Zooplankton counts (density) from R/V Seward Johnson, R/V Oceanus, and R/V Edwin Link cruises SJ9508, OC303, EL9904, and EL9905 in the Gulf of Maine and Georges Bank from 1995-1999 (GB project)

Website: https://www.bco-dmo.org/dataset/2332
Data Type: Cruise Results
Version: 1
Version Date: 2004-11-23

Project
» U.S. GLOBEC Georges Bank (GB)

Program
» U.S. GLOBal ocean ECosystems dynamics (U.S. GLOBEC)

Contributors	Affiliation	Role
Incze, Lewis	University of Southern Maine (USM)	Principal Investigator
Allison, Dicky	Woods Hole Oceanographic Institution (WHOI)	BCO-DMO Data Manager

Abstract
Zooplankton counts (density) from R/V Seward Johnson, R/V Oceanus, and R/V Edwin Link cruises SJ9508, OC303, EL9904, and EL9905 in the Gulf of Maine and Georges Bank from 1995-1999

Table of Contents

- Coverage
- Dataset Description
  - Methods & Sampling
  - Data Processing Description
- Data Files
- Parameters
- Instruments
- Deployments
- Project Information
- Program Information
- Funding

Coverage

Spatial Extent: **N**:41.836 **E**:-67.2 **S**:40.58 **W**:-68.475
Temporal Extent: 1995-06-11 - 1999-05-29

Dataset Description

Zooplankton Densities/Abundance

Principal Investigator: Lewis S. Incze (lincze@usm.maine.edu)
Research Technicians: Ford Dye, Beth Novak, Nicholas Wolff

Methods:

Using a pumping system appended to the CTD unit, measured water volumes (typically 40 liters) were sampled at descrete depths and filtered through 40 micron mesh prior to sorting. A subsample of the filtered sample was used for the zooplankton counts and identification. The size of the subsample varied and depended on the amount of zooplankton present - subsamples were larger when there were fewer animals.

From the subsamples, all zooplankton were counted and identifed. Counts were then converted into number per cubic meter as follows: Number counted / (Subsample size X Amount filtered).

It is worth noting that the frequency of repeated densities is an artifact of the small subsample volumes screened in order to process a large number of samples. The small sample volumes did not give us the ability to resolve small differences in abundance at individual species and stages (e.g., Cal fin Nauplius I). At this level of sorting many counts were reported as zeros, ones, twos or threes. These counts are at the threshold for detection, and the results give the false impression of many identical densities (concentrations). This also shows up in gaps in the life histories as well. For example, a single depth/station might have NI and NIII and NIV stages, but not II or V. As a result, samples were often recombined to give the population characteristics of an integrated water column, or a group of samples. The approach worked well for our research objectives and we are well aware of its limitations. A single station and depth in our data can be deceiving and does not tell the whole story.

Note: Sampling for cruise EL9904, events EL10999.24 and EL111299.6 are intentional replication sites. All sampling was made at same depth level. These stations were used to test the repeatability of methods.

Cruises

- SJ9508 (Seward Johnson Cruise 9508 to Southwest Georges Bank, 6 - 16 June 1995)
- OC303 (Oceanus Cruise 303 to Georges Bank, 6 - 23 May 1997)
- EL9904 (Edwin Link Cruise 9904 to Georges Bank, 14 - 28 April 1999)
- EL9905 (Edwin Link Cruise 9905 to Georges Bank, 10 - 29 May 1999)

Any questions, contact:

Lewis S. Incze
University of Southern Maine
P.O. Box 9300
96 Falmouth Street
Portland, ME 04104-9300

Voice: 207 228 8070
Fax: 207 228 8057
Email: (lincze@usm.maine.edu)

updated: 23 November 2004; gfh

Methods & Sampling

Using a pumping system appended to the CTD unit, measured water volumes (typically 40 liters) were sampled at descrete depths and filtered through 40 micron mesh prior to sorting. A subsample of the filtered sample was used for the zooplankton counts and identification. The size of the subsample varied and depended on the amount of zooplankton present - subsamples were larger when there were fewer animals.

Data Processing Description

From the subsamples, all zooplankton were counted and identifed. Counts were then converted into number per cubic meter as follows: Number counted / (Subsample size X Amount filtered).

