Science Snapshot report

Physical Coastal Monitoring

2023

BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Over the course of a year along the Bay of Plenty coastline, changes in the beach morphology result from "cut and fill" processes. The movement of sediment from this process is dependent on wind and wave action as well as sediment properties. These seasonal changes are superimposed on short and long term processes which act to produce periods (tens of years) of erosion, accretion and dynamic equilibrium.

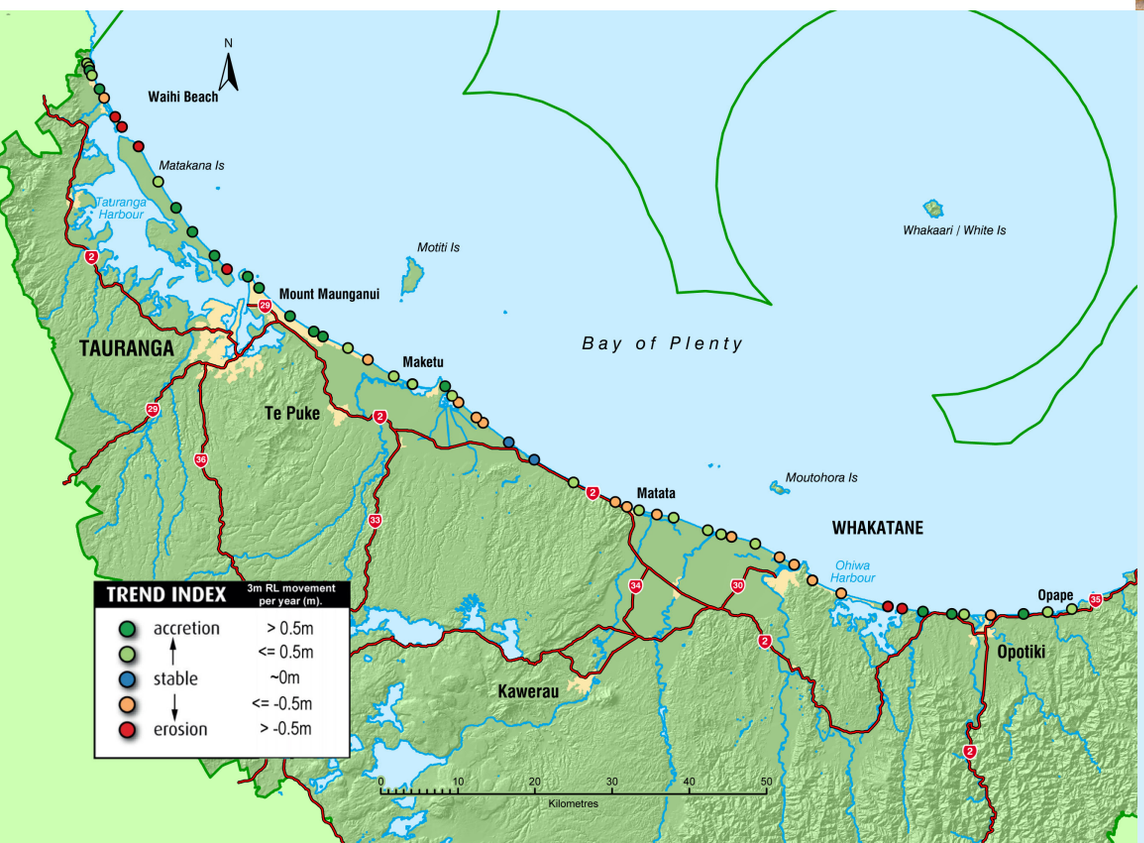
Beach profiles

Bay of Plenty Regional Council established a coastal beach monitoring programme in 1990, which built on a network developed by Professor Terry Healy. A total of 53 sites are profiled on an annual basis, normally in February. The shape of the beach (cross-section) is measured and the position of key features such as the location of the frontal dune toe is documented. The volume of sand on the beach is also calculated. This monitoring covers 135 kilometres of sandy coastline.

Long-section profiles also get measured, typically in front of sections of beach where urban development is present. Pre- and post-storm event cross-sections also get collected when necessary.

Council continues to develop their monitoring techniques within this very active zone of the environment. Newer measurement methods and technologies are regularly discussed by Council staff to ensure the data that is measured is robust and collected efficiently.

The cross-section data collected feeds into local coastal hazard analysis. All local district/city Councils within the Bay of Plenty region have recently undertaken this type of analysis, where the cross-section data gets used for assessing short and long-term trends, which helps define the position and shape of hazard lines and zones.

