HUTT ESTUARY: 2020/2021 INTERTIDAL SEDIMENT MONITORING SUMMARY

Salt Ecology Short Report 001. Prepared by Keryn Roberts for Greater Wellington Regional Council, February 2021.

OVERVIEW

Since 2010, Greater Wellington Regional Council has undertaken annual State of the Environment (SOE) monitoring in Hutt Estuary to assess trends in the deposition rate, mud content, and oxygenation of intertidal sediments. Monitoring is undertaken at a single site in the only remaining intertidal flat in the lower estuary (Fig. 1). The 2020/2021 annual monitoring was carried out on 9 December 2020 and the results are reported in Tables 2 and 3 and Figure 2.

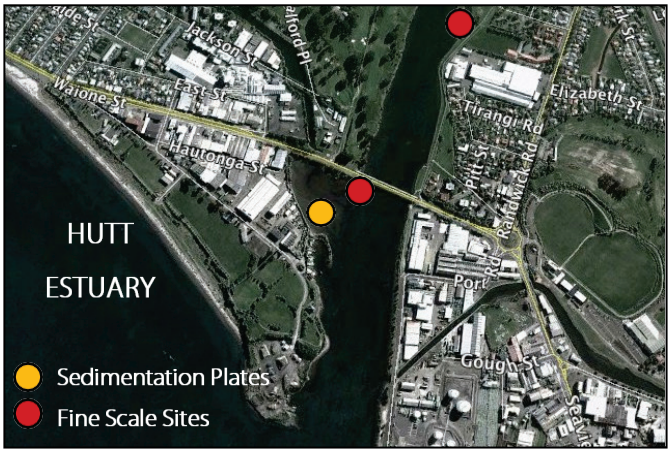
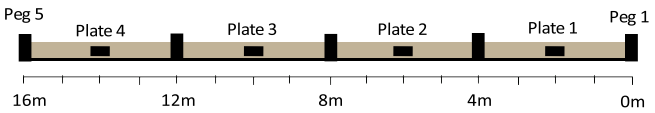


Figure 1: Location of monitoring sites in Hutt Estuary

METHODS

Estuary sedimentation was measured using the 'sediment plate' method, as described in Robertson & Stevens (2010). The approach involves measuring the sediment depth from the sediment surface to the top of each of four buried concrete plates. Measurements are averaged across each plate (n=3) and used to calculate a mean annual sedimentation rate for the site. As year-to-year sedimentation changes can be highly variable, the mean sedimentation rate is calculated for 5- and 10-year time periods.



A composite sample of the surface 20mm of sediment is collected adjacent to the plates, and analysed for particle grain size (wet sieve, RJ Hill laboratories). This approach allows changes in sediment muddiness to be determined even where there are no changes in sediment depth. Sediment oxygenation, another key measure of biological health, is visually assessed by measuring the depth at which sediments show a change in colour to grey/black, commonly referred to as the apparent Redox Potential Discontinuity (aRPD) depth. Results are compared to condition bands (Table 1) developed as part of the NZ Estuary Trophic Index (ETI) to indicate ecological state.

RESULTS

Sedimentation rate

The overall mean sedimentation rate over the past 10 years (2012-2021) was 3.1 mm/y (SE=3.0), reflecting an initial period of erosion, followed by steady sediment accrual since 2016 (Fig. 2). This overall rate corresponds to a condition rating of 'poor' (Table 2). However, due to more recent accrual, the mean sedimentation rate over the last 5 years (2017-2021) has increased to 9.3 mm/y (SE=4.1), also rated as 'poor'.

Table 2: Condition ratings for the Hutt River Estuary 2021

INDICATOR	RATING (2021)
Sedimentation rate (last 5-years)	POOR
Sedimentation rate (last 10-years)	POOR
Mud content (%)	FAIR
aRPD (mm)	GOOD

*mean sedimentation rate over the last 5-year and 10-year period.

