Olympia oyster growth samples cultured in 50 unique combinations of temperature, salinity, pCO2 at Shannon Point Marine Center in May 2018

Website: https://www.bco-dmo.org/dataset/776281
Data Type: experimental
Version: 1
Version Date: 2019-09-05

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

Contributors	Affiliation	Role
Arellano, Shawn M.	Western Washington University (WWU)	Principal Investigator
Olson, M Brady	Western Washington University (WWU)	Co-Principal Investigator
Yang, Sylvia	Western Washington University (WWU)	Co-Principal Investigator
Copley, Nancy	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Olympia oyster growth samples cultured in 50 unique combinations of temperature, salinity, pCO2 at Shannon Point Marine Center in May 2018.

Table of Contents

- Coverage
- Dataset Description
  - Methods & Sampling
  - Data Processing Description
- Data Files
- Parameters
- Instruments
- Project Information
- Funding

Coverage

Temporal Extent: 2018-05-04 - 2018-05-21

Dataset Description

Olympia oyster growth samples cultured in 50 unique combinations of temperature, salinity, pCO2 at Shannon Point Marine Center in May 2018.

Methods & Sampling

We cultured Olympia oyster larvae in 50 unique combinations of temperature, salinity, and pCO2. Larvae were collected on day of release from Puget Sound Restoration Fund, and overnight shipped to Shannon Point Marine Center, rehydrated, and dispensed into treatment cups. Culture cups were housed in a custom-build head gradient flow-through water bath ranging from ambient (~12°C) to ~30°C and assigned a random salinity value (9-36, by threes). Data sheet of cup chemistry follows.

Size samples were taken each two days by condensing larval culture cup and aliquoting onto a Sedgewick Rafter counting cell until at least 20 live larvae were present. If fewer than 20, we aliquoted again. If over 20,

we collected all alive on the slide. Samples were fixed in 4% formaldehyde solution then stored in 70% ethanol in -80°C incubator. Samples were measured later via size photographs taken on a Leica Stereoscope and processed in ImageJ software for maximum shell length and presence of eye spots.

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
- re-formatted date from mdyy to yyyy-mm-dd

[table of contents | back to top]

Data Files

File
OlyGrowth2018.csv (Comma Separated Values (.csv), 278.38 KB) MD5:5e7a41fc363dcc8a90b262ffa8dcbb65 Primary data file for dataset ID 776281

[table of contents | back to top]

Parameters

Parameter	Description	Units
Cup	Treatment label. Each cup represents a unique temperature/salinity/pCO2 combination	unitless
CupNumber	Numeric treatment labels 1-50	unitless
Date	Sample date from May 4 - May 21 2018; formatted as yyyy-mm-dd	unitless
Cup_Date	Concatenated cup label and date; formatted as Label_mmddyy; Ex: A1_050418	unitless
Larva	Individual from specific cup_date art	individuals
length_um	Maximum shell length per larva	microns
Eyes	Observation of visible eye spots; y if present	unitless
Notes	extra info left on physical data sheet	unitless

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Leica Stereoscope
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".

[table of contents | back to top]

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 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.

[table of contents | back to top]

Funding

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

[table of contents | back to top]