FY12 INVITATION
PROPOSAL SUMMARY PAGE

Project Title: Long term monitoring: Environmental drivers component - The Seward Line: Marine Ecosystem monitoring in the Northern Gulf of Alaska.

Project Period: October 1, 2011 – September 30, 2016

Primary Investigator(s): Russell R Hopcroft, Principal Investigator (hopcroft@ims.uaf.edu)

Study Location: North-central coastal Gulf of Alaska, Prince William Sound

Abstract: This project is a component of the integrated Long-term Monitoring of Marine Conditions and Injured Resources and Services submitted by McCammon et. al.
The ocean undergoes year-to-year variability in the physical environment, superimposed on longer-term cycles, and potential long-term trends. These variations influence ocean chemistry, and propagate through the lower trophic levels, ultimately influencing fish, seabirds and marine mammals. Over the past 50 years the Northern Pacific appears to have undergone at least one clear "regime shift", while the last 12 years have seen multi-years shifts of major atmospheric indices, leaving uncertainty about what regime the coastal Gulf of Alaska is currently in. Regime shifts are often expressed as fundamental shifts in ecosystem structure and function, such as the 1976 regime shift that resulted in a change from a shrimp dominated fisheries to one dominated by pollock, salmon and halibut. Long-term observations are also critical to describe the current state, and natural variability inherent in an ecosystem at risk of significant anthropogenic impact. Given the potential for such profound impacts, this proposal seeks to continue multidisciplinary observations which began in 1997 along the Seward Line and in PWS that assess the current state of the Northern Gulf of Alaska, during 2012-2017. Such observations form critical indices of ecosystems status that help us understand some key aspects of the stability or change in upper ecosystems components for both the short and longer-term. By analogy, the weather has been for more than a hundred years, yet regular observations are still needed to know what is happening and what can be expected in the near future.

Estimated Budget:
EVOSTC Funding Requested (including 9% GA):
2012 - $98,104; 2013 - $59,841; 2014 - $100,494; 2015 - $104,007; 2015- $107,703

Non-EVOSTC Funds to be used:
2012 - $200,000; 2013 - $300,000; 2014 - $300,000; 2015 - $300,000; 2015- $300,000
Sources: AOOS, NPRB, NOAA, UAF

Date: May 25, 2011

(NOT TO EXCEED ONE PAGE)

PROJECT PLAN

I. NEED FOR THE PROJECT

A. Statement of Problem

Long times-series are required for scientists to tease out pattern (and cause) from simple year-to-year variability. Like other regions, the Northern Pacific undergoes significant inter-annual variability, driven partially by variations in major climatic indices (e.g. El Niños, the Pacific Decadal Oscillation). Larger longer-term variations referred to as "regime shifts" have occurred in the past, and will likely occur again. Regime shifts are expressed as fundamental shifts in ecosystem structure and function, such as the 1976 regime shift that resulted in a switch within the Gulf of Alaska from a shrimp-dominated fishery to one dominated by pollock, salmon and halibut. Long-term observations are also critical to describe the current state, and natural variability inherent in an ecosystem at risk of significant anthropogenic impact. Given the potential for such profound impacts, the Seward Line Long-term Observation Program (http://www.sfos.uaf.edu/sewardline/) provides these critical observations on the current state of the Northern Gulf of Alaska ecosystem.

The Seward Line represents the most comprehensive long-term multidisciplinary sampling program in the Coastal Gulf of Alaska that allows observation of changes in the oceanography of this region that is critical to Alaska's fisheries, subsistence and tourist economies. Seward Line observations over the past 13 years have fundamentally revised our understanding of the coastal Gulf of Alaska ecosystem and allow us an appreciation of not only its major properties, but also their inter-annual variability. To date, we have observed both unusually warm and cold years, which influence the timing of the planktonic communities, but not necessarily their ultimate abundance and biomass. The quantity and composition of both late spring and summer zooplankton, appear to be significantly correlated with PWS hatchery Pink Salmon survival in this region; relationships to herring have yet to be explored. Thus, springtime abundance of zooplankton along the Seward Line appears to be an index of generally favorable years for higher trophic levels throughout the Gulf of Alaska. The larger GOA-IERP program, which the Seward Line provides an oceanographic foundation for, will explore broader regional patterns as well as search for relationships between oceanography and other species of forage and commercial fish.

