

Hutt River Estuary

Intertidal Macroalgal Monitoring 2009/10



Prepared
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By

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Extensive growths of *Enteromorpha* along the intertidal margins of Hutt River Estuary.



1. INTRODUCTION AND METHODS

INTRODUCTION



Macroalgae is an important feature of estuaries, contributing to their high productivity and biodiversity. However, when high nutrient inputs combine with suitable growing conditions, nuisance blooms of rapidly growing algae (e.g. *Ulva* (sea lettuce), *Gracilaria*, *Enteromorpha*) can occur. At nuisance levels such growths can deprive sea-grass of light causing its eventual decline, while decaying macroalgae can accumulate on shorelines causing localised depletion of sediment oxygen, and nuisance odours.

This brief report summarises the 2010 intertidal macroalgal monitoring results for Hutt River Estuary, one of the key estuaries in the Greater Wellington Regional Council (GWRC) long term estuary monitoring programme. The report describes the intertidal macroalgal cover of the estuary in January 2010, and uses a macroalgal coefficient (described below) developed for Wellington's estuaries to rate the condition of the estuary, and recommend monitoring and management actions. The next monitoring in Hutt River Estuary is due in January 2011.

METHODS

Broad scale mapping of the percentage cover of macroalgae throughout all the intertidal habitat of Hutt River Estuary was undertaken in January 2010 using a combination of aerial photography, ground-truthing, and ArcMap 9.3 GIS-based digital mapping. The procedure, originally described for use in NZ estuaries by Robertson et al. (2002), has subsequently been modified and successfully applied to various estuaries to develop a separate GIS macroalgal layer (e.g. Stevens and Robertson 2008, 2009).

Rectified aerial photographs of the estuary (2008 Hutt City Council ~0.3 metre per pixel and 2005 LINZ 2.0 metre per pixel images) were used as base maps. Experienced coastal scientists then recorded the percentage cover of macroalgae directly onto laminated photos during field assessment of macroalgal cover. The field maps were then used to create a GIS layer from which the percentage cover information was subsequently calculated.

The report outputs are used to both identify and classify macroalgal cover, and to show changes in macroalgal cover over time by comparisons with previous surveys (annually if a problem estuary, or 5 yearly if not). The current report presents the 2010 percentage cover of macroalgae within the estuary as a GIS-based map (Figure 1), and a summary table of the dominant species and percentage cover classes (Table 1).

