FY16 PROJECT PROPOSAL SUMMARY PAGE

Continuing, Multi-Year Projects

Please note that the information in your proposal and budget form will be used for funding review. Late proposals, revisions or corrections may not be accepted.

Project Title: Long-term monitoring: Benthic monitoring component - Long-term monitoring of Ecological Communities in Kachemak Bay: a comparison and control for Prince William Sound

Project Period: February 1, 2016 – January 31, 2017

Primary Investigator(s): Brenda Konar and Katrin Iken (UAF)
Co-operating Investigator: Angie Doroff (UAA, KBNERR)

Study Location: Kachemak Bay, lower Cook Inlet

Project Website (if applicable): http://www.gulfwatchalaska.org/

Abstract*: This project is a component of the integrated Long-term Monitoring of Marine Conditions and Injured Resources and Services. As part of this component, we monitor rocky intertidal, seagrass and clam gravel beach systems as well as the sea otter abundance and diet in Kachemak Bay. This component is complementary to work being conducted under this program in Prince William Sound, Kenai Fjords and Katmai.

Estimated Budget:

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

FY12	FY13	FY14	FY15	FY16	TOTAL
$48.1	$48.2	$48.1	$48.1	$47.4	$239.8

Non-EVOSTC Funds to be used:

FY12	FY13	FY14	FY15	FY16	TOTAL
$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

** Funds expressed in $1000 increments*

Date: September 1, 2015

I. EXECUTIVE SUMMARY

The purpose of this study is to provide long-term monitoring data for the Gulf of Alaska regions, specifically the nearshore environment that is most affected by anthropogenic influences such as oil spills and to climate fluctuations and changes. The focus of the Gulf of Alaska Long-Term Monitoring program is on Prince William Sound but a larger area has to be monitored to be able to evaluate if any observed patterns in community dynamics are locally isolated and specific to Prince William Sound or reflect larger-scale Gulf-wide patterns. Kachemak Bay, contiguous to lower Cook Inlet, is one of the reference sites for Prince William Sound and is being monitored for rocky intertidal communities, seagrass beds, clam and mussel communities as well as sea otter abundance and diets. We find that Kachemak Bay communities are similar to Prince William Sound but they also differ in many aspects. These similarities and differences are being used to create a better understanding of the potential biological and environmental drivers that are structuring these communities. For biological drivers, we have been monitoring mussel recruitment and mortality in at different spatial scales Kachemak Bay. We are currently working on investigating the role of static drivers (such as substrate, and other non-changing surrounding environmental conditions) on rocky intertidal community structure across the northern Gulf of Alaska, including Kachemak Bay, Katmai, Kenai, and Prince William Sound. From this, we will be able to separate these effects from those of more dynamic drivers (e.g., climate or anthropogenic related) in the future. Control regions outside of Prince William Sound, such as Kachemak Bay, are essential to determine spatial variability scales and scaling the impact of various drivers of benthic communities.

II. COORDINATION AND COLLABORATION

A. Within a EVOTC-Funded Program

This project links very tightly with the Prince William Sound, Kenai, and Katmai monitoring. For the monitoring of Prince William Sound, it is essential to have control sites for comparison. These control sites will allow for broader-scale questions to be asked and patterns assessed about community dynamics and drivers.

B. With Other EVOSTC-funded Projects

This project links with the Herring project funded by the EVOSTC. Herring are known to use kelp in the nearshore environment as essential spawning grounds, so the information collected through the nearshore benthic monitoring work is an important link to the life cycle of this important forage fish.
The Kachemak Bay component also builds on earlier work funded by the EVOSTC for nearshore biodiversity sampling under the NaGISA project (Rigby et al. 2007). Those historical data are comparable to those collected now and build important components of a time series starting in 2003. Data management is shared for both historical and ongoing projects under the AOOS workspace and data portal.

C. With Trustee or Management Agencies

Within the sea otter component of this project we have partnerships with the USFWS and USGS for aerial-based population surveys. The USFWS Marine Mammals Management, Alaska Maritime National Wildlife Refuge, and the Alaska Marine Mammal Stranding Network all contribute to monitoring the sea otter mortality trends in the Kachemak Bay area. USFWS is conducting regular beach surveys for stranded live and dead sea otters on the north side of the bay (contact: Joel Garlic-Miller). The Marine Mammal Stranding Network works with the Alaska Maritime National Wildlife Refuge and incorporates students from the Kachemak Bay Campus to fill this monitoring role year-around.

In summer 2015, we started a pilot project under Bureau of Ocean and Energy Management (BOEM) funding (contact: Cathy Coon) to investigate rocky intertidal and shallow subtidal communities in western Cook Inlet. We are using the same protocols for some of this work as we use for the Gulf Watch Alaska program, thus extending the spatial range of this work farther across Cook Inlet, and linking to BOEM's interests in the region based on the oil and gas extraction plans in upper Cook Inlet.

In summer 2014 and 2015, we conducted a pilot project with the Coastal Marine Institute/BOEM to explore the possibilities of using aerial drones to take photographs so that we can extend the spatial monitoring of intertidal beaches and seagrass beds. We are currently analyzing these photographs to determine how the resolution compares between drone photographs and having scientists in the field taking the data. We are also comparing data between the typical 50 m Gulf Watch transect and longer transects that can be flown by a drone to determine what additional information can be obtained with longer transects.

