

In early November 2023 the Department of Conservation (DOC) and the University of Auckland Waipapa Taumata Rau (UoA), with the support of Te Whanau a Rangiwhakaahu (Ngātiwai), returned to the Poor Knights to monitor the experimental removal of the subtropical sea urchin *Centrostephanus rodgersii*. The monitoring was planned for 6 months after removals from three areas at the Poor Knights – Rikoriko cave (630 m², 842 urchins), Middle Arch (540 m², 948 urchins) and Ngoio Rock (1000m², 2350 urchins) were cleared in April.



Figure 1. Ngoio Rock, with a proliferation of long spined sea urchins, *Centrostephanus rodgersii*.
Photo: Paul Caiger

There are four aims of the monitoring:

*Objective 1 – To survey *C. rodgersii* and other urchin populations in three trial removal locations and control locations to assess any changes in urchin density and assess the rate (if any) of re-incursion by *C. rodgersii* back into removal areas.*

Objective 2 – To survey habitat in three trial removal locations and associated control locations to assess the changes in the benthic communities (% covers) related to the removal of urchins and how this may change over a two-year period [Arie's work & photo quadrats].

Objective 3 – To survey fish populations at three trial removal locations and associated control locations to assess if there are any changes in fish behaviour associated with the removal/culling of urchins.

*Objective 4 - Visual estimate of overall *Ecklonia* canopy cover to assess if there are any changes in macroalgae composition after *C. rodgersii* removal.*

The dive team, from DOC and UoA, travelled up from Leigh on 9(2)(g)(ii). Three dive teams split the work needed to collect data to meet the objectives of the monitoring. To fulfill the first objective two divers surveyed the removal area for any urchins that had reinvaded and randomly

measured their test size. Once the monitoring for all objectives had been completed the team went back in and removed the urchins found in the removal areas. 301 urchins were removed from the three plots: 90 from Rikoriko, 53 from the removal area of Middle Arch and another 21 from the pinnacle plus 137 from Ngoio Rock.

Photogrammetry (mapping the area using photos) of selected areas was repeated to meet objective 2 (see figure below). Laminated photographs of sites were used by divers to relocated areas and photograph any changes.