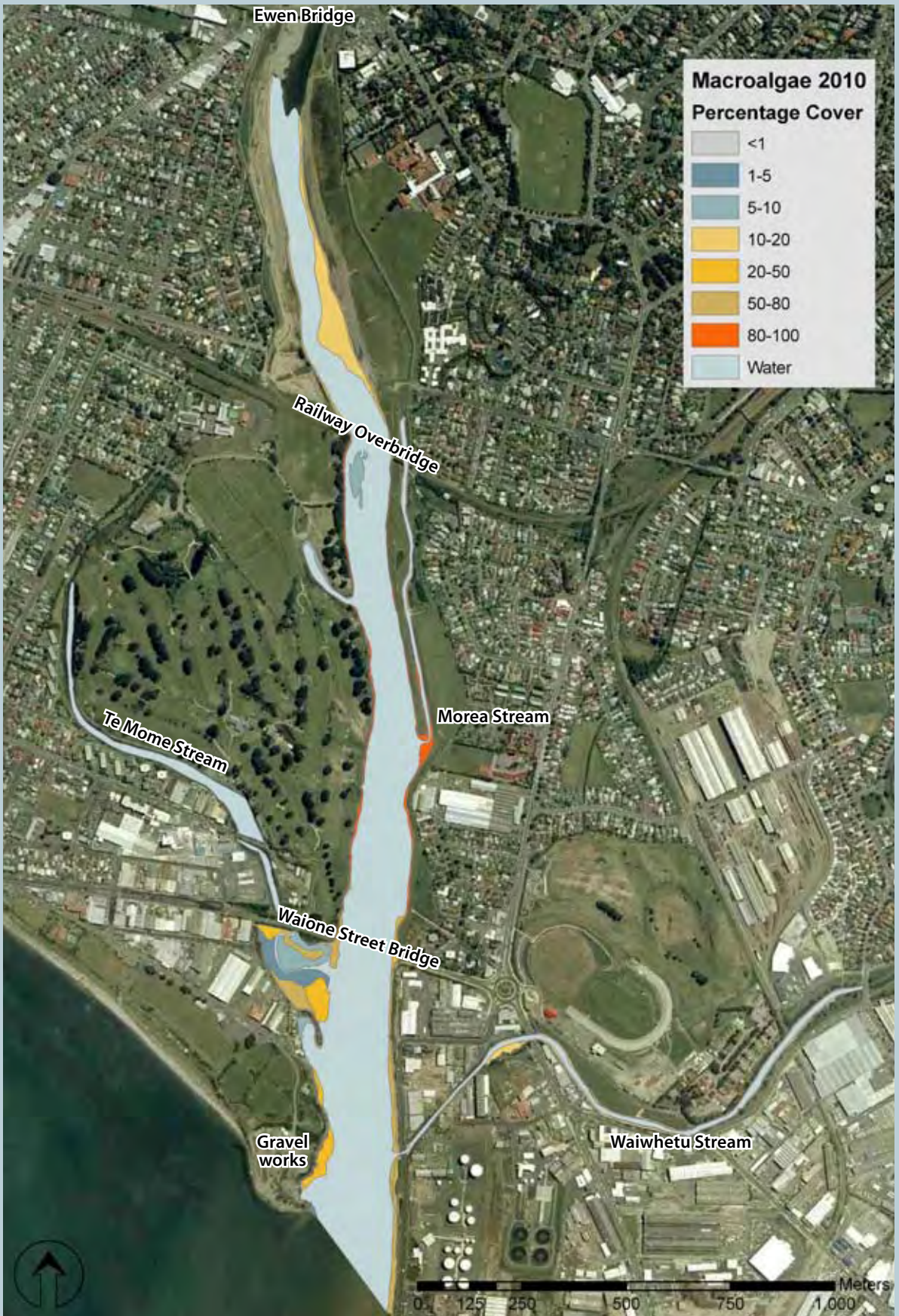
WELLINGTON ESTUARIES: MACROALGAE CONDITION RATING

A continuous index (the macroalgae coefficient - MC) has been developed to rate macroalgal condition based on the percentage cover of macroalgae in defined categories using the following equation: $MC = ((0 \times \% \text{macroalgal cover} < 1\%) + (0.5 \times \% \text{cover } 1-5\%) + (1 \times \% \text{cover } 5-10\%) + (3 \times \% \text{cover } 10-20\%) + (4.5 \times \% \text{cover } 20-50\%) + (6 \times \% \text{cover } 50-80\%) + (7.5 \times \% \text{cover} > 80\%)) / 100$. Overriding the MC is the presence of either nuisance conditions within the estuary, or where >5% of the intertidal area has macroalgal cover >50%. In these situations the estuary is given a minimum rating of FAIR and should be monitored annually with an Evaluation & Response Plan initiated.

MACROALGAE CONDITION RATING

RATING	DEFINITION (+Macroalgae Coefficient)	RECOMMENDED RESPONSE
Over-riding rating: Fair	Nuisance conditions exist, or >50% cover over >5% of estuary	Monitor yearly. Initiate Evaluation & Response Plan
Very Good	Very Low (0.0 - 0.2)	Monitor at 5 year intervals after baseline established
Good	Low (0.2 - 0.8)	Monitor at 5 year intervals after baseline established
	Low Low-Moderate (0.8 - 1.5)	Monitor at 5 year intervals after baseline established
Fair	Low-Moderate (1.5 - 2.2)	Monitor yearly. Initiate Evaluation & Response Plan
	Moderate (2.2 - 4.5)	Monitor yearly. Initiate Evaluation & Response Plan
Poor	High (4.5 - 7.0)	Monitor yearly. Initiate Evaluation & Response Plan
	Very High (>7.0)	Monitor yearly. Initiate Evaluation & Response Plan
Early Warning Trigger	Trend of increasing Macroalgae Coefficient	Initiate Evaluation and Response Plan

FIGURE 1. MAP OF INTERTIDAL MACROALGAL COVER - HUTT RIVER ESTUARY, JAN. 2010



2. RESULTS, RATING AND MANAGEMENT

RESULTS

MACROALGAL COVER CONDITION RATING

FAIR



Figure 1 and Table 1 summarise the results of intertidal macroalgal mapping within Hutt River Estuary. As the highly modified estuary is confined within extensive floodbanks, the intertidal area is restricted to narrow bands along steep rip-rap rock walls and small areas of mudflat habitat present at the mouths of the Te Mome and Morea Streams. *Enteromorpha* is growing on almost every part of the intertidal habitat with the most extensive cover located between the Waione Street bridge and the railway overbridge approximately 1.2kms upstream. Also present, but much less common than *Enteromorpha*, are *Gracilaria* and the green alga *Ulva* (sea lettuce). These species were generally found only in the lower intertidal reaches, with subtidal growths extensive near the Hutt River mouth.

The Macroalgae Coefficient (MC) for the estuary was 3.9, a condition rating of “fair”. This rating reflects that the vast majority of the intertidal area within Hutt River Estuary (9.1ha, 93.8%) had greater than 5% cover of macroalgae, with 4.1ha (42% of the intertidal area) exceeding 50% cover. Despite the high cover, nuisance conditions (e.g. rotting macroalgae and poorly oxygenated and sulphide rich sediments) were not widespread in intertidal areas, but are present in subtidal areas near the mouth which is currently muddy, poorly oxygenated, and sulphide rich.

The condition rating triggers annual monitoring and initiation of an evaluation and response plan, with the implications of the macroalgal mapping addressed in the conclusions of the fine scale monitoring report (see Robertson and Stevens 2010).

Table 1. Summary of macroalgal cover results, January 2010.

MACROALGAE	Hutt River Estuary			
	Percentage Cover	Ha	%	Dominant species
<1%	0	0	-	-
1-5%	0.6	6.2	<i>Enteromorpha</i>	
5-10%	2.8	28.9	<i>Enteromorpha</i>	
10-20%	1.1	11.3	<i>Enteromorpha, Ulva</i>	
20-50%	1.1	11.3	<i>Enteromorpha, Gracilaria</i>	
50-80%	3.0	30.9	<i>Enteromorpha</i>	
>80%	1.1	11.3	<i>Enteromorpha</i>	
TOTAL	9.7	100.0		

CONCLUSION

Macroalgal cover had a condition rating of “fair”, with extensive growth throughout the estuary. Nuisance conditions (rotting macroalgae and poorly oxygenated and sulphide rich sediments) were not present intertidally but exist in subtidal areas near the Hutt River mouth.

RECOMMENDED MANAGEMENT

The widespread extent of macroalgal cover means it should be monitored annually. The likely cause of macroalgal growths should also be further evaluated (e.g. catchment wide nutrient inputs or localised sources), and a management response plan initiated.

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