CTD data from the Fixed Station cruises of the TRANSPORT program on the R/V Hugh R. Sharp (HRS110714EN, HRS120711EN) in the Choptank River, Chesapeake Bay during 2011-2012 (TRANSPORT project)

Website: https://www.bco-dmo.org/dataset/567925
Version: 2
Version Date: 2015-09-22

Project
» Integrating field methods and numerical models to quantify the links between larval transport, connectivity, and population dynamics (TRANSPORT)

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Dataset Description

The CTD data were collected in the Choptank River at three fixed locations in July 2011 and 2012.

Methods & Sampling

CTD Processing information (pdf)

Links to calibrations sheets:

2011:
SBE3 T2224 06Nov10.pdf
SBE3 T2574 26Jan11.pdf
SBE3 T2631 26Jan11.pdf
SBE3 T2864 06Nov10.pdf
SBE4 C1911 09Nov10.pdf
SBE4 C2170 05Nov10.pdf
SBE4 C2208 26Jan11.pdf
SBE4 C2209 26Jan11.pdf
configuration file: 2011-B.con
Pressure Cal (2010-02-05): 9Plus0483.JPG
SBE43 - O2 Cal (2010-11-02): 430021 POST CAL.pdf
SBE43- O2 Cal (2011-02-15): 430539 Final cal.pdf
Chl and Turbidity (2011-02-16): FLNTURT-090_CharSheet.pdf

Chl and Turbidity (2010-12-06): FLNTURT-091_CHARSHEET.pdf
Flr:Chl plot: FSBT11Chlacal_1.png
NTS:TSS plot: FSBT11tsscal_1.png

2012:
SBE3 T2574 25Jan12.pdf
SBE3 T2631 07Feb12.pdf
SBE3 T2224 19Jul11.pdf
SBE3 T2864 19Jul11.pdf
SBE4 C2208 17Jan12.pdf
SBE4 C2209 17Jan12.pdf
SBE4 C1911 28Jul11.pdf
SBE4 C2603 28Jul11.pdf
Pressure test: 05-1548 PTest.pdf
Pressure test: 05-3557 PTest.pdf
Pressure cal: (2011-02-01) (in use 1/1/2012)TSS Calibration for ECO-FLNTU w/outliers removed
SBE43- O2_Calib._Sheet.jpg
SBE43- O2_430021 Final cal.pdf
Chl and Turbidity: FLNTURT-090_CharSheet.pdf
Chl and Turbidity: FLNTURT-091.charsheet.pdf
Flr:Chl plot: FSBT12Chlacal_1.png

Data Processing Description

CTD data were processed into depth bins.

BCO-DMO Processing:

- added conventional header with dataset name, PI name, version date
- renamed parameters to BCO-DMO standard
- created toplevel file to serve individual files as a single object
- added cruise_name, cruise_id, lat_start, lon_start (for mapping capabilities)

Versions:
- v2: 2015-09-22 - added lat_start, lon_start
- v1: 2015-09-21: served data

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Data Files

File
CTD_FSBT.csv (Comma Separated Values (.csv), 622.13 KB) MD5:4b741ce496f8d80c4b0336fc5289c7cf Primary data file for dataset ID 567925

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Parameters

Parameter	Description	Units
year	Calendar year	yyyy
cruise_id	Official R2R cruise identification	unitless
cruise_name	Alternate cruise name	unitless
cast	CTD cast number (integer)	unitless
lat_start	Latitude at start of cast	decimal degrees
lon_start	Longitude at start of cast; east is positive	decimal degrees
press	Mid-point of pressure bin	decibars
month	Calendar month	mm
day	Day of month	dd
time_UTC	UTC time	HHMM
ISO_DateTime_UTC	Date and time; ISO 8601:2004(E) format	yyyy-mm-ddTHH:MM:SS[.xx]
julian_day	Numeric time in Julian day for year in UTC time base	unitless
lat	Latitude geographic coordinate from ship	decimal degrees
lon	Longitude geographic coordinate from ship. Minus indicates western hemisphere	decimal degrees
temp	Water temperature from primary temp sensor	degrees Celsius
cond	Conductivity from primary sensor	Siemens per meter
sal	Salinity	PSU
density	Density	kilograms per cubic meter
flvolt	A/D voltage 0 = Fluorescence voltage from ECO-FLNTU sensor	volts
trans_v	A/D voltage 4 = CStar transmissometer	volts
alt	Altimeter distance to seabed. NaN values are readings that were flagged suspected bad values in post-processing step	meters
O2_mg_L	Dissolved oxygen concentration	milligrams per liter
O2sat	Percent dissolved oxygen saturation	percent
turbidity	Nephelometric Turbidity Units (NTU) from ECO-FLNTU sensor	NTU
TSS	Total Suspended Solids (TSS) from calibration of collected water samples analyzed in the lab for TSS and NTU from ECO-FLNTU sensor	milligrams per liter
fluor	Fluorescence units from ECO-FLNTU sensor	micrograms per liter
chl_a	Chlorophyll-a from calibration of fluorescence to analysis of water samples for chla	micrograms per liter
flag	Data flag from SeaBird Data Processing Software(0 = good)	unitless

