

CTD profile data from 2010 R/V Llyr cruises, Downeast Maine (44.1N 68.1W 44.9N. 66.9W), Saco Bay, Maine (43.45N 70.33W, 43.47N 70.28W)

Website: <https://www.bco-dmo.org/dataset/3941>

Data Type: Cruise Results

Version: 1

Version Date: 2013-05-07

Project

» [Does larval transport or physiological tolerance set the southern range boundary of a northern blue mussel?](#)
(MuLTI)

Contributors	Affiliation	Role
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Abstract

CTD profile data from 2010 R/V Llyr cruises, Downeast Maine (44.1N 68.1W 44.9N. 66.9W), Saco Bay, Maine (43.45N 70.33W, 43.47N 70.28W).

Table of Contents

- [Coverage](#)
- [Dataset Description](#)
 - [Methods & Sampling](#)
 - [Data Processing Description](#)
- [Data Files](#)
- [Parameters](#)
- [Instruments](#)
- [Deployments](#)
- [Project Information](#)
- [Funding](#)

Coverage

Spatial Extent: N:44.98148 E:-66.92126 S:43.45326 W:-70.33037

Temporal Extent: 2010-06-06 - 2010-08-26

Dataset Description

Multiple year CTD Profile Data - Binned Downcasts

Resolution

Temperature - 0.0001C

Salinity - 0.4 ppm

Pressure - 0.002% of full scale range (7000 m)

Fluorescence CDOM - 0.09 ppb

Fluorescence ECO-AFL - 0.01ug/l

Oxygen Saturation - 2% of saturation

PAR/Irradiance - 5%

Methods & Sampling

Sampling and Analytical Methodology:

Samples were taken using a Sea-Bird SBE19plus.

```
* InstrumentState
* HardwareData DeviceType='SBE19plus' SerialNumber='01906084'
* Manufacturer Sea-Bird Electronics, Inc. Manufacturer
* FirmwareVersion 2.0c FirmwareVersion
* FirmwareDate 20 February 2008 14:10 FirmwareDate
* PCBAssembly PCBSerialNum='not assigned' AssemblyNum='41054F'
* PCBAssembly PCBSerialNum='not assigned' AssemblyNum='41580A'
* PCBAssembly PCBSerialNum='not assigned' AssemblyNum='41056F'
* PCBAssembly PCBSerialNum='not assigned' AssemblyNum='41059D'
* MfgDate 11 JUN 2008 MfgDate
* InternalSensors
*   Sensor id='Main Temperature'
*     type temperature0 type
*     SerialNumber 01906084 SerialNumber
*   Sensor
*   Sensor id='Main Conductivity'
*     type conductivity-0 type
*     SerialNumber 01906084 SerialNumber
*   Sensor
*   Sensor id='Main Pressure'
*     type strain-0 type
*     SerialNumber 2742950 SerialNumber
*   Sensor
* InternalSensors
* ExternalSensors
*   Sensor id='volt 0'
*     type SBE 43 type
*     SerialNumber 431476 SerialNumber
*
*   Sensor
*   Sensor id='volt 1'
*     type not assigned type
*     SerialNumber not assigned SerialNumber
*   Sensor
*   Sensor id='volt 2'
*     type QSP2300 type
*     SerialNumber 70185 SerialNumber
*   Sensor
*   Sensor id='volt 3'
*     type FLCDRT type
*     SerialNumber
*   Sensor
*   Sensor id='volt 4'
*     type FLNTURT - CHL type
*     SerialNumber FLNUTRT-1038 SerialNumber
*   Sensor
*   Sensor id='volt 5'
*     type FLNTURT - NTU type
*     SerialNumber FLNTURT-1038 SerialNumber
*   Sensor
* ExternalSensors
```

Resolution

Temperature - 0.0001C

Salinity - 0.4 ppm

Pressure - 0.002% of full scale range (7000 m)

Fluorescence CDOM - 0.09 ppb
Fluorescence ECO-AFL - 0.01 ug/l
Oxygen Saturation - 2% of saturation
PAR/Irradiance - 5%

