

MITIARO

NEARSHORE MARINE ASSESSMENT

2019



Ministry of Marine Resources
GOVERNMENT OF THE COOK ISLANDS

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Front Cover: The Tai Roto of Mitiaro Photo: ©MMR/K.Morejohn

Inside Rear Cover: Beach on the eastern coast Photo: ©MMR/K.Morejohn

Rear Cover: Vaka fishermen netting fish during the Maroro Tu Photo: ©MMR/K.Morejohn

Avarua, Rarotonga, Cook Islands, 2019

MITIARO

NEARSHORE MARINE ASSESSMENT

Prepared for the Mitiaro Island Council and Community

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Ministry of Marine Resources



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This book is an abbreviated form of the 2018, Mitiaro
Nearshore Invertebrate and Finfish Assessment

TABLE OF CONTENTS

INTRODUCTION	1
METHODOLOGY.....	2
RESULTS.....	3
Invertebrates.....	3
<i>Ungakoa</i>	4
<i>Rori Toto</i>	4
<i>Paua Kura</i>	5
<i>Paua</i>	5
Finfish	7
Coral and Substrate	8
MANAGEMENT OPTIONS	9

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INTRODUCTION

Mitiaro

Mitiaro has a fringing coral reef with a total reef circumference of 19 km. This reef encompasses the entire island including few sandy beaches situated in between *makatea* cliffs. Mitiaro reef flats are shallow and are very exposed at normal low tides. This exposure can stress corals, invertebrates and reef fish. Invertebrates that can survive the pressure of prolonged exposure to air are further subjected to harvest by local communities. There is one designated *rā'ui* on Mitiaro located directly in front of the village named Oponi te Vai Rā'ui. Located on the western side of the island this *rā'ui* encompasses both sites, Oponi and Kovea (Figure 1). At the time of the survey this *rā'ui* was open and to our knowledge still is, however we chose to include this for analysis between sites.