B. Relevance to 1994 Restoration Plan Goals and Scientific Priorities

Please see pages 2-4 of the integrated proposal titled "Long-Term Monitoring of Marine Conditions and Injured Resources and Services," and submited by McCammon et. al

II. PROJECT DESIGN

A. Objectives

The scientific purpose of this project is to develop an understanding of the response of this marine ecosystem to climate variability, and provide baselines against which to access any other anthropogenic influences on the GOA ecosystem. Toward this end, the Seward Line cruises on the Gulf of Alaska shelf determine the physical-chemical structure, primary production and the distribution and abundance of zooplankton, along with their seasonal and inter-annual variations. Some of the data is compared with historical data sets whereas other data sets are a product of this continuing systematic sampling effort on this shelf.

Specifically, cruises:

1. Determine thermohaline, velocity, and macro-nutrient structure of the Gulf of Alaska shelf, emphasizing the Seward Line, and Prince William Sound stations (Fig.1).
2. Determine the state of carbonate chemistry (i.e. Ocean acidification)
3. Determine primary production and phytoplankton biomass distribution.
4. Determine the distribution and abundance of zooplankton.
5. Determine rates of growth and egg production of selected key zooplankton species.

B. Procedural and Scientific Methods

Overview

The Seward Line (Fig.1) is a transect of 21 stations stretching from GAK1 at the mouth of Resurrection Bay (Seward, Alaska) southward approximately 150 miles to beyond the continental shelf, augmented by 11 stations in Prince William Sound. From 1998-2004, cruises occurred 6-7 times annually. From 2005 onward the program consists of two cruises each year, in early May and early September, to capture the typical spring bloom and stabilized summer conditions, respectively. Using the USFWS vessel *Tiglax*, we determine the physical-chemical structure, algal biomass, primary (algal) production, and the distribution, abundance, biomass and productivity of zooplankton (using 2 different net types). We explore seasonal and inter-annual variations, seeking to understand how different climatic conditions influence the biological conditions in each of these years. Since in 2007 we have also monitored carbonate chemistry (i.e. ocean acidity). With EVOS support we will commence routine sampling at an additional 5-9 stations in the northern and eastern PWS, some of which have been sampled intermittently by the Seward Line program. Patterns emerging from the time series and results from each cruise are posted online at http://www.sfos.uaf.edu/sewardline/ as they become available.

