

Ichthyoplankton density and plankton displacement volume data collected using MOCNESS plankton nets on the NSF RAPID Plankton Cruises in the Northwestern Gulf of Mexico in 2017-2018

Website: <https://www.bco-dmo.org/dataset/829545>

Data Type: Cruise Results

Version: 1

Version Date: 2020-11-17

Project

» [Collaborative Research: RAPID-HARVEY: Response of plankton assemblages and trophodynamics to a historic, hurricane-induced floodwater plume in a subtropical, pelagic environment](#) (RAPID Plankton)

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Abstract

This dataset includes ichthyoplankton density and plankton displacement volume data collected using MOCNESS plankton nets (1x2m, equipped with 10 nets of 333um mesh widths) during three NSF RAPID Plankton cruises. RAPID Plankton Cruise 1 took place on R/V Point Sur, cruise number PS1813, from October 28-November 3, 2017. RAPID Plankton Cruise 2 took place on R/V Pelican, cruise number PE18-18, from January 6- 12, 2018. RAPID Plankton Cruise 3 took place on R/V Pelican, cruise number PE18-21, from March 19- 23, 2018.

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Coverage

Spatial Extent: N:29.5 E:-93.69 S:27.3 W:-95

Temporal Extent: 2017-10-30 - 2018-03-23

Methods & Sampling

The MOCNESS Plankton Net was deployed over the aft to horizontally sample three discrete depth strata in the water column: (1) Under Chla maximum layer above bottom, (2) within the Chla maximum layer, (3) Above Chla maximum layer underneath the surface. Ship speed was 1.5-2.0 knots and was adjusted according to online flowmeter readings.

One net per sampled stratum was analyzed for ichthyoplankton (net # 1, 5, 7). Nets were rinsed and processed on board and samples were preserved in 200 proof Ethanol (ETOH) according to NOAA SEAMAP Operations Manual upon retrieval of nets. After 24 hours, ETOH was exchanged with fresh ETOH. Plankton samples were stored in 1000ml plastic jars until processing in the Geist Early Life History Research Laboratory at Texas A&M University Corpus Christi during 2017 and 2020. Total Zooplankton Displacement Volume was determined using a calibrated 1000ml measuring cylinder by subtracting the volume of ethanol without sample from the volume of ethanol with sample. The plankton sample was separated from ethanol using a concentrator sieve with a mesh size < than the net mesh size. Then the plankton sample was resuspended in Ethanol. Larval fish were picked under dissecting microscopes using feather steel tweezers. Every sample was looked through twice for quality check purposes.

Data Processing Description

Data Processing:

Filtered Volume was calculated automatically by MOCNESS software. Total Plankton Displacement Volume and Total Larval Fish Density was standardized per 100m³ filtered water volume.

Problems/Issues:

On the RAPID Plankton 1 cruise (PS1813), at shallow bottom depths, deployment time was shortened, which resulted in less than 3 nets available for analyses.

On the RAPID Plankton 2 cruise (PE18-18), rough weather did not allow deployment at station 1. At other shallow bottom depth stations, deployment time was shortened, which resulted in less than 3 nets available for analyses.

On the RAPID Plankton 3 cruise (PE18-21), MOCNESS was not deployed at station 1. At other shallow bottom depth stations, deployment time was shortened, which resulted in less than 3 nets available for analyses.

BCO-DMO Processing:

- concatenated separate files into one dataset;
- converted date format to YYYY-MM-DD;
- added ISO date-time fields;
- added Cruise_ID numbers.

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Data Files

| File |
|--|
| mocness.csv (Comma Separated Values (.csv), 13.24 KB) MD5:3e7bd28359722487fb5d0834e7d6a1a1 |
| Primary data file for dataset ID 829545 |

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Related Publications

National Marine Fisheries Service and Gulf States Marine Fisheries Commission. (2001). SEAMAP Field Operations Manual for Collection of Data. Revision 4. <https://www.fisheries.noaa.gov/inport/item/53243>
Methods

