ATTACHMENT C *EVOSTC Annual Project Report Form*

Form Rev. 10.3.14

1. Program Number: *See,* Reporting Policy at III (C) (1).

15120114-R

2. Project Title: *See,* Reporting Policy at III (C) (2).

Gulf Watch Alaska: Nearshore Benthic Systems in the Gulf of Alaska

3. Principal Investigator(s) Names: *See,* Reporting Policy at III (C) (3).

H. Coletti, D. Esler, B. Ballachey, J. Bodkin, T. Dean, K. Kloecker, M. Lindeberg, D. Monson, B. Weitzman

4. Time Period Covered by the Report: *See,* Reporting Policy at III (C) (4).

February 1, 2015 – January 31, 2016

5. Date of Report: *See,* Reporting Policy at III (C) (5).

March 1, 2016

6. Project Website (if applicable): *See,* Reporting Policy at III (C) (6).

www.gulfwatchalaska.org, http://science.nature.nps.gov/im/units/swan/

7. Summary of Work Performed: *See,* Reporting Policy at III (C) (7).

Our field work for year 4 (the 2015 field season, with field work from April through July) was performed with no problems or concerns, with project components completed on schedule. We conducted 5 field trips, including 1 to Katmai National Park (KATM), 1 to Kenai Fjords National Park (KEFJ), 2 to western Prince William Sound (WPWS), and 1 to northern PWS (NPWS). At all areas, we re-sampled nearshore sites that were established in previous years. Work completed in all areas included monitoring of rocky intertidal sites, mussel sites, soft sediment sites, and eelgrass beds. At KATM, KEFJ, and WPWS, we also monitored black oystercatcher nests and collected sea otter forage data. We completed marine bird and mammal surveys in KATM and KEFJ, and sea otter carcass collections in WPWS, KATM and KEFJ. An aerial survey of sea otters in KATM was completed in July 2015. Additionally, we have continued to closely coordinate monitoring efforts with the Gulf Watch Alaska (GWA) nearshore project in Kachemak Bay (KBAY; K. Iken and B. Konar; GWA Nearshore Project 12120114-L).

A detailed description of the nearshore component of GWA is presented by Dean et al. (2014) in the *Protocol Narrative for Nearshore Ecosystem Monitoring in the Gulf of Alaska*, updated in 2014 to reflect the joint effort of the National Park Service (NPS) Southwest Alaska Vital Signs Monitoring Program and the Exxon Valdez Oil Spill (EVOS) GWA Long-term Monitoring of nearshore sites in the Gulf of Alaska. In brief, the nearshore component of GWA is a carefully designed set of measurements, which are spatially and temporally coordinated and taken across a broad swath of shoreline in the northern Gulf of Alaska. This program collects information on biota from throughout the nearshore food web, allowing considerations of the trophic levels and spatial scales over which environmental variation has effects. Figure 1 illustrates some of the species and processes addressed by the nearshore component of GWA.

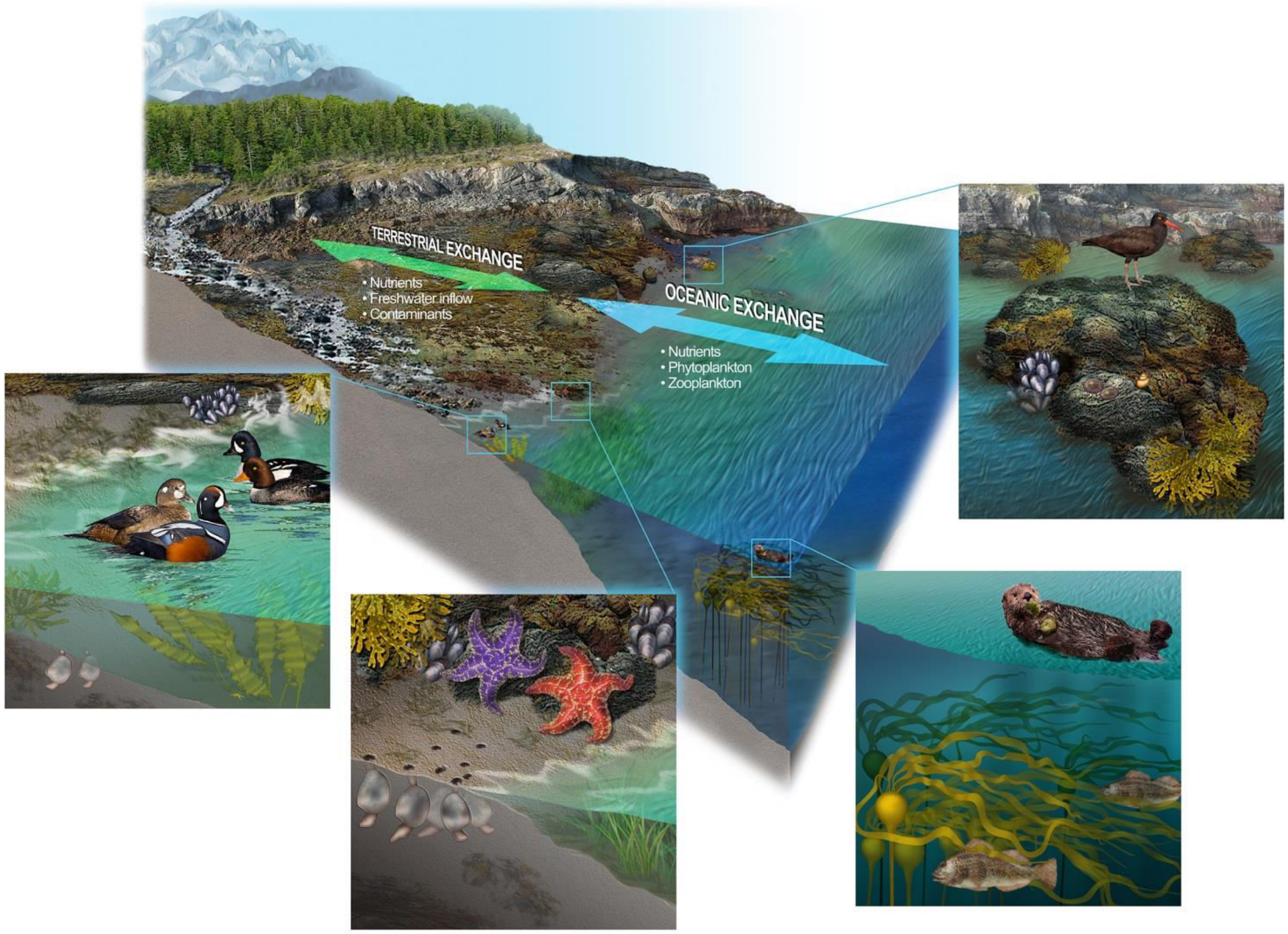

Figure 1. The nearshore ecosystem monitored by GWA in the northern Gulf of Alaska.

