riparian edge of the TLB (forefront of photo) is well protected. The island of higher ground in the middle right of the picture with rank grass is soon to be planted with coastal species.



Figure 26: Good stock fencing that restricts stock access to the harbour but also provides enough room for riparian plantings (totara, cabbage tree, flax and exotics are planted here). Manuka is regenerating naturally and the wilding pines have been felled or ringbarked.



Figure 27: An area of partially fenced sea meadow clearly showing the negative effect of stock grazing and pugging.



Figure 28: An area of dead sea rush immediately seaward of a stopbank. It is unclear why the sea rush has died and the reason for these open areas.



Figure 29: A mixed mangrove/rush zone. Saltwater paspalum occurs along the seaward edge of the stopbank behind an open pool area. A number of these pools beside the stopbank had saltwater paspalum associated with them.



Figure 30: An area with an exposed hard organic bed pan. Very few mangroves have managed to establish due to the lack of a good rooting base and wave exposure. A band of loose oyster clumps occur out at the water's edge.



Figure 31: This active chenier ridge behind mangroves provides a high tide roost for about 60 stilts.



Figure 32: The high tide roost in Figure 31 is visible in the middle distance with Matarangi in the far distance. Mixed saltwater paspalum and rush in the foreground.



Figure 33: Tall mangroves (varying from 4-6m tall) form islands and winding channels along the TRB of the Oweria River mouth.



Figure 34: This fenced coastal edge with pines, flax, *Baumea juncea* and giant umbrella sedge must have a gap in it as evidenced by the extensive stock tracking, grazing and dung along the coastal edge here.



Figure 35: A remnant natural coastal riparian edge beside an area of infill (grassy edge) and earthworks within the rush/sedgeland.



Figure 36: Stock access into the CMA here has resulted in bank erosion and loss of riparian shrubs, as well as grazed and pugged rush/sedgeland and mangroves out to the orange tape 'fence'.



Figure 37: More unfenced coastal edge with obvious tracking through the rush/sedgeland and degraded riparian vegetation and freshwater seepage.



Figure 38: More unfenced harbour margin with heavily grazed mangroves, eroded banks and loss of riparian vegetation.



Figure 39: Badly pugged and grazed sea rush/saltmarsh ribbonwood/manuka/*Baumea juncea* wetland.



Figure 40: Mangroves have been completely grazed from this wetland except where they are out of stock reach. The rest of the sea rush and saltmarsh ribbonwood wetland is also badly pugged, tracked and occasionally grazed.



Figure 41: Unfenced estuarine wetland grading into a freshwater raupo/manuka wetland at head of this arm.



Figure 42: An earth dam prevents the natural flow of salt water upstream.



Figure 43: Large *Cypruss* planted along the coastal edge are seeding into the rush/sedgeland. Three *Cypruss* seedlings are visible in the middle of the photo.

