

Stomach dissection results from fish caught in Chesapeake Biological Laboratory's seine survey in Summer 2023

Website: <https://www.bco-dmo.org/dataset/986250>

Data Type: Other Field Results

Version: 1

Version Date: 2025-10-24

Project

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

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|-------------------------------------|---|------------------------|
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Abstract

This dataset includes results from the dissection of stomach contents of fish caught from a night time seine survey (August-September) conducted by Chesapeake Biological Laboratory. The fish were kept based on previous evidence of consuming mysids and what other studies have determined to consume mysids. The dissection data include the individual fish identification number, date and time the fish was caught, location fish was caught, species of fish, total length of fish, full and empty weights of the fish, and the presence of various prey items (amphipods, fish, insects, mysids, polychetes, crabs, foliage, shrimp, isopods), the items found in the stomachs, and comments about each dissection. Dissections took place from October 2023 to January 2024. Laboratory scalpels and forceps were used to remove the organs from the fish, and a dissecting microscope was used to identify the stomach contents visually. Sampling was done by various students and technicians at Chesapeake Biological Laboratory, and dissections were done by Lael Collins.

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Coverage

Location: mouth of the Patuxent River of Chesapeake Bay, Solomons, Maryland, USA

Spatial Extent: N:38.8178 E:-75.9531 S:37.8178 W:-76.9531

Temporal Extent: 2023-08-15 - 2023-09-28

Methods & Sampling

Samples came from an area adjacent to Chesapeake Biological Laboratory's research pier near the mouth of the Patuxent River of Chesapeake Bay, Solomons, Maryland, USA. The waters of the sampled area are 0.5-2

meters deep. The salinity here ranges from 8.8 to 18, with water temperature ranging from 3.3° to 28° C . The benthic habitat is primarily flat sandy bottom, with a mixture of small rocks, shell hash, and occasional *Rupia maritima* seagrass beds.

The fish were collected using a 30.0 × 1.2 meter (m) beach seine with 6.0 millimeter (mm) mesh. We fully deployed the seine perpendicular from shore and swept in a quarter circle back to shore. Fish that were kept were separated in a container and brought in at the end of sampling to be frozen until dissected. All sampling took place between sunset and sunrise.

BCO-DMO Processing Description

- Imported original file "2023_fishdissections.xlsx" into the BCO-DMO system.
- Converted date to YYYY-MM-DD format.
- Renamed fields to comply with BCO-DMO naming conventions.
- Created date-time field (local) in ISO 8601 format.
- Saved the final file as "986250_v1_2023_cbl_dissection_results.csv".

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Data Files

| File |
|--|
| 986250_v1_2023_cbl_dissection_results.csv (Comma Separated Values (.csv), 17.77 KB) MD5:b0fa2ab5f11d132b30f9cb67fc78027b |
| Primary data file for dataset ID 986250, version 1 |

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Parameters

| Parameter | Description | Units |
|--------------------|--|------------------|
| Fish_ID | Individual dissection number | unitless |
| ISO_DateTime_Local | Date and time (EDT) the fish was caught in the Seine Survey | unitless |
| Date_Caught | Date the fish was caught in the Seine Survey | unitless |
| Time_Caught | Time of the seine in EDT | unitless |
| Location_Survey | Which survey the data came from, either day time or night time | unitless |
| Species | Common name or description of species | unitless |
| Total_Length_mm | Fish's total length in millimeters | millimeters (mm) |
| | | |

| | | |
|-----------------|---|-----------|
| Total_Weight_g | Fish's total weight in grams | grams (g) |
| Full_Stomach_g | Weight of the removed full stomach of the fish in grams | grams (g) |
| Empty_Stomach_g | Weight of the removed empty stomach of the fish in grams | grams (g) |
| Mysids_count | Number of mysids in the stomach of the fish | unitless |
| Mysids_present | Presence / absence of mysids in the stomach contents of the fish | unitless |
| Amphipods | Presence / absence of amphipods in the stomach contents of the fish | unitless |
| Fish | Presence / absence of other types of fish in the stomach contents of the fish | unitless |
| Insects | Presence / absence of insects in the stomach contents of the fish | unitless |
| Polychetes | Presence / absence of polychetes in the stomach contents of the fish | unitless |
| Crabs | Presence / absence of crabs in the stomach contents of the fish | unitless |
| Foliage | Presence / absence of vascular plant material in the stomach contents of the fish | unitless |
| Shrimp | Presence / absence of shrimp in the stomach contents of the fish | unitless |
| Isopods | Presence / absence of isopods in the stomach contents of the fish | unitless |
| Items | Items that were present in the stomach contents of the fish written out | unitless |
| Comments | Comments regarding the stomachs or quality of the fish | unitless |

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Instruments

| | |
|---|---|
| Dataset-specific Instrument Name | Olympus SZ61 Microscope |
| Generic Instrument Name | Microscope - Optical |
| Generic Instrument Description | Instruments that generate enlarged images of samples using the phenomena of reflection and absorption of visible light. Includes conventional and inverted instruments. Also called a "light microscope". |

| | |
|---|--|
| Dataset-specific Instrument Name | Laboratory scalpels and forceps; Integra iltex Stainless Steel Surgical Blades |
| Generic Instrument Name | scalpel |
| Generic Instrument Description | A scalpel, or lancet, or bistoury, is a small and extremely sharp bladed instrument used for dissection and surgery. |

| | |
|---|---|
| Dataset-specific Instrument Name | 30.0 × 1.2 m Beach Seine |
| Generic Instrument Name | Seine Net |
| Generic Instrument Description | A seine net is a very long net, with or without a bag in the centre, which is set either from the shore or from a boat for surrounding a certain area and is operated with two (long) ropes fixed to its ends (for hauling and herding the fish). Seine nets are operated both in inland and in marine waters. The surrounded and catching area depends on the length of the seine and of the hauling lines. (definition from: fao.org) |

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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 ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$) and AA-CSI ($\delta^{15}\text{N}$) 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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