

Exxon Valdez Oil Spill
Long-term Monitoring Program (Gulf Watch Alaska) Final Report

Long-term Monitoring: Program Coordination, Logistics, and Outreach
Exxon Valdez Oil Spill Trustee Council Project 16120114-B
Final Report

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May 2018

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Study History: This project comprises the administrative program management component of Gulf Watch Alaska; specifically, program coordination, logistics, and outreach. This project was initiated in response to the Request for Proposals for a long-term monitoring program that would be managed internally. Because the program incorporated multiple agencies, universities, and non-governmental organizations from a wide geographic area, a structure was needed to provide umbrella support and oversight to ensure that the program operated in a coordinated fashion and met its objectives while reducing the number of contracts that would need to be managed by the *Exxon Valdez* Oil Spill Trustee Council. A practical requirement of overseeing such a large program, this project provided for fiscal management of all non-Trustee Agency subawards; coordinated and supported all Principal Investigator meetings; convened an internal Science Review Team; and oversaw the planning and extension of all community outreach and stakeholder engagement activities.

Abstract: The Prince William Sound Science Center served as the administrative lead and fiscal agent for all non-Trustee Agencies participating in Gulf Watch Alaska. Prince William Sound Science Center was responsible for all activities related to fiscal administration, logistics, and outreach for Gulf Watch Alaska, made possible through a cooperative agreement with the National Oceanic and Atmospheric Administration. Fiscal administration included issuance and maintenance of subaward contracts; completion of annual audits and semi-annual reporting; submission of annual work plans; attendance at annual Trustee Council and Public Advisory Committee meetings; attendance at data management meetings; logistics support for quarterly program teleconferences, an annual principal investigator meeting, and a mid-program synthesis workshop; and convening a Science Review Team. This program management component also convened an Outreach Steering Committee and oversaw all outreach activities, including the creation of a program website, as well as the culminating publication of a special issue journal. Through an iterative emphasis on fiscal accountability, reporting, annual meetings, and outreach opportunities, the administrative project required principal investigators to think beyond their individual project towards the holistic integration of all aspects of the program. This project and its emphases are one of the key reasons this program truly functioned as an integrated program.

Key words: Community engagement, cooperative agreement, fiscal administration, logistics, outreach, program coordination

Project Data: This is an administrative project and does not involve field data collection.

Citation:

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EXECUTIVE SUMMARY

In 2012, the Prince William Sound Science Center assumed administrative leadership of Gulf Watch Alaska and partnered with the Alaska Ocean Observing System to carry out the Outreach and Community Involvement component of the long-term monitoring program of the *Exxon Valdez* Oil Spill Trustee Council. To be most fiscally efficient, the Prince William Sound Science Center served as the administrative lead and fiscal agent for all non-Trustee Agencies participating in Gulf Watch Alaska. The Prince William Sound Science Center was responsible for all activities related to fiscal administration of Gulf Watch Alaska, made possible through a cooperative agreement with the National Oceanic and Atmospheric Administration. Fiscal administration included issuance and maintenance of subaward contracts; completion of annual audits and semi-annual reporting; submission of annual work plans; attendance at annual Trustee Council and Public Advisory Committee meetings; attendance at data management meetings; logistics support for quarterly program teleconferences, an annual principal investigator meeting, and a mid-program synthesis workshop; and convening a Science Review Team. This program management component also convened an Outreach Steering Committee and oversaw all outreach activities, including the creation of a program web site (www.gulfwatchalaska.org), as well as publication of a special issue journal. Outreach activities were directed by Molly McCammon of the Alaska Ocean Observing System. Outreach activities were diverse and occurred through a number of modes. In-person outreach included things such as presentations to classrooms; community lectures; museum exhibits; and filmmaking workshops about the effects of the spill, recovery from the spill, and ecosystem changes since the spill. Virtual engagement included things such as Virtual Field Trips, data visualizations, webinars, podcasts, and videos. Having the Prince William Sound Science Center serve as the logistics, outreach, and fiscal administrator for this long-term monitoring program as well as the Herring Research and Monitoring program meant that administration was consolidated, efficient, and an effective means of engaging principal investigators in program-wide responsibilities and accomplishments.

INTRODUCTION

Efficient and cost-effective administration of the \$10.5 million Long-term Monitoring (LTM) program was critical to the success of Gulf Watch Alaska (GWA). The *Exxon Valdez* Oil Spill Trustee Council (EVOSTC) requested that a consortium submit one proposal for the LTM program. Our consortium included three primary organizations: the Prince William Sound Science Center (PWSSC) as the administrative lead and fiscal agent; the National Oceanic and Atmospheric Administration (NOAA) Kasitsna Bay Laboratory (KBL) provided science program leadership; and the Alaska Ocean Observing System (AOOS) provided data management, outreach, and community involvement services, as well as

serving as the Program Coordinator and primary point of contact for the overall program. Collectively, this Program Management Team (PMT) represented a wealth of knowledge about the spill-affected region, had extensive experience with managing multi-million dollar, multi-party science programs, and had significant outreach and stakeholder engagement expertise. Additionally, the administrative lead of GWA is co-located at the PWSSC with Scott Pegau, Program Lead for the Herring Research and Monitoring (HRM) program. As these two programs had complementary purposes and structures in addition to similar outreach and community involvement needs, GWA coordinated closely with the HRM program across all five years.