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Parameters

| Parameter | Description | Units |
|----------------------|--|--|
| Date | Date; format: YYYY-MM-DD | unitless |
| Cruise_ID | Cruise identifier | unitless |
| CR_N | Project Internal Cruise Name | unitless |
| P_SN | Project Internal Station Number | unitless |
| NOAA_SN | Respective NOAA SEAMAP/GOMECC Station Number | unitless |
| GEAR_T | Plankton Net Gear Type | unitless |
| MESH_W | Plankton Net Mesh Width | micrometers (um) |
| NET_NO | Net number, if gear has more than 1 net | unitless |
| STA_LAT | Generalized Station Latitude | decimal degrees |
| STA_LON | Generalized Station Longitude | decimal degrees |
| BOT_D | Assigned Bottom Depth | meters (m) |
| MAX_ND | Max Net Depth | meters (m) |
| MIN_ND | Min Net Depth | meters (m) |
| D_TW | Depth of Tow $FD_TW = MAX_ND - MIN_ND$ | meters (m) |
| TGI_GMT | Time Gear In (GMT), Net starting fishing; format: hh:mm | unitless |
| TGO_GMT | Time Gear Out (GMT), Net stopping fishing; format: hh:mm | unitless |
| TGI_CST | Time Gear In (CST), Net starting fishing; format: hh:mm | unitless |
| TGO_CST | Time Gear Out (CST), Net stopping fishing; format: hh:mm | unitless |
| TT | Time towed, Duration of Net fishing; format: hh:mm:ss | unitless |
| FIL_V | Filtered volume | cubic meters (m ³) |
| EV_WP | ETOH with Plankton (ml) | milliliters (ml) |
| EV_WOP | ETOH without Plankton (ml) | milliliters (ml) |
| PLA_D | Plankton Displacement Volume = ETOH with Plankton - ETOH without Plankton | milliliters (ml) |
| PLA_DD | Total Plankton Displacement Volume Density per 100 cubic meters filtered water volume | milliliters per 100 cubic meters (ml/100m ³) |
| TFILA | Total Larval Fish Number in sample | number of larval fish |
| TFILA_DV | Total Larval Fish Density per filtered water volume | larval fish per 100 cubic meters |
| TGI_ISO_DateTime_GMT | Date and Time Gear In (GMT), Net starting fishing; formatted to ISO8601 standard: YYYY-MM-DDThh:mmZ | unitless |
| TGO_ISO_DateTime_GMT | Date and Time Gear Out (GMT), Net stopping fishing; formatted to ISO8601 standard: YYYY-MM-DDThh:mmZ | unitless |

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Instruments

| | |
|---|--|
| Dataset-specific Instrument Name | in situ CTD |
| Generic Instrument Name | CTD MOCNESS |
| Dataset-specific Description | MOCNESS Plankton Net (1x2m), equipped with 10 nets of 333µm mesh widths, in situ CTD and online flowmeters. Nets # 1, 5, and 7 were analyzed for this dataset. |
| Generic Instrument Description | The CTD part of the MOCNESS includes 1) a pressure (depth) sensor which is a thermally isolated titanium strain gauge with a standard range of 0-5000 decibars full scale, 2) A Sea Bird temperature sensor whose frequency output is measured and sent to the surface for logging and conversion to temperature by the software in the MOCNESS computer (The system allows better than 1 milli-degree resolution at 10 Hz sampling rate), and 3) A Sea Bird conductivity sensor whose output frequency is measured and sent to the surface for logging and conversion to conductivity by the software in the computer (The system allows better than 1 micro mho/cm at 10 Hz sampling rate). The data rate depends on the speed of the computer and the quality of the cable. With a good cable, the system can operate at 2400 baud, sampling all variables at 2 times per second. One sample every 4 seconds is the default, although the hardware can operate much faster. (From The MOCNESS Manual) |

| | |
|---|---|
| Dataset-specific Instrument Name | Dissecting microscope |
| Generic Instrument Name | Microscope - Optical |
| Dataset-specific Description | Larval fish were picked under dissecting microscopes using feather steel tweezers. |
| 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 | MOCNESS Plankton Net (1x2m) |
| Generic Instrument Name | MOCNESS |
| Dataset-specific Description | MOCNESS Plankton Net (1x2m), equipped with 10 nets of 333um mesh widths, in situ CTD and online flowmeters. Nets # 1, 5, and 7 were analyzed for this dataset. |
| 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. There are currently 8 different sizes of MOCNESS in existence which are designed for capture of different size ranges of zooplankton and micro-nekton Each system is designated according to the size of the net mouth opening and in two cases, the number of nets it carries. The original MOCNESS (Wiebe et al, 1976) was a redesigned and improved version of a system described by Frost and McCrone (1974).(from MOCNESS manual) This designation is used when the specific type of MOCNESS (number and size of nets) was not specified by the contributing investigator. |

