Pacific Reef Assessment and Monitoring Program

Benthic REA monitoring summary: Jarvis Island 2016[1]

About this summary

The purpose of this document is to provide a brief summary of the most recent survey efforts conducted at Jarvis Island by the Coral Reef Ecosystem Program (CREP) of the NOAA Pacific Islands Fisheries Science Center as part of the Pacific Reef Assessment and Monitoring Program (Pacific RAMP). The 2015-2016 El Niño sea warming resulted in mass coral bleaching and catastrophic mortality of corals at Jarvis Island. A more detailed assessment of coral populations, reef community structure, and the impact of the bleaching event at Jarvis Island will be summarized in future publications.

Sampling effort

- Coral reef ecological monitoring surveys at Jarvis Island were conducted from May 16 – May 20, 2016.

- Surveys were conducted at 30 sites around Jarvis Island.

- Coral demography, partial mortality, and condition were surveyed using belt transects; benthic community structure will be assessed using photoquadrats.

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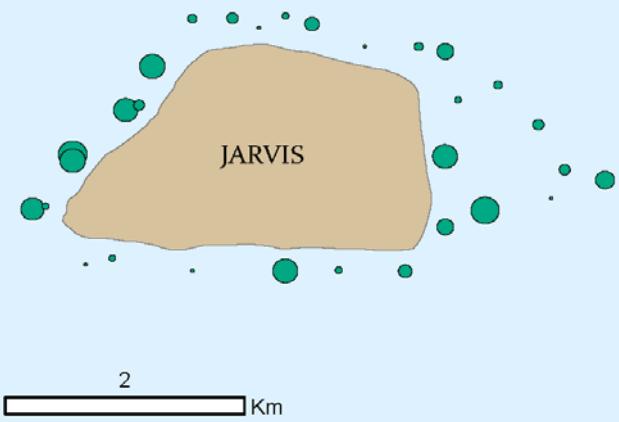
[1]PIFSC Data Report DR-17-006.
Issued 13 March 2017.

Overview of data collected

Figure 1. Mean density of all adult coral colonies (Scleractinia, ≥ 5 cm) at survey sites.
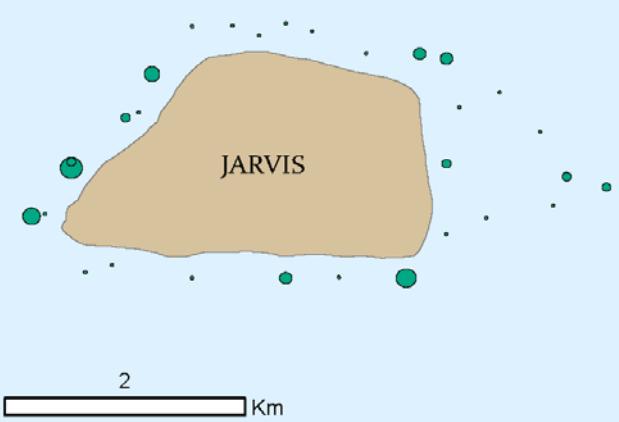
Figure 2. Mean density of all juvenile coral colonies (Scleractinia, < 5 cm) at survey sites.

Figure 3. Mean density of adult coral colonies (± standard error) for all scleractinians and the five most abundant genera within three depth categories: shallow (0-6 m), mid (> 6-18 m), and deep (> 18-30 m).
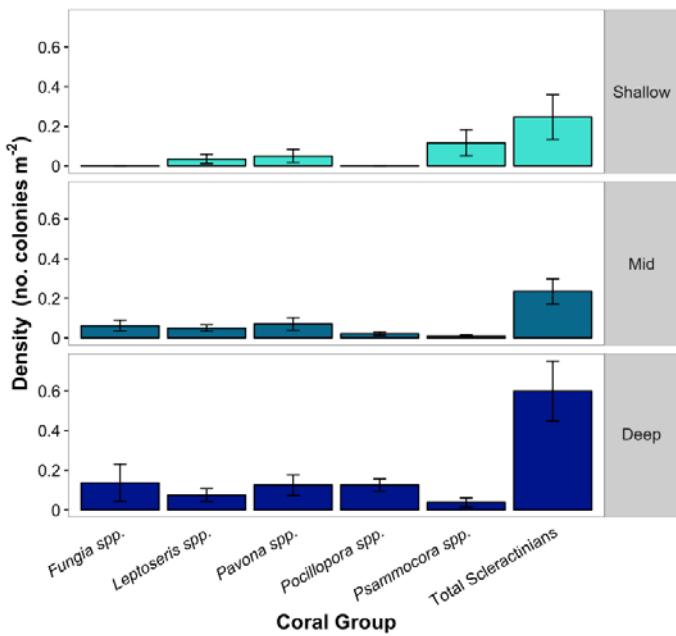

