Ministry *of* Marine Resources

GOVERNMENT OF THE COOK ISLANDS

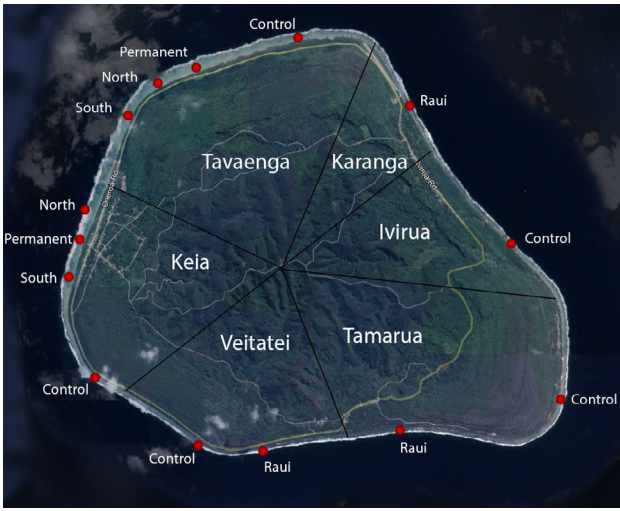
Mangaia Marine Survey

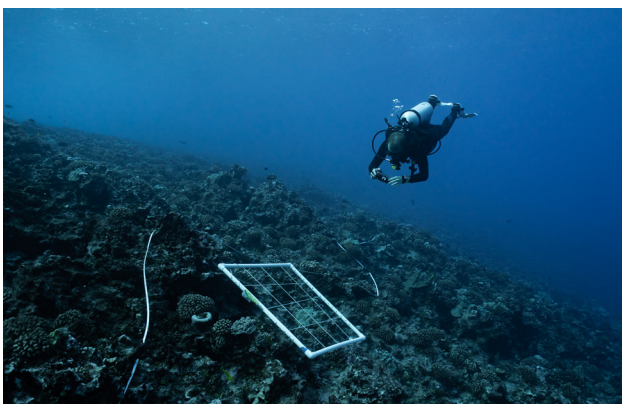
June 2022

About Mangaia

Mangaia is the southern-most island of the Cook Islands. Mangaia is divided into six *puna* (districts), each with its own traditional leader that actively uses *ra'ui* to manage local resources. *Ra'ui* in Mangaia are temporary or permanent closures that allow restoration of marine resources.

This traditional management system is actively enforced by traditional leaders and the community, and is reported to be well-respected. When leaders determine resources to be plentiful in their area, temporary *ra'ui* will be opened for harvest. As a result, locations and status of *ra'ui* frequently change.





Survey Details

- May 30th - June 8th of 2022
- Invertebrates, fish, and substrates were surveyed at 14 sites (see map)
- Within each site, surveys were performed within the reef on the reef flat, reef crest and outside the reef on the forereef slope at 10m depth
- Invertebrates were surveyed in all habitats
- Fish and substrate were only surveyed on the forereef
- All sites were previously surveyed in March, 2018 using the same methods

Substrate

- North-facing sites had the highest coral cover
- South-facing sites had the lowest coral cover
- Overall hard coral cover more than doubled since 2018
- Mangaia has the 3rd highest coral cover in Southern Group
- Algae cover decreased since 2018
- *Rimu* (*Caulerpa racemosa*) was most abundant in the Tamarua Ra'ui reef flat

Invertebrates

Overall
- Highest densities at Keia Control
- Lowest densities at Tavaenga South

* **Invertebrates** - animals without backbones

***Ungakoa* (*Cerisignum maximum*)**
- Most common invertebrate
- Densities highest on reef crest

***Rori Toto* (*Holothuria atra*)**
- Second most common invertebrate
- Highest density at Tavaenga Permanent

***Vana* (*Diadema setosum*)**
- Highest densities on forereef
- Highest densities in Southern Group
- Areas with highest numbers of *vana* had lowest amount of algae

***Pa'ua* (*Tridacna* spp.)**
- Island-wide clam populations appear stable
- Fewer large individuals than in 2018
- Densities increased at Keia Control and Veitatei Control
- Densities decreased at Tamarua Ra'ui

Chromis acares

Fish

- Fish densities decreased since 2018. This large decline was in *Maito* (*Ctenochaetus striatus*) and *Chromis acares*
- Parrotfish densities decreased by more than half
- Only one *maratea* (*Cheilinus undulatus*) was observed (off transect) in 2022
- Both target and non-target species declined confounding efforts to determine cause

Additional Observations

In late 2021 a school of *ature* (*Selar crumenophthalmus*) entered Mangaia's harbour. A local management measure was created that prohibited gillnet and cast net use for *ature*. This strategy proved effective and preserved the *ature* population in the harbour. In addition to allowing a sustainable *ature* harvest (using hook and line), the presence of the ature attract gamefish (*a'ai*, *varo*, and *titiara*) which are caught from shore.

(U'u) Chlorurus frontalis
These large parrotfish are susceptible to overfishing

Acknowledgements

The Ministry of Marine Resources would like to extend a gracious *meitaki ngao* to Numangatini Ariki e te Aronga Mana, the Mangaia Island Government, Poroa Arokapiti and the Fishing Club, Taokia Taokia, Pa Vaeau, and the Mangaia island community for their support and assistance during our expedition.

We would also like to recognize MMR Secretary Pamela Maru and Director of Inshore and Aquaculture Koroa Raumea for their continued support. Many thanks to our field team, Fisheries Officers Tua Matepi, Kirby Morejohn, Michael Parrish, Fiona Pearson, Adrian Teiotu, and Paul Upokokeu.

Management Recommendations & Options

Marine resource management in Mangaia appears to be one of the best in the country. The following recommendations may be used to further improve Mangaia's fisheries management. These regulations are common across the region and/or based on our survey findings and observations.

Overall

- Prohibit or develop rules for the sale and export of reef fish and invertebrate species
- Never open permanent *ra'ui*
- Create more permanent *ra'ui*
- Increase sizes of permanent *ra'ui*

Fish

- Prohibit spearfishing at night for sleeping fish
- Develop rules for net fishing
- Prohibit *maratea* harvesting

Invertebrates

- Create minimum size limit for *pa'ua* (e.g. 150 mm)
- Create daily bag limit for *pa'ua* (e.g. 10 *pa'ua*/person/day)
- Create a minimum size limit for crayfish (e.g. 85 mm carapace length)
- Prohibit the harvest of egg-bearing female crayfish
- Avoid breaking corals when harvesting *ungakoa*

Camouflaged scorpionfish

MMR fisheries officers survey Mangaia reef flat

Please contact us for more information

Juvenile domino damselfish sheltering in anemones were frequently observed on Mangaia forereefs

Ministry of Marine Resources

(682) 28-721 PO Box 85, Avarua, Rarotonga, Cook Islands www.mmr.gov.ck