In addition to core monitoring work, we also were engaged in several collaborative efforts to understand nearshore processes, leveraging the field presence facilitated by GWA. We continued collections of nearshore species including mussels, clams, and kelps for stable isotope analyses, collaborating with Dr. S. Newsome at the University of New Mexico. We collected additional mussels for two studies, to: 1) assess rates of growth at study sites across the Gulf of Alaska, and 2) evaluate gene expression, as a tool for monitoring long-term health of the nearshore, in collaboration with Drs. L. Bowen and K. Miles U.S. Geological Survey (USGS)-Western Ecosystem Research Center.

We surveyed sea stars at our nearshore sites for sea star wasting disease, which has been widely observed in stars along the California, Oregon, Washington and British Columbia coasts. We initially collaborated with an experienced star observer from the University of California Santa Cruz (on our eastern PWS trip in 2014). In 2014, a concerted effort to look for wasting disease at GWA intertidal long term monitoring sites in southcentral Alaska detected only 9 diseased stars out of 1,588 counted across

30 sites (0.6%), far fewer than expected given the prevalence of wasting disease further south. In 2015, we recorded 69 diseased stars out of 2,016 stars observed (3.4%); almost all of these (67) were observed in KBAY (Iken and Konar pers. comm.). Although there was a slight increase in 2015, the occurrence of diseased stars is still low in contrast to southeast Alaska and the Lower 48. Additional surveys of stars will continue this summer (2016), as part of our scheduled nearshore monitoring activities. Because of public interest in the topic of sea star wasting disease, we developed a "Resource Brief" to distribute to managers, educators and the public in 2014 (http://science.nature.nps.gov/im/units/swan/assets/docs/reports/resourcebriefs/GWA_2014_SeaStarWasting_RB.pdf). Additionally, a poster on the 2014 and 2015 sea star observations was presented at the 2016 Alaska Marine Science Symposium, and we are working to establish a network of scientists who are available to interact with the public when suspected cases of sea star wasting disease are seen.

Considerable effort has been invested during 2015 on data coordination and management. Specifically, nearshore data sets have been modified to ensure consistency in data structure across years, metadata records have been updated to enhance clarity, and data have been posted on-time to the workspace, as well as shared with the National Center for Ecological Analysis and Synthesis (NCEAS) when appropriate. We are committed to providing clean, accessible, understandable, and timely data for the life of this program.

2015 Highlights

Below we present results from several aspects of our nearshore studies, as examples of the variety of findings that are emerging from this long-term program, both expected and unanticipated. These include: (1) nearshore water temperature anomalies in 2014, (2) common murre numbers observed in nearshore areas during summer surveys, (3) a summary of aerial surveys of sea otters and energy recovery rates through 2015, (4) variation in selected mussel metrics across the Gulf of Alaska, and (5) descriptions of clam assemblages at sand/gravel sites in KATM, KEFJ, and WPWS. Additional data syntheses and analyses have been presented in a variety of reports, journal articles, posters, presentations, and outreach events, listed below.

(1) Water temperature across the northern Gulf of Alaska: Does "the blob" affect the nearshore?

Observations by the Environmental Drivers component of GWA have revealed anomalously high water temperatures in offshore waters throughout the northern Gulf of Alaska in 2014 and 2015; this concurs with documentation of a large area of warm water in the northeast Pacific, referred to as "the blob". These observations have been associated with important biological effects in pelagic food webs, e.g., in phytoplankton and zooplankton abundance and species composition. However, the extent to which elevated water temperature reaches the nearshore is unknown, and is complicated by many factors specifically affecting water conditions in nearshore systems, including freshwater inputs, glacial melt, tidal exchange, nearshore currents, etc. Our regular nearshore component activities include deployment of sensors to record temperature at rocky intertidal sites throughout the year. Based on data through July 2014, elevated temperatures in offshore areas corresponded to slightly higher than normal temperatures in the nearshore (Figure 2). The next steps will be to analyze temperature through 2015 and consider whether elevated water temperatures affected abundance, species composition, or performance of intertidal biota monitored at the same sites where temperature was recorded.

