Mussel bed phototransects surveyed between July 2011 and June 2015 on rocky intertidal shorelines of Barkley Sound, British Columbia, Canada

Website: https://www.bco-dmo.org/dataset/699862
Data Type: Other Field Results
Version:
Version Date: 2018-01-18

Project
» Spatial Realism in the Mussel Bed Disturbance Paradigm (Mussel Bed Disturbance)

Contributors	Affiliation	Role
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Coverage

Spatial Extent: **N**:48.86507 **E**:-125.14912 **S**:48.83267 **W**:-125.20371
Temporal Extent: 2011-07-27 - 2015-06-19

Dataset Description

This dataset contains phototransects of rocky intertidal mussel beds. Images were collected between July 2011 and June 2015 on shorelines in the area of Barkley Sound, British Columbia, Canada.

Methods & Sampling

Photos were taken between 2011-07-27 and 2015-06-19. Mussel beds imaged were between approximately 1.5m and 4.5m above mean lower low water (MLLW) in areas of moderate to heavy wave exposure. Permanent transects were established at 8 sites using stainless steel bolts and washers affixed to the rock. Ends of each transect were of the same tidal height. Transects were spaced 2m apart in the xy plane.

For photography, transect lines were placed between bolts at each of three tide heights. Plastic livestock tags were placed, at minimum, at 1m intervals along the transect. Additional tags were placed midway between each tag on the line (estimated by eye), and above and below the transect lines at similar intervals. Additional tags were placed as needed to ensure that tags appeared in each photograph and to mark features of interest such as hummocks.

Photos were taken with a Nikon DSLR D300(B), with an AF-S Nikkor 18-55mm lens. Lens was set at 18mm for all photos. The camera was mounted on a survey pole with a camera armature mounted on top. The armature extends 1m horizontally from the pole. The survey pole was extended vertically to 2.25m for the photos and a remote used to trigger each photo. The survey pole spirit level was used to ensure the camera was as parallel to the xy plane as possible. For each photo, the camera was centered over each tag placed at 1m intervals on the transect line and at the tags placed midway between each transect. A laser pointer attached to the camera helped center each photo. Additional photos were taken as needed to ensure complete coverage of the area, particularly above and below the uppermost and lowermost transect lines.

Zip files containing the phototransects for each site are available on the data page and can be found by pressing the "Get Data" button.

Data Processing Description

BCO-DMO Data Manager Processing Notes:
* added a conventional header with dataset name, PI name, version date
* Images indexed and dimensions (length,width) in pixels, and original timestamp of image acquisition added
* added ISO timestamp generated from Date and Time the image was taken.
* Zip files of images made for each survey site, and link to download zip files added to dataset as "image_download_link"
* Image thumbnails of 100px height made for display purposes, individual original images available as "image_link" in the dataset.
* data version 2: 2018-01-18 replaces data version 1: 2017-05-19. Deleted duplicate GB value of one file download link text. Reformatted display of data to prevent error in live data view where the user is shown an error after clicking a comment with spaces in it.

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Data Files

File
images.csv (Comma Separated Values (.csv), 1.99 MB) MD5:31c1aefdddc9a85d7717c4ebf0fff9ee Primary data file for dataset ID 699862

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Parameters

Parameter	Description	Units
site_id	Identifier for site	unitless
location	Geographic name for the site	unitless
lat	Latitude of survey site.	decimal degrees
lon	Longitude of survey site; west is negative.	decimal degrees
description	Description of survey site	unitless
site_images_link	Link to download all phototransect images for each site	unitless
imagename	Filename of image	unitless
year	Year image taken	unitlss
date	Local date image taken in format yyyy-mm-dd	unitless
time	Local time image taken in format HH:MM:SS	unitless
ISO_DateTime_UTC	Timestamp when image was taken in ISO 8601:2004(E) standard format YYYY-mm-ddTHH:MM:SSZ (UTC)	unitless
width	Width of image	pixels
height	Height of image	pixels
image_link	Link to full-size image; formatted in HTML using a hyperlink	unitless
image_thumbnail	Link to thumbnail of image for display purposes. Formatted in HTML using tag; Thumbnail files are 100px in heigth with various widths	unitless

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Instruments

Dataset-specific Instrument Name	Nikon DSLR D300(B)
Generic Instrument Name	Camera
Dataset-specific Description	Nikon DSLR D300(B), with a AF-S Nikkor 18-55mm lens. Lens was set at 18mm for all photos.
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

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Deployments

Robles_Mussel_Bed_Disturbance

Website	https://www.bco-dmo.org/deployment/699874
Platform	Robles_Mussel_Bed_Disturbance

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Project Information

Spatial Realism in the Mussel Bed Disturbance Paradigm (Mussel Bed Disturbance)

Coverage: Intertidal and nearshore subtidal of Barkley Sound, British Columbia

Project description from NSF award abstract:
Our understanding of how physical disturbance shapes the structure of populations and communities owes much to field studies of wave-generated gap formation in mussel beds. Prior studies depict mussel beds as a non-equilibrium system, in which disturbance is spatially unpredictable, generating a random patchwork of mussel cover and gaps. This project will test assumptions and predictions of an alternative view -- that disturbance shows predictable landscape patterns that depend not merely on spatial distribution of external forcing (wave stress) but also on biological processes determining the structure of the aggregation. Specifically, spatially varying mussel productivity (recruitment and growth), physiological stress, and predation interact to produce landscape patterns in the structure of the mussel cover. Certain regions of the mussel bed develop as mono-layers attached directly to the rock, resisting disturbance. Other regions develop in multi-layered configurations that when very deep force superficial mussels to attach solely to adjacent mussels instead of the rock surface, and cause interior mussels to only weakly attach to either rock or one another, favoring propagating disturbances. Therefore, spatial patterns of gap formation and recovery emerge from a unified landscape process.

Field work for this project emphasizes construction of a detailed GIS database using some innovative sampling methods applied to >10 mussel bed sites in Barkley Sound, British Columbia. GIS data layers for each site include wave force, topography (tidal height, slope, and aspect), mussel size structure, mussel bed thickness, differentiation of layering, and size-specific attachment strengths stratified by layer. GIS interpolations and regression analyses will be used to first examine assumptions of the hypothetical landscape process and then test specific predictions regarding spatial patterns in the occurrence of disturbance and recovery. Finally, controlled field experiments will test the key proposition that different mussel bed structures cause different resistance to-, extent of-, and recovery from disturbance.

The landscape disturbance hypothesis includes several processes that differ from previous conceptualizations of disturbance in this system: steady state (equilibrium) structures influence the likelihood that hydrodynamic stresses initiate a disturbance and whether once initiated the disturbance will propagate. Thus, equilibrium processes condition essential features of the disturbance process. Disturbance is predictable within probabilistic limits, and the landscape patterns of disturbance reflect in considerable measure the biological characteristics of a foundation species. This reframing of the disturbance paradigm may apply to a diverse array of layered ecosystems subject to perturbations (e.g. biofilms, coral reefs, forests).

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1130414
NSF Division of Ocean Sciences (NSF OCE)	OCE-1131013
NSF Division of Ocean Sciences (NSF OCE)	OCE-1131201

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