FY07 Invitation: Narrative Forms for Proposals

PROPOSAL SIGNATURE FORM

THIS FORM MUST BE SIGNED BY THE PROPOSED PRINCIPAL INVESTIGATOR AND SUBMITTED ALONG WITH THE PROPOSAL. If the proposal has more than one investigator, this form must be signed by at least one of the investigators, and that investigator will ensure that Trustee Council requirements are followed. Proposals will not be reviewed until this signed form is received by the Trustee Council Office.

By submission of this proposal, I agree to abide by the Trustee Council's data policy (*Trustee Council Data Policy**, adopted July 9, 2002) and reporting requirements *(Procedures for the Preparation and Distribution of Reports***, adopted July 9, 2002).

PROJECT TITLE: Biophysical Observations Aboard Alaska Marine Highway System Ferries

Printed Name of PI: Edward D. Cokelet

Signature of PI: _____ Date _____

Printed Name of co-PI: Calvin W. Mordy

Signature of co-PI: _____ Date _____

Printed Name of co-PI: W. Scott Pegau

Signature of co-PI:  Date _____

* **www.evostc.state.ak.us/Policies/data.htm**
** **www.evostc.state.ak.us/Policies/Downloadables/reportguidelines.pdf**

Trustee Council Use Only Project No._____ Date Received: _____

FY07 INVITATION
PROPOSAL SUMMARY PAGE
(to be filled in by proposer)

Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries

Project Period: 1 October 2006 – 30 September 2009 (FY07-FY09)

Proposer(s): Edward D. Cokelet, NOAA, Pacific Marine Environmental Laboratory
Calvin W. Mordy, University of Washington, Joint Institute for the Study of the Atmosphere and Ocean
W. Scott Pegau, ADF&G, Kachemak Bay Research Reserve

Study Location: Prince William Sound and Alaska Coastal Current

Abstract: Oceanographic monitoring is essential to deliver real-time ecosystem information for public and advisory use, to provide boundary conditions for numerical models and to put the marine ecosystem into an historical perspective that can reveal long-term developmental, climatic and anthropogenic changes. For example, in Prince William Sound (PWS) it is important to monitor water temperature because it affects the Pacific herring fishery through alterations in spawning timing, metabolic rate and feeding, and wintertime resistance to disease. Salinity affects circulation, therefore herring larval dispersal. Circulation models used to predict herring larval drift require periodic calibration to actual temperature and salinity observations to give realistic results.

In September 2004, we installed an EVOS-funded monitoring system aboard the Alaskan ferry M/V *Tustumena* that operated in two oil-spill areas, PWS and the Alaska Coastal Current (ACC). The monitoring system measures water temperature, salinity, and indicators of essential nutrients, phytoplankton biomass, freshwater influence and sediment load. The system operated successfully in PWS until May 2005 when the ferry was reassigned to ACC routes only. We propose to add a similar oceanographic monitoring system in PWS to the Alaskan ferry M/V *Aurora*, a volunteer observing ship that transits the sound daily. These observations will complement the present data set. Furthermore, we propose to continue *Tustumena's* ACC measurements at marginal cost to monitor essential biophysical variables in the coastal Gulf of Alaska.

Funding:

EVOS Funding Requested:	FY07 PMEL & JISAO	$ 286.5 k (must include 9%GA)
	FY07 KBRR	$ 13.8 k (must include 9%GA)
	TOTAL:	$ 300.3 k
Non-EVOS Funds to be used:	FY07 PMEL & JISAO	$ 52.1 k
	FY07 KBRR	$ 0.0 k
	TOTAL:	$ 52.1 k

Date: 3 August 2006

(NOT TO EXCEED ONE PAGE)

I. NEED FOR THE PROJECT

A. Statement of Problem

The *Exxon Valdez* Oil Spill (EVOS) of March 1989 impacted Prince William Sound (PWS) first, then the oil was transported by the Alaska Coastal Current (ACC) to the Kenai Peninsula, Cook Inlet, the Alaska Peninsula and the Kodiak Archipelago (Fig. 1). After the initial efforts to clean up the oil, work shifted to longer-term evaluation and restoration of the marine ecosystem (EVOSTC, 1994). An ecosystem consists of a community of organisms and the physical and chemical environment in which they live. There is a need to monitor the ecosystem components to determine their trends and variability, owing to both natural and human causes (EVOSTC, 2003). We propose to monitor biological, physical and chemical parameters in the ocean from two volunteer observing ships, Alaskan ferries, in Prince William Sound and in the Alaska Coastal Current (ACC). The FY07 Invitation for Proposals (EVOSTC, 2006) emphasizes Pacific herring (*Clupea pallasi*) as a resource that has not recovered in PWS. Our proposal bears on two categories of Pacific herring projects – on oceanographic monitoring directly and on modeling indirectly.

Of the oceanographic parameters that affect herring, temperature is the most studied. In PWS, readiness to spawn is related to winter and spring sea surface temperatures (Norcross *et al*., 2001). Herring spawn at 4 ºC with a mean spawn date of 20 April ± 12 days (95% CI). From 1995 to 1998, spawning occurred sequentially earlier as mean spring water temperatures increased (Gay and Vaughan, 2001). Temperature also determines the herring-egg incubation period, which is about 24 days in PWS (Biggs and Baker, 1993) compared to only 14 days in the warmer waters of British Columbia (Hourston and Haegele, 1980). Brown and Norcross (2001) found that summer temperature in PWS was one of three predictor variables that were key in the generalized additive models they tested and found to be significant. The summer temperature during July and August of the cohort year had a positive relationship to Pacific herring recruitment. These are the months of larval drift and recruitment of age-0 herring into the nursery bays. Foy and Norcross (2001) observed that lower zooplankton densities in the fall of 1997 than in 1996 were correlated with a 2 ºC increase in water temperatures in four bays of PWS. They hypothesized that the prey demand for herring rose with the temperature leading to decreased zooplankton abundance through feeding. Also thermal stratification may have been

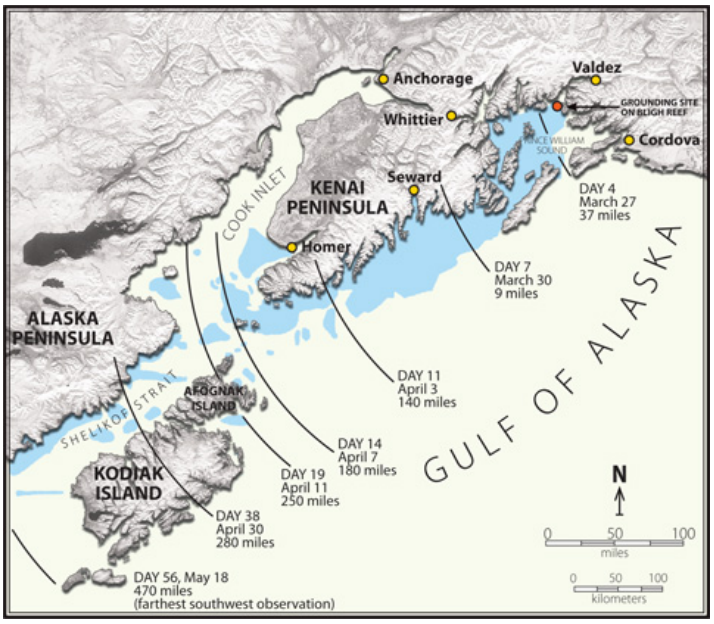

Figure 1. Map of the *Exxon Valdez* oil spill impact area from the *Exxon Valdez* Oil Spill Trustee Council's web page (http://www.evostc.state.ak.us/History/PWSmap.htm).

enhanced, reducing nutrient input to the surface layers, reducing primary production and hence secondary production. Even though the food supply for herring in the fall and winter of 1997-98 was decreased, winter survival increased possibly because the herring entered winter in better condition owing to higher growth rates during the warmer autumn. Cold temperatures may have a detrimental effect on herring. Pearson *et al*. (1999) speculated that low winter temperature may have triggered a disease outbreak leading to the 1993 decline in Pacific herring stocks in PWS. Cold temperatures have been associated with viral hemorrhagic septicemia virus (VHSV) outbreaks in other fishes. Unfortunately, Pearson *et al*. (1999) were not able to deduce a significant effect in PWS for the winter of 1992-93 due to insufficient temperature measurements.

The effects of salinity and density stratification on herring are less direct than those of temperature. The influence is primarily through currents induced by stratification. In the Sound Ecosystem Assessment (SEA) study, simulated herring larvae were released in a three-dimensional model of PWS circulation (Wang *et al*., 2001). Results show that some larvae were transported into potential nursery areas and retained in PWS while others moved out of the Sound (Norcross *et al*., 2001). Jin and Wang (2004) found that to conduct accurate simulations of the seasonal salinity cycle and surface circulation patterns, it was essential to correct their model results to measured salinity values. Without periodic calibration, their model circulation diverged from reality. Jin and Wang (2004) also found that correcting their numerical model calculations to measured temperatures was necessary to compute the correct seasonal heat cycle. Only one oceanographic time series in central PWS, at NOAA Data Buoy 46060, was available to them. We conclude that if a monitoring time series of temperature, salinity and other oceanographic variables were available along an entire ferry track, model simulations would improve over a large area. Therefore, not only will oceanographic measurements provide an environmental context for Pacific herring in PWS, but they will also improve the circulation/larval drift model – another component of herring restoration (EVOSTC, 2006, p. 46).

B. Relevance to 1994 Restoration Plan Goals and Scientific Priorities

The Monitoring and Research section of the 1994 Restoration Plan (EVOSTC, 1994, p. 25) addresses why monitoring is important:

> *A lack of long-term research into ecosystem relationships and problems may result in less effective restoration and possibly continued injury. Inadequate information may require managers to unduly restrict human use of the resources, and could compound the injury to services, such as commercial fishing and subsistence. Inadequate information may also lead to management actions that inadvertently reduce the productivity and health of a resource, inappropriate restoration actions, or restoration opportunities missed for lack of knowledge.*

Pacific herring restoration in Prince William Sound is a focus for FY07. The proposal invitation (EVOSTC, 2006, p. 47) recognizes the following:

> *Any effort to restore or enhance herring production will require understanding of the factors affecting recruitment success. Oceanographic parameters, including,*

but not limited to temperature, salinity, and zooplankton production may influence herring recruitment and population dynamics.

