

TAURANGA AND WHAKATĀNE ESTUARINE WETLAND MONITORING, 2020



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TAURANGA AND WHAKATĀNE ESTUARINE WETLAND MONITORING, 2020

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1. INTRODUCTION

Bay of Plenty Regional Council is monitoring estuarine wetlands throughout the Bay of Plenty Region to determine what changes in condition and vegetation are occurring over time. This report describes the methods used to establish and measure seven estuarine wetlands in Tauranga Harbour and three estuarine wetlands in Whakatāne Harbour in June 2020. Monitoring methods are outlined in ‘A monitoring strategy for Bay of Plenty Regional Council estuarine wetlands’ by Fitzgerald *et al.* (2019) and included measuring plant species height and cover, collecting and analysing soil and foliage samples, undertaking five minute bird counts, taking photographs, and measuring plot physical parameters. Data from the first monitoring round were entered into an Excel workbook and supplied to Council, along with scanned copies of all original plot sheets, plot photographs, and a GPX file of plot locations.

2. METHODS

2.1 Estuary plots

Thirty-three permanent monitoring plots were established in Tauranga Harbour and 17 were established in Whakatāne Harbour at locations identified in Fitzgerald *et al.* (2019) based on vegetation and habitat mapping completed by Wildland Consultants 2013 and Beadel *et al.* 1992. Whakatāne Harbour plots were surveyed between 2 and 25 June 2020, Tauranga Harbour plots were surveyed between 8 and 29 June 2020 with the exception of one plot (Plot TAU10) which was surveyed on 19 March 2020. The location of all plots monitored is provided in Table 1 and 2. Each plot was 5 × 5 metres and marked with either metal poles (c.10 millimetres diameter, 2 metre length - tops bent over) wooden posts (c.40 millimetres diameter, c.445 millimetres length).

Back-up plots were identified by Fitzgerald *et al.* (2019), these were utilised when the original plot was either inaccessible, no permission was provided, or the plot was dominated by exotic pest plant species (such as pampas (*Cortaderia selloana*) at plots WHK 2 and 4). Replacement plots were chosen based on similar vegetation structure, relative proximity to the original plot, and accessibility. There were relatively fewer back-up plots for Tauranga Harbour, therefore the replacement plots used were not in the same wetland as the original plots, and were chosen based on similar vegetation structure and accessibility. As per the client’s request back-up plots were not established for Te Hopai Island (Plots TAU2, 3, 4, and 6) and Opureora plots (Plot TAU15) for which access was denied.

Table 1: Plots measured in Tauranga Harbour.

Plot Number	Coordinate of the SW Corner (Origin) (NZTM)		Location
	Easting	Northing	
TAU 1	1861647	5834052	Aongatete Estuary
TAU 5	1861317	5833922	Aongatete Estuary
TAU 9	1862267	5852232	Athenree
TAU 10	1877757	5820492	Wamapu Estuary
TAU 11	1861327	5834292	Aongatete Estuary

Plot Number	Coordinate of the SW Corner (Origin) (NZTM)		Location
	Easting	Northing	
TAU 13	1871117	5837542	Blue Gum Bay 1
TAU 16	1861897	5852542	Athenree
TAU 17	1873247	5834132	Otapu Bay
TAU 18	1863047	5835952	Matahui Point Intertidal Flats
TAU 20	1862437	5834692	Aongatete Estuary
TAU 24 ¹	1862947	5835492	Aongatete Estuary
TAU 25	1865387	5836402	Tirohanga Mangroves
TAU 26	1866047	5837062	Tirohanga Mangroves
TAU 27	1866727	5837042	Tirohanga Mangroves
TAU 28	1865877	5836512	Tirohanga Mangroves
TAU 29	1866537	5837122	Tirohanga Mangroves
TAU 30	1866167	5836582	Tirohanga Mangroves
TAU 31	1867007	5837062	Tirohanga Mangroves
TAU 32	1865407	5836702	Tirohanga Mangroves
TAU 33	1865127	5836792	Tirohanga Mangroves
TAU 34	1865137	5836332	Tirohanga Mangroves
TAU 35	1865687	5836182	Tirohanga Mangroves
TAU 36	1865837	5837262	Tirohanga Mangroves
TAU 41	1863937	5832952	Wainui Estuary
TAU 42	1858007	5841122	Katikati Estuary
TAU 43	1865477	5828792	Waipapa Estuary
TAU 44	1866517	5829432	Waipapa Estuary
TAU 45	1862947	5831472	Wainui Estuary
TAU 46	1862367	5830782	Wainui Estuary
TAU 47 ²	1877387	5824952	Waikareao Estuary 1
TAU 48	1861077	5846822	Ongare
TAU 49	1861737	5831122	Wainui Estuary
TAU 50	1862117	5831632	Wainui Estuary

- 1 Back up plot to replace plot TAU14 (Client did not apply for DOC permit to monitor this plot).
- 2 Back up plot to replace plot TAU21 (Client did not apply for DOC permit to monitor this plot).

Table 2: Plots measured in Whakatāne Harbour.

