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Estuarine Vegetation Survey - Port Waikato

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Table of Contents

Introduction

A 1997 pilot study of Whangamata, Wharekawa, and Otahu harbours determined that it is feasible to map coastal vegetation using aerial photography. The success of this work encouraged Environment Waikato to continue with this method within the Coromandel region. Tairua, Coromandel, Te Kouma, Manaia and Whitianga harbours were mapped in 1998 and 1999. Raglan Harbour has been mapped in 2004.

Mapped vegetation is in the Coastal Marine Area (CMA) and includes the spatial cover of mangroves, seagrass, sea meadow, and saltmarsh. Results of the harbour surveys are included in Environment Waikato's Global Information System (GIS) database and are used for State of the Environment investigations and assessing consents.

This report details results from the survey of the Port Waikato river mouth. Comments are included on the areas' vulnerability to degradation, and other field notes of interest. This report is accompanied by a vegetation-coded acetate sheet combined with a 1:10,000 2002 aerial map of Port Waikato.

Methodology

The survey was undertaken on the 22nd November 2004 by foot at low tide and by boat over high tide. Identical methodology for mapping saltmarsh, mangrove, seagrass and weed communities was followed to that previously used to map East Coast estuaries (see Graeme, 1997, 1998a, 1998b, 1999).

A1:10,000 scaled aerial map of the harbour was laminated and overlayed with another clear acetate sheet. Colour-coded lines were drawn on the overlay to define the spatial extent of wetland vegetation types and to allow transferral to GIS. These boundary lines were ground-truthed to establish their accuracy. Field notes were made of estuarine wetland characteristics and vulnerability. An estimate was made of historical estuarine vegetation extent where there had been reclamation.

Wetland Vegetation Classification

For the purpose of this investigation, native wetland species influenced by the tidal cycles were split into four groups: saltmarsh, mangrove, seagrass and weed communities.

1. **Saltmarsh -** a broad community in which three sub-communities are distinguishable. They are:

    a) **'Rush community'** - generally oioi *(Apodasmia similis)* and the less colourful sea rush (*Juncus maritimus* var *australiensis*);

    b) **'Saltmarsh ribbonwood community'** - this includes areas where rushes are interspersed with saltmarsh ribbonwood *(Plagianthus divaricatus)*, sea primrose *(Samolus repens)*, remuremu *(Selliera radicans)*, the silver tussock grass *(Stipa stipoides)*, and glasswort *(Sarcocornia quinqueflora)* giving a patchy appearance compared with the uniformity of the 'rush community';

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

2. **Mangrove** *(Avicennia marina* var. *resinifera)* – usually a monospecific community but sometimes seagrass beds can be found below trees.

3. **Seagrass** *(Zostera* sp.)- usually a monospecific community.

4. **'Weed community'** - in the Waikato Region the most significant estuarine weeds are saltwater paspalum *(Paspalum vaginatum)* and cord grass *(Spartina* spp*.).* Both of these weeds grow in the open estuary, and trap sediment greatly increasing the harbour's infilling rate. These weeds also compete amongst other native wetland communities.

Field Notes

Due to the nature of the river mouth with its large freshwater influence, there was a broad mixing zone where indicative 'estuarine' vegetation overlapped with the 'freshwater' vegetation upstream. The upper limit of the saline influence was taken to be indicated by the extent of oioi which together with saltmarsh ribbonwood provides a clear indication of the upper limit of the salt wedge in other Waikato estuaries. While most other Waikato estuaries grade from defined oioi and saltmarsh ribbonwood communities into clearly defined 'freshwater' species, the islands at Port Waikato sustain extensive populations of lake clubrush *(Schoenoplectus tabernaemontani)* and marsh clubrush *(Bolboschoenus fluviatilis)*, species that can tolerate some brackish water. However for this survey these two species were defined as 'freshwater' vegetation.

Table 1 presents the common and dominant estuarine and freshwater vegetation species that were surveyed at Port Waikato. The 'vegetation type' for the estuarine species refers to the vegetation zone classification of estuarine vegetation which corresponds to the different zones on the maps.

Estuarine Vegetation Description and Extent

The diversity of estuarine plants diminished upstream from Klondyke Rd, until the inland limit of estuarine vegetation was reached at the downstream end of the islands. West of Klondyke Rd on the true left bank (TLB) sea rush, oioi, three square *(Schoenoplectus pungens)*, sea meadow (including bachelor's button and sharp spike-sedge) and saltwater paspalum mix with lake clubrush, marsh clubrush, and small patches of reed sweetgrass (Figure 1). However, oioi was the only estuarine species found in patches upstream of Klondyke Rd indicating a weaker saline influence from this point. Similarly scattered patches of oioi were the only estuarine vegetation around the downstream ends of the seaward islands. Small areas of Bachelor's button and sharp spike-sedge were also found on the seaward end of a small north-western island (Figure 2). However, due to the predominance of other freshwater species at the site this was not included as estuarine vegetation.