Therefore monitoring oceanographic parameters is a relevant proposal topic. Continuous monitoring from a volunteer observing ship that plies the study area daily is a cost-effective way to achieve this over a wide area.

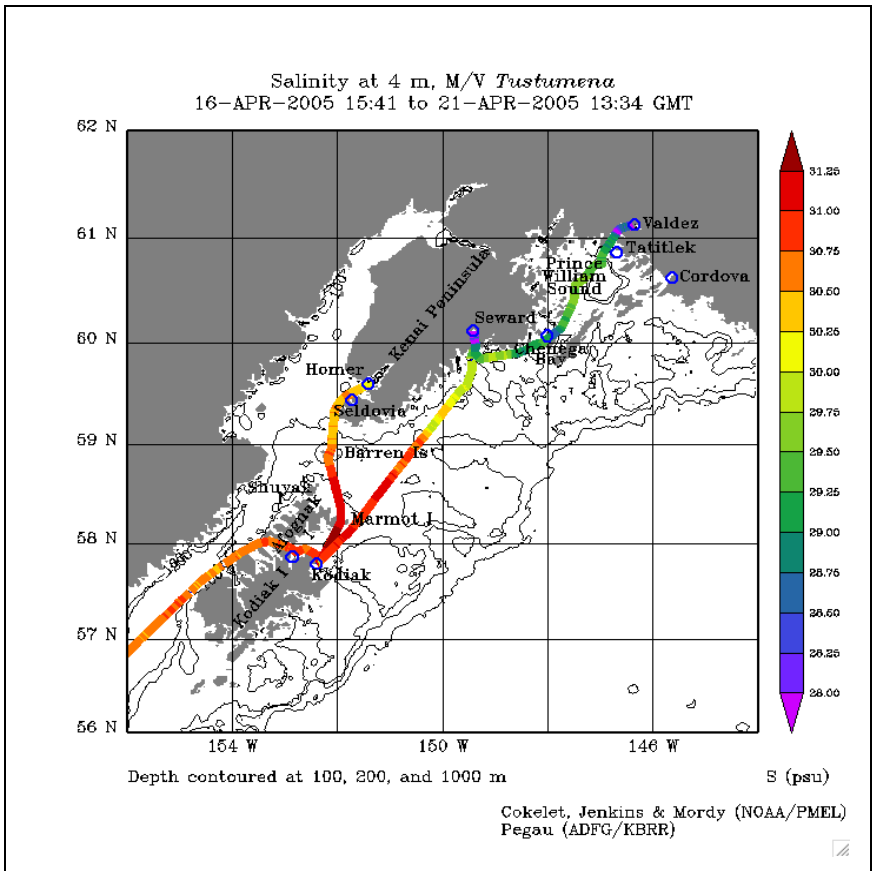

Figure 2. Map showing *Tustumena's* route in PWS and the ACC prior to 15 May 2005. The near-surface salinity is plotted along *Tustumena*'s route in April 2005. The ACC is inshore of the 30.75 psu salinity boundary.

The EVOS Trustee Council (EVOSTC) funded us for FY04-06 under the long-term, Gulf Ecosystem Monitoring and Research (GEM) Program to build and operate an oceanographic monitoring system on the Alaska Marine Highway System (AMHS) ferry M/V *Tustumena* sailing in Prince William Sound and the Gulf of Alaska. Figure 2 shows *Tustumena's* route in FY04. The goal of the monitoring system is to measure the essential variables, at reasonable cost, over a large area, for a long time. Figure 3 shows the primary instrument box in which we measure the following oceanographic variables from 4 m depth:

1. water temperature, a basic physical parameter,
2. salinity, a measure of freshwater input and density stratification,
3. dissolved nitrate, an essential nutrient for phytoplankton growth,
4. chlorophyll fluorescence, an indicator of phytoplankton concentration,
5. colored dissolved organic matter fluorescence, an indicator of terrestrial runoff, and
6. optical beam transmittance, an indicator of the total suspended particle concentration.

Figure 3. The primary instrument box on *Tustumena* containing temperature, salinity, nitrate, chlorophyll and CDOM fluorescence, and optical transmittance sensors.

This is a nearly comprehensive list of oceanographic variables that can be measured by reliable instruments requiring only occasional, hands-on maintenance (Miller, 2002). The monitoring system is cost effective because it uses standard, off-the-shelf instruments aboard a volunteer observing ship at no cost for ship time. This contrasts with oceanographic research vessels that cost $30,000 per day.

Figure 4 shows an example of our results – the time series of near-surface ocean temperature from 15 September 2004 to 15 July 2006 measured along *Tustumena's* route. (Data gaps in the first few months resulted from fouling and bubble problems that were resolved by mid-January 2005. Gaps in March-April 2005 and Nov 2005-May 2006 represent the annual shipyard maintenance period and a major vessel refit.) The annual cycle of cooling and warming sets the overall pattern as shown by the blue line representing the monthly running average. Superimposed frequent variations (red line) come from spatial differences along the track as the ship moves between confined and open waters. Temperature extremes occur in bays such as Kachemak Bay (near Homer), Resurrection Bay (near Seward) and Prince William Sound. These confined waters receive fresh water from rivers and melting glaciers that lead to thin, less-dense surface layers. The fresher layers cool in winter forming ice in places, and warm in summer. A website (http://www.pmel.noaa.gov/foci/GEM/alaska_ferry) gives more information about the system with graphs and animations.

Our monitoring system is one of the first successfully to measure dissolved nitrate underway using a new instrument, an in-situ ultraviolet spectrometer, based upon optical principles and requiring no chemical reagents and little maintenance. When first installed, the instrument quickly fouled with an invisible film composed of organic material and hull rust that blocked the ultraviolet light beam required for the measurements. After a technique to clean this film was found in July 2005, the instrument began working reliably. Figure 5 shows the nitrate time series. The high-frequency variations of the green curve are due to spatial differences as the ship

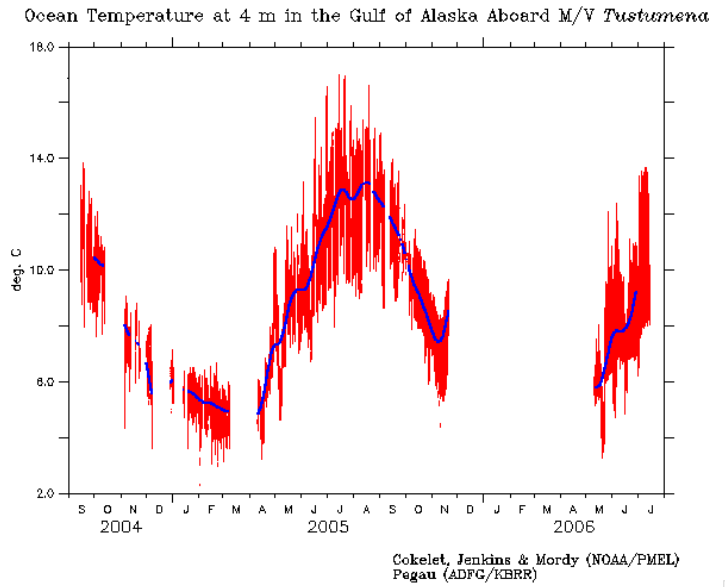

Figure 4. Time series of near-surface ocean temperature from 15 September 2004 to 15 July 2006 measured along *Tustumena's* track. The red line represents temperature measurements every 30 seconds, and the blue line is the monthly running average.

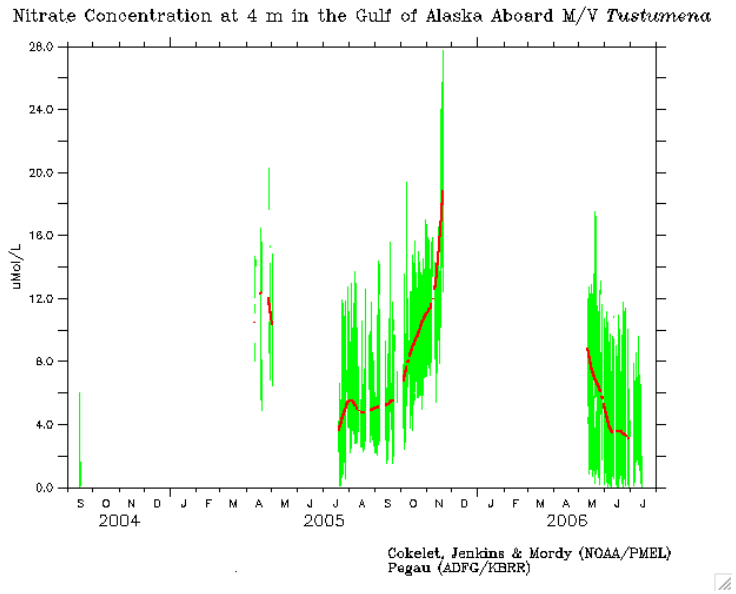

Figure 5. Time series of near-surface dissolved nitrate concentration from 15 September 2004 to 15 July 2006 measured along *Tustumena's* track. The green line represents nitrate measurements every 10 minutes, and the red line is the monthly running average.

moves from bays into the open ocean. The smooth red curve represents a monthly running average. Nitrate increases through the winter as nutrient-rich water is mixed up from depth by storms. In summer, storm mixing abates, and nitrate decreases as it is utilized by phytoplankton for growth. Nitrate is an essential nutrient for the growth of phytoplankton – the basis of the oceanic food chain. It governs primary production that is consumed by zooplankton that are eaten by herring. Monitoring nitrate will indicate when primary production is nutrient limited, impeding secondary production from the lowest trophic level.

When the project began, *Tustumena's* route crossed the oil spill area in Prince William Sound and the ACC between the Kenai Peninsula and Kodiak Island and extended along the ACC to Dutch Harbor (Fig. 2). On 15 May 2005, *Tustumena* was reassigned from PWS routes to Gulf of Alaska routes when a new fast ferry was scheduled to begin service in PWS. Figure 6 shows the new *Tustumena* routes. The ship crosses the ACC about 300 times per year, sailing daily between Homer and Kodiak. In summer, one week-long trip per month to Dutch Harbor is added.

