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Estuarine Vegetation Survey : Otama Estuary

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Prepared by:
Meg Graeme, Natural Solutions

For:
Environment Waikato
PO Box 4010
HAMILTON EAST

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Estuarine Vegetation Survey - Otama Estuary

June 2010

Prepared for Environment Waikato by

Estuarine Vegetation Survey – Otama Estuary, June 2010

Report prepared for:

Resource Information Group
Environment Waikato
PO Box 4010
HAMILTON EAST

Report prepared by:

Meg Graeme M.Sc (Marine Science)
Natural Solutions – Marine and Terrestrial Ecologists Ltd
RD 2
COROMANDEL 3582
Ph: (07) 866 0770
Email: natural.solutions@wave.co.nz

Report submitted:

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Reference:

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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 surveys are included in Environment Waikato's Global 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 Otama estuary. 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 2 days between the 4th and 5th June 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 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 or saltmarsh ribbonwood. The limit of these plants determined the inland/upstream extent of the survey.

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

2.1 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/sedge community' – This is generally sea rush (*Juncus krausii* subsp. *australiensis*), oioi *(Apodasmia similis),* and generally only common on the West Coast, 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 saltwater paspalum and spartina. Both of these grasses generally grow in the open estuary and trap sediment, 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 surveys due to their presence above the spring high tide mark.

Additional vegetation mapping categories have also been added to portray the increasing occurrence of '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 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 Otama estuary.

Common/Maori name	**Scientific name**	**Estuarine Vegetation Community**
arrow grass	*Triglochin striata*	sea meadow
glasswort	*Sarcocornia quinqueflora*	sea meadow
mangrove	*Avicennia marina* subsp. *australasica*	mangrove
native musk	*Mimulus repens*	sea meadow
oioi	*Apodasmia similis*	rush/sedge
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 capricorni*	seagrass
slender clubrush	*Isolepis cernua*	sea meadow

* denotes an exotic species

3. Field notes

3.2 Summary

The following observations provide a general overview of estuarine vegetation in the Otama estuary following the field visit.

- Seagrass beds are common along intertidal channel banks as well as subtidally downstream of the road bridge.
- Only one juvenile mangrove was noted in the entire estuary.
- Wide beds of sea rush and oioi blend into saltmarsh ribbonwood areas.
- Sea meadow communities are scattered along the banks of the watercourses and in patches along the rush/sedge - saltmarsh ribbonwood interface. Sea meadow species present include sea primrose, remuremu and of particular note, extensive beds of native musk (*Mimulus repens*).
- Dense beds of saltwater paspalum occur along the banks of the watercourses, either as thick monospecific beds or mixed with rush/sedge, sea meadow and saltmarsh ribbonwood communities.
- Weed species other than saltwater paspalum were restricted to a scattering of pampas, blackberry and various pasture grass species from the saltmarsh ribbonwood zone and above.
- Farming activities have disrupted most of the natural estuarine to freshwater wetland sequences, mainly impacting freshwater vegetation communities.
- However, one of the most significant examples of a relatively intact coastal vegetation sequence in the Coromandel Ecological Region is found beside the road where the rush/sedge and saltmarsh ribbonwood zone grades into a freshwater swamp community characterised by manuka (*Leptospermum scoparium*), pohuehue (*Muehlenbeckia complexa*), and blue-green sedge (*Baumea juncea*). This freshwater swamp community then grades into a small remnant of regenerating coastal forest and then into open duneland vegetation communities.
- Stock have access into some areas of the upper CMA but stock access is more of an issue for the associated freshwater wetland areas.

- Many of the stream banks upstream of the CMA are not adequately fenced to protect against bank erosion and pollution of the waterways from agricultural land use.

3.3 Site description

Otama wetland is described clockwise from the stream mouth. See Figure 1 for 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.

Seagrass beds extend up the stream from mid-way along the **pohutukawa-lined cliffs**, both subtidally in the stream channel and intertidally over the stream flats up to the road bridge.

Saltmarsh ribbonwood and rush/sedgeland are encountered to the south-west of the pohutukawa-lined cliff. These communities extend upstream to the edge of the road. Saltwater paspalum has established along the stream edge and extends into the rush/sedgeland and over some saltmarsh ribbonwood adjacent to the pohutukawa (Figure 2). The saltwater paspalum is thigh deep here, and is generally this deep wherever it occurs as a monospecific bed throughout the wetland.

Upstream of the bridge the land rises steeply from the estuary leaving room only for a narrow band of dense saltwater paspalum with scattered oioi, searush and saltmarsh ribbonwood in places. Further upstream the estuarine vegetation then expands out into wide rush/sedgeland beds interspersed with 'fingers' of saltmarsh ribbonwood on higher ridges. An area of 'cropped'[1] sea rush was noted with an associated fringe of dead oioi (Figure 3 and Figure 4) beside the **lower eastern tributary**. Saltwater paspalum has invaded only along the stream edges where it has easily dispersed. The landward extent of the estuarine vegetation around the lower and upper eastern tributaries of the main stream has been truncated by farming activities which has involved grazing, drainage and infilling of low wetland areas.