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	CTD Sea-Bird SBE 911plus
Generic Instrument Description	The Sea-Bird SBE 911 plus is a type of CTD instrument package for continuous measurement of conductivity, temperature and pressure. The SBE 911 plus includes the SBE 9plus Underwater Unit and the SBE 11plus Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 plus and SBE 11 plus is called a SBE 911 plus. The SBE 9 plus uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 plus and SBE 4). The SBE 9 plus CTD can be configured with up to eight auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). more information from Sea-Bird Electronics

Dataset-specific Instrument Name	
Generic Instrument Name	Sea-Bird SBE 43 Dissolved Oxygen Sensor
Generic Instrument Description	The Sea-Bird SBE 43 dissolved oxygen sensor is a redesign of the Clark polarographic membrane type of dissolved oxygen sensors. more information from Sea-Bird Electronics

Dataset-specific Instrument Name	
Generic Instrument Name	Sea-Bird SBE-3 Temperature Sensor
Generic Instrument Description	The SBE-3 is a slow response, frequency output temperature sensor manufactured by Sea-Bird Electronics, Inc. (Bellevue, Washington, USA). It has an initial accuracy of +/- 0.001 degrees Celsius with a stability of +/- 0.002 degrees Celsius per year and measures seawater temperature in the range of -5.0 to +35 degrees Celsius. more information from Sea-Bird Electronics

Dataset-specific Instrument Name	
Generic Instrument Name	Sea-Bird SBE-4 Conductivity Sensor
Generic Instrument Description	The Sea-Bird SBE-4 conductivity sensor is a modular, self-contained instrument that measures conductivity from 0 to 7 Siemens/meter. The sensors (Version 2; S/N 2000 and higher) have electrically isolated power circuits and optically coupled outputs to eliminate any possibility of noise and corrosion caused by ground loops. The sensing element is a cylindrical, flow-through, borosilicate glass cell with three internal platinum electrodes. Because the outer electrodes are connected together, electric fields are confined inside the cell, making the measured resistance (and instrument calibration) independent of calibration bath size or proximity to protective cages or other objects.

Dataset-specific Instrument Name	
Generic Instrument Name	WetLabs FLNTU
Generic Instrument Description	The WetLabs ECO FLNTU is a dual-wavelength, single-angle sensor for simultaneously determining both chlorophyll fluorescence and turbidity. It detects light scattered by particles suspended in water, generating an output voltage proportional to turbidity or suspended solids. Scaling factors are used to convert the voltage readings to values representing chlorophyll concentration and turbidity expressed in Nephelometric Turbidity Units (NTUs).

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Deployments

HRS110714EN

Website	https://www.bco-dmo.org/deployment/565814
Platform	R/V Hugh R. Sharp
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_FSBT11.pdf
Start Date	2011-07-14
End Date	2011-07-18

HRS120711EN

Website	https://www.bco-dmo.org/deployment/565816
Platform	R/V Hugh R. Sharp
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_FSBT12.pdf
Start Date	2012-07-10
End Date	2012-07-14

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Project Information

Integrating field methods and numerical models to quantify the links between larval transport, connectivity, and population dynamics (TRANSPORT)

Website: http://northweb.hpl.umces.edu/TRANSPORT/home.htm

Additional information can be found at the TRANSPORT website:
http://northweb.hpl.umces.edu/TRANSPORT/home.htm

Project description:
This coupled field-and-modeling research project is designed to address fundamental, cutting-edge questions that will significantly enhance our understanding of physical-biological interactions in planktonic organisms and quantify how pelagic life stages influence population dynamics. Technological advances in field methodology and numerical modeling will be integrated and applied to investigate and compare how circulation patterns, larval transport, sub-population connectivity, and population dynamics of the Eastern oyster, *Crassostrea virginica*, respond to environmental variability and habitat alteration. This project will provide information that will significantly enhance the restoration and management of oysters.

Physical-biological interactions are an integral part of understanding fish, bivalve, and crustacean early-life history and the processes that affect inter-annual variability in their recruitment to reproducing populations. The combined modeling and field approach builds on existing state-of-the-art models, it applies a new technology that will significantly advance our ability to investigate in-situ bivalve larvae dynamics, and it will generate critical information about the early life of oysters (timing of spawning, larval behavior) that is necessary for enhancing our understanding and prediction of recruitment processes.

This research will also advance our understanding of population dynamics of organisms with a pelagic life stages by making quantitative links between larval transport and a full life-cycle model. In doing so, it will provide improved understanding of the inter-relationships between, and relative importance of, larval transport, the connectivity of different reef systems, and adult growth, mortality, and gamete production, and how these relationships are influenced by changes in physical conditions and habitat.

