

HUTT ESTUARY: INTERTIDAL SEDIMENT MONITORING SUMMARY, 2014/2015

Prepared for Greater Wellington Regional Council by Leigh Stevens and Barry Robertson, Wriggle Coastal Management, February 2015

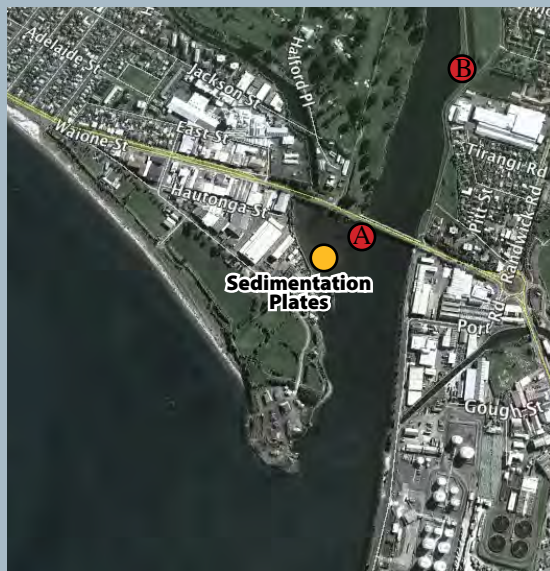


Figure 1. Location of intertidal sediment plates and fine scale monitoring sites in the lower Hutt Estuary.

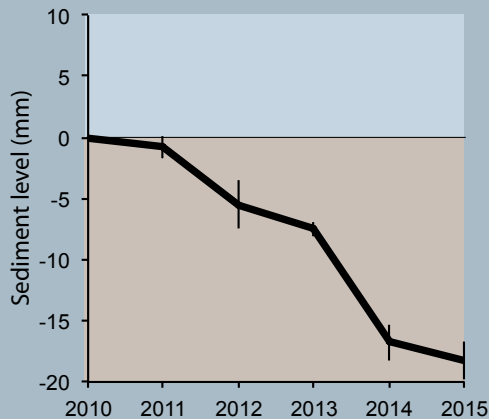


Figure 2. Change in mean sediment level over buried plates (+/- annual range), Hutt Estuary, 2010 to 2015.

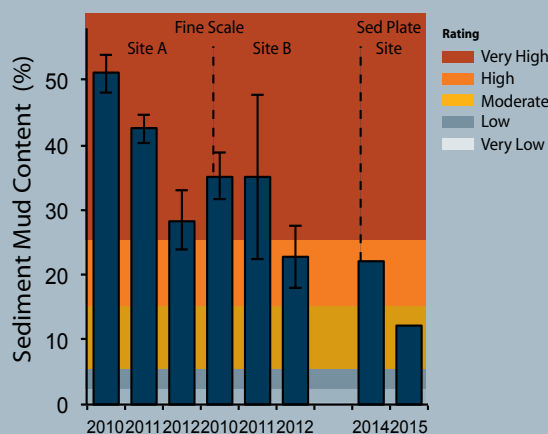


Figure 3. Sediment mud content (+/-SE, n=3), Hutt Estuary, 2010-15*.

*2010-2012 = triplicate composite samples
2014 & 2015 = single composite samples

This summary card presents the results of monitoring undertaken on 18 January 2015 to track changes to sediment indicators in Hutt Estuary. Detailed reporting is scheduled to be undertaken 5 yearly (next due 2017).

Methods

The depths to four concrete plates buried in intertidal sediment in 2010 were measured to assess the long-term sedimentation rate (Figure 1 - see Robertson and Stevens 2011 for full details). Sediment condition was assessed by measuring grain size and visually assessing the apparent Redox Potential Discontinuity (aRPD) depth, a measure of sediment oxygenation.

Risk Indicator Ratings

To help quickly identify the potential significance of sediment to Hutt Estuary, "risk indicator ratings" have been proposed (Table 1, see Stevens and Robertson 2014 for further detail) and are part of a suite of indicators being developed to assess the predominant issues affecting NZ estuaries (i.e. eutrophication, sedimentation, disease risk, toxicity and habitat change - Robertson and Stevens 2006, 2012, 2013). For each indicator, relative levels of risk (e.g. very low, low, moderate, high, very high) are assigned based on their relationship with water or sediment quality. Each rating is designed to be used in combination with relevant information and other risk indicator ratings, and under expert guidance, to assess overall estuary condition in relation to key issues, and monitoring and management recommendations.

Table 1. Risk indicator ratings for sedimentation rate, sediment mud content, and RPD depth.

