August 24, 2016

Elise Hsieh, Executive Director
Exxon Valdez Oil Spill Trustee Council
4210 University Drive
Anchorage, AK 99508-4626

Dear Elise:

Final FY 2017-2021 Proposal Submittal for Long-term Monitoring

17120114-I. Long-term Monitoring of Oceanographic Conditions in the Alaska Coastal Current from Hydrographic Station GAK-1

Gulf Watch Alaska, the long-term monitoring program of the *Exxon Valdez* Oil Spill Trustee Council (EVOSTC), has finalized our program and project proposals for fiscal years 2017-2021 funding based on comments received from EVOSTC's Science Panel on May 19, 2016. Below is the final budget summary and response to Science Panel comments for the Oceanographic Conditions at GAK-1 project.

EVOSTC Funding Requested *(including 9% GA)*

FY17	FY18	FY19	FY20	FY21	TOTAL
$146,800	$148,400	$132,600	$125,600	$127,400	$680,800

Non-EVOSTC Funding Available

FY17	FY18	FY19	FY20	FY21	TOTAL
$0	$0	$0	$0	$0	$0

Science Panel comment: *This long-term data set provides critical information to both Programs and to researchers beyond the Programs. The resultant data are heavily used. The Panel supports the continued funding of this work. The Panel also awaits seeing new analyses that integrate these environmental variables into the changing abundances of members of the food webs of importance.*

PI Response:

- Thank you for the comment. The proposal was not revised.

Sincerely,

Mandy Lindeberg
Gulf Watch Alaska Program Lead designate

Attachment: Gulf Watch Alaska: Environmental Drivers Component Project Proposal: 17120114-I—Long-term Monitoring of Oceanographic Conditions in the Alaska Coastal Current from Hydrographic Station GAK-1

EVOSTC FY17-FY21 INVITATION FOR PROPOSALS
PROGRAM PROJECT PROPOSAL SUMMARY PAGE

Project Title

Gulf Watch Alaska: Environmental Drivers Component Project:

17120114-I—Long-term Monitoring of Oceanographic Conditions in the Alaska Coastal Current from Hydrographic Station GAK-1

Primary Investigator(s) and Affiliation(s)

Seth L. Danielson, Principal Investigator, University of Alaska Fairbanks

Thomas J. Weingartner, Co-Investigator, University of Alaska Fairbanks

Date Proposal Submitted

24 August 2016

Project Abstract

This program continues a 45-year time-series of temperature and salinity measurements at hydrographic station GAK-1. The data set, which began in 1970, now consists of quasi-monthly conductivity-temperature versus depth (CTD) casts and a mooring outfitted with seven temperature/conductivity recorders distributed throughout the water column and a fluorometer at 20 m depth. The project monitors five important Alaska Coastal Current (ACC) ecosystem parameters that quantify and help us understand hourly to seasonal, interannual and multi-decadal period variability in:

1. Temperature and salinity throughout the 250 m deep water column
2. Near surface stratification
3. Surface pressure fluctuations
4. Fluorescence as an index of phytoplankton biomass
5. Along-shelf transport in the ACC

All of these parameters are basic descriptors that characterize the workings of the inner shelf and the ACC, an important habitat and migratory corridor for organisms inhabiting the northern Gulf of Alaska (GOA), including Prince William Sound (PWS). We are aware of 69 publications utilizing data collected at station GAK-1 and since 2000 the citation list has grown by nearly three publications per year. GAK-1 data are cited within at least eight student Masters theses and Doctoral dissertations, peer-reviewed papers, and both State of Alaska and federal agency reports. The topics covered by these publications range from physical oceanography and climate through lower- and upper-trophic (including commercial fisheries) level components and ecosystem analyses.

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

FY17	FY18	FY19	FY20	FY21	TOTAL
$146.8	**$148.4**	**$132.6**	**$125.6**	**$127.4**	**$680.8**

Non-EVOSTC Funding Available

FY17	FY18	FY19	FY20	FY21	TOTAL
0	**0**	**0**	**0**	**0**	**0**

1. Executive Summary

The goal of the GAK-1 project is to provide a long-term high-quality reference dataset for the coastal northern GOA that enables scientists, students, commercial and subsistence fishers and resource managers to better understand climatic and ecological conditions, their changes, and ramifications of change (Figure 1). Understanding, anticipating, and responding to change requires a stationary frame of reference in the form of long-term in situ observations. Such datasets are the best means to guide our assessments and interpretations of system variability. Untangling the relations between climatic and other drivers of change (e.g., oil spills or fishing regulations) similarly requires long reference time-series. Environmental time-series data can provide information valuable to the management of fish and shellfish populations and fisheries (Anderson and Piatt 1999, Munro and Tide 2014).

There exist no other full water column temperature and salinity time-series in the northern GOA with comparable data quality, temporal extent, and frequency of sampling. Hence, the GAK-1 dataset is the premier reference dataset for evaluating hypotheses that seek mechanistic descriptions of the regional ocean environment and ecosystem. As shown by an ever-increasing number of publications that utilize the GAK-1 dataset, the value of this unique time-series continues to grow and even accelerate with the passing years and decades.

The GAK-1 dataset is collected under the fundamental hypothesis that oceanic conditions are important to the physical and biological functioning of the PWS and GOA ecosystems. To that end, dozens of papers have examined this hypothesis from numerous perspectives (for a comprehensive listing, see the GAK-1 home page at http://www.ims.uaf.edu/gak1/). As the chemical and biological datasets begin to catch up (via quality of resolution, duration and frequency) to the physical measurements we expect that the insights gleaned through interdisciplinary analyses will grow in kind. To date, the 45-year GAK-1 time-series has helped show:

1. Large interannual differences associated with El Nino and La Nina events, including substantial differences in the spring bloom between these phenomena (Weingartner et al., 2003, Childers et al., 2005).
2. The intimate connection between coastal freshwater discharge and the depth-varying evolution of winter and spring temperatures over the shelf (Janout, 2009; Janout et al. 2010).
3. GAK-1 provides a reliable index of ACC transports of mass, heat, and freshwater (Weingartner et al., 2005).
4. That GAK-1 near-surface salinities are correlated with coastal freshwater discharge from around the GOA (Weingartner et al., 2005).

5. Variations in mixed-layer depth in the northern GOA, which affects primary production (Sakar et al., 2006).
6. Decadal scale trends in salinity and temperature, (Royer 2005; Royer and Grosch 2006, Weingartner et al. 2005, Janout et al. 2010, Kelley 2015).
7. The relationships between temperature and salinity variations and the Pacific Decadal Oscillation and the strength and position of the Aleutian Low (Royer 2005, Weingartner et al. 2005, and Janout et al. 2010).
8. That the record can guide understanding the variability in iron concentrations, a potentially limiting micro-nutrient required by many phytoplankton. Preliminary efforts indicate that iron and surface salinity are correlated at least in certain seasons (Wu et al. 2008).
9. Between about 1000 and 1500 years before present the northern GOA likely experienced a cooler, more sluggish and higher salinity ACC, whereas between 600 and 1000 years before present a stronger Aleutian Low may have driven a stronger and fresher ACC (Hallmann et al. 2011)
10. Ocean acidification (carbonate) system variability can be described using multiple linear regression models to predict dissolved inorganic carbon and total alkalinity using observations of nitrate, temperature, salinity, and pressure (Evans et al. 2013).
11. A decoupling of near-surface and near-bottom waters through increased stratification (Kelley, 2015) with implications for nutrient resupply to the euphotic zone and long-term changes in shelf productivity.

As shown and discussed by Mueter et al. (1994), Mueter (2004), and Spies (2009), these factors affect and relate to many ecosystem processes on both the shelf and within PWS and Lower Cook Inlet/Kachemak Bay.

