

Form Rev. 10.3.14

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

15120114-H

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

Science Coordination and Synthesis

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

Kris Holderied and Tammy Hoem Neher

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

Work in year four was focused on development of a plan and outline for a special journal issue, coordination of data delivery, metadata and updated sampling protocols to the Alaska Ocean Observing System (AOOS) Ocean Workspace, updates to outreach and data management tools, and planning and coordination for the program teleconferences and annual meeting. We provided formal and informal outreach of program findings, with program presentations at several science conferences, including the Alaska Marine Science Symposium in January 2016 and at workshops on the oceanographic and ecosystem effects of the Pacific warm water anomaly in May 2015 and January 2016. We are planning a joint Gulf Watch Alaska (GWA)-Herring Research and Monitoring (HRM) program special issue in the journal *Deep Sea Research II*. Guest editors and the submission framework have been established, with a manuscript submission period starting July 1, 2016. The annual program meeting was held in November 2015 with principal investigators (PIs) from the GWA and HRM programs, and the meeting was focused on preparing for the journal special issue and developing a proposal for the 2017-2021 *Exxon Valdez* Oil Spill Trustee Council (EVOSTC) Invitation. We also coordinated with the HRM program to present findings and share lessons learned from EVOSTC-funded ecosystem research and monitoring with organizations working on post-Deep Water Horizon oil spill efforts during a workshop held at the Gulf of Mexico Research Initiative conference in February, 2016.

Additional highlights from coordination and synthesis project efforts in year 4 include continuing to expand coordination with other organizations and we are participating in the Gulf of Alaska science synthesis effort led by the North Pacific Research Board (NPRB) Gulf of Alaska Integrated Ecosystem Research Program. We also participated in and shared information with the National Center for Ecological Analysis and Synthesis working groups (See project report for project number 15120120, M. Jones for details). Below is a summary of science coordination and synthesis work performed during the

reporting period by project objective, Table 1 highlights the project milestones and deliverables met during this reporting period.

Objective 1. Improve communication, data sharing and coordinated field work planning between principal investigators of the individual monitoring projects, as well as with other agencies and research organizations.

Two teleconferences were held with PIs and the Science Coordinating Committee (SCC) for GWA in May and August 2015. Most PIs attended the teleconference meetings and those that did not received meeting notes and held short discussions with the science coordinator and management team members. The annual program meeting was attended by all PIs (or representatives) in November and a second in-person meeting (with video-conference connection) was held in conjunction with the Alaska Marine Science Symposium in January 2016, with all PIs present in person or by phone. Meeting agendas, summaries, and other materials are posted on the internal AOOS GWA program Workspace (Program Coordination>Meetings). The SCC and program management team met formally via teleconference in April, July, September, October, and December 2015 with extensive additional coordination by email and in person to plan and discuss layout, content, and authorship of manuscripts for the journal special issue, provide input on needed data management services, start planning for the FY17-21 EVOSTC Invitation, and address ongoing program coordination issues.

We organized a small team to assist with the journal selection, the initial preproposal, timeline development, and guest editorial board for the joint programs special journal issue. The team met by teleconference in August, five guest editors were selected, the journal Deep Sea Research II was contacted, and the preproposal forms for the issue were submitted in November 2015 following the annual program meeting.

Much of the focus since October 2015 for the program and science coordination has been on development of the program proposal and projects under the 2017-2021 Invitation. This includes facilitating discussions on potential program changes, reaching out to scientists outside of the current team, creating budget estimates, organizing teleconferences, and writing drafts of the program and science coordination project proposals.

We continue to make changes to the AOOS Ocean Workspace, GWA website, and Gulf of Alaska Data Portal to facilitate communication between PIs and improve data access. This year, we developed an initiative to facilitate use of the data publishing tools, edit all project metadata, and create all file level metadata by holding one-on-one meetings with GWA and HRM science coordinators (Neher and Buckelew), Axiom staff and GWA program PIs. This initiative was well received and allowed us to make another leap forward in program data access and communication. All of the GWA projects housed within the AOOS Ocean Workspace, and Gulf of Alaska Data Portal have had the metadata reviewed and edited by the program PIs.