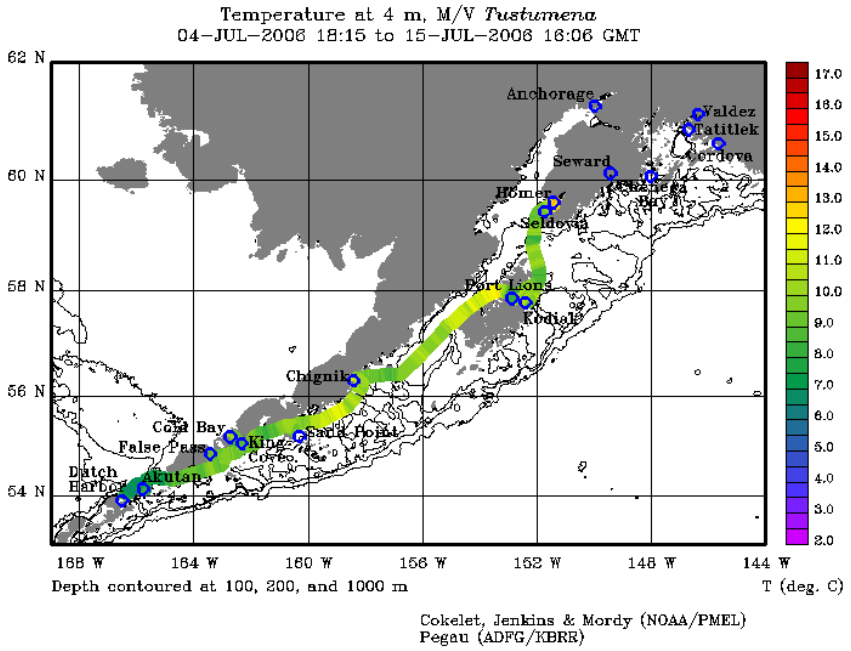

Figure 6. Map showing the routes of the Alaskan ferry *Tustumena* beginning 15 May 2005. The near-surface temperature at 4-m depth is plotted along the ship track.

Tustumena remains a valuable tool to monitor biophysical changes in the ACC, and there are several reasons for continuing the monitoring. The ACC transported the *Exxon Valdez* oil spill from PWS onto Kenai Peninsula, Alaska Peninsula and Kodiak Archipelago beaches. Furthermore, it continues to sustain the coastal marine ecosystem from Southeast Alaska to Unimak Pass, carrying a blend of oceanic water and runoff. Preliminary analysis indicates that the ferry measurements can identify the position of the ACC. Figure 2 shows the near-surface salinity measured along *Tustumena*'s route. The core of the ACC is marked by fresher water that has entered the current upstream as river runoff. The freshwater acts dynamically to drive the

current and passively to trace its course. In Figure 2 the ACC is inshore of the 30.75-psu salinity boundary on the Seward-Kodiak and Kodiak-Homer lines. Water fresher than 30.75 psu coincides remarkably with the *Exxon Valdez* oil spill impact area in Figure 1. The waters of the ACC affect the health of the Pacific herring fishery outside of PWS. It is the oceanic source for Cook Inlet where the Pacific herring fishery declined in the 1990s until closure in 1999 (Otis and Hammarstrom, 2004). Monitoring in the ACC can reveal long-term developmental, climatic and anthropogenic changes valuable to resource managers. The time series in Figure 3 shows that, at the very least, a few more years of measurements are required to define the mean annual signal in the ACC.

We propose to install a second instrument system on the Alaskan ferry *Aurora* to monitor Prince William Sound. The system will be very similar to *Tustumena's* and will take advantage of the instrument design, computer software and general expertise that we have gained. We will augment both systems with oxygen sensors. Phytoplankton produce oxygen as they photosynthesize, and the dissolved oxygen concentration serves as an index of primary production in the upper layers of the ocean.

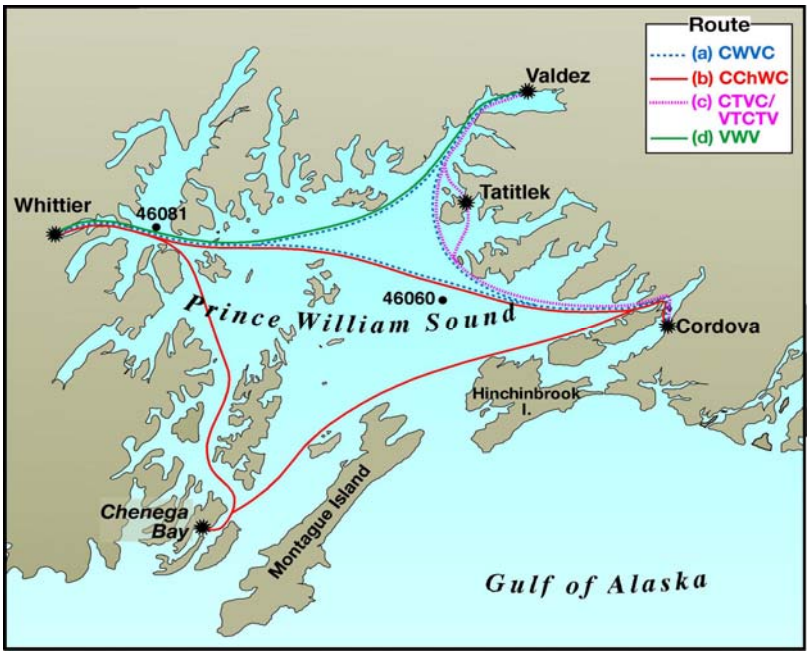

Figure 7. Map showing the routes of the Alaskan ferry *Aurora* in Prince William Sound. In winter, *Aurora* covers most of the open sound transiting one of the CWVC, CChWC or CTVC routes daily. In summer, it transits the eastern and northern sound along the VTCTV or VWV route daily. The route names derive from the ports visited. Adapted from a map of the Prince William Sound Regional Citizens' Advisory Council (http://www.pwsrcac.org/resources/maps.html).

Aurora is a good candidate for a monitoring system because it serves PWS in winter and summer (Fig. 7). In winter (October-April), *Aurora* sails between Cordova, Whittier, Valdez and Cordova (CWVC) in the north Sound about 22 days each month (Table 1). In the remaining winter periods, she sails either between Cordova, Chenega Bay, Whittier and Cordova (CChWC) in the south Sound or Cordova, Tatitlek, Valdez and Cordova (CTVC) in the east Sound. In summer (May-September), *Aurora* sails between Valdez, Whittier and Valdez (VWV) in the north Sound about 26 days each month. The remaining time she sails between Valdez, Tatitlek, Cordova, Tatitlek and Valdez (VTCTV) in the east Sound. (In summer, PWS routes are shared by a fast ferry, *Chenega*, but it is not a good candidate for a monitoring system due to weight restrictions and its rescheduling to Southeast Alaska routes in winter.) AMHS plans to keep Aurora on these routes for the foreseeable future (Mark Perez, Senior Port Engineer, personal communication). Jin and Wang's

(2004) numerical model tests demonstrated the value of oceanographic observations in PWS when model accuracy increased with periodic corrections to observations.

Table 1. Roundtrips made by M/V *Aurora* between Prince William Sound ports

Month 2005/2006	Route CWVC	Route CChWC	Route CTVC	Route VTCTV	Route VWV	Days per Month
October	23	4	4			31
November	19	6	5			30
December	23	4	4			31
January	22	4	5			31
February	21	3	4			28
March	22	5	4			31
April*	9	2	2			13
May*				1	5	6
June				3	23	26
July				4	27	31
August				4	27	31
September				4	26	30
*Shipyard period: 14 April-25 May 2006						

II. PROJECT DESIGN

A. Objectives

The goal of this proposal is to monitor the physical and biochemical properties of Prince William Sound and the Alaska Coastal Current aboard Alaskan ferries as volunteer observing ships. The specific objectives are as follows:

Objective 1: Consult with AMHS to install an automated, oceanographic sampling system on *Aurora* similar to that on *Tustumena*.

Objective 2: Build the oceanographic monitoring system for the *Aurora*.

Objective 3: Reinitiate a long-term, ferry-monitoring program in PWS aboard *Aurora* to replace that curtailed when *Tustumena* was rerouted from PWS in May 2005.
Hypothesis: Monitoring time series will establish the annual variability and interannual and decadal trends in the PWS ecosystem that are important to the Pacific herring fishery. The measurements will also provide high-resolution, temporal data to modeling teams.

Objective 4: Continue oceanographic monitoring in the ACC aboard *Tustumena*.
Hypothesis: The location and variability of the ACC can be determined from its surface properties, especially its low salinity. Conditions in the ACC relate to the herring fishery on the Kenai Peninsula, in Cook Inlet and in the Kodiak Archipelago.

Objective 5: Map surface temperature, salinity, nitrate, optical transmittance, chlorophyll fluorescence, dissolved organic matter and oxygen on *Aurora* routes within PWS and on *Tustumena* routes in the ACC. Make the data available via the worldwide web in graphical and numerical form to researchers, modelers and resource users.

B. Procedural and Scientific Methods

Objective 1: Consult with AMHS to install an automated, oceanographic sampling system on *Aurora* similar to that on *Tustumena*.

Method: We have already established a successful track record with AMHS. The *Tustumena* installation and operation have gone off without a hitch. We have an instrument design approved by a naval architect to American Bureau of Shipping standards. We have consulted often with the Captains and Chief Engineer. We have discussed the present proposal with the Senior Port Engineer at AMHS. Further discussions and a visit to the *Aurora* will take place after funding is secured.

