Mysid sampling and water quality monitoring from 24-hour sampling events in Patuxent River in MD, USA from May 2024 to Oct 2024

Website: https://www.bco-dmo.org/dataset/996519
Data Type: Other Field Results
Version: 1
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Project
» Planktonic Omnivores and Stable Isotopes: Developing, Validating and Field-testing a Multi-species Functional Response Model (MSFR)

Contributors	Affiliation	Role
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Abstract
These data include mysid counts, water quality and sampling metadata from 24hr sampling events that occurred between May 2024 and October 2024 in the Patuxent River in MD, USA. Observations were collected with a zooplankton net (500 µm net mesh) and epi-benthic sled (500 µm net mesh) and water quality sonde. These measurements were taken to understand mysid (opossum shrimp) spatial and temporal dynamics in shallow-water estuarine habitats to inform models and were collected by Dr. Ryan Woodland and team at the University of Maryland Center for Environmental Science Chesapeake Biological Laboratory in Solomons, MD.

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Coverage

Location: Patuxent River, MD, USA Various stations
Spatial Extent: **N**:38.55787 **E**:-76.35666 **S**:38.257183 **W**:-76.67585
Temporal Extent: 2024-05-06 - 2024-10-29

Methods & Sampling

Zooplankton net samples (500 µm mesh) were collected from a small vessel at surface and mid-water column

depths for 2 minutes. Epi-benthic sled samples (500 µm mesh) were collected from a small vessel and from the Chesapeake Biological Laboratory pier at recorded depth per sample. Water quality samples were collected via sonde before each sampling.

After collection, samples were placed into sample jars with either 75% buffered ethanol OR 10% formalin solution. Samples were then transported back to the Chesapeake Biological Laboratory. Upon analysis, individual mysids were separated from the rest of the sample, counted and speciated by hand.

BCO-DMO Processing Description

- Loaded sheet 1 from "24hr_Mysid_Sampling_BCODMO.xlsx" treating "nd" and "N/A" as missing values
- Combined Date and Time fields into a new string field datetime_raw
- Applied find/replace patterns on datetime_raw to normalize datetime strings: padded times missing seconds with ":00" and standardized spacing
- Converted datetime_raw from format "%m-%d-%y %H:%M:%S" to ISO 8601 datetime field datetime with output format "%Y-%m-%dT%H:%M:%S"
- Deleted fields Date, Time, and datetime_raw
- Reordered fields placing datetime first, followed by Site, Lat, Long, Gear, Type, count fields, proportion fields, Mysids/m^2, volume/area fields, water quality fields, and Notes
- Applied find/replace on Notes field to replace a raw annotation ("****October depth data from pier all says zero?") with a cleaner description ("October depth data from pier all says zero: Depth meter failure")
- Renamed fields: Mysids/m^2 to Mysids_per_m2, "Volume filtered (zoop nets only)" to Volume_filtered, "Swept area (sled only)" to Swept_area, "Sonde_depth (m)" to Sonde_depth, "Temperature (C)" to Temperature, "Conductivity (mS/cm)" to Conductivity, "Salinity (PSU)" to Salinity
- Exported file as "996519_v1_24hr_mysid_sampling.csv"

World Register of Marine Species (WoRMS) Taxon Match. All scientific names referenced in the parameter descriptions are valid and accepted names as of 2026-04-22.

Americamysis Price, Heard & Stuck, 1994 (urn:lsid:marinespecies.org:taxname:161519)
Neomysis americana (S.I. Smith, 1873) (urn:lsid:marinespecies.org:taxname:157807)

Problem Description

Depth meter failure: there was a failure of unknown origin from pier data sonde. No other sensors from those observations are known to be affected.

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Parameters

Parameter	Description	Units
datetime	Datetime of sampling	unitless
Site	Name of site where sampling occurred	unitless
Lat	Latitude of sample collection, positive is North	decimal degrees
Long	Longitude of sample collection, negative is West	decimal degrees

Gear	Gear type used: Sled = epi-benthic sled, 500um net mesh size; Zoopnet = 500um net mesh	unitless
Type	Type of location sampled; DeepBot = sled pulled in approximate deep water depths, ShallBot = sled pulled in approximate shallow water depths, Mid = zooplankton pulled in middle of water column at site, Surf = zooplankton pulled at the surface of water column at site	unitless
Total_count	Total count of mysids caught per sample	unitless
A_spp_count	Sub-sample count of *Americamysis spp.* mysids caught per sample	unitless
N_amer_count	Sub-sample count of *Neomysis Americana* mysids caught per sample	unitless
Un_ID	Sub-sample count of unidentifiable mysids caught per sample	unitless
Sub_count	Sub-sample count of total mysids speciated	unitless
Prop_A	Proportion of *Americamysis spp.* mysids in total count	unitless
Prop_N	Proportion of *Neomysis Americana* mysids in total count	unitless
Mysids_per_m2	Catch per unit effort of mysids collected per sample	Mysids per square meter
Volume_filtered	Total water volume sampled with the zooplankton net	m3
Swept_area	Benthic area sampled, in meters squared	m2
Sonde_depth	Depth of water quality sonde in water column at time of measurement collection, in meters	m
Temperature	Water temperature at time of collection	degrees Celsius
Percent_DO	Oxygen % of water at time of collection, in percent	percent (%)
DO_mgL	Dissolved oxygen in water at time of collection, in milligrams per liter	mg/L
Conductivity	Water conductivity at time of collection, in milliSiemens per centimeter	mS/cm