Opposite Klondyke Rd on the true right bank (TRB) was a small area of three-square and saltwater paspalum. Small patches of oioi grew amongst the lake clubrush around the sewage pond outlet (Figure 3). This was the only estuarine vegetation found along the TRB, which was otherwise characterised by eroding sand cliffs with pines and pampas downstream (Figure 4) or fringing freshwater wetland, willow and alder upstream (Figure 5). An area of freshwater swamp around the sewage ponds that was not dominated by willow or alder included cabbage trees, flax and mingimingi.

The dominant vegetation along the TLB between Klondyke Rd and Port Waikato was saltwater paspalum. Saltwater paspalum generally formed a wide band along the foreshore beside disjointed bands of oioi, and small patches of sea rush and sea meadow (Figures 6,7,8). Sparse patches of seagrass were found in the bays east of the Putatake (?) Stream mouth often backed by a saltwater paspalum band. The seagrass blades were generally thin and the beds do not stand out unless they are

more than a few square metres. Some of the seagrass beds showed signs of die-back along the seaward edge. The largest patch of seagrass was immediately to the west of the Putatake (?) Stream mouth (Figure 9).

Table 1: Common and dominant estuarine and freshwater species at Port Waikato

Estuarine vegetation species:

Common name	**Scientific name**	**Vegetation Community**
arrow grass	*Triglochin striata*	sea meadow
bachelor's button	*Cotula coronopifolia*	sea meadow
glasswort	*Sarcocornia quinqueflora*	sea meadow
oioi	*Apodasmia similis (=Leptocarpus similis)*	rush/sedge
knobby clubrush	*Ficinia nodosa (Isolepis nodosa)*	duneland
remuremu	*Selliera radicans*	sea meadow
saltmarsh ribbonwood	*Plagianthus divaricatus*	saltmarsh ribbonwood
saltwater paspalum	*Paspalum vaginatum*	weed
sea primrose	*Samolus repens*	sea meadow
sea rush	*Juncus krausii subsp. australiensis*	rush/sedge
seagrass	*Zostera novazelandica*	seagrass
sharp spike-sedge	*Eleocharis acuta*	sea meadow
shore lobelia	*Lobelia anceps*	sea meadow
silvery sand grass	*Spinifex sericeus*	duneland
slender clubrush	*Isolepis cernua*	sea meadow
spartina	*Spartina sp.*	weed
three-square	*Schoenoplectus pungens*	rush/sedge

Freshwater Species:

alder	*Alnus glutinosa*	weed
crack willow	*Salix fragilis*	weed
lake clubrush, kapungawha	*Schoenoplectus tabernaemontani*	rush/sedge
marsh clubrush, kukuraho	*Bolboschoenus fluviatilis*	rush/sedge
pampas	*Cortaderia selloana and C. jubata*	weed
raupo	*Typha orientalis*	rush/sedge
reed sweetgrass	*Glyceria maxima*	weed
mingimingi	*Coprosma propinqua*	shrub

The seaward extent of the estuarine vegetation ended at the Maraeai Stream mouth. Figure 10 shows mats of saltwater paspalum with three square sedge and sea primrose patches. Beyond are eroded banks vegetated with buffalo grass. Saltwater paspalum was also present at the other end of the settlement beach, invading spinifex habitat (Fig 11).

Saltmarsh ribbonwood and silver tussock were not seen in this survey. Mats of the green seaweed *Enteromorpha* were common on the mudflats and around the rush beds.

A single mangrove seedling (post-2002 recruit) was seen during the survey but not mapped.

Birds

Birds seen during the survey were stilt, swan, white-faced heron, pukeko, mallard duck, paradise duck, black shag, pied shag, black-backed gull, kingfisher and plover. An Australasian bittern was seen flying over the wetland just north east of Klondyke Rd. The islands and river mouth are a significant breeding and feeding site for shags, particularly the large pied shag (Figure 12).

Weeds

From observations in other estuaries it has been suspected that saltwater paspalum may be a significant threat to the low-growing sea meadow communities, it also climbs over and threatens rush and saltmarsh ribbonwood communities. However, at Port Waikato it seems the saltwater paspalum is encroaching into seagrass habitat, but without monitoring over time it is difficult to determine (Figures 13 & 14).

Another pest plant in the area is alligator weed which was found scattered along the whole survey length of the TLB. In areas it was found on sand banks occupying rush and sea meadow habitat. Spraying of this weed had recently been undertaken, however follow-up control is necessary. Other weeds found along the coast are boxthorn (along the Cobourne Reserve), smilax (extends north east of the boat ramp) and ladder fern (on the harbour edge immediately east of the boat ramp). Scattered alder seedlings were noted outside of the main infestation on the TLB swampy flats.