Fiscal management of all non-Trustee Agency activities was conducted by PWSSC. This included management of six subaward contracts; timely submission of annual work plans, progress reports, and financial reports to the NOAA as well as to the EVOSTC; completion of an annual audit; and project spending monitoring.

OBJECTIVES

Objectives for this project included the following:

1. Provide fiscal management for the LTM program, including award and management of all contracts and subawards for non-Trustee organizations involved in the program, timely submission of financial reports, completion of annual audits, and monitoring of project spending.
2. Form and operate a Scientific Review Team.
3. Manage expenses and logistics for the annual meeting of the LTM PIs.
4. Provide travel expenses for the outreach team.
5. Oversee LTM project outreach and community involvement.

METHODS

As the first self-managed LTM program funded by the EVOSTC, and because the program incorporated Trustee and non-Trustee Agencies and organizations from a wide geographic area, a structure was needed to provide umbrella support and oversight to ensure the program as a whole operated smoothly and met its objectives. We implemented the administration, logistics, and outreach project, in conjunction with the science coordination and synthesis and data management support projects, to serve this purpose.

The study area for the administration, logistics, and outreach project included communities affected by the *Exxon Valdez* oil spill. Administrative services were conducted from the

PWSSC office in Cordova, Alaska. Outreach services were managed from the AOS office in Anchorage, Alaska and the PWSSC office in Cordova. Outreach and community involvement activities were completed throughout the spill-affected region.

Fiscal Management Tasks

PWSSC coordinated with NOAA contracting and served as the agent responsible for awarding and managing all non-Trustee Agency contracts for organizations involved in the LTM program. Non-Trustee Agencies and organizations (including PI and projects) included the following:

- PWSSC (Hoffman, this project; Campbell, Prince William Sound Oceanography [16120114-E]; and Bishop, Prince William Sound Fall/Winter Seabird Abundance [16120114-C]).
- University of Alaska Fairbanks (Hopcroft, Seward Line [16120114-J]; Weingartner, GAK1 [16120114-P]; and Konar and Iken, Ecological Communities in Kachemak Bay [1612-114-L]).
- Sir Alister Hardy Foundation for Ocean Science (Batten, Continuous Plankton Recorder [16120114-A]).
- North Gulf Oceanic Society (Matkin, Killer Whale Monitoring [16120114-M]).
- Alaska SeaLife Center (ASLC; Hollmen, Conceptual Ecological Modeling [16120114-I]).
- Alaska Ocean Observing System (AOS) and Axiom Data Science (McCammon, this project, and Bochenek, Data Management [16120114-D and 16150114-T]).
- Kachemak Bay National Estuarine Research Reserve (KBRR)/University of Alaska Anchorage (Doroff, Cook Inlet and Kachemak Bay Oceanographic [16120114-G]).
- National Centers for Environmental Analysis and Synthesis (Jones, Collaborative Data Management and Holistic Synthesis [16120120]).

For PWSSC to be able to receive the contract for this work from NOAA, we had to re-write the LTM program proposal and all nine subaward proposals in a manner compliant with NOAA formatting requirements. We had to generate and submit an SF-424A budget form for the proposal. Since SF-424a budget forms are not structured to accommodate a 5-year award, we worked with NOAA grants and contracts staff to modify the presentation of the budget material in a manner acceptable to them. The SF-424A required us to estimate, with accuracy, the amount of funds that would be expended in Year One across all non-Trustee Agency projects. If, at any point during the program, a non-Trustee Agency PI wanted to make an equipment purchase that was not specified in their original proposal, PWSSC would make a request to the EVOSTC Executive Director. Upon approval from EVOSTC staff, we would submit the request to NOAA using their GrantsOnline system. We would answer all questions that NOAA grants and contracts officers had about such equipment requests, and, if approved, forward the permission to the PI.

We established contracts with each of the institutions in which the nine subaward projects resided. This involved circulating a draft contract, working to accommodate any requested edits, and checking that both institutions were in agreement on the budget line items, totals, and allowable indirect costs. For the duration of the project, expenses were reimbursed after being incurred and invoices submitted to PWSSC. Subaward entities were allowed to invoice PWSSC no more than biweekly. Throughout the project, we monitored project spending and would notify subawardees who were not invoicing with appropriate frequency that they needed to send us an invoice for their project. Upon receipt of subaward invoices, we would request an ACH transfer from NOAA and cut a check to the subaward agency to reimburse them for project expenses. Various internal controls were maintained during this process. Invoices were reviewed, at minimum, by two people at PWSSC and checks for amounts greater than \$5,000 were signed by two authorized signatories.

At the end of each contract year, contract amendments were established to reflect the newly approved funding if the EVOSTC extended funding for an additional year to the project. This process involved circulating a draft amendment to the institution for review and approval, and returning an executed document to them.