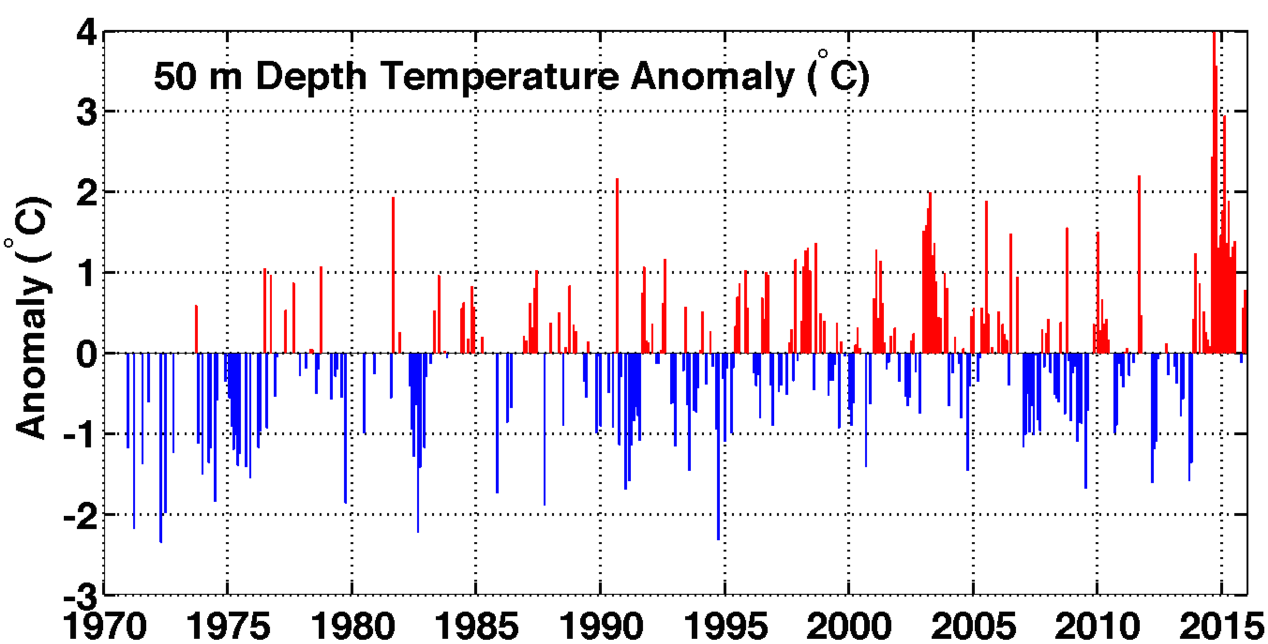

Figure 1. Temperature anomalies from the GAK-1 dataset at 50 m depth exhibit a long-term trend in warming along with signals associated with the cycles of El Nino and other phenomena.

2. Relevance to the Invitation for Proposals

The purpose of this proposal is to provide long-term monitoring data on the physical oceanography of ACC and the northern GOA shelf. The ACC is the most prominent feature of the GOA shelf circulation. It is a narrow (~40 km), swift, year-round flow maintained by the integrated forcing of winds and coastal freshwater discharge. That forcing is variable and reflected in ACC properties. The current originates on the British Columbian shelf and leaves the GOA for the Bering Sea through Unimak Pass. Substantial portions of the ACC circulate through PWS and feed lower Cook Inlet and Kachemak Bay before flowing southwestward through Shelikof Strait; another significant fraction bypasses Shelikof Strait to flow along the southeastern coast of Kodiak Island. The current controls water exchange and transmits its properties into the fjords and bays between PWS and the Alaska Peninsula. The monitoring proposed herein quantifies variability of the GOA's shelf environment. ACC monitoring provides the broader-scale context for understanding variability in adjacent marine ecosystems and its effect on particular species (e.g., herring, salmon, forage fish). The ACC's variability is transmitted to nearshore habitats around the GOA.

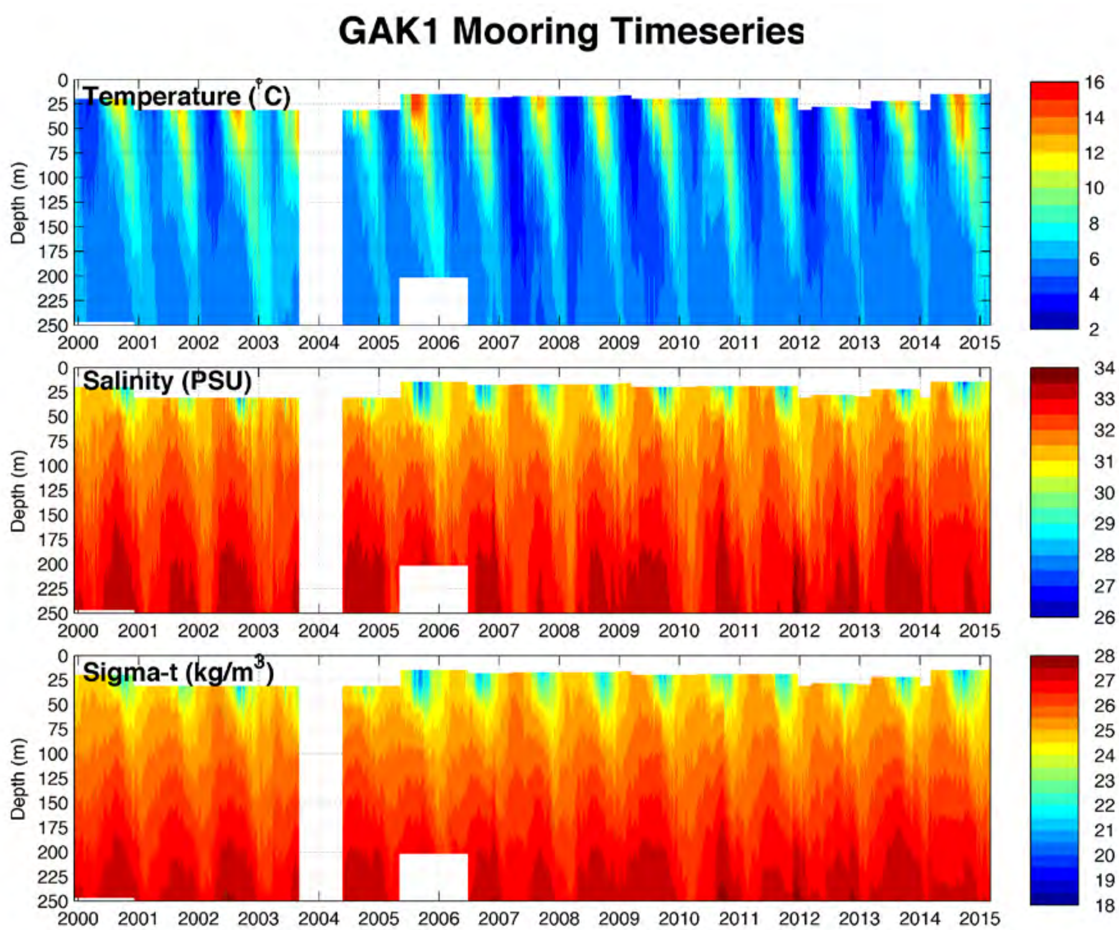

Figure 2. Time-series over 2000 to 2015 of temperature, salinity, and density (sigma-t) from the GAK-1 mooring.

