Results from predation assays (squidpops) conducted along rocky reefs of the Western coast of San Cristobal, Galapagos from June to November 2021 to determine fish predation intensity across a spatial and temporal temperature gradient

Website: https://www.bco-dmo.org/dataset/894249
Data Type: Other Field Results, experimental
Version: 1
Version Date: 2024-05-17

Project
» The Role of Temperature in Regulating Herbivory and Algal Biomass in Upwelling Systems (Temperature and Herbivory)

Contributors	Affiliation	Role
Bruno, John	University of North Carolina at Chapel Hill (UNC-Chapel Hill)	Principal Investigator
Rauch, Shannon	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
This dataset contains results from predation assays (squidpops) to determine fish predation intensity across a spatial and temporal gradient of temperature. Assays were conducted between June and November 2021 at six locations of rocky reefs along the Western coast of San Cristobal, the eastern Island of the Galapagos Archipelago.

Table of Contents

Coverage

Spatial Extent: **N**:-0.702778 **E**:-85.584444 **S**:-0.926667 **W**:-89.820556
Temporal Extent: 2021-06-29 - 2021-11-15

Methods & Sampling

The squidpop assays consiste of the deployment of 25 stakes with small pieces of squid on top for one hour by burying the stakes in sand on the edge of the reefs. After one hour, the number of baits eaten is quantified to estimate predation intensity. Trials were done in six localities during the months of July and November. The study sites were rocky reefs along the Western coast of San Cristobal, the eastern Island of the Galapagos Archipelago.

BCO-DMO Processing Description

- Imported original files "SquidpopData_2021_updated.xlsx" (data) and "Coordinates_Squidpop2021.xlsx" (site list with coordinates) into the BCO-DMO system.

- Joined the latitude and longitude columns from the site list to the primary data file.
- Renamed fields to comply with BCO-DMO naming conventions.
- Replaced "July2" with "July" in the Month column.
- Converted Date column to YYYY-MM-DD format.
- Created date-time fields in ISO8601 format (both Local and UTC).
- Made latitude and longitude values negative (in the southern and western hemispheres)
- Saved the final file as "894249_v1_squidpop_assays_2021.csv".

[table of contents | back to top]

Data Files

File	
894249_v1_squidpop_assays_2021.csv	(Comma Separated Values (.csv), 38.22 KB) MD5:91de68d870a1120d97575f23aeaacc8b
Primary data file for dataset ID 894249, version 1	

[table of contents | back to top]

Related Publications

Duffy, J. E., Ziegler, S. L., Campbell, J. E., Bippus, P. M., & Lefcheck, J. S. (2015). Squidpops: A Simple Tool to Crowdsource a Global Map of Marine Predation Intensity. PLOS ONE, 10(11), e0142994. doi:10.1371/journal.pone.0142994
Methods

Rodemann, J., & Brandl, S. (2017). Consumption pressure in coastal marine environments decreases with latitude and in artificial vs. natural habitats. Marine Ecology Progress Series, 574, 167–179. https://doi.org/10.3354/meps12170
Methods

Whalen, M. A., Whippo, R. D. B., Stachowicz, J. J., York, P. H., Aiello, E., Alcoverro, T., Altieri, A. H., Benedetti-Cecchi, L., Bertolini, C., Bresch, M., Bulleri, F., Carnell, P. E., Cimon, S., Connolly, R. M., Cusson, M., Diskin, M. S., D'Souza, E., Flores, A. A. V., Fodrie, F. J., … Duffy, J. E. (2020). Climate drives the geography of marine consumption by changing predator communities. Proceedings of the National Academy of Sciences, 117(45), 28160–28166. https://doi.org/10.1073/pnas.2005255117
Methods

[table of contents | back to top]