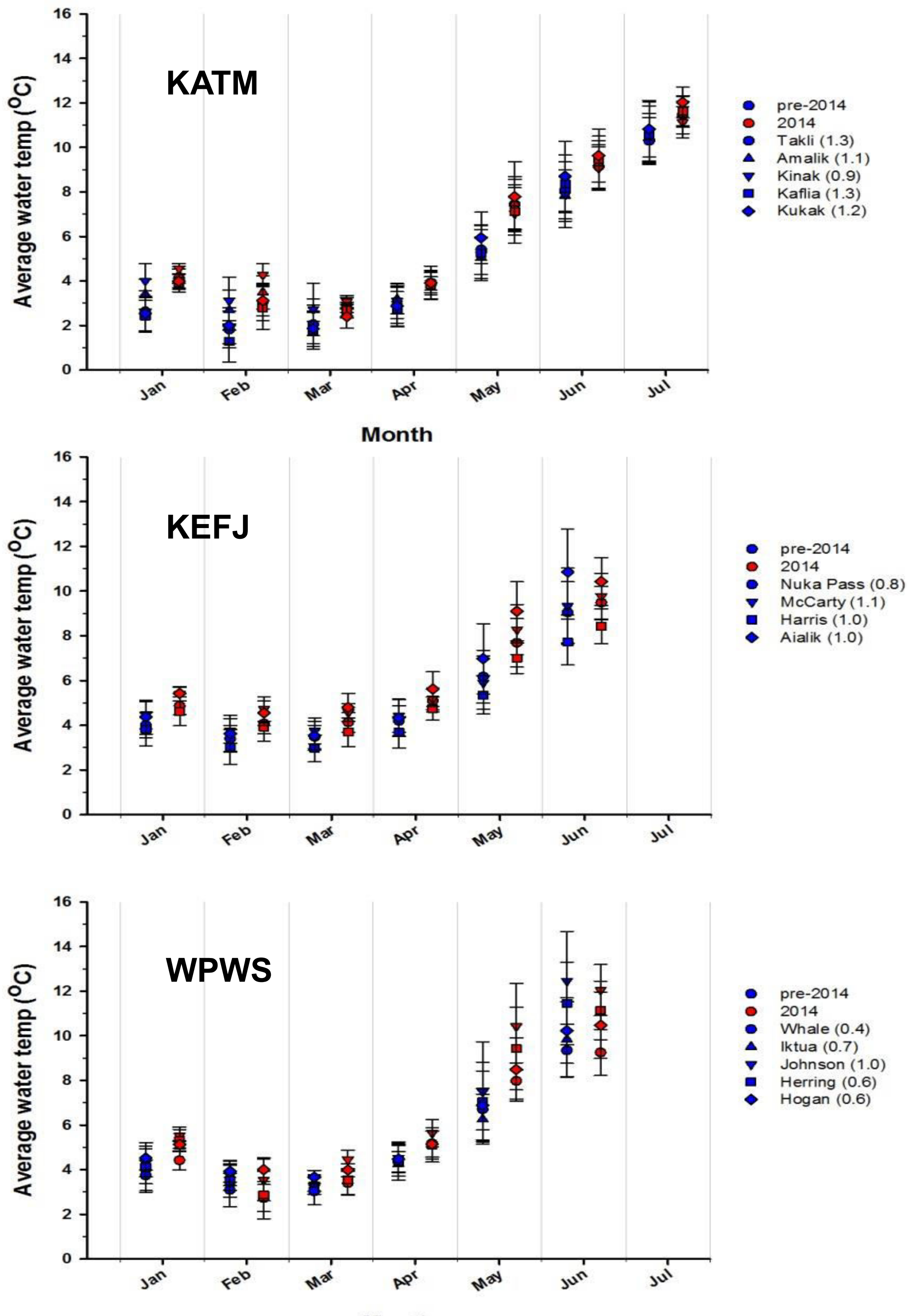

Figure 2. Contrasts of intertidal water temperature in 2014 (red) and 2006-2013 (blue) in Katmai (top), Kenai Fjords (middle), and western Prince William Sound (bottom). Numbers in parentheses in the legend indicate the average temperature difference between pre-2014 and 2014 by site.

(2) Common Murres (*Uria aalge*): Unexpected high numbers of common murres in nearshore areas during 2015 summer surveys

In KATM and KEFJ, as part of the nearshore component, we conduct skiff-based marine bird and mammal surveys along coastal (nearshore) transects. We observed large increases in common murres during the summer of 2015 relative to previous years. This increase was particularly evident in KATM (Figure 3) where there are no murre colonies and densities of murres are generally low. This increase in numbers is most likely a function of changed distribution. In poor conditions, these long-lived birds will readily defer breeding, therefore they are not tied to colonies and thus ended up nearshore, likely searching for food. KEFJ does have common murre colonies, however we still have evidence of an increase of these birds moving into coastal areas not associated with colonies (Figure 4). Our documentation of unusual murre distributions correspond to observations of large die-offs of murres throughout the north Pacific in winter 2015-2016. We speculate that high water temperature may have disrupted prey abundance or availability, leading to changes in murre distribution, behavior, condition, and mortality rates. Our results contribute to observations across GWA components that demonstrate that 2015 was an anomalous year.

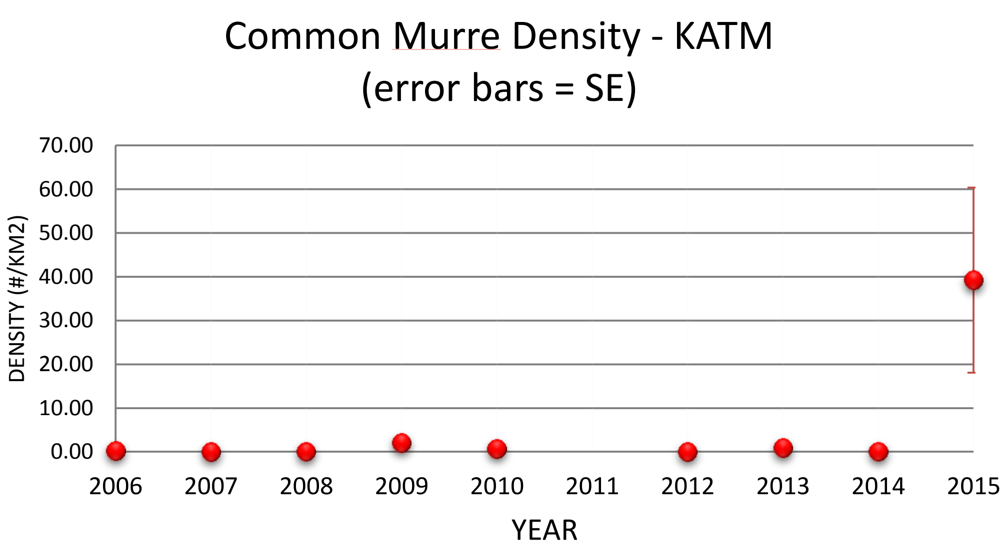

Figure 3. Common murre density estimates in KATM from 2006-2015. 2011 was not surveyed.

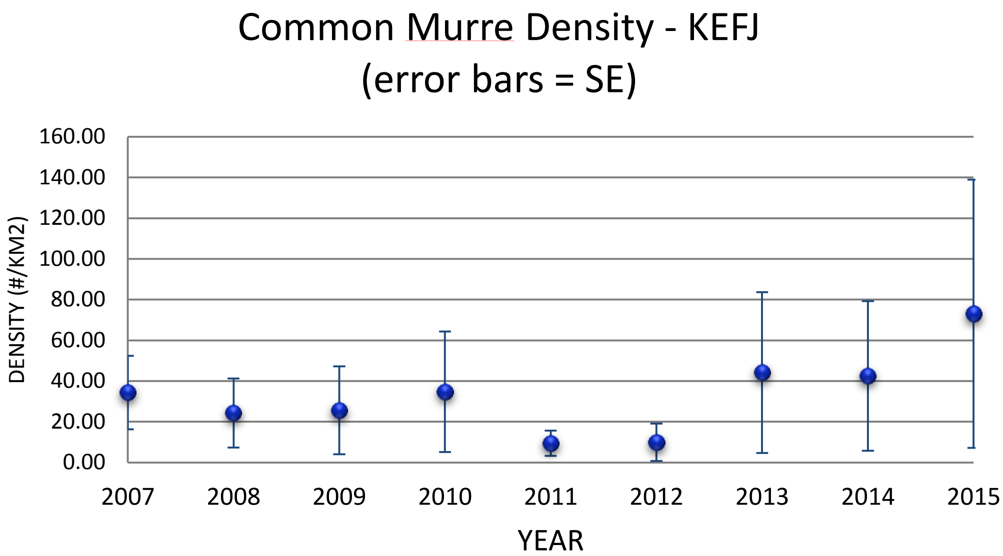

Figure 4. Common murre density estimates in KEFJ from 2007-2015.

(3) Sea Otters (*Enhydra lutris*): Varying population trajectories and energy recovery rates point to different factors affecting populations at small spatial scales

As part of the nearshore component, aerial surveys to calculate sea otter abundance were flown in KATM (2008, 2012, and 2015), KEFJ (2007 and 2010) and WPWS (annually from 1993 through 2005, 2007-2009, and 2011-2013). Sea otter foraging data also were collected annually in these regions to estimate energy recovery rates, which are known to indicate population status relative to a food-limited carry capacity. In KATM, our data suggest that sea otter numbers increased substantially since the early 1990s and have been at high and stable densities in recent years (Figure 5). This corresponds with declining energy recovery rates, suggesting that otters have reached a food-limited state (Figure 6). Densities of otters in KEFJ have been stable and relatively low (Figure 5) with stable energy recovery rates (Figure 6), indicating a population at carrying capacity and low food availability compared to KATM. In WPWS, initially, food was not a limiting factor in sea otter recovery from the EVOS, but more recently we have observed a moderate increase in density with a subsequent decline in energy recovery rates indicating that the population may be reaching carrying capacity (Figures 5 and 6). The design and coordination of the nearshore component of GWA allows us to infer cause and spatial extent of observed changes and provide recommendations to management.