Objective 2: Build the oceanographic monitoring system for the *Aurora*.
Method: We will build a monitoring and Iridium satellite data communication system very similar to that used on *Tustumena*. Figure 3 shows the primary instrument box. The ship is plumbed with copper-nickel pipe from an existing sea chest, to a strainer and on to the instruments. A Sea-Bird SBE-38 digital oceanographic thermometer measures temperature at the intake. In the instrument enclosure, an SBE-45 micro-thermosalinograph measures the temperature and conductivity of the water, deducing its salinity. A Satlantic ISUS nitrate sensor measures the dissolved nitrate concentration. Two WETLabs ECO fluorometers measure the fluorescence at chlorophyll and colored dissolved organic matter (CDOM) wavelengths. These are equipped with mechanical wipers to keep the optical paths clean. A WETLabs C-STAR 25 transmissometer measures optical beam transmittance. A newly added Sea-Bird SBE-43 oxygen sensor will measure the dissolved oxygen concentration. A vortex debubbler and various float valves remove air from the system. Water is filtered by 50-micron and 1-micron filters before the ISUS to remove rust particles. The system has a unique freshwater back flush mode to remove sediment and biological particles periodically when the ship reaches port. A Windows laptop computer controls the system, and observations are stored every 30 seconds except nitrate which is recorded every 10 minutes. A second instrument box holds an uninterruptible power supply for clean power and a Linux computer running MatLab. The latter controls a graphical display on a hardened, tourist-proof monitor in the passenger lounge where maps of the oceanographic observations on the current voyage are displayed. Mounted on the ship's superstructure are GPS and Iridium satellite antennas. Position data and time are measured by GPS and stored with the oceanographic data. The Iridium satellite telephone calls PMEL hourly and downloads the data files. If desired, the shipboard system can be called and new instructions uploaded to it. An automatic computer program at PMEL runs periodically to graph the results for inspection and troubleshooting. Other programs read the data, quality control (QC) it, and write it out as NetCDF files with metadata included. These files are read by Ferret scripts and produce the graphs seen on our web pages. We will add new web software that allows for graphing the results using user-selected parameters and downloading the data to the user's

computer. Shipyard work will be required (1) to run the GPS and Iridium wires from the engine room to the mast, (2) to run cable from the Windows laptop to the public display monitor, (3) to run power to the instrument boxes, and (4) to plumb from the sea chest to the primary instrument box with copper-nickel pipe.

Objective 3: Reinitiate a long-term, ferry-monitoring program in PWS aboard *Aurora* to replace that curtailed when *Tustumena* was rerouted from PWS in May 2005.
Method: System fabrication will take place during winter 2007 with shipyard work performed during *Aurora's* annual maintenance period in April-May 2007. Final installation and check-out will lead to system operation by 1 August 2007. The strainers, oxygen sensor, salinity sensor and optical instruments without automatic wipers (nitrate sensor and transmissometer) will require weekly cleaning. This work will be performed under contract by Dr. Robert Benda of Prince William Sound Community College in Valdez, AK. Sampling trips will be made aboard the ferry to take salinity, nitrate, chlorophyll and oxygen samples for instrument calibration.

Objective 4: Continue oceanographic monitoring in the ACC aboard *Tustumena*.
Method: The new oxygen sensor will be added to *Tustumena* during winter 2007. The MatLab program and data transmission system will be modified to handle the new data messages. Dr. Pegau and associates at KBRR will clean the instruments weekly. Sampling trips will be made aboard the ferry to take salinity, nitrate, chlorophyll and oxygen samples for instrument calibration. Travel will be combined with *Aurora* calibration trips to manage travel funds efficiently.

Objective 5: Map surface temperature, salinity, nitrate, optical transmittance, chlorophyll fluorescence, dissolved organic matter and oxygen on *Aurora* routes within PWS and on *Tustumena* routes in the ACC. Make the data available via the worldwide web in graphical and numerical form to researchers, modelers and resource users.
Method: Computer programs will read the data, QC it, and write it out as NetCDF files with metadata included. MatLab and Ferret scripts will read the data and draw maps such as those in Figures 2 and 4-6. New web software, such as Live Access Server, will be added to the website to allow web users to graph the results using user-selected parameters and download the data to the their computers.

C. Data Analysis and Statistical Methods

Data Frequency – Temperature, salinity, transmittance, fluorescence and oxygen data is collected between ports at a frequency of once every 30 seconds corresponding to a horizontal resolution of ~200m at a 14-knot ship speed. Nitrate measurements are made once every 10 minutes.

Error Removal: At PMEL, flow-through data are subjected to outlier removal and consistency checks via data plotting and automated techniques. This is done using Perl scripts, PMEL's EPIC and Ferret software, and Matlab.

Underway Temperature and Salinity: Temperature sensors will measure intake-water and thermosalinograph temperatures. An algorithm establishing relationships between these has

been devised and used to spot abnormal values. Sensors will be calibrated yearly by the manufacturer. The manufacturer suggests absolute accuracy better than ±0.001 °C for the SBE 38 and ±0.002 °C accuracy for the SBE 45 MicroTSG with a drift of less than 0.001 °C during a six-month period for both instruments.

Conductivity will be converted to salinity using internal calibration factors. Salinity will be measured with an accuracy of ±0.005 equivalent psu and a typical drift of 0.003 equivalent psu per month. Discrete salinity samples will be collected during sampling trips and analyzed using a Guildline Autosal (accuracy <±0.002 equivalent psu, maximum resolution <0.0002 Equivalent psu).

Aurora passes by two NOAA National Data Buoy Center buoys – 46060 in the central Sound and 46081 in the northwest Sound (Fig. 7). These measure surface temperature and salinity and will be useful for cross-checking data quality.

Underway Fluorescence and Transmittance: The WETStar chlorophyll fluorometer provides a highly sensitive (0.03 µg/l) measurement of chlorophyll fluorescence with a dynamic range of 0.03–75 µg/l (standard range). The C-Star is a single channel transmissometer precise to 1mV (0-5V signal) with a sensitivity of 1.25 mV, a temperature error of 0.02 % full scale per °C, and a linearity error of 0.1% full scale. Water samples will be taken, filtered and their chlorophyll concentration determined to provide a statistical relationship to fluorescence.

Underway Dissolved Organic Matter: The WETStar CDOM fluorometer detects colored dissolved organic matter (CDOM). It has an excitation wavelength of 370 nm, an emission wavelength of 460nm, and is sensitive to 0.05 ppb quinine sulfate with a resolution of 0.00125V (0-5V full scale).

Underway Nitrate: The Satlantic MBARI-ISUS optical nitrate sensor measures nitrate concentration by comparing the UV scan of seawater to the unique UV absorption spectra of nitrate. The claimed instrument accuracy is ± 2 mM with ± 0.05 mM precision. Discrete calibration samples will be collected from the ship's underway system, filtered, and frozen. Samples will be analyzed at PMEL according to WOCE-JGOFS protocols.

Underway Dissolved Oxygen: The Sea-Bird SBE-43 oxygen sensor measures the dissolved oxygen concentration to an initial accuracy of 2% of saturation with a stability of 2% per 1000 hours of operation with a clean membrane. Oxygen samples will be taken and analyzed for calibration.

D. Description of Study Area

The study area is defined by *Tustumena*'s and *Aurora*'s ferry routes. Both routes change between winter (from 1 October to a month-long shipyard period sometime between early March and mid-May) and summer (from the shipyard period to 1 October). Figure 6 shows the present *Tustumena* route in the ACC with approximately daily roundtrips between Homer and Kodiak and weekly trips to Dutch Harbor (summer only). The *Tustumena* routes lie between 53.9 N and

59.5 N and between 166.5 W and 151.5 W. Figure 7 shows the five routes used by *Aurora* in PWS. The *Aurora* routes lie between 60.0 N and 61.5 N and between 148.7 W and 145.5 W.

E. Coordination and Collaboration with Other Efforts

All three PIs are investigators in other programs in the Gulf of Alaska. These include NOAA/FOCI, GLOBEC and EVOSTC/GEM. These projects complement one another.

We do not know what other projects are proposed for this funding round. However, any projects involving moored oceanographic instruments in PWS bays or in the central Sound would dovetail nicely with this monitoring project. For bays, our observations would provide monitoring data on their source waters. If significant correlations were found between ferry-route observations and bay observations, that would have predictive value and would imply the ability to generalize to other bays. Circulation/drift model studies would benefit from our observations as demonstrated by the results of Jin and Wang (2004).

Our quality-controlled observations will be made freely available to other investigators. One objective is to make the numerical data downloadable from the worldwide web.

We know of no conflicts.

III. SCHEDULE

A. Project Milestones

Objective 1: Consult with AMHS to install an automated, oceanographic sampling system on *Aurora* similar to that on *Tustumena*. To be met by December 31, 2006.

Objective 2: Build the oceanographic monitoring system for the *Aurora*. To be met by July 1, 2007.

Objective 3: Reinitiate a long-term, ferry-monitoring program in PWS aboard *Aurora* to replace that curtailed when *Tustumena* was rerouted from PWS in May 2005. To be met by August 1, 2007.

Objective 4: Continue oceanographic monitoring in the ACC aboard *Tustumena*. Ongoing.

Objective 5: Map surface temperature, salinity, nitrate, optical transmittance, fluorescence, dissolved organic matter and oxygen on *Aurora* routes within PWS and on *Tustumena* routes in the ACC. Make the data available via the worldwide web in graphical and numerical form to researchers, modelers and resource users. To be met by September 30, 2007

B. Measurable Project Tasks

FY 07, 1st quarter (October 1, 2006-December 31, 2006)

October: Project funding approved by Trustee Council
November 1: Conduct a calibration cruise on the *M/V Tustumena*
December 31: Consult with AMHS staff, complete system design for the *M/V Aurora*
Modify the system design on the *M/V Tustumena* as needed

FY 07, 2nd quarter (January 1, 2007-March 31, 2007)

January 1: Conduct a calibration cruise on the *M/V Tustumena*
January: Annual EVOS Workshop
March 1: Purchase all instruments for the *M/V Aurora*
Conduct a calibration cruise on the *M/V Tustumena*
Modify the system design on the *M/V Tustumena* as needed

FY 07, 3rd quarter (April 1, 2007-June 30, 2007)

May 1: Conduct a calibration cruise on the *M/V Tustumena*
May 15: Complete shipyard work and installation of the main instrument box on the *M/V Aurora*
June 1: Conduct a calibration cruise on the *M/V Tustumena*

FY 07, 4th quarter (July 1, 2007-September 30, 2007)

