Time series of horizontal and vertical current profiles collected from an upward-facing acoustic Doppler current profiler (ADCP) in Fidalgo Bay, WA during July 2017

Website: https://www.bco-dmo.org/dataset/752803
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 is a time series of horizontal and vertical current profiles collected from an upward-facing acoustic Doppler current profiler 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**:48.4828 **Lon**:-122.5811
Temporal Extent: 2017-07-25 - 2017-07-28

Dataset Description

This dataset is a time series of horizontal and vertical current profiles collected from an upward-facing acoustic Doppler current profiler 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 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

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Data Files

File
ADCP_FB_JUL2017.csv (Comma Separated Values (.csv), 2.06 MB) MD5:b6adac9a8c5a75047286b9670862f977 Primary data file for dataset ID 752803

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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

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Parameters

Parameter	Description	Units
lat	latitude; north is positive	decimal degrees
long	longitude; east is positive	decimal degrees
ISO_Date_Time_UTC	Date/Time (UTC) ISO formatted based on ISO 8601:2004(E) with format YYYY-mm-ddTHH:MM:SS[.xx]Z	unitless
month	month	unitless
day	day	unitless
year	year	unitless

time_PT	time in Pacific time zone	unitless
pitch	ADCP pitch from internal tilt sensor	degrees
roll	ADCP roll from internal tilt sensor	degrees
temp_c	Water temperature at the ADCP transducer	degrees Celsius
u_1	Eastward component of water velocity relative to true north at depth of 1 meters above the seafloor.	meters/second
u_1_3	Eastward component of water velocity relative to true north at depth of 1.3 meters above the seafloor.	meters/second
u_1_6	Eastward component of water velocity relative to true north at depth of 1.6 meters above the seafloor.	meters/second
u_1_9	Eastward component of water velocity relative to true north at depth of 1.9 meters above the seafloor.	meters/second
u_2_2	Eastward component of water velocity relative to true north at depth of 2.2 meters above the seafloor.	meters/second
u_2_5	Eastward component of water velocity relative to true north at depth of 2.5 meters above the seafloor.	meters/second
u_2_8	Eastward component of water velocity relative to true north at depth of 2.8 meters above the seafloor.	meters/second
u_3_1	Eastward component of water velocity relative to true north at depth of 3.1 meters above the seafloor.	meters/second
u_3_4	Eastward component of water velocity relative to true north at depth of 3.4 meters above the seafloor.	meters/second
u_3_7	Eastward component of water velocity relative to true north at depth of 3.7 meters above the seafloor.	meters/second
u_4	Eastward component of water velocity relative to true north at depth of 4 meters above the seafloor.	meters/second

u_4_3	Eastward component of water velocity relative to true north at depth of 4.3 meters above the seafloor.	meters/second
u_4_6	Eastward component of water velocity relative to true north at depth of 4.6 meters above the seafloor.	meters/second
u_4_9	Eastward component of water velocity relative to true north at depth of 4.9 meters above the seafloor.	meters/second
u_5_2	Eastward component of water velocity relative to true north at depth of 5.2 meters above the seafloor.	meters/second
u_5_5	Eastward component of water velocity relative to true north at depth of 5.5 meters above the seafloor.	meters/second
u_5_8	Eastward component of water velocity relative to true north at depth of 5.8 meters above the seafloor.	meters/second
u_6_1	Eastward component of water velocity relative to true north at depth of 6.1 meters above the seafloor.	meters/second
u_6_4	Eastward component of water velocity relative to true north at depth of 6.4 meters above the seafloor.	meters/second
u_6_7	Eastward component of water velocity relative to true north at depth of 6.7 meters above the seafloor.	meters/second
u_7	Eastward component of water velocity relative to true north at depth of 7 meters above the seafloor.	meters/second
u_7_3	Eastward component of water velocity relative to true north at depth of 7.3 meters above the seafloor.	meters/second
u_7_6	Eastward component of water velocity relative to true north at depth of 7.6 meters above the seafloor.	meters/second
u_7_9	Eastward component of water velocity relative to true north at depth of 7.9 meters above the seafloor.	meters/second
u_8_2	Eastward component of water velocity relative to true north at depth of 8.2 meters above the seafloor.	meters/second
v_1	Northward component of water velocity relative to true north at depth of 1 meters above the seafloor.	meters/second

v_1_3	Northward component of water velocity relative to true north at depth of 1.3 meters above the seafloor.	meters/second
v_1_6	Northward component of water velocity relative to true north at depth of 1.6 meters above the seafloor.	meters/second
v_1_9	Northward component of water velocity relative to true north at depth of 1.9 meters above the seafloor.	meters/second
v_2_2	Northward component of water velocity relative to true north at depth of 2.2 meters above the seafloor.	meters/second
v_2_5	Northward component of water velocity relative to true north at depth of 2.5 meters above the seafloor.	meters/second
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v_7_9	Northward component of water velocity relative to true north at depth of 7.9 meters above the seafloor.	meters/second
v_8_2	Northward component of water velocity relative to true north at depth of 8.2 meters above the seafloor.	meters/second
w_1	Vertical component of water velocity at depth of 1 meters above the seafloor.	meters/second
w_1_3	Vertical component of water velocity at depth of 1.3 meters above the seafloor.	meters/second
w_1_6	Vertical component of water velocity at depth of 1.6 meters above the seafloor.	meters/second
w_1_9	Vertical component of water velocity at depth of 1.9 meters above the seafloor.	meters/second

w_2_2	Vertical component of water velocity at depth of 2.2 meters above the seafloor.	meters/second
w_2_5	Vertical component of water velocity at depth of 2.5 meters above the seafloor.	meters/second
w_2_8	Vertical component of water velocity at depth of 2.8 meters above the seafloor.	meters/second
w_3_1	Vertical component of water velocity at depth of 3.1 meters above the seafloor.	meters/second
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w_8_2	Vertical component of water velocity at depth of 8.2 meters above the seafloor.	meters/second

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Instruments

Dataset-specific Instrument Name	Nortek 1MHz Aquadopp ADCP
Generic Instrument Name	Acoustic Doppler Current Profiler
Generic Instrument Description	The ADCP measures water currents with sound, using a principle of sound waves called the Doppler effect. A sound wave has a higher frequency, or pitch, when it moves to you than when it moves away. You hear the Doppler effect in action when a car speeds past with a characteristic building of sound that fades when the car passes. The ADCP works by transmitting "pings" of sound at a constant frequency into the water. (The pings are so highly pitched that humans and even dolphins can't hear them.) As the sound waves travel, they ricochet off particles suspended in the moving water, and reflect back to the instrument. Due to the Doppler effect, sound waves bounced back from a particle moving away from the profiler have a slightly lowered frequency when they return. Particles moving toward the instrument send back higher frequency waves. The difference in frequency between the waves the profiler sends out and the waves it receives is called the Doppler shift. The instrument uses this shift to calculate how fast the particle and the water around it are moving. Sound waves that hit particles far from the profiler take longer to come back than waves that strike close by. By measuring the time it takes for the waves to bounce back and the Doppler shift, the profiler can measure current speed at many different depths with each series of pings. (More from WHOI instruments listing).

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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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