Fish community surveys at artificial reefs in Kāneʻohe Bay, Oʻahu conducted in 2022 and 2023 as part of a reef halo dynamics study

Website: https://www.bco-dmo.org/dataset/985611
Data Type: Other Field Results
Version: 1
Version Date: 2025-11-21

Project
» CAREER: Decoding seascape-scale vegetation patterns on coral reefs to understand ecosystem health: Integrating research and education from organismal to planetary scales (Coral Reef Halos)

Contributors	Affiliation	Role
Innes-Gold, Anne	Hawaii Institute of Marine Biology (HIMB)	Principal Investigator, Student
York, Amber D.	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
The goal of this dataset was to survey the reef fish communities at three artificial reefs constructed in Kāneʻohe Bay, Oʻahu, Hawaiʻi from August 2022-December 2023. Fish community surveys were conducted monthly. Surveys were conducted by the same observer each time who would sit ~3m away from the reef to minimize disturbance, and record all fish seen within 1m of the reef for three minutes. After that time, the observer would move to the reef and attempt for another two minutes to record any fish that may not have been initially visible. This was repeated at each of the three artificial reefs.

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Coverage

Location: Kāneʻohe Bay, Oʻahu, Hawaiʻi
Spatial Extent: **N**:21.464275 **E**:-157.806396 **S**:21.464012 **W**:-157.806783
Temporal Extent: 2022-08-24 - 2023-12-04

Methods & Sampling

Fish community surveys were conducted monthly at the same time as nutrient sampling and vegetation transects. Surveys were conducted by the same observer each time who would sit ~3m away from the reef to minimize disturbance, and record all fish seen within 1m of the reef for three minutes. After that time, the observer would move to the reef and attempt for another two minutes to record any fish that may not have been initially visible. This was repeated at each of the three artificial reefs. Surveys were conducted with mask and snorkel.

BCO-DMO Processing Description

* The data table within the submitted file "fish surveys.csv" (uploaded 2025-10-28) was imported into the BCO-DMO data system for this dataset. Values "NA" imported as missing data values. Table will appear as Data File: 985611_v1_kaneohe-bay-halos_fish-surveys.csv (along with other download format options).

Missing Data Identifiers:
* In the BCO-DMO data system missing data identifiers are displayed according to the format of data you access. For example, in csv files it will be blank (null) values. In Matlab .mat files it will be NaN values. When viewing data online at BCO-DMO, the missing value will be shown as blank (null) values.

* A unique category list was created and added as a supplemental file along with matching LSIDs for taxonomic names by matching names in the data with the World Register of Marine Species taxa match tool (match performed 2025-10-16).

* Correction was made after consultation with the data submitter. One row entry where the common and sciName did not agree. Data row 79 (not including header row) was corrected :

Acanthurus blochii Ringtail Surgeonfish Surgeonfish
was:
Acanthurus blochii Hawaiian Sergeant Damselfish

Problem Description

Rows that appear as duplicate rows are unique measurements, not duplicate reporting of the same measurement.

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Data Files

File	
985611_v1_kaneohe-bay-halos_fish-surveys.csv	(Comma Separated Values (.csv), 32.32 KB) MD5:5ea10fffc6f9bc88e59827209346fa4d
Primary data file for dataset ID 985611, version 1	

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Supplemental Files

File	
985611_fish_survey_category_list.csv	(Comma Separated Values (.csv), 2.24 KB) MD5:c7b78824554a92e2d88fceb24f4b9603

Unique list of categories in the fish survey data, with corresponding taxonomic information and identifiers. This table includes:

Category_in_Dataset: Category name as it appears in the fish survey data table "Scientific_Name" column. Includes both taxonomic and colloquial names for species groups.
Common_Name: Common name as it appears in the fish survey data table "Common_Name" column.
Family_or_Group: The group the identified organism belongs to as it appears in the fish survey data table "Family" column. Includes both taxonomic and colloquial names for species groups.
Lowest_Identifiable_Taxon: The lowest taxonomic level to which the organism can be confidently identified (taxonomic level associated with the category).
Lowest_Identifiable_Taxon_LSID: Life Science Identifier (LSID) for the taxonomic names (Lowest_Identifiable_Taxon)

Note: The status of taxonomic names changes over time. Consult the World Register of Marine Species or other authoritative sources for up-to-date species name information such as what is considered the "accepted" name or an unaccepted synonym for an organism. The LSID provided here can be used for this purpose.

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Related Publications

Innes-Gold, A. A., McManus, L. C., Lester, E., Ong, T. W., Cook McNab, A., Rahnke, S. A., Brett Pablo, J., Tokoyoda, A., Watson, D., & Madin, E. M. P. (2025). Herbivory and temperature mediate coral reef halo dynamics. The American Naturalist. https://doi.org/10.1086/738015
Results

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Related Datasets

IsRelatedTo

Innes-Gold, A. (2025) **Temperature measured at artificial reefs in Kāneʻohe Bay, Oʻahu in 2022 and 2023 as part of a reef halo dynamics study.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2025-11-18 doi:10.26008/1912/bco-dmo.987237.1 [view at BCO-DMO]
Relationship Description: Datasets collected at artificial reefs in Kāneʻohe Bay, Oʻahu in 2022 and 2023 as part of a reef halo dynamics study (Innes-Gold, 2025; doi: 10.1086/738015).