It is worth noting that the frequency of repeated densities is an artifact of the small subsample volumes screened in order to process a large number of samples. The small sample volumes did not give us the ability to resolve small differences in abundance at individual species and stages (e.g., Cal fin Nauplius I). At this level of sorting many counts were reported as zeros, ones, twos or threes. These counts are at the threshold for detection, and the results give the false impression of many identical densities (concentrations). This also shows up in gaps in the life histories as well. For example, a single depth/station might have NI and NIII and NIV stages, but not II or V. As a result, samples were often recombined to give the population characteristics of an integrated water column, or a group of samples. The approach worked well for our research objectives and we are well aware of its limitations. A single station and depth in our data can be deceiving and does not tell the

whole story.

[table of contents | back to top]

Data Files

File
zoo_pump.csv (Comma Separated Values (.csv), 2.72 MB) MD5:59184385c8819f74dd9cadb9d9307397 Primary data file for dataset ID 2332

[table of contents | back to top]

Parameters

Parameter	Description	Units
cruiseid	cruise identification	
year	four digit year	GMT
station	station number	
yrday_gmt	day of year, J ulian calendar	decimalday,GMT
month_gmt	month of year	GMT
day_gmt	day of month	GMT
time_gmt	time, reported as HHmm.m	GMT
event	event number, from event log	
lat	latitude, negative = southdecimal degrees	
lon	longitude, negative = west	decimal degrees
depth	sample depth	meters
taxon	taxonomic identification	
stage	Nauplii or Copepodite or Other (non copepod)	
stage_num	Copepodite and nauplii developmental stages number (1 - 6)	
sex	Only Copepodite stage 6 were sexed, (F/M)	
num_per_m3	abundance, number of specific animal/group counted	number per cubic meter

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Zooplankton Pump - gas centrifugal
Generic Instrument Name	Zooplankton Pump - gas centrifugal
Dataset-specific Description	Earlier three deployments: The end of a sampling hose was attached near the bottom of the CTD rosette frame. The hose was lowered independently over the side using the CTD to control depth and record conditions throughout sampling. A system was used that delivered approximately 255 l min-1 to the deck and cleared in less than 1 minute. Lines were allowed to clear between samples. On deck the water passed through a manifold and a reduced volume, 31 l min-1, was passed through a succession of small sampling nets with 40 µm mesh. Variations in flow, which are generally small, were monitored with a flow meter on one of the main lines from the manifold and were used to adjust flow rate calculations. Sampling in the small nets was timed with a stop watch, with a target of 1 minute (31 l) per sampled depth. Samples (up to 12 per cast) were preserved in a small volume of buffered formalin for later analysis.
Generic Instrument Description	The Pacer gas-powered centrifugal pump is a water pumping system for zooplankton sampling.

Dataset-specific Instrument Name	Zooplankton Pump - gas powered diaphragm
Generic Instrument Name	Zooplankton Pump - gas powered diaphragm
Dataset-specific Description	EL9905: Pump samples were taken by attaching one end of a 5 cm x 60 m reinforced hose to the CTD/rosette frame so that the hose opening was near (within ~0.25 m of) the CTD sensors. The CTD was lowered to depth (usually 50 m) and stopped at discrete sampling depths at 5 m intervals up to a depth of 5 m. Time was given for the system to clear at each new depth before sampling. A gas-powered diaphragm pump delivered water from sampling depths to the surface at a nominal rate of 0.3 m3/min. This water passed into a small, rapidly draining reservoir (0.13 m3) on deck to dampen the surge. This reservoir also was drained between sampling depths. A 1.9 cm ID hose carried water from the reservoir to individual samplers equipped with 40 um mesh nets. An electronic timer and flow meter installed in the 1.9 cm hose was started and stopped for each sample, providing very high accuracy measurements of the volumes filtered. The final sampling rate averaged 13 l/min, and most samples were filtered from 27-33 l of water. Samples were preserved in 3-5% buffered formalin.
Generic Instrument Description	This kind of diaphragm pump, manufactured by Homelite and run on gasoline, is called a positive displacement pump because it pumps a specific volume for each pump cycle. Diaphragm pumps move fluids more slowly than centrifugal pumps but treat the animals more gently and they can handle thicker mud and larger amounts of solids. They also tolerate air being drawn into the pump and can be run dry without damage. In 2002, Homelite was acquired and became Riverside Pump Manufacturing, Inc. Diaphragm pumps feature a straight through self priming design and the rubber elastomer diaphragm and flapper valves are easily replaced on site.

