EVOSTC FY17-FY21 INVITATION FOR PROPOSALS
FY20 (YEAR 9) CONTINUING PROJECT PROPOSAL SUMMARY PAGE

Project Number and Title

Gulf Watch Alaska: Environmental Drivers Component Project

20120114-D—Continuous Plankton Recorder monitoring of plankton populations on the Alaskan Shelf

Primary Investigator(s) and Affiliation(s)

Sonia Batten, Continuous Plankton Recorder Survey, Marine Biological Association

Robin Brown, North Pacific Marine Science Organization

Date Proposal Submitted

August 16, 2019

Project Abstract

The Continuous Plankton Recorder (CPR) transect samples the Alaskan shelf from lower Cook Inlet across the slope into the open Gulf of Alaska, providing a now 19-year record of taxonomically resolved, seasonal, near-surface zooplankton and large phytoplankton abundance over a wide spatial scale. Sampling takes place approximately monthly, six times per year, usually between April and September. Outputs from the project include indices of plankton abundance (e.g., large diatom abundances, estimated zooplankton biomass), seasonal cycles (phenology of key groups) and community composition (e.g., appearance of warm water species, change in dominance by some groups). Variability in any, or all, of these indices might be expected to flow-through to higher trophic levels such as herring, salmon, birds and mammals that forage across the region, some of which have been impacted by the *Exxon Valdez* oil spill. Results show that interannual variability in plankton dynamics is high and plankton responded clearly and rapidly to the warm conditions of 2014-2016, with changes evident in abundance, composition and timing. We are not proposing any major changes to this project for FY20.

EVOSTC Funding Requested* *(must include 9% GA)*

FY17	FY18	FY19	FY20	FY21	TOTAL
$76,500	$78,800	$81,200	$83,600	$86,100	$406,200

Non-EVOSTC Funds to be used, please include source and amount per source: (see Section 6C for details)

FY17	FY18	FY19	FY20	FY21	TOTAL
$183,700	$183,900	$186,300	$188,300	$190,300	$932,500

1. PROJECT EXECUTIVE SUMMARY

The Continuous Plankton Recorder (CPR) transect samples the Alaskan shelf across the slope into the open Gulf of Alaska, providing a record of taxonomically resolved, seasonal, near-surface zooplankton and large phytoplankton abundance over a wide spatial scale (Fig. 1). Many important species, including herring, salmon, marine birds, and marine mammals, forage in these regions of the shelf and Gulf of Alaska for at least some of their life history so an understanding of the productivity of these areas is important to understanding and predicting fluctuations in resource abundance, including those recovering from the *Exxon Valdez* oil spill. CPR sampling began in 2000 and there is now an adequate time series available to assess the impacts of climate variability (Batten et al. 2018). Natural, as well as human-related, processes known to influence this region are numerous. For example, on seasonal and interannual time scales the strength of the Alaskan shelf and Alaskan Coastal currents are mediated by freshwater run-off and winds (Royer 1979, Stabeno et al. 2004, Weingartner et al. 2005), persistent coastal down-welling in contrast to most eastern Pacific boundary regions, and eddy-mediated cross-shelf transport of organisms and nutrients (Okkonen et al. 2003, Ladd et al. 2005). Moderate to strong El Niño and La Niña events are also felt on the Alaskan Shelf (Weingartner et al. 2002). Regime shifts, which may be triggered by the climate processes described above, have periodically occurred with lower frequency, such as the 1976/77 shift which changed Alaskan fisheries from shrimp to fish dominated (Francis and Hare 1994). The sudden and unusual warming in the North Pacific in 2014-2016 has also caused widespread impacts on Alaskan marine ecosystems which are still being noted and assessed (Di Lorenzo and Mantua 2016).

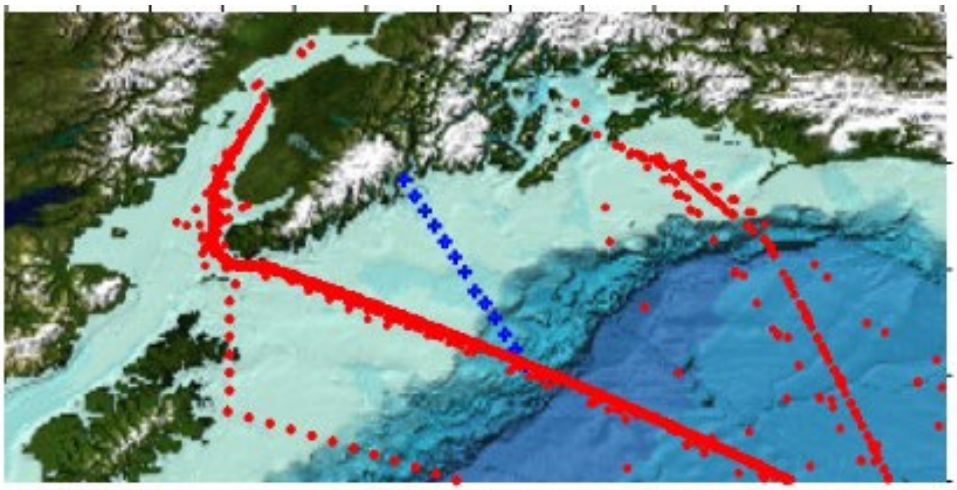

Figure 1. Location of CPR samples in the northern Gulf of Alaska (red dots) from 2000 to 2018 and the Seward Line stations (blue +). Since 2004 the transect has sampled into Cook Inlet.

With short generation times, limited mobility and lack of a commercial harvest, plankton often respond to changes in their environment more rapidly and less ambiguously than higher trophic levels, so that a relatively short time series of plankton information can provide insights into the responses of the shelf ecosystem to some of the processes described above. Any of, or a combination of, the physical processes described above can influence water column stability and nutrient availability which in turn affects plankton timing, composition and productivity. The unusually warm conditions in this region from 2014-2016, known as a marine heatwave, induced noticeable changes in the plankton. Continued sampling of the CPR transect in 2017-2018 can now be

used to determine whether a return to less extreme (although still warm conditions) also saw a return to more typical sub-arctic plankton communities (Fig. 2).

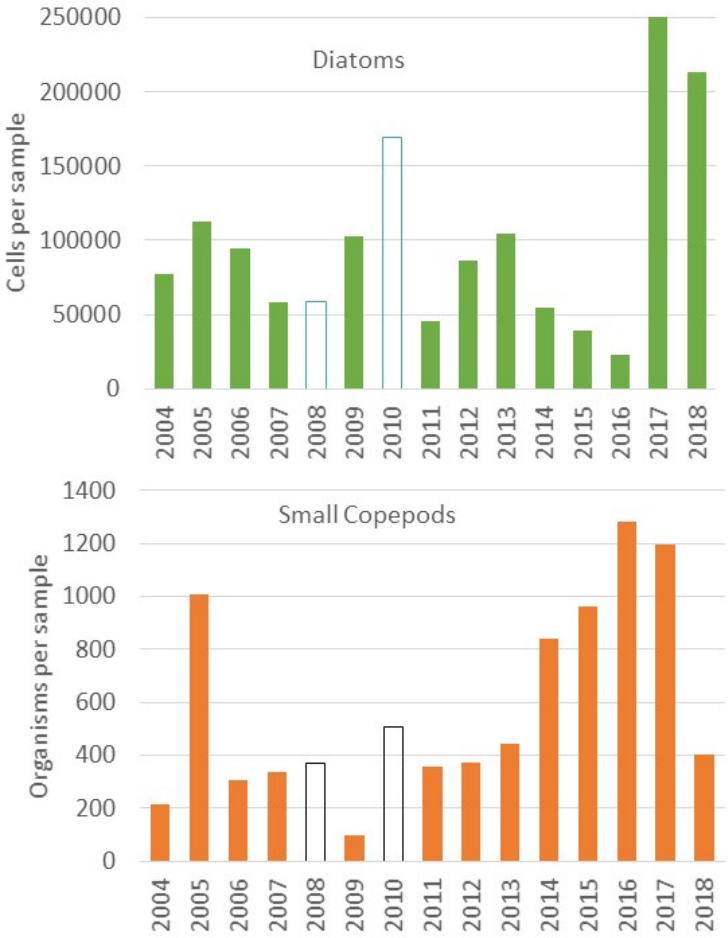

Figure 2. Mean annual abundance of diatoms and small copepods (<2mm total length) from shelf samples shown in Figure 1. Unfilled bars are years when sampled months <4 and so data are not as robust.