Table 1. Relation between the along-shelf baroclinic transport and GAK-1 measurements of salinity and dynamic height integrated from the surface to 200 m depth (dynamic height is derived from the CTD temperature, salinity and pressure data). From left to right, the columns show the observed parameters, months that the regression holds for, fraction of variance explained by the regression, regression slope, and the 95% confidence bound on the slope. Reproduced from Weingartner et al. (2005).

GAK-1 Parameter	Months	r^2	Slope	CI
30 m Salinity	Nov-May	0.47	0.69	-0.28
50 m Salinity	Jun-Aug	0.72	0.85	-0.43
200 m Dynamic Height	Jun-Aug	0.86	0.93	-0.3

Measurements (Figures 1 and 2) at GAK-1, at the mouth of Resurrection Bay, began in 1970. Initially the sampling was opportunistic, became more regular in the 1980s and 1990s, and fully systematic beginning in 1997 with National Science Foundation Global Ocean Ecosystem Dynamics (GLOBEC) program support of Seward Line sampling that occupied station GAK-1 with multidisciplinary sampling up to 7 times per year from 1997 to 2004 and *Exxon Valdez* Oil Spill Trustee Council (EVOSTC) support of moorings and monthly CTDs. Since then it involves monthly CTD casts and from 2000 hourly temperature and salinity measurements at 6-7 depths distributed over the water column from the GAK-1 subsurface mooring (Figure 2). GAK-1 is the only station over the GOA shelf that measures both salinity and temperature over the 250 m deep water column. As shown in Table 1, the GAK-1 measurements also provide a proxy for the along-shelf transport of the ACC. With this metric we are able to assess fluctuations in the advection of passively drifting organisms, fresh water and heat in the coastal zone (Weingartner et al. 2005).

3. Project Personnel

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Please see 2 page CVs at end of this document

4. Project Design

A. Objectives

The fundamental goal of this program is to provide high quality, long-term data to quantify and understand variations that occur over short (hours to days) to long (inter-annual to multi-decadal) period variability of the GOA shelf. This measurement provides the broader temporal and spatial perspective important to our ecosystem-level understanding and management of the northern GOA. Specifically, we will measure:

1. Temperature and salinity throughout the water column,
2. Near-surface pressure fluctuations,
3. Water column stratification since this affects phytoplankton bloom dynamics
4. Fluorescence at 20 m depth as a measure of phytoplankton standing crop.

B. Procedural and Scientific Methods

Following past protocols, we propose nominally monthly CTD measurements and year-long, continuous measurements from a subsurface mooring with temperature and conductivity (T/C) recorders placed at depths of 20, 30, 60, 100, 150, 200, and 250 m. A fluorometer (Wetlabs, Inc.) is included at 20 m, to determine timing and duration of the spring, summer, and fall blooms. The fluorometer emits an illuminated beam of light (at 470 nm) that stimulates chlorophyll in the beam path. The absorbed light excites the chlorophyll molecules, which emit light (fluoresce) at a 695 nm. The emitted light is detected by the fluorometer and the intensity of the fluorescence is proportional to chlorophyll biomass. Note that fluorescence is only a relative measure of chlorophyll concentration and the signal has dependencies on temperature, phytoplankton species composition, and health of the algae cells.

The moored instruments and monthly CTD sampling schemes are complementary; the CTD provides high vertical resolution at monthly time scales and the mooring provides high temporal resolution, but at coarser vertical spacing. The monthly CTDs provide redundancy in the event an instrument fails on the mooring. The GAK-1 monthly temperature and salinity are statistically significant predictors of monthly anomalies of the alongshelf baroclinic transport in the ACC (Table 1) so ACC transport anomalies are monitored indirectly from the GAK-1 data (Weingartner et al. 2005).

The moored T/C recorders are Microcats (at depths greater than 20 m) and a SeaCat (at 20 m depth, to incorporate the fluorometer). Both are manufactured by Seabird, Inc. Seabird performs pre- and post-deployment calibrations upon which we determine sensor drift (typically ~0.01°C yr-1 and ~0.03, or better, Practical Salinity Unit yr-1). The monthly CTD casts are collected from a chartered fishing vessel resident in Seward using a portable CTD (Seabird SBE-25) or the UAF Seward Marine Center vessel the R/V Little Dipper. The SBE 25 has an accuracy ~0.01 or better for salinity and .005 °C for temperature. The mooring is recovered and re-deployed annually. Bio-fouling gradually degrades the signal quality of the fluorometer so we strive to deploy the mooring in March or early April (depending upon weather) in order to minimize fouling potential prior to the spring bloom in April or May. Temperature and salinity data are sampled at 15-minute intervals except at 20 m depth where power supply considerations for the fluorometer dictate hourly sampling.

Alternative methodologies

Autonomous underwater vehicles (AUVs) could provide higher vertical resolution than the mooring sensors and higher temporal resolution than the ship-based CTDs. AUVs have the ability to move along tracklines (e.g., along the Seward Line) or remain near one point and conduct repeat vertical profiles. They can operate for 3-4 months on a single battery charge and have the ability to fly themselves from and then back to the dock in Seward at the start and end of a mission, respectively. AUVs can also incorporate additional biological and geochemical measurement parameters. However, the AUV spin-up equipment cost (~$200k) is significant and additional technician time is needed to run the AUV. We determined that the proposed ship and mooring-based sampling methods still represent the most cost-effective balance for temporal and spatial resolution in the data collection.

C. Data Analysis and Statistical Methods

The temperature and salinity data analyses are straightforward. We will compute standard statistical estimates for each month and depth and compare these with historical data since the thrust of this effort is to quantify seasonal to interannual and longer variability. We continue to incorporate an integrated discharge time-series and air-sea heat fluxes derived from National Center for Environmental Prediction (NCEP) in our analyses of salinity and temperature variability, however the National Weather Service has changed their reporting divisions for temperature and precipitation and we will need to generate a new set of regressive relations in order to make new updates. Heat flux calculations that show winter heat losses (from the ocean to the atmosphere) are more variable both interannually and at longer periods than summer heat gains. For example, winter heat loss has decreased by nearly 20% since the mid-1970s and this change was reflected in the warming at GAK-1 through 2005. Since that time winter heat loss has increased substantially and returned to values that occurred in the early 1970s. Winter heat loss, in conjunction, with runoff, affects the ocean temperature distribution through spring when many young larvae are emerging to feed (Janout et al. 2010). On the other hand, summer heat gains appear to be relatively consistent from year to year because this is primarily a function of cloud cover. Royer et al. (2006) contend that summer surface temperatures over the shelf and in PWS are primarily a function of the stratification. They suggest that stronger stratification traps heat in the surface layer and elevates surface temperatures, whereas weaker stratification allows the heat to mix to greater depths. Within the ACC, stratification is primarily a function of the vertical salinity gradients that we are measuring at GAK-1.

We will also quantify spring and summer phytoplankton blooms in relation to changes in stratification, runoff, and winds. Stratification estimates will be made from the 3 uppermost instruments and the monthly CTD surveys. The fluorescence data will provide an estimate of the number of blooms and bloom duration observed in spring and summer. This approach is necessarily subjective since a bloom event is defined with reference to a base line, which may drift over time because of bio-fouling, and because phytoplankton species composition affects fluorometer signals. However, when present, biofouling develops after the spring bloom, so our qualitative descriptions are primarily valuable in describing year-to-year variability of the spring bloom. GLOBEC measurements, as well as those by Eslinger et al. (2001) from PWS, indicate that the timing of the spring bloom varies considerably from year-to-year perhaps by as much as several weeks or more. Weingartner et al. (2003) show that the onset of the spring bloom on the GOA shelf is tied to the quantity and phasing of winter and early spring runoff because freshwater is the principal stratifying agent in the ACC in both seasons. For example, the spring bloom in the ACC was delayed until May in 2007 and 2008 because of the weak stratification; in contrast it occurred between early to mid-April during the GLOBEC years when winters were wetter and warmer, and stratification stronger and earlier.