[table of contents | back to top]

Deployments

SJ9508

Website	https://www.bco-dmo.org/deployment/57487
Platform	R/V Seward Johnson
Start Date	1995-06-06
End Date	1995-06-16
Description	This was a process type cruise. Process turbulence. Note: Twenty one navigation records in the evenlog were corrected on February 3, 2011 to fix errors in the latitude, from 41 to 40, for the inclusive dates of 6/11/1995: 0218 - 1536 (GMT). [MDA and RCG] **Methods & Sampling** Using a pumping system appended to the CTD unit, measured water volumes (typically 40 liters) were sampled at descrete depths and filtered through 40 micron mesh prior to sorting. A subsample of the filtered sample was used for the zooplankton counts and identification. The size of the subsample varied and depended on the amount of zooplankton present - subsamples were larger when there were fewer animals. **Processing Description** From the subsamples, all zooplankton were counted and identifed. Counts were then converted into number per cubic meter as follows: Number counted / (Subsample size X Amount filtered). It is worth noting that the frequency of repeated densities is an artifact of the small subsample volumes screened in order to process a large number of samples. The small sample volumes did not give us the ability to resolve small differences in abundance at individual species and stages (e.g., Cal fin Nauplius I). At this level of sorting many counts were reported as zeros, ones, twos or threes. These counts are at the threshold for detection, and the results give the false impression of many identical densities (concentrations). This also shows up in gaps in the life histories as well. For example, a single depth/station might have NI and NIII and NIV stages, but not II or V. As a result, samples were often recombined to give the population characteristics of an integrated water column, or a group of samples. The approach worked well for our research objectives and we are well aware of its limitations. A single station and depth in our data can be deceiving and does not tell the whole story.

OC303

Website	https://www.bco-dmo.org/deployment/57449
Platform	R/V Oceanus
Report	http://globec.whoi.edu/globec-dir/reports/oc303/oc303.html
Start Date	1997-05-06
End Date	1997-05-23
Description	process **Methods & Sampling** Using a pumping system appended to the CTD unit, measured water volumes (typically 40 liters) were sampled at descrete depths and filtered through 40 micron mesh prior to sorting. A subsample of the filtered sample was used for the zooplankton counts and identification. The size of the subsample varied and depended on the amount of zooplankton present - subsamples were larger when there were fewer animals. **Processing Description** From the subsamples, all zooplankton were counted and identifed. Counts were then converted into number per cubic meter as follows: Number counted / (Subsample size X Amount filtered). It is worth noting that the frequency of repeated densities is an artifact of the small subsample volumes screened in order to process a large number of samples. The small sample volumes did not give us the ability to resolve small differences in abundance at individual species and stages (e.g., Cal fin Nauplius I). At this level of sorting many counts were reported as zeros, ones, twos or threes. These counts are at the threshold for detection, and the results give the false impression of many identical densities (concentrations). This also shows up in gaps in the life histories as well. For example, a single depth/station might have NI and NIII and NIV stages, but not II or V. As a result, samples were often recombined to give the population characteristics of an integrated water column, or a group of samples. The approach worked well for our research objectives and we are well aware of its limitations. A single station and depth in our data can be deceiving and does not tell the whole story.

EL9904

Website	https://www.bco-dmo.org/deployment/57394
Platform	R/V Edwin Link
Report	http://globec.whoi.edu/globec-dir/reports/el9904/el9904.html
Start Date	1999-04-14
End Date	1999-04-28
Description	process **Methods & Sampling** Using a pumping system appended to the CTD unit, measured water volumes (typically 40 liters) were sampled at descrete depths and filtered through 40 micron mesh prior to sorting. A subsample of the filtered sample was used for the zooplankton counts and identification. The size of the subsample varied and depended on the amount of zooplankton present - subsamples were larger when there were fewer animals. **Processing Description** From the subsamples, all zooplankton were counted and identifed. Counts were then converted into number per cubic meter as follows: Number counted / (Subsample size X Amount filtered). It is worth noting that the frequency of repeated densities is an artifact of the small subsample volumes screened in order to process a large number of samples. The small sample volumes did not give us the ability to resolve small differences in abundance at individual species and stages (e.g., Cal fin Nauplius I). At this level of sorting many counts were reported as zeros, ones, twos or threes. These counts are at the threshold for detection, and the results give the false impression of many identical densities (concentrations). This also shows up in gaps in the life histories as well. For example, a single depth/station might have NI and NIII and NIV stages, but not II or V. As a result, samples were often recombined to give the population characteristics of an integrated water column, or a group of samples. The approach worked well for our research objectives and we are well aware of its limitations. A single station and depth in our data can be deceiving and does not tell the whole story.

