

Monthly barnacle habitat characteristic data collected at Bird Rock, La Jolla, CA, 2014-2016

Website: <https://www.bco-dmo.org/dataset/743915>

Data Type: Other Field Results

Version: 1

Version Date: 2018-08-20

Project

» [Nearshore larval transport: physical and biological processes](#) (Nearshore larval transport)

Contributors	Affiliation	Role
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Abstract

Reported in this dataset are monthly surveys of the barnacle *Chthamalus fissus* settlement rates and their habitats measured as percent cover by live and dead barnacles, algae, sand, other, and free space. The study took place at Bird Rock, La Jolla, CA in the southern California nearshore from December 2014 through November 2016.

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Coverage

Spatial Extent: Lat:32.81 Lon:-117.2695

Temporal Extent: 2014-12 - 2016-11

Dataset Description

Reported in this dataset are monthly surveys of the barnacle *Chthamalus fissus* settlement rates and their habitats measured as percent cover by live and dead barnacles, algae, sand, other, and free space. The study took place at Bird Rock, La Jolla, CA in the southern California nearshore from December 2014 through November 2016.

Methods & Sampling

Chthamalus fissus barnacle settlement (# of individuals per cm² d) was measured from April 2014 to December 2016 using PVC settlement plates. From daily and weekly settlement rates, monthly *C. fissus* settlement rate (# of individuals per cm² d) was calculated by taking the average settlement rate for all plates deployed during each 30-day period leading up to the dates of the adult/habitat surveys. (Settlement plates

were collected daily and weekly at Bird Rock, La Jolla and processed as described in Pineda et al. (2018).

To understand how the distribution and cover of adult *C. fissus* populations and habitat characteristics varied across the site, monthly surveys were conducted from December 2014 through December 2016 during new moon periods at the lowest low tide. A 4 x 4 cm quadrat was haphazardly placed on top of the same rocks where settlement plates were deployed. Within the 16 cm² area of the quadrat, percent cover of free space, live barnacles, dead barnacles, and algae were quantified by sampling 30 randomly selected (x, y) points within the quadrat. Habitat surveys and settlement collections are also described in Hargenrader (2018).

Data Processing Description

BCO-DMO data manager processing notes:

- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- reduced number of digits to right of decimal from 14 to 3 places for settlement rates and statistics
- re-formatted date from mmm-yy to mmm-yyyy

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Data Files

File
habitat.csv (Comma Separated Values (.csv), 2.06 KB) MD5:7481b4729cc18906a211b8da4f3cd4cd Primary data file for dataset ID 743915

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Related Publications

Hargenrader, C. (n.d.). The temporal and spatial dynamics of larval supply, settlement, and adult populations of *Chthamalus fissus* within the La Jolla, California rocky intertidal. <https://doi.org/10.22371/02.2018.015>

Results

Pineda, J., Reys, N., & Lentz, S. J. (2018). Reduced barnacle larval abundance and settlement in response to large-scale oceanic disturbances: Temporal patterns, nearshore thermal stratification, and potential mechanisms. *Limnology and Oceanography*. doi:[10.1002/lno.10964](https://doi.org/10.1002/lno.10964)

Methods

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Parameters

Parameter	Description	Units
month_year	month and year of habitat survey formatted as mmm-yyyy	unitless
AVERAGE_Monthly_settlement	average Chthamalus fissus settlement to rocky intertidal	# settlers/cm ² /day
SE_Monthly_settlement	standard error of monthly Chthamalus fissus	# settlers/cm ² /day
AVERAGE_pct_Live_Barnacles	monthly average cover of adult living barnacles on boulders in rocky intertidal	% cover
SE_pct_Live_Barnacles	standard error of adult living barnacles on boulders in rocky intertidal	% cover
AVERAGE_pct_Dead_Barnacles	monthly average cover of adult dead barnacles on boulders in rocky intertidal	% cover
SE_pct_Dead_Barnacles	standard error of adult dead barnacles on boulders in rocky intertidal	% cover
AVERAGE_pct_Free_space	monthly average cover of bare space on boulders in rocky intertidal	% cover
SE_pct_Free_space	standard error of free space on boulders in rocky intertidal	% cover
AVERAGE_Algae	monthly average algal cover on boulders in rocky intertidal	% cover
SE_Algae	standard error of algal cover on boulders in rocky intertidal	% cover
AVERAGE_Sand	monthly average sand cover on boulders in rocky intertidal	% cover
SE_Sand	standard error of sand cover on boulders in rocky intertidal	% cover
AVERAGE_other	monthly average cover off all other organisms on boulders in rocky intertidal	% cover
SE_other	standard error of cover by oher organisms on boulders in rocky intertidal	% cover

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	colonization substrata
Dataset-specific Description	PVC settlement plates
Generic Instrument Description	Natural or artificial materials deployed in a marine or artificial environment for a given period to act as standardised, passive settlement sampling devices (e.g. settlement plates). They are used to determine the extent of colonization and/or the diversity of settled organisms.

Project Information

Nearshore larval transport: physical and biological processes (Nearshore larval transport)

Coverage: Southern California

Description from NSF award abstract:

Providing an award for this study will provide essential knowledge required for management of coastal resources. This study addresses near shore cross-shore larval transport processes that operate over wide geographic areas in open coast settings, namely larval transport by wave circulation / Stokes drift, and by internal tidal bores. Larval transport by wave circulation / Stokes drift is a ubiquitous process that has not been studied observationally, and it is not known how internal tidal bores deliver larvae to intertidal habitats. This project will examine near shore (region between 20 m depth and intertidal) physical and biological processes that account for the delivery of larvae to adult habitats. The study system in Southern California shares similarities with most other temperate areas and we will study marine taxa that are widely distributed and successful in a variety of environments.

Recent studies suggest that larval transport in the near shore zone plays a central role in larval dispersal and connectivity of shallow water species. These recent advances, however, have not been matched with process-oriented studies addressing circulation and behavioral processes at the appropriate temporal and spatial scales, and only a few larval transport mechanisms have been considered for near shore open coastlines. Recent advances in our understanding of hydrodynamic processes driving cross-shore flows and growing awareness of the importance of the processes to larval transport, however, make this study timely. The investigators hypothesize that a series of physical and biological events results in the delivery of invertebrate larvae to the intertidal habitat. These events include physical transport due to wave circulation / Stokes drift near the surface and internal tide circulation near the bottom, alteration of behavior for terminal larval stages, and larval use of "adaptive" behavioral responses to exploit event-dependent flows. Further, they suggest that the predominance of wave circulation / Stokes drift and internal tide circulation varies seasonally, with internal tidal bores important in spring/summer, when the water column is well-stratified, and wave circulation / Stokes drift more pervasive in fall/winter, coinciding with winter storms. The hypotheses in this study will be tested with estimates of physical transport, larval supply and settlement. These measurements will be combined with use of adaptive sampling to test the dependence of larval vertical distribution on changes in hydrodynamic conditions.

Results from this study will have important ecological implications as wave circulation / Stokes drift and internal motions may represent critical and regular transport mechanisms for larvae of marine organisms that must return to near shore habitats to complete their life cycle, thereby impacting population connectivity and management strategies used by coastal planners (e.g., ecosystem-based fisheries management, placement of Marine Protected Areas).

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1357290
NSF Division of Ocean Sciences (NSF OCE)	OCE-1357327