Table of taxonomic hierarchy and the sampling method for organisms collection in Aleutian Island kelp forests, June 2016 and July 2017 (Kelp Forest Ecosystem Engineer Loss project)

Website: https://www.bco-dmo.org/dataset/728110
Data Type: Cruise Results
Version: 1
Version Date: 2018-02-21

Project
» Collaborative Research: Changes in ecosystem production and benthic biodiversity following the widespread loss of an ecosystem engineer (Kelp Forest Ecosystem Engineer Loss)

Contributors	Affiliation	Role
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Abstract
This dataset includes the taxonomic hierarchy for epibenthic community organisms collected in Aleutian Island kelp forests, based on biomass data. It also lists the method used to sample, either by a scrape collection or by a visual count along a swath.

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Coverage

Spatial Extent: **N**:53.39239 **E**:-167.62222 **S**:51.40996 **W**:-179.30663
Temporal Extent: 2016-06-17 - 2017-07-23

Dataset Description

This dataset includes the taxonomic hierarchy for epibenthic community organisms collected in Aleutian Island kelp forests, based on biomass data. It also lists the method used to sample, either by a scrape collection or by a visual count along a swath. These data are published in Metzger et al, 2019.

Methods & Sampling

Sampling locations were from the Aleutian Archipelago nearshore between longitude 173.9 and -167.6 in June 2016 and July 2017. The average depth 17.5 ft.

To assess community structure at each site, two methods were used. First, to quantify the remainder of the epibenthic community, ten 0.25 m2 quadrats were haphazardly placed within each site. Within these quadrats,

the percent bottom cover was visually estimated for bare substrate, kelp holdfasts, suspension feeders, pulvinate green algae (Codium spp.), and non-geniculate coralline algae - with differentiation made between Clathromorphum spp. and other encrusting coralline species.

Following visual estimation, all epibenthic organisms—excepting those strongly adhered to the substrate (e.g., barnacles, non-geniculate coralline algae, etc.)— were scraped from the substrate and placed in fine mesh collection bags for shipboard identification, and abundance and biomass determination. Second, three 10 m x 2 m swaths were placed haphazardly within each site. Within each swath, E. fistulosa stipes were counted, midwater and demersal fishes visually quantified by trained divers, and all conspicuous, sparsely distributed, large, mobile invertebrates (i.e., sea stars, crab, and large gastropods with distributions assumed to be less than 1 per 2.5 m2, the total area covered by the above quadrats) were collected in fine mesh bags for shipboard abundance and biomass determination. Once onboard, organisms were identified to the lowest possible taxa, counted (if the species occur as discrete individuals) and weighed using hanging spring scales to determine biomass to the nearest .005 kg. Ambiguous or difficult to identify individuals were preserved in 10% formalin (for invertebrates) or pressed (for algae) for later identification.

Related data are presented in Konar et al (2017).

Data Processing Description

All statistical analyses were done using PRIMER-E v. 7.0.13 (Clarke and Gorley 2015). Prior to multivariate analyses, abundance and biomass data were standardized to m2 to allow for pooling across sampling methods using Microsoft Excel for Mac v.16.9.

BCO-DMO Processing Notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- transposed rows to columns

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Data Files

File
community_taxonomy.csv (Comma Separated Values (.csv), 22.17 KB) MD5:0891e71030624b556761e048ad1cb952 Primary data file for dataset ID 728110

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Related Publications

Clarke, K. R., and Gorley, R. N. (2015). PRIMER v7: user manual/tutorial 3rd ed. Plymouth, United Kingdom: Primer-E Ltd.
Methods

Konar, B., Edwards, M. S., Bland, A., Metzger, J., Ravelo, A., Traiger, S., & Weitzman, B. (2017). A swath across the great divide: Kelp forests across the Samalga Pass biogeographic break. Continental Shelf Research, 143, 78–88. doi:10.1016/j.csr.2017.06.007
Methods

Metzger, J. R., Konar, B., & Edwards, M. S. (2019). Assessing a macroalgal foundation species: community variation with shifting algal assemblages. Marine Biology, 166(12). doi:10.1007/s00227-019-3606-1
Results

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Parameters

Parameter	Description	Units
Taxon	taxonomic name	unitless
Kingdom	taxonomic kingdom	unitless
Phylum	taxonomic phylum	unitless
Class	taxonomic class	unitless
Order_Subclass	taxonomic order or subclass	unitless
Family	taxonomic family	unitless
Genus	taxonomic genus	unitless
Species	taxonomic species	unitless
Sampling_method	taxonomic method	unitless

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Project Information

Collaborative Research: Changes in ecosystem production and benthic biodiversity following the widespread loss of an ecosystem engineer (Kelp Forest Ecosystem Engineer Loss)

Website: http://sdsukelp.weebly.com/blog

Coverage: Aleutian Islands Alaska (Attu Island to Unalaska)

NSF abstract:

In many ecosystems the presence of a single dominant species can modify the physical conditions of the environment and alter patterns of biodiversity, nutrient cycling, and primary production. Losses of these "ecosystem engineers" can have profound impacts to how ecosystems function. Coastal kelps provide excellent examples of organisms whose structure modifies the physical characteristics of their habitats (light, nutrients, water motion) and supports enhanced biodiversity. The kelp forests in the coastal waters of the Aleutian Archipelago have suffered large-scale declines over the past several decades. This project will examine how these losses impact patterns of ecosystem production and biodiversity using a combination of techniques ranging from in situ benthic chambers and shipboard incubations to remote sensing using satellite imagery. The results will provide an understanding of how such events may impact this and other ecosystems. This project will support graduate students and will introduce the public to the Aleutian ecosystems in a series of videos. The investigators will also work with a San Diego high school teacher to integrate project findings into classroom activities, and they expect to involve a teacher in their field program.

The investigators will ask two highly integrated questions: 1) How do the widespread losses of kelp forests

impact benthic productivity across the Aleutian Archipelago? 2) How do the widespread losses of kelp forests impact benthic biodiversity and community structure across the archipelago? To address these, the investigators will estimate changes to productivity at ten islands where they have historic data on seaweed community composition and estimates of kelp canopy cover. They will use in situ benthic chambers placed in both kelp forests and urchin barrens to measure plot-scale patterns of net ecosystem productivity (NEP), and shipboard incubations to examine net primary productivity (NPP) for the dominant macroalgae. Data for individual species rates of NPP will be scaled by their biomass and combined with in situ plot-scale benthic chamber experiments of whole communities to estimate NEP at the islands visited. These estimates will be scaled up to calculate NEP across the entire archipelago by first extrapolating results from the study sites to entire islands, and then across the archipelago. They will also estimate broad-scale patterns in production by characterizing water column irradiances across the archipelago and modeling NPP using species-level relationships between irradiance and photosynthesis. Coupling these with estimates of water column irradiance and community respiration will allow modeling of NEP across this region. Benthic biodiversity will be assessed using diver surveys and shipboard benthic trawls. Following these activities, satellite remote sensing of the kelp canopies dating back to the 1980s and the investigators' own historical data on benthic macroalgal abundances at these and other islands will be used to estimate the temporal and spatial patterns of change across the archipelago.

For more information see:

Project blog: http://sdsukelp.weebly.com/blog
Project website: http://www.uaf.edu/cfos/research/projects/collaborative-research--/

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1435205
NSF Division of Ocean Sciences (NSF OCE)	OCE-1435194

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