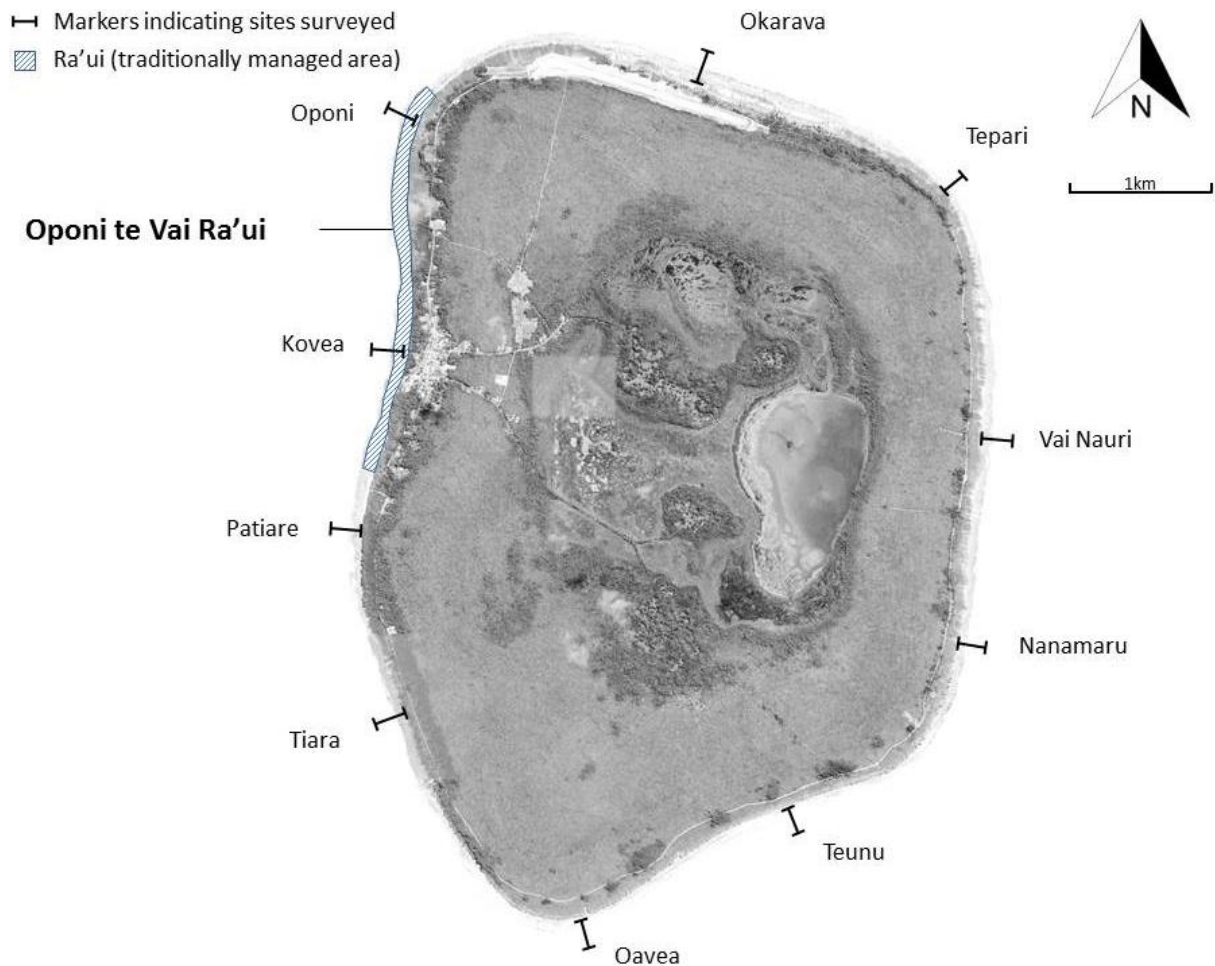


Figure 1. Mitiaro survey sites and traditionally managed areas. Map source: Google DigitalGlobe.

METHODOLOGY

The survey in Mitiaro took place from the 30th April to 3rd of May 2018 at ten field sites around the island. Survey sites were selected to include any existing or pre-existing *rā'ui* and nearby control areas (unregulated areas open to harvest). Finfish, invertebrates and substrate data were collected at each field site on both islands using SCUBA transects in 10 m of water on the fore reef slope. Invertebrate data were collected on the reef flat using snorkel and walk sampling transects.

Data collection of all species included identification to the lowest possible taxonomic classification (taxa), counts, and measurements when applicable. For finfish, fork length measurements (mm) were visually estimated. For invertebrates, length measurements were recorded (mm) for the first ten individuals of commonly harvested species or species of interest.



MMR staff swimming along 50 m transect in 10 metres of water. ©MMR/K.Morejohn

RESULTS

Invertebrates

A total of 1,890 individuals were observed across 90 transects in Mitiaro, representing 20 different taxa. The most frequently observed invertebrate was the *ungakoa* (*Dendropoma* spp.), where a total of 1,235 individuals were recorded across all transects. The *rori toto* (*Holothuria atra*) and the *paua kura* (*Chama pacifica*) were also frequently observed with 221 and 190 individuals recorded across all transects, respectively. The average density of reef flat invertebrates was greatest at Patiare (142 ind./100 m²; Figure 2). Densities at Patiare were significantly greater than Kovea, Okarava, Oponi and Tepari. The average species richness was also greatest at Patiare (3 taxa/40 m²), and was significantly greater than Nanamaru, Okarava, Oponi and Tepari (Figure 2).