The results in Fig. 2 show that the heatwave years had low diatom abundance which changed dramatically in 2017 and 2018 to high abundances. Furthermore, the small copepods were very abundant during the heatwave and this abundance continued into 2017 but declined back to average levels in 2018. It is possible that the low diatoms were the result of increased grazing pressure by the copepods during these years, rather than reduced productivity; however, since in 2017 we recorded high diatoms AND high numbers of small copepods it is more likely that primary productivity was reduced during the heatwave.

Using Species Temperature Indices (STI, the mean temperature that an organism occurs at over its entire sampled range) we have calculated the mean Community Temperature Index (CTI) for the plankton communities. Fig. 3 shows the annual CTI for phytoplankton on the shelf and shows that in 2013 there was an increase in species that have a preference for warmer water, increasing the mean CTI. Values stayed high through 2016, declined in 2017 and dropped further still in 2018, although still higher than the pre-heatwave years of 2007-2012. Note that the previous warmer period in the mid-2000s also showed warmer CTI values.

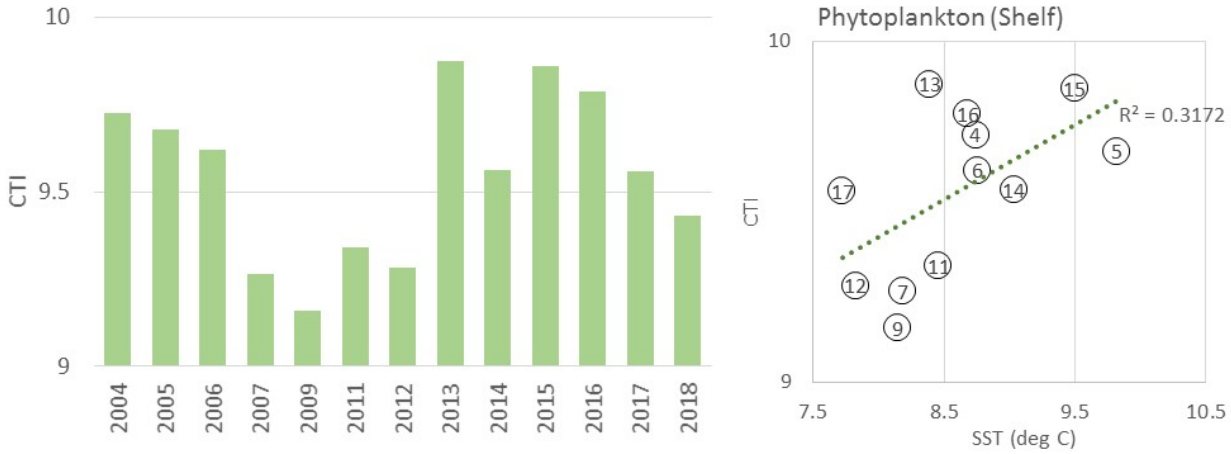

Figure 3. Mean annual Community Temperature Index (CTI) for the phytoplankton community on the shelf (left) and relationship with sea surface temperature from the GAK 1 data (right). Years with less than optimal sampling (2008 and 2010) are excluded. The correlation between sea surface CTI is significant, $p<0.03$.

A manuscript is in preparation which will include more detailed analyses on changes in the species present as well as abundance of major groups of plankton.

The CPR will continue to sample the same transect approximately monthly, six times per year, between about April and September, providing sufficient temporal resolution to detect seasonal shifts and community composition changes. The transect links two of the other plankton sampling regions within the Environmental Drivers group, that of the Seward Line (Fig. 1) and in lower Cook Inlet and Kachemak Bay, to provide a larger-scale context for these more intensive regional projects. With similar sampling frequency to the Prince William Sound oceanographic and zooplankton sampling, comparisons of lower trophic level fluctuations across the wider region will be made to examine responses to local and regional forcing.

The funding requested for CPR sampling is modest because of the consortium approach (the North Pacific CPR program is funded through a consortium managed by the North Pacific Marine Science Organization, PICES) and is less than half the actual cost of the data collection. We are not proposing any major changes to this project for FY20.

2. PROJECT STATUS OF SCHEDULED ACCOMPLISHMENTS

A. Project Milestones and Tasks

Table 1. This table breaks down project deliverables and their status into milestones and tasks by fiscal year and quarter, beginning February 1, 2017. Yellow highlight indicates proposed fiscal year workplan. C = completed, X = not completed or planned. Fiscal year quarters: 1 = Feb 1 – April 30; 2 = May 1 – July 31; 3 = Aug. 1 – Oct. 31; 4 = Nov. 1 – Jan. 31.

	FY17				FY18				FY19				FY20				FY21			
Milestone/Task	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Sample collection																				
CPR shipment	C				C								X							
Transect sampling	C	C	C		C	C	C		C	C	X		X	X	X		X	X	X	
CPR winter overhaul			C				C				X				X				X	

Milestone/Task	FY17				FY18				FY19				FY20				FY21			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Sample Processing																				
Sampling results		C	C	C	C	C	C	C	X	X	X	X	X	X	X	X	X	X	X	
Reporting																				
Progress reports			C				C				X				X				X	
Annual reports					C				C				X				X			
Annual PI meeting				C				C				X				X				X
FY work plan (DPD)			C				C				C				X					

In addition to the primary project deliverables in Table 1, we also contributed indicators to the annual Ecosystem Status Report (Batten, 2018), gave one presentation (Section 7) and have a manuscript in preparation for peer-reviewed publication (section 7). We anticipate completing FY19 and FY20 milestones and tasks as planned.

B. Explanation for not completing any planned milestones and tasks

All sampling, milestones, and tasks for 2018 and first two quarters of 2019 were completed in accordance with our proposal and with sampling protocols available on the GWA Research Workspace. Results from sampling in the first half of FY19 are underway with samples collected in April to June currently being analyzed. While sample processing is ongoing, we consider the task complete when QC is finished; thus the sampling results task for the first two quarters have not been marked complete.

C. Justification for new milestones/tasks

No new tasks are proposed.

3. PROJECT COORDINATION AND COLLABORATION

A. Within an EVOSTC-funded Program

Gulf Watch Alaska

This project provides a spatial link between the locally more intensive (but less seasonally resolved) sampling of lower trophic levels from the Seward Line and Lower Cook Inlet and Kachemak Bay within the Environmental Drivers component. Although there are differences in sampling design in each place, necessitated by the different sampling strategies, 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 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 and will be a necessary contribution to their studies. Nearshore studies are perhaps harder to link directly, but many benthic invertebrates have a planktonic phase. We have already provided a subset of CPR data to other Gulf Watch Alaska principal investigators summarizing the meroplankton to examine the long-term variability in larvae, and we expect such collaboration to continue.

Herring Research and Monitoring

We have actively collaborated with the Herring Research and Monitoring program (Pegau and Moffitt) in the first 5-year funding period, and a publication was produced (Batten et al. 2016). These time series will be updated during this project, and as they lengthen, we expect further insights.

Data Management

This project coordinates with the data management program by submitting data and preparing metadata for publication on the Gulf of Alaska Data Portal and DataONE within the timeframes required.

