

# Biomass of experimental marine invertebrate communities across latitude (Competition and Predation across Latitude)

**Website:** <https://www.bco-dmo.org/dataset/861655>

**Data Type:** experimental, Other Field Results

**Version:** 1

**Version Date:** 2021-09-28

## Project

» [Community Effects of Competition and Predation across Latitude and Implications for Species Invasions](#)  
(Competition and Predation across Latitude)

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## Abstract

Biomass of sessile marine invertebrates from coastal sites across a latitudinal gradient spanning the subarctic to the tropics. Biomass of each community was measured after a developmental period of three or 12 months under nine different treatments that tested the effect of predation and competition. Caging was used to reduce predation pressure and biomass removals opened up space, a limiting resource in sessile communities.

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## Coverage

**Spatial Extent:** N:55.4726 E:-79.5218 S:8.9128 W:-131.797

**Temporal Extent:** 2015-06-16 - 2018-09-12

## Dataset Description

Biomass of sessile marine invertebrates from coastal sites across a latitudinal gradient spanning the subarctic to the tropics. Biomass of each community was measured after a developmental period of three or 12 months under nine different treatments that tested the effect of predation and competition. Caging was used to

reduce predation pressure and biomass removals opened up space, a limiting resource in sessile communities.

## Methods & Sampling

### Methodology:

Marine invertebrate communities developed on PVC settlement panels (14 x 14 cm) hung on floating docks one meter below the water surface at local marinas at three coastal sites in each region (Panama, Mexico, California, Alaska). Communities developed for three or 12 months under the following treatments: caged (i.e. reduced predation), partial cage (i.e. procedural cage control; ambient predation) and (c) open (i.e. ambient predation). Caging material had a mesh size of 0.635 cm. These treatments were fully crossed with biomass removals of 0%, approximately 20% (actual 18%, 36cm<sup>2</sup>) or approximately 60% (actual 54%, 107cm<sup>2</sup>) panel surface scrapes. On panels assigned a removal treatment, a total of three parallel scrapes or one scrape positioned randomly on the surface of the panel to reach the 60% or 20% surface opening was performed, respectively. Communities that assembled for three months received two removal rounds (1 and 2 months after deployment) while those that assembled for 12 months received five rounds (1, 2, 6, 10, and 11 months after deployment) before the richness of each community was assessed. Experiments were initiated in Alaska in June 2015, California in May 2016, Mexico in June 2017 and Panama in December 2015.

### Sampling and analytical procedures:

Following the assigned developmental period and approximately one month after the last biomass removal, communities were retrieved and brought back to a laboratory for assessment.

Wet weight of each community was recorded as a measure of biomass. Biomass values include the weight of the panel (average 267.5 grams).

## Data Processing Description

BCO DMO Data Processing Notes:

- Converted dates to yyyy-mm-dd format

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## Data Files

File
<b>abc_biovision_dataarchive_mainexp_3mo12mo_26may21-3.csv</b> (Comma Separated Values (.csv), 97.67 KB) MD5:fd86f2e8ed310154d4e7a4d0a95c1c66
Primary data file for dataset ID 861655

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## Related Publications

Freestone, A. L., Torchin, M. E., Jurgens, L. J., Bonfim, M., López, D. P., Repetto, M. F., ... Ruiz, G. M. (2021). Stronger predation intensity and impact on prey communities in the tropics. *Ecology*, 102(8).

doi:[10.1002/ecy.3428](https://doi.org/10.1002/ecy.3428)

*Related Research*

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## Related Datasets

### IsRelatedTo

Freestone, A. L., Torchin, M. E., Bonfim, M., Jurgens, L. J., López, D. P., Repetto, M. F., Schlöder, C., Ruiz, G. E. (2022) **Richness of experimental marine invertebrate communities across latitude (Competition and Predation across Latitude)**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-09-22 doi:10.26008/1912/bco-dmo.861234.1 [[view at BCO-DMO](#)]

### References

Freestone, A. L., Torchin, M. E., Bonfim, M., Jurgens, L. J., López, D. P., Repetto, M. F., Schlöder, C., Ruiz, G. E. (2022) **Composition of experimental marine invertebrate communities across latitude (Competition and Predation across Latitude)**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-09-22 doi:10.26008/1912/bco-dmo.861250.1 [[view at BCO-DMO](#)]