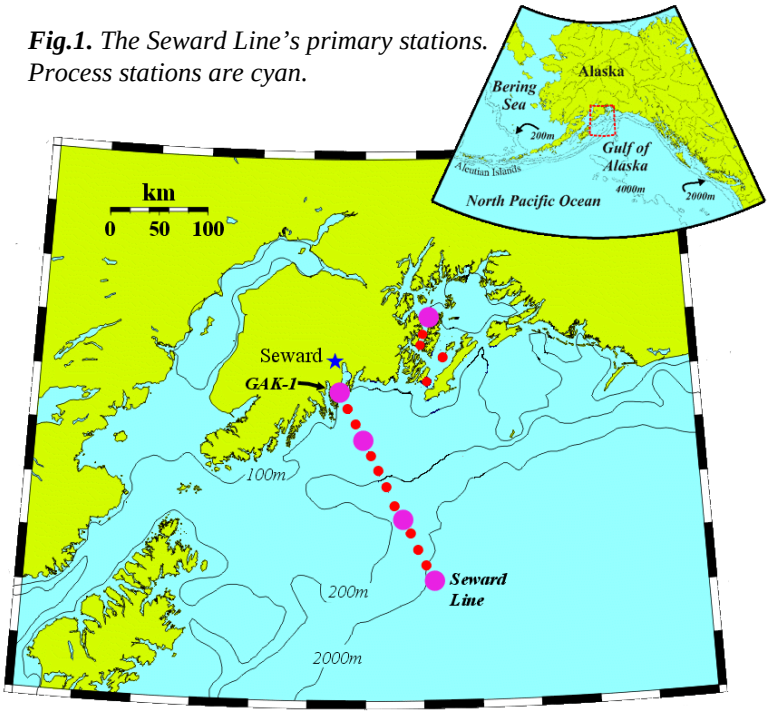

Fig.1. *The Seward Line's primary stations. Process stations are cyan.*

General Considerations

For a long-term observation series, one of the most critical requirements is consistency of sampling locations, timing of observations and methodology. We propose to employ the same set of 13 primary and 9 secondary stations along the Seward Line sampled by the GLOBEC program, which extends from the coast, across the shelf break, to the inner portion of the Alaska Stream (Fig.1). Prince William Sound represents not only a unique habitat but a key "upstream" source to the line. For over a decade we have sampled 3 Knight Island Passage stations and Montague

Strait, beginning in 2012 we will add additional station in northern and eastern PWS as well as stations across Hinchinbrook Entrance. Sampling will be conducted on 8-day cruises from the R/V *Tiglax* (home-ported in Homer) in May and early September. The early May period is consistent with sampling form 1998-2006, while the early September period captures late summer conditions as observed in 2005- 2011, but is slightly later than during the GLOBEC program. The shift to September has been necessitated by the availability of the *Tiglax.* Oceanographic sampling methodology will be close to that employed during the previous 7 years of the Gulf of Alaska GLOBEC LTOP program (i.e. U.S. GLOBEC, 1996; Weingartner *et al.*, 2002), and identical to employed during 2005-2009.

Physical, Chemical, and Phytoplankton

Weingartner is responsible for the physical measurements and Whitledge is responsible for the nutrient, chlorophyll, and primary production measurements. Mathis is responsible for measuring carbonate chemistry. Shipboard measurements include CTD fluorescence, PAR and discrete bottle samples for nutrients and chlorophyll. UAF provides a hydrographic winch with a conducting cable to the ship to facilitate sampling.

Nutrient measurements are made post-cruise on frozen samples using an Alpkem Rapid Flow Analyzer (Whitledge *et al.*, 1981) and will conform to WOCE standards (Gordon *et al.*, 1993). Tests of frozen versus refrigerated samples have indicated no significant difference between storage methods. Analytical precision for triplicate nutrient measurements is approximately 0.03-0.05 µmoles kg^{-1}. *Chlorophyll a* concentrations will be measured at all stations to calibrate the *in vivo* fluorescence profiles. The samples will be collected with the rosette on up-casts. Extracted chlorophyll *a* will be determined fluorometrically post-cruise (Parsons *et al.*, 1984).

Daily measurement of primary production rates will be estimated for large (>20 µm) and small (< 20 µm) size classes by the modified ^{14}C-uptake technique (Parsons *et al.*, 1984). Primary production estimates will be made at 4 stations along the Seward Line, plus one in the sound. Water samples inoculated with ^{13}C-labeled Na_2CO_3 will be incubated in 1-liter polycarbonate bottles under natural light conditions on-deck. Following the incubations, both light and dark bottles will be filtered, purged of inorganic carbon, and analyzed by mass spectrometry. Hourly and daily estimates of primary production rates will be calculated for each sample site. Particulate carbon and nitrogen samples will be obtained for each productivity sample.

We will collect samples at 26 CTD hydro-stations at approximately 5 km spacing along the Seward Line starting at GAK 1 and terminating at roughly to the 2,000 m isobath (GAK 13). We will also sample 15-20 stations inside Prince William Sound, particularly near major glacial outflows. We will use a rosette with 12L Niskin bottles and samples will be collected from the surface to the bottom at all locations. We anticipate collecting approximately 850 samples per cruise from the water column and another 300 underway samples. These measurements will be taken from a Sea-Bird 911+ CTD package that will be calibrated before and after the cruise and will have dual temperature and salinity sensors. The CTD package will also have a DO sensor and will be calibrated using discrete DO measurements by Mathis.