RISK INDICATOR RATING	SEDIMENTATION RATE	MUD CONTENT*	RPD DEPTH
Very Low	<1mm/yr	<2%	>10cm
Low	>1-2mm/yr	2-5%	3-10cm
Moderate	>2-5mm/yr	>5-15%	1-<3cm
High	>5-10mm/yr	>15-25%	0-<1cm
Very High	>10mm/yr	>25%	Anoxic at surface

* rating revised in 2014 based on Robertson (2013).

2010-2015 Sedimentation Rate

Figure 2 and Table 2 summarise sediment level changes since the 2010 baseline. Changes in sediment levels over individual plates range from -13 to +2mm/yr, with an annual site average range of -0.8 to -9.3mm/yr. The overall mean sedimentation rate across the five years of monitoring is a decrease of 3.7mm/yr. Regular dredging of sediments from the channel in the lower estuary, and scouring of tidal flats during high river flows, are likely reasons for the low mean annual erosion rate recorded at the monitoring site.

2015 Sediment Mud Content and RPD depth

Sediment mud content was 12.3% (Table 3), reflecting firm muddy sands, less than the 23-51% recorded from the nearby shallow subtidal fine scale sites (Figures 1 and 3). Average aRPD depth was 1.5cm (Table 3). The 2015 RPD and mud content fall within the "moderate" risk indicator rating.

Conclusion

The sedimentation rate over the past 5 years showed slight erosion, but the elevated sediment mud content and shallow RPD depth indicate the estuary is susceptible to sediment related impacts from poor clarity and muddy intertidal substrates, with a macrofaunal community dominated by mud tolerant species - a common situation in NZ tidal river estuaries.

Recommended Monitoring

Continue annual monitoring of sediment rate, RPD and grain size to measure sediment deposition and temporal change on the only significant remaining intertidal flat within the estuary. Report results annually via a summary card, with detailed reporting undertaken 5 yearly in conjunction with fine scale monitoring (next scheduled for 2017).

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Table 2. Sediment monitoring results for Hutt Estuary, April 2010 - January 2015.

SITE	Measured Mean Depth to Sediment Plate (mm)						Change in Sediment Level Over Plate (mm)					SEDIMENTATION RATE 2010-15	
	11/04/2010	15/01/2011	21/02/2012	15/01/2013	22/01/2014	18/01/2015	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	(mm/yr)	RISK RATING
Hutt Plate 1	257	256	247	246	240	-1	-1	-9	-1	-6	-5	-3.7 (SE=0.56)	VERY LOW
Hutt Plate 2	250	248	245	242	232	-2	-2	-3	-3	-10	+2		
Hutt Plate 3	295	297	290	289	276	+2	+2	-7	-1	-13	-3		
Hutt Plate 4	287	285	285	282	274	-2	-2	0	-3	-8	0		
Mean Change in Sediment Level (mm/yr)							-0.8	-4.8	-2.0	-9.3	-1.5		

Table 3. Grain size results for the Hutt Estuary sedimentation plate site.

Date	RPD mean depth	Mud	Sand	Gravel
22 Jan 2014	1.5 (SE=0.2)	21.9%	74.5%	3.6%
18 Jan 2015	1.5 (SE=0.1)	12.3%	77.6%	10.1%

Note: Grain size results are based on a single composite sample comprising 10 sub-samples collected from the site. Mean aRPD depth is derived from 10 replicate measures.

References

- Robertson, B.P. 2013. *Determining the sensitivity of macro-invertebrates to fine sediments in representative New Zealand estuaries. Honours thesis, University of Victoria, Wellington.*
- Robertson, B.M. and Stevens, L. 2006. *Southland Estuaries State of Environment Report 2001-2006. Prepared for Environment Southland. 45p plus appendices.*
- Robertson, B.M. and Stevens, L. 2011. *Hutt Estuary: Fine Scale Monitoring 2010/11. Prepared for Greater Wellington Regional Council. 25p.*
- Robertson, B.M. and Stevens, L. 2012. *Tasman Coast: Waimea Inlet to Kahurangi Point, habitat mapping, risk assessment and monitoring recommendations. Prepared for Tasman District Council. 167p.*
- Robertson, B.M. and Stevens, L. 2013. *Moutere Inlet fine scale monitoring 2012/2013. Prepared for Tasman District Council. 25p.*
- Stevens, L. and Robertson, B.M. 2014. *Whareama Estuary: Intertidal Sediment Monitoring 2013/14. Prepared for Greater Wellington Regional Council. 6p.*

Location of sedimentation rate monitoring plates in Hutt Estuary.

Site	NZTM East	NZTM North
Plate 1	1759101	5433548
Plate 2	1759097	5433548
Plate 3	1759093	5433548
Plate 4	1759089	5433548
Peg 1	1759103	5433548
Peg 2	1759099	5433548
Peg 3	1759095	5433548
Peg 4	1759091	5433548
Peg 5	1759087	5433548



Measuring sediment plates in the lower Hutt Estuary, Jan 2015.