

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

Website: <https://www.bco-dmo.org/dataset/829485>

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)

Contributors	Affiliation	Role
Geist, Simon	Texas A&M, Corpus Christi (TAMU-CC)	Principal Investigator
Robinson, Kelly L.	University of Louisiana at Lafayette	Co-Principal Investigator, Contact
Schnetzer, Astrid	North Carolina State University (NCSU)	Co-Principal Investigator
Stauffer, Beth	University of Louisiana at Lafayette	Co-Principal Investigator
McAskill, Shannan	Texas A&M, Corpus Christi (TAMU-CC)	Student
Paxton, Stormy	Texas A&M, Corpus Christi (TAMU-CC)	Student
Rauch, Shannon	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract

This dataset includes ichthyoplankton density and plankton displacement volume data collected using SEA-GEAR plankton ring nets 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 Ring Plankton Net was deployed using the same procedures reported for the NOAA Bongo Plankton Net in the "NOAA SEAMAP Field Operations Manual for collection of data, Chapter V., National Marine Fisheries Service and Gulf States Marine Fisheries Commission, October 2001, Revision No.4."

Target Fishing Depth as much of the water column as possible stopping 2-4m above the bottom at bottom depths <200m, and upper 200m at bottom depths >200m; ship speed 1.5-2.0 knots; target wire angle of 45°; winch speeds during pay out and retrieving according to Chapter V., Table A. The net was deployed over the side.

Nets were rinsed and processed on board. A subset of larval fish was picked on board and frozen at ultra-low temperatures in liquid nitrogen and kept in an on-board Ultra Low Temperature Freezer, transported using a Dry Shipper to Texas A&M University Corpus Christi and stored in an ULT until further processing. The remainder of the sample was 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. 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 ETOH and 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 according to the manufacturer manual of the flowmeter (General Oceanics):

Filtered Volume = distance towed * net opening area,

with distance towed calculated as:

Flowmeter Count Difference * Flowmeter Constant / 999999.

Total Plankton Displacement Volume and Total Larval Fish Density was standardized per 100m³ filtered water volume and per area as under 10m² water column using the same formula as NOAA SEAMAP Pascagoula Office (POC G. Zapfe).

BCO-DMO Processing:

- concatenated separate files into one dataset;
- converted date format to YYYY-MM-DD;
- removed commas from the FM_CO field;
- added ISO date-time fields;
- added Cruise_ID numbers.

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Data Files

File
ring.csv (Comma Separated Values (.csv), 7.55 KB) MD5:15e8211c0d430f70f9ee188065e0e577
Primary data file for dataset ID 829485

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Related Publications

National Marine Fisheries Service and Gulf States Marine Fisheries Commission. (2001). SEAMAP Field

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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
NET_DIA	Diameter of the net	meters (m)
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
FM_M	Flowmeter Manufacturer	unitless
FM_IC	Flowmeter initial count	unitless
FM_FC	Flowmeter final count	unitless
FM_CD	Flowmeter count difference	unitless
FM_CO	Flowmeter Constant, Manufacturer Supplied	unitless
DIS_T	Distance of Net towed through the water based on flowmeter readings	meters (m)
NET_OA	Net Opening Area	square meters (m ²)
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)
PLA_DA	Total Plankton Displacement Volume under 10m ² area of the water column, $PLA_DA = PLA_D * ((FD_TW / FIL_V) * 10)$	milliliters under 10 square meters (ml/10m ²)
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
TFILA_DA	Total Larval Fish Density under 10m ² area, TFILA_DA=TFILA * ((FD_TW / FIL_V) * 10)	larval fish under 10 square meters (Ind./ 10m ²)
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	General Oceanics Mechanical Flowmeter
Generic Instrument Name	Mechanical Flowmeter
Generic Instrument Description	Manufactured by General Oceanics, a mechanical flow meter is used with plankton tows to determine the volume of water which flows through the net. Flow meters are also used in rivers, estuaries, canals, sewer outfalls, pipes, and harbor entrances to determine water velocity and flow distance information.

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	SEA-GEAR Plankton Ring Net
Generic Instrument Name	Ring Net
Dataset-specific Description	SEA-GEAR Plankton Ring Net (1m opening diameter, 1000µm mesh width, 3:1), equipped with General Oceanics Mechanical Flowmeter. Online depth sensor (Seabird) was supplied by research vessel to allow safe deployment.
Generic Instrument Description	A Ring Net is a generic plankton net, made by attaching a net of any mesh size to a metal ring of any diameter. There are 1 meter, .75 meter, .25 meter and .5 meter nets that are used regularly. The most common zooplankton ring net is 1 meter in diameter and of mesh size .333mm, also known as a 'meter net' (see Meter Net).

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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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