Stomach dissection results from fish caught in Chesapeake Biological Laboratory's seine survey in Summer 2022

Website: https://www.bco-dmo.org/dataset/986256
Data Type: Other Field Results
Version: 1
Version Date: 2025-10-22

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

This dataset includes results from the dissection of stomach contents of fish caught from a yearly seine survey (May-October) conducted by Chesapeake Biological Laboratory (CBL). The fish were kept based on morphology, where those that could physically consume a mysid shrimp were kept and frozen to be dissected at a later date. The dissection data include the individual fish identification number, date 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 (unidentifiable material, amphipods, polychaetes, mysids, unidentifiable crustaceans, isopods, barnacles, bivalves, miscellaneous larvae, insects, fish, foliage, diatoms, algae, potential parasites), the items found in the stomachs, and comments about each dissection. Dissections took place from September 2022 to January 2023. 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: 2022-08-11 - 2022-10-13

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. The survey began in May 2022 and ended in October 2022, on a ~weekly basis. Data in this dataset are from only August to October. Fish that were kept were separated in a container and brought in at the end of sampling to be frozen until dissected.

BCO-DMO Processing Description

- Imported original file "2022_fishdissections.xlsx" into the BCO-DMO system.
- Converted date to YYYY-MM-DD format.
- Renamed fields to comply with BCO-DMO naming conventions.
- Replaced ",02" on row 102 in Empty_stomach_wt_g column with "0.02".
- Saved the final file as "986256_v1_2022_cbl_dissection_results.csv".

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Data Files

File
986256_v1_2022_cbl_dissection_results.csv(Comma Separated Values (.csv), 19.60 KB)
MD5:c1b4b0dbcbee75f9c58ed73992480b45
Primary data file for dataset ID 986256, version 1

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Parameters

Parameter	Description	Units
Fish_ID	Individual dissection number	unitless
Date_Caught	Date the fish was caught in the Seine Survey	unitless
Location_Survey	Which survey the data came from, either day time or night time	unitless
Species	Common name or description of species	unitless
TotalLength_mm	Fish's total length in millimeters	millimeters (mm)
Weight_g	Fish's total weight in grams	grams (g)
Full_stomach_wt_g	Weight of the removed full stomach of the fish in grams	grams (g)

Empty_stomach_wt_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
Polychetes	Presence / absence of polychetes in the stomach contents of the fish	unitless
Unid_crustacean	Presence / absence of unidentifiable crustacean parts in the stomach contents of the fish	unitless
Copeods	Presence / absence of copepods in the stomach contents of the fish	unitless
Isopods	Presence / absence of isopods in the stomach contents of the fish	unitless
Barnacles	Presence / absence of barnacles in the stomach contents of the fish	unitless
Miscellaneous_larvae	Presence / absence of small larvae from varying species in the stomach contents of the fish	unitless
Insects	Presence / absence of insects in the stomach contents of the fish	unitless
Fish	Presence / absence of other types of fish in the stomach contents of the fish	unitless
Foliage	Presence / absence of vascular plant material in the stomach contents of the fish	unitless
Diatoms	Presence / absence of diatoms or algae in the stomach contents of the fish	unitless
Potential_parasites	Presence / absence of potential parasites 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

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)

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.

Funding

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