CTD data represents the fundamental physical hydrographic measurements and data are fully comparable to all other high-quality CTD profile and time-series data from around the globe, including profile data from the ARGOS program in the deep North Pacific. The chosen SeaBird Electronics instruments represent this manufacturer's industry-leading CTD sensors that are well known for their accuracy, stability, and low sensor drift. With a sample rate of one month for the CTD profiles we well capture seasonal-scale hydrographic anomalies and with the 15-minute MicroCat sampling we resolve the fluctuations associated with storms, tides and other high frequency motions.

D. Description of Study Area

The fieldwork will be conducted at oceanographic station GAK-1 at the mouth of Resurrection Bay. GAK-1 is located at 59° 51'N, 149° 28'W, and is located on the inner edge of the ACC midway between PWS and Cook Inlet in approximately 265 m water depth.

5. Coordination and Collaboration

Data availability

GAK-1 data provides high-resolution long-term contextual environmental data for the Gulf Watch Alaska scientific team, other researchers and agency personnel and the public at large. Data are available online at the GAK-1 website home page (http://www.ims.uaf.edu/gak1/) and through the Alaska Ocean Observing System (AOOS) Gulf of Alaska Data Portal served by Axiom. After processing, the data are posted to the GAK-1 website, submitted to the Gulf Watch Alaska data management team for archiving, and published to the AOOS-Axiom Gulf of Alaska Data Portal.

Coordination with other EVOSTC and Non-EVOSTC research

The Gulf Watch Alaska framework for integration with other principal investigators and components of the environmental drivers monitoring, and Herring Research and Monitoring and Lingering Oil programs were outlined separately in the project management proposals. In addition, we note that the GAK-1 effort has assisted many others with their research over the years both within EVOSTC funded projects and external projects. For example, in 2001-02 it provided a test bed for prototype halibut tags (developed by USGS-BRD scientists), which were then used to study halibut migrations in the GOA and the Bering Sea. The data were used by herring biologists to assess energetic costs of overwintering herring (Heintz, pers. comm), and it has been used studies of king crab (Bechtol, 2009), spiny dogfish Tribuzio (2009), the community structure of rocky coasts (Ingolfsson, 2005), rock sole (Fedewa et al., 2015) and salmon (Boldt and Haldorson, 2002). We have had requests from Steve Moffitt (Alaska Department of Fish and Game salmon biologist) to use this data as an aid in salmon forecasts (see Eggers et al., 2013; Munro and Tide, 2014) and we are aware of several GOA fishermen who routinely access this data set. The GAK-1 data are also used by the AOOS-supported ocean acidification (OA) monitoring study on the surface buoy nearby to GAK-1, which is known as mooring GAK-OA (Evans et al., 2013). Many other similar examples can be found in the publication list at the GAK-1 website (http://www.ims.uaf.edu/gak1/).

We have assisted the National Park Service (NPS) in establishing a similar monthly sampling and data processing protocol in Glacier Bay National Park and Preserve through the Inventory and Monitoring program (http://science.nature.nps.gov/im/units/sean/default.aspx), which also serves their data online. The sampling in Glacier Bay therefore provides a complementary data set that is made upstream in terms of the general circulation characteristics of the GOA shelf. Collectively, the Glacier Bay, PWS, Cook

Inlet, and GAK-1 data sets provide a broad-scale perspective of the GOA shelf environment. We are collaborating at no cost to this proposal with NPS scientists using CTD sampling and analysis protocols identical to those at GAK-1. Since southeast Alaska waters contribute to the ACC, the 24-year Glacier Bay time-series provides the opportunity to assess variability in the northeast and northwest GOA and to understand how these regions co-vary and how the ACC evolves as if flows westward toward PWS.

6. Schedule

PROJECT MILESTONES

- **Task 1**
  Collect monthly CTD profiles; process profile data and upload to the GAK-1 and AOOS websites.
- **Task 2**
  Annually deploy and recover GAK1 mooring; process mooring data and upload to the GAK-1 and AOOS websites.
- **Task 3**
  Determine seasonal changes in the water column stratification since this affects phytoplankton bloom dynamics. Updated annually in accordance with the processing of the mooring data.

MEASURABLE PROJECT TASKS

Measureable project tasks are presented by fiscal year and quarterly graphically in Table 2 and descriptively below.

Table 2. Schedule of Measurable Program Tasks

Task	FY17				FY18				FY19				FY20				FY21			
	Quarter (EVOSTC FY beginning Feb. 1)																			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Data collection & processing																				
Monthly CTD Cruises	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CTD Data Processing	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CTD Data Upload to Web	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mooring Turnaround	X				X				X				X				X			
Moored Data Processing				X				X				X				X				X
Mooring Data Upload to Web				X				X				X				X				X
Reporting																				
Annual Reports	X				X				X				X				X			
Annual PI meeting				X				X				X				X				X
FY Work Plan (DPD)			X				X				X				X					

FY 2017 (Year 6)

FY17, 1st quarter (February 1, 2017 - April 30, 2017)
February: Project funding approved by EVOSTC
February, March, and April monthly CTD profile cruise
March mooring recovery and redeployment cruise
Process prior quarter's CTD profile data and update webpage

FY17, 2nd quarter (May 1, 2017 - July 31, 2017)
Ship recovered mooring instrumentation to SeaBird, Inc. for post-deployment calibrations
June and July monthly CTD profile cruise (May survey on Seward Line cruise)
Process prior quarter's CTD profile data and update webpage

FY17, 3rd quarter (August 1, 2017 - October 31, 2017)
August and October monthly CTD profile cruise (September profile on Seward Line cruise)
Process prior quarter's CTD profile data and update webpage

FY17, 4th quarter (November 1, 2017 - January 31, 2018)
Update webpage with prior year's mooring data
November, December and January monthly CTD profile cruise
Process prior quarter's CTD profile data and update webpage
Process prior year's recovered mooring data when all instruments are returned from calibration facility
Begin annual analysis and report writing

FY 2018 (Year 7)

FY18, 1st quarter (February 1, 2018 - April 30, 2018)
February, March, and April monthly CTD profile cruise
March mooring recovery and redeployment cruise
Process prior quarter's CTD profile data and update webpage

FY18, 2nd quarter (May 1, 2018 - July 31, 2018)
Ship recovered mooring instrumentation to SeaBird, Inc. for post-deployment calibrations
June and July monthly CTD profile cruise (May survey on Seward Line cruise)
Process prior quarter's CTD profile data and update webpage

FY18, 3rd quarter (August 1, 2018 - October 31, 2018)
August and October monthly CTD profile cruise (September profile on Seward Line cruise)
Process prior quarter's CTD profile data and update webpage

FY18, 4th quarter (November 1, 2018 - January 31, 2019)
Update webpage with prior year's mooring data
November, December and January monthly CTD profile cruise
Process prior quarter's CTD profile data and update webpage
Process prior year's recovered mooring data when all instruments are returned from calibration facility
Begin annual analysis and report writing

FY 2019 (Year 8)

FY19, 1st quarter (February 1, 2019 - April 30, 2019)
February, March, and April monthly CTD profile cruise
March mooring recovery and redeployment cruise
Process prior quarter's CTD profile data and update webpage

FY19, 2nd quarter (May 1, 2019 - July 31, 2019)
Ship recovered mooring instrumentation to SeaBird, Inc. for post-deployment calibrations
June and July monthly CTD profile cruise (May survey on Seward Line cruise)
Process prior quarter's CTD profile data and update webpage

