Temperature, pH, DO, and salinity data from Mumford Cove, Connecticut, USA from 2015-2020

Website: https://www.bco-dmo.org/dataset/659874
Data Type: Other Field Results
Version: 2
Version Date: 2020-03-20

Project
» Collaborative research: Understanding the effects of acidification and hypoxia within and across generations in a coastal marine fish (HYPOA)

Contributors	Affiliation	Role
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Abstract
Despite their importance for research and environmental protection, there's still a shortage of high quality and high-resolution temperature, pH, and oxygen data particularly in shallow coastal habitats. We monitor five important environmental parameters (i.e., depth, temperature, salinity, pH, and dissolved oxygen) at 30 minute intervals in Mumford Cove, CT (41 degrees 19'25"N, 72 degrees 01'07"W), a small (2 km N-S × 0.5 km E-W), shallow (1-5m), cone-shaped embayment opening to northeastern Long Island Sound, with protected marsh habitat along its western side, marsh and beach habitat along its eastern side, and an extensive seagrass (Zostera marina) cover. Continuous monitoring is achieved by swapping identical and recalibrated probes (Eureka Manta Sub2) every 3-5 weeks.

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Coverage

Spatial Extent: **Lat**:41.3252611 **Lon**:-72.02088
Temporal Extent: 2015-04-14 - 2020-02-04

Dataset Description

Since April 2015, pH, DO, temperature, and salinity measurements have been taken in 30 min intervals in Mumford Cove, CT, United States. This is a shallow cove that is typical for the area.

This dataset includes records from 14-April-2015 to 04-Feb-2020.

Acquisition Description

All measurements were made with Eureka Manta Sub2 probes (www.waterprobes.com). The measurement interval was 30 minutes. All measurements were made in Mumford Cove, CT, ~ 0.5m above sandy bottom. Deployment time of each sensor varied between 3-6 weeks, all probes were calibrated prior to deployment for salinity, pH, 100% air-saturated water oxygen. The probe was attached to a local subsurface buoy.

pH: calibrated with 3-point, NIST certified buffers, accuracy +/- 0.1, precision: 0.01, automatic temperature correction
Optically Measured Dissolved Oxygen (HDO): calibrated with 100% air-saturated water
Salinity: Calibrated with FisherScientific Conductivity standard 50,000 uS/cm

Processing Description

QA/QC consisted of identifying and deleting salinity data that ‘jumped’ within a single 30 min interval more than 1 salinity unit.

BCO-DMO Processing Notes:
- reformatted date to yyyy-mm-dd; added date/time column in ISO8601 format;
- replaced spaces with underscores in the location name;
- filled blank cells with "nd" ("no data");

- 2020-March-20: appended data from second dataset submission (monitoringMC_02).

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Parameters

Parameter	Description	Units
location	Location where measurments were taken	unitless
lat	Latitude	decimal degrees North
lon	Longitude	decimal degrees East
year	Year of sampling; format: yyyy	unitless
dataset	Original dataset file name; monitoringMC_01 = submission 1; monitoringMC_02 = submission 2	unt
probe_serialNum	Serial number of the sampling probe	unitless
date	Date that samples were taken; format: yyyy-mm-dd	unitless
time	Time that samples were taken (Eastern Standard Time); format: HH:MM or HH:MM:SS	unitless
temp	Water temperature	degrees Celsius
pH	pH; NIST calibrated with three point NIST calibration buffers (4.00; 7.00; 10.00)	unitless
conductivity	Specific conductivity; Calibrated with FisherScientific Conductivity standard 50,000 µS/cm	uS/cm
HDO_mgL	Dissolved oxygen saturation; calibrated using 100% air-saturated water	milligrams per liter (mg/L)
HDO_percentSat	Dissolved oxygen percent saturation; calibrated using 100% air-saturated water	unitless (percent)
pH_mV	Voltage from pH	millivolts (mV)

salinity	Salinity	PSS
depth	Depth where measurement was taken; earlier measurement did not have a depth sensor, which was later refitted to all probes. Note that the sensor position ~0.5m above bottom did not change	meters
ISO_DateTime_EST	Date and time of sampling (EST/EDT); formatted to ISO 8601 standard: yyyy-mm-ddTHH:MM. Before each deployment, the probe clock is synchronized with the lab clock (local time zone of EST/EDT).	unitless
comments	Comments/notes	unitless

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Instruments

Dataset-specific Instrument Name	Eureka Manta Sub2 probe
Generic Instrument Name	Water Quality Multiprobe
Dataset-specific Description	Took data on temperature, pH, DO, and salinity
Generic Instrument Description	An instrument which measures multiple water quality parameters based on the sensor configuration.