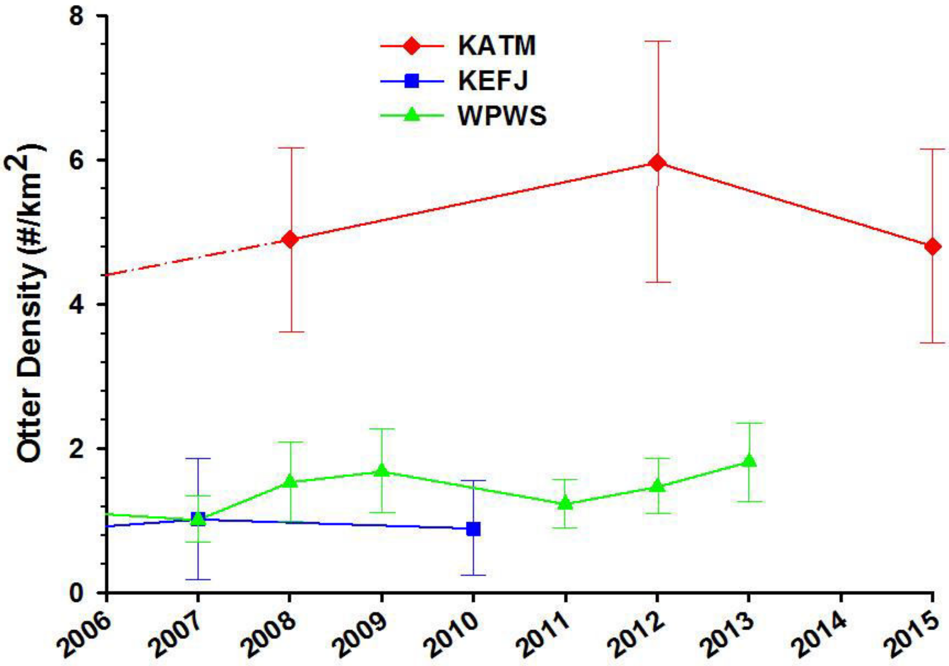

Figure 5. Density (estimated abundance/available suitable habitat) of sea otters living in the KATM, KEFJ and WPWS study blocks.

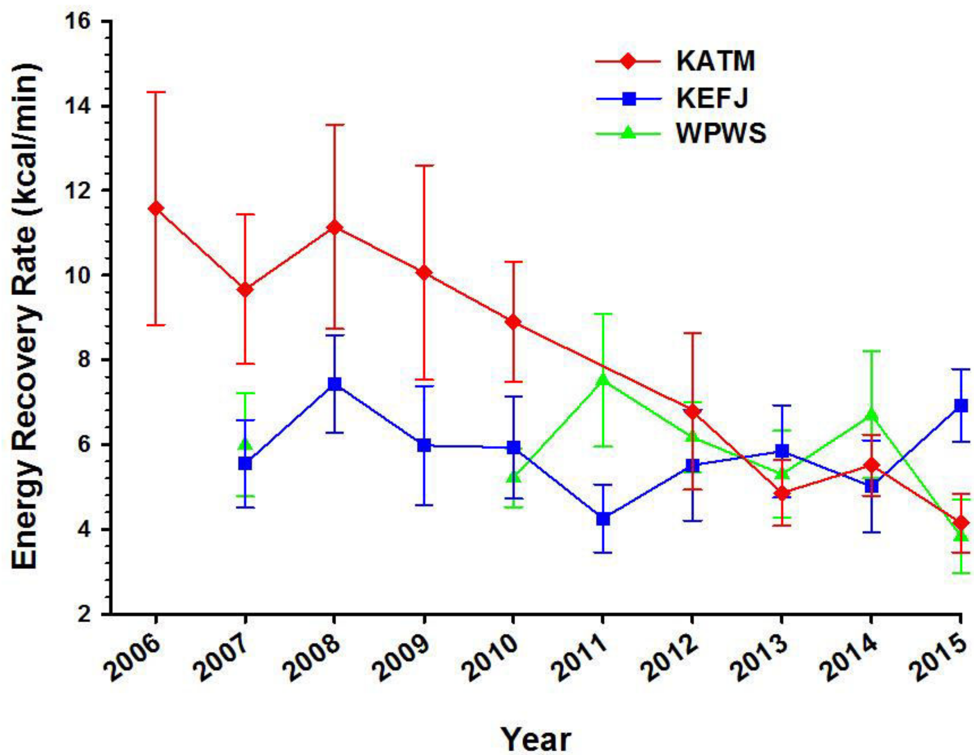

Figure 6. Energy recovery rates (kcal/min) for sea otters foraging in WPWS, KEFJ and KATM. Error bars represent Monte Carlo simulation-based 95% confidence intervals.

(4) Pacific Bay Mussels (*Mytilus trossulus*):Variation in selected mussel metrics across the Gulf of Alaska

Since 2008 we have monitored 15 mussel beds at sites in KATM, KEFJ and WPWS. When we began sampling, beds were largest in KEFJ, averaging about 5,000 m^2 and about 2,000 m^2 at KATM and WPWS. Although rate and timing of declines varied among sites, by 2012-13 average bed size had declined by about 50% across the Gulf of Alaska and some beds essentially vanished. Since 2012-13 we have observed recovery to near or above initial dimensions at most sites (10 of 15), although the largest beds in KEFJ (mostly on unconsolidated sediments) have not recovered, resulting in the patterns seen in Figure 7. We also monitor abundance of small mussels through cores to see how recruitment of juvenile mussels will eventually affect bed size. We see similar patterns of mussel abundance from these cores when viewed across the Gulf, with core densities at KEFJ (about 25,000 m^2) generally more than 5 times the average in other areas (Figure 8). Relationships among environmental conditions, recruitment and settlement, and survival of settled mussels, along with their relative effects on abundance and bed size, are topics that warrant additional study. Understanding how and why mussel populations vary over time will aid management and conservation of not only mussels, but also of the many consumers that rely on this important bivalve.