FY19, 3rd quarter (August 1, 2019 - October 31, 2019)
August and October monthly CTD profile cruise (September profile on Seward Line cruise)
Process prior quarter's CTD profile data and update webpage

FY19, 4th quarter (November 1, 2019 - January 31, 2020)
Update webpage with prior year's mooring data
November, December and January monthly CTD profile cruise
Process prior quarter's CTD profile data and update webpage
Process prior year's recovered mooring data when all instruments are returned from calibration facility
Begin annual analysis and report writing

FY 2020 (Year 9)

FY20, 1st quarter (February 1, 2020 - April 30, 2020)
February, March, and April monthly CTD profile cruise
March mooring recovery and redeployment cruise
Process prior quarter's CTD profile data and update webpage

FY20, 2nd quarter (May 1, 2020 - July 31, 2020)
Ship recovered mooring instrumentation to SeaBird, Inc. for post-deployment calibrations
June and July monthly CTD profile cruise (May survey on Seward Line cruise)
Process prior quarter's CTD profile data and update webpage

FY20, 3rd quarter (August 1, 2020 - October 31, 2020)
August and October monthly CTD profile cruise (September profile on Seward Line cruise)
Process prior quarter's CTD profile data and update webpage

FY20, 4th quarter (November 1, 2020 - January 31, 2021)
Update webpage with prior year's mooring data
November, December and January monthly CTD profile cruise
Process prior quarter's CTD profile data and update webpage
Process prior year's recovered mooring data when all instruments are returned from calibration facility
Begin annual analysis and report writing

FY 2021 (Year 10)

FY21, 1st quarter (February 1, 2021 - April 30, 2021)
February, March, and April monthly CTD profile cruise
March mooring recovery and redeployment cruise

	Process prior quarter's CTD profile data and update webpage
FY21, 2nd quarter	(May 1, 2021 - July 31, 2021) Ship recovered mooring instrumentation to SeaBird, Inc. for post-deployment calibrations June and July monthly CTD profile cruise (May survey on Seward Line cruise) Process prior quarter's CTD profile data and update webpage
FY21, 3rd quarter	(August 1, 2021 - October 31, 2021) August and October monthly CTD profile cruise (September profile on Seward Line cruise) Process prior quarter's CTD profile data and update webpage
FY21, 4th quarter	(November 1, 2021 - January 31, 2022) Update webpage with prior year's mooring data November, December and January monthly CTD profile cruise Process prior quarter's CTD profile data and update webpage Process prior year's recovered mooring data when all instruments are returned from calibration facility Begin annual analysis and report writing

7. Budget

BUDGET FORMS (ATTACHED)

Completed budget forms are attached.

SOURCES OF ADDITIONAL FUNDING

None.

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Fedewa, E.J., J. A. Miller and T.P. Hurst. 2015. Pre-settlement processes of northern rock sole (*Lepidopsetta polyxystra*) in relation to interannual variability in the Gulf of Alaska., J. Sea Res., http://dx.doi.org/10.1016/j.seares.2015.11.008

Hallmann, N., Schöne, B.R., Irvine, G.V., Burchell, M., Cockelet, E.D., Hilton, M.R. 2011. An improved understanding of the Alaska coastal current: the application of a bivalve growth temperature model to reconstruct freshwater-influenced paleoenvironments. Palaios 26, 346e363

Ingolfsson, A. 2005. Community structure and zonation patterns of rocky shores at high latitudes: an interocean comparison, Journal of Biogeography, 32(1):169-182, doi:10.1111/j.1365-2699.2004.01150.x

Janout, M. A., T. Weingartner, P. Stabeno. 2013. Air-sea and oceanic heat flux contributions to the heat budget of the northern Gulf of Alaska shelf. 2013. J. Geophys. Res., 118, doi:10.1002/jgrc.20095.

Janout, M.A, T. J. Weingartner, T. Royer, and S. Danielson. 2010. On the nature of winter cooling and the recent temperature shift on the northern Gulf of Alaska shelf, J. Geophys. Res., 115, C05023, doi:10.1029/2009JC005774.

Kelley, J. 2015. An Examination of Hydrography and Sea Level in the Gulf of Alaska. M.S. Thesis, University of Alaska Fairbanks.

Mueter, F.J., B.L. Norcross and T.C. Royer. 1994. Do cyclic temperatures cause cyclic fisheries? Can. Spec. Publ. Fish. Aquat. Sci. 121:119-129.

Mueter, F.J. 2004. Gulf of Alaska. In: Marine Ecosystems of the North Pacific. PICES Special Publication 1, pp.153-175.

Munro, A. R., and C. Tide, editors. 2014. Run forecasts and harvest projections for 2014 Alaska salmon fisheries and review of the 2013 season. Alaska Department of Fish and Game, Special Publication No. 14-10, Anchorage.

Royer, T.C. 2005. Hydrographic responses at a coastal site in the northern Gulf of Alaska to seasonal and interannual forcing, Deep-Sea Research Part II-Topical Studies in Oceanography 52(1-2):267-288.

Royer, T. C. and C. E. Grosch. 2006. Ocean warming and freshening in the northern Gulf of Alaska, Geophysical Research Letters, 33 (16), L16605,doi:10.1029/2006GL026767

Sarkar, N, T. C. Royer and C. E. Grosch. 2005. Hydrographic and mixed layer depth variability on the shelf in the northern Gulf of Alaska, 1974-1998. Cont. Shelf. Res. 25:2147-2162.

Spies, R. B., editor. 2007. Long-Term Ecological Change in the Northern Gulf of Alaska, Elsevier B.V., Amsterdam, 589 pp.

Tribuzio, C.A. 2009. Life history, demography and ecology of the spiny dogfish (*Squalus acanthias*) in the Gulf of Alaska: Critical information for aiding management, Doctoral dissertation, University of Alaska Fairbanks

Weingartner, T.J. 2007. The Physical Environment of the Gulf of Alaska (Section 2.2, p 12 – 47), IN: Long Term Ecological Change in the Northern Gulf of Alaska, edited by R. B. Spies, Elsevier B.V., Amsterdam, 589 p.

Weingartner, T.J., S. Danielson, and T. C. Royer. 2005. Freshwater Variability and Predictability in the Alaska Coastal Current Deep-Sea Res., 52:169-192.

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

Wu, J., A. Aguilar-Islas, R. Rember, T. Weingartner, S. L. Danielson, and T. Whitledge. 2009. Size-fractionated iron distribution on the northern Gulf of Alaska, Geophys. Res. Lett., 36, L11606, doi:10.1029/2009GL038304.

PROJECT DATA ONLINE

Publicly available data from this project are available online at the following internet links:

UAF GAK-1 HOMEPAGE
http://www.ims.uaf.edu/gak1/data/

AOOS GULF WATCH ALASKA DATA PORTAL
http://portal.aoos.org/gulf-of-alaska.php#metadata/3c4ecb88-6436-4312-8281-ed584e020b0e/project/files

PROJECT PERSONNEL CURRICULUM VITAE

SETH LOMBARD DANIELSON

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PROFESSIONAL PREPARATION

University of Alaska Fairbanks, Ph.D. Oceanography, 2012
University of Alaska Fairbanks; M.S. Oceanography, 1996
Lehigh University; B.S. Electrical Engineering, 1990, with honors

APPOINTMENTS

Research Assistant Professor of Oceanography, IMS-UAF, Fairbanks, AK, 2013-present
Research Professional, IMS-UAF, UAF, Fairbanks, AK, 1997–2013
Driller, Polar Ice Coring Office, IMS-UAF, Fairbanks AK, 1993-1994 and UNL, Lincoln, NB, 1996-1997
Research Assistant, Institute of Marine Science, UAF, Fairbanks, AK, 1994-1996
Junior Engineer, Allen Organ Company, Macungie, PA, 1990-1992

MEMBERSHIPS

American Geophysical Union
The Oceanography Society

5 PUBLICATIONS RELATED TO GAK-1

Stabeno, P. J. S. Bell, W. Cheng, **S. L. Danielson**, N. B. Kachel, C. W. Mordy (in press) Long-term observations of Alaska Coastal Current in the northern Gulf of Alaska, *Deep-Sea Res. II*

Janout, M. A., T. J. Weingartner, T. C. Royer, **S. L. Danielson** (2010), On the nature of winter cooling and the recent temperature shift on the northern Gulf of Alaska shelf, JGR Oceans, 2009JC005774R, DOI: 10.1029/2009JC005774

Wu, J., A. Aguilar-Islas, R. Rember, T. Weingartner, **S. L. Danielson**, and T. Whitledge (2009), Size-fractionated iron distribution on the northern Gulf of Alaska, *Geophys. Res. Lett.*, 36, L11606, doi:10.1029/2009GL038304.

