Sessile organisms found in tide pools during community surveys at John Brown's Beach, Sitka, Alaska, USA from 2018 to 2020.

Website: https://www.bco-dmo.org/dataset/872885
Data Type: Other Field Results
Version: 1
Version Date: 2022-05-17

Project
» Collaborative Research: Effects of multiple aspects of climate change on marine biodiversity and ecosystem functioning (Sitka CO2 and Temp Expt)

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Abstract
This dataset includes information on sessile species found in tide pools on a rocky shoreline during community surveys conducted at John Brown's Beach, Sitka, Alaska, USA from 2018 to 2020.

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Coverage

Spatial Extent: **Lat**:57.05 **Lon**:-135.37
Temporal Extent: 2018-06-27 - 2020-09-15

Dataset Description

This dataset includes only the sessile organism abundance data from the study. See "Related Datasets" section for mobile species percent cover data.

Methods & Sampling

Surveys were conducted at John Brown's Beach (57.05 N, 135.37 W), near Sitka, Alaska, USA. Specific site information is included in the file "Tide_Pool_Characteristics.csv" under Supplemental Files.

Sampling and analytical procedures:
We selected 36 tide pools to study and surveyed each using a flexible quadrat with 10cm x 10cm mesh openings. At the beginning of the survey, the perimeter of each tide pool was delineated using a piece of cord, then the pool was drained using a bilge pump and a bucket. The surveyors then laid down the mesh quadrat and used it to measure the total bottom surface area of the tide pool. The surveyor then identified all non-mobile species (sessile invertebrates and algae) present, measured the surface area occupied by each, and, when finished, refilled the tide pool with the previously removed water. This dataset includes only the sessile organism abundance data from the study. See "Related Datasets" section for mobile species data percent cover data.

Known Issues:
There are multiple small gaps in the data. Dead mussels and dead barnacles were not assessed in the first set of surveys. The time of the pools being drained and refilled was not recorded during the surveys between January and May 2019. There were also a pair of tide pools (22 and 23) that were connected, preventing accurate volume measurements from being taken.

WoRMS Taxa Match:

BCO-DMO checked the provided taxonomic names using the World Register of Marine Species Taxa Match tool (WoRMS). All names matched a known name exactly, though two matched an unaccepted synonym. The following are details on the results of the Taxa Match:

- in dataset: *Petrocelis;* accepted name: *Mastocarpus.* The Petrocelis form of Mastocarpus represents a distinct life-history stage. It remains as a separate classification in the data.
- in dataset: *Pterosiphonia bipinnata;* accepted name: *Savoiea bipinnata.* This name was changed in the data.

Data Processing Description

Data Processing:
Data were collected on data sheets and entered into an Excel spreadsheet, where the data were later double-checked against the original data sheets to ensure transfer accuracy.

BCO-DMO Processing
- Converted dates to YYYY-MM-DD format
- Adjusted field/parameter names to comply with BCO-DMO naming conventions
- Added a conventional header with dataset name, PI names, version date
- Missing data identifier 'empty' replaced with 'nd' (BCO-DMO's default missing data identifier)
- Taxonomic names were checked using the World Register of Marine Species Taxa Match tool (WoRMS). All names matched a known name exactly. Though two matched an unaccepted synonym:
(1) Orgininally labeled *Pterosiphonia bipinnata* in the dataset, it was changed to the accepted name: *Savoiea bipinnata*.
(2) Originally labeled Petrocelis matched with Mastocarpus and the submitter requested that Petrocelis remain as a life stage of Mastocarpus.

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Data Files

File
surveys_cover.csv (Comma Separated Values (.csv), 925.62 KB) MD5:065be309d9d49e2e7a6e50837adce92c Primary data file for dataset ID 872885

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Supplemental Files

File
Tide_Pool_Characteristics.csv (Comma Separated Values (.csv), 1.72 KB) MD5:85c06b50953fa6716049840ca77f7c85

Characteristics of tide pools studied in the Light-Dark Tide Pool Productivity study.

Column names, Units, Descriptions:

Pool_ID, unitless, The number assigned to each tide pool.

Latitude, Degrees North, The latitude of each tide pool.

Longitude, Degrees East, The longitude of each tide pool.

Maximum_depth, centimeters (cm), Water depth at the deepest point in each tide pool, measured with a ruler.