Dissolved oxygen (DO) will be sampled and processed before all other measurements to avoid compromising the samples by atmospheric gas exchange. Oxygen samples will be drawn into individual 115 ml BOD flasks, rinsed with 4-5 volumes of sample, and analyzed using an automated Winkler titration method. Samples are usually analyzed within 24 hours. The use of the UV endpoint detector will allow for increased precision (<0.08%; <0.3 µmoles kg^{-1}).

DIC and TA samples, which will be used to quantify carbonate chemistry and ocean acidification in the region will be fixed with a saturated mercuric chloride solution (200 µl), the bottles sealed, and stored until analysis. When possible, TA samples will be analyzed onboard, otherwise stored after being poisoned with $HgCl_2$. Samples will be shipped to UAF for analysis. High-quality DIC data is achieved using a highly precise (0.02%; 0.4 µmoles kg^{-1}) VINDTA 3C-coulometer system. TA is determined by potentiometric titration with a precision of ~1 µmoles kg-1. Highly accurate DIC and TA is calibrated by routine analysis of seawater certified reference materials (prepared and distributed by Andrew Dickson, UCSD), thereby providing the highest possible accuracy. The remaining carbonate parameters (pCO_2, pH, carbonate mineral saturation states) will be calculated from DIC and TA using the CO_2 SYS program (Lewis and Wallace, 1995).

The physical and chemical data will be used to quantify the seasonal, interannual, and along- and cross-shelf distributions of water masses and their variability. The data will be used along with historical data from this region (i.e. LTOP plus temperature and salinity record at GAK1 since 1970) to examine spatial and temporal variations in both physical and chemical variables and processes. Inter-decadal time scales will also be addressed through the use of sea surface temperatures (available from Scripps since 1947), Sitka air temperatures (since 1828), upwelling indices (from the Pacific Oceanographic Group/NOAA since 1946), the Pacific Decadal Oscillation (since 1900), oceanographic buoy data (from NOAA since ca. 1975) and the EVOSTC-supported continuous measurements at GAK1.

Zooplankton

Coyle and Hopcroft are responsible for the zooplankton component. Hopcroft will assume responsibility for daytime operations (finer meshed vertical plankton nets, copepod incubations) and Coyle will assume responsibility for night-time operations (Multinet collections).

Plankton nets: Day time zooplankton samples will be collected with a Quad net consisting of 25 cm diameter nets of 1.6 m length equipped with GO flowmeters. A pair of these nets is constructed of 0.15 mm mesh and will sample small, primarily early copepodid stages of calanoids (e.g., Coyle *et al.*, 1990; Coyle & Pinchuk, 2003), while nauplii and the smallest copepodid stages of neritic species will be sampled with the pair constructed of 0.05 mm mesh. The tows will be made from 100 m to the surface at the 13 stations along the Seward Line. A 0.25-m^2 Hydrobios Multinet system with 0.5 mm mesh nets will be fished at night to assess large zooplankton and micronekton, such as euphausiids that are important components in the diet of many fish, sea-birds and marine mammals. The Multinet is equipped with five nets that can be programmed to open and close at specific depths, or opened and closed electronically from the deck if a conducting cable is available. Depth, flow meter counts, and volume filtered are recorded at 1 second intervals. The nets will be fished at each of the 13 main Seward Line stations (Fig. 3), plus the 3 stations within Prince William Sound. At each station, 5 samples will be collected at 20 m depth intervals from 100 m depth to the surface. Additional Multinet collections will be made to 600m at Gak13 and PWS2 to assess over-wintering populations of *Neocalanus* spp. All zooplankton samples will be preserved in 10% formalin for later analysis by LTOP methods to the lowest taxonomic category possible. Analysis to date indicates the Multinet yields collections consistent with those obtained using a MOCNESS from 1997-2004.

During traditional taxonomic processing, all larger organisms (primarily shrimp and jelly fish) will be removed and enumerated, the sample will then be Folsom split until the smallest subsample contains about 100 specimens of the most abundant taxa. The most abundant taxa will be identified, copepodites staged, measured, enumerated and weighed with each larger

subsample examined for the larger, less abundant taxa. Blotted wet weights of all specimens of each taxa and stage will be taken on each sample with ±1 μg with a Cahn Electrobalance until weights stabilize, after which point the wet weight biomass will be estimated using mean wet weight. Wet weights on euphausiids, shrimp and other larger taxa are always measured and recorded individually for each sample.

