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Committee Regulatory
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Porirua Harbour broad-scale habitat mapping and fine-scale ecological monitoring

1. Purpose

To report on the broad-scale mapping of intertidal substrate and vegetation in the Porirua Harbour, and fine-scale ecological monitoring undertaken at two intertidal sites within each arm of the harbour over the 2007/08 summer.

2. Background

Broad-scale habitat mapping surveys and ecological risk assessments have already been undertaken across most of Wellington's extensive coastline, including the Wairarapa coast (see Report No. 07.384), the Kapiti Coast, Plimmerton, Titahi Bay, and Makara Estuary (see Report No. 06.83), and the Wellington Harbour and South Coast (see Report No. 04.320). The habitat surveys are designed to fill a gap in our ecological understanding of coastal and marine biodiversity. The results of the surveys are valuable for resource consent assessments and policy development because habitat information can be used to indicate the organisms likely to be present in certain areas, and the sensitivity of different areas to various pressures.

Fine-scale monitoring incorporates a more detailed assessment of the ecological health of selected representative locations within a coastal environment. In the Wellington region, it is proposed to only undertake this level of monitoring in high value, "at-risk" environments. The Porirua Harbour is one such environment.

The broad-scale habitat mapping and fine-scale ecological monitoring were jointly funded by Porirua City Council and complement earlier investigations of sediment quality in the subtidal areas of the Porirua Harbour.

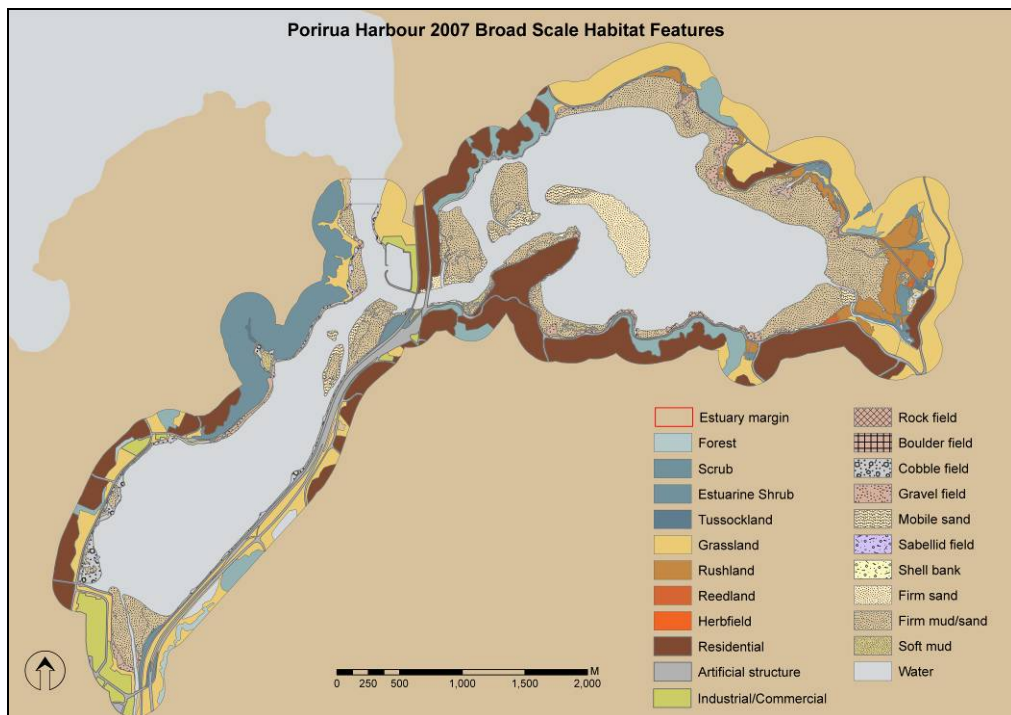
3. Broad-scale habitat mapping¹

Wriggle Coastal Management Ltd were contracted to undertake a broad-scale survey of the types of substrate (e.g., firm sand, soft sand, mud, gravel) and vegetation (e.g., macroalgal beds, seagrass beds, saltmarsh vegetation, exotic weeds) present throughout the intertidal areas of the Porirua Harbour. The survey was undertaken during December 2007, with habitat cover recorded onto laminated aerial photographs and subsequently digitised and entered into a GIS framework.

3.1 Key findings

The intertidal mapping (Figure 1) of Porirua Harbour showed:

- The majority of the intertidal area of both arms was dominated by unvegetated, firm muddy sands (122 ha in the Pauatahanui Arm and 33 ha in the Onepoto (Porirua) Arm). Soft muds occupied only 1.9 ha and 1.5 ha respectively.
- Saltmarsh vegetation was virtually non-existent in the Onepoto Arm but occupied 51 ha in the Pauatahanui Arm where it was dominated by wide beds of rushland. As the terrestrial influence increased, rushland transitioned through areas dominated by saltmarsh ribbonwood (*Plagianthus divaricatus*) and grassland.



(Source: Wriggle 2008)

Figure 1: Summary of the broad-scale habitat (substrate and vegetation) features of Porirua Harbour, December 2007

¹ This section is a summary of the technical report: Stevens, L.; Robertson, B. 2008. *Porirua Harbour: Broad scale habitat mapping 2007/08*.

- Areas of seagrass (*Zostera*) were relatively extensive, 41.2 ha in the Pauatahanui Arm and 17.3 ha in the Onepoto Arm. The beds appeared healthy, stable and relatively free of fine sediment.
- Both arms of the harbour have a poor terrestrial vegetation buffer, reflecting the predominance of residential areas, grassland and artificial structures (primarily road and rail).