Finally, in partnership with the National Oceanic and Atmospheric Administration (NOAA) Kasitsna Bay Laboratory, we continue to maintain our interactive intranet Google Site for the program management team and PIs to share program updates, field highlights, and research discussions. To improve program coordination, the site is also linked to Google Drive folders and the GWA Google calendar.

Objective 2. Improve and document integration of science monitoring results across the LTM program - working with the PIs, data management and modeling teams as well as other agencies and research organizations.

We continued our progress in integration between the GWA-HRM programs in 2015-2016 with the initial planning of a joint program special journal issue and joint annual program meeting. PIs are closely coordinating across the programs on field activities, process studies, modeling, and working groups. Examples include integrated work between the HRM program and scientists from three of the environmental drivers component projects, as well as the humpback whales, marine birds, and forage fish projects, that was presented during the January 2015 Alaska Marine Science Symposium and February 2015 EVOSTC joint science workshop and described in the synthesis reports from both programs. These collaborations are ongoing and the lessons learned are being incorporated in planning for the FY17-21 phase of the long-term monitoring program.

The conceptual modeling project developed a series of sub-models to assist with understanding of ecology by focusing on various drivers of ecosystem function. These models are being used to facilitate discussion within the program teams and for outreach. One sub-model completed this year was a conceptual figure for the nearshore component provided for the synthesis report and several presentations. Three additional sub-models are in progress and are centered on: 1) top-down processes, such as whale predation; 2) bottom-up processes such as the effects of temperature and nutrients on plankton production; and 3) “lynch-pin” processes, such as the key role of forage fish in the ecological processes in the Gulf of Alaska. We are assisting in coordination with EVOSTC staff and project PIs on a revised timeline and final deliverables for the conceptual modeling project, in light of the Council decision not to fund year 5 of that project.

Objective 3. Improve communication of monitoring information to resource managers and the public through data synthesis and visualization products and tools – working with the data management, conceptual ecological modeling and outreach teams, as well as other agencies and research organizations.

One of our highlights from this year’s work on program data communication includes assisting with the development of a data visualization prototype by Axiom staff under the program data management project (15120114-D, McCammon and Bochenek). Based on needs expressed by Alaska Department of Fish and Game (ADFG) and NOAA fishery and marine mammal managers and researchers, the tool displays spatial observation data for humpback whales (15120114-N, Moran and Straley) with potentially related information, such as environmental data and ADFG herring spawn and school observations. The tool facilitates examination of co-located patterns of whale, herring, and oceanographic data in both space and time, and provides a simple way to explore relationships between key drivers, such as temperature or salinity, with herring and/or whale distributions. Axiom staff successfully demonstrated the prototype to GWA PIs during the in-person program meeting held at the AMSS in January 2016, generating much interest.

Table 1. Status of deliverables and milestones.

Deliverable/Milestone	Status
Continue to assist development of new data visualization and access tools	Tools were developed and a prototype was demonstrated for the program PIs during the AMSS program meeting.
Submit year 5 work plan.	Year 5 work plans were prepared or edited as needed and were provided Sept. 1 to Trustee Council staff. Work plans were approved during the November EVOSTC meeting.

Facilitate annual PI meeting	The program management team and SCC planned the meeting agenda, conducted the meeting, and coordinated associated work group discussion sessions. Meeting was held in November 2015 in conjunction with the HRM program meeting and focused on the joint special journal issue and the program proposal for the FY2017-2021 Invitation.
Attend AMSS and provide update to GWA program	Tammy Hoem Neher presented an update on monitoring program highlights from the GWA program at the CERF conference in November 2015 and at AMSS in January 2016. Kris Holderied provided monitoring program highlights at the Pacific Warm Anomaly Workshops in May 2015 and January 2016.
Submit report on synthesis of all available historical data from LTM projects	The NCEAS project is submitting a progress report on the historical data collection in conjunction with this annual report.
Submit annual project report	This document constitutes report submission.

