Neocalanus distribution, mean length, mean weight, abundance and biomass from the Gulf of Alaska , Fall 2015, 2016 and 2017

Website: https://www.bco-dmo.org/dataset/852896
Data Type: Cruise Results
Version: 1
Version Date: 2024-05-10

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
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Abstract
Neocalanus distribution, mean length, mean weight, abundance and biomass from the Gulf of Alaska, Fall 2015, 2016 and 2017

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Coverage

Location: Gulf of Alaska
Spatial Extent: **N**:60.5402 **E**:-147.507 **S**:57.7883 **W**:-147.995
Temporal Extent: 2015-09-20 - 2017-09-21

Dataset Description

Notes: In 2015 a 505um mesh was utilized on the multinet however in 2016 and 2017 a 150 um mesh was employed. The Neocalanus copepods are above the capture efficiency for both nets and no bias is introduced because of the different methodology.

Methods & Sampling

Zooplankton samples were collected from the Gulf of Alaska (Seward Line) in September 2015, 2016 and 2017 using a vertically hauled MultiNet (0.25 m2 MIDI) equipped with a 505um mesh in 2015 and a 150 um mesh in 2016 and 2017. Depth strata sampled were 0-100m, 100-200m, 200-300m, 300-400 and 400-700m. The samples were immediately preserved in 10% formalin

For analysis each sample was poured into a sorting tray where large organisms, primarily shrimp and jelly fish, were removed. The sample was then sequentially split using a Folsom splitter until a subsample containing approximately 100 specimens of Neocalanus copepods was obtained. The individual organisms were identified to species, staged, and the prosome length was measured using a computer based program interfaced to a digitizing tablet . Dry weights were calculated from literature length- weight equations. Abundance and biomass were calculated for each taxon and tabulated using EXCEL

Data Processing Description

In EXCEL Abundance and biomass calculations were merged with the ship event logs for date.time, latitude and longitude and formatted for export (csv).

BCO-DMO Processing Description

* Adjusted column names to comply with database requirements
* Biomass columns: value 0 set to NA after discussion with the submitter (no published length weight regression for the larger morph animal type, they did not want to apply a regression that would not accurately predict the biomass of the animal(s)).

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Data Files

File
852896_v1_multinet.csv (Comma Separated Values (.csv), 13.53 KB) MD5:e3fd00e12caa7a630dbcf08d2a9270de Primary data file for dataset ID 852896, version 1

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Parameters

Parameter	Description	Units
Cruise	Cruise Designation RV Tiglax TXYY	unitless
DateTime	Date and time of sample collection mm/dd/yyyy hh:mm (Local Time)	unitless
Station	The name of the sampling location	unitless
Latitude	The latitude of the sampling location	decimal degrees
Longitude	The longitude of the sampling location	decimal degrees
NetNo	The multinet number	unitless
MaximumDepth	The maximum depth of the gear deployment	meters (m)
MinimumDepth	The minimum depth of the gear deployment	meters (m)
APHIAID	The APHIA id number given to the identified organism (per worms www.marinespecies.org as of 2020)	unitless
ScientificName	The scientific name of the identified organism	unitless
LifeStage	The life stage or copepodite stage of the organism. stages 1-5 copepodite stages 1-5 ; F- Female; M-male	unitless
Abundance	The abundance of the organism	(#/m3)
MeanLength	The mean prosome length of the organism	(um)
MeanDryWeight	The mean dry weight of the organism	(ug)
Biomass	The biomass of the organism	(mgDW/m3)
Comment	Notes or comments pertaining to the identification or condition of the organism	units

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Instruments

Dataset-specific Instrument Name	General Oceanics flowmeters
Generic Instrument Name	Mechanical Flowmeter
Dataset-specific Description	General Oceanics flowmeters were employed to calculate volume of water filtered by the net
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	MultiNet (MIDI)
Generic Instrument Name	MultiNet
Dataset-specific Description	0.25m2 MultiNet (MIDI) equipped with a 150 or 505 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.

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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

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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.

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Funding

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

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