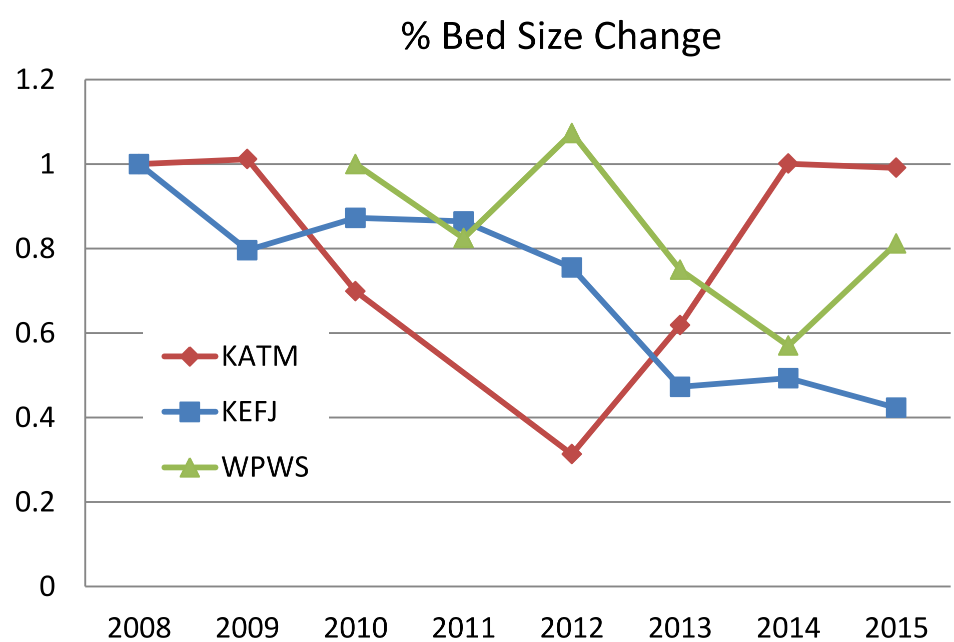

Figure 7. Percent change in mussel bed from size when sampling was initiated. Error bars were omitted for clarity of divergent trends.

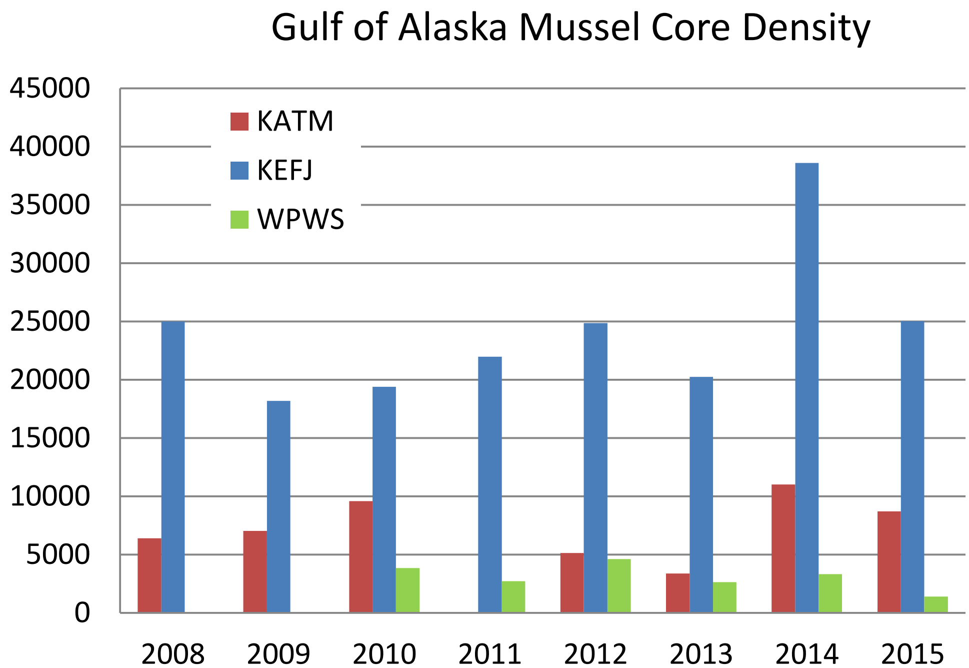

Figure 8. Density of mussels in cores in the Gulf of Alaska.

(5) Bivalve Assemblages: Density and diversity across time and space.

Soft sediment sites have been monitored every other year at 15 sites since 2007 to evaluate variation in infaunal bivalve species composition, abundance, size, and available biomass. The most common species encountered include infaunal bivalves such as *Saxidomus gigantea, Leukoma staminea, Clinocardium nuttallii, Hiatella arctica, Mya arenaria, Mya truncata,* and multiple species of the genus *Macoma*, as well as epibenthic bivalves such as the mussel *Mytilus trossulus*. Biomass of infaunal bivalves has decreased since the program began in 2007, and is apparent in the declines of density for infaunal species where we have yet to see any major recruitment events, except in the case of *H. arctica* in 2015 (Figure 9). Interestingly, mussel biomass at soft sites was low from 2007 through 2014; in 2015, mussel biomass increased over fourfold in KATM and KEFJ (Figure 10) following observed trends from our mussel and rocky intertidal monitoring sites. Understanding drivers underlying bivalve population dynamics warrants further study. In subsequent years we will be compiling and evaluating bivalve abundance and size data from around the Gulf of Alaska and Northeast Pacific to ascertain the extent of intertidal clam declines. Through collaboration with bivalve experts Gary Shigenaka and Allan Fukuyama, we aim to develop better monitoring tools and elucidate potential drivers behind clam recruitment and growth.

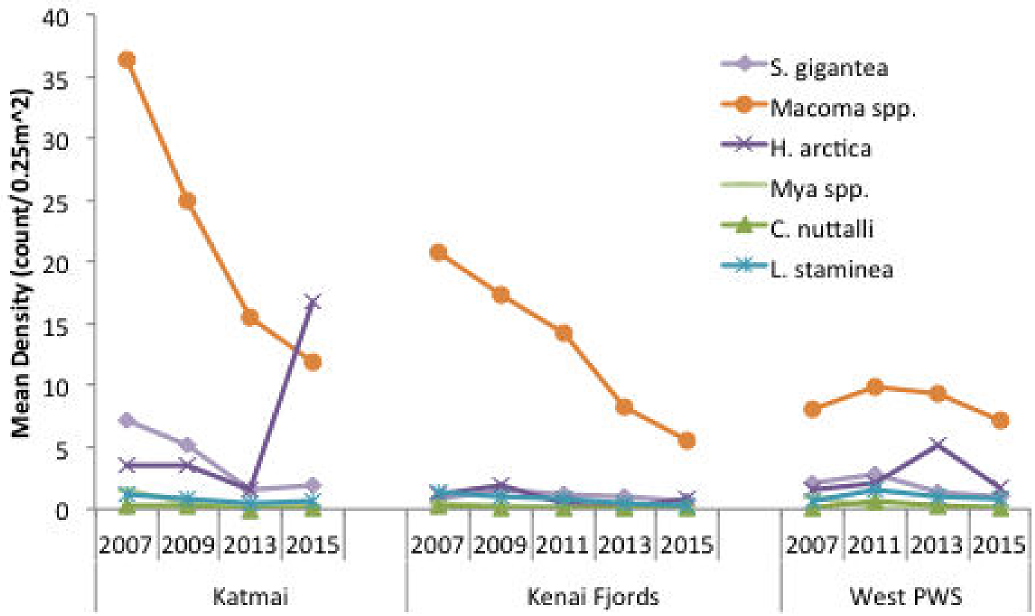

Figure 9. Mean density of infaunal clam species by block over time. *M. trossulus* has been excluded to show trends by species of clams.