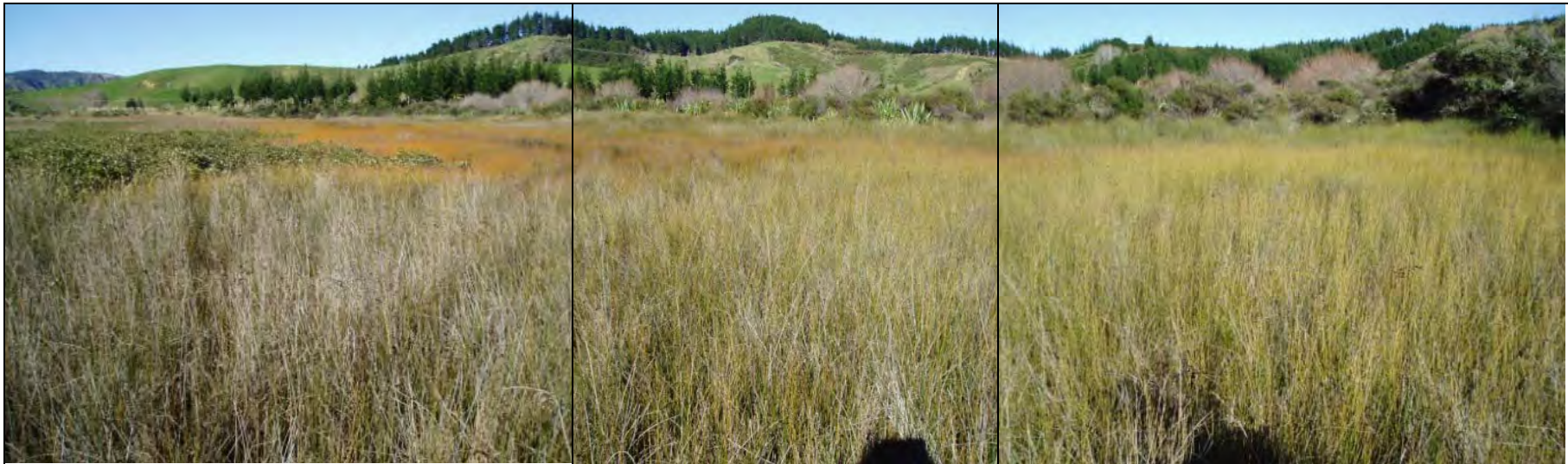


Figure 44: A view over a natural sequence of mangroves – sea rush and oioi –freshwater wetland (manuka, flax, *Baumea spp.* and raupo). The only unnatural feature in this locally uncommon sequence is the willow invading the freshwater wetland.



Figure 45: Heavy tracking and pugging of the estuary and a dead cow amongst mangroves.



Figure 46: This stretch of harbour edge is badly pugged, grazed and polluted (dung). The riparian vegetation survives but is heavily tracked and grazed underneath.



Figure 47: Mangroves stripped where stock have access to the harbour. Areas of exposed bed rock are often covered with oysters.



Figure 48: A 'ploughed' area with grazed mangroves, saltwater paspalum, sea rush and oioi grading into a freshwater wetland.



Figure 49: A view of the 'ploughed' area looking over a freshwater seepage.



Figure 50: The land edge becomes eroded where mangroves are absent (or grazed) and the sediment firmer to walk on.



Figure 51: A view over the oyster farm to clear-felled forestry within the Owera catchment. Owera Point is to the right of the photo.



Figure 52: A seagrass patch along the oyster farm channel with juvenile mangroves visible. Owera Point and Mt Rerenga are in the right background.



Figure 53: The exposed coast line west of Oweria Head (distant left headland) is also eroded where the fringing vegetation is damaged and removed by stock.



Figure 54: Stock fencing protects the coastal edge vegetation in the distance while the coastal edge vegetation in the forefront is unprotected. A new fence is being built along the immediate land edge of the badly eroded section.



Figure 55: This gate forms part of the poorly fenced harbour edge and allows stock to access the harbour causing extensive damage to harbour vegetation and contributing sediment and faecal pollution.



Figure 56: Extensive soft sand flats extend upstream towards the Opitonui River mouth.



Figure 57: Stock have access to the wetland in the forefront (dominated by sea rush and saltwater paspalum) but not the saltmarsh ribbonwood in the background.



Figure 58: Cattle pugging, grazing (primarily of mangroves) and dung are visible here.



Figure 59: A fringe of oioi in front of sea rush. Note the cattle tracks over the open flats.



Figure 60: A view of the eroding exposed edges of the Opi-tonui/Waingaro/Waitekuri rivers wetland complex.



Figure 61: The expanse of rush/sedgeland and saltmarsh ribbonwood in the foreground is poorly fenced and the more distant rush/sedgeland further up the TRB of the Waingaro stream is unfenced.



Figure 62: Saltwater paspalum is common along the lower unfenced TLB of the Waingaro River amongst oioi and sea rush. A patch of saltwater paspalum is also visible on the lower opposite bank.



Figure 63: Saltmarsh ribbonwood here along the TLB of Waingaro River is backed by a thick band of mature coastal daisy.



Figure 64: This cleared path down through a remnant flax and manuka freshwater wetland allows stock access to the upper harbour wetland.



Figure 65: Looking down the lower Waitekuri River to its junction with the harbour. Grazed and pugged sea meadow, sea rush and saltmarsh ribbonwood dominates the TRB here. Only mangroves above stock reach survive.



Figure 66: A view upstream along the TRB of the lower Waitekuri River over grazed and pugged saltmarsh ribbonwood, sea meadow and rush/sedgeland. The significant mature remnant stand of tarairi, puriri and kanuka floodplain forest can be seen in background.



Figure 67: A band of saltwater paspalum dominates the foreground here. Behind the fence to the right of the photo is low-growing sea primrose and some rushes; and stretching into the distance is a patch of ungrazed sea rush with grazed sea rush on the left hand side of the fence.



Figure 68: A view along a boundary fence showing the effect of grazing on rush/sedgeland. Also note the outwash debris from the Horongaherehere Stream over the 'paddock'.



Figure 69: The mouth of the Horongaherehere Stream smothered by eroded sediment and kikuyu.



