

Richness of marine invertebrate communities across latitude with exposure to predation (Competition and Predation across Latitude)

Website: <https://www.bco-dmo.org/dataset/862052>

Data Type: experimental, Other Field Results

Version: 1

Version Date: 2021-09-29

Project

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

(Competition and Predation across Latitude)

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Abstract

Richness of sessile marine invertebrates from coastal sites across a latitudinal gradient spanning the subarctic to the tropics. Invertebrate communities developed under low predation for three or 12 months within cages and then underwent exposure to predation or were re-caged as controls. This experiment provided an assessment of predation impact on mature communities to complement predator exclusion experiments that measured impact of predators on prey community assembly.

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Coverage

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

Temporal Extent: 2015-06-16 - 2017-09-23

Dataset Description

Richness of sessile marine invertebrates from coastal sites across a latitudinal gradient spanning the subarctic to the tropics. Invertebrate communities developed under low predation for three or 12 months within cages and then underwent exposure to predation or were re-caged as controls. This experiment provided an assessment of predation impact on mature communities to complement predator exclusion experiments that measured impact of predators on prey community assembly.

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. Communities developed for three or 12 months under reduced predation (in cages). Cages had a mesh size of 0.635 cm. Communities were retrieved, assessed for species richness using non-destructive methods, and assigned to control (re-caged) or exposure (no cage) treatments. Communities were re-deployed in the same location where they developed for a short-term, three-day experiment to test the impact of ambient predation on prey communities. Initial deployment of caged panels occurred 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 development period, communities were temporarily retrieved and brought back to a laboratory for assessment. Communities were then re-deployed in their original location on the same day, and cages were either removed (exposure treatment) or kept intact (controls) for the short-term three-day experiment. After three days, communities were retrieved again and brought back to a laboratory for final assessment. Initial richness (pre) was assessed using non-destructive methods and is directly comparable with final richness (post1), which was recorded using the same methods. Additional species not originally recorded were uncovered using destructive methods (post2). Species richness provided here is a comprehensive list of sessile invertebrate species observed per community, including species that were captured in point count (composition) measures and those that were not.

Data Processing Description

BCO-DMO Processing Notes:

- Converted dates to YYYY-MM-DD format

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Data Files

File
def_biovision_dataarchive_predexp_3mo12mo_10jun21-1.csv (Comma Separated Values (.csv), 1.21 MB) MD5:b6c75c0ab7f9b48d37233e77401c43d9
Primary data file for dataset ID 862052

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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) **Biomass of sessile marine invertebrate communities with exposure to predation (Competition and Predation across Latitude)**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-09-29 doi:10.26008/1912/bco-dmo.862092.1 [[view at BCO-DMO](#)]

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 marine invertebrate communities across latitude with exposure to predation (Competition and Predation across Latitude)**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-10-12 doi:10.26008/1912/bco-dmo.862068.1 [[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
Exposure_start_date	Date when short-term, three-day exposure experiment started	unitless
Deploy_duration	Length of developmental period (3 or 12-month)	number of months
Predation_exposure_treatment	Treatment description. control = caged, exposed = uncaged, exposed to predation	unitless
Sampling_interval	Time when community was sampled. pre = after initial retrieval, prior to onset of exposure experiment (non-destructive); post1 = after three-day exposure period (non-destructive); post2 = additional species observed using destructive methods	unitless
Taxa	Family or higher taxonomic information. Bare = panel surface on point, no organism present	unitless
Taxa_num	Unique morphospecies number identifier	unitless
MorphName	Lower taxonomic information (~genus/species, if available) based on best available information in the field	unitless
InvStatus	Invasion status: native; introduced; crypto = cryptogenic	unitless

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Instruments

Dataset-specific Instrument Name	PVC settlement panels
Generic Instrument Name	Grooved PVC settlement plate
Dataset-specific Description	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. Communities developed for three or 12 months under reduced predation (in cages).
Generic Instrument Description	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.

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.

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1434528