Subtidal temperature data (12-15 m depth) in the central Galapagos Islands, Ecuador from 2011-2013 (GMR Trophic Cascades project)

Website: https://www.bco-dmo.org/dataset/516994
Data Type: Other Field Results
Version: 1
Version Date: 2014-06-11

Project
» Effects of Predator Diversity on the Strength of Trophic Cascades in an Oceanic Benthic Ecosystem (GMR Trophic Cascades)

Contributors	Affiliation	Role
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Abstract
Subtidal temperature data (12-15 m depth) in the central Galapagos Islands, Ecuador from 2012-2013.

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Coverage

Spatial Extent: **N**:-0.236963 **E**:-90.14147 **S**:-1.328788 **W**:-90.74908
Temporal Extent: 2012-08-02 - 2013-08-14

Methods & Sampling

Temperature data collected by Onset Tidbit temperature loggers (http://www.onsetcomp.com/products/data-loggers/utbi-001) at 10 minute intervals. Loggers were attached to subtidal rock walls at 12-15 m depth. They are downloaded approximately twice a year. The temperature loggers have an accuracy of 0.2 degrees C.

DMO NOTE: This is a large dataset and is slow to load. Please be patient.

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Data Files

File
temperature.csv(Comma Separated Values (.csv), 41.07 MB) MD5:370708b1cac53f752bbb124aa02e7512 Primary data file for dataset ID 516994

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Parameters

Parameter	Description	Units
year	year	unitless
station	station name	unitless
sta_id	station code	unitless
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees
mon	month	unitless
day	day	unitless
time	local time	unitless
yrday_local	year	unitless
temp	temperature	degrees Celsius

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Instruments

Dataset-specific Instrument Name	Water Temp Sensor
Generic Instrument Name	Water Temperature Sensor
Dataset-specific Description	Onset Tidbit temperature loggers (http://www.onsetcomp.com/products/data-loggers/utbi-001) at 10 minute intervals. Loggers were attached to subtidal rock walls at 12-15 m depth . They are downloaded approximately twice a year. The temperature loggers have an accuracy of 0.2 degrees C.
Generic Instrument Description	General term for an instrument that measures the temperature of the water with which it is in contact (thermometer).

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Deployments

Witman_2014

Website	https://www.bco-dmo.org/deployment/517275
Platform	Unknown Platform
Start Date	2011-01-01
End Date	2013-08-14
Description	Temperature loggers attached to subtidal rock walls at 12-15 m depth

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Project Information

Effects of Predator Diversity on the Strength of Trophic Cascades in an Oceanic Benthic Ecosystem (GMR Trophic Cascades)

Website: http://www.witmanlab.com/predator-diversity-and-the-strength-of-trophic-cascades-gmr.html

Coverage: Galapagos Islands, Ecuador 00 33.953 S; 90 08.493 W

Description from NSF award abstract:
Predator diversity has decreased dramatically in the world's oceans due to overfishing, anthropogenic habitat destruction and possibly climate change. Yet, still unknown for most ecosystems is the importance of predator diversity and abundance for ecosystem functioning. One of the most pervasive community-wide consequences of top predators is the Trophic Cascade (TC), where herbivores are suppressed, which releases plants from consumption, thus increasing plant productivity. Recent studies have shown that the diversity of predators may reduce, increase, or have no effect on the strength of trophic cascades. The small number, to date, of experimental tests of predator diversity effects on cascade strength precludes broad generalizations vital to the development of predictive theory. Such research is limited by the lack of experimental realism due to the small number of predator species that can be manipulated in simplified mesocosms. Without more realistic species numbers, it is impossible to extrapolate results to natural ecosystems that experience losses of predator diversity.

To meet these challenges, and to better understand the consequences of present and changing levels of predator diversity in marine ecosystems, a series of experimental manipulations will be conducted on natural

levels of predator diversity and their herbivorous sea urchin prey. The hypotheses test the ultimate effects on benthic algae, as a measure of cascade strength in oceanic benthic ecosystems of the Galapagos Marine Reserve (GMR). Because of years of protection from industrial fishing as a UNESCO World Heritage Site, and of local conservation protection as the GMR, there are diverse guilds of higher trophic level predators, such as large fish and sharks. Likewise, there is high diversity of intermediate-level fish and invertebrates that prey on sea urchins, creating an unusual opportunity for testing and developing predator diversity and Biodiversity Ecosystem Functioning theory. The overarching questions addressed in this project are: How do naturally occurring large ranges of oceanic predator diversity influence the strength of trophic cascades? and How does environmental variation and conservation protection influence these processes? The first question will be addressed in experiments manipulating both horizontal (within trophic level; urchin herbivores) and vertical (across trophic level; predators) consumer diversity and in another experiment manipulating the diversity of predatory fish and invertebrates guilds. The experiments employ open fenced treatments containing urchins but allowing access by fish and invertebrate predators of the urchins. To record natural levels of fish and invertebrate predator richness encountering the treatments, consuming the urchins and interacting with each other, the entire experimental layout will be video-recorded for up to several weeks at a time. The time-lapse cameras/lighting system is capable of day and night imaging without affecting predator behavior. A simplified manipulation to measure the influence of predator diversity on cascade strength will be replicated and video-recorded at 16 sites -- representing different levels of upwelling and conservation protection -- to place the mechanistic understanding gleaned from detailed experiments at local sites into a broader (mesoscale) context.

Relevant References:

Witman, J.D and F. Smith. 2003. Rapid community change at a tropical upwelling site in the Galapagos Marine Reserve. Biodiversity and Conservation 12: 25-45

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

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1061475

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