

Concentration of zooplankton, in particular copepods, from hypoxic waters collected by R/V Hugh R. Sharp cruises (HRS100524JP, HRS100819JP, HRS100920JP, HRS110525JP, HRS110719JP, HRS110922JP) in the Chesapeake Bay from 2010-2011 (DeZoZoo project)

Website: <https://www.bco-dmo.org/dataset/564755>

Data Type: Cruise Results

Version: first draft of final

Version Date: 2015-08-26

Project

» [Hypoxia in Marine Ecosystems: Implications for Neritic Copepods](#) (DeZoZoo)

Contributors	Affiliation	Role
Pierson, James J.	University of Maryland Center for Environmental Science (UMCES/HPL)	Principal Investigator
Allison, Dicky	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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Coverage

Spatial Extent: N:39.5371 E:-74.9864 S:37.4565 W:-76.6289

Temporal Extent: 2010-05-24 - 2011-12-21

Dataset Description

These data represent a merging of electronic data collected from the MOCNESS sensor systems and the count data from the samples collected with the net tows. Some nets were used for zooplankton samples, while others were collected specifically to estimate bay anchovy concentrations. (See associated dataset: <http://www.bco-dmo.org/dataset/563428>.) These are contained on different sheets, and the count data was merged individually.

Data Processing Description

Electronic data was post-processed by PI Pierson. Zooplankton sorting data was analyzed, processed, and quality controlled in PI Pierson's lab.

DMO adjustments: added column for official cruise name; replaced sal=50 (error) with sal=nd; changed *C. canadensis* in parenthesis to *Coullana canadensis* in the appropriate columns; used MOCNESS start lats and lons as best, according to PI instructions; removed MOCNESS-recorded times and used GPS times instead, which is much more accurate (according to PI instructions); changed decimal days for 1102 (HRS110719JP) to

HH:MM;

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Data Files

File
zoop_DZZ_rs.csv (Comma Separated Values (.csv), 223.72 KB) MD5:5ed938ca77fccdd8ec6aa244d8c6e12c
Primary data file for dataset ID 564755

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Parameters

Parameter	Description	Units
cruiseid	official cruise name	text
cruise_informal	The Year and the cruise series. i.e. 1101 = the first cruise in 2011	text
year	year	time
month_local	month	time
tow	MOCNESS trawl series number	text
day_local	day in local time	time
net	net number	text
gear	the sampling gear	text
time_local	local time of day	HH:MM
lat_best	the latitude when a MOCNESS tow starts; considered the best latitude by the PI	decimal degrees
lon_best	the longitude when a MOCNESS tow starts; considered the best longitude by the PI	decimal degrees
yrday_local	day of year in local time	time
vol_filt	filtration volume, i.e the volume of water flowing through the net	cubic meters
temp	water temperature	degrees centigrade
sal	water salinity	PSU
O2_mg_L	dissolved Oxygen	milligrams per liter
fluor	Chlorophyll a concentration from Wetlabs FLNTU	milligrams per cubic meter
turbidity	turbidity measured in Nephelometric Turbidity Unites (NTU) from Wetlabs FLNTU	NTU
PAR	Photosynthetically available radiation	microEinsteins per square meter per second
lat_end	the latitude when a MOCNESS tow ends	decimal degrees
lon_end	the longitude when a MOCNESS tow ends	decimal degrees
low_depth_best	the surface depth of a net trawl; considered the best depth by the PI	m

high_depth_best	the bottom depth of a net trawl; considered the best depth by the PI	m
angle	MOCNESS trawl angle	degrees
dist	the tow distance	kilometers
area_net	the net mouth opening area	meters square
site	sampling station: north or south	text
splits	the number of times the sample is split in half	number
dilution	the dilution volume of a split sample	ml
subsample_size	the subsample volume from a diluted sample	ml
genus	the genus name	text
species	the species name	text
stage	the copepod stages: nauplii (N1-N6); copepodite (C1-C5); adult (Female or Male)	text
count_subsample	the counted numbers in a subsample	number
abund_m3	number of individuals per cubic meter sampled	number
abund_m2	integrated abundance; number of individuals in a square meter	number

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Instruments

Dataset-specific Instrument Name	1/4 Meter MOC
Generic Instrument Name	MOCNESS.25
Dataset-specific Description	Had trouble communicating with the 1/4 m2 MOCNESS in the beginning of the first cruise. Picked up replacement parts and were able to get it working again with an underwater unit borrowed from BESS, the manufacturer of the MOCNESS system. (Subsequent analysis by BESS, Inc. showed that some damage to the underwater unit was caused when it was plugged into the sea cable with some charge still in the cable -- most likely from the Seabird deck unit still turned on.) -- from the Cruise Report
Generic Instrument Description	The Multiple Opening/Closing Net and Environmental Sensing System or MOCNESS is a family of net systems based on the Tucker Trawl principle. The MOCNESS-1/4 carries nine 1/4-m2 nets usually of 64 micrometer mesh and is used to sample the larger micro-zooplankton.