July 1: Complete construction of the oceanographic monitoring system for the M/V Aurora
Conduct a calibration cruise on the *M/V Tustumena*
August 1: Oceanographic monitoring system installed and working on the *M/V Aurora*
Conduct a calibration cruise on the *M/V Tustumena*
September 1: Submit annual report
Conduct a calibration cruise on both vessels
September 30: On-line access and downloading of data from both vessels through the web site

FY 08, 1st quarter (October 1, 2007-December 31, 2007)

November 1: Conduct a calibration cruise on both vessels
December 31: Modify system design on either vessel as needed

FY 08, 2nd quarter (January 1, 2008-March 31, 2008)

January 1: Conduct a calibration cruise on both vessels
January: Annual EVOS Workshop
March 1: Modify system design on either vessel as needed
Conduct a calibration cruise on both vessels

FY 08, 3rd quarter (April 1, 2008-June 30, 2008)

May 1: Conduct a calibration cruise on both vessels
June 1: Conduct a calibration cruise on both vessels

FY 08, 4th quarter (July 1, 2008-September 30, 2008)

July 1: Conduct a calibration cruise on both vessels
August 1: Conduct a calibration cruise on both vessels
September 1: Submit annual report
Conduct a calibration cruise on both vessels

FY 09, 1st quarter (October 1, 2008-December 31, 2008)

November 1: Conduct a calibration cruise on both vessels
December 31: Modify system design on either vessel as needed

FY 09, 2nd quarter (January 1, 2009-March 31, 2009)

January 1: Conduct a calibration cruise on both vessels
January: Annual EVOS Workshop
March 1: Modify system design on either vessel as needed
Conduct a calibration cruise on both vessels

FY 09, 3rd quarter (April 1, 2009-June 30, 2009)

May 1: Conduct a calibration cruise on both vessels
June 1: Conduct a calibration cruise on both vessels

FY 09, 4th quarter (July 1, 2009-September 30, 2009)

July 1: Conduct a calibration cruise on both vessels
August 1: Conduct a calibration cruise on both vessels
September 1: Submit final report
September 30: Data analyzed and interpreted

IV. RESPONSIVENESS TO KEY TRUSTEE COUNCIL STRATEGIES

A. Community Involvement and Traditional Ecological Knowledge (TEK)

Several aspects to this project foster community interaction. Direct local involvement is represented by collaboration with Dr. Pegau and the technical staff of the Kachemak Bay Research Reserve, and with Dr. Robert Benda, biology professor at Prince William Sound Community College in Valdez, AK. Dr. Pegau and his staff help maintain the instruments on the *Tustumena*, and conduct collaborative research out of Homer. Dr. Benda will maintain the instruments on the *Aurora*. The *Tustumena* has a science display that explains the project in language oriented to the general public with a computer monitor showing the most recent time series data in real time. Doug Stuart is the U.S. Fish and Wildlife Service naturalist on the *Tustumena*. He uses our public display images in interpretive programs for passengers during summer voyages to Dutch Harbor. A similar display will be constructed on the *Aurora*, and available for viewing by the public, and for use by the U.S. Forest Service naturalist that sails on that vessel.

B. Resource Management Applications

Variability of biological populations is coincident with environmental variability, and management of biological resources can improve with a better understanding of this linkage. Data collected from the *Tustumena* has been used in oceanographic modeling efforts by NOAA/PMEL/FOCI's Dr. A. J. Hermann to refine the understanding of linkages between atmospheric forcing, variability in the ACC and biological variability. Improving the link between resource managers and scientific efforts has been discussed at recent Marine Science in Alaska Symposia, and this project represents an ideal opportunity to do so.

V. PUBLICATIONS AND REPORTS

We are requesting $1000 for publication funding. At the completion of three years of monitoring in PWS, we will submit an article to *Continental Shelf Research* or *Estuarine, Coastal and Shelf Science* with the working title "Ferrybox monitoring of the oceanic ecosystem in Prince William Sound, Alaska." We will submit annual and multi-year reports by 1 September of each fiscal year as required. We would be pleased to provide an oral briefing to the Trustee Council.

References

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Education

B.Sc. University of Washington, Oceanography, 1970
M.Sc. University of Washington, Oceanography, 1971
Ph.D. Cambridge University, England, Applied Mathematics, 1976

Professional Experience

Oceanographer, Pacific Marine Environmental Laboratory/NOAA, Seattle, 1978-present.

Oceanographer, Institute of Oceanographic Sciences, Wormley, Godalming, Surrey, England, 1975-1978.

Five Relevant Recent Publications

Cokelet, E.D., M.L. Schall, and D.M. Dougherty (1996): ADCP-referenced geostrophic circulation in the Bering Sea basin. *Journal of Physical Oceanography*, **26**(7), 1113-1128.

Cokelet, E.D., and P.J. Stabeno (1997): Mooring observations of the thermal structure, salinity, and currents in the SE Bering Sea basin. *Journal of Geophysical Research*, **102** (C10), 22,947-22,964.

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edition of *Deep Sea Research*.

U.S. GLOBEC (1996): Report on Climate Change and Carrying Capacity of the North Pacific Ecosystem. *U.S. GLOBEC Rep. 15* (A. Hollowed, H. Batchelder, N. Bond, E.D. Cokelet, ..., A. Hermann, ..., J. Overland, ..., R. Reed, ..., J. Schumacher, ..., P. Stabeno, eds.), University of California, Berkeley, CA, 95 pp.

Other Relevant Publications

Brodeur, R.D., J.M. Napp, M.T. Wilson, S.J. Bograd, E.D. Cokelet, and J.D. Schumacher (1996): Acoustic detection of mesoscale biophysical features in the Shelikof sea valley, and their relevance to pollock larvae in the Gulf of Alaska. *Fisheries Oceanography*, **5**(Suppl. 1), 71-80.

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Collaborators in past 4 Years

J. G. Bellingham – MBARI; L. L. Etherington - Cordell Bank National Marine Sanctuary; E. V. Farley, Jr. - NOAA/Auke Bay Lab.; Anthony J. Jenkins – University of Washington, JISAO; Calvin W. Mordy, University of Washington, JISAO; J. H. Moss - NOAA/Auke Bay Lab; S. R. Okkonen - U. Alaska Fairbanks; W. Scott Pegau – Kachemak Bay Research Reserve; G. M. Schmidt - SAIC; P. J. Stabeno - NOAA/PMEL; N. Tervalon – MBARI.

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PROFESSIONAL PREPARATION

Ph.D. Oregon State University, Chemical Oceanography, 1991
M.S. University of Kansas, Bioorganic Chemistry, 1986
B.S. Berry College, Chemistry, 1982

APPOINTMENTS AND AWARDS

Oceanographer, NOAA/Pacific Marine Environmental Laboratory (PMEL), 1993-present
Antarctic Service Medal of the United States, 1999
International WOCE Hydrographic Programme Planning Committee, 1995-1996
Postdoctoral Fellow, University of Southern California, 1991-1993
Research Fellow, University of Kansas, 1984

PUBLICATIONS

Relevant Publications

Strom, S.L., M.B. Olson, E.L. Marci, and C.W. Mordy (Accepted) Cross-shelf gradients in phytoplankton community structure, nutrient utilization, and growth rate in the coastal Gulf of Alaska. *Marine Ecology Progress Series*.

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Reed, R.K. and C.W. Mordy (1999) Bering Sea deep circulation: water properties and geopotential. *Journal of Marine Research* 57:763-773.

Other Publications

Sigleo, A.C., C. W. Mordy, P.J. Stabeno, and W.E. Frick (2005) Nitrate variability along the Oregon Coast: Estuarine-coastal exchange. *Estuarine, Coastal and Shelf Science*, 64:211–222.

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Zhang, J.-Z., C.W. Mordy, L.I. Gordon, A.Ross, and H.E. Garcia (2000) Are reported trends in deep ocean Redfield ratios artifact? *Science,* 289:1839a.

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Professional Experience:
1987-1990 Research Assistant, University of Alaska, Fairbanks
1990-1996 Graduate Research Assistant, Oregon State University
1996-1997 Research Associate (Post Doc), Oregon State University
1997-1999 Faculty Research Associate, Oregon State University
1999-present Assistant Professor, Oregon State University
2002-2003 Senior Scientist, Kachemak Bay Research Reserve
2003-present Research Coordinator, Kachemak Bay Research Reserve

Some recent publications

Skyllingstad, E. D., C. A. Paulson, and W. S. Pegau, Simulation of turbulent exchange processes in summertime leads, *J. Geophys. Res.*, **110**, doi:10.1029/2004JC002502, 2005.

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Collaborators

A. H. Barnard (Wetlabs), E. Boss (U Maine), T. Boyd (OSU), G. C. Chang (UCSB), E. Cokelet (PMEL), T. D. Dickey (UCSB), C. Mordy (PMEL), D. Musgrave (UAF), S. Okkonen (UAF), T. Otis (ADFG), C. A. Paulson (OSU), S. Saupe (CIRCAC), E. Skyllingstad (OSU), G. C. Schoch (OSRI), H. Wijesekera (OSU), T. Whitledge (UAF), M. Willette (ADFG)

BUDGET JUSTIFICATION

Non-EVOS Funds/Cost Sharing

Personnel costs: E. D. Cokelet's personnel costs (3 months each year - FY07-09) are covered by NOAA/PMEL as part of the Fisheries Oceanography Coordinated Investigations (FOCI) because the proposed work fits within FOCI's goal.

Government Agency Mandate

NOAA/PMEL/FOCI's goal is to understand the influence of the environment on the abundance of various commercially valuable fish and shellfish stocks in Alaskan waters and their role in the ecosystem. FOCI does not receive adequate NOAA base funds to support salaries, travel, instruments, computers, etc. for all of its research activities. FOCI and the scientific community find it useful and rewarding to leverage base funds through proposals to other funding agencies as long as the proposal objectives support FOCI's goal. Examples of such agencies are the North Pacific Marine Research Program and U.S. GLOBEC. In the present case, FOCI cost-shares through NOAA PI personnel costs and by instrument loans.

FY07

Personnel ($109.0) - Costs to design, build and install underway system, clean and maintain instruments aboard the two ships, QC data through periodic sampling, download data from instruments, process and analyze the observations, provide ferry passenger real-time data viewing, maintain a project web site, liaise with EVOSTC data managers.