Upstream of the **upper eastern tributary**, saltmarsh ribbonwood intermingles with raupo, giant umbrella sedge and saltwater paspalum where fenced from stock (Figure 5). The stream then forks with the natural stream channel to the east and a drainage channel to the west. Stock have access to both sides of the natural stream channel resulting in pugged and grazed mixed rush (predominately freshwater) and pasture community. Of note was the dense beds of native musk along the natural stream banks (Figure 6 and Figure 7). The upstream extent of estuarine vegetation was indicated by a

[1] See 'General Notes' for further discussion.

thin band of saltwater paspalum and the occasional sea rush along the immediate stream bank.

Moving downstream along the TLB, the **upper western tributary** is reached. This area is unfenced, and the vegetation pugged and grazed by cattle. Saltwater paspalum, native musk, arrow grass and sea rush are present here. Downstream of this tributary stock are fenced from the main wetland area, resulting in a wide band of rush/sedgeland extending into saltmarsh ribbonwood. Patches of sea meadow are found at, and extending up past, the saltmarsh ribbonwood zone. Pohuehue (*Muehlenbeckia complexa*) and giant umbrella sedge (*Cyprus ustulatus*) are also found mixed with sea rush and saltmarsh ribbonwood. Above the saltmarsh ribbonwood zone, the higher land is predominately covered in exotic grasses including Indian doab (*Cynodon dacylon*) and narrow-leaved carpet grass (*Axonopus fissifolius*), as well as areas of sharp spike sedge *(Eleocharis acuta).* Clumps of mature manuka are scattered around the edges of the higher ground, however there is little sign of manuka regeneration establishing through the thick grass sward. Montbretia is present, particularly associated with sea meadow hollows (Figure 8). Patches of blackberry (*Rubus fruticosus*) and pampas (*Cortaderia selloana*) are also present, although have not become a huge problem yet.

Saltwater paspalum lines the stream edge down the TLB and at the junction with the **lower western tributary**. Another patch of 'cropped' sea rush, dead oioi, saltwater paspalum and sea primrose was noted along the tributary bank upstream of the viewing platform (Figure 9). However, healthy thigh deep saltwater paspalum lined the immediate tributary bank. A manuka/Baumea swamp forest extends out from the road towards the tributary. This swamp forest is then encircled by the natural tributary channel and bi-sected by a farm drain. Figure 10 shows a thick sward of saltwater paspalum covering the tributary channel bed. A small population of native musk is also present at the open edge of the saltwater paspalum sward. Saltmarsh ribbonwood with oioi lines the tributary, and blends into the manuka/Baumea swamp forest on its TLB. Figure 11 gives a view over the upper wetland from the road side viewing platform.

3.4 General notes

'Cropped' areas of sea rush were noted often associated with dead patches of saltwater paspalum and fringes of dead oioi. This presumably is a result of prolonged flooding over the summer months when the stream mouth blocked up. A 'high tide' line is visible on much of the oioi indicating that water levels had been much higher than at the time of the survey.

Storm events in May as well as a recent storm on the 1st of June have unblocked the stream mouth and subsequently flushed out the water that had ponded over summer.

It was difficult to tell when the saltwater paspalum gave way to its freshwater relative Mercer grass (*Paspalum distichum*), and therefore some of the mapped saltwater paspalum is likely to be Mercer grass at its upstream extent.

A stoat and quite a few rats were noted to have been caught in the Victor snap traps laid around the wetland perimeter. This will benefit the local fernbird population (heard at a number of sites around the wetland) and the local bittern which was disturbed in the lower western tributary.

Figure 1: Otama wetland site localities mentioned in this report. The numbers refer to the location of the following figures.

Figure 2: This view looking downstream towards the beginning of the pohutukawa-lined cliff shows saltwater paspalum intermingled with oioi and saltmarsh ribbonwood (closest to pohutukawa). Seagrass beds can be seen within the stream channel.

Figure 3: Here the sea rush has a 'cropped' look presumably due to the effect of flooding in this area. Also note the dead (brown) band of oioi fringing the higher healthier green oioi behind. Saltwater paspalum dominates the foreground.

Figure 4: ‘Cropped’ pedestals of sea rush left behind after flooding.

Figure 5: An abrupt boundary to saltmarsh ribbonwood. Raupo and saltwater paspalum are in the background.

Figure 6: The grazed stream bank here has native musk (*Mimulus repens)* on the TRB (foreground) and mixed native musk and saltwater paspalum on the TRB further upstream. Saltwater paspalum dominates the TLB.

Figure 7: *Mimulus repens* found along the stream banks. Note the elongated form and sparse leaves – presumably a result of the summer water ponding and the recent flood.

Figure 8: A patch of remuremu and montbretia, with saltmarsh ribbonwood seaward and giant umbrella sedge landward.

Figure 9: The saltwater paspalum, sea primrose and oioi in the foreground has been affected by ponding water. The healthy saltwater paspalum lines the bank of the western tributary (slightly elevated).

