

CTD data from 53 TRANSPORT Mapping cruises aboard the R/V Terrapin in the Choptank River from 2010-2012 (TRANSPORT project)

Website: <https://www.bco-dmo.org/dataset/474224>

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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

CTD data from a series of one-day research cruises on the Choptank River (Chesapeake Bay, USA) during May to September of 2010 to 2012.

Methods & Sampling

Each cruise took place on the R/V Terrapin, a 26-ft Parker with a 275 mercury outboard equipped with a davit, operated by UMCES. On each cruise, several sampling stations were occupied. A CTD cast was made at each station, and the downcast was used to measure water properties. The CTD equipped with a fluorometer, OBS, dissolved oxygen and PAR sensors. Using hoses attached to the CTD frame, bivalve larvae were collected from near bottom to the surface by moving the CTD up through the water column. Water samples were collected for chl-a pigment (using a syringe/filter apparatus) to calibrate the fluorometer and for total suspended solids (using a water bottle provided by Analytical Services).

Data Processing Description

CTD Processing:

The SBEDataProcessing package of SeasoftV2 software was used for CTD Processing.

CTD Processing Overview; 4 steps:

- (1) Data Conversion – converts the raw hex data to engineering units;
- (2) Align CTD – aligns the Oxygen Voltage data with an appropriate advance time;
- (3) Bin Average – averages the variables over bins of the specified size;

(4) ASCII Out - creates text files that can be read by other programs.

For more details, see the [CTD Metadata for the 2010-2012 TRANSPORT Mapping Cruises \(PDF\)](#).

TSS and chl_a were calculated using the following equations:

2010 Data:

TSS May/June: $y = 1.3396x + 24.35$ where $x = \text{OBS_NTU..}$
TSS July/Aug/Sept: $y = 1.6991x + 26.139$ where $x = \text{OBS_NTU.}$
chl_a May/June: $y = 26.527x - 2.7618$ where $x = \text{voltage (V4).}$
chl_a July/Aug/Sept: $y = 22.251x + 0.8101$ where $x = \text{voltage (V4).}$

2011 Data:

TSS May/June: $y = 1.5307x + 1.7239$ where $x = \text{OBS_NTU.}$
TSS July/Aug/Sept: $y = 1.5087x + 4.6136$ where $x = \text{OBS_NTU.}$
chl_a May/June: $y = 8.1264x + 5.8107$ where $x = \text{voltage (V4).}$
chl_a July/Aug/Sept: $y = 12.328x + 0.3111$ where $x = \text{voltage (V4).}$

2012 Data:

TSS May/June: $y = 1.5049x + 2.284$ where $x = \text{OBS_NTU.}$
TSS July/Aug/Sept: $y = 1.2666x + 6.3753$ where $x = \text{OBS_NTU.}$
chl_a May/June: $y = 10.387x + 0.315$ where $x = \text{voltage (V4).}$
chl_a July/Aug/Sept: $y = 17.801x - 3.1581$ where $x = \text{voltage (V4).}$

BCO-DMO Processing:

- Modified parameter names;
- Replaced '-9.99e-29' with 'nd' ('no data').

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Data Files

File
CTD.csv (Comma Separated Values (.csv), 3.35 MB) MD5:a03cf2abba098bf94fc30271663e6a01 Primary data file for dataset ID 474224