Figure 5. Mean density of juvenile coral colonies (± standard error) for all scleractinians and the five most abundant genera within three depth categories: shallow (0-6 m), mid (> 6-18 m), and deep (>18-30 m).
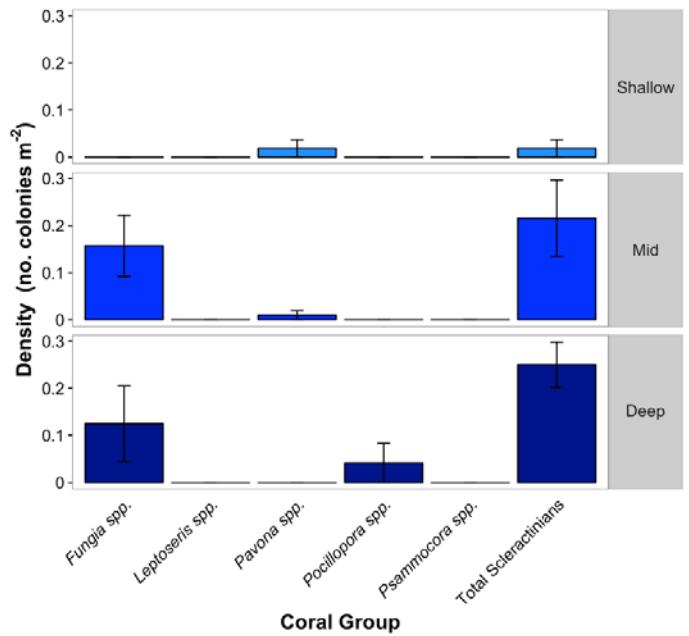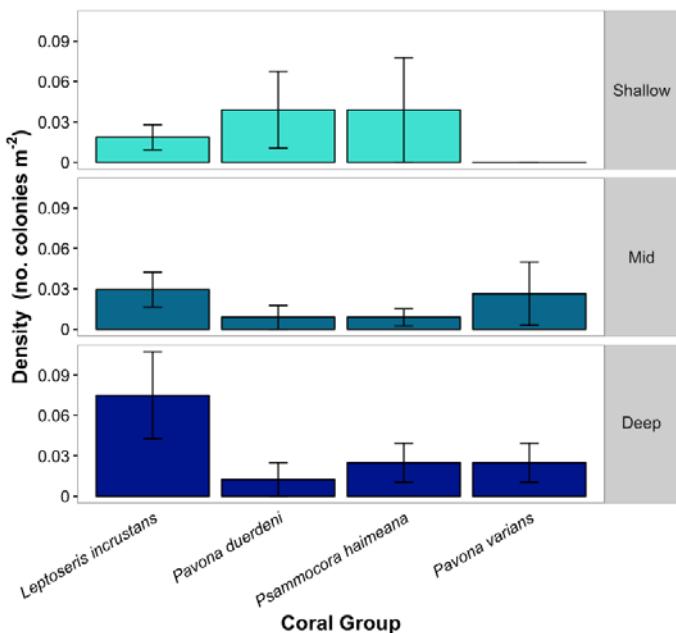

Figure 4. Mean colony density of the four most abundant adult coral species (± standard error) within three depth categories: shallow (0-6 m), mid (> 6-18 m), and deep (> 18-30 m).

Disease, Bleaching, and COTS – The percent of adult colonies exhibiting signs of bleaching, disease, or crown-of-thorns sea star (COTS) predation lesions

is shown in 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.

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

Sites	% bleaching	% disease	% COTS
30	28.07	0	0

Survey sampling design

A two-stage stratified random sampling design was employed to survey coral reefs around Jarvis Island. The stratification scheme sampled all fore reef hard-bottom habitat across three depth categories (shallow (0–6 m), mid (> 6–18 m) and deep (>18–30 m)). 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. Adult coral colonies ($\geq$ 5 cm) were surveyed within 10 m^2 on each transect (Figure 6). 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).
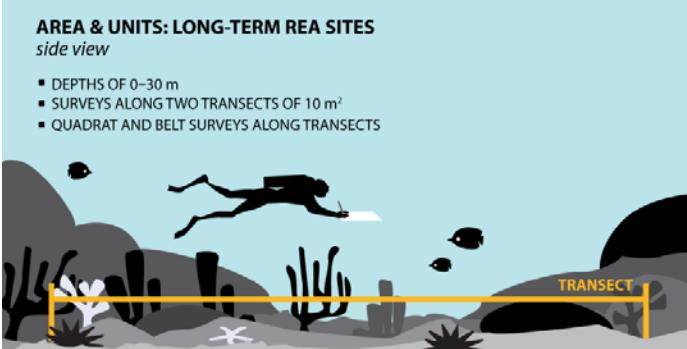

Figure 6. Schematic of the method used to conduct demographic surveys of coral populations and benthic community structure at Rapid Ecological Assessment (REA) sites.

Juvenile coral colonies (< 5 cm) were surveyed within 3 m^2 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 bleaching, disease, and COTs predation prevalence. The island scale estimates presented here are generated from site-level means and are not weighted by strata area. Our data also include island 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. Island-scale estimates (means and totals) are calculated using weighted strata means. These statistical survey design estimates of the full suite of coral population and community metrics will be summarized in future publications.

About the monitoring program

Pacific RAMP forms a key part of the National Coral Reef Monitoring Program (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 have 3 principal aims:

- Document the status of reef species of ecological and economic importance
- Track and assess changes in reef populations and 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, invertebrate diversity and abundance, microbial diversity and abundance; coral reef habitat assessments and mapping, and studies of effects of climate change and ocean acidification on coral reefs. Data are available upon request.

For more information

Coral Reef Conservation Program:
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