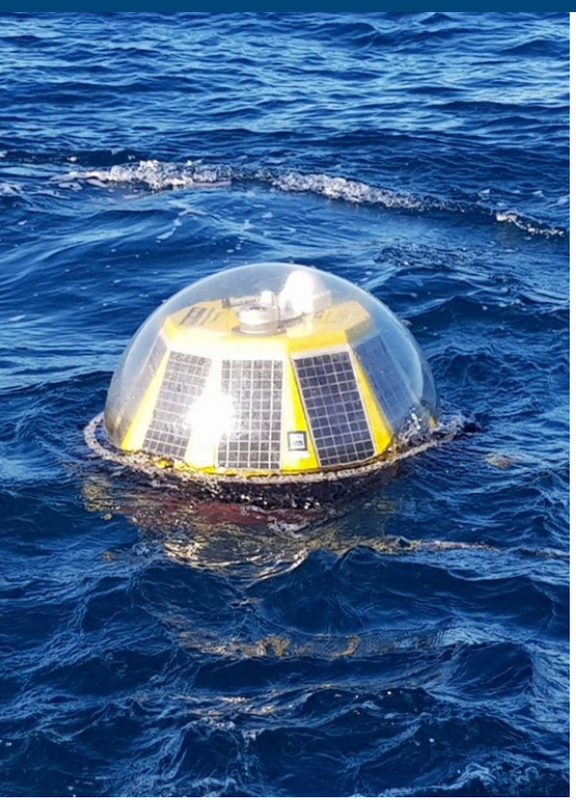


Results from the 2011-2022 cross-section datasets for each of the 53 monitoring sites show the following trends (left).

The following beaches are exhibiting trends of ongoing erosion:

- **Ōhope Beach**
- **Pukehina Beach**
- **Southern area of Waihī Beach.**

It should be noted that the measured profile is just a single line of data in a very dynamic system and marked variation can occur in close proximity to each of the monitoring sites.



Wave climate

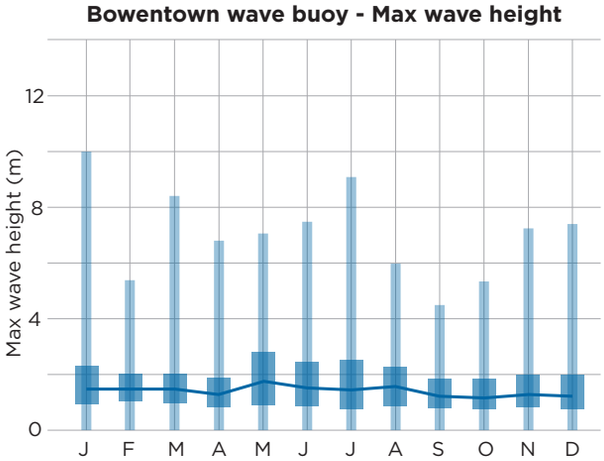
Wind blowing over the sea surface produces short waves or ripples. The stronger the wind, and the more time and distance it has to work on the waves, the higher and longer they get. In a storm the rough sea is a mixture of waves of different heights and lengths, travelling in different directions. Once started, waves can travel long distances (as "swell"), crossing whole oceans.

Data from the Council Triaxys wave buoy located 13km north of Pukehina Beach (picture above) is used to ground truth models as well as providing a useful data source and safety tool for recreation users of the open sea environment within the Bay of Plenty. Data for the period October 2005 to May 2023 shows maximum recorded Hmax = 12.4m (13/4/2017). A second buoy has more recently been deployed (February 2020) off the Bowentown entrance in the western area of the Bay of Plenty.

Wave height data for the full periods of record for both buoys are shown in box plots for Hmax and Hsig (below). Regular servicing by the Data Services team keeps the data capture and data quality high for this instrument.