B. With Other EVOSTC-funded Projects

This project will coordinate with other *Exxon Valdez* Oil Spill Trustee (EVOSTC)-funded projects as appropriate by providing data, discussing the relevance and interpretation of data, and collaborating on reports and publications.

C. With Trustee or Management Agencies

This project is working with the National Oceanic and Atmospheric Administration and provides CPR time series data as indicators in ecosystem assessments and reports to the North Pacific Fisheries Management Council (Stephani Zador, National Oceanic and Atmospheric Administration [NOAA]).

4. PROJECT DESIGN

A. Overall Project Objectives

Objective 1

Plankton samples will be collected on the transect between Cook Inlet and Puget Sound approximately monthly from about April to September 2020 (6 transects will be sampled). All shelf samples will be processed and every 4th oceanic sample. Unfortunately, the CTD-F fitted to the CPR and used to collect environmental data was lost with the CPR it was mounted on in 2018. We are continuing to collect temperature data via a borrowed sensor.

Objective 2

A subset of samples (25%) will be processed within 3 months of and results from this processing will be available in progress reports and on the project website as soon as practicable. Full, quality-controlled data from 2020 will be available by July 2021 as in previous years.

B. Changes to Project Design and Objectives

None.

5. PROJECT PERSONNEL – CHANGES AND UPDATES

No changes.

6. PROJECT BUDGET

A. Budget Forms (See GWA FY20 Budget Workbook)

Please see project budget forms compiled for the Gulf Watch Alaska program.

No changes have been made to the FY20 budget for this project.

B. Changes from Original Project Proposal

None

C. Sources of Additional Project Funding

The North Pacific CPR survey is supported by a Consortium managed PICES, of which the EVOSTC is a member. There are two CPR transects in the survey, one of which is not in the spill-affected area and which is supported by the other Consortium members. Costs included in the budget are estimated at 40% of the full costs of acquiring data along the north-south transect shown in Fig. 1. Other members of the Consortium which contribute to this transect's costs are:

- The North Pacific Research Board (NPRB) contributes funding at a similar annual level to that requested here, through the NPRB's Long-Term Monitoring Program. The first year of a 5-year contract began July 2019. Contributions for 2019-2020 are US$64,261 (see attached documentation).
- The Canadian Department of Fisheries and Oceans (DFO) contributes CAD$50-70k annually to PICES as a retroactive payment for the year April 1 -March 31, as well as in-kind support by providing laboratory facilities at the DFO lab in Sidney, BC. The attached Collaborative Agreement is for support for the project for the period 2018-2023. It describes the in-kind support, valued at $4,000 per year (It is worth noting that it would be impossible to rent laboratory space for this amount and the actual in-kind support is much more valuable than this).
- The CPR parent organization, The CPR Survey at the Marine Biological Association (formerly the Sir Alister Hardy Foundation for Ocean Science, SAHFOS) is also providing salary support for the UK-based personnel, and in-kind support through the sampling vessel program it manages, for laboratory equipment (e.g., microscopes, fume hoods, etc.), sample archiving, and curation. See attached documentation for this amount, estimated to be $79,000 per year.

Owing to the differing financial year cycles of each organization, as well as currency exchange rates, contributing funds per EVOSTC fiscal year from these combined sources were estimated as best we could.

7. FY17-19 PROJECT PUBLICATIONS AND PRODUCTS

Publications

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. 2018. Continuous plankton recorder data from the northeast Pacific through 2017 *in* Zador, S. G., and E. M. Yasumiishi. 2018. Ecosystem Status Report 2018: Gulf of Alaska. Report to the North Pacific Fishery Management Council, 605 W 4th Ave, Suite 306, Anchorage, AK 99301. https://www.fisheries.noaa.gov/resource/data/2018-status-gulf-alaska-ecosystem

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., and R. Brown. 2019. Continuous plankton recorder monitoring of plankton populations on the Alaskan shelf. FY18 annual report to the *Exxon Valdez* Oil Spill Trustee Council, project 18120114-D.

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.

Batten, S.D, A. Walne, and P. Helaouet. In prep. Impact of the marine heat wave on Gulf of Alaska plankton communities. Has normal service now been resumed?

Published and updated datasets

DataONE Published Datasets

Batten, S.D., K. Holderied, M. McCammon, and K. Hoffman. 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. 2018. Continuous Plankton Recorder Final 2016 Plankton Data, Gulf of Alaska, 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.

Gulf of Alaska Data Portal Datasets

Batten, S.D. 2019. Gulf Watch Alaska Continuous Plankton Recorder 2017 physical data. *Exxon Valdez* Oil Spill Trustee Council Long-Term Monitoring program, Gulf Watch Alaska. Gulf of Alaska Data Portal.

Research Workspace Datasets

Batten, S.D. 2019. Gulf Watch Alaska Continuous Plankton Recorder 2018 physical data. *Exxon Valdez* Oil Spill Trustee Council Long-Term Monitoring program, Gulf Watch Alaska. Research Workspace.

Batten, S.D. 2019. Gulf Watch Alaska Continuous Plankton Recorder 2017 plankton data. *Exxon Valdez* Oil Spill Trustee Council Long-Term Monitoring program, Gulf Watch Alaska. Research Workspace.

Presentations

Batten, S.D. 2018. Lower Trophic Level Variability Across the Subarctic North Pacific, From Continuous Plankton Recorder Sampling. Oral presentation, RS41A-04, Ocean Sciences February 2018, Portland, Oregon.

Batten, S.D, A. Walne, and P. Helaouet. 2019. Impact of the marine heat wave on Gulf of Alaska plankton communities. Has normal service now been resumed? Oral presentation, Alaska Marine Science Symposium, January 2019, Anchorage, Alaska.

Outreach

No new outreach was performed.

LITERATURE CITED

Batten, S.D., S. Moffitt, W.S. Pegau, and R. Campbell. 2016. Plankton indices explain interannual variability in Prince William Sound herring first year growth. Fisheries Oceanography 25:420-432.

Francis, R.C., and S.R. Hare. 1994. Decadal-scale regime shifts in the large marine ecosystems of the Northeast Pacific: a case for historical science. Fish. Oceanogr. 3:279-291.

DiLorenzo, E., and N. Mantua. 2016. Multi-year persistence of the 2014/15 North Pacific marine heatwave. Nature Climate Change, published online:11 July 2016 DOI:10.1038/ nclimate3082

Ladd, C., N.B. Kachel, C.W. Mordy, and P.J. Stabeno. 2005. Observations from a Yakutat eddy in the northern Gulf of Alaska, Journal of Geophysical Research - Oceans, 110, C03003, doi: 03010.01029/02004JC002710.

Okkonen, S.R., T.J. Weingartner, S.L. Danielson, and D.L. Musgrave. 2003. Satellite and hydrographic observations of eddy-induced shelf-slope exchange in the northwestern Gulf of Alaska. Journal of Geophysical Research, 108 (C2), 3033, doi:10.1029/2002JC001342.

Royer, T.C. 1979. On the effect of precipitation and runoff on coastal circulation in the Gulf of Alaska. J. Phys. Oceanogr., 9:555–563.

Stabeno, P.J., N.A. Bond, A.J. Hermann, N.B. Kachel, C.W. Mordy, and J.E. Overland. 2004. Meteorology and oceanography of the Northern Gulf of Alaska, Continental Shelf Research, 24:859-897.

Weingartner, T.J., S.L. Danielson, and T.C. Royer. 2005. Freshwater variability and predictability in the Alaska Coastal Current, Deep Sea Research Part II: Topical Studies in Oceanography, Volume 52:169-191.

Weingartner, T.J., K.O. Coyle, B. Finney, R. Hopcroft, T. Whitledge, R.D. Brodeur, M. Dagg, E. Farley, D. Haidvogel, L. Haldorson, A. Herman, S. Hinckley, J.M. Napp, P.J. Stabeno, T. Kline, C. Lee, E. Lessard, T. Royer, and S. Strom. 2002. The Northeast Pacific GLOBEC Program: Coastal Gulf of Alaska. Oceanography, 15:48-63.