Growth/reproduction (Hopcroft) Ongoing changes in the Gulf of Alaska will likely be a reflection of underlying change in the rates of growth and reproduction experienced by the most dominant components of the zooplankton. In the Gulf of Alaska, biomass is seasonally dominated by the large *Neocalanus* spp., although on average they may be exceeded in terms of biomass and production by *Pseudocalanus* species (Coyle & Pinchuk, 2003, 2005). We propose to work with both these species, collected using fine mesh nets at 4 stations spaced along the Seward Line, plus one inside the sound, as was done in the GLOBEC program (e.g. Napp *et al.*, 2005; Liu & Hopcroft, 2006). For *Pseudocalanus,* we propose to monitor egg production rate (EPR), because it appears to be generally reflective of somatic growth of prior developmental stages for these species in this ecosystem (Liu & Hopcroft, 2006b, 2007, 2008), and EPR generally reflects the current food climate (Runge & Roff, 2000). For these experiments, 100 females representing a mixture of the *P. mimus* and *P. newmani* are incubated individually in 70 ml flasks, and the number of eggs produced over 2 days by each population is determined (Napp *et al.*, 2005). In contrast, *Neocalanus* only spawn at great depth during the winter months, thus we must directly assess the growth rates. In this case, single stages of *Neocalanus flemingeri* are selected and incubated at low densities in 20L carboys (with natural food concentration) for 4-5 days, harvested, preserved, and the increase in stage and size later determined from the samples (Liu & Hopcroft, 2006). If time permits, EPR may also be determined for other important species (e.g. *Metridia pacifica* – Hopcroft *et al.*, 2005).

C. Data Analysis and Statistical Methods

The data undergo various forms of quality control during processing. Ultimately, data sets are uploaded to a Microsoft Access database for sorting and analysis, with data and metadata supplied to the consortium's members. The fist analytical pass is visual presentation of the data, and recalculation of long-term means, confidence intervals, and anomalies. Statistically distinct years or periods can already be identified. For biological data, multidimensional scaling of percentage dissimilarities between samples has proven an effective method of revealing cross-shelf patterns (Coyle & Pinchuk, 2005), but becomes complicated when making seasonal or inter-annual comparisons. A variety approaches to separate cyclic and long-term trends continue to be explored, but are hampered by the somewhat stochastic pattern of climate indices – truly long-term (i.e. multi-decadal) observations are required for some of these patterns to emerge.

D. Description of Study Area

See above.

E. Coordination and Collaboration with Other Efforts

Project Integration: This project links tightly with the GAK1 mooring, providing a cross shelf context for its observations. It complements the CPR, PWS, and Lower Cook Inlet/Kachemak Bay long-term monitoring efforts by providing more detailed oceanographic evaluation of the GOA shelf and the major passages in PWS than provided by the other programs. All of these components overlap in their sampling locations relatively little, enough to ensure comparability

between datasets, but not enough to be duplicative. The Seward Line cruises are timed to capture the 2 dominate states of this ecosystem at high resolution: the spring bloom and the more oligotrophic late summer. Notably, the Seward Line cruises have been monitoring Montague Strait, as requested by the RFP, since its inception.

Leveraging: This proposal seeks for EVOS to join the consortium of NPRB, AOOS and NOAA currently funding the line. We propose to add additional sampling (the central sound and Hinchinbrook Entrance) to provide more extensive representation of PWS. Full annual costs are ~400K including ship time, thus the 4 members of the consortium should each contribute ~100K per year. Substantial cost saving are anticipated in 2013 when NPRB's GOA-IERP program will cover a larger-than-normal share of the annual funding as well as provide larger sampling context throughout the Gulf of Alaska Shelf. The proposal also leverages on the consolidation of historical and contemporary information in the Gulf of Alaska planned through GOA-IERP program.