Multiple times per year we would compile and submit an SF-425 form to NOAA. An SF-425 is a cumulative report that captures the financial status of the program at a point in time. Once per year PWSSC would have a complete audit of our financial position and a federal single audit performed by an external auditing firm with expertise in evaluating fiscal records against generally accepted accounting principles, the Office of Management and Budget (OMB) A-133 supplement, and once it was in effect after late 2013, the OMB Supercircular. Completion of the audit required preparation followed by a full week of field testing by the audit firm at the PWSSC finance office in Cordova and follow-up communication to provide any additional materials or answer questions as needed. The PWSSC Board of Directors and board finance committee reviewed the audits annually, heard a presentation by the auditors if requested, and accepted the audits with a motion of the board.

In the final year of the program, preparations were made to accept responsibility for the publication of a special edition of the research journal, *Deep Sea Research II*, to be focused on the LTM and HRM programs. This entailed communicating with EVOSTC staff, the publisher, and authors of all LTM and HRM peer-reviewed articles that were accepted for inclusion.

Efficiencies were achieved across all fiscal administration responsibilities because PWSSC was responsible for all subawards in both the LTM and HRM programs. This meant the contracting, invoicing, and audit processes were replicated across the two programs by PWSSC staff.

Formation and Operation of a Scientific Review Team

Five scientists with eminence in their field of study were recruited to provide scientific oversight of the LTM program. Science Review Team members came from Trustee Agencies and universities that have experience conducting research in the program's study area. The Science Review Team reviewed annual reports and work plans, participated in quarterly PI teleconferences and annual meetings to develop a deeper understanding of the LTM program's work, and worked with LTM program management to guide and ensure the scientific integrity of monitoring activities.

As part of the administration, logistics, and outreach project, PWSSC coordinated and paid for all Science Review Team travel to LTM program meetings.

Travel Expenses for the Annual Meeting of Long-term Monitoring Principal Investigators

LTM program PIs met in person twice each year: at the Alaska Marine Science Symposium (AMSS) in January and at a multi-day collaboration meeting in the fall. PWSSC secured meeting locations and assumed responsibility for any site or audio visual rental needs. In some cases, PWSSC provided travel funds and made arrangements for individual PIs to attend the meeting. This included securing hotel and airfare reservations. For multi-day meetings, PWSSC made catering arrangements so meals were available during working hours.

Travel Expenses for Outreach

PWSSC covered reimbursable expenses for all members of the Outreach Steering Committee (OSC). Meetings were typically held in a fee-free space at the AOOS office in Anchorage, Alaska. To improve efficiency, telephonic OSC meetings were held on many occasions and in-person meetings were held approximately once annually. The OSC was a group of outreach and community engagement experts who provided direction to the outreach coordinator and outreach lead regarding what outreach activities the program should pursue. When outreach events were scheduled in spill-affected communities, the outreach coordinator and outreach lead solicited participation from various PIs. PWSSC would arrange travel logistics including lodging and airline routes and pay for or reimburse for the expenses. These included activities such as educational experiences or community lectures offered in spill-affected communities about LTM activities.

Long-term Monitoring Project Outreach and Community Involvement

Disseminating information from GWA LTM program science to the public, particularly communities affected by the spill, was a key goal of this project. The first step included establishing an OSC made up of education/outreach specialists. The original committee included representatives from AOOS, the Center for Ocean Science Education Excellence (COSEE), the ASLC, PWSSC, and KBRR. When COSEE disbanded early in the five-year

period, a representative from Alaska Sea Grant filled the available seat and provided coordination services. The OSC decided on, implemented, and directed implementation of outreach and community involvement activities throughout the five-year period.

Methods used for outreach and community involvement included the following:

- Developing branding materials.
- Developing and maintaining a website for the program.
- Preparing and disseminating project profiles.
- Engaging GWA LTM program scientists from various projects to present public lectures, school presentations, educational activities, and participate in ocean science festivals.
- Holding discovery labs for children and adults.
- Publishing videos of scientific work performed by GWA LTM projects and interviews with GWA LTM PIs.
- Publishing articles in *Delta Sound Connections*, PWSSC's annual science and natural history newspaper.
- Holding workshops and webinars, such as for staff of management agencies responsible for managing resources affected by the spill.
- Developing a large, visual exhibit of GWA LTM projects that is capable of traveling to other communities.
- Engaging spill-affected communities through youth filmmaking workshops and movie nights.
- Preparing virtual field trips as educational tools to support science education and science teachers.
- Developing animations, visualizations, and graphic displays to help the public understand the northern Gulf of Alaska ecosystem, the spill affected area, and the findings of the LTM program.
- Publications for general audiences.

RESULTS

Fiscal Management Tasks

In all five years of the Gulf Watch Alaska program from 2012-2017, PWSSC issued and managed subaward contracts for all non-Trustee Agency projects. We remunerated subawardees based on demonstrated expenses, tracked spending, and completed our annual audit each fall. We provided outreach funding as directed by McCammon and the OSC. Semi-annual program reports to NOAA and annual EVOSTC reports and work plans were submitted on time. Fiscal reports such as SF425s were submitted to NOAA by all required deadlines. Annual audits including federal single audits were completed in every program year. Project spending for all subawards was monitored and assistance was provided to the program overall with budget reconciliation, tracking of cumulative spending, and requests for line item transfers or transfers between projects. In each of the program years 1-5 (2012-2016), the PMT was very proactive and met telephonically approximately twice monthly, and sometimes with weekly or greater frequency as needed. On more rare occasions, the PMT met in person. PWSSC provided teleconferencing and webinar capabilities for all such meetings.