Weingartner, T. J., L. Eisner, G. L. Eckert, **S. L. Danielson** (2008), Southeast Alaska: oceanographic habitats and linkages (p 387-400), *J. of Biogeography*, DOI: 10.1111/j.1365-2699.2008.01994.x.

Weingartner, T. J., **S. L. Danielson**, T.C. Royer (2005), Fresh Water Variability in the Gulf of Alaska: Seasonal, Interannual and Decadal Variability, Deep-Sea Res. II, 52 (1-2): 169-191

5 SELECTED PEER-REVIEWED PUBLICATIONS

Danielson. S. L., L. Eisner, C. Ladd, C. Mordy, L. de Sousa, and T. J. Weingartner (in press) A comparison between late summer 2012 and 2013 water masses, macronutrients, and phytoplankton standing crops in the northern Bering and Chukchi Seas, Arctic Eis DSR-II Special Issue

Danielson, S. L., T. W. Weingartner, K. Hedstrom, K. Aagaard, R. Woodgate, E. Curchitser, and P. Stabeno, (2014), Coupled wind-forced controls of the Bering–Chukchi shelf circulation and the Bering Strait through- flow: Ekman transport, continental shelf waves, and variations of the Pacific–Arctic sea surface height gradient. Prog. Oceanogr. http://dx.doi.org/ 10.1016/j.pocean.2014.04.006

Grebmeier, J. M., B. A. Bluhm, L. W. Cooper, **S. L. Danielson**, K. R. Arrigo, A. L. Blanchard, J. T. Clarke, R. H. Day, K. E. Frey, R. R. Gradinger, M. Kedra, B. Konar, K. J. Kuletz, S. H. Lee, J. R. Lovvorn, B. L. Norcross, S. R. Okkonen. (2015) Ecosystem Characteristics and Processes Facilitating Persistent Macrobenthic Biomass Hotspots and Associated Benthivory in the Pacific Arctic, *Prog. Oceanogr.*,

V136, August 2015, pp. 92-114, doi:10.1016/j.pocean.2015.05.006

Danielson, S. L., K. Hedstrom, K. Aagaard, T. Weingartner, and E. Curchitser (2012), Wind-induced reorganization of the Bering shelf circulation, *Geophys. Res. Lett.*, 39, L08601, doi:10.1029/2012GL051231.

Danielson, S. L., E. N. Curchitser, K. Hedstrom, T. J. Weingartner, and P. Stabeno (2011) On ocean and sea ice modes of variability in the Bering Sea, *J. Geophys. Res.*, doi:10.1029/2011JC007389

RELATED ACTIVITIES

1997-2004: Global Ocean Ecosystem Dynamics (GLOBEC) program in the Gulf of Alaska (NSF)
2008-2014: Bering Sea Ecosystem Study (BEST) moorings and larval transport modeling (NSF)
2008-2014: Chukchi Sea Environmental Studies Program (CSESP, Shell/Conoco Phillips/Statoil)
2009-present: PI, Advisor and analyst for Glacier Bay National Park and Preserve oceanographic monitoring and associated process studies (NPS)
2012-2015: co-PI, Arctic Ecosystem Integrated Survey (Arctic Eis, BOEM)
2013-present: PI, Cook Inlet Model Computations (BOEM)
2014-present: PI, Ecosystem monitoring and detection of wind and ice-mediated changes through a year-round physical and biogeochemical mooring in the Northeast Chukchi Sea (NPRB, AOOS, Olgoonik-Fairweather, UAF)
2014-present: co-PI Measuring the pulse of the Gulf of Alaska: Oceanographic observations along the Seward Line (NPRB)
2015-present: co-PI, Arctic Marine Biodiversity Observing Network (AMBON; NOPP)

THESIS TITLES

Variability in the circulation, temperature, and salinity fields of the eastern Bering Sea shelf in response to atmospheric forcing, 2012 Ph.D. Thesis
Chukchi Sea Tidal Currents: Model and Observations, 1996 Masters Thesis.

COLLABORATORS (OUTSIDE OF UAF AND OVER LAST 48 MONTHS)

Aagaard, Knut, UW; Bluhm, Bodil, AUN; Bond, Nick, NOAA; Carmack, Eddy DFO-IOS Canada; Cross, Jessica, JISAO; Curchitser, Enrique, Rutgers; Day, Robert, ABR, Inc.; De Robertis, Alex, NOAA; Drinkwater, Kenneth, IMR; Eisner, Lisa, NOAA; Evans, Wiley, NOAA; Frey, Karen, Clark U; Gradinger, Rolf, AUN; Heintz, Ron, NOAA; Hunt, George, UW; Jakobsson, Martin, Stockholm U; Kuletz, Kathy, USFWS; Ladd, Carol, NOAA; Lauth, Robert, NOAA; Logerwell, Elizabeth, NOAA; Lovvorn, James, SIU; Martini, Kim, NOAA; Mathis, Jeremy, NOAA/UAF; Mordy, Calvin, NOAA; Overland, James, NOAA; Pickart, Robert, WHOI; Sigler, Michael, NOAA; Sousa, Leandra, NSB; Stabeno, Phyllis, NOAA; Whitehouse, Andrew, NOAA; Williams, William, DFO-IOS Canada; Wood, Kevin, NOAA; Woodgate, Rebecca, UW; Zarayskaya, Yulia, GI RAS

THOMAS J. WEINGARTNER

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EDUCATION

Ph.D. Physical Oceanography, 1990, North Carolina State University
M.S. Physical Oceanography, 1980, University of Alaska
B.S. Biology, 1974, Cornell University

SYNERGISTIC ACTIVITIES

National

- Workshop Organizer, Physical Oceanography Studies Needs for the Alaskan Beaufort Sea (sponsored by MMS, 2004)
- Past Member, GLOBEC Northeast Pacific Executive Committee, 2000 - 2003
- Past Member, Science Steering Committee, NSF - Arctic System Science-Ocean Atmosphere Ice Interaction (OAII) Shelf-Basin Interaction Project (2/98 - 2/03).
- Past Member, Science Steering Committee, NSF - ARCSS-OAII Shelf-Basin Interactions (1995 -2002)
- Past Member, UNOLS Fleet Improvement Committee (1994 – 1998)
- Member, Science Advisory Committee, Synthesis Of Arctic Research, BOEM-NOAA (2012-2015)
- Member, National Research Council Committee on "The Arctic in the Anthropocene: Emerging Research Questions" (2013 - 2014)

State of Alaska

- Member, Science Advisory Council, Alaska Sea Life Center,
- Member, Science Advisory Committee, Shell-North Slope Borough Baseline Studies Program, Barrow, Alaska (2011-2015).