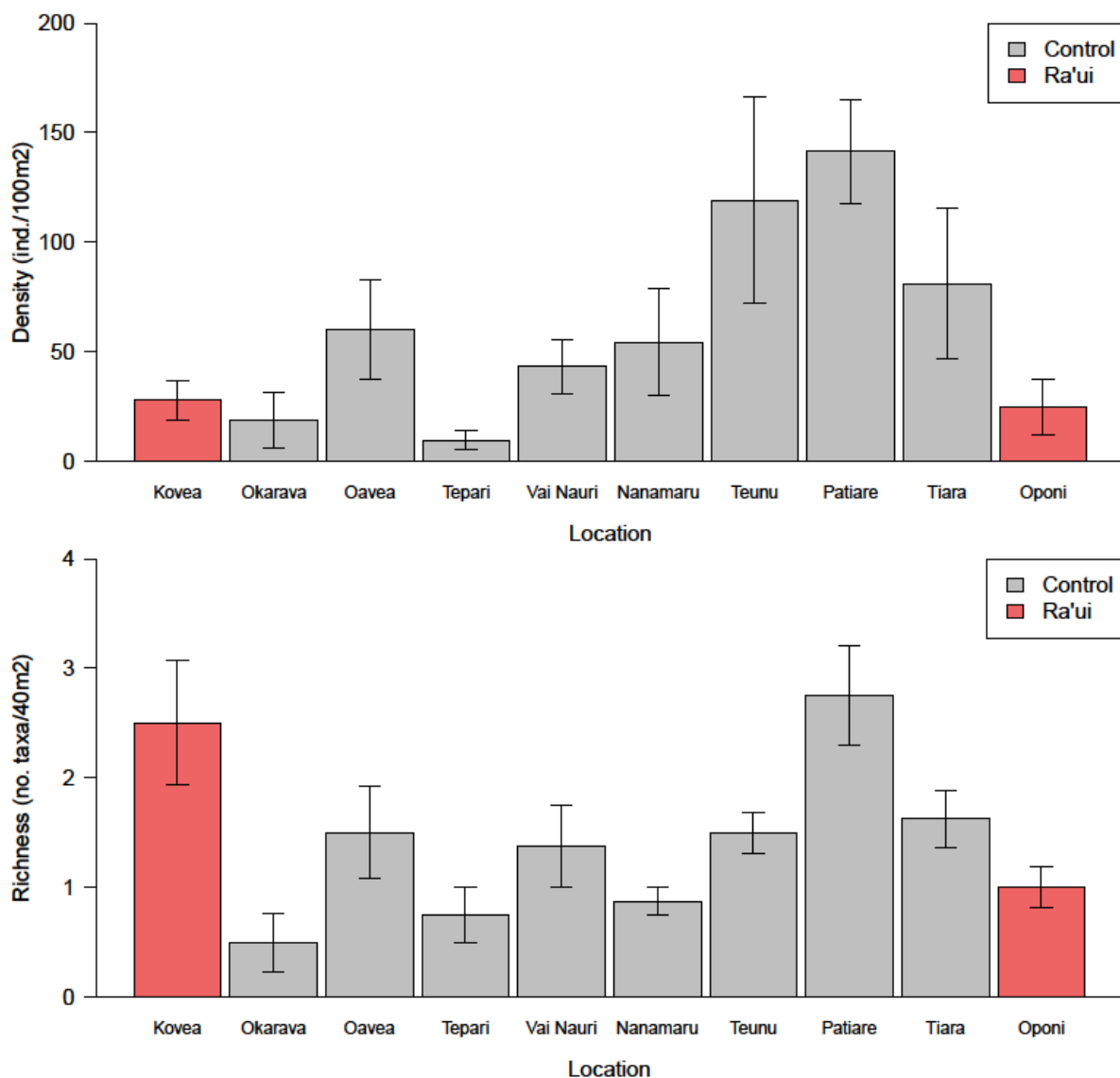


Figure 2. **Top:** Densities of reef flat invertebrates in control sites (grey) and *rā'ui* sites (red). **Bottom:** Species richness of reef flat invertebrates in control sites (grey) and *rā'ui* sites (red).

Ungakoa

Average *ungakoa* density on the reef flat was greatest at Teunu (111 ind./100 m²) and least at Kovea (0 ind./100 m²). Densities at Teunu were also significantly greater than both Kovea and Tepari (Figure 3).

