

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

12120114-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).

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

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

February 1, 2014 – January 31, 2015

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

March 1, 2015

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

[www.gulfwatchalaska.org](http://www.gulfwatchalaska.org)

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

Our field work for year 3 (the 2014 field season, with field work from April through July) was completed 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 PWS (WPWS), and 1 to eastern PWS (EPWS). At all areas, we visited and sampled nearshore sites that were established in previous years. Work completed in all areas included monitoring/sampling of rocky intertidal sites, mussel sites, and eelgrass beds. At KATM, KEFJ, and WPWS, we 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 Kenai Fjords was scheduled for August 2013 but due to several factors, we were not able to complete this survey in 2013 or 2014. An aerial survey of sea otters at KATM is scheduled for July 2015.

We have continued to closely coordinate monitoring efforts with the GWA nearshore project in Kachemak Bay (KBAY; K. Iken and B. Konar; GWA Nearshore Project 12120114-L). We combined data sets from KBAY, KATM, KEFJ, WPWS, EPWS, and NPWS for an analysis of static habitat attributes at nearshore rocky sites (GWA Science Synthesis Report: Chapter 4 *Research Summary 1: Influence of static habitat attributes on local and regional biological variability in rocky intertidal communities of the northern Gulf of Alaska*) and concluded that static attributes are important in determining nearshore community structure. We also conducted an analysis of mussel data, included multiple data sets and examining the role of environmental drivers at broad spatial and temporal scales (GWA Science Synthesis Report: Chapter 4 *Research Summary 2: Inter-annual and spatial variation in Pacific blue mussels (*Mytilus trossulus*) in the Gulf of Alaska, 2006-2013*) and concluded that although mussel abundance and biomass vary synchronously over spatial and temporal scales, local variation at sites is significant in determining mussel abundance.

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 GOA, 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 (USGS-WERC) and T. Hollmen (AK SeaLife Center).

We surveyed sea stars at our nearshore sites for the sea star wasting disease which has been widely observed in stars along the California, Oregon and British Columbia coasts. We initially cooperated with an experienced star observer from the University of California Santa Cruz (on our EPWS trip, the first of the season). Subsequently we observed over 3000 stars at our sites, ranging from EPWS to KATM, and saw no indications of diseased stars, suggesting the disease had not moved into the northern GOA. Additional surveys of stars will be done this summer, 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:

[http://science.nature.nps.gov/im/units/swan/assets/docs/reports/resourcebriefs/GWA\\_2014\\_SeaStarWasting\\_RB.pdf](http://science.nature.nps.gov/im/units/swan/assets/docs/reports/resourcebriefs/GWA_2014_SeaStarWasting_RB.pdf).

<b>Deliverable/Milestone</b>	<b>Status</b>
Field work (4 trips, multiple tasks per trip to collect data on series of nearshore metrics); KATM, KEFJ, WPWS, EPWS	Completed, June - July 2014
Upload 2013 data to project website	Completed, August 2014
Preparation of Gulf Watch Alaska Synthesis Report	Completed, November 2014
PI's attend annual Gulf Watch meeting	Completed, November 2014

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

8.A.:

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. We collaborated with Drs. Konar and Iken to combine data sets for analyses presented in the 2014 GWA Science Synthesis report. We also worked more closely in 2014 with the other GWA components (ED & Pelagic), to identify data sets that can be shared (e.g., ED data were used extensively in our analysis of mussel trends across the GOA, presented in the 2014 GWA Science Synthesis report).

8.C.:

In 2013, building on GWA findings, we initiated a study of annual patterns in mussel energetics and sea otter foraging at KEFJ, funded by NPS and USGS.

Our GWA nearshore data from KATM contributed to USGS and NPRB studies of the status of the SW Alaska stock of sea otters, which is listed as threatened under the Marine Mammal Protection Act.

In July 2014, during our fieldwork at KATM, we coordinated with the NPS and with Dr. Gail Irvine of USGS to sample long-term study sites on armored beaches at Katmai National Park and Preserve, which have previously been monitored for lingering oil (G. Irvine, PI; EVOSTC projects 040708, 070801, and 11100112).

In May 2014, we collaborated with NPS and USFWS to train additional personnel to increase the available pool of observers and pilots available to conduct sea otter aerial surveys.

