



Pacific Reef Assessment and Monitoring Program

Benthic monitoring summary: Pacific Remote Island Areas (PRIAs) 2015

About this summary

The purpose of this document is to provide a brief summary of the most recent survey efforts conducted in the Pacific Remote Island Areas (PRIAs) by the Coral Reef Ecosystem Division (CRED) of the NOAA Pacific Islands Fisheries Science Center as part of the Pacific Reef Assessment and Monitoring Program (Pacific RAMP). A more detailed assessment of coral populations and reef community structure in the PRIAs will be summarized in a forthcoming annual report.

Sampling effort

- Ecological monitoring in the PRIAs was conducted from January 25 – February 11 and from April 8 – April 28 2015.
- Surveys were conducted at 155 sites across 6 islands and atolls: Baker, Howland, Jarvis, Johnston, Kingman, and Palmyra
- Coral demography, partial mortality, and condition were surveyed using belt transects; benthic community structure will be assessed using photoquadrats.

Overview of data collected

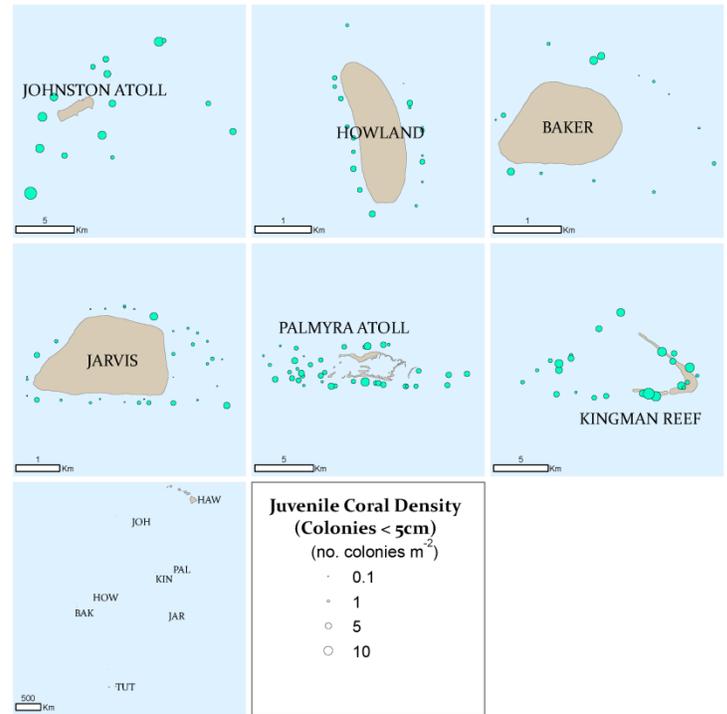


Figure 2. Mean density of all juvenile coral colonies (Scleractinia, < 5 cm) at survey sites.

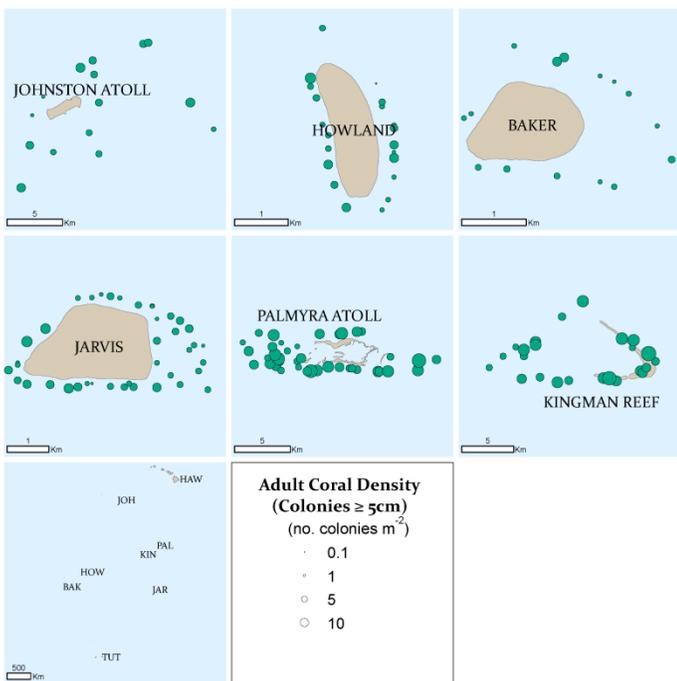


Figure 1. Mean density of all adult coral colonies (Scleractinia, ≥ 5 cm) at survey sites.