EL9905

Website	https://www.bco-dmo.org/deployment/57395
Platform	R/V Edwin Link
Report	http://globec.whoi.edu/globec-dir/reports/el9905/el9905new.html
Start Date	1999-05-10
End Date	1999-05-29
Description	process **Methods & Sampling** Pump samples were taken by attaching one end of a 5 cm x 60 m reinforced hose to the CTD/rosette frame so that the hose opening was near (within ~0.25 m of) the CTD sensors. The CTD was lowered to depth (usually 50 m) and stopped at discrete sampling depths at 5 m intervals up to a depth of 5 m. Time was given for the system to clear at each new depth before sampling. A gas-powered diaphragm pump delivered water from sampling depths to the surface at a nominal rate of 0.3 m3/min. This water passed into a small, rapidly draining reservoir (0.13 m3) on deck to dampen the surge. This reservoir also was drained between sampling depths. A 1.9 cm ID hose carried water from the reservoir to individual samplers equipped with 40 um mesh nets. An electronic timer and flow meter installed in the 1.9 cm hose was started and stopped for each sample, providing very high accuracy measurements of the volumes filtered. The final sampling rate averaged 13 l/min, and most samples were filtered from 27-33 l of water. Samples were preserved in 3-5% buffered formalin. **Processing Description** From the subsamples, all zooplankton were counted and identifed. Counts were then converted into number per cubic meter as follows: Number counted / (Subsample size X Amount filtered). It is worth noting that the frequency of repeated densities is an artifact of the small subsample volumes screened in order to process a large number of samples. The small sample volumes did not give us the ability to resolve small differences in abundance at individual species and stages (e.g., Cal fin Nauplius I). At this level of sorting many counts were reported as zeros, ones, twos or threes. These counts are at the threshold for detection, and the results give the false impression of many identical densities (concentrations). This also shows up in gaps in the life histories as well. For example, a single depth/station might have NI and NIII and NIV stages, but not II or V. As a result, samples were often recombined to give the population characteristics of an integrated water column, or a group of samples. The approach worked well for our research objectives and we are well aware of its limitations. A single station and depth in our data can be deceiving and does not tell the whole story.

[table of contents | back to top]

Project Information

U.S. GLOBEC Georges Bank (GB)

Website: http://globec.whoi.edu/globec_program.html

Coverage: Georges Bank, Gulf of Maine, Northwest Atlantic Ocean

The U.S. GLOBEC Georges Bank Program is a large multi- disciplinary multi-year oceanographic effort. The proximate goal is to understand the population dynamics of key species on the Bank - Cod, Haddock, and two species of zooplankton (*Calanus finmarchicus* and *Pseudocalanus*) - in terms of their coupling to the physical environment and in terms of their predators and prey. The ultimate goal is to be able to predict changes in the distribution and abundance of these species as a result of changes in their physical and biotic environment as well as to anticipate how their populations might respond to climate change.

The effort is substantial, requiring broad-scale surveys of the entire Bank, and process studies which focus both on the links between the target species and their physical environment, and the determination of

fundamental aspects of these species' life history (birth rates, growth rates, death rates, etc).

Equally important are the modelling efforts that are ongoing which seek to provide realistic predictions of the flow field and which utilize the life history information to produce an integrated view of the dynamics of the populations.

The U.S. GLOBEC Georges Bank Executive Committee (EXCO) provides program leadership and effective communication with the funding agencies.

[table of contents | back to top]

Program Information

U.S. GLOBal ocean ECosystems dynamics (U.S. GLOBEC)

Website: http://www.usglobec.org/

Coverage: Global

U.S. GLOBEC (GLOBal ocean ECosystems dynamics) is a research program organized by oceanographers and fisheries scientists to address the question of how global climate change may affect the abundance and production of animals in the sea.

The U.S. GLOBEC Program currently had major research efforts underway in the Georges Bank / Northwest Atlantic Region, and the Northeast Pacific (with components in the California Current and in the Coastal Gulf of Alaska). U.S. GLOBEC was a major contributor to International GLOBEC efforts in the Southern Ocean and Western Antarctic Peninsula (WAP).

[table of contents | back to top]

Funding

Funding Source	Award
National Oceanic and Atmospheric Administration (NOAA)	unknown GB NOAA
NSF Division of Ocean Sciences (NSF OCE)	OCE-9313669

[table of contents | back to top]