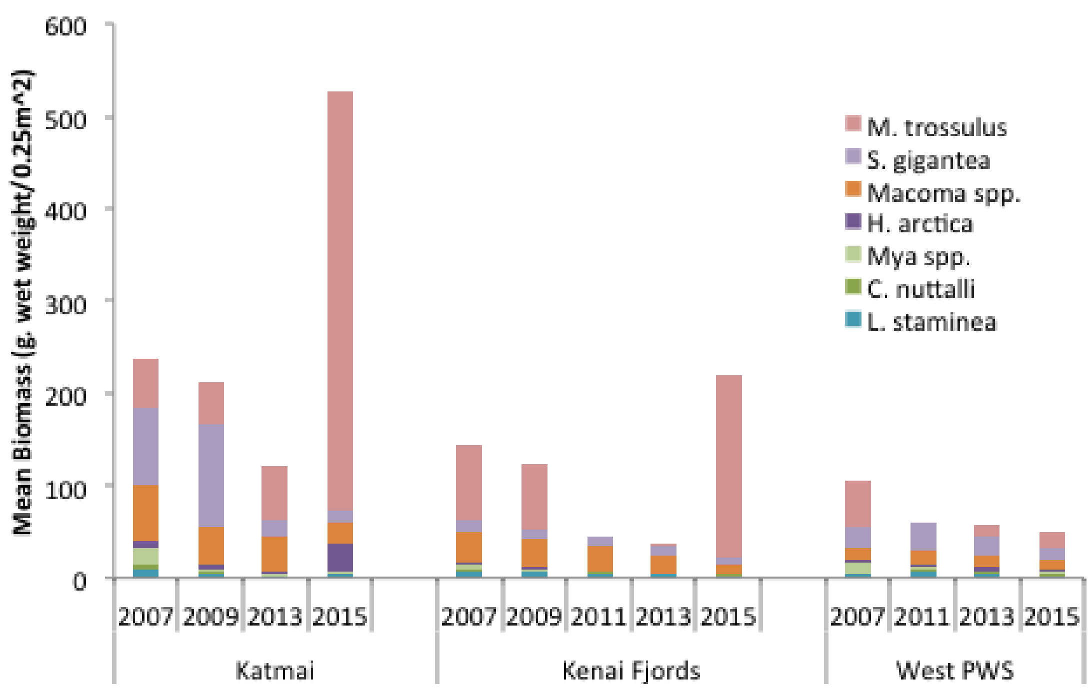

Figure 10. Mean biomass of intertidal bivalves, including *M. trossulus*, by block over time.

Deliverable/Milestone	Status
Field work (5 trips, multiple tasks per trip to collect data on series of nearshore metrics); KATM, KEFJ, WPWS, NPWS	Completed, June - July 2015
Upload 2014 data to project website	Completed, August 2015
PI's attend annual Gulf Watch meeting	Completed, November 2015

8. Coordination/Collaboration: *See,* Reporting Policy at III (C) (8).

8.A.: Collaboration and coordination both within your program and between the two programs.

As noted above, the nearshore component of GWA is a highly coordinated effort involving multiple principal investigators (PIs) with expertise on various aspects of nearshore ecosystems; the overall design and coordination are critical for drawing inference about factors affecting the nearshore. We are working closely with the other nearshore project (12120114-L, Ecological Trends in Kachemak Bay; B. Konar and K. Iken) to ensure that data collected in Kachemak Bay are comparable with those from other nearshore sites and provide another window into the causative factors and spatial extent of changes in nearshore systems. For example, we collaborated with Drs. Konar and Iken to combine data sets for analyses presented in the 2014 GWA Science Synthesis report, which has subsequently been submitted to a peer reviewed journal. We also worked more closely in 2015 with the other GWA components (Environmental Drivers and Pelagic), to identify data sets that can be shared (e.g., Environmental Drivers data were used extensively in our analysis of mussel trends across the Gulf of Alaska, presented in the GWA Science Synthesis report). In July 2015, during our fieldwork in KATM, we coordinated with the Environmental Drivers component (Holderied and Doroff) to collect phytoplankton and mussel samples in light of the harmful algal bloom documented in 2015. These samples are still being analyzed. We have been working with Tuula Hollmen and Lisa Sztukowski of the Alaska Sea Life Center (ASLC) on a nearshore conceptual model, leading from variation in prey to variation in behavioral and demographic responses in consumers such as sea otters and sea ducks. Finally, data collected by the nearshore component are relevant for understanding ecosystem recovery with respect to the Lingering Oil component (e.g., sea otter abundance, energy recovery rate, and age-at-death data have all been used to evaluate population recovery).

8 B.: Coordination with other EVOSTC funded projects.

None to report.

8.C.: Coordination with trust agencies.

In 2013, building on GWA findings indicating that sea otters in KEFJ consume mussels at much higher frequencies than at other areas, we initiated a study of annual patterns in mussel energetics and sea otter foraging at KEFJ, funded by NPS and USGS. That study is to be completed in 2016. Initial results indicate that mussel energy density varies seasonally, likely corresponding to spawning condition. Further, we found that mussel consumption by otters varied slightly seasonally in association with varying mussel energy density, but overall mussel consumption was high in KEFJ across seasons.

Our GWA nearshore data from KATM contributed to USGS and North Pacific Research Board (NPRB) studies of the status of the southwest Alaska stock of sea otters, which is listed as threatened under the Marine Mammal Protection Act. These data are shared with the U.S. Fish and Wildlife Service, Marine Mammals Management, who is responsible for sea otter management.

Nearshore GWA PIs (Ballachey, Bodkin, Coletti, and Esler) worked with NPS on the 'Changing Tides' Project. This study examines the linkages between terrestrial and marine ecosystems and is funded by the National Park Foundation. Field work was initiated in July 2015 with in-kind support from our KATM vessel charter. National Parks in Southwest Alaska are facing a myriad of management concerns that were previously unknown for these remote coasts, including increasing visitation, expanded commercial and industrial development, and environmental changes due to natural and anthropogenic forces. These are concerns because of their potential to significantly degrade and potentially impair resources in coastal systems. The project has three key components: (1) brown bear fitness and use of marine resources, (2) health of bivalves (clams and mussels), and (3) an integrated outreach program. We (GWA nearshore component) assisted with the collection of a variety of bivalve species from the coast of Katmai National Park and Preserve. Several specimens were kept live in small aquarium-like containers, and condition and performance metrics were assessed in the laboratory by ASLC collaborators Tuula Hollmen and Katrina Counihan. Others are being used to perform genetic transcription diagnostics (gene expression) to measure the physiologic responses of individuals to stressors, in collaboration with Liz Bowen and Keith Miles of USGS. This project will increase our understanding of how various stressors may affect both marine intertidal invertebrates and bear populations at multiple spatial and temporal scales.