Perimeter, centimeters (cm), Perimeter of each tide pool, measured at water level with a transect tape.

Volume, liters (L), Water volume in each tide pool, measured by pumping all water in a tide pool into a graduated bucket.

Interior_surface_area, square meters (m2), Interior surface area of each tide pool, measured along the bottom of each tide pool with a flexible mesh quadrat.

Tide_height, meters (m), The height of each tide pool above Mean Lower Low Water, measured with a measuring rod and surveying scope.

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Related Publications

Bracken, M. E. S., Miller, L. P., Mastroni, S. E., Lira, S. M., & Sorte, C. J. B. (2022). Accounting for variation in temperature and oxygen availability when quantifying marine ecosystem metabolism. Scientific Reports, 12(1). https://doi.org/10.1038/s41598-021-04685-8
Methods

Sorte, C. J. B., & Bracken, M. E. S. (2015). Warming and Elevated CO2 Interact to Drive Rapid Shifts in Marine Community Production. PLOS ONE, 10(12), e0145191. doi:10.1371/journal.pone.0145191
Methods

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Related Datasets

IsRelatedTo

Sorte, C., Bracken, M., Kroeker, K. J., Miller, L. P. (2022) **Mobile organisms found in tide pools during community surveys at John Brown's Beach, Sitka, Alaska, USA from 2018 to 2020.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2022-05-17 doi:10.26008/1912/bco-dmo.872957.1 [view at BCO-DMO]

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Parameters

Parameter	Description	Units
Date	The date of the survey in format: YYYY-MM-DD	unitless
Pool_ID	The numerical ID of the tide pool surveyed	unitless
Time_drained	The time at which water was pumped from the tide pool in local (Alaska Standard or Alaska Daylight) time in format: hh:mm	unitless
Time_water_returned	The time at which the tide pool was refilled in local (Alaska Standard or Alaska Daylight) time in format: hh:mm	unitless
Pool_surface_area	The total basal surface area of the tide pool	meters squared (m2)
Bare_space	Percentage of total tide pool area occupied by bare rock with no biological cover, relative to surface area	percent (%) cover
Organism	The species observed during the survey	unitless
Abundance	Percentage of total tide pool surface area occupied by the named species. Dead barnacles and dead mussels were not assessed in June 2018, January-May 2019, or June-September 2020.	percent (%) cover

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Project Information

Collaborative Research: Effects of multiple aspects of climate change on marine biodiversity and ecosystem functioning (Sitka CO2 and Temp Expt)

Coverage: Sitka Sound, Alaska, USA (57.1N 135.4 W)

NSF Award Abstract:
This project addresses fundamental gaps in our knowledge of how changing environmental conditions will impact the earth's species and ecosystems. One of the main challenges is predicting impacts of multiple environmental stressors changing at the same time within highly dynamic ecosystems. Climate simulations in coastal marine habitats will, therefore, yield critical information about likely future changes in biodiversity and ecosystem health. This project is a partnership between institutions with a strong focus on serving underrepresented communities of students, and the investigators are committed to participating in K-12 and undergraduate mentorship programs through their respective institutions. Furthermore, the research will be based in Sitka, Alaska, where investigators will collaborate with the Sitka Sound Science Center to incorporate research into the Scientist in the Schools program and a summer day camp for elementary age children.

This work aims to uncover the trajectory of climate change impacts and interactive responses to multiple climatic stressors on coastal marine species, communities, and ecosystem functioning. To uncover these links, the investigators will (1) quantify seasonal and diel dynamics under ambient conditions in a benthic marine community, (2) conduct factorial manipulations of two climatic stressors - increased carbon dioxide concentrations and temperatures - and measure impacts on physiology, diversity, and productivity, and (3) conduct a second field experiment to evaluate whether productivity responses are due to changes in

physiology or biodiversity. Climatic changes have the potential to influence ecosystem functioning by altering physiology, abundance, and community structure (i.e., biodiversity), and this research specifically aims to partition these different pathways, leading to more effective predictions of impacts on benthic marine ecosystems.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1756173
NSF Division of Ocean Sciences (NSF OCE)	OCE-1756208
NSF Division of Ocean Sciences (NSF OCE)	OCE-1756216
NSF Division of Ocean Sciences (NSF OCE)	OCE-1904185

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