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Deployments

Mumford_Cove_Subsurface_Buoy

Website	https://www.bco-dmo.org/deployment/659887
Platform	Avery_Point
Start Date	2015-04-04
Description	Local subsurface buoy in Mumford Cove, CT, a shallow, coastal embayment in outer Long Island Sound, US Atlantic coast.

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Project Information

Collaborative research: Understanding the effects of acidification and hypoxia within and across generations in a coastal marine fish (HYPOA)

Coverage: Eastern Long Island Sound, CT, USA

Description from NSF award abstract: Coastal marine ecosystems provide a number of important services and resources for humans, and at the same time, coastal waters are subject to environmental stressors such as increases in ocean acidification and reductions in dissolved oxygen. The effects of these stressors on coastal marine organisms remain poorly understood because most research to date has examined the sensitivity of species to one factor, but not to more than one in combination. This project will determine how a model fish species, the Atlantic silverside, will respond to observed and predicted levels of dissolved carbon dioxide (CO2) and oxygen (O2). Shorter-term experiments will measure embryo and larval survival, growth, and metabolism, and determine whether parents experiencing stressful conditions produce more robust offspring. Longer-term experiments will study the consequences of ocean acidification over the entire life span by quantifying the effects of high-CO2 conditions on the ratio of males to females, lifetime growth, and reproductive investment. These studies will provide a more comprehensive view of how multiple stressors may impact populations of Atlantic silversides and potentially other important forage fish species. This collaborative project will support and train three graduate students at the University of Connecticut and the Stony Brook University (NY), two institutions that attract students from minority groups. It will also provide a variety of opportunities for undergraduates to participate in research and the public to learn about the study, through summer research projects, incorporation in the "Women in Science and Engineering" program, and interactive displays of environmental data from monitoring buoys. The two early-career investigators are committed to increasing ocean literacy and awareness of NSF-funded research through public talks and presentations. This project responds to the recognized need for multi-stressor assessments of species sensitivities

to anthropogenic environmental change. It will combine environmental monitoring with advanced experimental approaches to characterize early and whole life consequences of acidification and hypoxia in the Atlantic silverside (Menidia menidia), a valued model species and important forage fish along most of the US east coast. Experiments will employ a newly constructed, computer-controlled fish rearing system to allow independent and combined manipulation of seawater pCO2 and dissolved oxygen (DO) content and the application of static and fluctuating pCO2 and DO levels that were chosen to represent contemporary and potential future scenarios in productive coastal habitats. First CO2, DO, and CO2 × DO dependent reaction norms will be quantified for fitness-relevant early life history (ELH) traits including pre- and post-hatch survival, time to hatch, post-hatch growth, by rearing offspring collected from wild adults from fertilization to 20 days post hatch (dph) using a full factorial design of 3 CO2 × 3 DO levels. Second, the effects of tidal and diel CO2 × DO fluctuations of different amplitudes on silverside ELH traits will be quantified. To address knowledge gaps regarding the CO2-sensitivity in this species, laboratory manipulations of adult spawner environments and reciprocal offspring exposure experiments will elucidate the role of transgenerational plasticity as a potential short-term mechanism to cope with changing environments. To better understand the mechanisms of fish early life CO2-sensitivity, the effects of temperature × CO2 on pre- and post-hatch metabolism will be robustly quantified. The final objective is to rear silversides from fertilization to maturity under different CO2 levels and assess potential CO2-effects on sex ratio and whole life growth and fecundity. Related references: Gobler, C.J. and Baumann, H. (2016) Hypoxia and acidification in ocean ecosystems: Coupled dynamics and effects on marine life. Biology Letters 12:20150976. doi:10.1098/rsbl.2015.0976 Baumann, H. (2016) Combined effects of ocean acidification, warming, and hypoxia on marine organisms. Limnology and Oceanography e-Lectures 6:1-43. doi:10.1002/loe2.10002 Depasquale, E., Baumann, H., and Gobler, C.J. (2015) Variation in early life stage vulnerability among Northwest Atlantic estuarine forage fish to ocean acidification and low oxygen Marine Ecology Progress Series 523: 145–156.doi:10.3354/meps11142

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1536336

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