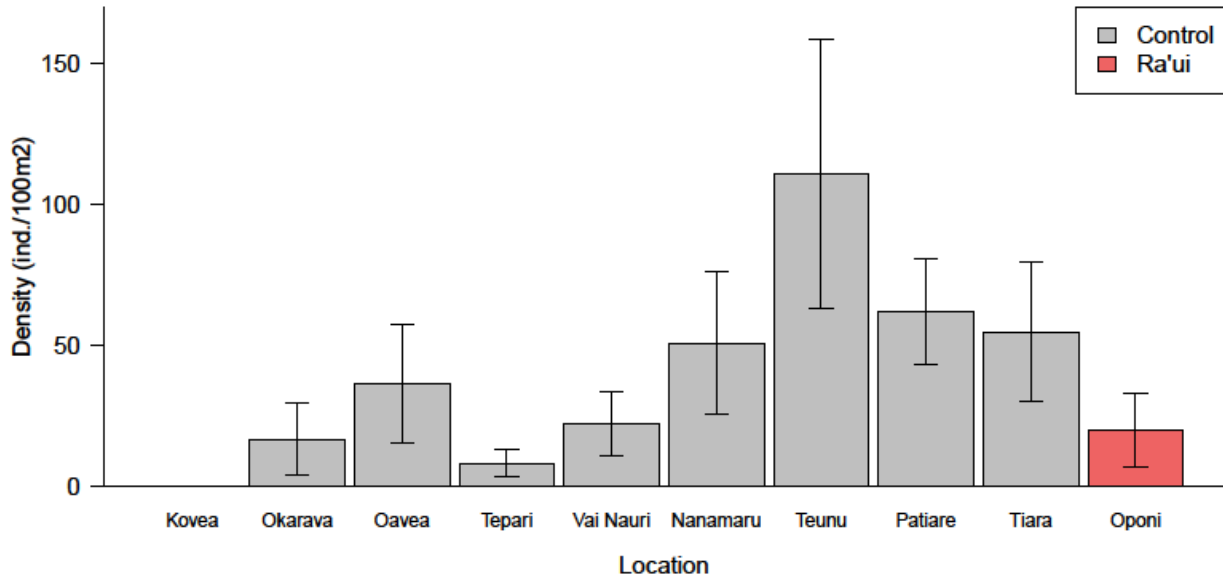


Figure 3. *Ungakoa* densities on the reef flat in control sites (grey) and *rā'ui* sites (red).

Rori Toto

Average *rori toto* density on the reef flat was greatest at Patiare (40 ind./100 m²) and least at both Tepari and Vai Nauri (1 ind./100 m²). Densities at Patiare were significantly greater than all other sites (Figure 4).