Dataset-specific Instrument Name	Tucker Trawl
Generic Instrument Name	Tucker Trawl
Dataset-specific Description	1 m2 Tucker Trawl fitted with 280 um mesh.
Generic Instrument Description	The original Tucker Trawl, a net with a rectangular mouth opening first built in 1951 by G.H. Tucker, was not an opening/closing system, but shortly thereafter it was modified so that it could be opened and closed. The original had a 183 cm by 183 cm flexible rectangular mouth opening 914 cm long net with 1.8 cm stretched mesh for the first 457 cm and 1.3 cm mesh for last 457 cm. 152 cm of coarse plankton or muslin netting lined the end of the net. Tucker designed the net to collect animals associated with the deep scattering layers, principally euphausiids, siphonophores, and midwater fish. (from Wiebe and Benfield, 2003). Currently used Tucker Trawls usually have 1-m2 openings and can have a single net or multiple nets on the frame.

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Deployments

HRS100524JP

Website	https://www.bco-dmo.org/deployment/518664
Platform	R/V Hugh R. Sharp
Report	http://dmoserv3.bco-dmo.org/data_docs/DeZoZoo/DeZoZoo_1001_CruiseReport_FINAL.pdf
Start Date	2010-05-24
End Date	2010-06-01
Description	Cruise in Main Channel of Chesapeake Bay

HRS100819JP

Website	https://www.bco-dmo.org/deployment/518707
Platform	R/V Hugh R. Sharp
Start Date	2010-08-19
End Date	2010-08-26
Description	Cruise in main channel of Chesapeake Bay to collect zooplankton samples.

HRS100920JP

Website	https://www.bco-dmo.org/deployment/518709
Platform	R/V Hugh R. Sharp
Start Date	2010-09-21
End Date	2010-09-27
Description	One of a series of cruises in the main channel of the Chesapeake Bay to collect gelatinous zooplankton.

HRS110525JP

Website	https://www.bco-dmo.org/deployment/518711
Platform	R/V Hugh R. Sharp
Start Date	2011-05-24
End Date	2011-06-01
Description	One of six week-long cruises in the main channel of Chesapeake Bay to collect gelatinous zooplankton.

HRS110719JP

Website	https://www.bco-dmo.org/deployment/518842
Platform	R/V Hugh R. Sharp
Start Date	2011-07-19
End Date	2011-07-26
Description	One of six week-long cruises in the main channel of the Chesapeake Bay to collect gelatinous zooplankton

HRS110922JP

Website	https://www.bco-dmo.org/deployment/518904
Platform	R/V Hugh R. Sharp
Start Date	2011-09-21
End Date	2011-09-26
Description	One of 6 week-long cruises in the main channel of the Chesapeake Bay, collecting gelatinous zooplankton.

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Project Information**Hypoxia in Marine Ecosystems: Implications for Neritic Copepods (DeZoZoo)**

Website: <http://www.planktoneer.com/research.html#HYPOX>

Coverage: Chesapeake Bay

Description from NSF award abstract:

The occurrence of low-oxygen waters, often called "dead zones" in coastal ecosystems throughout the world is increasing. Despite these increases, the pelagic food-web consequences of low-oxygen waters remain poorly understood. Laboratory research has demonstrated that hypoxic water (< 2 mg l⁻¹) can result in mortality, reduced fitness and lower egg production of planktonic copepods, a major link in food webs supporting pelagic fish. Observations in the sea indicate that hypoxic bottom waters usually have depressed abundances of copepods compared to normoxic waters (> 2 mg l⁻¹). The gradient of declining oxygen concentration with respect to depth (oxycline) can be a critical interface in coastal pelagic ecosystems by altering the migratory behavior and depth distribution of copepods and their spatial coherence with potential predators and prey. This project will result in a mechanistic understanding of how behavior and fitness of copepods are affected by hypoxia. The PIs will compare bottom-up and top-down controls on the ecology of

copepods in Chesapeake Bay waters experiencing seasonal hypoxia and those that are normoxic.

Specific objectives of this project are to:

- 1) analyze changes in migratory behavior and fine-scale (meter) distribution of copepods across the oxycline over hourly and diel time scales while simultaneously examining the distribution and abundance of their food (phytoplankton and microzooplankton) and predators (fish, gelatinous zooplankton);
- 2) estimate effects of hypoxia on the "fitness" of copepods using a suite of measurements (length/weight ratios, feeding, egg production, and egg hatching success) to develop condition indices of copepods captured at different times and depths in hypoxic and normoxic waters; and
- 3) evaluate effects of hypoxia on copepod mortality by hypoxia-induced, stage-specific copepod mortality in hypoxic bottom waters and by changes in top-down control of copepods from predation by fish and gelatinous zooplankton.

Oxyclines may be a barrier to vertical migration of copepods and thus disruptive to predator avoidance behavior. Faced with increased predation risk from fish and jellyfish, copepods may seek refuge in hypoxic waters for part of the day and/or make short-term vertical excursions between hypoxic and normoxic waters. By regulating vertical migrations, copepods may increase utilization of microzooplankton prey concentrated in the oxycline. Hypoxic waters may elevate consumption of copepods by jellyfish and depress consumption by pelagic fish. This project will evaluate copepod distribution and migration behavior, individual fitness and stage-specific mortality in hypoxic and normoxic waters. It will examine food-web consequences of increased or decreased spatial coherence of copepods and their predators and prey in regions with hypoxic bottom waters and will contribute to fundamental understanding of food-web processes in eutrophic coastal ecosystems.

Project acronym "DeZoZoo" = "Dead Zone Zooplankton"

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0961924

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