Reef community abundance data collected from SCUBA divers in the middle Florida Keys from June 2022 to July 2024

Website: https://www.bco-dmo.org/dataset/956148
Version: 1
Version Date: 2025-03-14

Project
» RAPID: A comparison of acute heat stress and fish abundance influencing coral survival. (Heat Stress & Fish Behavior Coral Survival)

Contributors	Affiliation	Role
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Abstract
These data are annual summer census data for 30 reefs in the middle Florida Keys taken between the months of June and July each year. The survey is based on a permanent transect 50 m in length and 30 m in width. Divers survey substrate composition by taking 12 50 cm x 50 cm photographs at 10 m intervals on the left and right side of the main transect tape. Fish counts for butterflyfishes and parrotfishes and sea urchin counts are collected by two divers visually counting along each side of the main transect down and back. The counts are then averaged. Additional reef fish surveys are taken from a video filmed by diver swimming along the main transect at a rate of 50 m / 3 mins. Cryptofauna abundances are from a single Autonomous Reef Monitoring Structure (ARMS) located in the center point (25 m) of the main transect line. Abundance is the sum of the counts, richness is based on the number of observed operational taxonomic units, diversity is Simpson's Index of Diversity (1-D method). Rugosity is by chain and tape method (1- D/L). Temperature data is average daily temperature and average daily DHW taken either from Hobo Temperature loggers or NOAA satellite SST imagery (Coral Watch).

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Coverage

Spatial Extent: **N**:24.925 **E**:-80.6214 **S**:24.675 **W**:-80.975
Temporal Extent: 2022-06-08 - 2024-06-26

Methods & Sampling

These data are annual summer census data for 30 reefs in the middle Florida Keys taken between the months of June and July each year. The survey is based on a permanent transect 50 m in length and 30 m in width. Divers survey substrate composition by taking 12 50 cm x 50 cm photographs at 10 m intervals on the left and right side of the main transect tape. Fish counts for butterflyfishes and parrotfishes and sea urchin counts are collected by two divers visually counting along each side of the main transect down and back. The counts are then averaged. Additional reef fish surveys are taken from a video filmed by diver swimming along the main transect at a rate of 50 m / 3 mins. Cryptofauna abundances are from a single Autonomous Reef Monitoring Structure (ARMS) located in the center point (25 m) of the main transect line. Abundance is the sum of the counts, richness is based on the number of observed operational taxonomic units, diversity is Simpson's Index of Diversity (1-D method). Rugosity is by chain and tape method (1- D/L). Temperature data (12 months prior to the annual June census (July 1 - June 30) is average daily SST, average daily SST anomaly, average daily degree heating weeks (DHW), maximum SST, maximum SST anomaly, and maximum DHW taken from Coral Reef Watch NOAA Satellite data for the following pixels (https://pae-

paha.pacioos.hawaii.edu/erddap/griddap/dhw_5km.graph). See the supplemental file "dhw_5km_location_pixel_coordinates.csv" for a list of site names and corresponding pixel latitudes and longitudes.

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Parameters

Parameters for this dataset have not yet been identified

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Project Information

RAPID: A comparison of acute heat stress and fish abundance influencing coral survival. (Heat Stress & Fish Behavior Coral Survival)

Website: https://childresslab.weebly.com

Coverage: Florida Keys National Marine Sanctuary

NSF Award Abstract
Rising global temperatures continue to place coral reefs in severe peril. The symbiotic relationship between corals and their algal symbionts breaks down under extreme temperatures leading to the expulsion of these protective algal cells, a process known as coral bleaching. Without these algal symbionts, transparent bleached corals are vulnerable to elevated UV light exposure which can be lethal, yet some corals show higher resilience and recovery of their algal symbionts after the extreme heat has passed. One potential reason for increased resilience may be positive interactions with reef fishes that associate with corals. Many reef fish graze directly on coral polyps or on harmful fleshy algae that compete with corals for space and nutrients. As these reef fish establish territories on and around coral, they have the potential to benefit corals through increased movement of water, fecal deposition of nutrients and algal symbionts, and in some cases even shading from direct sunlight. This research leverages a mass coral bleaching event in the Florida Keys to investigate how reef fish-coral associations influence coral survival and recovery from bleaching, increasing our understanding of the importance of reef fish populations for survival of corals in a warming world. The project includes training for undergraduate and graduate students and incorporation of the research into an ongoing marine science STEAM program for children. The results of this research have implications for coral management and restoration. Exceptionally warm waters off the southern tip of Florida in summer 2023 initiated a mass coral bleaching event in the Florida Reef Tract, the third largest barrier reef in the world. Herbivores (parrotfishes and damselfishes), corallivores (butterflyfishes), and cleaner gobies play critical roles in modulating coral-macroalgae competitive interactions. This project tests the hypothesis that reef-fish coral interactions influence the recovery of bleached corals, thereby affecting coral reef community structure. A total of 240 individual corals across 15 sites in the middle Florida Keys are being marked and photographed to measure their degree of bleaching. Underwater camera deployments record the species and number of reef fish present, allowing for quantification of fish behaviors and coral association times. Pre-bleaching observations and data from four timepoints following the bleaching event are being compared to examine the relationship between fish-coral associations, abiotic factors, and fate of individual corals. The results will advance understanding of coral resilience to bleaching events and the role of reef fishes during the recovery period. This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-2347805

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