PIFSC Data Report DR-13-006 Issued 28 February 2013

Pacific Reef Assessment and Monitoring Program

Fish monitoring brief: main Hawaiian Islands 2012

About this summary brief

The purpose of this document is to outline the most recent survey efforts conducted by the Coral Reef Ecosystem Division (CRED) as part of the long-term monitoring program known as the Pacific Reef Assessment and Monitoring Program (Pacific RAMP).

Sampling effort

- Ecological monitoring took place in the main Hawaiian Islands from September 01 2012 to September 13 2012.
- Data were collected at 163 sites. Surveys were conducted at Lanai (n=29), Maui (n=49), Molokai (n=50) and Oahu (n=35).
- At each site, the fish assemblage was surveyed by underwater visual census and the benthic community of the reef was assessed.

Overview of data collected

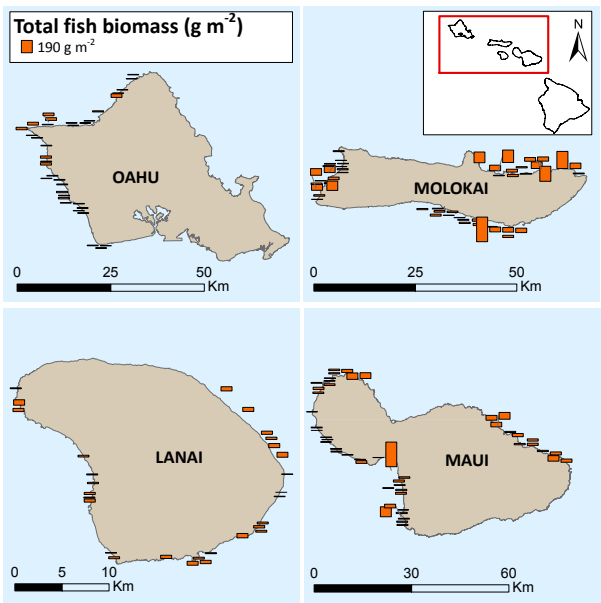

Figure 1. Mean total fish biomass at sites surveyed.

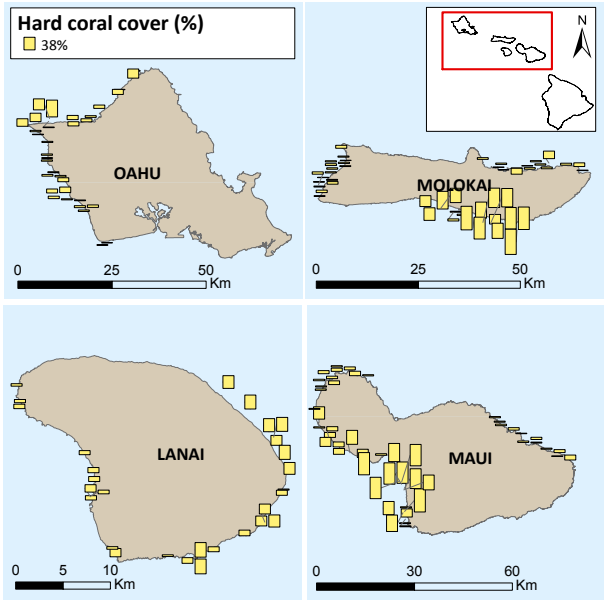

Figure 2. Mean hard coral cover at sites surveyed.

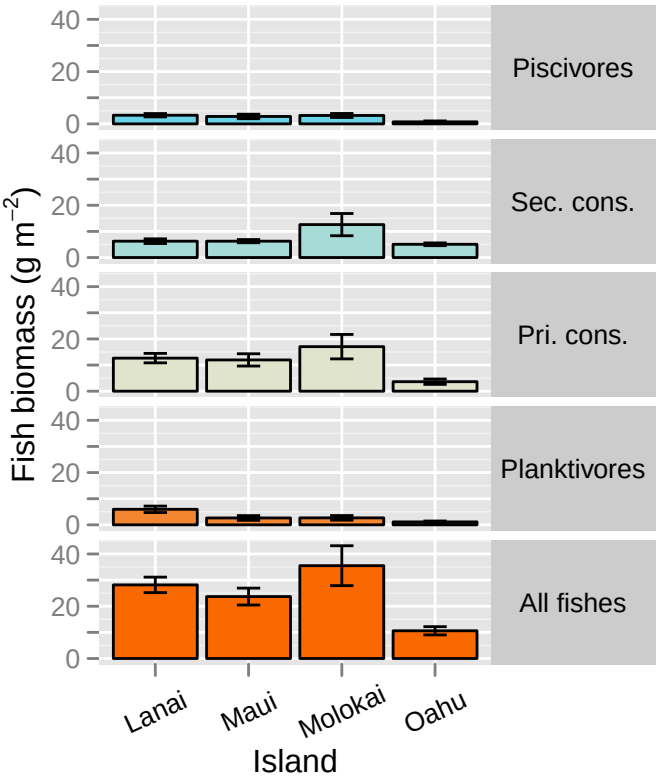

Figure 3. Mean consumer group fish biomass (± standard error). Primary consumers are herbivores and detritivores, and secondary consumers are omnivores and invertivores.

Overview of data collected contd.

