Barnacle percent cover in rocky subtidal habitats of the Galapagos Islands observed in 2015 and 2016 (RAPDGALPGS project)

Website: https://www.bco-dmo.org/dataset/683633
Data Type: Other Field Results
Version:
Version Date: 2017-02-16

Project
» RAPID: Understanding Thresholds and regime shifts in marine ecosystems: effects of the 2014-2015 El Nino in the Galapagos rocky subtidal (RAPDGALPGS)

Contributors	Affiliation	Role
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Table of Contents

Coverage

Spatial Extent: **N**:-0.14065 **E**:-90.23696 **S**:-0.74908 **W**:-91.32879

Dataset Description

This dataset contains percent cover of the barnacles (Megabalanus sp.) per 0.25 m2 area photo quadrat at 12 sites (6 m depth) in January 2015 and January 2016 in rocky subtidal habitats of the Galapagos Islands, Ecuador.

Methods & Sampling

Percent cover data were obtained by the random dot method (200 dots per quadrat, Witman et al. 2010) with 18 replicate quadrats sampled per site. January 2016 data not worked up yet for 2 sites (Pinzon, Roca Cousins). Barnacle percent cover values have an upper bound of 100.

For more information about these sampling methods see:

Witman, J. D., Brandt, M. and Smith, F. (2010), Coupling between subtidal prey and consumers along a mesoscale upwelling gradient in the Galapagos Islands. Ecological Monographs, 80: 153–177. doi:10.1890/08-1922.1

Data Processing Description

Data Processing:
Data are raw percent cover values, with no processing.

BCO-DMO Data Manager Processing Notes:
* added a conventional header with dataset name, PI name, version date
* modified parameter names to conform with BCO-DMO naming conventions
* split yy-MMM column into year (yyyy) and numeric month (MM)
* rounded percent cover to two decimal places
* changed some site names to be consistent with site location list (e.g. Baltra -> North Baltra)
* data were sorted alphabetically by site after naming modifications
* added lat lon from site list

[table of contents | back to top]

Parameters

Parameter	Description	Units
site	Site identifier	unitless
lon	Longitude of sampling site	decimal degrees
lat	Latitude of sampling site; west is negative	decimal degrees
year	Year sampling occured	unitless
month	Month sampling occurred	unitless
depth	Depth sampling occured	unitless
quadrat_num	Replicate quadrat number	unitless
barnacle_percent_cover	Percent cover of quadrat by barnacles (100% upper bound)	unitless

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Camera
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

[table of contents | back to top]

Deployments

RAPDGALPGS_barnacles_2015-2016

Website	https://www.bco-dmo.org/deployment/683665
Platform	Galapagos_Islands
Description	Subtidal sites surveyed: Champion -1.23683 -90.38498 Cousins -0.23696 -90.57309 Cuatro_Hermanos -0.84787 -90.74908 Daphne_Menor -0.39446 -90.35375 Islote_Gardner -1.32879 -90.29429 Guy_Fawkes -0.49897 -90.51222 La_Botella -1.28992 -90.49900 Las_Cuevas -1.26508 -90.35641 North_Baltra -0.41155 -90.27445 Pinzon -0.59087 -90.68595 Rocas_Beagle -0.41240 -90.62917 Rocas_Gordon -0.56596 -90.14065 **Methods & Sampling** Subtidal sites were surveyed. See measurement sites for more details.

[table of contents | back to top]

Project Information

RAPID: Understanding Thresholds and regime shifts in marine ecosystems: effects of the 2014-2015 El Nino in the Galapagos rocky subtidal (RAPDGALPGS)

Website: http://www.witmanlab.com

Coverage: Eastern Tropical Pacific, Galapagos Islands: 00.41100 S, 90.27525 W

The question addressed in this project is: Does the 2014-2015 El Niño cause a regime shift in Galapagos subtidal ecosystems? And if so, what thresholds are crossed to drive the change from rocky subtidal communities with abundant corals to a barnacle dominated regime? Regime shifts are non-linear "ecological surprises" in the sense that the endpoint is not predictable as a linear outcome of a driver variable. The working hypothesis for this project is that the forthcoming 2014-2015 El Niño will create non-linear effects that are negative for corals which bleach during extreme temperature variability of the El Niño Southern Oscillation (ENSO), but are positive for the benthic (bottom dwelling) food chain dependent on barnacles for food. The specific work in the Galapagos will contribute to the general understanding of non-linear effects of climate stress in marine ecosystems, which has been highlighted as a critical information gap needed to understand the effects of climate change on ecosystems. The study will also inform best practices for the conservation of corals, which are threatened worldwide by multiple stressors and cumulative direct, and indirect impacts.

Perturbations such as El Niños can drive ecosystems to a tipping point as thresholds are exceeded and a sudden transition to a different state (regime) occurs. Since the frequency of extreme El Niños is projected to increase with climate change, there is a pressing need to develop a more comprehensive understanding of how ENSOs affect marine communities in the context of climate change. Currently, the National Oceanic and Atmospheric Administration (NOAA) Climate Prediction Center predicts a 70-80 % chance of an El Niño occurring during the northern hemisphere summer-winter of 2014-2015. This project leverages an existing quantitative baseline on benthic community structure in the Galapagos subtidal to address 12 predictions about community-ecosystem level impacts of the oncoming 2014-2015 El Niño. The research employs an observational-experimental approach to test the predictions and to discern if additional bleaching stress to corals and further increases in barnacles associated with this ENSO ultimately leads to an ecosystem state (regime) characterized by declining coral populations and increasing barnacles and their predators.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1450214

[table of contents | back to top]