

Winter 2024.

Noosa's Huon Mundy reefs update

Our project is located on Kabi Kabi Sea Country. The project is guided by the Kabi Kabi Traditional Owners who provide cultural knowledge and collective memories of the Noosa River and Lakes region and advise our restoration work.

In June 2024, independent consultants, Ecological Service Professionals, completed a round of monitoring of Noosa's Huon Mundy Reefs, just shy of two years since the reef foundations were laid at the restoration locations of Tewanin, Goat Island, Noosa Sound East, and Noosa Sound West (Figure 1) in the lower reaches of the Noosa River estuary.



Figure 1 Location of Noosa's Huon Mundy reefs.

In short, the good news is that despite lengthy summer rains and high river turbidity over 2023-2024, the reefs continue to develop above expectations. All reefs show high oyster densities, regular recruitment of young oyster 'spat' and an increase in the median size of oysters.

Oyster density and distribution

We are pleased to report that the density of oysters at all four restoration locations remains above 550 oysters per m², which exceeds the target of 200 oysters per m² required for healthy reef development.

The monitoring, however, indicated a dip in the density of oysters at the Tewanin and Goat Island sites, of 15 and 30 percent respectively. This was likely in response to the long period of summer rains causing low river salinity between September 2023 and June 2024. Yet, the monitoring report stated that the oyster mortality

at non-reef sites was much higher than at reef sites and that the density changes were well within normal limits for healthy reef development.

The density of oysters across the reefs is not homogenous. Oysters on different parts of the reefs are exposed to different stressors. High on the reefs, they are more subject to heat, desiccation, and predation by species like wader birds. Lower on the reefs, which remain submerged for longer, they are more subject to predation from fish and invertebrates, such as marine snails, worms and octopus.

For this reason, the reefs are monitored (Figure 2) along the inner margins (closer to the shore and generally shallower), outer margins (furthest from the shore and generally deeper) and on top of the reefs (where reef exposure is generally the highest). Monitoring revealed that while oyster densities vary across a reef's profile, the density of oysters across the profile continues to increase.



Figure 2 Ecological Service Professionals monitor Noosa Sound West. Photo M Connell

Oyster recruitment continues to occur primarily on the lower surfaces of the reefs, where they are better protected from smothering river sediment and turfing algae, both which dominates the upper surfaces of the reefs. Oysters have recently started to outcompete the sediment and algae and can be seen, in places, growing on the lower vertical edges of the reefs. Individual adult oysters are now also surviving on upper reef surfaces. This follows a similar pattern of reef development seen on Rock Oyster reefs in Port Stephens, New South

Wales (NSW), which TNC restored in 2021 in partnership with the NSW Department of Primary Industries Fisheries.

Oyster size

The median size of oysters growing in the restoration areas has increased from 21mm in September 2023 to 24mm in June 2024 (Figure 3). The Rock Oysters surviving on the reef structures generally had a similar size range to that recorded on remnant rubble and structured habitats, though the density was much greater on the reef structures.



Figure 3 Oyster size measurement Photo S Walker

Shoreline condition

Waves generated by storms and boat wake are a major shoreline erosion problem in modern day estuaries. Noosa is no exception. For example, erosion at Goat Island is undercutting the southern bank (Figure 4), causing trees to die and collapse into the river. The exposed sediments are then readily washed away, exacerbating river turbidity and sediment levels. A common response is often to fortify the shoreline with rock seawalls, or other hard materials, which can increase wave refraction, which exacerbates erosion elsewhere.

Shellfish reefs, however, can be used to great effect in the fight against coastal erosion. They can be designed to attenuate waves while minimising wave refraction. They also provide benefits to nature. The shellfish reefs at Goat Island are showing just that. Monitoring has shown that erosion shoreward of the Goat Island reefs has been halted and sand is building up between the shoreline and the reefs. Mangrove propagules have also begun to settle and establish on the sand build up, adding to the shoreline protection offered by the reefs. However, between the reef patches and up and downstream of the reefs, wave action continues to erode and threaten Goat Island.



Figure 4 Erosion and undercutting at Goat Island. Photo S. Walker

Mangrove propagules have also begun settling and growing on the reef patches with several now in their second year of growth. Seagrass has also begun recruiting between reef patches, particularly at the Noosa Sound East and West sites.

Seagrass

Last year, we were excited to report that the reefs were encouraging the establishment of seagrass meadows between and near some of the reef patches. This was particularly evident at the Noosa Sound East and West reefs.

Between September 2023 and June 2024, these new meadows disappeared, likely due to the prolonged summer rains which elevated river turbidity levels for extended periods. High turbidity is widely known as a major killer of seagrass (see also the Noosa Sediment Study Report, by the Noosa Parks Association, which TNC sponsored, for more information about the nature of Noosa's sedimentation challenges).

Fish

A variety of fish species continue to aggregate around the reefs and are regularly seen by locals foraging over the reefs and in soft sediments between reef patches. Future monitoring will include an updated technical assessment of fish diversity.

Oyster Gardening

Now well into its second season, Noosa's Oyster Gardening Project continues to grow oysters for Noosa's Huon Mundy Reefs. Oyster gardens also provide a window into the unseen wildlife found in the Noosa River. Led by an active crew of river guardians from the Noosa Integrated Catchment Association (NICA), along with their large and committed team of oyster gardeners, oyster gardens continue to quietly achieve amazing outcomes. This includes the use of the oyster gardens as an educational tool to help visitors understand the complexity of the underwater community in the Noosa River (Figure 5).



Figure 5 Oyster gardens are used as a window to the underwater community Photo M. Connell

Despite high sediment loads and freshwater levels in the Noosa River over the summer of 2023-2024, NICA reports that the oyster gardens continue to thrive (Figure 6). Along with Rock Oysters, Pearl Oysters tend to colonise and dominate many oyster gardens. Pearl Oysters grow faster and larger than Rock Oysters, so can readily take over an oyster garden, leaving less space and food for Rock Oyster gardens.



Figure 6 Oyster gardening rock oyster "clump" Photo M. Connell

NICA has also established additional oyster gardens (Figure 7), as experimental plots as we seek to understand what surfaces oysters prefer to settle on (for example, rough or smooth oyster shells). The team has also commenced experiments to reveal at what stage of their life oysters become less vulnerable to predation, particularly from fish. This will help us identify the best moment to release oysters from the gardens back into the restored rock oyster reefs.



Figure 7 Setting up additional oyster gardens for settlement trials Photo R. Howard

Noosa's Huon Mundy Reefs were established by a partnership between The Nature Conservancy, Noosa Shire Council, The Thomas Foundation, the Queensland Government, the Australian Government's Reef Builder initiative, the Kabi Kabi and the Noosa community. The Noosa Parks Association (NPA) played a key role in the early development of the oyster reef restoration project concept in the Noosa estuary.