Primary consumers include herbivores (which eat plants) and detritivores (which bottom feed on detritus), and secondary consumers are largely omnivores (which mostly eat a variety of fish and invertebrates) and invertivores (which eat invertebrates).

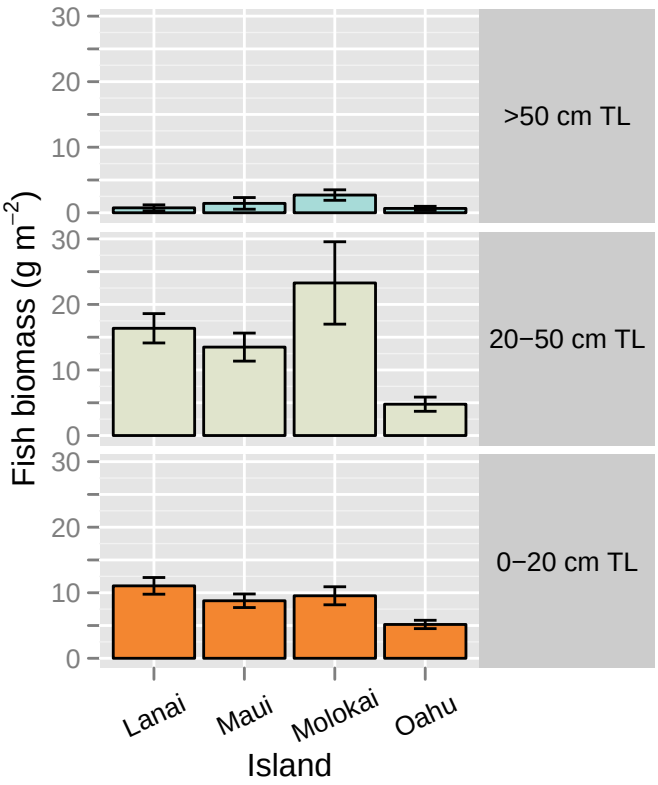

Figure 4. Mean fish biomass per size class (± standard error). Fish measured by total length (TL) in centimeters (cm).

Spatial sample design

Survey site locations are randomly selected using a depth-stratified design. During cruise planning and the cruise itself, logistic and weather conditions factor into the allocation of monitoring effort around sectors of each island or atoll. The geographic coordinates of sample sites are then randomly drawn from a map of the area of target habitat per study area. The target habitat is hard-bottom reef, the study area is typically an island or atoll, or in the case of larger islands, sectors per island, and the depth strata are shallow (0-6 m), mid (6-18 m), and deep (18-30 m).

Sampling methods

A pair of divers surveys the fish assemblage at each site using a stationary-point-count method (Fig. 5). Each diver identifies, enumerates, and estimates the total length of fishes within a visually estimated 15-m-diameter cylinder with the diver stationed in the center. These data are used to calculate fish biomass per unit area (g m^{-2}) for each species. Mean biomass estimates per island are calculated by weighting averages by the area per strata. Island-scale estimates presented here represent only the areas surveyed during this cruise. For gaps or areas not surveyed during this cruise, data from this and other survey efforts will generally be pooled to improve island-scale estimates.

Each diver also conducts a rapid visual assessment of reef composition, by estimating the percentage cover of major benthic functional groups (encrusting algae, fleshy macroalgae, hard corals, turf algae and soft corals) in each cylinder. Divers also estimate the complexity of the surface of the reef structure, and they take photos along a transect at each site that are archived to allow for future analysis.

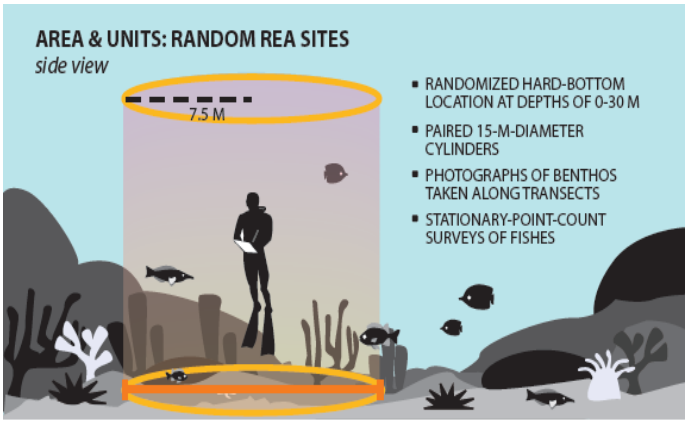

Figure 5. Method used to monitor fish assemblage and benthic communities at the Rapid Ecological Assessment (REA) sites.

About the monitoring program

Pacific RAMP forms a key part of the National Coral Reef Monitoring Program of NOAA's Coral Reef Conservation Program (CRCP), providing integrated, consistent, and comparable data across U.S. Pacific islands and atolls. CRCP monitoring efforts have these aims:

- 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

For more information

Coral Reef Conservation Program:
http://coralreef.noaa.gov
NMFS Pacific Islands Fisheries Science Center:
http://www.pifsc.noaa.gov/
CRED publications:
http://www.pifsc.noaa.gov/pubs/credpub.php
CRED fish team:
http://www.pifsc.noaa.gov/cred/fish.php
Fish team lead:
ivor.williams@noaa.gov