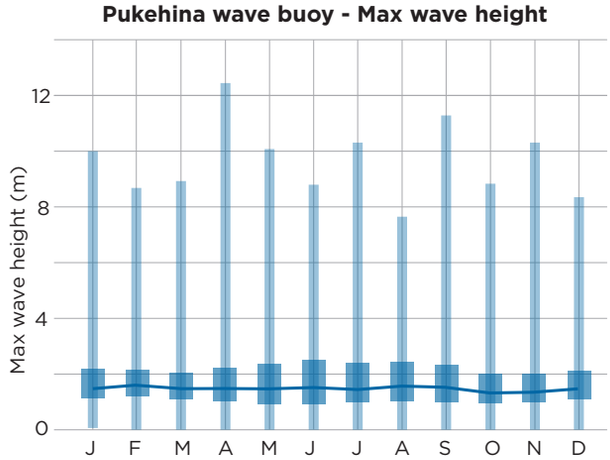
Wave buoy wave height data

Bowentown wave buoy - Max wave height



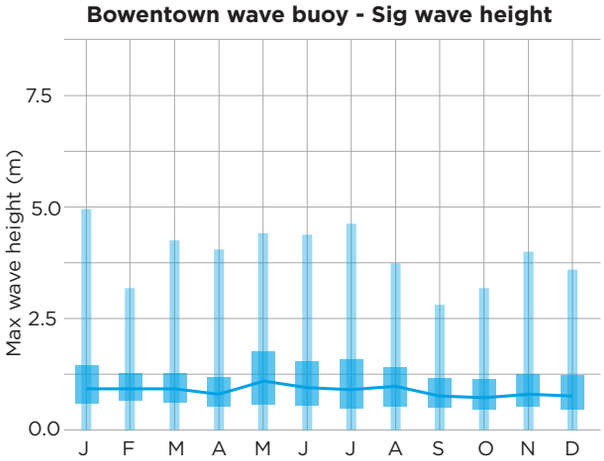
median, 25/75 and min/max quantities

Pukehina wave buoy - Max wave height



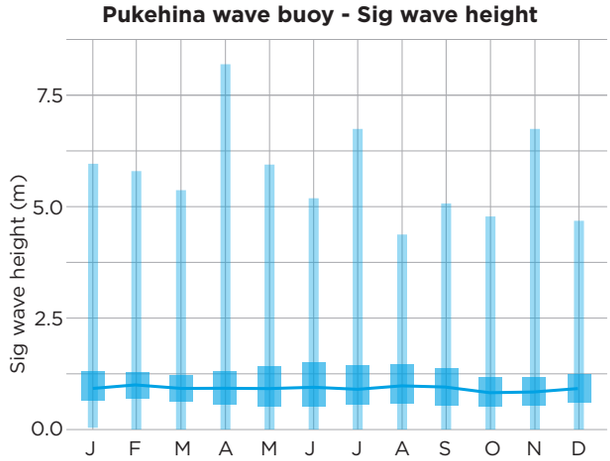
median, 25/75 and min/max quantiles

Bowentown wave buoy - Sig wave height



median, 25/75 and min/max quantiles

Pukehina wave buoy - Sig wave height

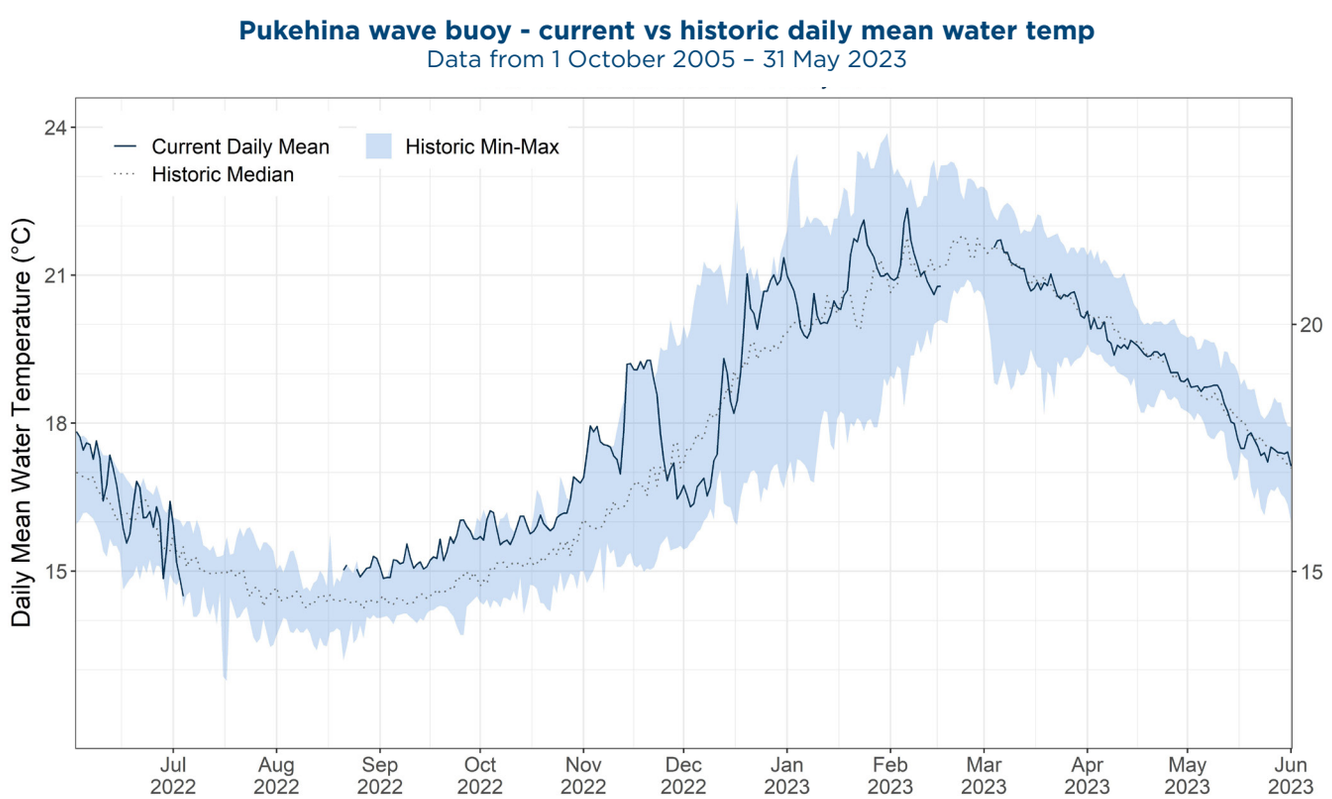


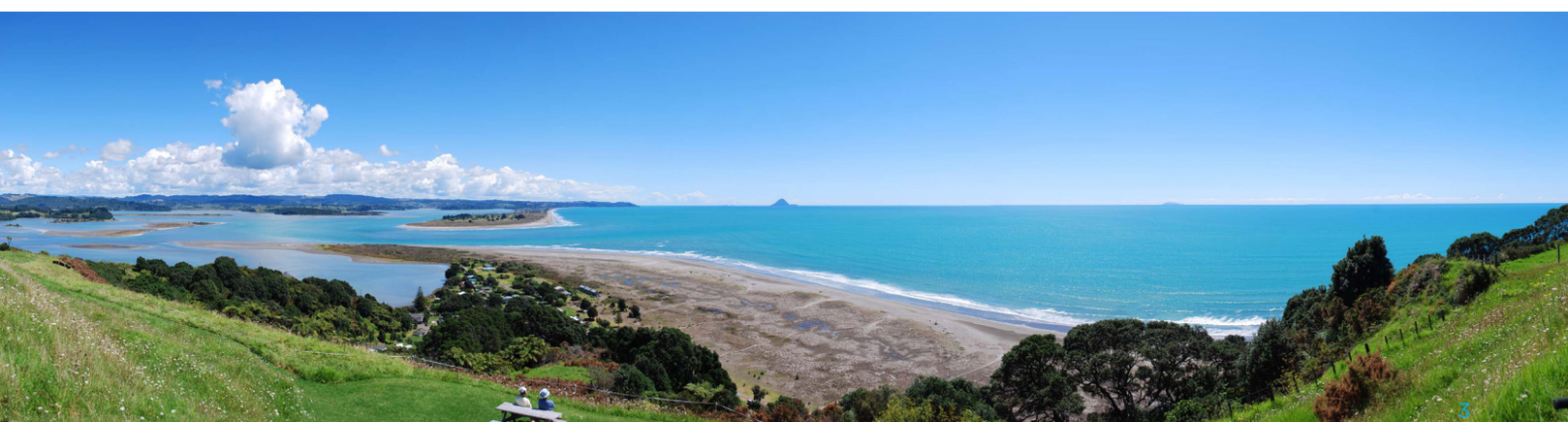
median, 25/75 and min/max quantiles

Wave buoy temperature

In addition to the wave parameters measured by the wave buoy, "surface" temperature is also recorded. The sensor is mounted at the base of the buoy hull and is approximately 0.5m below the water surface. As expected, strong seasonal temperature patterns exist. Year to year variations also exist as the water mass is affected by short, medium and long term climatic factors, such as diurnal solar heating, El Nino Southern Oscillation and Interdecadal Pacific Oscillation. This information is used for investigating ecological trends within open coast and estuarine environments. Local fisherman also use it to get a picture of what fishing may be like at particular times of the year. The latest 12 months of temperature data is shown on the plot (below) with a historic range also included to show the variability at any thing of the year for the near 20 years of record at this location.

Find wave buoy data on our Environmental Data Portal **envdata.boprc.govt.nz**





For more information on coastal monitoring undertaken by Bay of Plenty Regional Council, contact the Science Team on 0800 884 880 or visit **www.boprc.govt.nz**

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