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Parameters

Parameter	Description	Units
year	4-digit year.	YYYY
cruise_id	Cruise identification number.	dimensionless
station	Identification number of the sampling station.	dimensionless
lat	Latitude of the sampling station.	decimal degrees
lon	Longitude of the sampling station.	decimal degrees
month	Month (1-12) of year. Local time (EDT).	dimensionless
day	Day (1-31) of month. Local time (EDT).	dimensionless
time_local	Local time (EDT) as hours and minutes; 24-hour clock.	HHMM
depth	Sample depth.	meters
sal	Salinity.	Practical Salinity Units (PSU)
temp	Water temperature.	degrees Celsius
cond	Conductivity.	milli-Siemens per centimeter (mS/cm)
density	Density.	kilograms per cubic meter (kg/m ³)
fluor	Fluorescence.	milligrams per cubic meter (mg/m ³)
O2_mgL	Dissolved oxygen.	milligrams per liter (mg/L)
O2_sat_pcnt	Percent dissolved oxygen saturation.	percent (%)
OBS_NTU	Turbidity measured by Optical Backscatter Sensor (OBS).	Nephelometric Turbidity Units (NTU)
PAR	PAR.	microEinsteins per second per square meter (uE/sec/m ²)
TSS	Total suspended solids (see 'Processing Description' for equations used).	milligrams per liter (mg/L)
chl_a	Chlorophyll-a (see 'Processing Description' for equations used).	micrograms per liter (ug/L)
V4	Fluorometer voltage; used in calculation of chl_a.	volts
V1	OBS voltage.	volts
scan	CTD scan number.	dimensionless
nbin	Number of data cycles used to compile an average value for a given depth/BIN interval.	dimensionless
flag	Flag.	dimensionless
ISO_DateTime_Local	Date and time (in local EDT time zone) formatted to ISO 8601 standard. T indicates start of time string.	YYYY-mm-ddTHH:MM:SS.ss

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Instruments

Dataset-specific Instrument Name	SBE25 SEALOGGER CTD
Generic Instrument Name	CTD Sea-Bird 25
Dataset-specific Description	An SBE25 SEALOGGER CTD, made by Sea-Bird Electronics, was used. It was equipped with a fluorometer (WET Labs WETstar), an Optical Backscatter Sensor (OBS, D & A), dissolved oxygen (SBE 43) and PAR (Biospherical/Licor) sensors. Because of the plumbing system on the CTD, there is delay between the dissolved oxygen/fluorometry readings and the pressure sensor.
Generic Instrument Description	The Sea-Bird SBE 25 SEALOGGER CTD is battery powered and is typically used to record data in memory, eliminating the need for a large vessel, electrical sea cable, and on-board computer. All SBE 25s can also operate in real-time, transmitting data via an opto-isolated RS-232 serial port. Temperature and conductivity are measured by the SBE 3F Temperature sensor and SBE 4 Conductivity sensor (same as those used on the premium SBE 9plus CTD). The SBE 25 also includes the SBE 5P (plastic) or 5T (titanium) Submersible Pump and TC Duct. The pump-controlled, TC-ducted flow configuration significantly reduces salinity spiking caused by ship heave, and in calm waters allows slower descent rates for improved resolution of water column features. Pressure is measured by the modular SBE 29 Temperature Compensated Strain-Gauge Pressure sensor (available in eight depth ranges to suit the operating depth requirement). The SBE 25's modular design makes it easy to configure in the field for a wide range of auxiliary sensors, including optional dissolved oxygen (SBE 43), pH (SBE 18 or SBE 27), fluorescence, transmissivity, PAR, and optical backscatter sensors. More information from Sea-Bird Electronics: http://www.seabird.com .

Dataset-specific Instrument Name	OBS
Generic Instrument Name	D&A Instruments Optical Backscatter Sensor OBS-3
Dataset-specific Description	Equipped on the CTD.
Generic Instrument Description	Optical backscatter instrument measuring scattering in water between 140 - 160 deg for a wavelength of 875nm. It has a turbidity range of 0-2000 FTU and a maximum working depth of 500m. This instrument was superseded by the OBS-3+ model in 2005. The D and A Instrument Company and its OBS product line were purchased by Campbell Scientific Inc who now has full responsibility for D and A Instruments.

Dataset-specific Instrument Name	Biospherical/LI-COR PAR Sensor
Generic Instrument Name	LI-COR Biospherical PAR Sensor
Dataset-specific Description	Equipped on the CTD.
Generic Instrument Description	The LI-COR Biospherical PAR Sensor is used to measure Photosynthetically Available Radiation (PAR) in the water column. This instrument designation is used when specific make and model are not known.

Dataset-specific Instrument Name	SBE-43
Generic Instrument Name	Sea-Bird SBE 43 Dissolved Oxygen Sensor
Dataset-specific Description	Equipped on the CTD.
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	WETLabs WETStar Fluorometer
Generic Instrument Name	WETLabs WETStar fluorometer
Dataset-specific Description	Equipped on the CTD.
Generic Instrument Description	Submersible fluorometer designed for through-flow or pumped CTD applications manufactured by WetLabs and which can be configured for various types of fluorescence. The probe has a temperature range of 0-30 degrees C and a depth rating of 600m.