Figure 70: A freshwater wetland edge of manuka, swamp coprosma, and flax backs the estuarine vegetation along Whangapoua Road.



Figure 71: Mangroves of varying heights are found out on the intertidal flats. Old tall trees are generally 2-4m tall towards the Horongaherehere channel. Young seedlings are beginning to fill in the open flats landward of the tall trees.



Figure 72: A large patch of sprayed spartina has left behind a decaying root base and encouraged the settlement of mangroves. A patch of live spartina is marked with a stick.



Figure 73: Titiko have recolonised into a area of controlled spartina. Oioi and mangroves are also colonising the open ground.



Figure 74: A healthy patch of spartina in a drain beside Whangapoua Road.



Figure 75: Vehicle tracks on the open mudflats between sea rush patches alongside Whangapoua Road.



Figure 76: A view over sea rush patches and open mudflats with scattered small mangroves present around the edges of the sea rush patches.



Figure 77: Mangroves and the young plants of oioi are establishing in front of sea rush.



Figure 78: A mangrove with yellow lesions on its leaves.



Figure 79: Rush/sedgeland behind the breached stopbank with mangroves and seagrass in the drain. Note the zone of dead manuka as a result of breaching the stopbank.



Figure 80: A mix of oioi and spartina in the foreground surrounded by sea rush. The breached stopbank and causeway are in the background.



Figure 81: An open area characterised by titiko and scattered small mangroves.



Figure 82: Expanding oioi appearing to subsume mangroves along the rush/sedgeland edge. Sparsely scattered mangroves are present eastward of the island.



Figure 83: An advancing edge of oioi and *Baumea juncea* (blue green sedge). Titiko are present along the rush/sedgeland edge.



Figure 84: An advancing edge of *Baumea juncea*. This is unusual as it is a more brackish species than oioi and not usually characteristic of frontal estuarine communities.



Figure 85: Oioi expanding amongst mangrove pneumatophores.



Figure 86: Looking south over a controlled spartina patch (note survey markers).



Figure 87: Looking north towards a vegetated relict chenier ridge island with rush/sedgeland and mangroves in its lee.



Figure 88: View over a saltmarsh ribbonwood edge with *Baumea juncea*, *Coprosma propinqua*, manuka, ngaio, flax, costal daisy and red matipo on the higher ground.



Figure 89: Saltmarsh ribbonwood fringes a manuka chenier ridge and grades into sea rush.



Figure 90: An eroding frontal edge of a vegetated chenier ridge. Old mangrove stumps and rush root mass are present in the dark exposed bank.



Figure 91: Here saltwater paspalum is invading the sea rush band and extending into the saltmarsh ribbonwood and knobby rush zone.



Figure 92: Seagrass washed up over saltwater paspalum into the *Baumea juncea* edge. Saltmarsh ribbonwood, pohuehue, ngaio, pohutukawa, flax, manuka, *Coprosma propinqua* and giant umbrella sedge occur on top of the chenier.



Figure 93: Thin patchy seagrass is visible here amongst scattered mangroves. The tallest mangrove pictured is ~3.5m tall.



Figure 94: Mangroves, saltmarsh ribbonwood and coast spear grass along this active chenier edge which is showing signs of erosion, even with a band of scattered mangroves seaward.



Figure 95: Ngaio, *Baumea juncea*, knobby rush, saltmarsh ribbonwood and flax occur on this chenier ridge, with saltwater paspalum extending high into this zone.



Figure 96: Buffalo grass creeping through sea rush and saltmarsh ribbonwood.



Figure 97: A patch of mixed sea rush, *Baumea juncea* and glasswort.



Figure 98: A mixed seagrass, Neptune's necklace and mangrove community between the causeway and the closest chenier island.



Figure 99: A prostrate growing mangrove.



Figure 100: A typical portion of harbour edge alongside the native forest section of Whangapoua Road.



Figure 101: A recently installed road culvert along Whangapoua Road that is perched higher than the old culvert.



Figure 102: A view looking south over the harbour flats with Whangapoua Road to the right. The bed of Neptune's necklace is free-floating but a permanent feature.



Figure 103: This chenier island provides an important roost for wading birds. The foreground ridge is dominated by tall fescue and spinifex, while the background end of the ridge is generally clear of vegetation apart from scattered mangroves.



Figure 104: Free floating Neptune's necklace and clumps of tubeworms are found amongst the shelter of mangrove pneumatophores. Oysters also occur here on mangrove trunks.



