Paired barnacle larval supply and settlement data collected at Bird Rock, La Jolla, CA, 2014-2015

Website: https://www.bco-dmo.org/dataset/743845
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
Reyns, Nathalie	University of San Diego (USD)	Principal Investigator, Contact
Lentz, Steven J.	Woods Hole Oceanographic Institution (WHOI)	Co-Principal Investigator
Pineda, Jesus	Woods Hole Oceanographic Institution (WHOI)	Co-Principal Investigator
Copley, Nancy	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Barnacle larvae settlement rates of Chthamalus fissus were measured in the rocky intertidal on settlement plates and compared with rates in larval traps at the same location. Settlement plates were deployed at Bird Rock, La Jolla, CA in the southern California nearshore from June 2014 to August 2015.

Table of Contents

Coverage

Spatial Extent: **Lat**:32.81 **Lon**:-117.2695
Temporal Extent: 2014-06-16 - 2015-08-02

Dataset Description

Barnacle larvae settlement rates of Chthamalus fissus were measured in the rocky intertidal on settlement plates and compared with rates in larval traps at the same location. Settlement plates were deployed at Bird Rock, La Jolla, CA in the southern California nearshore from June 2014 to August 2015.

Methods & Sampling

To compare larval supply and settlement, we established 8 locations within our study site where larval supply and settlement were concurrently measured each day during the spring-summer 2014 and 2015. We deployed 6 cylindrical PVC larval traps during the lowest low tide at locations approximately 0.66 to 12.6 m west from each settlement location to measure Chthamalus fissus barnacle larval supply. Traps measured 18.2 cm high by 8.7 cm in diameter and the interior consisted of a segmented funnel that emptied into a 100 µm mesh collection net.

Daily settlement was measured by deploying settlement plates on rocks adjacent to larval traps during the lowest low tide (with the distances between described above). The tops of the larval traps and center line of the settlement plates were deployed at approximately the same elevation (average elevation of all traps and plates was 0.4 m relative to mean lower low water (MLLW), with a range of 0.3 m to 0.5 m relative to MLLW). Settlement rate, the number of individuals per cm2 per day was measured using PVC settlement plates with three grooves that provided 1.9 cm2 (each ~95 mm long, 6 mm wide, 1 mm high).

Larval supply and settlement collections and comparisons are also described in Hargenrader, C. S. (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 12 to 3 places for settlement rates
- re-formatted date from m/d/yyyy to yyyy-mm-dd

[table of contents | back to top]

Data Files

File
larval_supply_settle.csv (Comma Separated Values (.csv), 16.83 KB) MD5:ec8505b7d01d7255f8206490c5b031dc Primary data file for dataset ID 743845

[table of contents | back to top]

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

[table of contents | back to top]

Parameters

Parameter	Description	Units
Date	date of study formatted as yyyy-mm-dd	unitless
Trap	replicate larval trap number from 1-7 (6a and 6b represent the same trap that had to be moved following changes in the boulders)	unitless
Live_Cyprids	number of Chthamalus fissus barnacle cyprids collected in a trap over a 24h deployment	larvae/trap/day (#/trap/d)
Settlement	Chthamalus fissus settlement rate to rocky intertidal on a rock paired with a larval trap at same location	settled larvae/centimeter^2/day (#/cm^2/d)

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Grooved PVC settlement plate
Dataset-specific Description	PVC settlement plates with three grooves
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.

[table of contents | back to top]

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).

[table of contents | back to top]

Funding

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

[table of contents | back to top]