Olympia oyster larvae length measurements from depth-specific sampling collected by boat in Fidalgo Bay, WA, during July 2017

Website: https://www.bco-dmo.org/dataset/753098
Data Type: experimental
Version: 1
Version Date: 2019-01-14

Project
» RUI: Will climate change cause 'lazy larvae'? Effects of climate stressors on larval behavior and dispersal (Climate stressors on larvae)

Contributors	Affiliation	Role
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Abstract
This dataset includes Olympia oyster larvae length measurements from depth-specific sampling collected by boat in Fidalgo Bay, WA, during July 2017.

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Coverage

Temporal Extent: 2017-07-11 - 2017-07-14

Dataset Description

This dataset includes Olympia oyster larvae length measurements from depth-specific sampling collected by boat in Fidalgo Bay, WA, during July 2017.

Methods & Sampling

We measured larval abundance, chlorophyll-a, temperature, and salinity from four depths at one location in Fidalgo Bay, WA, by boat each day from July 11 to July 14, 2017. Each day, we completed eleven sampling events. During each sampling event, we collected samples from four depths in the water column: surface (0.5 m below surface), bottom (0.5 m above seafloor), and two mid-depth samples, which evenly split the depth between surface and bottom samples. We planned each sampling event to begin at specific times relative to the predicted low tide with the goal of collecting approximately equal numbers of samples during ebb and flood tide. To collect each larval sample, we used a modified bilge pump to filter 100 liters of water from our targeted depths through a 102-µm mesh plankton net to ensure retention of Olympia oyster larvae. Each sample was stored on ice while in the field and then preserved in 70% ethanol.

We used an Olympus Optical Company SZ-ST stereoscope fit with polarized lens filters to hand sort Olympia oyster larvae from each sample. First, we narrowed down all the potential local species of bivalve larvae that might be in our samples based on reproductive season (Loosanoff et al. 1966, personal communication Julie Barber). We then distinguished Olympia oyster larvae from these other species by comparing morphological features relative to size based on identification keys (Loosanoff et al. 1966, Shanks 2001) and reference Olympia oyster larvae that we reared in the laboratory. Reference larvae were fixed and photographed under an Olympus CH-2 microscope to aid identification.We measured larva shell lengths perpendicular to the hinge of each larva digitally using a stereomicroscope equipped with a camera and ImageJ software (Leica MC170 HD and Leica Application Suite, Leica, Wetzlar, Germany).

Data Processing Description

BCO-DMO Processing Notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- reformatted and renamed date_time_UTC to ISO_DateTime_UTC
- renamed mdy as date_local and time as time_local
- reformatted date_local from m/d/yy to yyyy-mm-dd

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Data Files

File
OysterLarvae_Length_FidalgoBay_2017.csv (Comma Separated Values (.csv), 720.52 KB) MD5:61939fef95e18ff948ae0774be3f17a0 Primary data file for dataset ID 753098

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Related Publications

Loosanoff, V. L. (1966). Dimensions and shapes of larvae of some marine bivalve mollusks. Malacologia, 4, 351-435.
General

Shanks, A. (2001). An identification guide to the larval marine invertebrates of the Pacific Northwest. History of Oregon State University Collection. Oregon State University Press. https://isbnsearch.org/isbn/9780870715310
General

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Parameters

Parameter	Description	Units
profile	Each unique profile # represents four depth-specific samples: bottom; midlower; midupper; surface	unitless
tide	Tidal direction based on NOAA tidal predictions: ebb; flood; and low	unitless
date_local	Local date in US Pacific time; formatted as yyyy-mm-dd	unitless
depth_seafloor_m	Depth from seasurface to seafloor at the time of sampling measured in meters	meters
sample	Water column collection sample identifier	unitless
depth_sample_m	Depth of the collected sample in meters below the seasurface	meters
depth_des	Depth category of sample collection: surface = 0.5 m below sea surface; bottom = 0.5 m above seafloor; two mid-depth samples labeled midlower and midupper which evenly split the depth between surface and bottom samples.	unitless
time_local	Time in 24-hour US Pacific time; HH:MM	unitless
date_time_UTC	Date/Time (UTC) ISO formatted based on ISO 8601:2004(E) with format YYYY-mm-ddTHH:MM:SS[.xx]Z (year;month;day;hour;minute;second)	unitless
larvae_length_um	Length of Olympia oyster larva measured perpendicular to the hinge	micrometers (um)

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Instruments

Dataset-specific Instrument Name	Leica MC170 HD camera
Generic Instrument Name	Camera
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

Dataset-specific Instrument Name	an Olympus Optical Company SZ-ST stereoscopeand a Leica stereomicroscope
Generic Instrument Name	Microscope - Optical
Generic Instrument Description	Instruments that generate enlarged images of samples using the phenomena of reflection and absorption of visible light. Includes conventional and inverted instruments. Also called a "light microscope".

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Project Information

RUI: Will climate change cause 'lazy larvae'? Effects of climate stressors on larval behavior and dispersal (Climate stressors on larvae)

Coverage: Coastal Pacific, USA

In the face of climate change, future distribution of animals will depend not only on whether they adjust to new

In the face of climate change, future distribution of animals will depend not only on whether they adjust to new conditions in their current habitat, but also on whether a species can spread to suitable locations in a changing habitat landscape. In the ocean, where most species have tiny drifting larval stages, dispersal between habitats is impacted by more than just ocean currents alone; the swimming behavior of larvae, the flow environment the larvae encounter, and the length of time the larvae spend in the water column all interact to impact the distance and direction of larval dispersal. The effects of climate change, especially ocean acidification, are already evident in shellfish species along the Pacific coast, where hatchery managers have noticed shellfish cultures with 'lazy larvae syndrome.' Under conditions of increased acidification, these 'lazy larvae' simply stop swimming; yet, larval swimming behavior is rarely incorporated into studies of ocean acidification. Furthermore, how ocean warming interacts with the effects of acidification on larvae and their swimming behaviors remains unexplored; indeed, warming could reverse 'lazy larvae syndrome.' This project uses a combination of manipulative laboratory experiments, computer modeling, and a real case study to examine whether the impacts of ocean warming and acidification on individual larvae may affect the distribution and restoration of populations of native oysters in the Salish Sea. The project will tightly couple research with undergraduate education at Western Washington University, a primarily undergraduate university, by employing student researchers, incorporating materials into undergraduate courses, and pairing marine science student interns with art student interns to develop art projects aimed at communicating the effects of climate change to public audiences

As studies of the effects of climate stress in the marine environment progress, impacts on individual-level performance must be placed in a larger ecological context. While future climate-induced circulation changes certainly will affect larval dispersal, the effects of climate-change stressors on individual larval traits alone may have equally important impacts, significantly altering larval transport and, ultimately, species distribution. This study will experimentally examine the relationship between combined climate stressors (warming and acidification) on planktonic larval duration, morphology, and swimming behavior; create models to generate testable hypotheses about the effects of these factors on larval dispersal that can be applied across systems; and, finally, use a bio-physically coupled larval transport model to examine whether climate-impacted larvae may affect the distribution and restoration of populations of native oysters in the Salish Sea.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1538626

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