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Deployments

BT-10-01

Website	https://www.bco-dmo.org/deployment/474446
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-01.doc
Start Date	2010-05-07
End Date	2010-05-07
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-02

Website	https://www.bco-dmo.org/deployment/474491
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-02.docx
Start Date	2010-05-20
End Date	2010-05-20
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-03

Website	https://www.bco-dmo.org/deployment/474509
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-03-3_ewn.docx
Start Date	2010-06-02
End Date	2010-06-02
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-04

Website	https://www.bco-dmo.org/deployment/474526
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-04.docx
Start Date	2010-06-08
End Date	2010-06-08
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-05

Website	https://www.bco-dmo.org/deployment/474543
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-05.docx
Start Date	2010-06-14
End Date	2010-06-14
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-06

Website	https://www.bco-dmo.org/deployment/474561
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-06.docx
Start Date	2010-06-18
End Date	2010-06-18
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-07

Website	https://www.bco-dmo.org/deployment/474579
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-07.docx
Start Date	2010-06-23
End Date	2010-06-23
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-08

Website	https://www.bco-dmo.org/deployment/474609
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-08.docx
Start Date	2010-06-29
End Date	2010-06-29
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-09

Website	https://www.bco-dmo.org/deployment/474620
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-09.docx
Start Date	2010-07-02
End Date	2010-07-02
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-10

Website	https://www.bco-dmo.org/deployment/474638
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-10.docx
Start Date	2010-07-06
End Date	2010-07-06
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-11

Website	https://www.bco-dmo.org/deployment/474694
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-11.docx
Start Date	2010-07-09
End Date	2010-07-09
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-12

Website	https://www.bco-dmo.org/deployment/474745
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-12.docx
Start Date	2010-07-12
End Date	2010-07-12
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-13

Website	https://www.bco-dmo.org/deployment/474776
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-13.docx
Start Date	2010-07-15
End Date	2010-07-15
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-14

Website	https://www.bco-dmo.org/deployment/474810
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-14.docx
Start Date	2010-07-20
End Date	2010-07-20
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-15

Website	https://www.bco-dmo.org/deployment/474840
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-15.docx
Start Date	2010-07-23
End Date	2010-07-23
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-16

Website	https://www.bco-dmo.org/deployment/474871
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-16.docx
Start Date	2010-07-27
End Date	2010-07-27
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-17

Website	https://www.bco-dmo.org/deployment/474902
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-17.docx
Start Date	2010-07-29
End Date	2010-07-29
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-18

Website	https://www.bco-dmo.org/deployment/474930
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-18.docx
Start Date	2010-08-02
End Date	2010-08-02
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-19

Website	https://www.bco-dmo.org/deployment/474960
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-19.docx
Start Date	2010-08-19
End Date	2010-08-19
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-10-20

Website	https://www.bco-dmo.org/deployment/474990
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2010cruise_reports/TRANSPORT_Cruise_Report_BT-10-20.docx
Start Date	2010-09-15
End Date	2010-09-15
Description	Part of a series of 20 one-day cruises that took place during the summer of 2010 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-01

Website	https://www.bco-dmo.org/deployment/475392
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-01.docx
Start Date	2011-05-25
End Date	2011-05-25
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-02

Website	https://www.bco-dmo.org/deployment/475407
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-02.docx
Start Date	2011-06-07
End Date	2011-06-07
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-03

Website	https://www.bco-dmo.org/deployment/475438
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-03.docx
Start Date	2011-06-17
End Date	2011-06-17
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-04

Website	https://www.bco-dmo.org/deployment/475468
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-04.docx
Start Date	2011-06-21
End Date	2011-06-21
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-05

Website	https://www.bco-dmo.org/deployment/475496
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-05.docx
Start Date	2011-06-28
End Date	2011-06-28
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-06

Website	https://www.bco-dmo.org/deployment/475524
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-06.docx
Start Date	2011-06-30
End Date	2011-06-30
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-07

Website	https://www.bco-dmo.org/deployment/475552
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-07.docx
Start Date	2011-07-06
End Date	2011-07-06
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-08

Website	https://www.bco-dmo.org/deployment/475569
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-08.docx
Start Date	2011-07-11
End Date	2011-07-11
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-09