Formation and Operation of a Scientific Review Team

Science Review Team members included Terrie Klinger (University of Washington); Jeep Rice (NOAA, retired); Eric Volk (ADF&G) who retired and was replaced by Rich Brenner (ADF&G); Leslie Holland-Bartels (USGS, retired); and Hal Batchelder (Oregon State University). The PMT, with agreement from the EVOSTC staff, decided not to convene the Science Review Team until Year Three when the program synthesis was taking place. The Science Review Team exceeded our expectations in their dedicated engagement and participation in LTM program meetings and reviews for program synthesis, annual report, and program proposal review for the EVOSTC fiscal year 2017-2021 Invitation (EVOSTC 2015).

Travel Expenses for the Annual Meeting of Long-term Monitoring Principal Investigators

We held at least four PI meetings per year. Two quarterly meetings were held by phone; the other two were held in person at AMSS and at the annual PI meeting each fall. PWSSC coordinated logistics and processed expenses for all in-person meetings. We also managed travel and logistics for the Science Review Team in each of the years they were involved in program planning and program review. Fall PI meetings were typically scheduled in collaboration with the EVOSTC-funded HRM program to enable cross-component and cross-program collaboration. We submitted all financial reports to NOAA and the EVOSTC as required and on time. Additionally, we presented to and/or made ourselves available to the EVOSTC and Public Advisory Committee every fall at their annual meetings.

In Year 3 we participated in the Synthesis Workshop with EVOSTC Science Panel members and PIs from both GWA and HRM. We worked closely with EVOSTC staff to streamline reporting and communications processes and ensure that the program was responsive to their requests and input.

Travel Expenses for Outreach Team

Outreach goals were exceeded and outreach team needs were met through coordination of travel and logistics and remuneration of expenditures incurred.

Long-term Monitoring Project Outreach and Community Involvement

Outreach and community involvement events, products, and publications reached both targeted and diverse audiences everywhere from rural Alaskan villages to larger spill-affected communities, to in- and out-of-state visitors, to any interested viewer on the Internet.

Branding Materials

Outreach work began with developing branding materials so that the disparate scientists involved in the program could speak the same language when referring to their work, and presentations and outreach materials would have a similar look and feel no matter what the outreach activity involved. Branding materials developed included a project logo (Fig. 1), poster and presentation templates, pop-up GWA signs and display banners, brochures, presentation folders, and bookmarks with the GWA website.



Figure 1. Gulf Watch Alaska logo developed as part of program branding. The logo was used on the program's website, poster and presentation templates, display signs, brochures, presentation folders, and bookmarks.

Gulf Watch Alaska website

A basic program website was developed during the first year of the project and hosted by AOS. Once branding materials were developed and scientific projects had been underway long enough to provide preliminary findings, the website was redesigned with an established web address (www.gulfwatchalaska.org; Fig. 2). The updated website provided links to the Gulf of Alaska Data Portal where LTM program data are publicly available. The website displayed program, component, and project overview pages; provided PI contact information; listed project publications, reports, and presentations; and provided links to outreach materials. Once developed, the website was updated regularly as new findings became available.