Nearshore component PIs (Coletti, Iken, Konar and Lindeberg) have been working on development of recommendations to the Bureau of Ocean Energy Management (BOEM) for nearshore community assessment and long-term monitoring. The BOEM Proposed Final Outer Continental Shelf (OCS) Oil and Gas Leasing Program 2012-2017 includes proposed Lease Sale 244 in the Cook Inlet Planning Area in 2017. An OCS Cook Inlet Lease Sale National Environmental Policy Act (NEPA) analysis has not been undertaken since 2003. Updated information is needed to support an analysis associated with the planned lease sale. The overall objective of this study is to provide data on habitats and sensitive species to support environmental analyses for NEPA documents, potential future Exploration Plans, and Development and Production Plans. The goal was to utilize existing protocols already developed thorough GWA when possible to ensure data comparability. The project will be ongoing through 2019 and all data are being provided to the Alaska Ocean Observing System data portal.

USGS and NPS provide logistical, administrative, and in-kind support for the GWA Nearshore component.

9. Information and Data Transfer: *See,* Reporting Policy at III (C) (9).

Publications & Reports:

Ballachey, B.E., J.L. Bodkin, K.A. Kloecker, T.A. Dean, and H.A. Coletti. 2015. Monitoring for Evaluation of Recovery and Restoration of Injured Nearshore Resources. *Exxon Valdez* Oil Spill Restoration Project Final Report (Restoration Project 10100750), U.S. Geological Survey, Alaska Science Center, Anchorage, Alaska.

Ballachey, B.E. and J.L. Bodkin. 2015. Challenges to sea otter recovery and conservation. Chapter 4 in Larson SE, Bodkin JL, VanBlaricom GR., Eds. Sea Otter Conservation. Academic Press, Boston. Pp 63-96.

Ballachey, B., J. Bodkin, H. Coletti, T. Dean, D. Esler, G. Esslinger, K. Iken, K. Kloecker, B. Konar, M. Lindeberg, D. Monson, M. Shephard, and B. Weitzman. 2015. Variability within nearshore ecosystems of the Gulf of Alaska. In: Quantifying temporal and spatial variability across the northern Gulf of Alaska to understand mechanisms of change. Gulf Watch Alaska Synthesis Report to the Exxon Valdez Oil Spill Trustee Council, Projects 14120114 and 14120120.

Bodkin, J.L. 2015. Historic and Contemporary Status of Sea Otters in the North Pacific. Chapter 3 in Larson SE, Bodkin JL, VanBlaricom GR, Eds. Sea Otter Conservation. Academic Press, Boston. Pp 43-61.

Bowen, L., A. K. Miles, B. Ballachey, S. Waters and J. Bodkin. Gene transcript profiling in sea otters post-*Exxon Valdez* oil spill: A tool for marine ecosystem health assessment. In review, *J. Mar. Sci. Eng.*

Coletti, H.A. and T.L. Wilson. 2015. Nearshore marine bird surveys: data synthesis, analysis and recommendations for sampling frequency and intensity to detect population trends. In: Quantifying temporal and spatial variability across the northern Gulf of Alaska to understand mechanisms of change. Gulf Watch Alaska Synthesis Report to the Exxon Valdez Oil Spill Trustee Council, Projects 14120114 and 14120120.

Coletti, H.A. and T.L. Wilson. 2015. Nearshore marine bird surveys: data synthesis, analysis and recommendations for sampling frequency and intensity to detect population trends. *Exxon Valdez* Oil Spill Restoration Project Final Report (Restoration Project 12120114-F), National Park Service, Anchorage, Alaska.

Coletti, H.A., J.L. Bodkin, D.H. Monson, B.E. Ballachey and T.A. Dean. In review. Engaging form and function to detect and infer cause of change in an Alaska marine ecosystem. Ecosphere.

Esler, D., and B.E. Ballachey. 2015. Long-term monitoring program - evaluating chronic exposure of harlequin ducks and sea otters to lingering Exxon Valdez oil in western Prince William Sound. Exxon Valdez Oil Spill Trustee Council Restoration Project Final Report (Project 14120114-Q), U.S. Geological Survey, Alaska Science Center, Anchorage, Alaska.

Esler, D., B. Ballachey, M. Carls, and M. Lindeberg. 2015. Introduction to lingering oil monitoring. In: Quantifying temporal and spatial variability across the northern Gulf of Alaska to understand mechanisms of change. Gulf Watch Alaska Synthesis Report to the Exxon Valdez Oil Spill Trustee Council, Projects 14120114 and 14120120.

Esler, D., J. Bodkin, B. Ballachey, D. Monson, K. Kloecker, and G. Esslinger. 2015. Timelines and mechanisms of wildlife population recovery following the Exxon Valdez oil spill. In: Quantifying temporal and spatial variability across the northern Gulf of Alaska to understand mechanisms of change. Gulf Watch Alaska Synthesis Report to the Exxon Valdez Oil Spill Trustee Council, Projects 14120114 and 14120120.

Larson, S., J.L. Bodkin, and G.R. VanBlaricom. 2015. Sea Otter Conservation. Academic Press, Boston. 447 p.

Konar, B., K. Iken, H.A. Coletti, T.A. Dean, and D.H. Monson. 2015. Research Summary: Influence of static habitat attributes on local and regional biological variability in rocky intertidal communities of the northern Gulf of Alaska. In: Quantifying temporal and spatial variability across the northern Gulf of Alaska to understand mechanisms of change. Gulf Watch Alaska Synthesis Report to the Exxon Valdez Oil Spill Trustee Council, Projects 14120114 and 14120120.

Konar, B, K. Iken, H. Coletti, D. Monson, and B. Weitzman. In review. Influence of static habitat attributes on local and regional rocky intertidal community structure. Estuarine Coastal and Shelf Science

Kuletz, K., and D. Esler. 2015. Spatial and temporal variation in marine birds in the northern Gulf of Alaska: the value of marine bird monitoring as part of Gulf Watch Alaska. In: Quantifying temporal and spatial variability across the northern Gulf of Alaska to understand mechanisms of change. Gulf Watch Alaska Synthesis Report to the Exxon Valdez Oil Spill Trustee Council, Projects 14120114 and 14120120.

Monson, D.H. and L. Bowen. 2015. Evaluating the Status of Individuals and Populations: Advantages of Multiple Approaches and Time Scales. Chapter 6 in Larson SE, Bodkin JL, VanBlaricom GR, Eds. Sea Otter Conservation. Academic Press, Boston. Pp 121-158.