Plot Number	Coordinate of the SW Corner (Origin) (NZTM)		Location
	Easting	Northing	
WHK 1	1951007	5792642	Otamarakau-Matata-Whakatāne Dunes A
WHK 3 ¹	1951127	5792682	Otamarakau-Matata-Whakatāne Dunes A
WHK 7	1950647	5792432	Whakatāne Estuary
WHK 8	1950437	5792732	Orini Estuary
WHK 9	1949657	5792572	Orini Estuary
WHK 10	1950367	5792792	Orini Estuary
WHK 11	1951337	5792622	Whakatāne Estuary
WHK 12	1951317	5792582	Whakatāne Estuary
WHK 13	1949617	5792522	Orini Estuary
WHK 15	1950607	5792392	Whakatāne Estuary
WHK 17	1949747	5792692	Orini Estuary
WHK 18	1950717	5792432	Whakatāne Estuary
WHK 19	1950197	5792452	Whakatāne Estuary
WHK 20	1951397	5792582	Whakatāne Estuary
WHK 21	1951037	5792232	Whakatāne Estuary
WHK 41 ²	1949927	5792772	Orini Estuary
WHK 47 ³	1951127	5792612	Orini Estuary

- 1 Back up plot to replace plot WHK 2 (WHK 2 was entirely pampas).
- 2 Back up plot to replace plot WHK14 (WHK 14 was entirely pampas).
- 3 Back up plot to replace plot WHK16 (could not access this site).

Measurements Within Plots

Within each plot the following measurements were undertaken:

- A five minute bird count as per Hartley (2012). Birds were recorded to a maximum of 100 metres from the observer. In most instances, records were added to ebird (www.ebird.org).
- At least two photographs were taken as per Clarkson *et al.* (2004). An additional two photographs were taken at the majority of plots to provide a better visual representation of the plot. These were of the south west corner facing north-eastern and of the northern edge of the plot.
- Two soil samples were collected (using a 5 cm diameter and 7.5 cm deep corer) from just outside the south-western corner (to reduce damage to the plot) following the methods of Clarkson *et al.* (2004). These were analysed by Hill Laboratories for water content, bulk density, pH, conductivity, total carbon, total nitrogen, and total phosphorus.
- Foliage samples (five grams of foliage, from the tips of vegetation) were collected for a common species in each plot. These were analysed by Hill Laboratories for total carbon, nitrogen and phosphorous content.
- Vegetation monitoring followed the methods of Clarkson *et al.* (2004):
 - All vascular plant species were identified and recorded. Usnea and other lichens and epiphytes were recorded to the lowest possible taxonomic level.
 - The percentage cover for each canopy species within the plot regardless of whether rooted in the plot or not was estimated.
 - The percentage cover of each species in the remaining vegetation layers was estimated.
 - Any species in the vicinity that were growing in the same vegetation type and were not encountered in the plot were listed.
 - The maximum and average height of each species in the plot was recorded.
- Vegetation-based plot indicator scores and condition index as per Clarkson *et al.* (2004) were calculated.
- The following physical parameters were measured in each plot from the south-western (origin) corner:
 - Redox (ORP) measurements, taken at 5 cm and 15 cm depths with a YSI dissolved oxygen meter (in tidal environments the water table was often too low to measure Redox).
 - The water table depth was measured (if <30 cm). Note that in tidal environments this only represented the lower tide conditions.
 - Water temperature, pH, and conductivity.

2.2 Estuarine wetland record sheet

For each estuarine wetland in which plots were sampled, a wetland record sheet was completed (16 in total) as per the methodology in Clarkson *et al.* (2004). The following features and indicators were recorded and calculated:

- Classification of the wetland system, subsystem, class and form level (summarised in Table 1 of Clarkson *et al.* 2004).
- The wetland condition score (Table 4 in Clarkson *et al.* 2004).
- The wetland pressure score (Table 6 in Clarkson *et al.* 2004).

GPS coordinates were recorded for each plot, and, in addition, for estuaries with more than one plot, a centre point for the estuary was recorded.

2.3 Data storage

All monitoring data sheets (vegetation, five-minute bird counts and wetland record sheets) were scanned and securely stored. Raw data from the data sheets was entered into an Excel workbook. Detailed data analysis was not undertaken.

Plot photographs were securely stored with the following information:

- Plot location TAU (Tauranga) or WHK (Whakatāne).
- Plot number.
- Direction of the photograph, such as: SWcornerN (south west corner facing north).
- Date.
- General photographs of the plot were saved under their plot name and number.

2.4 Limitations of the methods

The wetland record sheet used from Clarkson *et al.* (2004) has been designed for inland wetland systems not coastal estuarine wetland systems. This meant that there were the following limitations:

- The boundaries of the catchments for coastal estuarine wetlands are not as well defined as inland wetlands.
- The tidal nature of these estuarine wetlands meant that data collected for the following indicators would vary depending on the position of the tide when the data was collected, including:
 - The water table depth.
 - Soil moisture content.
 - Redox measurements at 5 and 10 cm depths, which were dependent on the tides being high enough to have water to take the measurements in.

Data entered into the wetland record sheet on catchment information was influenced by how well the catchment was known by the field ecologist.

There is no replication in estuarine wetlands with only one plot.

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