We worked with the University of California Santa Cruz to conduct surveys of sea stars, looking for signs of sea star wasting disease

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

<b>9. Information and Data Transfer:</b> See, Reporting Policy at III (C) (9).
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**Publications & Reports:**

- Ballachey, B., Bodkin, J., Coletti, H., Dean, T., Esler, D., Esslinger, G., Iken, K., Kloecker, K., Konar, B., Lindeberg, M., Monson, D., Shephard, M., and Weitzman, B. 2014. Variability within Nearshore Ecosystems of the Gulf of Alaska. Chapter 4 in Gulf Watch Alaska Science Synthesis Report, December 1, 2014 (*includes Introduction and two research summaries*).
- Ballachey, B.E., J.L. Bodkin, D. Esler and S.D. Rice. 2014. Lessons from the 1989 *Exxon Valdez* oil spill: a biological perspective. In: J.B. Alford, M.S. Peterson and C.C. Green, Eds. *Impacts of Oil Spill Disasters on Marine Habitats and Fisheries in North America*. CRC Marine Biology Series. Pp. 181-198.
- Ballachey, B.E., D.H. Monson, G.G. Esslinger, K. Kloecker, J. Bodkin, L. Bowen and A.K. Miles. 2014. 2013 update on sea otter studies to assess recovery from the 1989 Exxon Valdez oil spill, Prince William Sound, Alaska: US Geological Survey Open-File Report 2014-1030, 40p.
- 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 *Sea Otter Conservation*, edited by J. Bodkin. S. Larson and G. VanBlaricom. Elsevier. Published January 2015. Pp 63-96.
- 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.
- Bodkin, J.L., D. Esler, S.D. Rice, C.O. Matkin, and B.E. Ballachey. 2014. The effects of spilled oil on coastal ecosystems: lessons from the Exxon Valdez spill. In: B. Maslo and J.L. Lockwood, Eds. *Coastal Conservation*. Cambridge University Press. Pp. 311-346.

Coletti, H.A., Dean, T.A., Kloecker, K.A., and Ballachey, B.E. 2014. Nearshore marine vital signs monitoring in the Southwest Alaska Network of National Parks: 2012. Natural Resource Technical Report NPS/SWAN/NRTR—2014/843. National Park Service, Fort Collins, Colorado. <http://science.nature.nps.gov/im/units/swan/publications.cfm?tab=2>

Dean, T.A., Bodkin, J.L., and Coletti, H.A. 2014. Protocol Narrative for Nearshore Marine Ecosystem Monitoring in the Gulf of Alaska, Version 1.1. Natural Resource Technical Report NPS/SWAN/NRTR—2014/756. National Park Service, Fort Collins, Colorado.

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

Monson, D.H. and Bowen, L. 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.

#### **Presentations:**

Holderied, K., McCammon, M., Hoffman, K., Ballachey, B., Weingartner, T., Lindeberg, M., and Hopcroft, R. Gulf Watch Alaska – Monitoring the pulse of the Gulf of Alaska’s changing ecosystems: Alaska Marine Science Symposium, Anchorage, January 2015.

Monson, D., Dean, T., Lindeberg, M., Bodkin, J., Coletti, H., Esler, D., Kloecker, K., Weitzman, B., and Ballachey, B. Inter-annual and spatial variation in Pacific blue mussels (*Mytilus trossulus*) in the Gulf of Alaska, 2006-2013: Alaska Marine Science Symposium, Anchorage, January 2015.

Konar, B., Iken, K., Coletti, H., Dean, T., and Monson, D. Static habitat attributes influence biological variability in intertidal communities in the central Gulf of Alaska: Alaska Marine Science Symposium, Anchorage, January 2015.

Lujan, S., Newsome, S.D., Coletti, H., von Biela, V., Monson, D., Ballachey, B., and Bodkin, J. Importance of micro- vs. macro-algae to Alaska marine invertebrates: Western Society of Naturalists, Tacoma, WA, November 2014.

#### **Meeting attendance:**

January 2015, Alaska Marine Science Symposium, Anchorage: Ballachey, Coletti, Doroff, Esler, Kloecker, Lindeberg, Monson, Shephard, Weitzman.

November 2013, Gulf Watch PI meeting, Anchorage: Ballachey, Bodkin, Coletti, Dean, Doroff, Esler, Kloecker, Lindeberg, Monson, Shephard.

#### **Data & metadata uploaded to data portal:**

(1) Black oystercatchers: prey and nest site data, KEFJ, KATM, WPWS; (2) Rocky intertidal sites: percent cover of invertebrates and algae, nucella, katharina, & sea star counts, slope data; KEFJ, KATM, WPWS, EPWS; (3) Invertebrates on sand/gravel beaches: counts, species, sizes, KEFJ, KATM, WPWS, EPWS; (4) mussels: counts, sizes (if > 20mm), KEFJ, KATM, WPWS, EPWS; (5) Sea otters: carcass data, KATM, WPWS, forage data, KEFJ, KATM, WPWS, EPWS, aerial survey--metadata only; (6) Water quality: mussel contaminant data, KEFJ, KATM, WPWS, EPWS, temperature data (intertidal), KEFJ, KATM, WPWS; (7) Marine bird and mammal survey data, KATM, KEFJ (raw count data and metadata in form of description of project and methods).

**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).*

Budget forms submitted separately. 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.