Although focused on the oyster, *Crassostrea virginica*, the ecological studies and comparisons will result in a significant enhancement in our understanding of the interactions between physical conditions and a suite of bivalve species. This program will benefit society by providing new insights and understanding that will enhance fisheries management capabilities. The numerical tools developed will have the resolution appropriate for helping to guide oyster restoration programs, locate optimal sanctuaries (i.e., marine protected areas), and inform spatial management of oyster harvest. Although the quantitative tools and information generated will directly support oyster management and restoration activities of state and federal partners in Chesapeake Bay, the findings and tools developed in this project will be applicable to many other systems where bivalves comprise an important component of commercial and recreational fisheries. A PhD graduate student will be trained in field and numerical modeling research in this coupled field-and-modeling program. In addition to gaining a solid foundation in a cutting-edge field, the student will have the opportunity to develop science communication skills and interact with management agency representatives.

Publications Produced as a Result of this Research:

Gallego, A., E.W. North and E.D. Houde. 2012. Understanding and quantifying mortality in pelagic, early life stages of marine organisms — Old challenges and new perspectives. Journal of Marine Systems 93: 1-3.

Goodwin, J. D., and E.W. North. In prep. Identifying factors that influence the swimming behavior of *Crassostrea virginica* larvae in Choptank River and calculating their mortality.

Goodwin, J. D., E. W. North, and C. M. Thompson. 2014. Evaluating and improving a semi-automated image analysis technique for identifying bivalve larvae. Limnology and Oceanography: Methods 12: 548-562. DOI: 10.4319/lom.2014.12.548

Goodwin, J. D., E. W. North, and V. S. Kennedy. 2016. Identification of eastern oyster *Crassostrea virginica* larvae using polarized light microscopy in a mesohaline region of Chesapeake Bay. Journal of Shellfish Research 35(1): 157-168.

Goodwin, J. D., E. W. North, C. M. Thompson, I. Mitchell and H.M McFadden. In press. Improving a semi-automated classification technique for bivalve larvae: automated image acquisition and measures of quality control. Limnology and Oceanography: Methods.

North, E. W., D. M. King, J. Xu, R. R. Hood, R. I. E. Newell, K. T. Paynter, M. L. Kellogg, M. K. Liddel, and D. F. Boesch. 2010. Linking optimization and ecological models in a decision support tool for oyster restoration and management. Ecological Applications 20(3): 851–866.

Spires, J. E., E. W. North, and W. Long. In prep. The influence of salinity-induced mortality on larval transport between eastern oyster (*Crassostrea virginica*) reefs in an oligohaline estuary: model simulations and implications for restoration. Estuaries and Coasts.

Thompson, C. M., E. W. North, V. S. Kennedy, and S. N. White. 2015. Classifying bivalve larvae using shell pigments identified by Raman spectra. Analytical and Bioanalytical Chemistry 407:3591-3604, DOI 10.1007/s00216-015-8575-8

Thompson, C.M., E.W. North, S.N. White, and S.M. Gallager. 2014. An analysis of bivalve larval shell pigments using micro-Raman spectroscopy. Journal of Raman Spectroscopy 45(5):349-358

Dissertations and Theses:

Goodwin, J. D. 2015. Integrating automated imaging and a novel identification technique to estimate mortality and factors that determine the vertical distribution of *Crassostrea virginica* larvae. Ph.D. Dissertation. University of Maryland College Park and the University of Maryland Center for Environmental Science.

Spires, J. E. The exchange of eastern oyster (*Crassostrea virginica*) larvae between subpopulations in the Chotpank and Little Choptank Rivers: model simulations, the influence of salinity, and implications for restoration. Master of Science Thesis, University of Maryland College Park and Center for Environmental Science, 79 pp.

Books and One-Time Proceedings:

Anthony, Z. 2014. Optimal microscope and camera settings for counting and identifying copepods (*Acartia tonsa*) using a newly developed semi-automated image analysis technology. Undergraduate Research Report. 14 pp.

Hinson, K. I., E.W. North, and C.M. Thompson. 2011. New technologies to support shellfish restoration. Research Experience for Undergraduates (REU) final report.

Mitchell, I. 2013. Updates in LTRANS v.2b. University of Maryland Center for Environmental Science, Horn Point Laboratory. Cambridge, MD. 2 pp.

North, E. W. 2010. Q&A: Elizabeth North. 10/01/2009-09/30/2010, ICES Insight, September 2010, vol. 47, p. 43-44.

Schlag, Z. R., and E. W. North. 2012. Lagrangian TRANSport model (LTRANS v.2) User's Guide. University of Maryland Center for Environmental Science, Horn Point Laboratory. Cambridge, MD. 183 pp.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0829512

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