Neocalanus copepod egg production is described from the Northern Gulf of Alaska for Fall 2015, 2016, 2017

Website: https://www.bco-dmo.org/dataset/852869
Data Type: Other Field Results
Version: 1
Version Date: 2021-11-08

Project
» Collaborative Proposal: Optimizing Recruitment of Neocalanus copepods through Strategic Timing of Reproduction and Growth in the Gulf of Alaska (Neocalanus Gulf of Alaska)

Contributors	Affiliation	Role
Hopcroft, Russell R.	University of Alaska Fairbanks (UAF)	Principal Investigator, Contact
Lenz, Petra H.	University of Hawai'i at Mānoa (SOEST)	Co-Principal Investigator
Soenen, Karen	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Neocalanus copepod egg production is described from the Northern Gulf of Alaska for Fall 2015, 2016,2017.

Table of Contents

Coverage

Spatial Extent: **N**:60.7313 **E**:-147.987 **S**:60.275 **W**:-147.989
Temporal Extent: 2015-09-18 - 2017-09-21

Methods & Sampling

Neocalanus flemingeri females were collected in September of 2015, 2016 and 2017 from Knight Island Passage in Prince William Sound, Northern Gulf of Alaska using a Midi MultiNet equipped with a 150 um mesh. Healthy females, taken from samples collected below 400m, were placed individually in 500 ml tissue culture flasks.

Flasks were filled with seawater from Niskin bottles taken at the same depth as female collection, and sieved through a 35um mesh to remove metazoans. The flasks were maintained in darkened incubators at a temperature of 5 degrees Celsius. The animals were checked every 2-3 days for the presence of eggs or nauplli.

If production was observed, the female was transferred to a new flask and the eggs and nauplii were sieved from the container and counted under the microscope. This procedure was continued until all of the females either died or were spawned out (i.e. no ovaries or lipid storage were still present).

For 2015, and 2016 the prosome length of the female was measured after the egg production had ceased.

However this length may have not been representative if the females were diseased or dead. Thus, for 2017 the female was photographed just before she was placed in the flask and the prosome length was measured directly from the scaled image.

Location of Animal Collection per cruise (station KIP2):

TXF15

- Latitude (decimal degrees): 60.275
- Longitude (decimal degrees): -147.987

TXF16

- Latitude (decimal degrees): 60.2752
- Longitude (decimal degrees): -147.989

TXF17

- Latitude (decimal degrees): 60.7313
- Longitude (decimal degrees): -147.987

Data Processing Description

All egg and nauplii production were compiled into an EXCEL spreadsheet and the final flat-field output was consolidated from the original matrix

Any observations without egg production or nauplii presence were removed. The data from animals that showed disease throughout the experiment were also removed.

BCO-DMO Processing notes:

- No adjustments have been made

[table of contents | back to top]

Data Files

File
egg_production.csv (Comma Separated Values (.csv), 19.50 KB) MD5:14b483d1748d9025097d9ca76861ec18 Primary data file for dataset ID 852869

[table of contents | back to top]

Parameters

Parameter	Description	Units
Year	The year of animal collection	unitless
Animal	The individual animal identification number within each year	unitless
Prosome_length	The prosome length of the individual animal	micrometer (um)
Consecutive_Clutch	The consecutive clutch number for each individual animal	unitless
Date_of_observation	The date that egg production was observed	unitless
Consecutive_day	The consecutive day from animal collection when activity was observed	unitless
Eggs	The number of eggs produced per given clutch	unitless
Nauplii	The number of nauplii observed per given clutch	unitless

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Midi Multinet
Generic Instrument Name	MultiNet
Dataset-specific Description	Midi Multinet (0.25 m2) equipped with 150 um mesh
Generic Instrument Description	The MultiNet© Multiple Plankton Sampler is designed as a sampling system for horizontal and vertical collections in successive water layers. Equipped with 5 or 9 net bags, the MultiNet© can be delivered in 3 sizes (apertures) : Mini (0.125 m2), Midi (0.25 m2) and Maxi (0.5 m2). The system consists of a shipboard Deck Command Unit and a stainless steel frame to which 5 (or 9) net bags are attached by means of zippers to canvas. The net bags are opened and closed by means of an arrangement of levers that are triggered by a battery powered Motor Unit. The commands for actuation of the net bags are given via single or multi-conductor cable between the Underwater Unit and the Deck Command Unit. Although horizontal collections typically use a mesh size of 300 microns, mesh sizes from 100 to 500 may also be used. Vertical collections are also common. The shipboard Deck Command Unit displays all relevant system data, including the actual operating depth of the net system.