Monson D.H., T.A. Dean, M.R. Lindeberg, J.L. Bodkin, H.A. Coletti, D. Esler, K.A. Kloecker, B.P. Weitzman and B.E. Ballachey. 2015. Inter-annual and spatial variation in Pacific blue mussels (*Mytilus trossulus*) in the Gulf of Alaska, 2006-2013. In: Quantifying temporal and spatial variability across the northern Gulf of Alaska to understand mechanisms of change. Gulf Watch Alaska Synthesis Report to the Exxon Valdez Oil Spill Trustee Council, Projects 14120114 and 14120120.

Weitsman, B.P., and G.G. Esslinger. 2015. Aerial Sea Otter Abundance Surveys – Prince William Sound, Alaska, Summer 2014. U.S. Geological Survey Administrative Report.

Presentations:

Coletti, H., D. Esler, B. Ballachey, J. Bodkin, T. Dean, G. Esslinger, K. Iken, K. Kloecker, B. Konar, M. Lindeberg, D. Monson and B. Weitzman. Updates of key metrics from long-term monitoring of nearshore marine ecosystems in the Gulf of Alaska: Detecting change and understanding cause. Alaska Marine Science Symposium, Anchorage, January 2016.

Coletti, H., G. Hilderbrand, J. Pfeiffenberger, C. Turner, B. Ballachey, L. Bowen, K. Counihan, J. Erlenbach, D. Esler, T. Hollmen, D. Gustine, B. Mangipane, B. Pister, C. Robbins, and T. Wilson. Changing tides – The convergence of intertidal invertebrates, bears and people. Alaska Marine Science Symposium, Anchorage, January 2016.

Esler, D., B.Ballachey, C.Matkin, D. Cushing, R. Kaler, J. Bodkin, D. Monson, G. Esslinger, and K. Kloecker. Long-term data provide perspective on ecosystem recovery following the *Exxon Valdez* oil spill. Oil Spill and Ecosystems Conference, Tampa, February 2016.

Esler, D.. Oil and wildlife don't mix: 25 years of lessons from the *Exxon Valdez* oil spill. Seminar at University of Quebec Rimouski, November 2015.

Pister, B., B. Ballachey, H. Coletti, T. Dean, K. Iken, B. Konar, M. Lindeberg and B. Weitzman. Multi-agency efforts to monitor sea star wasting disease in Alaska: Results and recommendations for future efforts. Alaska Marine Science Symposium, Anchorage, January 2016.

Neher, T., M. McCammon, K. Hoffman, K. Holderied, B. Ballachey, R. Hopcroft, M. Lindeberg, and T. Weingartner, Gulf Watch Alaska in hot water! Ecological patterns in the northern Gulf of Alaska under the Pacific 2014-2015 warm anomaly. Alaska Marine Science Symposium, Anchorage, January 2016.

Meeting attendance:

January 2016, Alaska Marine Science Symposium, Anchorage: Doroff, Esler, Esslinger, Kloecker, Lindeberg, Monson, Shephard, Weitzman.

November 2015, Gulf Watch PI meeting, Anchorage: Ballachey, Bodkin, Coletti, Dean, Doroff, Esler, Kloecker, Lindeberg, Monson.

October 2015, GWA Nearshore PI meeting, Port Townsend, WA: Ballachey, Bodkin, Coletti, Dean, Esler, Monson, and Weitzman.

February 2016, Oil Spills and Ecosystems Conference, Tampa: Esler.

December 2015, Marine Mammal Society Conference, San Francisco: Monson

Outreach activities:

Ballachey, B. (USGS) February 2015. Guest Lecture, University of Calgary, Continuing Education Course: Environmental Site Assessment: "Long-term Effects of the 1989 Exxon Valdez Oil Spill on Sea Otters and Nearshore Ecosystems"

Bodkin, J. (USGS). November 2015. Public presentation at the Prince William Sound Science Center, Cordova. "Gulf Watch Alaska and the Nearshore Food Web."

Coletti, H. (NPS). April 2015. Overview of SWAN and GWA to interpretive rangers at Kenai Fjords National Park.

Esler, D. (USGS). January 2015. USGS Alaska Science Center Participates in on-line Gulf Watch Alaska curriculum in an outreach partnership effort with the Alaska SeaLife Center (ASLC).

Esler, D. (USGS). 2015-2016. Delta Sound Connections Article - Tidewater Trends in Nearshore Ecosystems.

Esler, D. (USGS). November 2015. Interviewed by Hayley Hoover, education and outreach specialist with the Prince William Sound Science Center (PWSSC) for "Field Notes" radio program.

Jones, R. (NPS). July 2015. NPS Interpretive Ranger Provides Educational Outreach about NPS SWAN and the Alaska Gulf Watch Program during a Discovery Lab event held at the Alaska Islands & Ocean Visitor Center in Homer, Alaska.

Kloecker, K. (USGS). July 2015. USGS Scientist Provides Educational Outreach about the Alaska Gulf Watch Program—26 Years of Ocean Monitoring during a Discovery Lab event held at the Alaska Islands & Ocean Visitor Center in Homer, Alaska.

Kunisch, E. and H. Coletti (NPS). Spring 2015. DOI Newswave Article – Monitoring for Sea Star Wasting Disease in the Northern Gulf of Alaska.

Data & metadata uploaded to data portal:

- SOP01=CoastlineSurveys: sea otter carcass and age at death data and metadata
- SOP02=SeaOtterForage: raw data and metadata
- SOP03=MarBirdMammalSurveys: raw survey data and metadata
- SOP04=InvertsRockyShores: limpet size, Nucella and Katharina counts, algae and invertebrate percent cover, sea star counts, substrate composition, and metadata
- SOP05=SeaOtterAerialSurveys: KATM 2008 and 2012 raw data and metadata, KEFJ 2007, 2010, 2013 raw data and metadata
- SOP06=InvertsGravelSandBeaches: species count, size, and metadata
- SOP07=BlackOystercatcher: nest density, chick diet, and metadata
- SOP08=MusselBeds: mussels >20mm counts and sizes, mussel core sample counts and sizes, site layout (used for bed size calculations), site substrate, site slope, and metadata
- SOP 09=Eelgrass

10. Response to EVOSTC Review, Recommendations and Comments: *See,* Reporting Policy at III (C) (10).

There were no recommendations for modifications to the Nearshore component of GWA in the recent EVOS reviews.

11. Budget: *See,* Reporting Policy at III (C) (11).

Please see provided program work book.

Our overall budget expenditures are on target with the proposed expenditures, and are in keeping with the objectives of the project. However, our agency financial system codes categories somewhat differently than the EVOS categories, so that the total for each EVOS category sometimes varies between the proposed and the actual. Further detail, if needed, will be provided upon request.