Catchment-built habitats hidden by the sea: habitat mapping of the intertidal and subtidal Motueka Delta

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1 Intertidal habitat mapping

Estuarine intertidal systems of large rivers are known to play an important role in the nourishment of coastal sea ecosystems, providing a link between terrestrial and marine environments. They can encompass high-value ecological habitat/resources.

A detailed, spatial description of major habitats of the Motueka River intertidal delta was undertaken using **broad-scale habitat mapping**. The aim was to describe the intertidal environment according to different dominant habitat types based on surface substrate characteristics (mud, sand, cobble, etc) and vegetation type, in order to develop a baseline map against which later changes can be compared.

- Field surveys of the Motueka Estuary were undertaken to verify substrate types and habitats identified on an aerial photograph and identify map boundaries.
- Vegetation and substrate features were then digitally mapped on-screen from the rectified photograph using the Arcview™ software package 'image analysis' extension, producing the detailed habitat map seen in Figure 1.

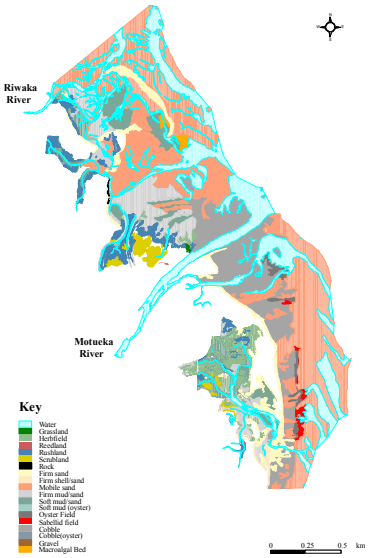

Figure 1. Structural habitats of the Motueka intertidal delta (2001).

2 Changes in intertidal habitat areas – 1947, 1986, 2001

Habitat mapping can be applied to historical aerial photographs, to give an indication of how the major habitats and substrates have changed over time. Tasman District Council applied the broad-scale habitat mapping exercise to historical aerial photographs of the Motueka Delta for 1947 and 1986. The structural class habitats were estimated and mapped (Figure 2).

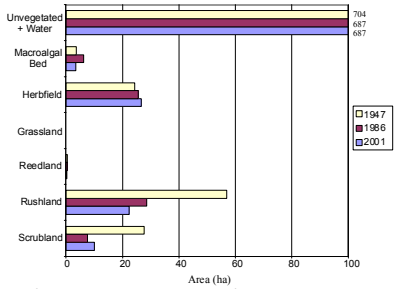

Figure 2. The area of selected structural class habitats of the Motueka intertidal delta across the surveys

- The total intertidal area of the delta decreased by ~50 ha from 1947 to 1986. Since 1986, the area has altered very little.
- The reduction in area occurred primarily in the vegetated upper intertidal to supra-tidal (rushland 28 ha loss and scrubland 20 ha loss).
- Prior to 1947, there was likely to have been already significant alteration of delta habitat, possibly in the order of 200-300 ha.
- The most significant changes to the intertidal habitats have been brought about through river control works (stop banking), land drainage and floodgates.

Implications to fish -
- Rather than an extensive and dynamic floodplain with wetlands and varying successions of flora and fauna communities, the Motueka Estuary now has very defined limits and flow channels and stable vegetated areas.
- For fish such as inanga (the adult form of the most common whitebait), wetlands for adult rearing have been significantly reduced, removed or made inaccessible (by floodgates).
- Not surprisingly, the decline of inanga habitat through the years has been followed by an ever declining whitebait catch in the Motueka River.

3 Subtidal habitat mapping

- Subtidal habitat mapping of the Motueka Delta was undertaken in 2004.
- Ground-truthing of substrates indicated by an aerial photograph of the delta (Figure 4) involved using side-scan sonar (Figure 3), SCUBA diving, video transects and sediment core profiles.
- The output is a preliminary habitat map of the subtidal reaches of the delta system (Figures 5 and 6).

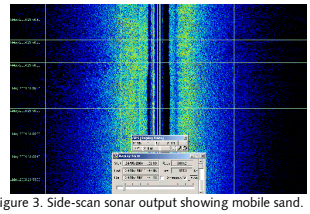

Figure 3. Side-scan sonar output showing mobile sand.

Figure 4. Aerial photograph of the Motueka Delta.

- The subtidal delta is shallow, ranging from 1 m to 13 m.
- Much of the subtidal delta comprises sand and mud, ranging from mobile sand inshore to firm mud sand, soft mud and very soft mud offshore.
- Small areas of gravel were identified, as well as drifts of terrestrial debris.
- Sidescan sonar identified irregular areas in the north east that were ground-truthed by divers as mud with patchy horse mussels and boulders. Areas to the south with a similar sonar signal were not ground-truthed but are assumed to be the same (Figure 6).

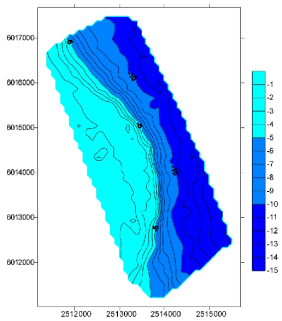

Figure 5. Bathymetry plot of the subtidal Motueka Delta.

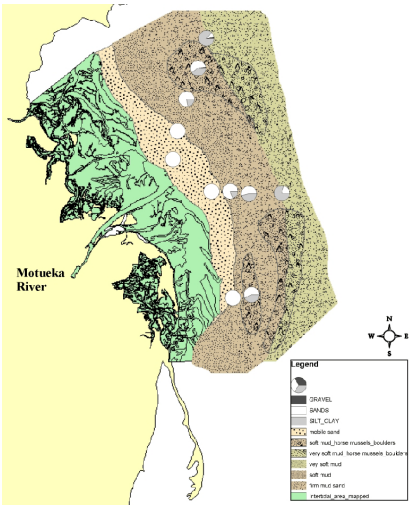

Figure 6. Subtidal habitat map of the Motueka Delta.

4 Building a management rationale

Now that we have a broad understanding of what the delta consists of, we can start to address management-related questions:

1). What are the values attached to these habitats (ecological, community, iwi)?
2). Are the habitats in good condition? Fine-scale analyses of intertidal, subtidal and offshore seabed habitats will provide a point-in-time baseline for assessing change.
3). How vulnerable are they and what role does the catchment/river play?

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