Website	https://www.bco-dmo.org/deployment/475606
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-09.docx
Start Date	2011-07-21
End Date	2011-07-21
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-10

Website	https://www.bco-dmo.org/deployment/475635
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-10.docx
Start Date	2011-07-27
End Date	2011-07-27
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-11

Website	https://www.bco-dmo.org/deployment/475659
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-11.docx
Start Date	2011-08-02
End Date	2011-08-02
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-12

Website	https://www.bco-dmo.org/deployment/475683
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-12.docx
Start Date	2011-08-11
End Date	2011-08-11
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-13

Website	https://www.bco-dmo.org/deployment/475711
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-13.doc
Start Date	2011-08-17
End Date	2011-08-17
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-14

Website	https://www.bco-dmo.org/deployment/475739
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-14.doc
Start Date	2011-08-24
End Date	2011-08-24
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-15

Website	https://www.bco-dmo.org/deployment/475767
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-15.docx
Start Date	2011-08-31
End Date	2011-08-31
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-11-16

Website	https://www.bco-dmo.org/deployment/475798
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2011cruise_reports/TRANSPORT_Cruise_Report_BT-11-16.docx
Start Date	2011-09-08
End Date	2011-09-08
Description	Part of a series of 16 one-day cruises that took place during the summer of 2011 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-01

Website	https://www.bco-dmo.org/deployment/475858
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-01.doc
Start Date	2012-05-22
End Date	2012-05-22
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-02

Website	https://www.bco-dmo.org/deployment/475886
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-02.doc
Start Date	2012-05-30
End Date	2012-05-30
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-03

Website	https://www.bco-dmo.org/deployment/475917
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-03.doc
Start Date	2012-06-06
End Date	2012-06-06
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-04

Website	https://www.bco-dmo.org/deployment/475947
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-04.doc
Start Date	2012-06-08
End Date	2012-06-08
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-05

Website	https://www.bco-dmo.org/deployment/475976
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-05.doc
Start Date	2012-06-14
End Date	2012-06-14
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-06

Website	https://www.bco-dmo.org/deployment/476000
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-06.doc
Start Date	2012-06-19
End Date	2012-06-19
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-07

Website	https://www.bco-dmo.org/deployment/476030
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-07.doc
Start Date	2012-06-25
End Date	2012-06-25
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-08

Website	https://www.bco-dmo.org/deployment/476055
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-08.doc
Start Date	2012-07-05
End Date	2012-07-05
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-09

Website	https://www.bco-dmo.org/deployment/476083
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-09.docx
Start Date	2012-07-09
End Date	2012-07-09
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-10

Website	https://www.bco-dmo.org/deployment/476089
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-10.doc
Start Date	2012-07-18
End Date	2012-07-18
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-11

Website	https://www.bco-dmo.org/deployment/476100
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-11.doc
Start Date	2012-07-24
End Date	2012-07-24
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-12

Website	https://www.bco-dmo.org/deployment/476127
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-12.doc
Start Date	2012-07-31
End Date	2012-07-31
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-13

Website	https://www.bco-dmo.org/deployment/476155
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-13.doc
Start Date	2012-08-10
End Date	2012-08-10
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-14

Website	https://www.bco-dmo.org/deployment/476159
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-14.doc
Start Date	2012-08-13
End Date	2012-08-13
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-15

Website	https://www.bco-dmo.org/deployment/476187
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-15.doc
Start Date	2012-08-15
End Date	2012-08-15
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-16

Website	https://www.bco-dmo.org/deployment/476206
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-16.doc
Start Date	2012-08-29
End Date	2012-08-29
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

BT-12-17

Website	https://www.bco-dmo.org/deployment/476209
Platform	R/V Terrapin
Report	http://dmoserv3.bco-dmo.org/data_docs/TRANSPORT/2012cruise_reports/TRANSPORT_Cruise_Report_BT-12-17.docx
Start Date	2012-09-27
End Date	2012-09-27
Description	Part of a series of 17 one-day cruises that took place during the summer of 2012 on the Choptank River (Chesapeake Bay, USA). "BT" = "Bivalve Transport" cruises; also called "Mapping Cruises".

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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 Choptank 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
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