III. SCHEDULE

A. Project Milestones

As with most long-term observation programs, the Seward Line has the same Milestones annually.

Objectives 1-5. Cruises are executed early each May and in mid September collecting data or samples to address all objectives each cruise. Products associated with each objective are subsequently posted graphically to the project's website at various intervals reflecting the degree or post-processing required. Final datasets are released annually.

Typically:

- Physical oceanography and chlorophyll are posted 60 days after a cruise.
- DIC and TA are posted 90 days after a cruise.
- Macronutrients and zooplankton are posted 6 months after a cruise.
- Results are presented annually at the Alaska Marine Science Symposium

B. Measurable Project Tasks

FFY, 3rd quarter (April 1-June 30)

May	*Spring Cruise*

FFY, 4th quarter (July 1-September 30)

July	*Spring Cruise physical data and chlorophyll figures on web-site*
August	*DIC and TA figures on web-site*
September	*Late summer Cruise*

FFY, 1st quarter (October 1-December 31)

November	*Spring macronutrients and zooplankton figures on web-site*
November	*Late-summer physical data and chlorophyll figures on web-site*
December	*Late-summer DIC and TA figures on web-site*

FFY, 2nd quarter (January 1-March 31)

January	*Annual Marine Science Symposium*
March	*Late-summer macronutrients and zooplankton figures on web-site*

Presentations are anticipated annually at ASLO, OS or AGU meetings.
First peer-reviewed manuscripts submitted in Third fiscal year, and annually thereafter.

REFERENCES

Coyle, K.O., Paul, A.J. & Ziemann, D.A. (1990) Copepod populations during the spring bloom in an Alaskan subarctic embayment. *J. Plankton Res.*, **12**, 759-797.

Coyle, K.O. & Pinchuk, A.I. (2003) Annual cycle of zooplankton abundance, biomass and production on the northern Gulf of Alaska shelf, October 1997 through October 2000. *Fish. Oceanogr.*, **12**, 227-251.

Coyle, K.O. & Pinchuk, A.I. (2005) Cross-shelf distribution of zooplankton relative to water masses on the northern Gulf of Alaska shelf. *Deep-Sea Res. II.*, **52**, 217-245.

Gordon, C., Jennings, A.A. & Krest, J.M. (1993) A suggested protocol for continuous flow automated analysis of seawater nutrients (phosphate, nitrate, nitrite, and silicic acid) in the WOCE Hydrographic Program and the Joint Global Ocean Fluxes Study. pp. 51, Oregon State University, Corvalis.

Hopcroft, R.R., Pinchuk, A.I., Byrd, A. & Clarke, C. (2005) The paradox of *Metridia* spp. egg production rates: A new technique and measurements from the coastal Gulf of Alaska. *Mar. Ecol. Prog. Ser.*, **286**, 193-201.

Liu, H. & Hopcroft, R.R. (2006a) Growth and development of *Neocalanus flemingeri/plumchrus* in the northern Gulf of Alaska: validation of the artificial cohort method in cold waters. *J. Plankton Res.*, **28**, 87-101.

Liu, H. & Hopcroft, R.R. (2006b) Growth and development of *Metridia pacifica* (Copepoda: Calanoida) in the northern Gulf of Alaska. *J. Plankton Res.*, **28**, 769-781.

Liu, H. & Hopcroft, R.R. (2007) A comparison of seasonal growth and development of the copepods *Calanus marshallae* and *C. pacificus* in the northern Gulf of Alaska. *J. Plankton Res.*, **29**, 569-581.

Liu, H. & Hopcroft, R.R. (2008) Growth and development of *Pseudocalanus* spp. in the northern Gulf of Alaska. *J. Plankton Res.* **30**, 923-935.

Lewis, E.R., & Wallace, D.W.R. (1995) Basic programs for the CO_2 system in seawater. Brookhaven National Laboratory, BNL-61827.

Napp, J.M., Hopcroft, R.R., Baier, C.T. & Clarke, C. (*2005*) Distribution and species-specific egg production of *Pseudocalanus* in the Gulf of Alaska. *J. Plankton Res.*, **27**, 415-426.