The broad-scale results, together with other catchment and harbour information, were used to provide an understanding of the condition of the harbour in terms of some common estuary problems; sedimentation, eutrophication and habitat loss. From this assessment it was concluded that:

- Sedimentation is rated moderate for the whole harbour. Ongoing management and monitoring will be required; excessive sediment inputs in an estuary lead to infilling with muds, reducing biodiversity and human values and uses.
- The whole harbour is moderately eutrophic (enriched), indicating a risk of nuisance macroalgal growth (e.g., sea lettuce). This can be seen in the broad-scale macroalgal mapping results; approximately 70% of the intertidal area of each arm had macroalgal cover of at least 5%. Continued surveys of macroalgal cover are recommended.
- Habitat loss is rated as moderate in the Pauatahanui Arm and very high in the Onepoto Arm. The very high rating for the Onepoto Arm reflects the extensive modification this arm has undergone in response to urban development. Loss of habitat is an important issue; estuaries function best with a large area of rooted vegetation (i.e., saltmarsh and seagrass) as well as a healthy vegetated terrestrial margin. Loss of this habitat reduces wildlife, recreational and aesthetic values, and also adversely impacts on an estuary's role in flood and erosion protection, contaminant mitigation, sediment stability and nutrient cycling. Although habitat loss in the Onepoto Arm is significant, there is large scope for restoration of saltmarsh and margin vegetation.

4. Fine-scale ecological monitoring²

Wriggle Coastal Management Ltd undertook fine-scale monitoring at two intertidal sites within each arm of the Porirua Harbour in January 2008 (Figure 2). This monitoring included assessments of sediment texture, nutrient and organic content, contamination, and benthic (sediment dwelling) fauna and flora. The methods used were based on an extension of the tools included in the National Estuary Monitoring Protocol. One extension of the protocol was the installation of 15 sedimentation plates at selected intertidal and subtidal locations to enable long-term monitoring of sedimentation rates (Figure 2).

²This section is a summary of the technical report: Robertson, B.; Stevens, L. 2008. *Porirua Harbour: Fine scale habitat mapping 2007/08*.



(Source: Wriggle 2008)

Figure 2: Location of sedimentation and fine-scale monitoring sites in Porirua Harbour

4.1 Key findings

The key findings of the fine-scale assessment showed:

- Low to moderate concentrations of organic matter and nutrients in the sediments, with the highest concentrations recorded at the muddier sites (Por A and Pau A). Catchment nutrient load management is recommended to help maintain existing sediment nutrient levels; this is important because elevated sediment nutrient levels may result in a shift to sediment anoxia (low oxygen), leading to increased availability of nutrients (and other contaminants) and nuisance algal growth. Sediment anoxia can also result in adverse effects on benthic fauna. Although the sediments are predominantly sand (77-99% sand) and are moderately oxygenated at the present time, there were localised areas in the upper Onepoto Arm where the sediments are already anoxic.
- A benthic community dominated (in terms of abundance) by polychaete worms (>50%), bivalve molluscs, crustaceans and gastropod molluscs. Overall, the benthic community was rated “unbalanced”, with elevated numbers of organisms that tolerate moderate levels of mud and organic enrichment (e.g., the polychaete *Heteromastus filiformis*).

- Total heavy metal concentrations in the sediments (measured as an indicator of potential toxicants) well within national sediment quality guidelines, but a localised risk of sediment contamination from toxicants in urban stormwater in intertidal sediments at the southern end (site Por B) of the Onepoto Arm (this site recorded the highest metal concentrations). It is important to minimise sediment contamination; if inputs of toxicants are excessive, biodiversity may be threatened and shellfish may be unsuitable for consumption.

The fine-scale results, together with other catchment and monitoring information, supported the findings of the broad-scale assessment; the harbour has a moderate sedimentation rating and is moderately enriched. Although metal concentrations were relatively low at the intertidal monitoring sites, previous investigations by Greater Wellington have found significantly higher concentrations in the subtidal basins, particularly in the Onepoto Arm (see reports 05.42 and 06.313). This is not surprising as metals tend to be bound to the mud fraction of sediments and the subtidal basins are dominated by fine muds.

5. Summary

The broad-scale habitat mapping and fine-scale ecological monitoring have provided a valuable assessment of the health of the Porirua Harbour. Overall, the harbour is considered moderately eutrophic with a moderate sedimentation risk; the installation of sediment measurement plates at selected intertidal and subtidal locations will enable this risk to be quantified. Loss of habitat has also been identified as an issue, particularly in the Onepoto Arm which has minimal saltmarsh vegetation. The southern end of the Onepoto Arm also has the highest sediment metal concentrations, reflecting greater contaminant inputs from urban stormwater.

6. Next steps

Porirua Harbour has been identified as a high priority for ongoing monitoring and Greater Wellington will do this by working closely with the Porirua City Council through its Porirua Harbour programme. Issues around sedimentation, eutrophication, habitat loss and stormwater impacts will be assessed and appropriate research and investigations undertaken where necessary. At this stage regular (annual) assessments of sedimentation rates and nuisance macroalgal cover are recommended, together with a further three to four years of annual fine-scale monitoring to provide a sound baseline against which future changes in the health of the harbour can be assessed. Continued monitoring of contaminants in the subtidal sediments is desirable.

7. Communication

Copies of this report and Wriggle Coastal Management's broad-scale and fine-scale technical reports will be sent to Porirua City Council, Wellington City Council, the Department of Conservation, Ngati Toa and local interest groups. The technical reports will be available on Greater Wellington's website and a media release issued summarising the key findings.

8. Recommendations

That the Committee:

1. ***Receives the report.***
2. ***Notes the content of the report.***

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