# HUTT ESTUARY: INTERTIDAL SEDIMENT MONITORING SUMMARY, 2016/2017

Prepared for Greater Wellington Regional Council by Leigh Stevens, Wriggle Coastal Management, April 2017


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

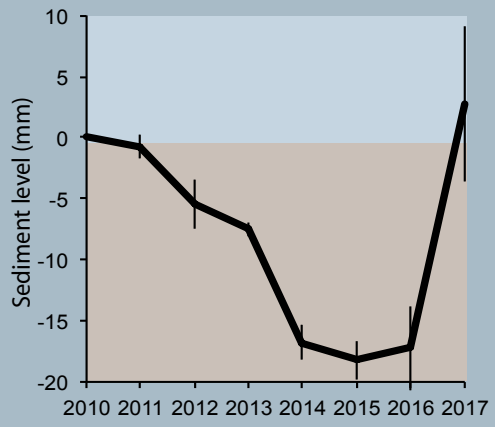


**Figure 2. Change in mean sediment level over buried plates (±SE, n=4), Hutt Estuary, 2010 to 2017.**

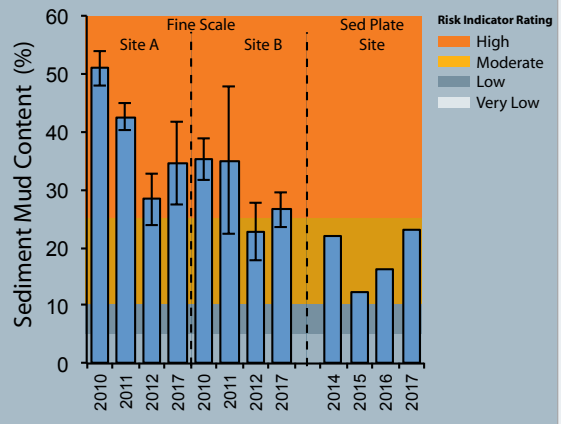


**Figure 3. Sediment mud content (±SE, n=3), Hutt Estuary, 2010-17*.**

*FINE SCALE SITES = triplicate composite samples
SED PLATE SITE = single composite sample

This summary card presents the results of monitoring undertaken on 27 January 2017 to track changes to sediment indicators in Hutt Estuary. Detailed reporting is scheduled to be undertaken 5 yearly (next due 2022).

## 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, visually assessing the apparent Redox Potential Discontinuity (aRPD) depth, and directly measuring sediment Redox Potential (RPmV@1cm).

## 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, Robertson et al. 2016). For each indicator, relative levels of ecological risk (e.g. very low, low, moderate, 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. Ecological risk indicator ratings for sedimentation rate, sediment mud content, and sediment oxygenation (aRPD depth 1cm).**

| RISK INDICATOR RATING | SEDIMENTATION RATE | MUD CONTENT | aRPD DEPTH |
|---|---|---|---|
| Very Low | <1mm/yr | <5% | Unreliable |
| Low | >1-2mm/yr | 5-10% | Unreliable |
| Moderate | >2-5mm/yr | >10-25% | 0.5-2cm |
| High | >5mm/yr | >25% | <0.5cm |

## 2010-2017 Sedimentation Rate

Figure 2 and Table 2 summarise sediment level changes since the 2010 baseline. The overall mean sedimentation rate across the seven years of monitoring is an increase of +0.4mm/yr, with changes in the annual site average ranging from a low of -9.3 (2014) to a high of +20mm/yr (2017). 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 overall mean annual sedimentation rate recorded at the monitoring site.

## 2017 Sediment Mud Content and RPD depth

Sediment mud content was 23.2% (Table 3), reflecting muddy sands, slightly less than the 27-35% recorded from the nearby shallow subtidal fine scale sites in 2017 (Figures 1 and 3). Average aRPD depth was 1.3cm (Table 3). The 2017 aRPD and mud content results fall within the "moderate" ecological risk indicator rating.

## Conclusion

The sedimentation rate over the past 7 years showed slight erosion for 6 consecutive years followed by large deposition and mean net accumulation of +0.4mm/yr. The elevated sediment mud content and shallow RPD depth indicate the estuary is susceptible to sediment related impacts from muddy intertidal substrates, poor clarity and with a macrofaunal community dominated by mud tolerant species - a common situation in NZ tidal river estuaries.

## Recommended Monitoring

Annually monitor sedimentation 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, and comprehensively in conjunction with 5 yr broad or fine scale monitoring.

# HUTT ESTUARY: INTERTIDAL SEDIMENT MONITORING SUMMARY, 2016/2017

**Table 2. Sediment monitoring results for Hutt Estuary, April 2010 - January 2017.**

| SITE | Measured Mean Depth to Sediment Plate (mm) | | | | | | | | Change in Sediment Level Over Plate (mm) | | | | | | | SEDIMENTATION RATE 2010-17 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 11/04/2010 | 15/01/2011 | 21/02/2012 | 15/01/2013 | 22/01/2014 | 18/01/2015 | 23/01/2016 | 27/01/2017 | 2010-2011 | 2011-2012 | 2012-2013 | 2013-2014 | 2014-2015 | 2015-2016 | 2016-2017 | (mm/yr) | RISK RATING |
| Hutt Plate 1 | 257 | 256 | 247 | 246 | 240 | 235 | 237 | 275 | -1.0 | -5.0 | -3.7 | -4.3 | -5.5 | -5.0 | 4.5 | +0.4 (SE=1.34) | VERY LOW |
| Hutt Plate 2 | 250 | 248 | 245 | 242 | 232 | 234 | 225 | 244 | -2.0 | -2.5 | -2.7 | -4.5 | -4.0 | -6.3 | -1.5 | | |
| Hutt Plate 3 | 295 | 297 | 290 | 289 | 276 | 273 | 278 | 292 | 2.0 | -2.5 | -2.0 | -4.8 | -5.5 | -4.3 | -0.8 | | |
| Hutt Plate 4 | 287 | 285 | 285 | 282 | 274 | 274 | 280 | 289 | -2.0 | -1.0 | -1.7 | -3.3 | -3.3 | -1.8 | 0.5 | | |
| Mean Change in Sediment Level (mm/yr) | | | | | | | | | -0.8 | -4.8 | -2.0 | -9.3 | -1.5 | +1.0 | +20.0 | | |

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

| Date | RPD mean depth | Mud | Sand | Gravel |
|---|---|---|---|---|
| 22 Jan 2014 | 1.5cm (SE=0.2) | 21.9% | 74.5% | 3.6% |
| 18 Jan 2015 | 1.5cm (SE=0.1) | 12.3% | 77.6% | 10.1% |
| 23 Jan 2016 | 0.8cm (SE=0.1) | 16.4% | 74.8% | 8.8% |
| 27 Jan 2017 | 1.3cm (SE=0.1) | 23.2% | 71.3% | 5.5% |

Note: Grain size results are based on a single composite sample comprising 4 sub-samples collected from the site. Mean aRPD depth is derived from 4 replicate measures.

## References


*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.*

*Robertson, B.M., Stevens, L., Robertson, B.P., Zeldis, J., Green, M., Madarasz-Smith, A., Plew, D., Storey, R., Hume, T. and Oliver, M. 2016. NZ Estuary Trophic Index. Screening Tool 2. Screening Tool 2. Determining Monitoring Indicators and Assessing Estuary Trophic State. Prepared for Envirolink Tools Project: Estuarine Trophic Index MBIE/NIWA Contract No: C01X1420. 68p.*

*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 2017.**