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## Parameters

Parameter	Description	Units
Region	Region where each taxon was collected (Alaska, California, Mexico, Panama)	unitless
Site_name	Complete site name	unitless
Site_code	Unique site abbreviation (two letter code)	unitless
Latitude	Latitude of site where communities developed. Negative values indicate South.	decimal degrees
Longitude	Longitude of site where communities developed. Negative values indicate West.	decimal degrees
Plate_ID	Unique panel (community) reference number	unitless
Deploy_date	Date when experimental communities (panels) were deployed for a 3 or 12 month developmental period. Format: YYYY-MM-DD.	unitless
Retrieve_date	Date when experimental communities (panels) were retrieved after a 3 or 12 month developmental period. Format: YYYY-MM-DD.	unitless
Deploy_duration	Length of growth period (3 or 12-month)	number of months
Treatment_type	Treatment description. full =full cage; open = no cage; partial = partial cage	unitless
Comp_removal	Biomass removal. 0 = no biomass removal; 20 = 20% surface scrape; 60 = 60% surface scrape	unitless
Wet_wt_g	wet weight (in grams) of the community, including the mass of the standard PVC panel	grams

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## Instruments

<b>Dataset-specific Instrument Name</b>	PVC settlement panels
<b>Generic Instrument Name</b>	Grooved PVC settlement plate
<b>Dataset-specific Description</b>	Marine invertebrate communities developed on PVC settlement panels (14 x 14 cm) hung on floating docks one meter below the water surface at local marinas at three coastal sites in each region (Panama, Mexico, California, Alaska).
<b>Generic Instrument Description</b>	An artificial colonization substrate made of a sheet of PVC with engraved lines to roughen its surface. It is used to determine the extent of colonization and/or the diversity of settled organisms in a marine or artificial environment.

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## Project Information

### Community Effects of Competition and Predation across Latitude and Implications for Species Invasions (Competition and Predation across Latitude)

**Coverage:** Eastern Pacific in four coastal regions: Ketchikan, Alaska; San Francisco, California; La Paz, Mexico; and Panama City, Panama

*Description from NSF award abstract:*

Global patterns of biodiversity demonstrate that most of the species on earth occur in the tropics, with strikingly fewer species occurring in higher-latitude regions. Biologists predict that this global pattern of species diversity is likely shaped by three ecological interactions between species. Yet few detailed experimental data exist that demonstrate how species interactions influence natural communities from the tropics to the arctic. Therefore, a significant opportunity exists to transform our understanding of how these fundamental species interactions shape patterns of biodiversity across the globe. Furthermore, these species interactions have the strong potential to limit potentially harmful biological invasions by non-native species, which are often transported by human activities that can breach historical dispersal barriers, such as ocean basins and continents. Biological invasions can cause undesired ecological and economic effects and are considered one of the primary drivers of global change. Through extensive field research on marine ecosystems along the Pacific Coast of North and Central America, from the tropics to the subarctic, this project will study ecological factors that shape global patterns of diversity and limit biological invasions.

Biologists have long theorized that the latitudinal diversity gradient may be shaped by stronger species interactions, such as competition and predation, occurring in the tropics than at higher latitudes. Prior research suggests that predation pressure is indeed stronger at lower latitudes, but it is unclear how interactive effects of predation and competition structure communities to maintain these diversity patterns in ecological time. This project represents an international research program to expand ecological understanding of species interactions across latitude. The objectives are to determine the relative influences of two primary species interactions, competition and predation, on patterns of species diversity, community assembly and sensitivity to species invasion. Field research will employ a large-scale experimental approach that focuses on sessile marine invertebrate communities across 47 degrees of latitude (over 7000 km). Experiments will manipulate levels of predation and competition for one year and will be conducted in four regions, ranging from the subarctic to the tropics: Alaska, California, Mexico, and Panama. Communities of sessile marine invertebrates, composed of both native and non-native species, will be examined iteratively under different predation and competition regimes to evaluate community dynamics. The relative importance of a suite of factors, including environmental conditions and recruitment rates, to interaction outcomes will be evaluated.

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## Funding

Funding Source	Award
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1434528</a>

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