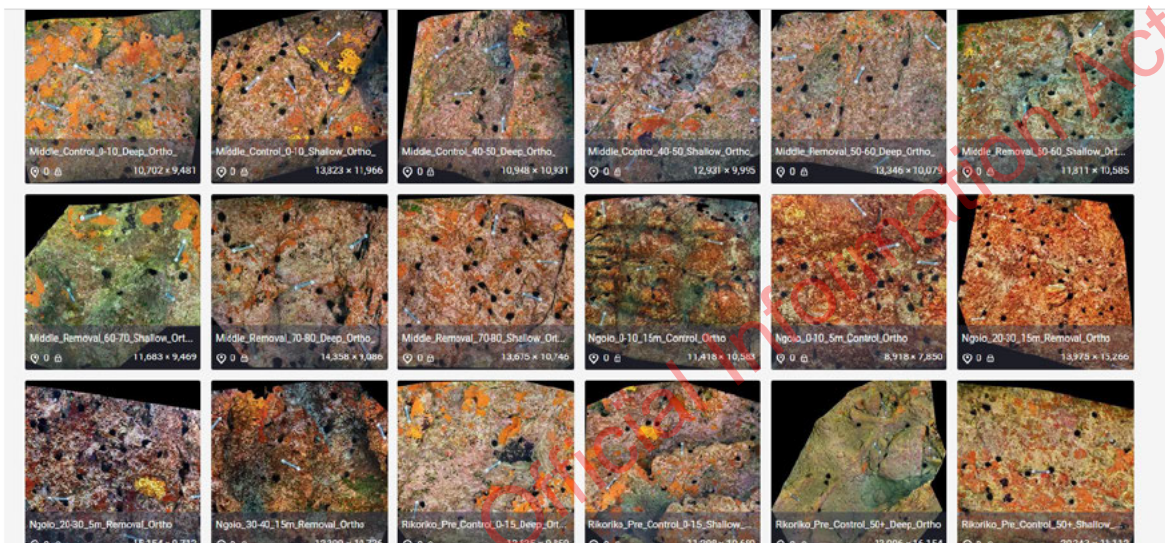


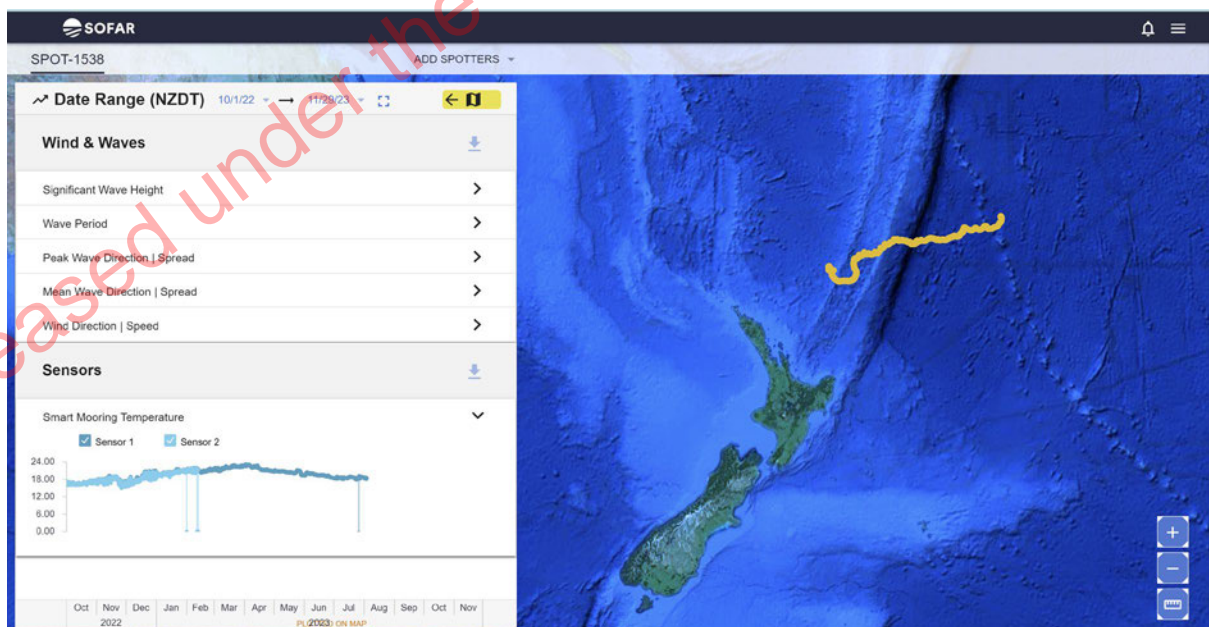
Figure 2. Photomosaics of wall communities utilised for recording various invertebrate parameters and sea urchin numbers. Photo: Arie Spyksma.

To meet objective 3, fish transects were completed to enable comparisons of reef wall communities inside and outside experimental removal areas. Time-lapse cameras were deployed to record the urchin grazing behaviour overnight.



Figure 3. Diver performing fish surveys at the Poor Knights Islands pre-urchin removal. Photo: Paul Caiger

While completing the monitoring the team also took the opportunity to deploy the new buoy to replace the one blown away by Cyclone Gita. The buoy measures temperature at the surface and at 20 m, wave height and wind direction, uploading the data hourly. The data is all freely available at <https://aqualink.org/sites/3293>. The old buoy continued to log after it had left its mooring at the Knights, giving researchers temperature data from right across the Pacific ocean. The data from this buoy will be used to help researchers understand how climate change is influencing the biodiversity at the Poor Knights Islands.



We will now take some time to review the work that has been done so far and consider the options for long-term management. Follow-up monitoring is planned for 12 months (April 2024) and 24 months (April 2025) to assess how the recovery of the wall communities is doing and the degree to which *C. rodgersii* is recolonising the removal areas.

If you have any questions, please contact Evan Davies (edavies@doc.govt.nz) or Monique Ladds (mladds@doc.govt.nz).

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