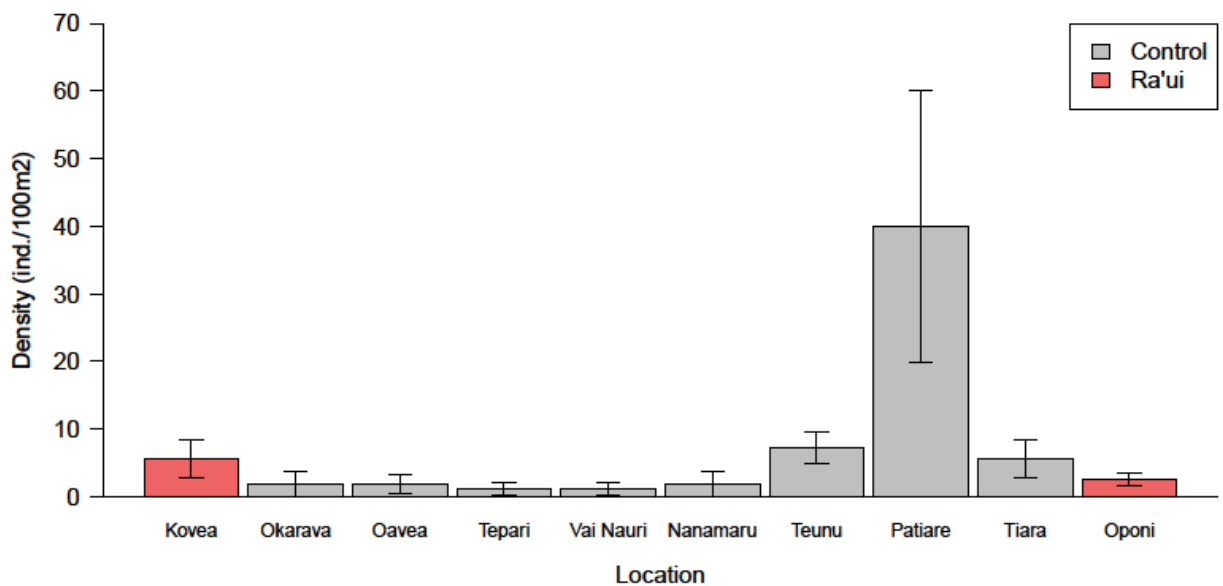


Figure 4. *Rori toto* densities on the reef flat in control sites (grey) and *rā'ui* sites (red).

Paua Kura

Average *paua kura* density on the reef flat was greatest at Patiare (22 ind./100 m²). *Paua kura* were not recorded at Okarava, Tepari, Nanamaru, Teunu, Tiara and Oponi. No significant differences exist between sites (Figure 5).

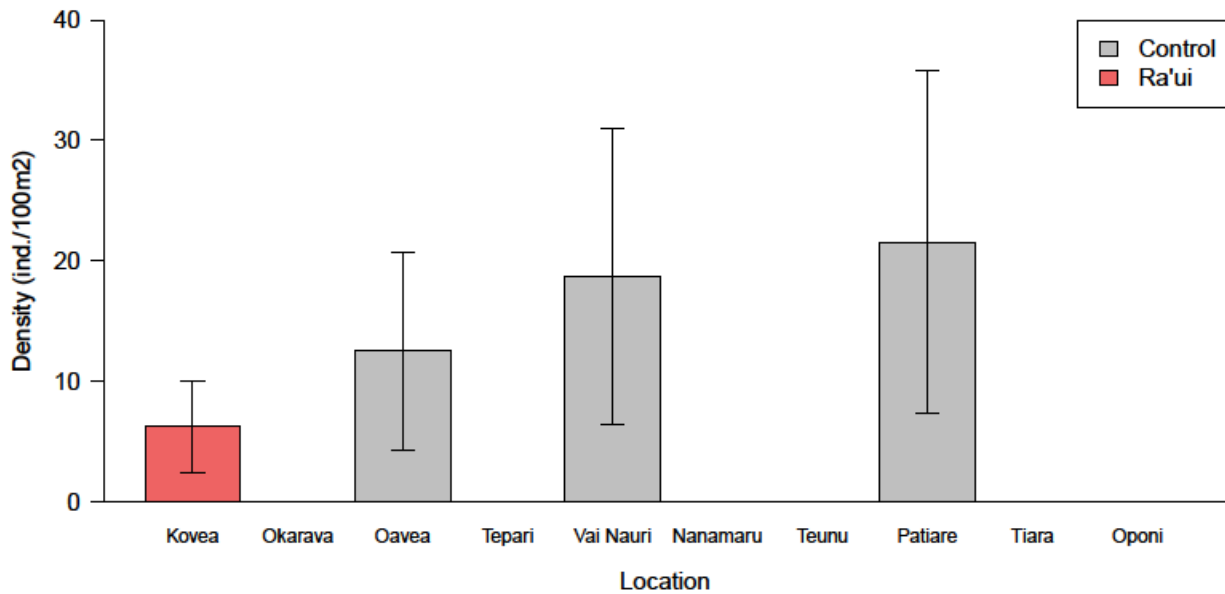


Figure 5. *Paua kura* densities on the reef flat in control sites (grey) and *rā'ui* sites (red).

Paua

Average *paua* (*Tridacna* spp.) density on the reef flat was greatest at Kovea (0.3 ind./100 m²) and Tepari (0.3 ind./100 m²). *Paua* were not recorded at any other sites (Figure 6).

