ATTACHMENT C ***EVOSTC Annual Project Report Form***

Form Rev. 9.14.17

1. Program Number:

17120114-D

2. Project Title:

Continuous Plankton Recorder monitoring of plankton populations on the Alaskan Shelf

3. Principal Investigator(s) Names:

Sonia Batten, Sir Alister Hardy Foundation for Ocean Science
Robin Brown, North Pacific Marine Science Organization

4. Time Period Covered by the Report:

February 1, 2017-January 31, 2018 (Year 6)

5. Date of Report:

March 2018

6. Project Website (if applicable):

www.gulfwatchalaska.org

7. Summary of Work Performed:

Objectives

The Continuous Plankton Recorder (CPR) transect samples the Alaskan shelf across the slope into the open Gulf of Alaska (GOA), providing a record of taxonomically resolved, seasonal, near-surface zooplankton and large phytoplankton abundance over a wide spatial scale. The fundamental goal of this project is to provide consistent large spatial scale data on plankton populations of the Alaskan Shelf to extend the existing time series and integrate the data with other regional sampling. More specifically, we provide monthly (spring to fall – typically April to September) sampling of zooplankton and large phytoplankton along the transect from the oceanic GOA to Cook Inlet, analyzing every 4th oceanic and every shelf sample to provide taxonomically resolved abundances.

Sampling

All sampling and analysis occurred according to plan during FY17. The CPR was deployed seven times during 2017, between April and October (Table 1), one extra deployment to compensate for a lack of autumn sampling on another transect (funded by the remainder of the North Pacific CPR Consortium). Environmental data (temperature, salinity and chlorophyll a fluorescence) were collected on six of these transects via the conductivity, temperature, depth, and fluorescence instrument (CTD-F) attached to the CPR.

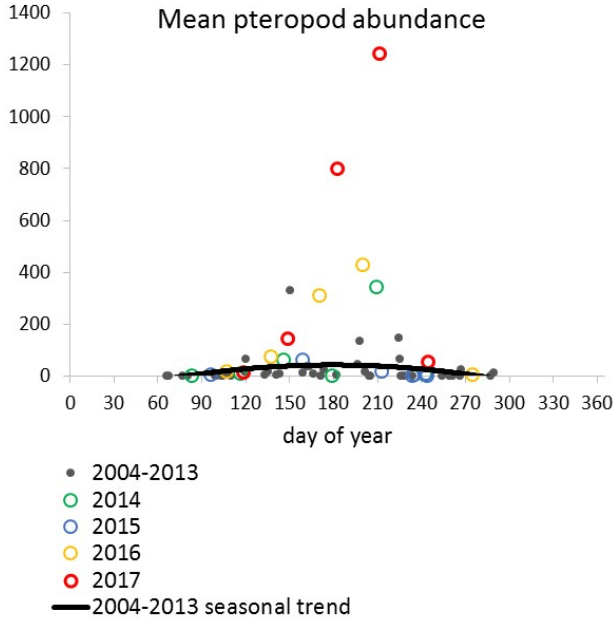
Table 1. CPR sampling in 2017.

Sampling Dates	Environmental data collected?[a]	Status of Sample Analysis
28-29th April	Yes: T, S and Chl a	Undergoing final QC.
28-29th May	Yes: T, S and Chl a	Undergoing final QC.
1-2nd July	No.	Provisional data available.
30-31st July	Yes: T, S and Chl a	Provisional data available.
1-2nd Sept	Yes: T, S and Chl a	Provisional data available.
1-2nd Oct	Yes: T, S and Chl a	Provisional data available.
22-23rd Oct	Yes: T, S and Chl a	Provisional data available.

[a]T=temperature, S=salinity, and Chl a=chlorophyll a

Results

Although full, QC'd data for 2017 are not yet available, we noted during the provisional sample analysis that pteropods appeared to be abundant in 2017. Data from previous years, including the mean seasonal cycle for 2004-2013, are shown in Fig. 1 with the more recent "marine heat wave" years 2014 to 2016 and 2017 plotted separately. Numbers generally reach a peak in summer, but numbers in summer 2016 were noticeably high, and in 2017 look likely to be even higher. This may be a response to the anomalous warming that occurred in recent years, or it may be simple interannual variability, but once all the data are available it can be examined more closely.