[table of contents | back to top]

Deployments

TXF15

Website	https://www.bco-dmo.org/deployment/852877
Platform	R/V Tiglax
Report	https://www.ncei.noaa.gov/access/ocean-carbon-acidification-data-system/oceans/Coastal/seward.html
Start Date	2015-09-09
End Date	2015-09-21
Description	Latitude North boundary (decimal degrees): 60.5298 Latitude South boundary (decimal degrees): 57.7747 Longitude West Boundary (decimal degrees): -149.4755 Longitude East Boundary (decimal degrees): -147.5105

TXF16

Website	https://www.bco-dmo.org/deployment/852880
Platform	R/V Tiglax
Report	https://www.ncei.noaa.gov/access/ocean-carbon-acidification-data-system/oceans/Coastal/seward.html
Start Date	2016-09-16
End Date	2016-09-19
Description	Latitude North boundary (decimal degrees): 60.5317 Latitude South boundary (decimal degrees): 57.745 Longitude West Boundary (decimal degrees): -149.4807 Longitude East Boundary (decimal degrees): -147.5788

TXF17

Website	https://www.bco-dmo.org/deployment/852883
Platform	R/V Tiglax
Report	https://www.ncei.noaa.gov/access/ocean-carbon-acidification-data-system/oceans/Coastal/seward.html
Start Date	2017-09-09
End Date	2017-09-22
Description	Latitude North boundary (decimal degrees): 60.6753 Latitude South boundary (decimal degrees): 57.7923 Longitude West Boundary (decimal degrees): . -149.4853 Longitude East Boundary (decimal degrees): -147.503

[table of contents | back to top]

Project Information

Collaborative Proposal: Optimizing Recruitment of Neocalanus copepods through Strategic Timing of Reproduction and Growth in the Gulf of Alaska (Neocalanus Gulf of Alaska)

Coverage: Gulf of Alaska; Seward Line

NSF abstract:

The Gulf of Alaska supports a diverse and productive marine community that includes many commercially important fishes. Toward the base of this food web are small planktonic crustaceans that serve as the primary food source for many of these fish, as well as seabirds and marine mammals. The copepod Neocalanus flemingeri is one of these crustaceans, and it experiences rapid population growth during each spring's algal, or phytoplankton, bloom. An apparent mismatch between the presence of the youngest stages of the copepod, or nauplii, in early winter and the unpredictable timing of the spring phytoplankton bloom several months later raises important questions about when females reproduce and how this relates to survival and growth of nauplii. Two types of dormancy, diapause in adult females and physiological quiescence in nauplii, may be the key to the success of this copepod species. Timing and duration of the egg-laying period by adult females is linked to emergence from diapause. In addition, nauplii may enter a state of physiological quiescence while food resources are low, resuming growth after phytoplankton levels increase. This research will address a long-standing goal of biological oceanographers to understand dormancy and its role in controlling population cycles in marine copepods. It will use new technologies in molecular biology called transcriptomics to catalog the messages used by the cells to control copepod life processes, in this case those related to dormancy in adults and nauplii. Undergraduate students and a postdoctoral investigator will be trained in interdisciplinary research, and students from Native Hawaiian and Native Alaskan groups will be targeted for participation. Fishing is a major industry in the Gulf of Alaska, and outreach will focus on communicating the role copepods play in marine ecosystems. New content, including images, will be generated for existing websites: the Seward Line long-term observation program, the Alaska Ocean Observing System and the Gulf Watch Alaska Program.

Recruitment to the Neocalanus flemingeri spring population is dependent on successful emergence from diapause followed by reproduction, survival, and growth of the next generation. Individual-based models have made significant progress in predicting population growth in calanoid copepods using food, temperature, and advection as key environmental factors. Few of these models include predictors for naupliar recruitment, however, because little is known about this part of the life cycle given sampling difficulties and the lack of biomarkers to evaluate physiological state. This study will leverage existing monitoring efforts to track the N. flemingeri population during the winter and early spring. The research team will combine laboratory and field approaches to determine duration and synchronization of reproduction in emerging females and strategies for naupliar survival during low food conditions. Zooplankton samples will be processed to enumerate nauplii to species and to determine physiological condition of both nauplii and adult females. Gene expression studies will develop molecular markers for female dormancy and reproductive readiness and for naupliar growth and possible dormancy, which in turn will be used to evaluate field collected individuals. This will be the first comprehensive study to combine molecular and traditional tools to connect diapausing adults, naupliar production, and the resulting spring population of copepodites.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1459826

[table of contents | back to top]