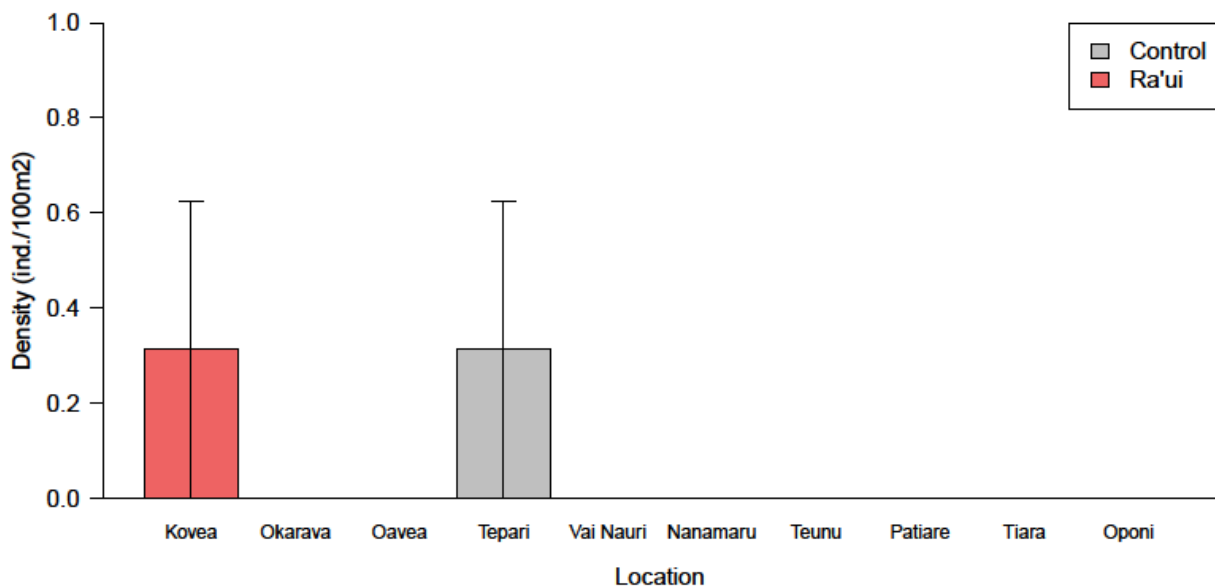


Figure 6. *Paua* densities on the inner reef in control sites (grey) and *rā'ui* sites (red).



Ungakoa in 10 metres of water on the fore reef slope taken just outside the harbour. ©MMR/K.Morejohn



Paua on the reef flat near Vai Nauri ©MMR/K.Morejohn

Finfish

A total of 2,558 finfish were observed across ten transects representing a total of 66 taxa. The most frequently observed species was the Midget Chromis (*Chromis acares*) where a total of 845 individuals were recorded across all transects. The Olive Anthias (*Pseudanthias olivaceus*) and *maito*, Striped Bristletooth (*Ctenochaetus striatus*) were also frequently observed with total individuals of 470 and 282, respectively. Finfish density over the reef was greatest at Patiare (191 ind./100 m²) and least at Oavea (67 ind./100 m²; Figure 7).