Parsons, T.R., Maita, Y. & Lalli, C.M. (1984). *A manual for chemical and biological methods in seawater*. Pergamon Press, Toronto. 173 pp.

Runge, J.A. & Roff, J.C. (2000) *The measurement of growth and reproductive rates*. pp. 401-454. *In:* Harris, R.P., Weibe, P.H., Lenz, J., Skjoldal, H.R. and Huntley, M. (ed.) ICES Zooplankton Methodology Manual, Academic Press, London.

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

Whitledge, T.E., Malloy, S.C., Patton, C.J. & Wirick, C.D. (1981) Automated nutrient analyses in seawater. pp. 216, Brookhaven National Laboratory, Upton, New York.

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

Budget Category:	Proposed FY 12	Proposed FY 13	Proposed FY 14	Proposed FY 15	Proposed FY 16	TOTAL PROPOSED
Personnel	$28.8	$35.3	$68.8	$71.8	$75.1	$279.7
Travel	$2.5	$2.6	$1.4	$1.5	$1.6	$9.5
Contractual	$49.0	$3.0	$1.5	$1.5	$1.5	$56.5
Commodities	$1.2	$3.0	$2.1	$1.5	$0.9	$8.7
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Indirect Costs (*will vary by proposer*)	$8.6	$11.0	$18.4	$19.1	$19.8	$76.9
SUBTOTAL	$90.0	$54.9	$92.2	$95.4	$98.8	$431.4
General Administration (9% of subtotal)	$8.1	$4.9	$8.3	$8.6	$8.9	$38.8
PROJECT TOTAL	$98.1	$59.9	$100.5	$104.0	$107.7	$470.2
Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

COMMENTS: In this box, identify non-EVOSTC funds or in-kind contributions used as cost-share for the work in this proposal. List the amount of funds, the source of funds, and the purpose for which the funds will be used. Do not include funds that are not directly and specifically related to the work being proposed in this proposal.

FY12-16

Program Title: Seward Line
Team Leader: R. Hopcroft

SUMMARY

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

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Other Resources (Cost Share Funds)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

COMMENTS:

FY12-16

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3A
NON-TRUSTEE AGENCY
SUMMARY

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Hopcroft, R.	Principal Investigator	0.0			0.00
Mathis, J.	co-Investigator	0.5	11.20		5.60
Post doctoral fellow		1.0	5.90		5.90
Technician 1		1.0	8.27		8.27
Technician 2		1.0	9.04		9.04
		Subtotal	34.4	0.0	
				Personnel Total	$28.81

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Fairbanks to Seward (to cruise) - per diem only			32	0.03	0.96
Fairbanks to Seward (to cruise) - vehicle rental			2	0.75	1.50
				Travel Total	$2.5

FY12

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
PERSONNEL & TRAVEL DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs:		Contract
Description		Sum
shipping		1.0
CTD calibration		1.0
partial vessel lease		47.0
If a component of the project will be performed under contract, the 4A and 4B forms are required.	**Contractual Total**	$49.0

Commodities Costs:		Commodities
Description		Sum
project supplies		1.17
	Commodities Total	$1.17

FY12

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
CONTRACTUAL &
COMMODITIES DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency

FY12

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
EQUIPMENT DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Hopcroft, R.	Principal Investigator	0.0			0.00
Mathis, J.	co-Investigator	0.5	11.70		5.85
Post doctoral fellow	Investigator	4.8	6.13		29.42
Technician 1	zooplankton	0.0			0.00
Technician 2	zooplankton	0.0			0.00
		Subtotal	17.8	0.0	
				Personnel Total	$35.3

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Fairbanks to Seward (to cruise) - per diem only			32	0.03	0.96
Fairbanks to Seward (to cruise) - vehicle rental			2	0.83	1.66
				Travel Total	$2.6

FY13

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
PERSONNEL & TRAVEL DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs:		Contract
Description		Sum
shipping		2.0
CTD calibration		1.0
If a component of the project will be performed under contract, the 4A and 4B forms are required.	**Contractual Total**	$3.0