Parameters

Parameter	Description	Units
Year	Year when the assay was conducted	unitless
Month	Month when the assay was conducted	unitless
Date	Date of assay	unitless
Time_Local	Time when the squidpop were deployed; local time zone (GMT-6:00)	unitless
ISO_DateTime_Local	Date and time when the squidpop were deployed in ISO 8601 format; local time zone (GMT-6:00)	unitless
ISO_DateTime_UTC	Date and time when the squidpop were deployed in ISO 8601 format; UTC time zone	unitless
Code1	Combination of month and locality	unitless
Locality	Location where assay was conducted	unitless
Latitude	Latitude of site where assay was conducted; negative values = South	decimal degrees
Longitude	Longitude of site where assay was conducted; negative values = West	decimal degrees
Season	Whether the assay was conducted during the cold (May-December) or warm season (January-April)	unitless
Habitat	Habitat type (reef, rocky reef, or beach)	unitless
Depth	Depth of deployment	meters (m)
Temperature	Water temperature	degrees Celsius
Squidpop	Number of squidpop deployed	unitless
Eaten	Whether the bait was eaten (1) or not (0)	unitless
Code2	Combination of month, locality, and squidpop number	unitless

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Squidpop
Generic Instrument Description	The squidpop assay is described in detail in Duffy et al., 2015 (doi: 10.1371/journal.pone.0142994). In summary, the squidpop consists of a standard prey item: a small piece of dried squid mantle tissue, tethered to a fiberglass plant stake with light monofilament fishing line. The squidpop is assembled by first punching a 1.3-centimeter (cm) diameter disc from the squid mantle using a cork borer. A length of monofilament line is threaded through the squid disc and tied to it securely, then the other end of the line is attached to the end of the plant stake with electrical tape, leaving 1-2 cm of line with the squid piece on the end. The short length of the line helps prevent tangling the tethers when squidpops are bundled together. Squidpops are deployed by pushing the stakes securely into the substratum. The stakes are typically arranged in one or two rows, but the spatial arrangement is of secondary importance to ensuring that the squidpops can be reliably relocated and retrieved at the end of the deployment. Squidpops are assessed for the presence or absence of the squid bait after some period of time.

[table of contents | back to top]

Project Information

The Role of Temperature in Regulating Herbivory and Algal Biomass in Upwelling Systems (Temperature and Herbivory)

Website: http://github.com/johnfbruno/Galapagos_NSF.git

NSF Award Abstract:
A well-known pattern in coastal marine systems is a positive association between the biomass of primary producers and the occurrence or intensity of upwelling. This is assumed to be caused by the increase in nutrient concentration associated with upwelling, enabling higher primary production and thus greater standing algal biomass. However, upwelling also causes large, rapid declines in water temperature. Because the metabolism of fish and invertebrate herbivores is temperature-dependent, cooler upwelled water could reduce consumer metabolism and grazing intensity. This could in turn lead to increased standing algal biomass. Thus upwelling could influence both bottom-up and top-down control of populations and communities of primary producers. The purpose of this study is to test the hypothesis that grazing intensity and algal biomass are, in part, regulated by temperature via the temperature-dependence of metabolic rates. Broader impacts include the training and retention of minority students through UNC's Course Based Undergraduate Research program, support of undergraduate research, teacher training, and various outreach activities.

The investigators will take advantage of the uniquely strong spatiotemporal variance in water temperature in the Galápagos Islands to compare grazing intensity and primary production across a natural temperature gradient. They will combine field monitoring, statistical modeling, grazing assays, populations-specific metabolic measurements, and in situ herbivore exclusion and nutrient addition to measure the effects of temperature on pattern and process in shallow subtidal communities. The researchers will also test the hypothesis that grazer populations at warmer sites and/or during warmer seasons are less thermally sensitive, potentially due to acclimatization or adaptation. Finally, the investigators will perform a series of mesocosm experiments to measure the effect of near-future temperatures on herbivores, algae, and herbivory. This work could change the way we view upwelling systems, particularly how primary production is regulated and the temperature-dependence of energy transfer across trophic levels.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1737071

[table of contents | back to top]