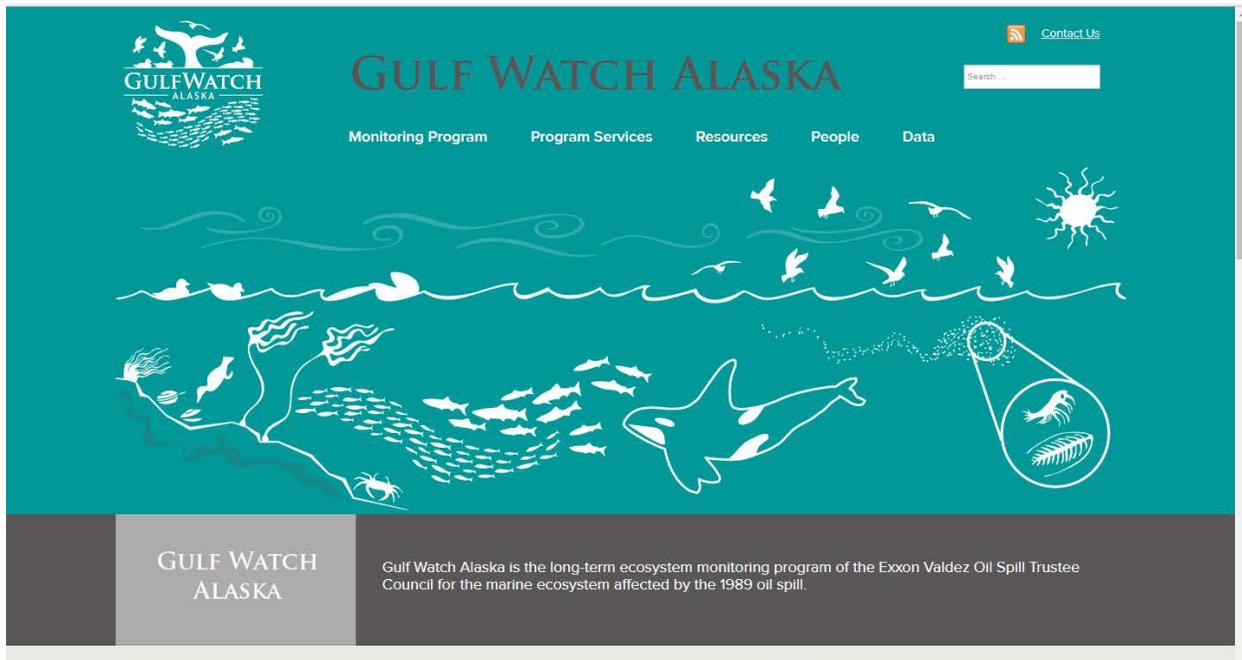


Figure 2. Gulf Watch Alaska website (www.gulfwatchalaska.org) showing the top of the opening page.

Project Profiles

Two-page profiles were written for each science project in the GWA LTM program (Fig. 3). Hard copies were printed for distribution and electronic copies were posted to the website project pages. Project profiles mirrored project information provided on the website and included contact information for the project PI(s) and answers to four questions: Why are we sampling? Where are we sampling? How are we sampling? What are we finding?



WHO WE ARE
Principal Investigators



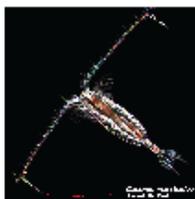
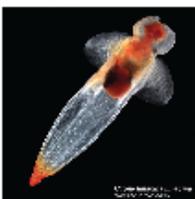
Russ Hopcroft
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info@gulfwatchalaska.org

PROJECT PROFILE

The Seward Line: Marine Ecosystem Monitoring in the Northern Gulf of Alaska

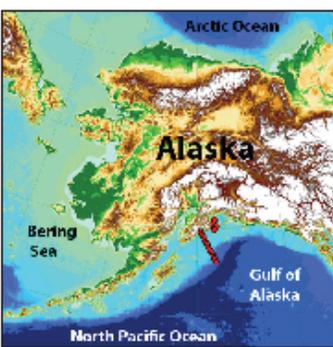

Left: A copepod, Galanus marshallae, captured during sampling of the Seward line. Middle: Pteropods are a pelagic snail. Their name means "winged foot," a reference to the modification of their fleshy molluscan foot that allows them to swim in the ocean. These animals, such as Clione limacina pictured here, are generally present in low numbers year round but can be the preferred prey of some species of fish. Right: Euphausiids, such as this Thysanoessa inermis pictured here, generally rank second or third in abundance in most ocean waters below copepods. These animals are important prey items for fish, birds, and mammals.

WHY ARE WE SAMPLING?

The Gulf of Alaska supports a diverse ecosystem that includes several commercially important fishes, as well as culturally and economically important mammals and plants. Historic observations suggest a connection between the Gulf of Alaska ecosystems and climate variations that range from interannual to interdecadal. The specific mechanisms by which climate variation causes ecosystem changes, however, are poorly understood. Sampling along the Seward line is producing a multi-year data set that will lead to a better understanding of the seasonal cycle and the variability that occurs from year to year in environmental conditions and biological productivity in the Gulf of Alaska.

WHERE ARE WE SAMPLING?

The Seward line is a transect of oceanographic survey stations that begins at the GAK1 mooring at the mouth of Resurrection Bay in the Gulf of Alaska (59°50.7'N, 149°28.0'W) and continues south across the Gulf of Alaska to past the outer edge of the continental Shelf, or "shelf break" (58°5.9'N, 147° W).



Location of the Seward line oceanographic survey transect in the Gulf of Alaska and Prince William Sound (red).

Figure 3. The first page of the Seward Line’s project profile provides an example of the two-page project profiles written and distributed for each Gulf Watch Alaska science project.

Scientist Lectures and Talks

GWA LTM program PIs provided public lectures and talks in a variety of venues and locations throughout the five years of the program, including the PWSSC community lecture series and pub talks; festivals including the PWSSC-led Ocean Fests in Valdez and Cordova, the shorebird festivals in Cordova and Homer, Sitka Whale Fest; Prince William Sound Regional Citizens' Advisory Council science night in Anchorage; KBRR sponsored lecture series in Homer; and various other venues and locations (Fig. 4). In conducting these events, the LTM program directly engaged well over 3,400 participants in meaningful experiences, and many individual events included more than 200 participants.

Scientists also presented to school groups through interactive activities in the classroom or turning a research vessel into a classroom and providing students with first-hand experience collecting marine data.



Figure 4. Craig Matkin, principal investigator for the killer whale monitoring project, presents a public lecture in Homer, Alaska.

Presentations by GWA LTM program scientists are listed at the end of this report under the Other References section.

