Water quality data and Olympia oyster abundance counts from depth-specific sampling collected by boat in Fidalgo Bay, WA, during July 2017

Website: https://www.bco-dmo.org/dataset/752902
Data Type: Other Field Results
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 reports water quality data and Olympia oyster abundance counts from depth-specific sampling collected by boat in Fidalgo Bay, WA, during July 2017. These data were published in the following Masters Thesis: McIntyre, Brooke A., "Vertical Distribution of Olympia oyster (Ostrea lurida) larvae in Fidalgo Bay, WA" (2018). WWU Graduate School Collection. 694. https://cedar.wwu.edu/wwuet/694

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Coverage

Spatial Extent: **Lat**:48.4823 **Lon**:-122.58
Temporal Extent: 2017-07-11 - 2017-07-14

Dataset Description

This dataset reports water quality data and Olympia oyster abundance counts from depth-specific sampling collected by boat in Fidalgo Bay, WA, during July 2017. These data were published in the following Masters Thesis: McIntyre, Brooke A., "Vertical Distribution of Olympia oyster (Ostrea lurida) larvae in Fidalgo Bay, WA" (2018). WWU Graduate School Collection. 694. https://cedar.wwu.edu/wwuet/694

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. At the end of filtering each 100-L sample, we collected 60-ml of bulk seawater from the pump for measurement of chlorophyll-a. We filtered the 60-ml of seawater through a glass microfiber filter (WhatmanTM GF/F). The foil-wrapped filters were held on ice in the field and then stored them at -80°C for later extraction. We measured chlorophyll-a concentration from each filtered sample by extracting the chlorophyll-a pigment using 90% acetone for 24 hours in the dark at -20°C and then reading fluorescence of each sample with a Turner Trilogy Fluorometer (Parsons et al. 1984; Welschmeyer 1994). We also programmed a Hach Environmental Company HydroLab DS5 water quality multiprobe instrument to collect temperature and salinity measurements at the same times and depths as our pump sampling. A Hach Hydras 3 Pocket instrument enabled us to calibrate, program, and retrieve data from the HydroLab.

This dataset includes unprocessed data and simple data calculations accomplished with R (Version 3.3.2).

We programmed a Nortek 1MHz Aquadopp acoustic Doppler current profiler (ADCP) to record velocity measurements in 0.3 meter vertical bins every 60 seconds. We then attached the ADCP instrument with sensors facing skyward to steel cross-bar frame and deployed it on the seafloor in Fidalgo Bay's main channel for four days. We utilized Nortek AS software AquaPro version 1.27 to program and retrieve current velocity data from the Aquadopp instrument. This dataset includes these raw unprocessed data.

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
- removed from display columns MDY and time
- reduced precision of current_velocity_m_s, chla_ug_L, temp_c, and salinity from 9 to 2 decimal places

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Data Files

File	
FieldData_FidalgoBay_July2017.csv	(Comma Separated Values (.csv), 16.68 KB) MD5:e1bd728059eb674cef400896f68fc49e
Primary data file for dataset ID 752902	

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Related Publications

McIntyre, B. A. (2018). Vertical Distribution of Olympia oyster (Ostrea lurida) larvae in Fidalgo Bay, WA. WWU Graduate School Collection. 694. Masters Thesis. https://cedar.wwu.edu/wwuet/694
Results

Parsons, T. R., Y. Maita, and C. M. Lalli. "A Manual of Chemical and Biological Methods of Seawater Analysis", Pergamon Press (1984). ISBN: 9780080302874
Methods

Welschmeyer, N. A. (1994). Fluorometric analysis of chlorophyll a in the presence of chlorophyll b and pheopigments. Limnology and Oceanography, 39(8), 1985–1992. doi:10.4319/lo.1994.39.8.1985
Methods

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Parameters

Parameter	Description	Units
ISO_DateTime_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
date_local	Calendar month/ day/ and year in US Pacific time; formatted as yyyy-mm-dd	unitless
time_local	Time in 24-hour US Pacific time; HH:MM	unitless
tide_category	Tidal direction based on NOAA tidal predictions	unitless
profile	Each unique profile # represents four depth-specific samples	unitless
depth_seafloor_m	Depth from seasurface to seafloor at the time of sampling measured in meters	meters
depth_sample_m	Depth of the collected sample in meters below the seasurface	meters
depth_cat	Depth category of sample collection: (s): surface (0.5 m below seasurface); bottom (0.5 m above seafloor); and two mid-depth samples labeled midlower and midupper which evenly split the depth between surface and bottom samples.	unitless
current_velocity_m_s	Estimated current velocity given in meters per second from data collected with an ADCP. Negative values indicate current moving in the offshore direction and positive values indicate current moving inshore.	meters per second
chla_ug_L	Concentration of chlorophyll-a measured from filtered whole water samples.	micrograms per liter seawater
temp_c	Temperature measured with a Hydrolab instrument.	degrees Celcius
salinity	Salinity measured with a Hydrolab instrument.	PSU
wind_anemometer_m_s	Wind measured with a handheld anemometer.	meters per second
oyster_larvae_100L	Counted number of Olympia oyster larvae in the 100-Liter collected seawater	larvae per 100-Liters seawater
oyster_larvae_m3	Calculated number of Olympia oyster larvae	larvae per cubic meter

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Instruments

Dataset-specific Instrument Name	hand-held anemometer
Generic Instrument Name	Anemometer
Dataset-specific Description	Used to measure wind speed.
Generic Instrument Description	An anemometer is a device for measuring the velocity or the pressure of the wind. It is commonly used to measure wind speed. Aboard research vessels, it is often mounted with other meteorological instruments and sensors.

Dataset-specific Instrument Name	Turner Trilogy Fluorometer model number 7200-000
Generic Instrument Name	Fluorometer
Dataset-specific Description	Used to measure fluorescence for the chlorophyll-a samples.
Generic Instrument Description	A fluorometer or fluorimeter is a device used to measure parameters of fluorescence: its intensity and wavelength distribution of emission spectrum after excitation by a certain spectrum of light. The instrument is designed to measure the amount of stimulated electromagnetic radiation produced by pulses of electromagnetic radiation emitted into a water sample or in situ.

Dataset-specific Instrument Name	HydroLab DS5 (Hach Environmental Co.)
Generic Instrument Name	Water Quality Multiprobe
Dataset-specific Description	A Hach Environmental Company HydroLab DS5 water quality multiprobe is designed for in-situ measurements. We used the Hach Temperature and Hach Conductivity sensors to measure temperature (°C) and salinity. The Hach Temperature sensor is factory set and did not require re-calibration. We performed a two-point calibration on the Hach Conductivity sensor using YSI conductivity calibrator solution before each days use.
Generic Instrument Description	An instrument which measures multiple water quality parameters based on the sensor configuration.

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Deployments

FidalgoBay_2017

Website	https://www.bco-dmo.org/deployment/752814
Platform	small boat: WWU
Start Date	2017-07-01
End Date	2017-07-31
Description	Water analyses associated with onshore experiments. Two WWU Shannon Point Marine Center vessels were used for field sampling. Each vessel was used for two of the four sampling days: RV/Magister, 35-ft aluminum hull motor vessel and RV/Zoea, 32-ft aluminum hull motor vessel.

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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 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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