The Marine Biological Association
Est. 1884, incorporated by Royal Charter 2013

The Laboratory
Citadel Hill
Plymouth
PL1 2PB
United Kingdom

Tel: +44 (0) 1752 426412
Fax: +44 (0) 1752 262043
finance@mba.ac.uk
www.mba.ac.uk

Registered Charity No. 1155893

For the attention of the Exxon Valdes Oil Spill Trustee Council

Contract 17-71-04
In support of the EVOSTC Gulf watch (LTM) project titled "GWA – Continuous Plankton Recorder"

The following MBA in-kind resources are used for the above mentioned project:

- The true cost of the Indirects is 98% of Staff costs. The Project funded overhead rate equates to 56% of staff costs therefore an additional 42% of Indirect costs are match funds
- The MBA CPR samples Archive Centre costs are not included in any of the funded Projects and are currently costing $37000 per annum which is all match funds.
- The true cost of towing the CPR on Commercial vessels, we have calculated, based on our own Research Vessel, amount to $4200 per tow or $21840 per year. This is hugely underestimated as the costs for a large commercial tow would far out cost our Research vessel.
- We have estimated the cost for the entire network of Volunteers we have at Ports for logistics purposes at a conservative rate of $3200 per annum.

These resources amount to approximately $79,000 for 2020 and the in kind contribution by the MBA is expected to be at least this amount, per annum, for the duration of the project.

Lorraine Olver
MBA Finance Supervisor

MARINE BIOLOGICAL ASSOCIATION PLYMOUTH

NORTH PACIFIC RESEARCH BOARD

"Building a clear understanding of the North Pacific, Bering Sea, and Arctic Ocean ecosystems that enables effective management and sustainable use of marine resources."

1007 West 3rd Avenue, Suite 100 | Anchorage, AK 99501 | tel 907.644.6700, fax 907.644.6780

www.nprb.org

July 23, 2019

Exxon Valdez Oil Spill Trustee Council
4230 University Drive #220
Anchorage, AK 99508

To Whom it may concern:

North Pacific Research Board confirms the intent to support the Continuous Plankton Recorder project funded under the NPRB Long-Term Monitoring Program for the period July 1, 2019-June 30, 2024. A total of $316,029 will be provided over the five-year period (i.e., approximately $63,000/year). Please direct any questions about NPRB's investment in this project to Danielle Dickson, the Senior Program Manager for the Long-Term Monitoring Program.

Sincerely,

Danielle Dickson

Danielle Dickson
Senior Program Manager/Chief Officer for Collaboration and Synthesis

DFO Financial coding – Receipt of funds: 51310–810–760–3239–57646
Expenditures: 51310–810–760–XXXX–57646

CANADA – THE CPR SURVEY OF THE MARINE BIOLOGICAL ASSOCIATION COLLABORATIVE AGREEMENT

THIS AGREEMENT is made in duplicate between

HER MAJESTY the Queen in right of Canada ('Canada'), as represented by the Minister of Fisheries and Oceans on behalf of Fisheries and Oceans Canada ('DFO')

And

The Marine Biological Association of the UK, a registered charity established under the laws of the U.K., and having its head office at: The Laboratory, Citadel Hill, Plymouth, U.K., PL12PB ('The Marine Biological Association' or 'Organization')

and is effective as of the date of execution by DFO and the Organization.

RECITALS

WHEREAS the Organization and DFO (each shall be referred to as 'Party' and DFO and the Organization together shall be referred to as 'Parties') wish to collaborate on a project entitled North Pacific Continuous Plankton Recorder Project as described in Appendix A hereto ('Project'); and

WHEREAS the Organization and DFO have a joint interest in the expected results of this collaboration and have shared and compatible objectives associated with the Project; and

WHEREAS the Organization and DFO agree to a fair allocation of risk, supported by a Project Management and risk mitigation frameworks associated with the Project; and

WHEREAS the Project is relevant to DFO's Mandate, Core Responsibilities and priorities; and

WHEREAS this Agreement is neither a procurement agreement pursuant to the Government Contracts Regulations, nor a transfer payment agreement pursuant to the Treasury Board Policy on Transfer Payments.

THEREFORE, the Parties agree as follows:

1 The Project

(a) General description, purpose and expected results of the Project

The purpose of this collaboration is to increase knowledge of the ocean ecosystem in the northeast Pacific, and to monitor annual changes in ocean productivity and its ability to produce fish of important commercial interest to Canada (such as Pacific salmon).

Description: DFO will provide shore-based laboratory facilities, shared (with DFO staff) office facilities, shipping and other logistics, and support to the Collaborator's field sampling equipment and technical staff, to carry out the collection, rapid processing, and analysis of plankton samples collected as part of the North Pacific Continuous Plankton Recorder program. Broadly, the CPR Survey (MBA) supplies the field sampling, technical staff, shore-based laboratory in their headquarters in the United Kingdom, and the bulk of the scientific interpretation. DFO will share its shore-based laboratory and

office space at IOS for the North Pacific sampling program, and assistance with both taxonomic identifications and scientific interpretation.

Ocean monitoring is part of DFO's mandate under Ecosystem Based Science, and international collaboration on monitoring of open ocean regions (using the Continuous Plankton Recorder) has been an activity under DFO's International Governance Strategy.

The collaboration is expected to provide early warnings of substantive changes in the marine ecosystem of the northeast Pacific, and of potential changes in its ability to produce fish.

(b) Benefits each party will receive from the Project.

Benefits to DFO: With very minor outlays of resources, DFO will benefit from access to early results and warnings of changes in the marine ecosystem of the northeast Pacific. Significant changes have occurred recently, such as the marine heatwave of 2014-2016, the large algal bloom of 2015, and the super-abundance of gelatinous plankton in 2017. Outcomes from this project will contribute to DFO's State of the Pacific Ocean reporting, DFO Oceans Sector identification and management of large ocean marine protected areas, and to DFO Fisheries Management's understanding of the processes influencing variations in fish stocks of commercial importance.

Benefits to collaborators: Collaborators will gain a North Pacific local base of operations for their sampling equipment and laboratory processing, and access to ocean experts at IOS, to facilitate plankton identifications and collaborations with DFO expertise on plankton dynamics in B.C. marine environments.

2 Definitions

(a) **"Agreement"** means the recitals, definitions, terms, conditions and obligations stipulated herein including the stipulations in the appendices affixed hereto.

(b) **"Background Information"** means any data, software, products and processes in a Party's possession prior to the start of the Project.

(c) **"Biological Material"** means any living organisms, including animals, and any material produced by and extracted from living organisms.

(d) **"Contribution"** means resources that are provided and used by either Party for the Project. The term should not be confused with a Government of Canada Contribution, as per the Treasury Board Policy on Transfer Payments.

(e) **"In-kind Expenditures"** means Project Expenditures that a Party incurs internally for the Project, accounting for its contribution to the Project in the form of salaries and salary benefits for its employees participating in the Project and other Project expenditures, but excluding any financial contribution to the other Party and costs associated with equipment, instruments and facilities acquired by the Party prior to the Project.

(f) **"Fiscal Year"** means any twelve month period starting April 1st of the year and ending March 31st of the following year.

(g) **"Intellectual Property"** or **"IP"** means any invention, and any other product of intellectual activity in the industrial, scientific, literary, or artistic fields including all intellectual creation that may be or is legally protected through patents or as copyright, industrial design, integrated

circuit topography, under the plant breeders' rights, or subject to protection under the law as trade secrets or as confidential information.

(h) **"Project Authority"** means the person designated by each Party to manage and oversee the execution of this Agreement on its behalf.

(i) **"Project Expenditures"** means expenditures required for the Project, including all applicable taxes, which are itemized in Appendix B, and consisting of In-kind Expenditures and Specified Project Expenditures.