Figure 105: The mangrove trees are not as tall in behind the outer fringe trees but often have very solid gnarled trunks indicating they are quite old.



Figure 106: The northern end of this chenier is dominated by saltmarsh ribbonwood and knobby rush on the higher ground, coast spear grass below this and then a lower fringe of glasswort before joining the mangrove flats.



Figure 107: The active northern end of the outer chenier ridge with mangroves being swamped. Glasswort and coast spear grass fringe the landward edge of the ridge, with knobby rush and saltwater paspalum covering the higher ground.



Figure 108: The more exposed middle section of the main chenier ridge is eroding. There are some scattered mangroves seaward (see following figure).



Figure 109: Mangroves seaward of the outer chenier ridge shown in Figure 108 have their pneumatophore system eroded and exposed by wave action.

1.4 Threats

There are two significant existing threats to the native estuarine vegetation communities of the Whangapoua Harbour: pests and inappropriate land use.

PESTS

WEEDS

Estuarine weeds such as saltwater paspalum and spartina can dominate large areas of the intertidal harbour at the expense of native estuarine vegetation and wildlife habitat. There will be further degradation of native intertidal vegetation communities if they continue to expand, including the loss of plant and animal biodiversity. The Department of Conservation has successfully sprayed spartina patches along the western side of the harbour however this survey has found new sites and follow-up control is also necessary for the known sites.

Saltwater paspalum is of particular concern as it has a wider habitat range than spartina and can grow amongst all of the estuarine vegetation communities, except sea grass. Saltwater paspalum is an introduced grass that, like spartina, is extremely efficient at stabilising sediments and building up bed levels, which can affect water flow in the area. Saltwater paspalum competes for space with native estuarine vegetation and colonises open mudflats. Due to its climbing ability and formation of dense beds up to half a metre deep, it can smother sea meadow, saltmarsh ribbonwood rush/sedgeland and mangrove communities to form dense mono-specific mats. Saltwater paspalum has not yet established extensive infestations in the harbour, although it has the potential to cover a lot more area if attempts to control this weed are not taken.

Coastal edge weeds (i.e. immediately above the saltmarsh ribbonwood zone) of concern around Whangapoua Harbour include pampas, wilding pine and exotic grasses such as kikuyu, buffalo grass and mercer grass. Other weeds such as phoenix palm, cypress and gorse and woolly nightshade have been observed at the tidal edge. Wattle is not as common as it is around other harbours. These coastal edge weeds can suppress natural regeneration of the native communities along the harbour edge, and break the contiguity of estuarine to freshwater/terrestrial native vegetation sequences.

ANIMAL PESTS

A recent study into the source of sediments in Whangapoua Harbour found that landslides in the steep native forest headwaters were contributing a significant

amount of sediment to the harbour (Roddy, 2010). This is principally due to the loss of mature dense forest cover by historical logging, mining and burning activities. These headwater areas experience heavy rainfall compared to the lower catchment. The steep land of the harbour's headwaters will not become stable again until a mature and permanent forest is able to regenerate. However, this regeneration is curtailed by the browsing pressure from goats, possums and rats. Meanwhile, harbour plants and animals sensitive to high levels of sediment such as seagrass and cockles will continue to be affected. Seagrass historically occurred subtidally in all the channels, providing safe refuge for juvenile fish such as spotties, trevally, snapper and piper. However this valuable habitat is susceptible to high sedimentation and most of the subtidal seagrass in Whangapoua Harbour has been lost.

POOR LAND USE

STOCK

Where stock have access to estuarine vegetation they have damaged it directly through grazing, trampling and pugging. Disturbance encourages the establishment and spread of weeds such as saltwater paspalum. Pugging accelerates soil erosion and creates habitat suitable for the Southern saltmarsh mosquito (*Aedes camptorhynchus*), for which there is recently been an eradication programme on the Coromandel Peninsula. Stock also increase the levels of sedimentation in the estuary via stream bank erosion as has been demonstrated by a recent scientific study (Roddy, 2010). Poor stock fencing also allows faecal matter to be deposited directly into the harbour or washed into streams.

The restriction of stock access to the CMA is limited to discrete areas where the coastal edge is stop-banked¹ and a few isolated areas of harbour edge fencing (e.g. the lower TLB Otanguru Stream). Stock access to the CMA is a widespread problem everywhere else around the harbour where farmland abuts the coastal edge.

FORESTRY

The clear-felling practise of the pine forestry industry in the Whangapoua Harbour catchment is contributing elevated levels of sediment to the harbour via exposure of the land to land sliding and stream bank erosion (Roddy, 2010). A change in forestry harvesting practice is required to minimise sedimentation from this land use.