Salinity	Salinity of water at time of collection, in PSU (Practical Salinity Unit)	PSU
Notes	Notes about the observations	unitless

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Instruments

Dataset-specific Instrument Name	Epibenthic sled
Generic Instrument Name	Epibenthic Sled
Dataset-specific Description	Methods Description: Epi-benthic sled samples (500 µm mesh) were collected from a small vessel and from the Chesapeake Biological Laboratory pier at recorded depth per sample. Instrument Description: Epibenthic sled - Custom design by Chesapeake Biological Laboratory facilities department, 500 µm net size.
Generic Instrument Description	An epibenthic sled is a semi-quantitative bottom-sampling device designed to trawl just above the bottom at the sediment water interface (the epibenthic zone). The sled consists of a rectangular steel frame with a mesh net (often more than one) attached to it. Towed along the ocean floor, its weight scrapes into the benthos, collecting any organisms on the surface or in the first few centimeters of sediment. It also collects the organisms in the water column just above the benthos. Descriptions from WHOI and Census of Marine Life.

Dataset-specific Instrument Name	Zooplankton net
Generic Instrument Name	Plankton Net
Dataset-specific Description	Methods Description: Zooplankton net samples (500 µm mesh) were collected from a small vessel at surface and mid-water column depths for 2 minutes. Instrument Description: Zooplankton net - SeaGear Model 9000 Straight Conical, 500 µm mesh size
Generic Instrument Description	A Plankton Net is a generic term for a sampling net that is used to collect plankton. It is used only when detailed instrument documentation is not available.

Dataset-specific Instrument Name	Eureka Manta2 Water Quality Sonde
Generic Instrument Name	Water Quality Multiprobe
Dataset-specific Description	Methods Description: Water quality samples were collected via sonde before each sampling. Instrument Description: Water quality sonde - Eureka Manta2 Water Quality Sonde
Generic Instrument Description	An instrument which measures multiple water quality parameters based on the sensor configuration.

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Project Information

Planktonic Omnivores and Stable Isotopes: Developing, Validating and Field-testing a Multi-species Functional Response Model (MSFR)

Coverage: Chesapeake Bay

NSF Award Abstract:

Diagrams of food webs are typically drawn as boxes that show linkages between predators and prey. While these are useful models of how energy is transferred along a food chain, real food webs are more complex. Predator diets are often variable making it difficult to establish predator-prey links in marine communities. This project is investigating prey switching in a key member of coastal food webs, the shrimp-like mysid, Neomysis americana. Prey switching affects community structure and an organism's resilience to environmental perturbation, but it is not easy to quantify. This project is using a combination of laboratory experiments and field sampling to develop a food web model that predicts mysid feeding patterns in the environment. This realistic and predictive food web model uses traditional gut analysis and analytical techniques that follow carbon and nitrogen as it is incorporated into the bodies of the mysids. In addition, mysid food preferences are being determined in the laboratory across a full range of diet possibilities. The calibrated gut analysis and chemical marker data in combination with feeding experiments are incorporated into the model, which then predicts mysid feeding on mixed diets under different environmental conditions. These predictions are validated against field data. Broader impacts include benefits to society for a better understanding of how coastal food webs work. Doctoral students and undergraduate students are being trained in experimental and field research. Increasing diversity in STEM fields is occurring through a partnership with two community colleges (College of Southern Maryland, Chesapeake College) to recruit summer interns for research experiences. Outreach activities include the development of educational materials for grade-appropriate hands-on laboratory experiments and training opportunities for middle and high school teacher groups in the use of these materials in their classrooms.

This project is developing and field-testing a generalizable approach to understand and predict complex predator-prey relationships in marine food webs. The research plan involves building and validating a multispecies functional response (MSFR) model for an omnivorous consumer, the mysid Neomysis americana. These models predict diet for consumers that feed on multiple types of prey under differing prey concentrations and identify conditions under which prey switching occurs in the environment. Recent and time-integrated diet tracking with gut contents, bulk stable isotope (SI) and compound-specific amino acid stable isotope (AA-CSI) analysis are validated in the lab and used to reconstruct diet of Neomysis in the field. The proposed research is testing specific hypotheses about Neomysis' consumption rates and prey preferences and the effectiveness of integrating SI and AA-CSI into MSFR models. Laboratory experiments are determining prey-specific functional response curves by Neomysis under varying prey concentrations and environmental (temperature) conditions using grazing experiments. Experimental results are incorporated into a temperature-dependent MSFR model for a 5-compartment simplified food web (Neomysis, adult copepod, copepod nauplii, phytoplankton, detritus). A complementary element of the project is the experimental determination of bulk SI (ð¿13C and ð¿15N) and AA-CSI (ð¿15N) equilibration rates and trophic enrichment factors for Neomysis and each prey type. The predator-prey dynamics of Neomysis in the environment are being modeled using the lab-validated MSFR approach and field data, including prey concentrations, gut contents, and prey and Neomysis SI and AA-CSI data.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-2023349

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