Discovery Labs

KBRR's education program conducted summer discovery labs in Homer from 2013 to 2016 (Fig. 5). The labs were open to all ages and attracted both residents and visitors. Each year

the lab presented materials, experiments, and activities related to the Gulf of Alaska ecosystem and GWA projects and findings.



Figure 5. Kim Kloecker, a scientist with the nearshore component, speaks with a curious discovery lab participant examining a sea otter skull.

Videos and Field Notes

The GWA LTM program has its own YouTube channel (Fig. 6). Through the course of the first five years of the program, scientists and professional videographers collected video footage of science in action. The video footage was developed into several-minute vignettes describing the program as a whole and individual projects. In addition, PWSSC interviewed scientists about their work and combined the interviews with video and photographs from field work or generated curated podcast-style radio shows called *Field Notes*.

Videos were presented during discovery labs and at public lectures and are available from the website or YouTube channel. Videos and field notes produced include the following:

- Gulf Watch Alaska Program.
- Cook Inlet Adventure in Oceanography.
- Kachemak Bay Ecological Trends.
- Intertidal Monitoring in SW Alaska Parks.
- Ecological Sampling in Kachemak Bay.
- Herring Scatter to Avoid Humpback Whale.

- Kachemak Bay Ecological Trends.
- Humpback Whale Identification.
- Humpback Whale Diet.

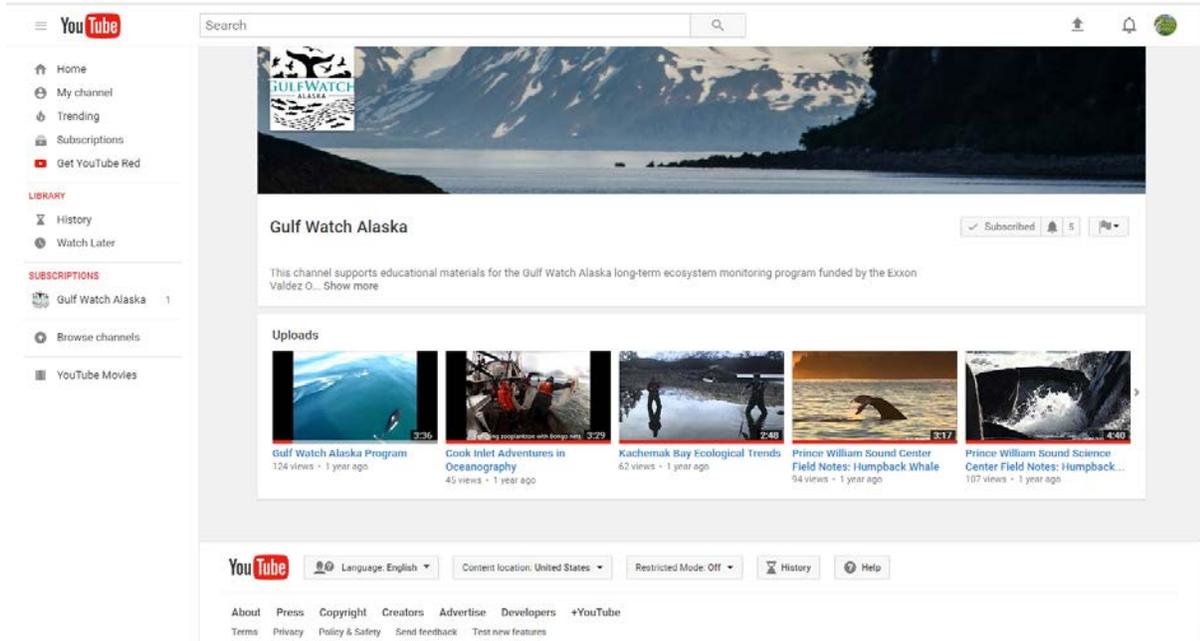


Figure 6. Gulf Watch Alaska’s YouTube channel with program and project videos produced during the first five years of the program.

Links to videos and field notes are listed at the end of this report under the Other References section.

Delta Sound Connections articles

Delta Sound Connections is a newspaper produced annually by the PWSSC and distributed widely throughout Prince William Sound and the Copper River Delta (e.g., state ferries, Ted Stevens Anchorage International airports, Mudhole Smith airport in Cordova, Begich Boggs Visitor Center at Portage Glacier, and a variety of sites in Girdwood, Glenallen, Copper Center, and Valdez). The newspaper includes articles on the natural history and science news from the Prince William Sound and Copper River Delta bioregion. The GWA LTM program contributed several articles per year and financially supported production of the newspaper (Fig. 7). Individual articles written for the GWA LTM program are listed at the end of this report under the Other References section.

We hosted an informational webinar in September 2014 about GWA, targeting EVOSTC agency staff as part of an effort to engage more deeply with management agencies.

GWA LTM program PIs participated in community workshops and symposia intended to present science information to lay audiences. These include the Sitka WhaleFest in Sitka and the Kachemak Bay Science Conference in Homer. GWA LTM program scientists also participated in a series of workshops on coastal resiliency to climate change in Homer.