University of Alaska

- Chair IMS Ship Committee (1994 – present)
- Chair (Academic Coordinator), Graduate Program in Marine Science and Limnology, SFOS (2005-07)
- Chair, Unit (Oceanography) Promotion and Tenure Committee (2010, 2012)
- Member, Unit (Oceanography) Promotion and Tenure Committee

AWARDS

Emil Usibelli Distinguished Research Award at University of Alaska, Fairbanks
2014 Alaska Marine Research Award

PROFESSIONAL EXPERIENCE

Professor; Institute of Marine Science, School of Fisheries and Ocean Sciences, U. of Alaska Fairbanks, Alaska; 6/07 – present
Associate Professor; Institute of Marine Science, School of Fisheries and Ocean Sciences, U. of Alaska Fairbanks, Alaska; 6/99 – 6/07
Assistant Professor; Institute of Marine Science, School of Fisheries and Ocean Sciences, U. of Alaska Fairbanks, Alaska; 11/93 - 1999
Research Associate; Institute of Marine Science, School of Fisheries and Ocean Sciences, U. of Alaska Fairbanks, Alaska; 9/91 - 10/93
Postdoctoral Student; Institute of Marine Science, School of Fisheries and Ocean Sciences, U. of Alaska Fairbanks, Alaska; 7/88 - 8/91

Graduate Research Assistant; Department of Marine, Earth and Atmospheric Sciences, North Carolina State U.; Raleigh, North Carolina; and Department of Marine Science, U. of South Florida; St. Petersburg, Florida; 8/84 - 10/88

ADDITIONAL APPOINTMENTS

Affiliate Senior Oceanographer, Applied Physics Laboratory, University of Washington, (2000 – 2014)
Affiliate Professor, College Natural Science and Mathematics, University of Alaska Fairbanks

REFEREED PUBLICATIONS (PUBLISHED, IN PRESS OR SUBMITTED)

1) Kasper, J. and T. Weingartner. 2015. The spreading of a buoyant plume beneath a landfast ice cover. *Journal of Physical Oceanography* 45: 478 – 494.
2) Lu, K., T. Weingartner, S. Danielson, P. Winsor, E. Dobbins, K. Martini, and H. Statscewich, 2015. Lateral mixing across ice meltwater fronts of the Chukchi Sea shelf. *Geophys. Res. Lett.*, 42, 6754–6761, doi:10.1002/2015GL064967.
3) Fang, Y-C., T. J. Weingartner, R. A. Potter, H. Statscewich, P. R. Winsor. Quality Assessment of HF Radar Derived Surface Currents Using Optimal Interpolation. 2015. *Journal of Atmospheric and Oceanic Technology,* 32:282-296. doi: 10.1175/JTECH-D-14-00109.1
4) Day, R. H., T. J. Weingartner, R. R. Hopcroft, L. A. M. Aerts, A. L. Blanchard, *A. E. Gall, B. J. Gallaway, D. E. Hannay, B. A. Holladay, J. T. Mathis, B. L. Norcross, and S. S. Wisdom. 2013. The offshore northeastern Chukchi Sea: a complex high-latitude system. *Continental Shelf Research*. http://dx.doi.org/10.1016/j.csr.2013.02.002.
5) Weingartner, T., E. Dobbins, S. Danielson, R. Potter, H. Statscewich, and P. Winsor. 2013 Hydrographic variability over the northeastern Chukchi Sea shelf in summer-fall 2008–2010, *Continental Shelf Research*. http://dx.doi.org/10.1016/j.csr.2013.03.012.

PUBLICATIONS USING OR INSPIRED BY GAK 1 DATA

1) Janout, M. A., T. Weingartner, P. Stabeno, Air-sea and oceanic heat flux contributions to the heat budget of the northern Gulf of Alaska shelf. 2013. *Journal of Geophysical Research*, 118, doi:10.1002/jgrc.20095.
2) Janout, M.A, T. J. Weingartner, T. Royer, and S. Danielson, 2010. On the nature of winter cooling and the recent temperature shift on the northern Gulf of Alaska shelf, *Journal of Geophysical Research*, 115, C05023, doi:10.1029/2009JC005774
3) Yankovsky, A. E., G. M. Maze, and T. J. Weingartner, 2010. Offshore transport of the Alaska Coastal Current water induced by a cyclonic wind field, *Geophysical Research Letters,* 37, L03604, doi:10.1029/2009GL041939
4) Williams, W. J., T. J. Weingartner, A. J. Hermann, 2010. Idealized 2-dimensional modeling of a coastal buoyancy front, or river front, under downwelling-favourable wind-forcing with application to the Alaska Coastal Current, *Journal of Physical Oceanography,* 40: 279-294.
5) Weingartner, T.J., S. Danielson, and T. C. Royer. 2005. Freshwater Variability and Predictability in the Alaska Coastal Current *Deep-Sea Research*, 52: 169 – 192.

COLLABORATORS

Aagaard, Knut, University of Washington
Brugler, Eric, WHOI
Curcuitser, Enrique, Rutgers
Day, Robert, ABR, Inc.
De Sousa, Leandra, North Slope Borough
Hannay, David JASCO
Pickart, Robert WHOI
Stabeno, Phyllis, NOAA
Williams, William, DFO-Canada
Woodgate, Rebecca, University of Washington

Budget Category:	Proposed FY 17	Proposed FY 18	Proposed FY 19	Proposed FY 20	Proposed FY 21	TOTAL PROPOSED	ACTUAL CUMULATIVE
Personnel	$47.1	$48.2	$49.3	$50.4	$51.6	$246.6	
Travel	$4.4	$4.4	$4.4	$4.4	$4.4	$21.9	
Contractual	$18.7	$18.7	$18.7	$18.7	$18.7	$93.3	
Commodities	$6.1	$6.1	$6.1	$6.1	$6.1	$30.5	
Equipment	$39.3	$39.5	$23.7	$15.8	$16.0	$134.3	
Indirect Costs (*25% of non-equip.*)	$ 19	$ 19	$ 20	$ 20	$ 20	$ 98	
SUBTOTAL	$134.6	$136.2	$121.7	$115.2	$116.8	$624.6	
General Administration (9% of	$12.1	$12.3	$11.0	$10.4	$10.5	$56.2	N/A
PROJECT TOTAL	$146.8	$148.4	$132.6	$125.6	$127.4	$680.8	
Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	

COMMENTS:

FY17-21

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

NON-TRUSTEE AGENCY SUMMARY PAGE

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Seth Danielson	Principal Investigator	1.0	12.8		12.8
Tom Weingartner	Co-Investigator	0.4	17.3		7.6
Peter Shipton	Mooring and field technician	1.5	7.7	5.6	16.9
Elizabeth Dobbins	Analyst	1.0	9.8		9.8
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	47.6	5.6	
				Personnel Total	$47.1

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
GulfWatch PI Meeting	0.4	1	5	0.1	0.7
GulfWatch PI Meeting:lodging			4	0.1	0.4
GulfWatch PI Meeting: ground transportation			1	0.1	0.1
GAK1 Team Meeting	0.4	5	5	0.1	2.3
GAK1 Team Meeting:lodging			4	0.2	0.7
GAK1 Team Meeting: car rental			5	0.1	0.3
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$4.4

FY17

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

FORM 3B PERSONNEL & TRAVEL DETAIL

Contractual Costs: Description	Contract Sum
Vessel Charter for CTDs - 8 1-day trips, $1500/day	12.0
Vessel Charter for Moorings - 2 1-day trips, $2000/day	4.0
Instrument Calibrations and refurbishments	1.9
Shipping	0.8
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$18.7