Travel ($29.3) - Consult with the Captain and Chief Engineer of the *Aurora* on the location and design of the monitoring system, supervise shipyard installation of equipment in Seward, test, maintain and calibrate gear on several cruises, attend community meeting in Cordova and attend Marine Science Symposium in Anchorage.

Contractual ($59.4) - Shipyard wiring and plumbing for installation of thermosalinograph, 2 fluorometers, transmissometer, nutrient meter and oxygen meter. The shipyard estimates are based on the costs of previous work. Unlimited Iridium service for twelve months for the Tustumena and for seven months for the Aurora to transmit data to PMEL. Scientific computing and web page maintenance charges. Contract with Dr. Robert Benda (Prince William Sound Community College) of Northern Reflections in Valdez, Alaska for 20 weekly cleanings and maintenance sessions aboard the Aurora.

Commodities ($0.5k) – cleaning supplies for the Tustumena

Equipment ($77.3k) – *Aurora*: Nitrate sensor, CDOM fluorometer, chlorophyll fluorometer and turbidity sensor, oxygen sensor, 25-cm transmissometer, remote temperature sensor, sea strainer, computer for data logging, laptop computer for remote display for passenger viewing of underway data, remote monitor, power supplies, flow control and monitoring equipment, thermosalinograph, pump/motor/speed controller, plumbing and electrical parts, iridium modem and GPS receiver to measure position. *Tustumena*: oxygen sensor.

FY08
Personnel ($115.0) - Costs for cleaning and maintenance sessions aboard both ships, QC data through periodic sampling, download data from instruments, clean instruments, process and analyze the observations, provide ferry passenger real-time data viewing, maintain a project web site, liaise with EVOSTC data managers.

Travel ($27.2 k) - Maintain and calibrate gear on several cruises, attend community meeting in Cordova and attend Marine Science Symposium in Anchorage.

Contractual ($19.7k) - Covers monthly network computing and web-page-hosting, one year of unlimited Iridium service for the *Tustumena* and *Aurora* to transmit data to PMEL, and contract with Dr. Robert Benda (Prince William Sound Community College) of Northern Reflections in Valdez, Alaska for 50 weekly cleanings and maintenance sessions aboard the *Aurora.*

Commodities ($8.3k) – Manufacturer calibrations for the *Aurora* and *Tustumena* (nitrate analyzer, cdom fluorometer, chlorophyll fluorometer and turbidity sensor, oxygen sensor, 25-cm transmissometer, remote temperature sensor, thermosalinograph). Scientific computing costs. Cleaning supplies.

Equipment ($2.4k) – Nitrate analyzer lamp replacement for the *Aurora* and *Tustumena*.

FY09
Personnel ($121.3) - Costs for cleaning and maintenance sessions aboard both ships, QC data through periodic sampling, download data from instruments, clean instruments, process and analyze the observations, provide ferry passenger real-time data viewing, maintain a project web site, liaise with EVOSTC data managers.

Travel ($28.6) - Maintain and calibrate gear on several cruises, attend community meeting in Cordova and attend Marine Science Symposium in Anchorage.

Contractual ($21.4k) - Covers monthly network computing and web-page-hosting, one year of unlimited Iridium service for the *Tustumena* and *Aurora* to transmit data to PMEL, and contract with Dr. Robert Benda (Prince William Sound Community College) of Northern Reflections in Valdez, Alaska for 50 weekly cleanings and maintenance sessions aboard the *Aurora.*

Commodities ($8.4k) - Manufacturer calibrations for the *Aurora* and *Tustumena* (nitrate analyzer, cdom fluorometer, chlorophyll fluorometer and turbidity sensor, oxygen sensor, 25-cm transmissometer, remote temperature sensor, thermosalinograph). Scientific computing costs. Cleaning supplies.

Equipment ($2.4k) - Nitrate analyzer lamp replacement for the *Aurora* and *Tustumena*.

DATA MANAGEMENT AND QA/QC STATEMENT

Physical measurements have been collected from instruments mounted on AMHS ferry, M/V *Tustumena*, since September 15, 2004. The data are being sent daily to the NOAA/PMEL in Seattle via Iridium satellite phone, excluding times in dry dock. The same physical measurements will be collected from AMHS ferry M/V *Aurora*. Data from the *Aurora*, covering Prince William Sound, and from the *Tustumena*, in the Gulf of Alaska will be used in tandem. We have built and fine-tuned a successful data-collection system for the *Tustumena* that has served us well since September 2004. The system also supports a public information display on board the ship describing our work. We will build a similar system for the *Aurora*. All data types match to project objectives 3 to 5 (p. 10-11, section II A of this proposal).

We collect ship's position, surface temperature, salinity, chlorophyll fluorescence (Chl), nutrient concentrations (nitrate), dissolved organic matter fluorescence (CDOM), optical transmission data, and dissolved oxygen. The Sea-Bird thermosalinograph includes software to convert voltages or machine values to scientific values, and applies drift and offset corrections based on Sea-Bird calibration numbers. The data are averaged to 30 seconds.. Conductivity is converted to salinity according to the PSS-78 (http://www.seabird.com/application_notes/AN14.htm). Nutrient concentrations (nitrate) will be collected via a Satlantic ISUS nitrate sensor. In situ absorption spectra are converted internally to concentrations with accuracies within 10% of the nitrate reading. Periodically, physical samples are taken from the ferry for further calibration and comparison. WETLabs WETStar Chlorophyll and CDOM fluorometers, and a WETLabs C-Star transmissometer are factory calibrated. The shipboard data collection system was engineered with on-board pumping and back-flush systems to side-step fouling problems that might otherwise occur with instruments and cause data drift or instrument failure. The system tracks the pumping and back flush cycles and produces a QC indicator flag that is included with all transmitted data.

Once the raw data are calibrated and converted, they will go through an in-house quality control phase where data points will be plotted and scrutinized for reasonableness and outliers. Small data gaps may be filled using linear interpolation and spectral methods. The software packages Ferret and MatLab are used for QC, plotting, and conversion of data. Ferret was developed in-house and is publicly available. MatLab is a commercial computational product.

PMEL gathers metadata for all of its incoming data, and uses the NetCDF protocol for data and attribute storage. NetCDF is a widely used, machine-independent scientific format created by Unidata/UCAR (http://www.unidata.ucar.edu/packages/netcdf/index.html). This is a binary file format that is capable of storing data in 4 dimensions (x,y,z,t), and bundles standard and user-added attributes (metadata) into each individual file. Axis definitions and variables are stored as key-coded attributes, where the key code defines the attribute name, short name, units, stored format, and short description. An additional list of non-coded attributes is stored with each data file. NetCDF allows for addition of any other desired attributes. Our metadata structure fully complies with the FGDC requirements. The following lists delineate our required attributes:

Key-code-defined Attributes (axes plus variables)

- Time, begin and end

- Latitude
- Longitude
- Depth of instrument
- All variables

Additional Attributes

- Instrument type
- Data type
- Data subtype
- Data origin
- Coordinate system
- Water mass
- Experiment
- Project
- Delta T
- Data comments
- Water depth
- Variable description
- Fill flag
- Variable used for fill (for missing data points)
- Variable description
- Creation date (of data file)
- Program comment 1 (multiple comments attributes allowed)

For this project, we will maintain and enhance a website specifically dedicated to this EVOSTC proposal. It will include research description, goals and information, updated maps, and plots of data in a near-real-time mode. The public will have access to FGDC metadata via this site. A data inventory will be maintained on the site and continually updated.

METALITE FILE

Metadata:
- Identification_Information
- Spatial_Data_Organization_Information
- Distribution_Information
- Metadata_Reference_Information

Identification_Information:
Citation:
Citation_Information:
Originator: NOAA/PMEL GEM proposal, E.D. Cokelet
Publication_Date: 20060728
Title: Gem Proposal metadata for 2007
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Publication_Information:
Publication_Place: Seattle, Washington, USA
Publisher: NOAA/PMEL, E.D. Cokelet
Online_Linkage: <http://www.pmel.noaa.gov/foci/GEM/alaska_ferry/>
Description:
Abstract:
Physical and chemical oceanographic data collected from ferry-mounted instruments during routine crossings.
Purpose:
For use in oceanography studies of the Gulf of Alaska, Prince William Sound, and coastal areas.
Time_Period_of_Content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: 20070101
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Currentness_Reference: ground condition
Status:
Progress: Planned
Maintenance_and_Update_Frequency: Irregular
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: 154
East_Bounding_Coordinate: 145.5
North_Bounding_Coordinate: 61.2
South_Bounding_Coordinate: 57.5
Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: oceanography
Theme_Keyword: climate
Theme_Keyword: salinity
Theme_Keyword: temperature
Theme_Keyword: chlorophyll
Theme_Keyword: nutrients
Theme_Keyword: currents
Theme_Keyword: Exxon Valdez oil spill
Theme_Keyword: GEM
Theme_Keyword: Alaska State Marine Highway
Theme_Keyword: Alaska Ferry
Theme_Keyword: Alaska Coastal Current

Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Gulf of Alaska
Place_Keyword: Cook Inlet
Place_Keyword: Prince William Sound
Temporal:
Temporal_Keyword_Thesaurus: None
Temporal_Keyword: 2007
Access_Constraints: None
Use_Constraints:
Permission of PI. Acknowledgment of NOAA/PMEL and GEM for publication and other use.

Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Point

Distribution_Information:
Distributor:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Edward.D. Cokelet
Contact_Organization: NOAA/PMEL
Contact_Address:
Address_Type: Mailing and Physical Address
Address: 7600 Sand Point Way, NE Bldg. 3
City: Seattle
State_or_Province: Washington
Postal_Code: 98115
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Resource_Description: GEM data
Distribution_Liability:
User bears all responsibility for use of data in any further analyses or comparisons.