Figure 10: *Mimulus repens* is being overwhelmed by saltwater paspalum in the creek bed here. The oioi and ribbonwood blend into a manuka/Baumea wetland on the TLB (right). Stock have access to the TRB in the foreground.

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Figure 11: The upper Otama estuary from the roadside viewing platform (note the predominance of saltwater paspalum along the waterways).

3.5 Threats

There are three significant existing threats to the native estuarine vegetation communities of the Otama wetland, as well as a number of potential threats associated with subdivision.

Weeds

The estuarine weed **saltwater paspalum** can dominate large intertidal areas at the expense of native estuarine vegetation and wildlife habitat. Saltwater paspalum is an introduced grass that, like spartina, is extremely efficient at stabilising sediments and building up bed levels, which can affect flooding. 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 750 centimetres deep, it can smother sea meadow, saltmarsh ribbonwood and rush/sedgeland communities to form dense mono-specific mats. There will be further degradation of native intertidal vegetation communities in the Otama Estuary if saltwater paspalum continues to expand, including the loss of plant and animal biodiversity. Of particular concern, is the threat of saltwater paspalum to the dense threatened native musk communities. The NZ Plant Conservation Network website lists native musk as "intolerant of much competition from taller plants or faster growing mat-forming species." It is therefore desirable to attempt to control the spread and reduce the dominance of saltwater pasplaum. Due to the relatively small size of this wetland, and its significant ecological value, it is an excellent candidate for saltwater paspalum control and it may be possible to attempt eradication.

Coastal edge weeds – There are few weeds of concern around the higher margins of the wetland, mainly scattered pampas and blackberry patches. Pampas can suppress natural regeneration of the native communities along the wetland edge, and break the contiguity of estuarine to freshwater/terrestrial native vegetation sequences. Blackberry is more of a nuisance weed as it hinders easy access (for other weed control or animal pest management). Montbretia (*Crocosmia crocosmiifolia)* could be controlled using a 'weed wiper' to avoid spraying.

Stock

Stock have access to the upper extent of the CMA around most of the estuary above the bridge. Where stock have access to estuarine vegetation they have damaged it directly through trampling and pugging or removed it by grazing. Disturbance encourages the establishment and spread of weeds such as saltwater paspalum. Pugging 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 wetland via pugging and stream bank erosion,

and they pollute water with faecal matter. Agricultural fertilisers can also pollute waterways if excessively applied and filtering riparian margins are absent.

There is also the potential for wetland within private land title to be grazed in the future if it has no legal protection.

Drainage

Drainage (and clearance) of low lying wet areas at the upper limits of the CMA and associated freshwater wet land has resulted in the loss of some estuarine vegetation and general depletion of freshwater wetland. Further drainage is also a threat. However, some of the drained areas are restorable should the opportunity arise.

Subdivision

Various potential effects of subdivision can threaten the ecological health of the wetland. This includes the introduction of pets around the wetland edge, urban run-off and the introduction of new weeds.

3.6 Birds

Birds seen or heard in the Otama wetland during this survey include: white-faced heron, kingfisher, fernbird, pukeko, bittern, black shag, paradise duck and mallard duck.

4. Discussion and Recommendations

A focus on restoring riparian vegetation around the Otama wetland will enhance the health and ecological value of the wetland. This will benefit the wetland wildlife including fernbird, bittern and banded rail. It will also enhance feeding habitat for nearby kiwi during drought periods.

The estuary mouth naturally often blocks during summer, causing ponding of waters within the wider wetland. This may provide favourable conditions for the prolific growth of the locally rare native musk (Mimulus repens). The human-induced unblocking of the stream mouth does not seem to occur as regularly as for other Coromandel stream mouths. With appropriate retirement of grazed low-lying floodplain, there should be no need to unblock the stream and this seasonal phenomenon able to continue naturally.

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

1. Some quite extensive areas of DoC land around the fringes of the main wetland are currently grazed. These areas could be considered for a land swap – good grazing land within DoC estate for estuarine/freshwater wetland restoration areas on private land. Otherwise the grazed DoC land could be revegetated with wetland and coastal forest species.
2. Spray the saltwater paspalum, pampas and blackberry within the wetland.
3. Spray an area of the exotic grass sward within the high land along the TLB and monitor it for native vegetation regeneration. It may be that giant umbrella sedge and manuka regeneration naturally, saving effort being spent on planting the remainder of this elevated area within the wetland.
4. Work with landowners to protect and restore degraded estuarine and freshwater areas within private property.
5. Encourage the ongoing community pest control initiative around the wetland margins.

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Appendix 1 – GPS locations of figures

Figure No.	GPS Way point	Longitude	Latitude
2	354	175.7618	-36.7085
3	346	175.7602	-36.7115
4	346	175.7602	-36.7115
5	348	175.7603	-36.7140
6	349	175.7628	-36.7146
7	349	175.7628	-36.7146
8	350	175.7586	-36.7128
9	352	175.7585	-36.7099
10	351	175.7556	-36.7119
11	353	175.7592	-36.7094