¹ Stopbanks are found from Matarangi Road around to the mouth of the Otanguru Stream and from the Otanguru Stream around to the mouth of the Owera Stream.

INFILLING/DRAINAGE

Most of the large scale infilling and drainage of wetlands around Whangapoua Harbour was undertaken in the past and often encouraged by government. Some attempts were unsuccessful as evidenced by the many old breached and abandoned stopbanks still visible around the harbour edge. However, large areas of freshwater have been lost. The value of wetlands is now generally well known, however drainage and infilling of these vital environments is still occurring in places around the harbour. Most recently (about 2003) the fill from the upgraded Whangapoua hill State Highway was dumped into the coastal edge near the Whangapoua Road.

No further drainage or infilling should be allowed to occur around the harbour, and opportunities taken to restore lost wetland areas where ever possible. A number of low-lying boggy paddocks could be easily restored to natural wetlands just by allowing the tidal waters back in, filling in drains and fencing stock out.

1.5 Birds

Birds seen or heard in the Whangapoua Harbour during this survey include: variable and pied oystercatcher, Northern New Zealand dotterel, Caspian tern, black-backed gull, gannet, pied stilt, white-faced heron, pied shag, little black shag, bittern, fernbird, banded rail, kingfisher, fantail, wax eye, pukeko, paradise duck, mallard duck, Canadian geese, black swan, welcome swallow.

4. Discussion and Recommendations

Whangapoua Harbour is one of the largest harbours on the Coromandel Peninsula and has a wide variety of estuarine vegetation. This variety is greatly enhanced by the presence of chenier ridges which are a characteristic estuarine feature of Whangapoua Harbour. They generally form from coarse material (e.g. sand or shell) and are moved gradually inland by wave action to eventually join up with the mainland or form stable islands. New ridges continually form out in the harbour to repeat the process.

The confluence of the Opiitonui Stream, Waingarō Stream and Waitekuri River contains a diverse mix of estuarine vegetation communities. Current land uses are severely impacting on the health of these communities and significant ecological gains could be achieved by reducing the adverse influence of adjacent land uses on this coastal environment.

Excessive sedimentation is an ongoing issue for the harbour. A continued focus on fencing farmed streams and the coastal margin, establishing 'continuous cover' plantation forestry including permanent wide riparian buffers and undertaking ongoing pest control in the headwater native forests is required to reduce the un-natural levels of sediment entering the harbour.

Whilst a good portion of the land sediment washed into the harbour is flushed out, some sediment settles out in sheltered areas such as the flats between the Whangapoua causeway and chenier ridge islands. This area has seen a rapid expansion of mangroves and apparently even the slower growing rush/sedgeland (particularly oioi).

Active and open chenier ridges provide important bird roosts at high tide. In Whangapoua Harbour significant bird roosts are provided by the large chenier islands in the north west of the harbour near the Whangapoua boat ramp as well as the smaller chenier out from the western point of Koruakomako headland. These open areas can become dominated by exotic weeds, reducing their roosting and breeding value to birds.

The following are recommended actions to maintain and restore the native estuarine vegetation communities around Whangapoua Harbour:

1. Control saltwater *paspalum* within the harbour before it becomes too widely established.
2. Undertake follow-up control of *spartina*.

3. Work with the landowners to protect and restore degraded harbour and stream margins.
4. Provide incentives for landowners to retire grazed boggy areas to restore floodplains and wetlands.
5. Encourage the legal protection of the highly significant coastal wetland on the Matarangi Spit and the remnant mature taraire/puriri/kanuka floodplain forest at the mouth of the Waitekuri River.
6. Investigate options to restore land between the Waingaro wetland (the largest remaining freshwater wetland in the Colville Ecological District) and the taraire/puriri/kanuka floodplain forest and estuarine wetland.
7. Encourage animal pest control around the harbour margins to protect estuarine wildlife (wading birds such as New Zealand dotterel, oystercatcher and stilt; and wetland birds such as fernbird, bittern and banded rail).
8. Monitor the chenier ridge bird roosts for weed growth which may require management. Small scale mangrove management could also be considered.
9. Establish small-scale monitoring of estuarine vegetation communities focusing on competitive interactions and growth of species within the sheltered zone beside the Whangapoua causeway road which appears to be undergoing rapid change.

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Appendix 1 – GPS locations of figures

Figure number	GPS Longitude	GPS Latitude
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