Metadata_Reference_Information:
Metadata_Date: 20060727
Metadata_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Edward.D. Cokelet
Contact_Organization: NOAA/PMEL
Contact_Address:
Address_Type: Mailing and Physical Address
Address: 7600 Sand Point Way, NE Bldg. 3
City: Seattle
State_or_Province: Washington
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Country: USA
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Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
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***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07- FY 09

	PROPOSED TRUSTEE AGENCY TOTALS (FY 07-09))						
		ADEC	ADF&G	ADNR	USFS	DOI	NOAA
	FY 07		$13.8				$286.5
	FY 08		$15.1				$173.0
	FY 09		$16.6				$181.9
Budget Category:	Proposed FY 07	Proposed FY 08	Proposed FY 09	TOTAL PROPOSED			
Personnel	$109.0	$115.0	$121.3	$345.3			
Travel	$29.3	$27.2	$28.6	$85.2			
Contractual	$59.4	$19.7	$21.4	$100.5			
Commodities	$0.5	$8.3	$8.4	$17.1			
Equipment	$77.3	$2.4	$2.4	$82.1			
Subtotal	$275.5	$172.6	$182.1	$630.2			
General Administration (9% of subtotal)	$24.8	$15.5	$16.4	$56.7			
Project Total	$300.3	$188.1	$198.5	$686.9			
Other Resources: (Cost Share Funds)	$52.1	$54.7	$57.4	$164.2			

Cost-share Funds:

FY07 Personnel: Cokelet, E., Oceanographer, 3 months, 17.350K per month - TOTAL = $52.1K

FY08 Personnel: Cokelet, E., Oceanographer, 3 months, 18.217K per month - TOTAL = $54.7K

FY09 Personnel: Cokelet, E., Oceanographer, 3 months, 19.128K per month - TOTAL = $57.4K

FY07-09
Cost-Share TOTAL = $164.2K

FY 07-09

Date Prepared: 2 August 2006

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: NOAA/PMEL and ADF&G/KBRR

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07- FY 09

Budget Category:	Proposed FY 07	Proposed FY 08	Proposed FY 09		TOTAL PROPOSED
Personnel	$97.8	$102.7	$107.8		$308.2
Travel	$28.4	$26.2	$27.5		$82.1
Contractual	$59.4	$19.7	$21.4		$100.5
Commodities	$0.0	$7.8	$7.8		$15.5
Equipment	$77.3	$2.4	$2.4		$82.1
Subtotal	$262.8	$158.7	$166.9		$588.5
General Administration (9% of subtotal)	$23.7	$14.3	$15.0		$53.0
Project Total	$286.5	$173.0	$181.9		$641.4
Other Resources: (Cost-share Funds)	$52.1	$54.7	$57.4		

Cost-share Funds:

FY07 Personnel: Cokelet, E., Oceanographer, 3 months, 17.350K per month - TOTAL = $52.1K

FY08 Personnel: Cokelet, E., Oceanographer, 3 months, 18.217K per month - TOTAL = $54.7K

FY09 Personnel: Cokelet, E., Oceanographer, 3 months, 19.128K per month - TOTAL = $57.4K

FY07-09
Cost-Share TOTAL = $164.2K

FY 07-09

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: NOAA/PMEL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07- FY 09

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Description	Step	Budgeted	Costs	Overtime	Sum
A. Jenkins	Project Engineer	RS/E 3	5.0	10.1		50.5
M. Sullivan	WEB Master	RS/E 3	2.0	9.2		18.4
C. Mordy	Senior Chemist	RS/E 3	3.0	9.7		29.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		10.0	28.9	0.0	
					Personnel Total	$97.8

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Edward Cokelet, Anchorage, annual Marine Science Symposium	1.1	1	3	0.2	1.8
Calvin Mordy, Anchorage, annual Marine Science Symposium	1.1	1	3	0.2	1.8
Tony Jenkins, Anchorage, Maintenance on the Tustumena	1.1	2	2	0.2	2.6
Tony Jenkins, Anchorage, Maintenance on the Aurora	1.1	2	2	0.2	2.6
Edward Cokelet, Anchorage, Aurora design consultation	1.1	1	2	0.2	1.5
Tony Jenkins, Anchorage, Aurora design consultation	1.1	1	2	0.2	1.5
Calvin Mordy, Anchorage, Calibration on both ships	1.1	2	4	0.2	3.1
Peter Proctor, Anchorage, Calibration on both ships	1.1	3	4	0.2	4.2
Eric Wisegarver, Anchorage, Calibration on both ships	1.1	3	4	0.2	4.2
Edward Cokelet, Cordova, community meeting	1.0	1	2	0.2	1.4
Calvin Mordy, Cordova, community meeting	1.0	1	2	0.2	1.4
Rental car			18	0.1	1.3
Ferry trip			10	0.1	0.9
				Travel Total	$28.4

FY 07

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: NOAA/PMEL

Contractual Costs:	Contractual
Description	Sum
A - unlimited iridium service - quote (3/07 - 9/07)	2.0
A - Dr. Robert Benda (Prince William Sound Community College), Northern Reflections, Valdez - 20 weekly instrument cleanings and maintenance sessions @ $200 ea	4.0
A - shipyard: wiring and plumbing - based on previous work	46.0
T - unlimited iridium service - quote (10/06 - 9/07)	3.4
Scientific computing	2.0
Web Page computing maintenance	2.0
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$59.4
Commodities Costs:	Commodities
Description	Sum
Commodities Total	$0.0

FY 07

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: NOAA/PMEL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07- FY 09

New Equipment Purchases:	Number	Unit	Equipment
Description	of Units	Price	Sum
A - 3 enclosures (modem/gps box, dry box, wet box) - price list	1	1.0	1.0
A - mil. spec connectors for electrical connections - quote	1	1.1	1.1
A - power supplies and shipboard ups - price list	1	1.1	1.1
A - precision flow meter - quote	1	1.2	1.2
A - remote monitor and signal extenders - price list	1	1.3	1.3
A - remote temperature sensor - quote	1	1.5	1.5
A - laptop for remote display - quote	1	2.0	2.0
A - large strainer/small strainer/misc. mechanical flow control equipment - quote	1	2.1	2.1
A - iridium modem/antennae/cable and gps receiver - quote	1	2.1	2.1
A - misc. plumbing and electrical parts - estimate based on '04 Tustumena work	1	2.2	2.2
A - pump/motor/speed controller assembly - quote	1	2.5	2.5
A - thermosalinograph - quote	1	2.6	2.6
A - electro-mechanical flow control and monitoring equipment - price list	1	2.7	2.7
A - single board computer and data acquisition modules - price list	1	2.7	2.7
A - 25cm transmissometer - quote	1	3.7	3.7
A - oxygen sensor - quote	1	4.0	4.0
A - chl. fluorometer with turbidity sensor - quote	1	5.4	5.4
A - cdom fluorometer - quote	1	5.4	5.4
A - nitrate analyzer and accessories - quote	1	28.5	28.5
T - oxygen sensor for Tustumena - quote	1	4.0	4.0
			0.0
		New Equipment Total	$77.3

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency

FY 07

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: NOAA/PMEL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07- FY 09

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Description	Step	Budgeted	Costs	Overtime	Sum
A. Jenkins	Project Engineer	RS/E 3	5.0	10.6		53.0
M. Sullivan	WEB Master	RS/E 3	2.0	9.6		19.3
C. Mordy	Senior Chemist	RS/E 3	3.0	10.1		30.4
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		10.0	30.4	0.0	
					Personnel Total	$102.7

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Edward Cokelet, Anchorage, annual meeting	1.2	1	3	0.2	1.9
Calvin Mordy, Anchorage, annual meeting	1.2	1	3	0.2	1.9
Tony Jenkins, Anchorage, Maintenance on the Tustumena	1.2	2	2	0.2	2.8
Tony Jenkins, Anchorage, Maintenance on the Aurora	1.2	2	2	0.2	2.8
Calvin Mordy, Anchorage, Calibration on both ships	1.2	2	4	0.2	3.2
Peter Proctor, Anchorage, Calibration on both ships	1.2	3	4	0.2	4.4
Eric Wisegarver, Anchorage, Calibration on both ships	1.2	3	4	0.2	4.4
Edward Cokelet, Cordova, citizens meeting	1.1	1	2	0.2	1.5
Calvin Mordy, Cordova, citizens meeting	1.1	1	2	0.2	1.5
Rental car			16	0.1	1.2
Ferry trip			8	0.1	0.7
				Travel Total	$26.2

FY 08

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: NOAA/PMEL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07- FY 09

Contractual Costs:	Contractual
Description	Sum
A - unlimited iridium service - quote	3.6
A - Dr. Robert Benda (Prince William Sound Community College), Northern Reflections, Valdez - 50 weekly instrument cleanings and maintenance sessions @ $210 ea	10.5
T - unlimited iridium service - quote	3.6
Web Page computing maintenance	2.0
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$19.7
Commodities Costs:	Commodities
Description	Sum
Scientific computing	1.0
A - remote temperature sensor calibrations/re-certification - quote	0.2
A - 25cm transmissometer calibrations - quote	0.4
A - oxygen sensor calibrations/re-certification - quote	0.4
A - thermosalinograph calibrations/re-certification - quote	0.6
A - chl. fluorometer and turbidity sensor calibrations - quote	0.6
A - cdom fluorometer calibrations - quote	0.6
A - nitrate analyzer calibrations - quote	0.6
T - remote temperature sensor calibrations/re-certification - quote	0.2
T - 25cm transmissometer calibrations - quote	0.4
T - oxygen sensor for Tustumena calibrations/re-certification - quote	0.4
T - thermosalinograph calibrations/re-certification - quote	0.6
T - chl. fluorometer with turbidity sensor calibrations - quote	0.6
T - cdom fluorometer calibrations - quote	0.6
T - nitrate analyzer calibrations - quote	0.6
Commodities Total	$7.8

FY 08

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: NOAA/PMEL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07- FY 09

New Equipment Purchases:	Number	Unit	Equipment
Description	of Units	Price	Sum
A - nitrate analyzer lamp replacement - quote	1	1.2	1.2
T - nitrate analyzer lamp replacement - quote	1	1.2	1.2
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$2.4

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency

FY 08

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: NOAA/PMEL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07- FY 09

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Description	Step	Budgeted	Costs	Overtime	Sum
A. Jenkins	Project Engineer	RS/E 3	5.0	11.1		55.6
M. Sullivan	WEB Master	RS/E 3	2.0	10.1		20.2
C. Mordy	Senior Chemist	RS/E 3	3.0	10.6		31.9
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		10.0	31.9	0.0	
					Personnel Total	$107.8