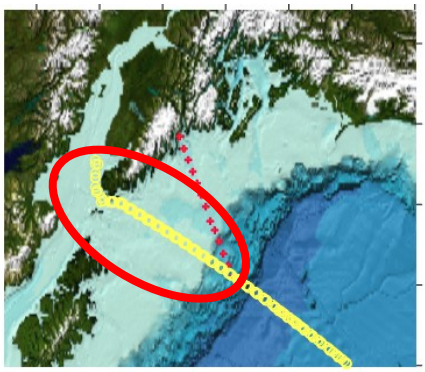


Figure 1. Monthly mean abundances of pteropods (per sample) on the Alaskan shelf (within the red oval shown on the map). The yellow points on the map indicate the CPR transect which intersects with the outer Seward Line (shown as red points on the map).

The environmental data collected via the CTD-F on the CPR provide additional characterization of the water at the depth of the plankton communities sampled. Fig. 2 shows the data from 3 transects in 2017 (late April, late July and early October) together with the plankton counts obtained so far (note that data for only 25% of the samples are currently available, so much greater resolution will be possible eventually). The expected seasonal progression is evident in temperature and salinity (coolest and saltiest in April, generally warmest and freshest in July, although there is regional variation). The relative fluorescence is interesting; it shows that highest values were found in lower Cook Inlet in October, and this agrees with high diatom counts from the CPR samples, too. High fluorescence was also seen off the shelf in October, though we do not yet have the matching cell counts. However, while the relative fluorescence in lower Cook Inlet and across the shelf was low in both April and July, cell counts were higher in April, suggesting that the high October chlorophyll fluorescence may also have been from cells other than large diatoms. Zooplankton abundance was highest in July (note log scale) so it is possible that the organisms had grazed down the phytoplankton. Abundance of zooplankton generally declined from north to south.

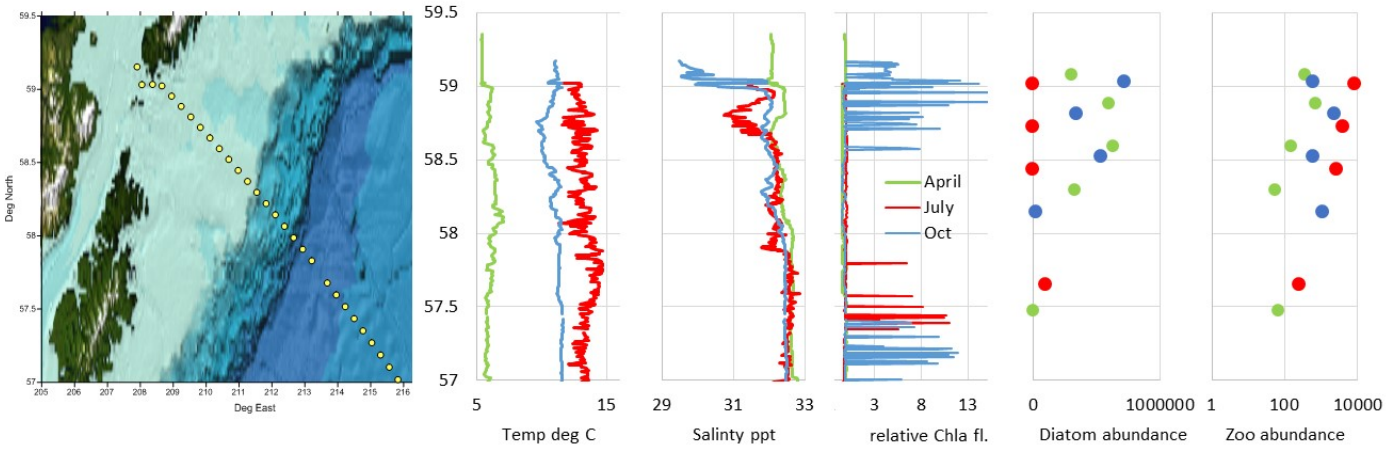


Figure 2. Location of the CPR transect as it heads from the open ocean onto the shelf and into Lower Cook Inlet, together with underway data from the CTD-F mounted on the CPR for three transects in April, July and October, and plankton counts from samples analyzed at this time.

Plans for sampling and analysis in FY18 remain the same as reported for FY17.