Commodities Costs:	Commodities
Description	Sum
project supplies	3.04
Commodities Total	$3.04

FY13

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
CONTRACTUAL &
COMMODITIES DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency

FY13

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
EQUIPMENT DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Hopcroft, R.	Principal Investigator	0.5	13.01		6.51
Mathis, J.	co-Investigator	0.5	12.87		6.44
Post doctoral fellow	Investigator	3.0	6.41		19.23
Technician 1	zooplankton	1.0	9.03		9.03
Technician 2	zooplankton	2.0	9.88		19.76
Technician 3	chlorophyll	0.5	9.30		4.65
Technician 4	CTD	0.3	12.62		3.16
		Subtotal	73.1	0.0	
				Personnel Total	$68.77

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Fairbanks to Seward (to cruise) - per diem only			16	0.03	0.48
Fairbanks to Seward (to cruise) - vehicle rental			1	0.91	0.91
				Travel Total	$1.4

FY14

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
PERSONNEL & TRAVEL DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs:		Contract
Description		Sum
shipping		1.0
CTD calibration		0.5
If a component of the project will be performed under contract, the 4A and 4B forms are required.	**Contractual Total**	$1.5

Commodities Costs:		Commodities
Description		Sum
project supplies		2.1
	Commodities Total	$2.1

FY14

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
CONTRACTUAL & COMMODITIES DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency

FY14

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
EQUIPMENT DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Hopcroft, R.	Principal Investigator	0.5	13.60		6.80
Mathis, J.	co-Investigator	0.5	13.45		6.73
Post doctoral fellow	Investigator	3.0	6.69		20.07
Technician 1	zooplankton	1.0	9.44		9.44
Technician 2	zooplankton	2.0	10.32		20.64
Technician 3	chlorophyll	0.5	9.73		4.87
Technician 4	CTD	0.3	13.18		3.30
		Subtotal	76.4	0.0	
				Personnel Total	$71.84

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Fairbanks to Seward (to cruise) - per diem only			16	0.03	0.48
Fairbanks to Seward (to cruise) - vehicle rental			1	1.00	1.00
				Travel Total	$1.48

FY15

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
PERSONNEL & TRAVEL
DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs:		Contract
Description		Sum
shipping		1.0
CTD calibration		0.5
If a component of the project will be performed under contract, the 4A and 4B forms are required.	**Contractual Total**	$1.5

Commodities Costs:		Commodities
Description		Sum
project supplies		1.5
	Commodities Total	$1.5

FY15

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
CONTRACTUAL &
COMMODITIES DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency

FY15

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
EQUIPMENT DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

Personnel Costs:		Months	Monthly		Personnel
Name	Project Title	Budgeted	Costs	Overtime	Sum
Hopcroft, R.	Principal Investigator	0.5	14.21		7.11
Mathis, J.	co-Investigator	0.5	14.05		7.03
Post doctoral fellow	Investigator	3.0	6.99		20.97
Technician 1	zooplankton	1.0	9.86		9.86
Technician 2	zooplankton	2.0	10.79		21.58
Technician 3	chlorophyll	0.5	10.16		5.08
Technician 4	CTD	0.3	13.78		3.45
		Subtotal	79.8	0.0	
				Personnel Total	$75.1

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Fairbanks to Seward (to cruise) - per diem only			16	0.03	0.48
Fairbanks to Seward (to cruise) - vehicle rental			1	1.10	1.10
				Travel Total	$1.58

FY16

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
PERSONNEL & TRAVEL
DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

Contractual Costs:		Contract
Description		Sum
shipping		1.0
CTD calibration		0.5
If a component of the project will be performed under contract, the 4A and 4B forms are required.	**Contractual Total**	$1.5

Commodities Costs:		Commodities
Description		Sum
project supplies		0.9
	Commodities Total	$0.9

FY16

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
CONTRACTUAL & COMMODITIES DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 12-FY16

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum

Existing Equipment Usage: Descriptior	Number of Units	Inventory Agency

FY16

Program Title: Seward Line
Team Leader: R. Hopcroft

FORM 3B
EQUIPMENT DETAIL