Commodities Costs: Description	Commodities Sum
Project supplies	0.5
Instrument batteries and hardware	0.9
Mooring floats, cages, line, etc	4.8
Commodities Total	$6.1

FY17

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

FORM 3B CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
SBE37	1.0	7.5	7.5
SBE16	1.0	24.1	24.1
Mooring fabrication & construction	1.0	7.7	7.7
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$39.3

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency
SBE37	12	UAF
SBE16	2	UAF
Floats, cages, line	2	UAF

FY17

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

FORM 3B
EQUIPMENT DETAIL

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Seth Danielson	Principal Investigator	1.0	13.0		13.0
Tom Weingartner	Co-Investigator	0.4	17.6		7.8
Peter Shipton	Mooring and field technician	1.5	7.9	5.7	17.3
Elizabeth Dobbins	Analyst	1.0	10.1		10.1
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	48.6	5.7	
				Personnel Total	$48.2

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
GulfWatch PI Meeting	0.4	1	5	0.1	0.7
GulfWatch PI Meeting:lodging			4	0.1	0.4
GulfWatch PI Meeting: ground transportation			1	0.1	0.1
GAK1 Team Meeting	0.4	5	5	0.1	2.3
GAK1 Team Meeting:lodging			4	0.2	0.7
GAK1 Team Meeting: car rental			5	0.1	0.3
					0.0
					0.0
					0.0
				Travel Total	$4.4

FY18

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

FORM 3B
PERSONNEL & TRAVEL DETAIL

Contractual Costs: Description	Contract Sum
Vessel Charter for CTDs - 8 1-day trips, $1500/day	12.0
Vessel Charter for Moorings - 2 1-day trips, $2000/day	4.0
Instrument Calibrations and refurbishments	1.9
Shipping	0.8
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$18.7

Commodities Costs: Description	Commodities Sum
Project supplies	0.5
Instrument batteries and hardware	0.9
Mooring floats, cages, line, etc	4.8
Commodities Total	$6.1

FY18

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

FORM 3B CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
SBE37	1.0	7.5	7.5
SBE16	1.0	24.1	24.1
Mooring fabrication & construction	1.0	7.9	7.9
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$39.5

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency
SBE37	12	UAF
SBE16	2	UAF
Floats, cages, line	2	UAF

FY18

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

FORM 3B
EQUIPMENT DETAIL

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Seth Danielson	Principal Investigator	1.0	13.3		13.3
Tom Weingartner	Co-Investigator	0.4	18.0		7.9
Peter Shipton	Mooring and field technician	1.5	8.1	5.8	17.8
Elizabeth Dobbins	Analyst	1.0	10.3		10.3
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	49.7	5.8	
				Personnel Total	$49.3

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
GulfWatch PI Meeting	0.4	1	5	0.1	0.7
GulfWatch PI Meeting:lodging			4	0.1	0.4
GulfWatch PI Meeting: ground transportation			1	0.1	0.1
GAK1 Team Meeting	0.4	5	5	0.1	2.3
GAK1 Team Meeting:lodging			4	0.2	0.7
GAK1 Team Meeting: car rental			5	0.1	0.3
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$4.4

FY19

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

FORM 3B
PERSONNEL & TRAVEL DETAIL

Contractual Costs: Description	Contract Sum
Vessel Charter for CTDs - 8 1-day trips, $1500/day	12.0
Vessel Charter for Moorings - 2 1-day trips, $2000/day	4.0
Instrument Calibrations and refurbishments	1.9
Shipping	0.8
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$18.7

Commodities Costs: Description	Commodities Sum
Project supplies	0.5
Instrument batteries and hardware	0.9
Mooring floats, cages, line, etc	4.8
Commodities Total	$6.1

FY19

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

FORM 3B CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
SBE37 temperature-conductivity-pressure datalogger	1.0	7.5	7.5
Mooring fabrication & construction	1.0	8.1	8.1
Mooring fabrication & construction	1.0	8.1	8.1
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$23.7

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency
SBE37	12	UAF
SBE16	2	UAF
Floats, cages, line	2	UAF

FY19

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

FORM 3B
EQUIPMENT DETAIL

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Seth Danielson	Principal Investigator	1.0	13.6		13.6
Tom Weingartner	Co-Investigator	0.4	18.4		8.1
Peter Shipton	Mooring and field technician	1.5	8.3	6.0	18.2
Elizabeth Dobbins	Analyst	1.0	10.6		10.6
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	50.8	6.0	
				Personnel Total	$50.4

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
GulfWatch PI Meeting	0.4	1	5	0.1	0.7
GulfWatch PI Meeting:lodging			4	0.1	0.4
GulfWatch PI Meeting: ground transportation			1	0.1	0.1
GAK1 Team Meeting	0.4	5	5	0.1	2.3
GAK1 Team Meeting:lodging			4	0.2	0.7
GAK1 Team Meeting: car rental			5	0.1	0.3
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$4.4

FY20

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

FORM 3B PERSONNEL & TRAVEL DETAIL

Contractual Costs: Description	Contract Sum
Vessel Charter for CTDs - 8 1-day trips, $1500/day	12.0
Vessel Charter for Moorings - 2 1-day trips, $2000/day	4.0
Instrument Calibrations and refurbishments	1.9
Shipping	0.8
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$18.7

Commodities Costs: Description	Commodities Sum
Project supplies	0.5
Instrument batteries and hardware	0.9
Mooring floats, cages, line, etc	4.8
Commodities Total	$6.1

FY20

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

FORM 3B CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
SBE37 temperature-conductivity-pressure datalogger	1.0	7.5	7.5
Mooring fabrication & construction	1.0	8.3	8.3
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$15.8

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency
SBE37	12	UAF
SBE16	2	UAF
Floats, cages, line	2	UAF

FY20

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

FORM 3B
EQUIPMENT DETAIL

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Seth Danielson	Principal Investigator	1.0	13.8		13.8
Tom Weingartner	Co-Investigator	0.4	18.7		8.2
Peter Shipton	Mooring and field technician	1.5	8.5	6.1	18.7
Elizabeth Dobbins	Analyst	1.0	10.8		10.8
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
		Subtotal	51.9	6.1	
				Personnel Total	$51.6

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
GulfWatch PI Meeting	0.4	1	5	0.1	0.7
GulfWatch PI Meeting:lodging			4	0.1	0.4
GulfWatch PI Meeting: ground transportation			1	0.1	0.1
GAK1 Team Meeting	0.4	5	5	0.1	2.3
GAK1 Team Meeting:lodging			4	0.2	0.7
GAK1 Team Meeting: car rental			5	0.1	0.3
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$4.4

FY21

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

FORM 3B
PERSONNEL & TRAVEL DETAIL

Contractual Costs: Description	Contract Sum
Vessel Charter for CTDs - 8 1-day trips, $1500/day	12.0
Vessel Charter for Moorings - 2 1-day trips, $2000/day	4.0
Instrument Calibrations and refurbishments	1.9
Shipping	0.8
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$18.7

Commodities Costs: Description	Commodities Sum
Project supplies	0.5
Instrument batteries and hardware	0.9
Mooring floats, cages, line, etc	4.8
Commodities Total	$6.1

FY21

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

FORM 3B CONTRACTUAL & COMMODITIES DETAIL

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
SBE37 temperature-conductivity-pressure datalogger	1.0	7.5	7.5
Mooring fabrication & construction	1.0	8.5	8.5
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$16.0

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency
SBE37	12	UAF
SBE16	2	UAF
Floats, cages, line	2	UAF

FY21

Project Title: Oceanographic Conditions in the Alaska Coastal Current from GAK-1.
Primary Investigator: Seth Danielson

FORM 3B
EQUIPMENT DETAIL