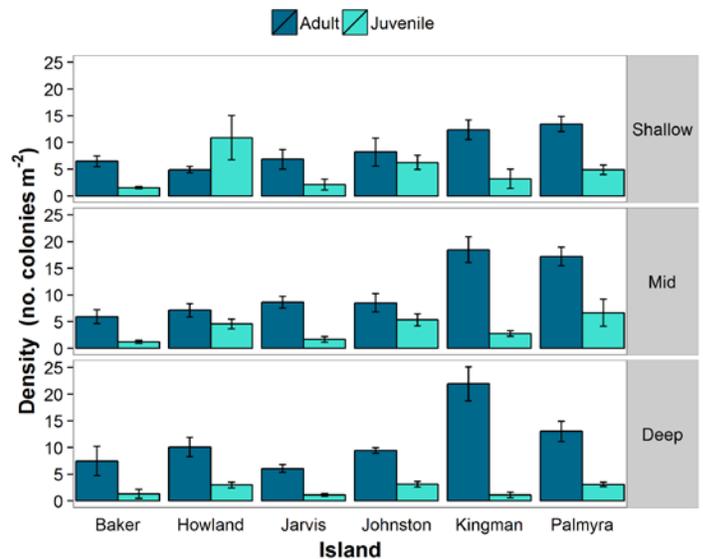


Figure 3. Mean density of adult (dark) and juvenile (light) coral colonies (± standard error) grouped by island within three depth categories: shallow (0–6 m), mid (>6–18 m), and deep (>18–30 m).

Overview of data collected (cont.)

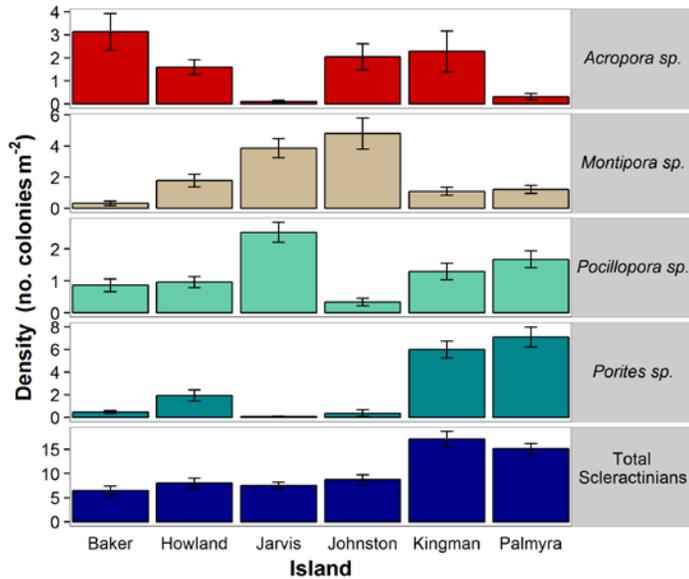


Figure 4. Mean island-wide density of adult colonies (\pm standard error) for all scleractinians and the four most abundant genera: *Acropora*, *Montipora*, *Pocillopora*, and *Porites*.