Other Issues

No large areas of land appeared to be 'reclaimed' from the sea. The width of the narrow estuarine band of vegetation along side the road on the TLB is likely to have been altered by the road but would still have been restricted to a fringe along the coastline.

Issues that require follow-up are the dumping of garden waste from the Cobourne Reserve into the CMA (Figure 15), and whether the retaining wall to the east of the reserve with an associated boat ramp has consent (Figure 16). Apart from the road, this timber wall and the rock wall in front of the café by the boat ramp are the only armouring of the coastline associated with the settlement. Armouring of the foreshore prevents the natural zonation of biota up the shore, alters wave and current behaviour, as well as negatively impacting on the natural character of the coast.

Discussion

Due to the 'river mouth' characteristic of this estuary the estuarine vegetation is generally restricted to a fringe along the lower river banks. The large sheltered embayments that characterise many of the other Waikato estuaries do not occur. Therefore large scale loss of estuarine wetland through land drainage of low-lying flats has not been an issue.

The most ecologically significant estuarine vegetation at Port Waikato is the seagrass beds. These will provide important habitat for polychaetes, molluscs and crustacean, which in turn will provide food for fish and birds.

The fringing rush and sea meadow bands are compromised and threatened by the invasive saltwater paspalum. Saltwater paspalum is now the dominant estuarine species along the banks.

References

Graeme, M. 1997: *Estuary Vegetation Survey Pilot Study : Whangamata, Otahu*, *Wharekawa*. Report prepared for Environment Waikato.

Graeme, M. 1998a: *Estuary Vegetation Survey : Coromandel & Tairua Harbours*. Report prepared for Environment Waikato.

Graeme, M. 1998b: *Estuary Vegetation Survey : Te Kouma & Manaia Harbours*. Report prepared for Environment Waikato.

Graeme, M. 1999: *Estuary Vegetation Survey : Whitianga Harbour*. Report prepared for Environment Waikato.

Appendix – Figures 1 - 17

1. Near the upstream limit of estuarine vegetation the harbour fringe on the TLB was a mosaic of oioi, sea rush, lake clubrush, marsh clubrush, reed sweetgrass, bachelor's button, and saltwater paspalum.
2. A patch of turf species on the downstream end of the small north-western island. Small areas of bachelor's button and sharp spike-sedge are scattered amongst the other low-growing freshwater species.
3. Scattered patches of oioi amongst lake clubrush and marsh clubrush indicate the upper extent of saline influence on the TRB near the sewage pond outlet.
4. Seaward of the sewage pond on the TRB the coastal edge is sandy and dominated by pampas and pine trees. At this site the banks are eroding and pines are falling into the water.
5. A band of marsh clubrush fringing an indent of the TRB. Other freshwater plants in this wetland include alder, raupo, reed sweetgrass and lake clubrush.
6. Saltwater paspalum dominates the upper foreshore along much of the TLB west of Klondyke Rd. Dead vegetation indicates the high tide line above which are freshwater grasses.
7. Saltwater paspalum growing over a sward of arrow grass. Low growing sea meadow species are particularly at risk of being out-competed by this invasive grass.
8. Saltwater paspalum invading the rush and sedge zone. Behind the marsh clubrush in the foreground, oioi is flattened by the creeping mat of saltwater paspalum.
9. The largest seagrass beds are in the wide shallow bay north of the Port Waikato settlement (Putatake (?) Stream).
10. The estuarine vegetation ends at where the Maraetai Stream enters the estuary. Here beds of saltwater paspalum dominate over the three square rush and sea primrose. The eroding edges of the grassed recreation reserve in the background are dominated by buffalo grass.
11. At the western end of the recreation reserve, saltwater paspalum has invaded the spinfex zone. This photograph shows spinifex in the foreground, saltwater paspalum and knobby clubrush over the path, and more spinifex in the background.
12. The Waikato River mouth is an important breeding and feeding site for the coastal pied shag. Here pied shags are nesting in a colony on one of the south-western islands.
13. It appears that the band of saltwater paspalum is expanding seaward along the TLB. In this photograph saltwater paspalum is growing into a seagrass bed.
14. A close up photograph showing seagrass in amongst the invading saltwater paspalum.
15. Garden rubbish from the Cobourne Reserve dumped in the CMA.
16. A timber retaining wall and groyne for a boat ramp south-west of the Cobourne Reserve. Also a boxed concreted pad.
17. A map of Port Waikato showing points of interest relating to this report.


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17
Sewage pond
Klondyke Rd
Putatake Stream (?)
Port Waikato settlement