(j) **"Results"** means all data, software, products and processes arising from the Project whether or not they may be subject to IP rights.

(k) **"Specified Purpose Account"** means an account created within DFO, in which DFO will deposit funds received from the Organization and which DFO will use to pay for Specified Project Expenditures.

(l) **"Specified Project Expenditures"** means Project expenditures that DFO incurs for the Project, which are payable with funds deposited in a Specified Purpose Account.

3 Term of the Agreement and Amendments

(a) The Agreement shall expire, unless terminated sooner in accordance with the termination provisions herein, on 30 June 2023 ('end of the Agreement').

(b) While the Agreement is in effect, it may be amended by a written agreement signed by authorized representatives of the Parties.

4 DFO's and the Organization's Contributions

(a) DFO's and the Organization's contributions to the Project are outlined in the table below:

Grand Totals of All Contribution Table	Organization		DFO	Total Value
Fiscal year	Financial Contribution to DFO	In-Kind Contribution	In-Kind Contribution	
2018-2019	$5,000	$45,000	$4,000	$54,000
2019-2020	$5,000	$45,000	$4,000	$54,000
2020-2021	$5,000	$45,000	$4,000	$54,000
2021-2022	$5,000	$45,000	$4,000	$54,000
2022-2023	$5,000	$45,000	$4,000	$54,000
Total	$25,000	$225,000	$20,000	$270,000

(b) DFO will not make any financial contribution to the Organization for this Project.

(c) The Organization shall make its financial contribution to DFO for the Project, upon receiving a request for payment, according to the payment schedule below:

Fiscal Year	Estimated Date of Payment	Payment Amount
2018-2019	1 September 2018	$5,000
2019-2020	1 May 2019	$5,000

2020-2021	1 May 2020	**$5,000**
2021-2022	1 May 2021	**$5,000**
2022-2023	1 May 2022	**$5,000**
	Total	**$25,000**

(d) DFO shall deliver the request for payment to the attention of the Organization's Project Authority.

(e) All payments to DFO shall be made payable to the Receiver General for Canada, shall reference the following DFO coding 51310–810–760–3239–57646 and shall be delivered to the DFO Project Authority, unless otherwise indicated in the request for payment.

(f) Amounts received by DFO under the Agreement will be deposited in a Specified Purpose Account and used to pay for Specified Project Expenditures.

(g) Upon expiration or upon termination of the Agreement, DFO shall provide to the Organization a financial statement in respect of Specified Project Expenditures actually incurred or that will be incurred during the same Fiscal Year and will return to the Organization any funds remaining in the Specified Purpose Account after accounting for all Specified Project Expenditures ('Residual') if the Residual is over $100. Otherwise the Residual will be credited to the Government of Canada as non-respen7dable miscellaneous revenue.

(h) Throughout the Term of the Agreement and for one year after expiration or termination of the Agreement, the Organization may request access to DFO records related to Specified Project Expenditures and DFO shall provide reasonable facilities and co-operation to allow the Organization to review these records and to take copies, as required.

5 Ownership of Equipment

(a) Any equipment, instruments, and supplies acquired by either Party under this Agreement shall belong to that Party.

6 Project Authorities

(a) The Project Authority for DFO is:

Dr. Ian Perry, Head
Plankton Ecology and Ecosystems Oceanography Program,
Institute of Ocean Science, Sidney, and Pacific Biological Station, Nanaimo
Ocean Sciences Division,
3190 Hammond Bay Road,
Nanaimo, B.C., V9T 6N7, Canada
Telephone/Fax: 250-756-7137 Fax: 2590756-7053
E-mail: Ian.Perry@dfo-mpo.gc.ca

(b) The Project Authority for the Organization is:

Dr. Sonia Batten,
The CPR Survey – Marine Biological Association
c/o 4737 Vista View Cr.
Nanaimo, B.C., V9V 1N8, Canada
Telephone/Fax: 250 756 7747
E-mail: Sonia.batten@mba.ac.uk

(c) Either Party may by written notice to the other designate a new Project Authority.

7 Project Management

A. Project management will be performed by the Project Authorities who will monitor the Project to ensure that it is proceeding in accordance with the Work Plan and that Project Expenditures and deliverables are consistent with the Project budget and the Work Plan. Management of, and reporting on the Project will be performed according to the following protocol:

i. The DFO Project Authority will ensure that all aspects of the Project for which DFO is responsible are carried out on time and within budget;

ii. The Organization Project Authority will ensure that all aspects of the Project for which the Organization is responsible, are carried out on time and within budget;

iii. The Organization and DFO will inform each other on a regular basis on the progress of the Project so they may together determine whether the main Project objectives are being met and, if not, decide if the Project should be altered, proceed under modified terms of reference or terminated.

B. More specifically, management of, and reporting on the Project will be performed by Project Authorities of the Parties and will include:

i. Administrative oversight;
ii. Monitoring of the quality of the work; and
iii. Report preparation

8 Risk Management

(a) The Project Authorities have discussed and completed a Project Risk Analysis, which is outlined in Appendix C.

(b) If a risk event identified in the Project Risk Analysis or any other unanticipated risk event occurred, the Parties will make reasonable efforts to implement appropriate mitigation measures, including those set out in the Project Risk Analysis, however the Parties do acknowledge that the occurrence of any risk event may require an extension to the Term of the Agreement or termination of the Agreement in accordance with the section entitled 'Termination'.

9 Communications, Reports and Notices

(a) Communications relating to the technical and scientific aspect of the Project shall be in writing and shall be addressed to the Project Authorities.

(b) Notices, reports and other communications relating to the Agreement shall be in writing and shall be addressed to the Project Authorities.

(c) Each Party shall report to the other on the progress of Project-related work it is performing, and on any Results arising from work it has completed. Reporting in respect of work performed in any Fiscal Year shall take place at least once a year, no later than ninety (90) days following the end of the Fiscal Year. However, to ensure that Parties remain well informed and up-to-date on the Project, additional reports throughout the Fiscal Year may be provided as agreed by the Project Authorities.

(d) Within ninety (90) days following expiration or termination of this Agreement each Party shall, upon request, provide to the other a final report on Project-related work it has performed, such report to be in a mutually agreeable format, and to include Results arising from the work.

(e) If requested, the Organization will assist DFO in completing an overall evaluation of the Project in accordance with the 'Project Evaluation' section of Appendix A.

(f) The Organization shall promptly notify DFO, and provide full particulars, upon:

(i) changing its corporate name;

(ii) changing its controlling interests;

(iii) filing for bankruptcy or involving itself in any insolvency proceedings;

(iv) taking advantage of any statutes relating to the orderly payment of debts; or

(v) being subject to criminal prosecution or convicted of a criminal offence.

10 Access to DFO Grounds and Buildings

(a) The Organization, its employees and its agents participating in the Project shall abide by all legislations, regulations, orders and policies with respect to access to DFO sites, vessels and buildings and utilization of facilities therein, including orders and policies related to security, health and safety, and shall not bring any people, equipment or any materials into DFO sites, vessels and buildings without the prior written consent of the DFO Project Authority.

11 Background Information, Results and Intellectual Property Rights

(a) Background Information, Results and IP rights shall be subject to the provisions of Appendix D.

12 Biological Material

(a) Biological Material produced from Project-related activities, Biological Material provided by the Organization to DFO under this Agreement and Biological Material issued therefrom shall be subject to the provisions of Appendix E.

13 Dispute Resolution

(a) If any dispute, other than a matter of public law arises between the Parties in connection with or arising out of the Agreement, the Parties shall use their best efforts to settle any such dispute by negotiations or mediation. If the Parties fail to resolve the dispute within a period of thirty (30) days or such greater period as may be mutually agreed, then either Party may refer the dispute to arbitration in accordance with the *Commercial Arbitration Act*. The Parties agree to have arbitration hearings conducted at Nanaimo, British Columbia, Canada. The decision rendered by the arbitrator shall be final, executable, not subject to appeal and binding on the Parties.

