

Percent cover and abundance of algae and invertebrates in the rocky intertidal zone from Bodega Marine Reserve, CA from 2004-2013 (Intertidal Diversity project)

Website: <https://www.bco-dmo.org/dataset/521221>

Version: 2014-10-01

Project

» [Long-term and interactive effects of seaweed diversity and herbivory on intertidal community structure and functioning](#) (Intertidal Diversity)

Contributors	Affiliation	Role
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Dataset Description

Access Restriction: These data can be made freely accessible after a period of 1 year from submission (submitted 11 July 2014).

Methods & Sampling

Percent cover of algae in 1.0 m diameter permanently marked plots was estimated using the random point contact method. Each alga or sessile invertebrate present under each of 102 points within the plot was identified to species or the lowest possible taxonomic level in the field. Thus percent cover can be greater than 100% where layering occurs. Data were collected quarterly from 2004 to 2014 with a few missing time periods during funding lapses.

Macrofaunal invertebrates were sampled on the plots at quarterly intervals. All mobile invertebrates were counted within four 20 x 20 cm quadrats interspersed within the larger 1 m diameter plot. Identification was to the lowest possible taxonomic level in the field (usually genus or species, but occasionally higher taxon)

Relevant References:

These data represent the "control" plots from the following papers:

John J. Stachowicz, Michael Graham, Matthew E. S. Bracken and Amber I. Szoboszlai. 2008. Diversity Enhances Cover and Stability of Seaweed Assemblages: The Role of Heterogeneity and TimeEcology, 89(11), 2008, pp. 3008-3019.

Rebecca J. Best, Ambre L. Chaudoin, Matthew E. S. Bracken, Michael H. Graham And John J. Stachowicz. 2014. Plant-animal diversity relationships in a rocky intertidal system depend on invertebrate body size and algal cover. Ecology, 95(5), 2014, pp. 1308-1322.

Data Processing Description

BCO-DMO Processing:

- Added conventional header with dataset name, PI name, version date, reference information
- Renamed parameters to BCO-DMO standard
- Added lat and lon columns
- The species list repeats for a each block
- Rearranged columns
- Added underscore to species names

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Data Files

File
algal_cover.csv (Comma Separated Values (.csv), 649.02 KB) MD5:f88783eb6065646a9dfeb01aa8abc53b
Primary data file for dataset ID 521221

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Parameters

Parameter	Description	Units
period	number of sampling period during the record: 1 = first sampling date, 2 = second, etc.	unitless
year	year of sampling	yyyy
season	season of sampling. exact dates vary from year to year. Spring (April-May); Summer (July-August) Fall (October-November); Winter (January-Feb)	unitless
plot	plot number	unitless
block	each plot was divided into 4 quadrants and one 20x 20cm area within each quadrant was sampled for invertebrate abundance	unitless
species	taxon recorded in each plot; identified to lowest possible taxonomic level in the field	unitless
pcent_cover	total percent of points (out of 102) that had this specific taxon present	percent
pcent_canopy	percent of points out of 102 that had this specific taxon present as the top (or only) layer	percent
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees

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Deployments

BodegaBay_Stachowicz

Website	https://www.bco-dmo.org/deployment/521213
Platform	Bodega Marine Reserve
Start Date	2004-07-19
End Date	2013-07-10
Description	rocky intertidal

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Project Information

Long-term and interactive effects of seaweed diversity and herbivory on intertidal community structure and functioning (Intertidal Diversity)

Coverage: Bodega Bay, CA (38.3244 N, 123.0386 W); Temperate rocky intertidal zone

Description from NSF award abstract:

Stimulated in part by rapid changes in the biological composition and richness of most of Earth's ecosystems, considerable theoretical and empirical research has focused on understanding the effects of species richness on communities and ecosystems. This research has resulted in major advances and has shown that diversity can affect ecosystem processes. However, we are currently limited in our ability to draw generalities regarding these effects that transcend ecosystems and to apply this knowledge to conservation and management efforts because: (1) most experiments are of short duration and relatively few are conducted under field conditions on natural substratum; and (2) most experiments manipulate only diversity and so cannot assess the strength of diversity relative to other known drivers of ecosystem functioning. Previous NSF-funded work found that species diversity of seaweeds does increase the accumulation of producer biomass and the diversity and richness of mobile invertebrates associated with those seaweeds. **In this project, the investigator will examine the interactive effects of plant and grazer richness on seaweed productivity and assemblage recovery from disturbance by (a) continuing our ongoing diversity manipulations (b) nesting additional experiments manipulating grazers within these plots, and (c) performing new experiments to examine effects of grazer richness on algal assemblages.** The main experiment consists of 72 1.5 m diameter plots in the rocky intertidal at Bodega Bay, California, split into 6 different treatments: a monoculture of each of the 4 algal species that comprise >85% of the algal cover in our system; a 4-species polyculture, and an unmanipulated control plot. The PI created these "diversity" plots by weeding under the auspices of a previous NSF grant.

Objectives of this project are:

- (1) To nest within the diversity plots smaller cleared areas that either allow or prohibit access by grazers in order to test the interactive effects of algal diversity and herbivory on recovery of the algal assemblage from disturbance (or resilience).
- (2) To conduct a separate combined additive and replacement series experiment to examine the effects of herbivore identity and richness on algal recruitment and succession.
- (3) While the nested grazer-exclusion experiment is in progress, to continue weeding and collecting data in the uncleared portion of these plots as a continued test of the univariate effect of algal richness on the cover of algae and sessile invertebrates, and on mobile invertebrate abundance, richness, and diversity. Together with previous results, this will produce a 7 year record of the effects of seaweed richness on rocky intertidal communities, which will then be correlated with archived environmental data.
- (4) After the nested grazer exclusion experiment is complete, to cease weeding plots and track their reinvasion by weeded species in order to evaluate the mechanisms maintaining diversity of perennial algae.

Understanding the consequences of simultaneous changes in grazer abundance or diversity and algal diversity as well as the long-term effects of both on the resilience of algal communities in the face of disturbance will provide a better understanding of both the consequences of human encroachment into these habitats and the appropriate management efforts needed to minimize impacts and maintain ecosystem functioning. This is especially critical given that harvesting and trampling by humans are altering the diversity and composition of herbivores and algae in the California rocky intertidal zone.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0850707

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