Data Processing Description

Data Processing:

Data has been converted to engineering units and bin averaged using Sea Bird's Software - SBE Data Processing, Version 7.18

[[table of contents](#) | [back to top](#)]

Data Files

File
CTD_PROFILES.csv (Comma Separated Values (.csv), 2.33 MB) MD5:b14a8f888d3e8b777cc37596331fe593 Primary data file for dataset ID 3941

[[table of contents](#) | [back to top](#)]

Parameters

Parameter	Description	Units
Year	Year of Data Collection in the format YYYY	unitless
deployment	Deployment Id	text
dataset_name	Dataset Name	text
sta_id	Station Id	text
location	General Station Location	text
date	date (GMT) in the format yyyyymmdd	unitless
time	time(GMT)	hhmmss
lat	latitude (South is negative)	decimal degrees
lon	longitude (West is negative)	decimal degrees
dataset_description	General Description of Dataset	text
DepSM	Depth salt water	meters
Sal00	Salinity	PSU
Tv290C	Temperature ITS-90	degrees Celsius
Upoly0	User Polynomial	(tbd)
Density00	Density	Kg/m ³
WetCDOM	Fluorescence - Wetlab CDOM	mg/m ³
FIECO_AFL	Fluorescence - Wetlab ECO-AFL/FL	mg/m ³
OxsatMg_L	Oxygen Saturation	mg/l
Par	PAR/Irradiance - Biospherical/Licor	uEinsteins/m ² /sec
Sbeox0PS	Oxygen SBE 43 % saturation	percentage
TimeS	Time Elapsed	seconds

[[table of contents](#) | [back to top](#)]

Instruments

Dataset-specific Instrument Name	CTD Sea-Bird SEACAT 19
Generic Instrument Name	CTD Sea-Bird SEACAT 19
Dataset-specific Description	Samples were taken using a Sea-Bird SBE19plus.
Generic Instrument Description	The Sea-Bird SBE 19 SEACAT Recorder measures conductivity, temperature, and pressure (depth). The SEACAT is self-powered and self-contained and can be deployed in profiling or moored mode. The SBE 19 SEACAT was replaced in 2001 by the 19plus. more information from Sea-Bird Electronics

[[table of contents](#) | [back to top](#)]

Deployments

MuLTI_2010

Website	https://www.bco-dmo.org/deployment/58644																																												
Platform	R/V Llyr																																												
Start Date	2010-06-06																																												
End Date	2010-08-26																																												
Description	<p>A series of stations were re-visited on 11 separate occasions during the 2010 sampling season. The stations were generally located in: Downeast Maine, 44.1°N, 68.1°W – 44.9°N, 66.9°W and Saco Bay, Maine, 43.45°N, 70.33°W – 43.47°N, 70.28°W</p> <table><thead><tr><th>Deployment Location</th><th>Start_Date</th><th>End_Date</th><th>Deployment Location</th></tr></thead><tbody><tr><td>Downeast Maine</td><td>2010/06/10</td><td>06-15-2010</td><td>Saco Bay Maine</td></tr><tr><td>2010/06/15</td><td>2010/06/15</td><td>06-23-2010</td><td>Downeast Maine</td></tr><tr><td>2010/06/22</td><td>2010/06/22</td><td>06-25-2010</td><td>Saco Bay Maine</td></tr><tr><td>2010/06/25</td><td>2010/06/25</td><td>07-09-2010</td><td>Downeast Maine</td></tr><tr><td>2010/07/07</td><td>2010/07/07</td><td>07-12-2010</td><td>Saco Bay Maine</td></tr><tr><td>2010/07/12</td><td>2010/07/12</td><td>07-22-2010</td><td>Downeast Maine</td></tr><tr><td>2010/07/20</td><td>2010/07/20</td><td>07-27-2010</td><td>Saco Bay Maine</td></tr><tr><td>2010/07/27</td><td>2010/07/27</td><td>08-06-2010</td><td>Downeast Maine</td></tr><tr><td>2010/08/03</td><td>2010/08/03</td><td>08-19-2010</td><td>Saco Bay Maine</td></tr><tr><td>2010/08/19</td><td>2010/08/19</td><td>08-26-2010</td><td>Downeast Maine</td></tr></tbody></table>	Deployment Location	Start_Date	End_Date	Deployment Location	Downeast Maine	2010/06/10	06-15-2010	Saco Bay Maine	2010/06/15	2010/06/15	06-23-2010	Downeast Maine	2010/06/22	2010/06/22	06-25-2010	Saco Bay Maine	2010/06/25	2010/06/25	07-09-2010	Downeast Maine	2010/07/07	2010/07/07	07-12-2010	Saco Bay Maine	2010/07/12	2010/07/12	07-22-2010	Downeast Maine	2010/07/20	2010/07/20	07-27-2010	Saco Bay Maine	2010/07/27	2010/07/27	08-06-2010	Downeast Maine	2010/08/03	2010/08/03	08-19-2010	Saco Bay Maine	2010/08/19	2010/08/19	08-26-2010	Downeast Maine
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[[table of contents](#) | [back to top](#)]