In summer 2015, we conducted a proof of concept study with USGS to determine the feasibility of using aerial drones to observe foraging sea otters. To assess the feasibility of this tool, we flew drones over resting and foraging otters and documented the focal animal's response to the drone. This was a success in that the drones could get close enough to the otters to video them without altering the otter's behavior, especially for single animals. In fact, most of the otters we observed did not pay any attention to the drones and no disturbance of marine birds in proximity to focal animals was documented. In Kachemak Bay, approximately 50% of forage observations were > 1 km from shore for telemetered sea otters (Doroff and Badajos 2010), which limits the effectiveness of focal animal sampling from shore-based observations; if developed, this tool could expand the effectiveness of determining sea otter diet in habitats with broad expanses of shallow water. We are now seeking funding to extend this study to expand the monitoring capability for sea otter forage observations.

III. PROJECT DESIGN – PLAN FOR FY16

A. Objectives for FY16

1) Map sea otter spatial use patterns in Kachemak Bay to inform long-term monitoring studies of benthic habitat use in the region.
2) Determine the diet and dietary shifts of sea otters.
3) Determine trends in sea otter mortality.
4) Determine trends in the abundance and distribution of rocky intertidal plants and invertebrates
5) Determine trends in the abundance and size frequency of clams on gravel beaches. Utilize data from these sampling efforts to validate deductive bivalve habitat models being developed for Kachemak Bay.
6) Determine trends in the abundance and distribution of seagrass plants and invertebrates.
7) Determine trends in selected environmental parameters and relate them to #1-6 above.

With the outlook of continuing this pattern of monitoring for up to 20 years, we will continue field sampling in year 5 of the project to avoid data gaps. However, we will also focus on synthesis of the first five field years; specifically, we will complete a publication of the influences of static drivers on rocky intertidal community structure. Additionally, we will continue to work on assembling nearshore environmental data and assessing how/if they relate to patterns observed in the offshore Gulf of Alaska region. Lastly, we will follow the population dynamics of select intertidal organisms in Kachemak Bay, specifically mussels, to understand their abundance, growth, and mortality as an important prey item for sea otters.

B. Changes to Project Design

There have been no substantive changes to this project. We have experienced some challenges with the recovery of data loggers that are either removed by inclement weather or curious visitors to the beaches. Hence, the collection of temperature information alongside the biological information is not progressing as well as anticipated. Since the Kachemak Bay Research Reserve maintains long-term temperature monitoring in three locations in Kachemak Bay we are confident that we can obtain relevant and appropriate temperature data from those records for those times when we are missing data.

IV. SCHEDULE

A. Project Milestones for FY 16

Objective 1. Monitor intertidal communities in Kachemak Bay.
To be done annually from 2012-2016, to be met by annually September 2016.

Objective 2. Monitor sea otter diet annually in Kachemak Bay.
To be done annually from 2012-2016, to be met by annually December 2016.

Objective 3. Synthesize temporal (annual) patterns in intertidal communities and their relation to select environmental variables and in sea otter diet in Kachemak Bay.
To be met by January 2017.

B. Measurable Project Tasks for FY 16

Specify, by each quarter of each fiscal year, when critical project tasks (for example, sample collection, data analysis, manuscript submittal, etc.) will be completed, as submitted in your original proposal. Please identify any substantive changes and the reason for the changes. Please format your schedule as in the following example:

FY 15, 1st quarter (February 1, 2016 - April 31, 2016)

February-April, 2016 — *Plan field sampling on intertidal communities, conduct monthly sea otter scat sampling*

FY 15, 2nd quarter (May 1, 2016-July 30, 2016)

May-June 2016 — *Conduct field sampling on intertidal communities and sea otter diet*
By July 30: — *Enter data from field sampling, continue sea otter sampling*

FY 15, 3rd quarter (August 1, 2016 – October 31, 2016)

November 30: — *Continue data entry and analysis, project presentation at annual PI meeting, discussions with collaborators on joint synthesis products*

FY 15, 4th quarter (November 1, 2016- January 31, 2017)

January 31: — *Report writing, prepare presentation at scientific conference (Alaska Marine Science Symposium), continue work on synthesis products*

V. PROJECT PERSONNEL – CHANGES AND UPDATES

There are no changes to the project personnel

VI. BUDGET

A. Budget Forms (Attached)

B. See budget form provided separately

C. Changes from Original Proposal

Total funding request does not differ from the original proposal; however, internal modifications have been made to funds of various categories. Specifically, we have increased travel funds to accommodate greater travel needs to meet with PIs and present at conferences.

D. Sources of Additional Funding

None.

References

Doroff A. M. and O. Badajos. 2010. Sea otter (Enhydra lutris kenyoni) survival and movement patterns in Kachemak Bay, Alaska 2007-2010. Final report to U.S. Fish and Wildlife Service Marine Mammals Management 1011 E.Tudor Rd, Anchorage, AK 99503. 63pp

Rigby PR, K Iken and Y Shirayama. 2007. Sampling Biodiversity in Coastal Communities NaGISA Protocols for Seagrass and Macroalgal Habitats- A NaGISA Handbook. Japan: Kyoto University Press