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Edward Cokelet, Anchorage, annual meeting	1.2	1	3	0.2	1.9
Calvin Mordy, Anchorage, annual meeting	1.2	1	3	0.2	1.9
Tony Jenkins, Anchorage, Maintenance on the Tustumena	1.2	2	2	0.2	2.9
Tony Jenkins, Anchorage, Maintenance on the Aurora	1.2	2	2	0.2	2.9
Calvin Mordy, Anchorage, Calibration on both ships	1.2	2	4	0.2	3.4
Peter Proctor, Anchorage, Calibration on both ships	1.2	3	4	0.2	4.6
Eric Wisegarver, Anchorage, Calibration on both ships	1.2	3	4	0.2	4.6
Edward Cokelet, Cordova, citizens meeting	1.1	1	2	0.2	1.6
Calvin Mordy, Cordova, citizens meeting	1.1	1	2	0.2	1.6
Rental car			16	0.1	1.2
Ferry trip			8	0.1	0.7
				Travel Total	$27.5

FY 09

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: NOAA/PMEL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07- FY 09

Contractual Costs:	Contractual
Description	Sum
A - unlimited iridium services - quote	3.7
A - Dr. Robert Benda (Prince William Sound Community College), Northern Reflections, Valdez - 50 weekly instrument cleanings and maintenance sessions @ $220 ea	11.0
T - unlimited iridium service - quote	3.7
Manuscript preparation: Subject - Ferrybox monitoring of the oceanic ecosystem in Prince William Sound, Alaska. Journal - Continental Shelf Research	1.0
Web Page computing maintenance	2.0
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$21.4
Commodities Costs:	Commodities
Description	Sum
Scientific computing	1.0
A - remote temperature sensor calibrations/re-certification - quote	0.2
A - 25cm transmissometer calibrations - quote	0.4
A - oxygen sensor calibrations/re-certification - quote	0.4
A - thermosalinograph calibrations/re-certification - quote	0.6
A - chl. fluorometer and turbidity sensor calibrations - quote	0.6
A - cdom fluorometer calibrations - quote	0.6
A - nitrate analyzer calibrations - quote	0.6
T - remote temperature sensor calibrations/re-certification - quote	0.2
T - 25cm transmissometer calibrations - quote	0.4
T - oxygen sensor calibrations/re-certification - quote	0.4
T - thermosalinograph calibrations/re-certification - quote	0.6
T - chl. fluorometer and turbidity sensor calibrations - quote	0.6
T - cdom fluorometer calibrations - quote	0.6
T - nitrate analyzer calibrations - quote	0.6
Commodities Total	$7.8

FY 09

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: NOAA/PMEL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07- FY 09

New Equipment Purchases:	Number	Unit	Equipment
Description	of Units	Price	Sum
A - nitrate analyzer lamp replacement - quote	1	1.2	1.2
T - nitrate analyzer lamp replacement - quote	1	1.2	1.2
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$2.4

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency

FY 09

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: NOAA/PMEL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07- FY 09

Budget Category:	Proposed FY 07	Proposed FY 08	Proposed FY 09		TOTAL PROPOSED
Personnel	$11.3	$12.3	$13.5		$37.1
Travel	$0.9	$1.0	$1.1		$3.0
Contractual	$0.0	$0.0	$0.0		$0.0
Commodities	$0.5	$0.5	$0.6		$1.6
Equipment	$0.0	$0.0	$0.0		$0.0
Subtotal	$12.7	$13.8	$15.2		$41.7
General Administration (9% of subtotal)	$1.1	$1.2	$1.4		$3.8
Project Total	$13.8	$15.1	$16.6		$45.5
Other Resources: (Cost-share Funds)					

FY 07-09

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: ADF&G/KBRR

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07- FY 09

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Description	Step	Budgeted	Costs	Overtime	Sum
W. Pegau	Research Coordinator	19/G	1.5	7.5		11.3
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		1.5	7.5	0.0	
					Personnel Total	$11.3

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Pegau, Homer to Kodiak, sample collection	0.2	4	8	0.0	0.9
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.9

FY 07

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: ADF&G/KBRR

Contractual Costs:		Contractual
Description		Sum
If a component of the project will be performed under contract, the 4A and 4B forms are required.	**Contractual Total**	$0.0
Commodities Costs:		Commodities
Description		Sum
cleaning supplies		0.5
	Commodities Total	$0.5

FY 07

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: ADF&G/KBRR

New Equipment Purchases:	Number	Unit	Equipment
Description	of Units	Price	Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency

FY 07

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: ADF&G/KBRR

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07- FY 09

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Description	Step	Budgeted	Costs	Overtime	Sum
W. Pegau	Research Coordinator	19/H	1.5	8.2		12.3
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		1.5	8.2	0.0	
					Personnel Total	$12.3

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Pegau, Homer to Kodiak, sample collection	0.2	4	8	0.0	1.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1.0

FY 08

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: ADF&G/KBRR

Contractual Costs:	Contractual
Description	Sum
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$0.0
Commodities Costs:	Commodities
Description	Sum
cleaning supplies	0.5
Commodities Total	$0.5

FY 08

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: ADF&G/KBRR

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07- FY 09

New Equipment Purchases:	Number	Unit	Equipment
Description	of Units	Price	Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency

FY 08

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: ADF&G/KBRR

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 07- FY 09

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Description	Step	Budgeted	Costs	Overtime	Sum
W. Pegau	Research Coordinator	19/I	1.5	9.0		13.5
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		1.5	9.0	0.0	
					Personnel Total	$13.5

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Pegau, Homer to Kodiak, sample collection	0.2	4	8	0.0	1.1
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1.1

FY 09

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: ADF&G/KBRR

Contractual Costs:	Contractual
Description	Sum
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$0.0

Commodities Costs:	Commodities
Description	Sum
cleaning supplies	0.6
Commodities Total	$0.6

FY 09

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: ADF&G/KBRR

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 07- FY 09

New Equipment Purchases:	Number	Unit	Equipment
Description	of Units	Price	Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency

FY 09

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Lead Agency: ADF&G/KBRR

Budget Category:	Proposed FY 07	Proposed FY 08	Proposed FY 09		TOTAL PROPOSED	
Personnel	$0.0	$0.0	$0.0		$0.0	
Travel	$0.0	$0.0	$0.0		$0.0	
Contractual	$4.0	$10.5	$11.0		$25.5	
Commodities	$0.0	$0.0	$0.0		$0.0	
Equipment	$0.0	$0.0	$0.0		$0.0	
Subtotal	$4.0	$10.5	$11.0		$25.5	
Indirect (rate will vary by contractor)						

Project Total	$4.0	$10.5	$11.0		$25.5

FY 07-09

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Name of Contractor: Dr. Robert Benda (Prince William Sound Community College), Northern Reflections

Personnel Costs:			Months	Monthly		Personnel
	Name	Description	Budgeted	Costs	Overtime	Sum
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
		Subtotal	0.0	0.0	0.0	
					Personnel Total	$0.0

Travel Costs:		Ticket	Round	Total	Daily	Travel
	Description	Price	Trips	Days	Per Diem	Sum
						0.0

					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.0

FY 07

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Name of Contractor: Dr. Robert Benda (Prince William Sound Community College), Northern Reflections

Contractual Costs:	Contractual Sum
Description	
A - Dr. Robert Benda (Prince William Sound Community College), Northern Reflections, Valdez - 20 weekly instrument cleanings and maintenance sessions @ $200 ea	4.0
Contractual Total	$4.0

Commodities Costs:	Commodities Sum
Description	

Commodities Total	$0.0

FY 07

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Name of Contractor: Dr. Robert Benda (Prince William Sound Community College), Northern Reflections

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	

FY 07

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Name of Contractor: Dr. Robert Benda (Prince William Sound Community College), Northern Reflections

Personnel Costs:		Months	Monthly		Personnel

	Name	Description		Budgeted	Costs	Overtime	Sum
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
							0.0
		Subtotal		0.0	0.0	0.0	
						Personnel Total	$0.0

Travel Costs:		Ticket	Round	Total	Daily	Travel
	Description	Price	Trips	Days	Per Diem	Sum
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$0.0

FY 08

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Name of Contractor: Dr. Robert Benda (Prince William Sound Community College), Northern Reflections

Contractual Costs:	Contractual
Description	Sum
A - Dr. Robert Benda (Prince William Sound Community College), Northern Reflections, Valdez - 50 weekly instrument cleanings and maintenance sessions @ $210 ea	10.5

Contractual Total	$10.5

Commodities Costs:	Commodities
Description	Sum
Commodities Total	$0.0

FY 08

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Name of Contractor: Dr. Robert Benda (Prince William Sound Community College), Northern Reflections

New Equipment Purchases:	Number	Unit	Equipment
Description	of Units	Price	Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
New Equipment Total			$0.0

Existing Equipment Usage:	Number	
Description	of Units	

FY 08

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Name of Contractor: Dr. Robert Benda (Prince William Sound Community College), Northern Reflections

Personnel Costs:			Months	Monthly		Personnel
	Name	Description	Budgeted	Costs	Overtime	Sum
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
		Subtotal	0.0	0.0	0.0	
					Personnel Total	$0.0

Travel Costs:		Ticket	Round	Total	Daily	Travel
	Description	Price	Trips	Days	Per Diem	Sum
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
					Travel Total	$0.0

FY 09

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Name of Contractor: Dr. Robert Benda (Prince William Sound Community College), Northern Reflections

Contractual Costs:	Contractual Sum
Description	
A - Dr. Robert Benda (Prince William Sound Community College), Northern Reflections, Valdez - 50 weekly instrument cleanings and maintenance sessions @ $220 ea	11.0
Contractual Total	$11.0

Commodities Costs:	Commodities Sum
Description	
Commodities Total	$0.0

FY 09

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Name of Contractor: Dr. Robert Benda (Prince William Sound Community College), Northern Reflections

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

				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
Indicate replacement equipment with an R.			**New Equipment Total**	$0.0

Existing Equipment Usage:	Number of Units	
Description		

FY 09

Project Number: 070699
Project Title: Biophysical Observations Aboard Alaska Marine Highway System Ferries
Name of Contractor: Dr. Robert Benda (Prince William Sound Community College), Northern Reflections