Deployments

PS1813

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/827940 |
| Platform | R/V Point Sur |
| Start Date | 2017-10-28 |
| End Date | 2017-11-03 |

PE18-18

| | |
|--------------------|---|
| Website | https://www.bco-dmo.org/deployment/827941 |
| Platform | R/V Pelican |
| Start Date | 2018-01-06 |
| End Date | 2018-01-13 |
| Description | More cruise information is available from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/PE18-18 |

PE18-21

| | |
|--------------------|--|
| Website | https://www.bco-dmo.org/deployment/827944 |
| Platform | R/V Pelican |
| Start Date | 2018-03-18 |
| End Date | 2018-03-23 |
| Description | More information is available from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/PE18-21 |

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Project Information

Collaborative Research: RAPID-HARVEY: Response of plankton assemblages and trophodynamics to a historic, hurricane-induced floodwater plume in a subtropical, pelagic environment (RAPID Plankton)

Website: <https://cajunplankton.com/nsf-rapid-plankton/>

Coverage: Northwestern Gulf of Mexico 95-96°W, 30-27.5°N

NSF Award Abstract:

This project will examine how plankton in the northwestern Gulf of Mexico respond to large floodwater plumes generated by extreme weather events like Hurricane Harvey at time scales relevant to its development and evolution (days to months). The goal is to understand how the timing, magnitude, and constituent loads of a massive pulse of freshwater to the Louisiana-Texas shelf are: (1) driving changes in phytoplankton, zooplankton, and larval fish communities and distributions over monthly, seasonal, and annual time scales and, (2) what the consequences of those changes are to food web interactions within the plankton. The timing of Hurricane Harvey flood water disturbance coincides with the summer-fall spawning seasons for economically important Gulf of Mexico fisheries (e.g. red drum, sea trouts, snappers), raising additional questions of longer term effects of food web disruptions on recruitment. This project will train two undergraduate students and four PhD-level graduate students across three institutions, as well as support three early-career investigators. Pre- and post-floodwater plume data and samples will be shared with the broader scientific community within

one year of collection to facilitate their immediate use by scientists beyond the research team. The team will give coordinated public talks at established regional science communication series and through other existing regional outreach partnerships to extend the educational scope of the project. Finally, results from this research will be incorporated in course curriculum and shared through scientific presentations and publications in peer-reviewed journals.

Record-breaking rain delivered by Hurricane Harvey to Southeast Texas in late August 2017 has resulted in a massive floodwater plume being delivered to coastal waters in the northern Gulf of Mexico (GOM). This project will investigate the short- and mid-term effects of that plume on planktonic (from pico- to ichthyoplankton) community composition and trophic interactions in that system. Building on data collected in July 2017 during a GOM Ecosystems and Carbon Cycle (GOMECC-3) cruise, and from historical datasets in the region, plankton assemblages, abundance, and food web interactions will be assessed during three research cruises 2, 4, and 8 months after the event. Oceanographic data and samples will be collected and processed using standard and state of the art gear, including ZooScan, FlowCAM, flow cytometry, and next generation sequencing. Onboard micro- and mesozooplankton grazing experiments will be conducted to understand the trophodynamic interactions and relationships between different plankton groups under changing environmental conditions. Diet and growth rate analyses of larval fish will be undertaken and related to phyto- and zooplankton (i.e. prey) abundance and community composition data. Application of the same gear types and methods during the three project cruises will ensure comparability of these new data to existing samples and datasets. These post-Harvey data will be compared to immediately-preceding and long-term data collected in the area by NOAA's Southeast Area Monitoring and Assessment Program (SEAMAP), allowing for investigation of the temporal evolution of planktonic assemblages and interpretation of plankton regime shifts in seasonal, multiyear, and decadal contexts.

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Funding

| Funding Source | Award |
|--|-----------------------------|
| NSF Division of Ocean Sciences (NSF OCE) | OCE-1760674 |

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