14 Liabilities

(a) Indemnification

(i) Each Party (referred to as 'Indemnifying Party' for the purpose of this section) hereby agrees to defend, indemnify and hold the other harmless from and against all claims, legal actions or causes thereof, liabilities and costs arising from the negligence or willful misconduct of the Indemnifying Party's employees or agents in connection with the execution of this Agreement provided that the Party to be indemnified gives prompt notice of the claim to

the Indemnifying Party, and provides all relevant information and reasonable assistance, as requested.

(ii) The obligations herein will subsist after expiration or termination of this Agreement in respect of any cause or event connected with any activity undertaken by the Indemnifying Party, or by its employees or agents prior to the expiration or termination of this Agreement.

(b) Insurance and Risks

(i) The Government of Canada underwrites its own risks, including the risk of liability for the acts or omissions of its officers and employees while they are acting within the scope of their employment with DFO.

(ii) The Organization warrants and represents that it has adequate liability insurance to cover its officers, employees and agents participating in the Project.

(iii) Each Party hereby assumes any and all risks of personal injury and property damage attributable to the negligent acts and negligent omissions of that Party and its officers, employees and agents participating in the Project.

15 Termination

(a) Either Party may terminate the Agreement by notice to the other without liability, and the other Party hereby waives its rights to initiate any proceedings against the terminating Party if:

(i) the other Party breaches any terms or conditions of the Agreement and does not rectify the breach within thirty (30) days after being notified in writing of the breach; or

(ii) the other Party fails to perform the Project in accordance with Appendix A and does not rectify the matter within thirty (30) days after being notified in writing of the specific rectifications required; or

(iii) the other Party has submitted or submits false or misleading information in respect of the Project or in respect of the its obligations pursuant to the Agreement, such termination to take effect immediately after the notice date; or

(iv) resources that the terminating Party is expected to contribute to the Project (in DFO's case 'resources' include resources that are subject to appropriations approved by Parliament) are reduced or not available, unless the other Party agrees to amend the Agreement to address the reduction in resources, such termination to take effect thirty (30) days after the notice date; or

(v) a risk event identified in the Project Risk Analysis in Appendix C or any other unanticipated risk event jeopardized the scientific integrity of the Project or prevented the Project from being completed within a reasonable period of time despite mitigation measures that may have been implemented.

(b) DFO may terminate the Agreement by notice to the Organization without liability, and the Organization hereby waives its rights to initiate any proceedings against DFO or Canada if:

(i) the Organization is insolvent, in receivership, bankrupt, files for bankruptcy, or is involved in any act of bankruptcy or any bankruptcy proceeding, such termination to take effect immediately after the notice date; or

(ii) the Organization is subject to criminal prosecution or is convicted of any criminal or regulatory offence under any law, order or regulation of Canada or the provinces or of a

duly constituted authority thereof, or convicted as an accessory to any such offence, such termination to take effect immediately after the notice date.

(c) Expiration or termination of the Agreement shall not relieve either Party from its obligations pursuant to the section entitled 'Communications, Reports and Notices' and the sub-section entitled 'Indemnification' or from its obligations, as set out in Appendix D, in respect of Background Information, Results and Intellectual Property Rights.

(d) Failure by either Party to notify the other of a breach of the Agreement or of any other circumstances possibly warranting termination of the Agreement, or to terminate the Agreement because of such breach or such other circumstances shall not constitute an acceptance of the breach by that Party or a waiver of its right to terminate this Agreement in accordance with its provisions, and, if applicable, to recover from the other Party any sums due under the Agreement.

16 *Canadian Environmental Assessment Act* (CEAA)

(a) The Parties agree that, if applicable, the Project will be assessed and approved in accordance with the *Canadian Environmental Assessment Act* prior to commencing the Project.

17 Canadian Council on Animal Care (CCAC)

(a) The Parties agree that, if applicable, the Project will be assessed and approved in accordance with the standards of the Canadian Council on Animal Care. DFO will engage the Animal Care Committee within DFO to ensure compliance with this provision prior to commencing the Project.

18 General

(a) Entire Agreement

This Agreement, including the appendices appended hereto which form part of this Agreement, sets forth the entire agreement between the Parties hereto concerning the Project and supersedes and revokes all negotiations, arrangements or communications, of any nature whatsoever whether they be verbal or in writing, between the Parties or their authorized representatives or any other person purporting to represent DFO or the Organization.

(b) No Agency

Nothing contained in the Agreement shall be considered or construed as creating a relationship of partners, principal and agent, lessor and lessee, licensor and licensee (except with respect to Intellectual Property, in accordance with Appendix D) or of employer and employee between the Parties. In particular, each Party shall be solely responsible for any and all payments and/or deductions required to be made including those required for Canada Pension Plan, Employment Insurance, Workers' Compensation, or Income Tax for all its employees participating in the Project, and for any and all fees payable to its agents participating in the Project. In addition, each Party shall be solely responsible for the supervision, scheduling of work and tasking for its employees and agents participating in the Project.

(c) Member of Parliament

The Organization shall ensure that no member of Parliament is admitted to any share or part of the Agreement or to any benefit that may arise from it.

(d) Former Public Servants

The Organization shall ensure that any former public office holder who is currently employed by or an agent of the Organization is in compliance with the post-employment provisions of the Fisheries and Oceans Canada Values and Ethics Code, which is posted at http://www.dfo-mpo.gc.ca/reports-rapports/vicr-virc/vicr-virc2012-eng.htm or comparable Treasury Board or other federal government department code.

(e) Laws in Force

This Agreement shall be interpreted in accordance with federal laws of Canada and the laws in force in the Province of British Columbia.

(f) Location

The Project shall be performed at Sidney, in the Province of British Columbia.

(g) Force Majeure

No breach of an obligation under this Agreement by either Party shall be deemed a breach of this Agreement or create any liability if such breach arises from any cause or causes beyond the control of such Party including, without limitation, fire, natural disaster, inclement weather, power failures, accident, war, rebellion, insurrection, riot and invasion provided that the Party remedy such breach resulting from one of the above causes as soon as it is practicable after the occurrence of one or more of the above causes, as appropriate.

(h) Severability

Should a court of competent jurisdiction hold that any provision of the Agreement is invalid, illegal, or unenforceable, such provision shall be considered severed from the Agreement and all other provisions of the Agreement, and all rights and obligations therein shall continue to be in force and effect.

(i) No Assignment

Neither Party may assign the Agreement, in whole or in part, without the prior written consent of the other Party.

(j) Communication

(i) The Parties agrees to acknowledge each other's contribution in any public communications related to and/or resulting from work carried out under this Agreement. Neither Party may use any symbol or mark of the other Party without the express written permission of the other Party.

(ii) The Organization will provide to DFO a copy of any materials developed by the Organization for communication at least one month prior to public disclosure, including materials to be presented at scientific conferences, manuscripts accepted for publication in scientific journals, and direct communications to media.

(iii) The Organization agrees that if DFO's involvement in the Project is mentioned in any communication or announcement to the public, the communication or announcement will be made in both official languages.

(k) Official Languages

The Agreement was prepared in English at the request of the Organization / Cette entente fut rédigée en anglais à la demande de l'Organisation.

(l) ***Lobbying Act***

The Organization must ensure that any person lobbying DFO, any other federal department or any federal agency on behalf of the Organization is registered pursuant to and in compliance with the *Lobbying Act*.

(m) Time of Essence

Time is of the essence with respect to all deliverables under the Agreement.

(n) Representation and Warranty

The Organization represents and warrants that it is not under a disability to contract with Her Majesty as set out in section 750 of the Criminal Code of Canada.