Innes-Gold, A. (2025) **Vegetation surveys at artificial reefs in Kāneʻohe Bay, Oʻahu conducted in 2022 and 2023 as part of a reef halo dynamics study.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2025-11-18 doi:10.26008/1912/bco-dmo.987227.1 [view at BCO-DMO]
Relationship Description: Datasets collected at artificial reefs in Kāneʻohe Bay, Oʻahu in 2022 and 2023 as part of a reef halo dynamics study (Innes-Gold, 2025; doi: 10.1086/738015).

Innes-Gold, A. (2025) **Water nutrients measured at artificial reefs in Kāneʻohe Bay, Oʻahu in 2022 and 2023 as part of a reef halo dynamics study.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2025-10-16 doi:10.26008/1912/bco-dmo.987232.1 [view at BCO-DMO]
Relationship Description: Datasets collected at artificial reefs in Kāneʻohe Bay, Oʻahu in 2022 and 2023 as part of a reef halo dynamics study (Innes-Gold, 2025; doi: 10.1086/738015).

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Parameters

Parameter	Description	Units
Date_local	Date of survey (local time, HST)	unitless
Month_local	Month of survey	unitless
Year_local	Year of survey	unitless
Time_local	Time of survey (local time, HST)	unitless
Timezone_local	Time zone of survey. Local time, Hawaii Standard Time (HST).	unitless
Tide	Tide description (e.g. 'Rising')	unitless
Site	Site identifier	unitless
Scientific_Name	Identification category which may be one species or a species group. This column includes taxonomic, common names, and group names (e.g. 'Seriola dorsalis','Crab', 'Trumpetfish sp.')	unitless
Common_Name	Common name for the identification category which may be one species or a species group (e.g. 'Domino damselfish', 'Jacks','Trumpetfish sp. Trumpetfish')	unitless
Family	The species group common name representing the family the organism belongs to (e.g. 'Damselfish')	unitless
Size_cm	Size (referring to fish length in cm).	centimeters (cm)
Number	Abundance of species	count per individual
Latitude	Artificial reef latitude	decimal degrees
Longitude	Artificial reef longitude	decimal degrees
ISO_DateTime_UTC	Datetime with timezone (ISO 8601 format) for the survey. UTC timezone.	unitless

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Diving Mask and Snorkel
Generic Instrument Description	A diving mask (also half mask, dive mask or scuba mask) is an item of diving equipment that allows underwater divers, including, scuba divers, free-divers, and snorkelers to see clearly underwater. Snorkel: A breathing apparatus for swimmers and surface divers that allows swimming or continuous use of a face mask without lifting the head to breathe, consisting of a tube that curves out of the mouth and extends above the surface of the water.

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Project Information

CAREER: Decoding seascape-scale vegetation patterns on coral reefs to understand ecosystem health: Integrating research and education from organismal to planetary scales (Coral Reef Halos)

Website: http://oceansphere.org

Coverage: Hawai'i (field components) and global (synthetic components)

NSF Award Abstract:
Coral reefs worldwide are under increasing threat from a range of human-induced stressors. Climate change is understood to be a key global stressor threatening reefs, but the only proven levers for ecosystem managers to increase reef resilience is to mitigate local and regional stressors such as fishing pressure. A vexing question persists, however, which is how to measure the effects of fishing on ecosystems, particularly over the large spatial (e.g., >10s of meters) and temporal (multi-year) scales over which fishing occurs. One promising approach to doing so is using the large-scale vegetation patterns found on coral reefs globally, called "halos", to remotely observe when, where, and to what extent fishing pressure is affecting community structure and function. This program combines lab- and field-based experiments with cutting-edge satellite imaging technology and computer science approaches to provide a leap forward in our understanding of how species-level interactions can scale up in space and time to shape coral reef seascapes around the world. By drawing on these approaches, the synergistic education program: 1) integrates science and art (i.e., murals and satellite imagery) to educate and inspire Hawai'i's students and general public about coral reef ecology; 2) builds technological capacity in Hawai'i's underrepresented minority high school to graduate students, and 3) empowers these students with science communication skills to communicate with diverse audiences. By leveraging this research program and the cutting-edge technologies it will involve, the investigator establishes a strong foundation for long-term teaching and mentoring activities focused on increasing capacity within STEM-underrepresented minorities with Hawaiian and other Pacific Islander backgrounds. Decoding what coral reef halos can tell us about the effects of fishing on reef ecosystem health provides valuable knowledge to reef ecosystem managers and conservation practitioners as reefs continue to rapidly change due to human stressors.

This project combines lab- and field-based experiments with cutting-edge satellite imaging technology and computer science approaches to address the goals of: 1) determining the mechanisms that create the "halos" that form around coral patch reefs, and 2) testing the predictions arising from these mechanisms in a global arena. This project uses a transdisciplinary approach – spanning ecology, oceanography, geospatial science, and computer science – to address these goals. This program has three scientific objectives: to determine 1) which species interaction mechanisms and environmental factors cause reef halos and what their relative importance is; 2) whether these mechanisms are globally consistent or vary geographically; and 3) whether halos can therefore be used as an indicator of aspects of coral reef ecosystem health. In the process, this research advances our understanding of how remote observation tools (satellite and drone imagery; camera traps) can be integrated with computer science (machine learning) and ecological approaches (mechanistic experiments) to generate emergent insights that would not otherwise be possible.

This project is jointly funded by the Biological Oceanography Program, the Established Program to Stimulate Competitive Research (EPSCoR), and Ocean Education Programs.

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-1941737

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