8. Coordination/Collaboration:

A. Projects Within a Trustee Council-funded program

1. Within the Program

This project provides a spatial link between the locally more intensive (but less seasonally resolved) sampling of lower trophic levels from the Seward Line (17120114-L) and lower Cook Inlet (17120114-J) within the Environmental Drivers component. Although there are differences in sampling design in each place, necessitated by the different sampling conditions, there are techniques available to facilitate integration. The CPR data can also provide information on seasonal timing changes which will help with interpretation. The

time series in Prince William Sound (17120114-G) offers a chance to compare variability across the wider region and examine the degree to which the outer shelf may influence the Sound. There is thus strong collaboration within the Environmental Drivers component. Productivity of the plankton populations directly influences the organisms monitored by the Pelagic component projects, and will be a necessary contribution to their studies. We have already provided a subset of CPR data to other Gulf Watch Alaska PIs summarizing the meroplankton to examine the long-term variability in larvae, and we expect such collaboration to continue.

2. Across Programs

a. Herring Research and Monitoring

We have actively collaborated with the Herring Research and Monitoring Group (Pegau and Moffitt) in the first 5-year funding period, and a publication has been produced. These time series will be updated during this project, and as they lengthen we expect further insights, especially in light of the unusually warm conditions currently being experienced.

b. Data Management

We are coordinating with the Data Management team to upload data to the Research Workspace and make it available on the Gulf of Alaska data portal and review metadata and update for accuracy.

c. Lingering Oil

None

B. Projects not Within a Trustee Council-funded program

None

C. With Trustee or Management Agencies

The CPR project contributes data annually to the National Oceanic and Atmospheric Administration's Ecosystem Considerations Reports. Full reports may be found at the following link: https://access.afsc.noaa.gov/reem/ecoweb/Index.php

Collaboration continues with groups associated with the other members of the North Pacific CPR Consortium, such as Fisheries and Oceans Canada and the North Pacific Research Board. While these are not Trustee agencies, CPR data are available for use by Trustee agencies in managing marine species.

9. Information and Data Transfer:

A. Publications Produced During the Reporting Period

Batten, S.D. 2017. Continuous Plankton Recorder Data from the Northeast Pacific: Lower Trophic Levels in 2016. Contribution in the 2017 NOAA Ecosystems Considerations Report to the North Pacific Fisheries Management Council.

Batten, S.D., and Brown, R. 2018. Long-term Monitoring of plankton populations on the Alaskan Shelf and in the Gulf of Alaska using Continuous Plankton Recorders. *Exxon Valdez* Oil Spill Restoration Project Final Report (Restoration Project 16120114-A). *Exxon Valdez* Oil Spill Trustee Council, Anchorage, Alaska.

Batten, S.D., Raitsos, D.E., Danielson, S.,Hopcroft, R.R., Coyle, K. and McQuatters-Gollop, A. 2018. Interannual variability in lower trophic levels on the Alaskan Shelf. Deep-Sea Research Part II. http://dx.doi.org/10.1016/j.dsr2.2017.04.023.

B. Dates and Locations of any Conference or Workshop Presentations where EVOSTC-funded Work was Presented

None.

C. Data and/or Information Products Developed During the Reporting Period, if Applicable

Batten, S. D. 2017. Continuous Plankton Recorder and Temperature Data, Gulf of Alaska, 2011-2016, Gulf Watch Alaska Environmental Drivers Component. Dataset. *Exxon Valdez* Oil Spill Trustee Council Long-Term Monitoring program, Gulf Watch Alaska. Research Workspace. https://doi.org/10.24431/rw1k112.

Batten, S. D. 2017. Data contributed to the NOAA Ecosystem Considerations Report 2017 for the Gulf of Alaska region. Full reports may be found at the following link: https://access.afsc.noaa.gov/reem/ecoweb/Index.php.

D. Data Sets and Associated Metadata that have been Uploaded to the Program's Data Portal

Data and metadata from the CTD-F from 2017 surveys have been uploaded to the Research Workspace and made available on the Gulf of Alaska data portal. Plankton data from the CPR, which are due one year after they are collected because of processing times, will be uploaded as soon as QC is completed.

10. Response to EVOSTC Review, Recommendations and Comments:

I thank the Science Panel for taking time to review my project. There were no comments to respond to.

11. Budget:

Please see provided program workbook.