(o) Order of Precedence

If there is any conflict or ambiguity between these sections of the Agreement and any appendices or schedules thereto, these sections of the Agreement shall prevail.

IN WITNESS WHEREOF this Agreement has been executed by DFO and the Organization through their duly authorized representatives.

The CPR Survey of the Marine Biological Association

Dr. Sonia D. Batten, Director Pacific CPR Survey

31st July 2018

Date

Her Majesty the Queen in Right of Canada, as represented by the Minister of Fisheries and Oceans

Lesley MacDougall for C. Lowe

Carmel Lowe, Regional Director, Science

23 July 18

Date

Appendix A: The Project

General description, purpose and expected results

The general description, purpose and expected results of the Project are as set out in section 1 of this Agreement.

Technical Description of the Project

Plankton are the base of ocean food webs. Ongoing time series observations of plankton populations have become important components of fisheries and ecosystem assessments. Many nations, including Canada, have established plankton monitoring programs in the near-coast waters of their respective Exclusive Economic Zones. However, effective monitoring of open ocean regions is more difficult logistically, and is best achieved through multinational collaborations.

The Continuous Plankton Recorder (CPR) is an established and cost-effective method to do open ocean plankton monitoring. The CPR is deployed from commercial ships-of-opportunity and towed at about 10m depth along established shipping routes. The CPR collects and retains a sequence of preserved samples, with each sample corresponding to about 18 km of survey track. The CPR method allows regular and repeated sampling of large open ocean regions. CPR surveys have been conducted in the NE Atlantic for more than 80 years. A North Pacific CPR program was established in 2000 and has now produced an 18 year time series, numerous scientific papers, and contributed to numerous advisory reports (e.g. the annual DFO State of the Ocean Report, and the PICES North Pacific Ecosystem Status Report).

Deliverables

1. New data collection, consisting of 4-6 NE Pacific survey lines between Juan de Fuca Strait and Cook Inlet Alaska, plus 2-3 trans-Pacific survey lines between Juan de Fuca Strait and Japan.

2. "Quick-look" processing (at IOS) and statistical analysis of a subset of the total samples.

3. Follow-up processing, quality control and archival at SAHFOS of additional samples, and additional statistical analysis.

4. Production of summary reports, as contribution to DFO and PICES Ecosystem Status Reports.

5. Production of peer-reviewed scientific publications that provide detailed analyses and interpretation.

Work Plan: Timelines, Milestones and Work Responsibilities

Date/ Period	Milestones	Responsible Party
1 September 2018	Project start	N/A
1 July 2019	Report on samples collected, analysed, and reports/papers written	Collaborator
1 July 2020	Report on samples collected, analysed, and reports/papers written	Collaborator
1 July 2021	Report on samples collected, analysed, and reports/papers written	Collaborator
1 July 2022	Report on samples collected, analysed, and reports/papers written	Collaborator

Date/ Period	Milestones	Responsible Party
31 March 2023	Report on samples collected, analysed, and reports/papers written	Collaborator

Project Evaluation

Evaluation of the Project will be performed by DFO, in consultation with the Government Organization if required by DFO, and will address the questions below and any lessons learned (as applicable).

1) Did the intended activities take place within scope, within budget?
2) Were the milestones achieved?
3) Were the deliverables of the project delivered?
4) Did the collaboration achieve its purpose?

Appendix B: Project Expenditures

Budget Summary for Fiscal Year 2018-2019

Name of the project: North Pacific Continuous Plankton Recorder Project

Detailed Expenditures Table	**Organization**			**DFO**	**Total Value**
Description	**Financial Contribution to DFO**	**In-Kind Contribution**	**Use of Fish**	**In-Kind Contribution**	
Salary – Term employees					$
Salary – Indeterminate employees (In-Kind: Collaborator's own time)		$45,000		$4,000	$49,000
Overtime					$
Benefits (e.g. 20% of Salary)					$
Salary – Casual employees					$
Salary- Student					$
Consultant Contract [specify work]					$
Equipment					$
Material					$
Supplies	$5000				$5000
Travel					$
Facilities					$
Vessels					$
Other Expenses					$
Totals	**$5,000**	**$45,000**	**$**	**$4,000**	**$54,000**

Budget Summary for Fiscal Year 2019-2020

Name of the project: North Pacific Continuous Plankton Recorder Project

Detailed Expenditures Table	**Organization**			**DFO**	**Total Value**
Description	**Financial Contribution to DFO**	**In-Kind Contribution**	**Use of Fish**	**In-Kind Contribution**	
Salary – Term employees					**$**
Salary – Indeterminate employees (In-Kind: Collaborator's own time)		$45,000		$4,000	$49,000
Overtime					**$**
Benefits (e.g. 20% of Salary)					**$**
Salary – Casual employees					**$**
Salary- Student					**$**
Consultant Contract					**$**
Equipment					**$**
Material					**$**
Supplies	$5000				$5000
Travel					**$**
Facilities					**$**
Vessels					**$**
Other Expenses					**$**
Totals	**$5,000**	**$45,000**	**$**	**$4,000**	**$54,000**

Budget Summary for Fiscal Year 2020-2021

Name of the project: North Pacific Continuous Plankton Recorder Project

Detailed Expenditures Table	**Organization**			**DFO**	**Total Value**
Description	**Financial Contribution to DFO**	**In-Kind Contribution**	**Use of Fish**	**In-Kind Contribution**	
Salary – Term employees					$
Salary – Indeterminate employees (In-Kind: Collaborator's own time)		$45,000		$4,000	$49,000
Overtime					$
Benefits (e.g. 20% of Salary)					$
Salary – Casual employees					$
Salary- Student					$
Consultant Contract					$
Equipment					$
Material					$
Supplies	$5000				$5000
Travel					$
Facilities					$
Vessels					$
Other Expenses					$
Totals	**$5,000**	**$45,000**	**$**	**$4,000**	**$54,000**

Budget Summary for Fiscal Year 2021-2022

Name of the project: North Pacific Continuous Plankton Recorder Project

Detailed Expenditures Table	**Organization**			**DFO**	**Total Value**
Description	**Financial Contribution to DFO**	**In-Kind Contribution**	**Use of Fish**	**In-Kind Contribution**	
Salary – Term employees					$
Salary – Indeterminate employees (In-Kind: Collaborator's own time)		$45,000		$4,000	$49,000
Overtime					$
Benefits (e.g. 20% of Salary)					$
Salary – Casual employees					$
Salary- Student					$
Consultant Contract					$
Equipment					$
Material					$
Supplies	$5000				$5000
Travel					$
Facilities					$
Vessels					$
Other Expenses					$
Totals	**$5,000**	**$45,000**	**$**	**$4,000**	**$54,000**

Budget Summary for Fiscal Year 2022-2023

Name of the project: North Pacific Continuous Plankton Recorder Project

Detailed Expenditures Table	**Organization**			**DFO**	**Total Value**
Description	**Financial Contribution to DFO**	**In-Kind Contribution**	**Use of Fish**	**In-Kind Contribution**	
Salary – Term employees					$
Salary – Indeterminate employees (In-Kind: Collaborator's own time)		$45,000		$4,000	$49,000
Overtime					$
Benefits (e.g. 20% of Salary)					$
Salary – Casual employees					$
Salary- Student					$
Consultant Contract					$
Equipment					$
Material					$
Supplies	$5000				$5000
Travel					$
Facilities					$
Vessels					$
Other Expenses					$
Totals	**$5,000**	**$45,000**	**$**	**$4,000**	**$54,000**

Detailed Expenditures Table	Organization			DFO	Total Value
Description	Financial Contribution to DFO	In-Kind Contribution	Use of Fish	In-Kind Contribution	
Salary – Term employees					$
Salary – Indeterminate employees (In-Kind: Collaborator's own time)		$45,000		$4,000	$49,000
Overtime					$
Benefits (e.g. 20% of Salary)					$
Salary – Casual employees					$
Salary- Student					$
Consultant Contract					$
Equipment					$
Material					$
Supplies	$5000				$5000
Travel					$
Facilities					$
Vessels					$
Other Expenses					$
Totals	**$5,000**	**$45,000**	**$**	**$4,000**	**$54,000**