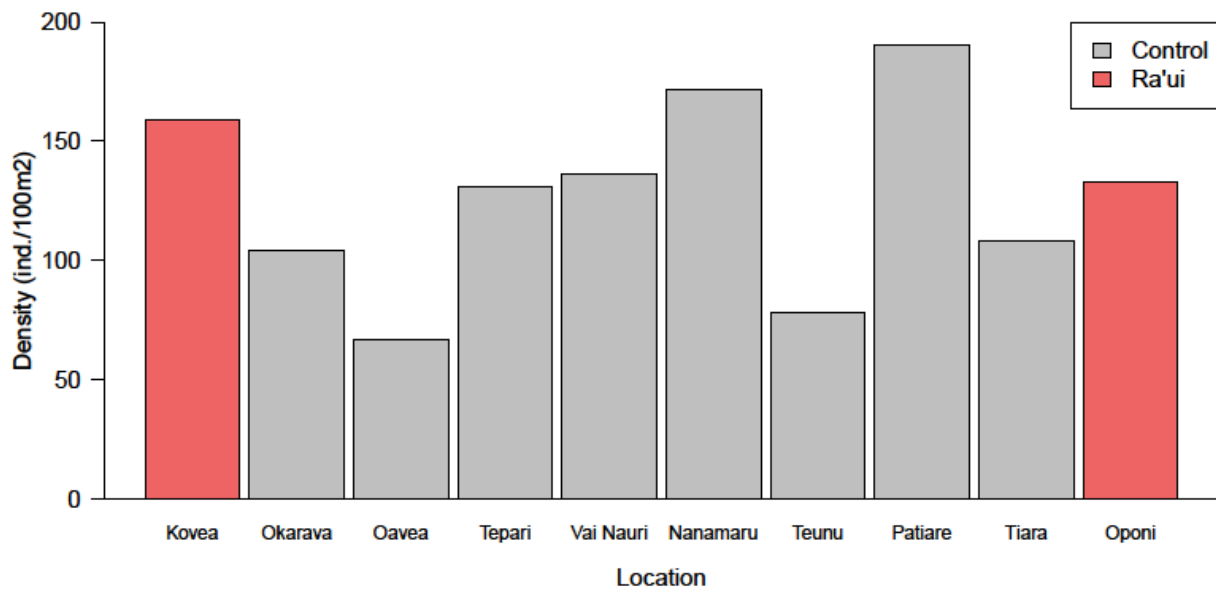


Figure 7. Finfish density over the reef in control (grey) and *rā'ui* (red) sites.

Coral and Substrate

The average live coral (hard and soft) cover for Mitiaro was 26% (Figure 8). The average hard coral cover was greatest at Tiara 44% and least at Nanamaru 15%. Hard substrate and macroalgae accounted for the second and third highest percentage cover over the reef with an overall average of 27% and 24%, respectively. Mitiaro average live coral cover was highest across all southern group islands surveyed including Mangaia 12%, Atiu 19%, Takutea 7%, Manuae 23%, Aitutaki 16% and Palmerston 23% (Figure 9).

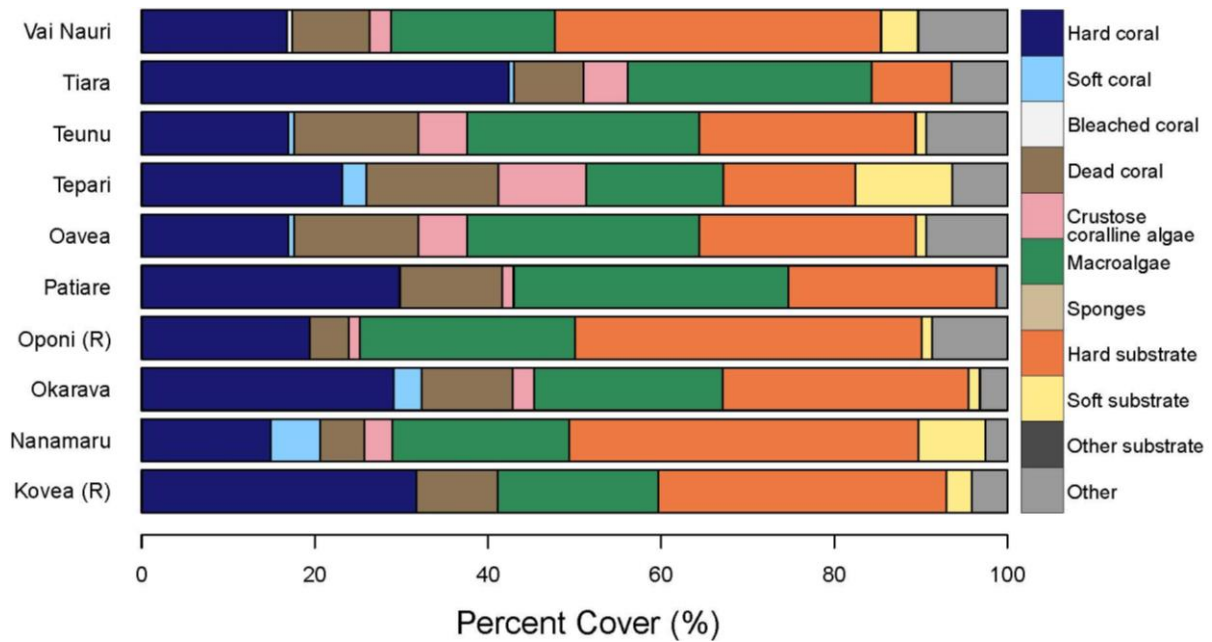


Figure 8. Substrate type and percentage cover from over the reef in control and *rā'ui* (R) sites.