Gulf Watch Alaska Traveling Exhibit

A five-panel interactive exhibit about the GWA LTM program was produced and is on display at the ASLC in Seward where all visitors can see it (Fig. 8). The exhibit is suitable for travel and will be able to be transported to other venues. The panels provide an overview of the program and details about each of the program's components: lingering oil, environmental drivers, pelagic ecosystems, and nearshore ecosystems. Videos produced for the program display on a screen.



Figure 8. Gulf Watch Alaska program panels on display near the entrance of the Alaska SeaLife Center in Seward, Alaska.

Film Workshops and Movie Nights

A professional videographer was contracted to lead filmmaking workshops with youth in spill-affected communities. The workshops were typically two weeks in duration and took place in schools in Nanwalek, Tatitlek, Cordova, Valdez, Whittier, and Chenega Bay. Students were tasked with creating short films about GWA-related subjects such as the how EVOS affected their community; how valued ecosystem components have changed over time; and how community members have observed both change and recovery evolving over time. Students learned skills in shooting video, interviewing, and editing and production of short films (Fig. 9). Some students interviewed elders about their experience during and following the EVOS. The resulting videos were screened in the villages on movie nights, allowing the students to display their new-found talents and community members to connect between generations as they recalled the ecological, physical, and emotional impacts of the spill. Links to films produced during the workshops are listed at the end of this report under the Other References section.

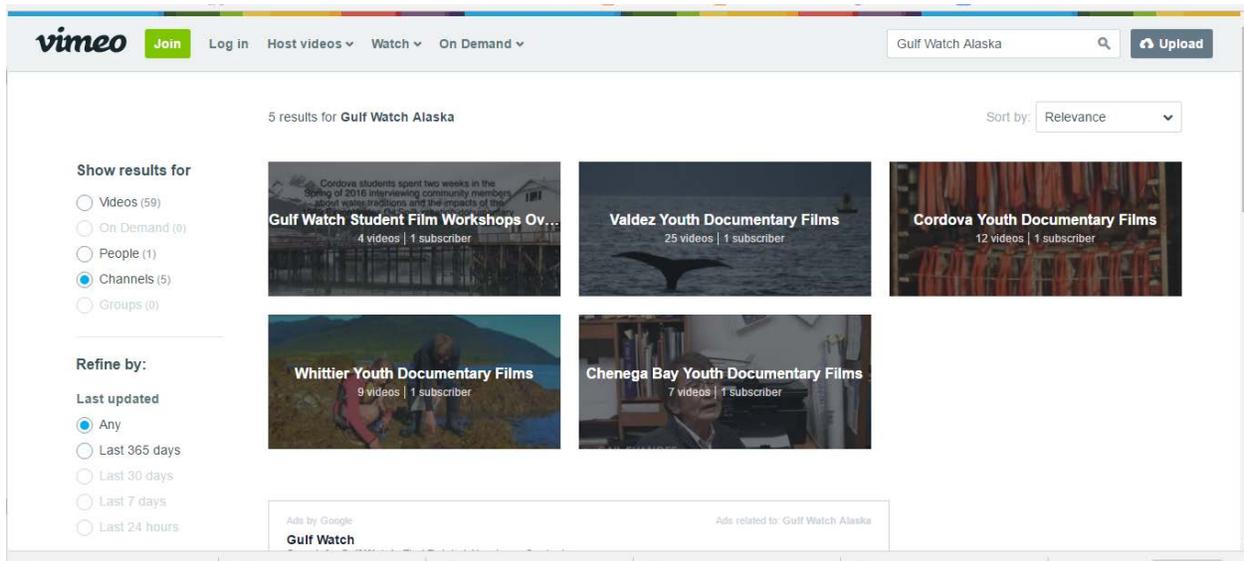


Figure 9. Videos produced by students in Valdez, Cordova, Whittier, and Chenega Bay on Gulf Watch Alaska’s Vimeo channel.

Virtual Field Trips

ASLC produced two virtual field trips, designed to complement middle-school science curricula, related to the GWA LTM program and made them available from their website and on compact disc. Both virtual field trips are interactive, with written material, videos, and interviews with GWA LTM program PIs, and include lesson plans for teachers (Fig. 10). The first, called “Gulf Watch Alaska Long-term Monitoring”, included background information on the EVOS and the Gulf of Alaska ecosystem and introduced the GWA LTM

program with videos featuring four program components and the work and careers of GWA scientists (Fig. 11). The second, called The Mystery of the Blob, compared seasonal patterns of ocean conditions in the Gulf of Alaska and implications for food webs under anomalously warm conditions (Fig. 11). Yosty Storms, a former intern with GWA through the Alaska Native Science and Engineering Program in Anchorage, narrates the second virtual field trip as she learns about the Mystery of the Blob talking with GWA Scientists. The link to the ASLC virtual field trip website is listed at the end of this report under the Other References section.

GULF WATCH ALASKA
Long-term monitoring

Introduction | Nearshore | Drivers | Lingerin Oil | Pelagic | Connections
Updates | For Teachers

WELCOME, TEACHERS!