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

As described above in the summary of work performed, many of the objectives and tasks performed under this project are efforts to build and facilitate coordination both within the GWA program and between the GWA and HRM programs as well as outreach information to other entities.

a. Coordination within and between council funded programs

- Planned GWA program meetings, teleconferences, and workshops
- Planned joint annual meeting with HRM program lead and attended HRM program meeting at the Alaska Marine Science Symposium. Also work closely with HRM program lead (Pegau) and science coordinator (Buckelew).
- Worked closed with the program PIs, data management, and outreach teams to provide program information and data on the website, Workspace, and public Data Portal.
- Worked with National Center for Ecological Analysis and Synthesis program working group team members to collect information for analyses and use by the team, including maps of the spill affected region, sampling data for lingering oil, oceanographic data, and humpback whale population data.
- Worked with GWA outreach committee to develop new outreach products (Discovery labs, virtual field trips, GWA YouTube channel and video, Prince William Sound Science Center Field Notes and video).
- Coordinated preparation of GWA annual reports and work plans.

b. Coordination with other Council funded projects –none during this reporting period

c. Coordination with management agencies and Trustees

- Presented program materials at numerous meetings, workshops, radio broadcasts, and conferences, including the American Fisheries Society Alaska chapter meeting in November 2015.
- Worked with Dr. Wayne Litaker (NOAA National Centers for Coastal Ocean Science) and Dr. Bruce Wright (Aleutian Pribilof Islands Association, Inc.) to review and discuss harmful algal bloom information from across the Gulf of Alaska to help understand potential impacts of toxic algae to communities and ecosystems. This information was used in program presentations to demonstrate some of the ecological shifts under anomalously high water temperatures.
- Worked with researchers from other NOAA offices (National Marine Fisheries Service, National Ocean Service, NOAA Research), U.S. Fish and Wildlife Service, U.S. Geological Survey, and ADFG throughout 2015 on the ecosystem responses to the Pacific warm anomaly, including

extensive seabird mortalities throughout the Gulf of Alaska, greatly increased sea otter mortalities in Kachemak Bay, toxic algae blooms throughout the GWA study area, and changes in species distributions, including increased numbers of herring, humpback whales, and king salmon in Kachemak Bay.

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

We are in the process of assisting the GWA outreach team in preparing the annual updates to the program website; these were last completed in May, 2015 and are done each year. Updates from this past year of monitoring are crucial as they will include information collected through the Pacific warm anomaly (late 2013 through present). We provided content and editorial review for a variety of outreach products in the past year, including review of Virtual Field Trip programs developed by the Alaska Sea Life Center (Screen shot in Figure 1, view it: http://www.alaskasealife.org/gw_introduction). Program PIs and their staff have participated in three public outreach events: the Kachemak Bay Science Conference in March, 2015, public Discovery Labs at the Kachemak Bay Research Reserve in Homer, Alaska in July, 2015 and the International Shorebird Festival in Cordova, Alaska in May, 2015. We also worked with program PIs to update all of the project level metadata and developed a GWA program YouTube channel to provide public access to program video and audio segments.



Figure 1. Screen shot of introductory page to the GWA program virtual field trip created by the Alaska Sea Life Center.

Publications: We did not publish peer reviewed literature as a program during this reporting period, a special journal issue is in development for publication during the spring of 2017.

Conference and workshop presentations and attendance: Multiple public presentations were made in a variety of venues on the integrated GWA program during this year. Dr. Tammy Hoem Neher gave the GWA program overview presentation at the March 2015 Kachemak Bay Science conference, the August 2015 National American Fisheries Society conference, the November 2015 Coastal Estuarine Research Federation conference, the January 2016 Alaska Marine Science Symposium, and the February 2016 Oil Spills and Ecosystems conference. Kris Holderied presented GWA program ecosystem monitoring results at the Pacific Anomalies Workshops in May 2015 (Scripps) and January 2016 (University of Washington). The science synthesis team also supported outreach for the GWA program during a

Kachemak Bay Research Reserve Discovery Lab on the program in July 2015, with over 300 people attending on three separate days. Topics included monitoring program results, history of the *Exxon Valdez* oil spill, and information on harmful algal blooms, seabirds, killer whales, nearshore ecosystems, and sea otters.

Data and/or Information Products: Efforts to develop information products this year were focused on development of the joint special journal issue with the HRM program to be published in the spring of 2017. In addition, we worked with the program PIs to update all project and file level metadata available on the Gulf of Alaska Data Portal.

Project data uploaded to program data portal: Not applicable to this project.

10. Response to EVOSTC Review, Recommendations and Comments: <i>See, Reporting Policy at III (C) (10).</i>

None for this project

11. Budget: <i>See, Reporting Policy at III (C) (11).</i>
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Please see provided program work book.