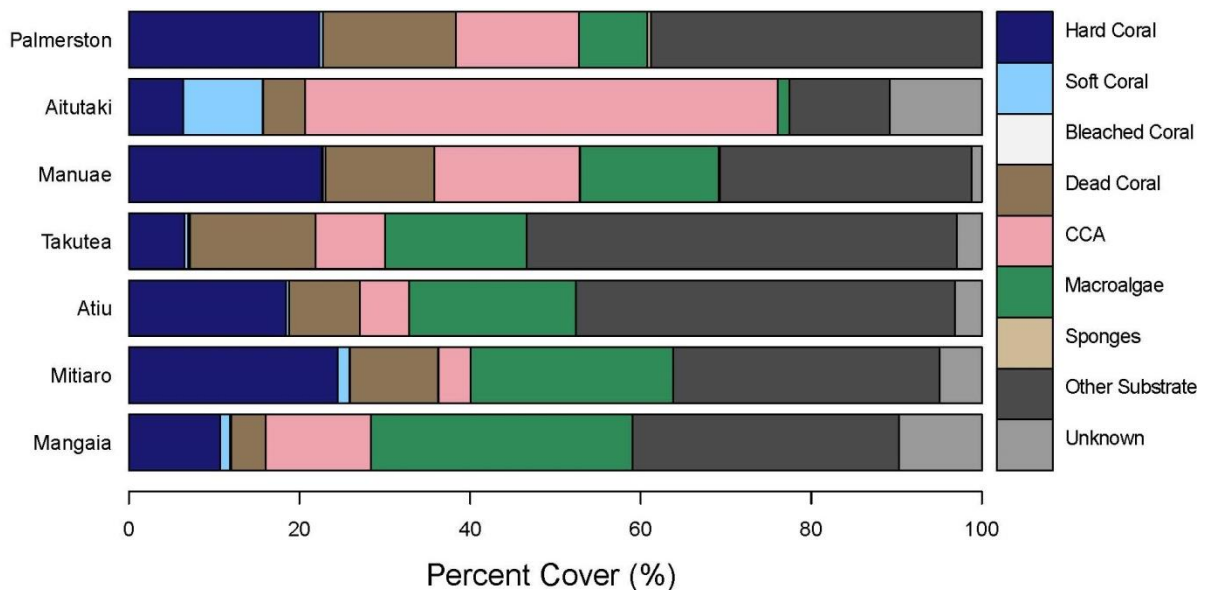


Figure 9. Substrate types and average percentage cover from outer reef sites in surveyed southern group islands.

MANAGEMENT OPTIONS

Based on these results and the current state of scientific knowledge, outlined below are management options that should have long term positive benefits for subsistence fishers, ecosystem resilience and biodiversity conservation in Mitiaro. These options may be accepted or modified to suit the needs of fishermen, communities and managers.

Mitiaro

- Establishing a marine reserve at Patiare or a permanent *rā'ui* as the data shows *paua kura*, *rori toto* and finfish showing high densities and good coral cover on the fore reef. This area will serve as a source population.
- Limit invertebrate harvest for sale, whether local or commercial, only permitting harvest for subsistence fishers by the Mitiaro community.
- To regulate *paua* harvests, we recommend:
 - Impose minimum size limit
 - Impose conservative daily bag limit
 - Never harvest *paua* from over the reef.
- On-going monitoring efforts of the population of *paua* over a period of time. For example a period of 5 years could show annual growth and density changes in any given area.
- On-going monitoring efforts of coral cover on the fore reef. Mitiaro exhibits the highest coral cover across all southern groups.



Healthy coral colonies located south of the harbour near Patiare ©MMR/K.Morejohn