Grand Totals of All Contributions Table

Grand Totals of All Contribution Table	Organization		DFO	Total Value
Fiscal year	Financial Contribution to DFO	In-Kind Contribution	In-Kind Contribution	
2018-2019	$5,000	$45,000	$4,000	$54,000
2019-2020	$5,000	$45,000	$4,000	$54,000
2020-2021	$5,000	$45,000	$4,000	$54,000
2021-2022	$5,000	$45,000	$4,000	$54,000
2022-2023	$5,000	$45,000	$4,000	$54,000
Total	**$25,000**	**$225,000**	**$20,000**	**$270,000**

Appendix C: Risk Management

Project Risk Analysis

Activity or Deliverable	1. New data collection, consisting of 4-6 NE Pacific survey lines between Juan de Fuca Strait and Cook Inlet Alaska, plus 2-3 trans-Pacific survey lines between Juan de Fuca Strait and Japan. 2. "Quick-look" processing (at IOS) and statistical analysis of a subset of the total samples		
Description of risk event and its consequences	Unable to deliver because of changes in qualified staff, and/or lack of sampling vessels		
	Likelihood	Impact	Risk Rating
	Unlikely	Very High	Medium
Mitigation measures	Replacement of staff and alternative sampling platforms		
Responsible Party	Organisation		

Table to determine Risk Rating

Impact						
	5. Extreme					
	4. Very High				**High**	
	3. Medium			**Medium**		
	2. Low		**Low**			
	1. Negligible					
		1. Rare	2. Unlikely	3. Low	4. Likely	5. Almost Certain
		Likelihood				

Appendix D: Background Information, Results and Intellectual Property Rights

1. Background Information[1]

1.1. Each Party ("Disclosing Party") shall promptly disclose to the other ("Receiving Party") any Background Information in its possession that is required by the Receiving Party to perform any Project activities for which the Receiving Party is responsible, excluding Background Information subject to third-party intellectual property rights. The Disclosing Party retains its rights in any Background Information disclosed to the Recipient Party.

1.2. Background Information disclosed by either Party shall be deemed confidential however the confidentiality of Background Information disclosed orally shall expire unless transferred in tangible form to the Receiving Party within two (2) weeks following disclosure. A Receiving Party may not disclose to third parties in any way whatsoever confidential Background Information of the Disclosing Party without the prior written authorization of the Disclosing Party.

1.3. The confidentiality obligations in article 1.2 above shall not apply to Background Information that is or falls lawfully in the public domain, that was lawfully in the possession of a Receiving Party prior to receiving it from a Disclosing Party, or that is received by a Receiving Party from a third party not bound by any confidentiality obligations, subject to evidence.

1.4. Any confidentiality obligation with respect to Background Information shall remain in effect until such time as the information becomes public.

2. Results[2]

2.1. The Parties understand and agree that any Results arising under this Agreement should be managed in the best interest of the Parties.

2.2. Each Party shall promptly inform the other of any Results it generates and provide to the other Party all technical information that may be necessary to enable that Party to use those Results.

2.3. Either Party is free to publish any Results in accordance with sub-article (a) provided it ensures that data integrity is preserved in the publication, and that the publication does not jeopardize the authorship interest of the other Party's employees or the IP rights of the other Party.

(a) If a Party ("Publishing Party") wishes to publish any Results, it shall submit these Results to the other Party for review. The other Party may, within thirty (30) days, request the Publishing Party, by written notice, to withhold publication of the Results or any portions thereof, for a reasonable time, for the purpose of securing its employees' authorship interest and protecting IP rights. Any obligation to withhold disclosure of Results may not exceed one year from the date of the notice, or one year following the end of the Agreement, whichever date is the earliest.

3. Intellectual Property ("IP") Rights[3]

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[1] **"Background Information"** is defined in section 2 of this Agreement.

[2] **"Results"** is defined in section 2 of this Agreement.

[3] **"Intellectual Property" or "IP"** is defined in section 2 of this Agreement.

3.1. Ownership of IP rights in Results

(a) DFO owns the IP rights in Results generated solely by its employees.

(b) The Organization owns the IP rights in Results generated solely by its employees and shall otherwise be free to determine ownership of such IP rights.

(c) The IP rights in Results generated jointly by employees of both Parties will be jointly own by the Parties ("Joint IP"), and will be managed according to section 4.

(d) Notwithstanding any conflict with any other provision in this Agreement, any student of the Organization who may be involved in the Project retains the copyright in any research report, Masters or PhD thesis subject only to the confidentiality provisions herein.

3.2. Licensing of IP rights in Results

(a) Any Party that owns IP rights in Results hereby grants to the other a non-exclusive, non-transferable, royalty-free and paid-up licence in respect of such IP rights and for the duration of the IP rights, allowing the other Party to use, reproduce, modify and translate the IP and any parts thereof for non-commercial research purposes only.

(b) The Organization may request from DFO, a licence to use, reproduce, modify and translate DFO-owned IP rights for commercial purposes. The request shall be in writing and shall be delivered to DFO no later than three (3) months following the end of the Agreement. The Parties shall negotiate the terms and conditions of such a licence in good faith; however if they can't agree within three (3) months following the beginning of licence negotiations, or at such later time as they may agree, DFO will no longer be obligated to continue licence negotiation with the Organization.

3.3. Patenting of inventions derived from Results

(a) The Parties shall fully cooperate with each other and assist each other free of charge in the preparation and filing of patent applications related to inventions associated with any Results however neither Party may file patent applications incorporating Results of the other Party without the prior written permission of that Party.

(b) Each Party shall promptly provide to the other a copy of every patent application that it files in relation to any such inventions.

(c) Each Party shall execute such conveyances or other documents as reasonably required for the filing, prosecution and maintenance of any patent applications and for defending any issued patents related to such inventions; however neither Party shall be obligated to incur any costs in relation to any such patent applications or any such patents.

4. Management of Joint IP

4.1. The Parties agree that Joint IP shall be managed by the Party that has contributed the most to such Joint IP ("IP Manager"). The IP Manager shall determine any disclosure, protection, reproduction and commercialization of the Joint IP taking into consideration the other Party's interests and internal policies, except if the Joint IP consists of an invention or software in which case section 4.3 shall also apply.

4.2. It is agreed that the IP Manager design may assign management of a Joint IP to the other Party who upon accepting the assignment becomes the IP Manager of such Joint IP.

4.3. With respect to Joint IP consisting of an invention or software that has a significant commercial potential, the Parties agree to co-operate in good faith to develop a detailed management plan relating to the protection and commercialization of the Joint IP, while ensuring that the Parties' mutual interests in the Joint IP are protected.

5. Term of Application

5.1. The obligations of the Parties in this Appendix shall survive the expiration or termination of the Agreement.

Appendix E: Provisions related to Biological Materials

1) Biological Material produced from Project-related activities performed by either Party shall belong to that Party.

2) Ownership of Intellectual Property related to Biological Material produced from the Project shall be determined in accordance with the provisions of Appendix D.

3) If DFO receives any Biological Material from the Organization, DFO will not return the Biological Material to the Organization unless requested, in writing, any time while the Agreement is in effect, in which case DFO will return to the Organization any such Biological Material that is no longer needed for the Project and remaining in its possession, subject to the following provisions:

   a) DFO shall not be responsible for the condition of the Biological Material or the death of animals that DFO receives from the Organization;

   b) DFO shall not be obligated to return to the Organization any deceased animals or any Biological Material which, in DFO's opinion, presents a health or environmental risk; and

   c) The Organization pays to DFO upon request all DFO costs related to the transfer of the Biological Material back to the Organization.