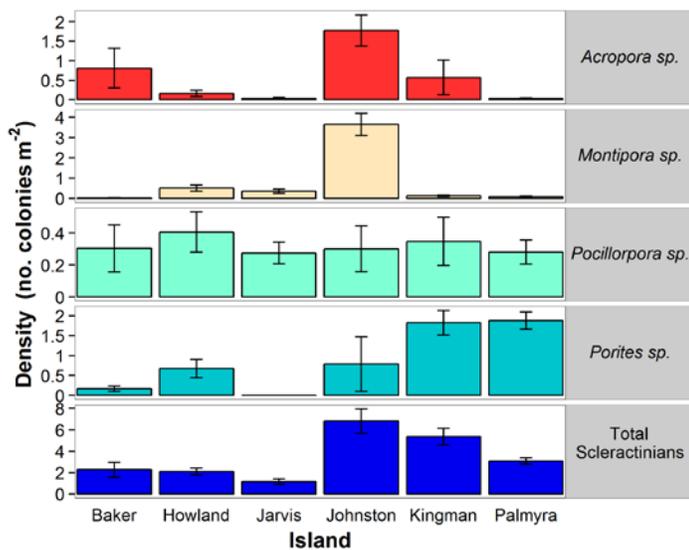


Figure 5. Mean island-wide density of juvenile coral colonies (\pm standard error) for all scleractinians and the four most abundant genera: *Acropora*, *Montipora*, *Pocillopora*, and *Porites*.

Disease, Bleaching, COTS, and Threatened species – The percent of adult colonies exhibiting signs of bleaching, disease, or crown-of-thorns sea star (COTS) predation lesions ranged from 1.04–10.6%, 0.7–1.6%, and 0–0.2% respectively (Table 1). ‘Disease’ was defined as the combination of all identified diseases and lesions. ‘Bleaching’ included all levels of bleaching extent and severity. COTS lesions were defined as recent coral mortality (i.e., tissue loss) attributed to COTS predation. Out of the 22,036 scleractinian coral

colonies measured, two colonies were identified as *Pavona diffluens* and 4 colonies identified as *Isopora* sp. The threatened species *Isopora crateriformis* was not consistently identified to species throughout our survey efforts in American Samoa due to the similarity to *I. cuneata* when both have an encrusting morphology.

Table 1. Percent of adult coral colonies that exhibited bleaching, disease, and crown-of-thorns sea star (COTS) predation lesions in the PRIAs.

Island	N	% bleaching	% disease	% COTs
Baker	15	1.22	0.52	0.0
Howland	21	1.28	0.53	0.0
Jarvis	41	4.02	0.88	0.0
Johnston	15	1.59	1.16	0.0
Kingman	24	1.27	1.63	0.82
Palmyra	39	1.35	1.27	0.0

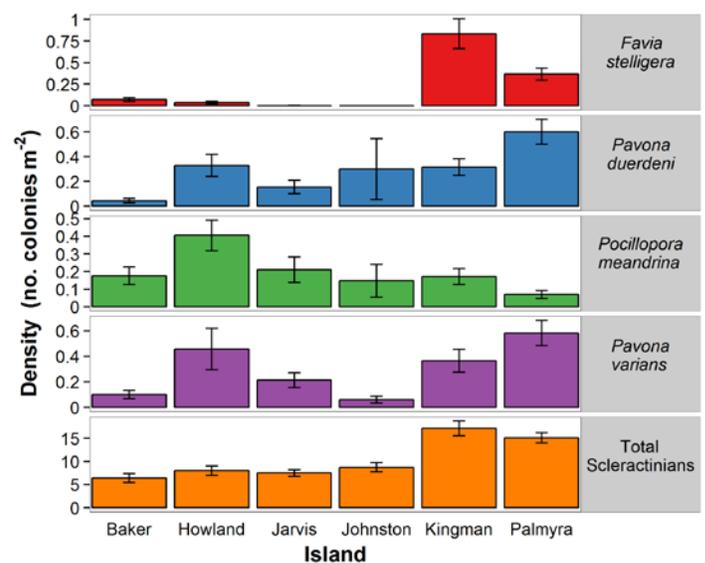


Figure 6. Mean island-wide density of adult colonies (\pm standard error) for the three most abundant species and all scleractinians

Survey sampling design

A two-stage stratified random sampling design was employed to survey the Pacific Remote Island Areas. The stratification scheme sampled all hard bottom habitat, within three reef zones (fore reef, back reef, and lagoon) where present, and across three depth categories (shallow (0–6 m), mid (>6–18 m) and deep (>18–30 m)). Surveys at Kingman Reef were allocated to back reef and lagoon habitats using available depth categories. Allocation of sampling effort was proportional to total strata area. Sites (geographic

coordinates) were randomly selected within each stratum.