Project Information

Does larval transport or physiological tolerance set the southern range boundary of a northern blue mussel? (MuLTI)

Coverage: Downeast Maine, 44.1°N, 68.1°W – 44.9°N, 66.9°W and Saco Bay, Maine, 43.45°N, 70.33°W – 43.47°N, 70.28°W

Collaborative Research: Does larval transport or physiological tolerance set the southern range boundary of a northern blue mussel?

Acronym "MuLTI" (Mussel Larval Transport Initiative)

This project will test whether the southern range boundary of a northern blue mussel, *Mytilus trossulus*, is determined by limitations on the dispersal of larvae, or the physiological tolerance of larvae and/or juveniles. *Mytilus trossulus* and its sister species, *M. edulis*, co-occur throughout the Canadian maritime provinces and the northern Gulf of Maine. While the abundance of *M. trossulus* decreases abruptly south of the Canadian border, *M. edulis* ranges south to North Carolina. Work to date has demonstrated that:

- 1) Adult *M. trossulus* in northeastern Maine inhabit coastal sites, islands, and man-made structures that are within the colder water of the Eastern Maine Coastal Current (EMCC).
- 2) Drifters released in the EMCC rarely enter nearshore waters to the south, suggesting that across-shelf transport is extremely limited.
- 3) Larvae of the two species may differ slightly in thermal tolerance, and some evidence suggests that tolerance may also be affected by nutritional status.
- 4) *Mytilus trossulus* juveniles transplanted within the northeastern Maine region, but outside of the EMCC, have high survivorship, while transplants further to the southwest suffer high mortality.

In combination, these results suggest that larval transport sets the proximate range boundary within northeastern Maine (on a scale of 10 km), but thermal tolerance would ultimately limit the distribution on a larger spatial scale (200 km).

We will test this pair of hypotheses via a combination of field and lab experiments. Satellite drifters equipped with temperature loggers deployed in and out of the EMCC during the season of *M. trossulus* larval dispersal (mid-June to mid-August) will be used to quantify the physical flow fields and temperature regimes during larval dispersal. Drogues will allow us to assess whether larvae at different depths may experience different flow fields. Data from hydrographic surveys, combined with regular spatial and temporal sampling of mussel larvae and new settlers, will be used to assess possible associations between larval and post-settlement stages and different water masses. The physiological tolerance of new settlers will be assayed via transplants to sites in

and out of the EMCC. Finally, laboratory growth and survival experiments will assay larval performance in different thermal and feeding regimes. We will use molecular markers to identify the morphologically indistinguishable larvae and settlers of these sibling species.

[[table of contents](#) | [back to top](#)]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0961157
NSF Division of Ocean Sciences (NSF OCE)	OCE-1233868

[[table of contents](#) | [back to top](#)]