Table 1: Summary of condition ratings for sediment plate monitoring

Indicator	Unit	Very Good	Good	Fair	Poor
Sedimentation rate[1]	mm/yr	< 0.5	≥0.5 to < 1	≥1 to < 2	≥ 2
Mud content[2]	%	< 5	5 to < 10	10 to < 25	≥ 25
aRPD[3]	mm	≥ 50	20 to < 50	10 to < 20	< 10

Ratings derived or modified from: [1]Townsend and Lohrer (2015), [2]Robertson et al. (2016), [3]FGDC (2012).

The reasons for the temporal variance in erosion and accretion patterns are unclear, but may relate to altered catchment sediment inputs, or variability due to river flow conditions. In the Hutt Estuary, high river flows can cause scouring of the tidal flats, which has been observed, on occasion, during monitoring. The Te Mome Stream channel, which discharges across the tidal flats near the site, also has a localised influence on sediment movement and partially explains the relatively high variance between plates within years.

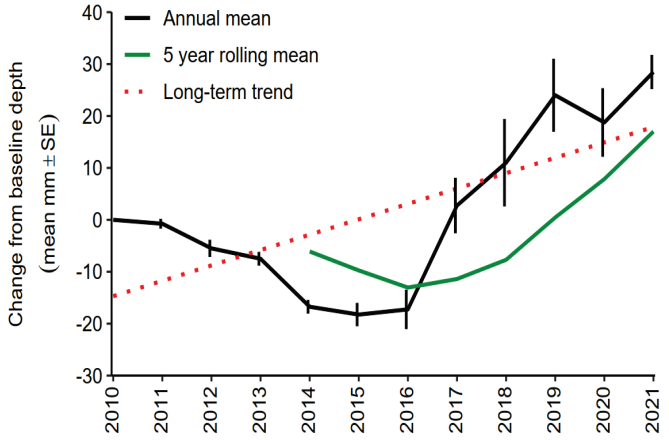


Figure 2. Change in mean sediment depth over buried plates (±SE) relative to the 2010 baseline, Hutt Estuary.

Sediment mud content

Mean sediment mud content in December 2020 was 12.3%. This value is among the lowest recorded to date and corresponds to a condition rating of 'fair'. Counterintuitively, the relatively low mud content in 2021 corresponds with accrual of sediment at the site. This result contrasts earlier surveys in which the lowest mud contents have correlated with periods of sediment erosion (2015, 2016 and 2020), likely owing to fine mud being flushed from the intertidal flats.

Table 3: Grain size and aRPD (mm) results for the Hutt Estuary sediment plate sites, 2014 - 2021.

Year	aRPD	Mud (%)	Sand (%)	Gravel (%)
2014	15	21.9	74.	3.6
2015	15	12.3	77.6	10.1
2016	8	16.4	74.8	8.8
2017	13	23.2	71.3	5.5
2018	15	23.8	68.4	7.8
2019	20	23.8	66.7	9.5
2020	25	17.2	73.7	9.1
2021	30	12.3	77.9	9.8

Note: Grain size results are based on a single composite sample.

Sediment aRPD depth

The average aRPD depth was 30mm, corresponding to a condition rating of 'good'. This level of oxygenation is partially maintained by the presence of crabs, shellfish (cockles) and worms, which turn over surface sediments and create voids that allow air and water to transfer oxygen to underlying layers.

Figure 3. Hutt Estuary monitoring site.

CONCLUSION

The sedimentation rate over the past 10 years shows an overall trend of deposition, which has increased over the last 5 years. Most recent sediment accrual is sand dominated with a relatively low mud content (2021; Table 3), comparable to previous years. Sediment movement and deposition is variable due primarily to the influence of stream inputs and flows. Dredging in the lower Hutt River may also influence sediment accrual on the adjacent intertidal flats. The 2021 results show the estuary flats remain under pressure from sediment impacts and further reinforce previous recommendations to manage sediment inputs to the estuary.

RECOMMENDED MONITORING

Continue annual monitoring of sedimentation rate, aRPD and grain size. Report results annually via a summary report, with comprehensive reporting undertaken five yearly in conjunction with 'fine scale' monitoring, next scheduled for 2022.

REFERENCES

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