Survey methods

Surveys at each site were conducted within two, 18 m belt transects (Figure 7). Adult coral colonies (≥ 5 cm) were surveyed within 10 m² on each transect. Colonies were identified to the lowest taxonomic level possible (species or genus), measured (maximum diameter to the nearest cm), and morphology was noted. In addition, partial mortality and condition of each colony was assessed. Partial colony mortality was quantified as the percent of dead tissue (classified as 'old dead' or 'recent dead'), and the cause of mortality was assessed if possible. Conditions affecting each colony (i.e., disease and bleaching) were noted, along with the extent (percent of colony affected) and severity (ranging from moderate to acute).

REA METHODS

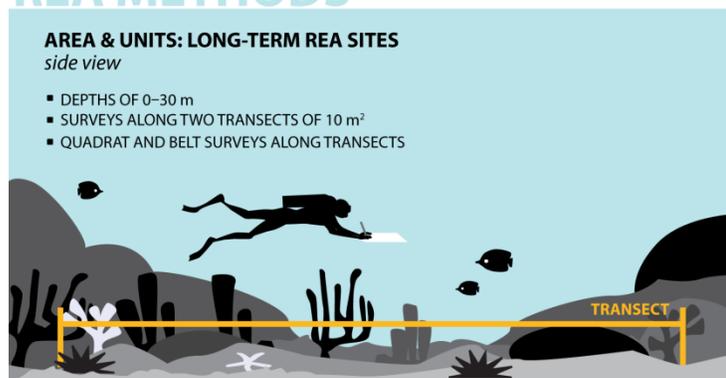


Figure 7. Schematic of the method used to conduct demographic surveys of coral populations and benthic community structure at the Rapid Ecological Assessment (REA) sites.

Juvenile coral colonies (< 5 cm) were surveyed within 3 m² on each transect. Juvenile colonies were identified in the field by a distinct tissue and skeletal boundary that distinguished them from fragments of larger adult colonies. Each juvenile colony was identified to the lowest taxonomic level possible (genus or species) and measured (both the maximum and perpendicular diameter to the nearest 2 mm).

The present summary focuses only on colony density and initial estimates of disease and bleaching prevalence. However, our data also include population and strata estimates of coral size structure, frequency of occurrence, colony abundance (means and totals), mean proportion of partial mortality, and condition (e.g. disease and bleaching) occurrence and prevalence.

Estimates for strata are generated from site means and are weighted by strata area. Island-scale estimates (means and totals) are calculated using weighted strata means. However, the island scale estimates presented here represent site-level means only; means are not weighted by strata area.

About the monitoring program

Pacific RAMP forms a key part of the National Coral Reef Monitoring Plan (NCRMP) of NOAA's Coral Reef Conservation Program (CRCP), providing integrated, consistent, and comparable data across US Pacific islands and atolls. The CRCP monitoring efforts aim to:

- Document the status of reef species of ecological and economic importance
- Track and assess changes in reef communities in response to environmental stressors or human activities
- Evaluate the effectiveness of specific management strategies and identify actions for future and adaptive responses

In addition to the coral population and benthic community surveys outlined here, Pacific RAMP efforts include interdisciplinary monitoring of oceanographic conditions, fish population and assemblages, coral reef habitat assessments and mapping, and climate change. Data are available upon request.

For more information

Coral Reef Conservation Program:

<http://coralreef.noaa.gov>

Pacific Islands Fisheries Science Center:

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