The Alaska SeaLife Center and Gulf Watch Alaska are excited to present this virtual field trip (VFT). Join the Gulf Watch Alaska team of scientists as they investigate the long term effects of the *Exxon Valdez* oil spill on the ecosystems of the Gulf of Alaska. Learn about the work of a collaborative team of scientists from many different ocean science disciplines, who represent over 15 different government agencies, non-profit research institutions, and universities.

GRADE LEVEL: 6-8th

TIME NEEDED: Between one and four 1-hour class periods (teachers may choose to use all or only some of the supplementary lessons).

NUTSHELL: Students will learn about the long-term monitoring projects that have been studying the effects of the 1989 *Exxon Valdez* oil spill in Prince William Sound and the northern Gulf of Alaska. They will explore the various projects and how, collectively, they can inform us about the overall ecosystem.

LEARNING OBJECTIVES:

After completing this virtual field trip, students will be able to:

- Explain how the long-term monitoring project called Gulf Watch Alaska was founded and what its overall goals are.
- Understand the collaborative nature of science and how researchers from various disciplines working together can provide a 'big picture' view of a massive project.
- Explain the various levels of a biome and how all components of an ecosystem depend upon each other for a healthy environment.

BACKGROUND:

CURRICULUM SUPPLEMENTS

Use the .pdf links below to access classroom activities for each section of the Gulf Watch Alaska virtual field trip experience.

- [Lesson 1 Nearshore.pdf](#)
- [Lesson 2 Drivers.pdf](#)
- [Lesson 3 Lingerin_Oil.pdf](#)
- [Lesson 4 Pelagic.pdf](#)
- [Gulf Watch Whale Fluke ID.pdf](#)
- [Who's that Whale? slideshow](#)

The map shows the state of Alaska with the Gulf of Alaska Monitoring Area highlighted in blue. Neighboring countries, Russia to the west and Canada to the east, are also labeled.

Figure 10. Alaska SeaLife Center’s curriculum for learning about long-term monitoring and the Gulf Watch Alaska program.

GULF WATCH ALASKA

Long-term monitoring

Introduction
Nearshore
Drivers
Lingering Oil
Pelagic
Connections

Updates
For Teachers



On March 24, 1989, an oil tanker leaving the port of Valdez, Alaska hit a shallow reef and spilled 11 million gallons of oil into the sea. This spill spread southwest, covering nearly 1,300 miles of coastline in thick, sticky oil. Oil was even found washed up near the village of Chignik, 470 miles away from the spill site. It is estimated that 250,000 seabirds, 2,800 sea otters, 300 harbor seals, 250 bald eagles, up to 22 orcas, and billions of salmon and herring eggs were lost in the spill. It is difficult to know how many intertidal plants and animals, such as barnacles, sea stars, and hermit crabs, were also impacted.

The Gulf of Alaska is part of the North Pacific Ocean. It stretches from the Alaska Peninsula in the west to the islands of Alaska's southeast. The coast includes mountains, glaciers, forests, towns, and cities. The waters are full of life and support one of the country's largest fishing industries. Powerful currents circulate marine life and bring up nutrients from deep waters. Seabirds and marine mammals feed in the many bays and estuaries of the gulf. These areas also provide nursery habitats for fish.

Click here to hear the captain's call moments after the Exxon Valdez oil tanker ran aground.

"Yeah, this is Valdez. We've... should be on your radar there. We've fetched up, hard aground, north of Goose Island off Bligh Reef and... evidently... leaking some oil."

WHO IS WATCHING THE GULF?

Meet... **John Moran** >> Research Fisheries Biologist

Meet... **Sonia Batten** >> Biological Oceanographer

Meet... **Dan Esler** >> Research Wildlife Biologist

Meet... **Heather Coletti** >> Marine Ecologist



Vocabulary

Baseline data (n): a measure of some or how things

GULF WATCH ALASKA

The Mystery of THE BLOB

Introduction
Observation
Investigation
Discovery
Results
For Teachers



The Gulf of Alaska is part of the North Pacific and reaches from the Alaska Peninsula in the west to the Alaska archipelago in the southeast. The coastline includes mountains, glaciers, temperate forests, towns, and cities. Powerful currents in the Gulf of Alaska have helped shape the surrounding land and communities, and circulate necessary nutrients and marine life from the deep waters to the surface. These circulation patterns allow the Gulf of Alaska to thrive with life and sustain some of the largest United States' fisheries, as well as provide essential habitats for seabirds, marine mammals, and fish to feed and reproduce.

WHO IS WATCHING THE BLOB?

Meet... **Kathy Kulutr** >> Wildlife Biologist

Meet... **Sonia Batten** >> Biological Oceanographer

Meet... **Seth Danielson** >> Physical Oceanographer



Vocabulary

Archipelago (n): a section of

Figure 11. Alaska SeaLife Center's introductory webpages for Gulf Watch Alaska virtual field trips.

Gulf of Alaska Ecosystem Animations

To demonstrate how changes in ocean temperatures affected the ecosystem, from plankton to whales, the outreach program developed animated videos of typical and anomalous ecosystem function (Fig. 12). Anomalously warm waters settled into the northern Gulf of Alaska in late 2013 and expanded during subsequent years of the first five years of the GWA LTM program. All monitoring projects detected changes related to the anomaly (see McCammon et al. 2018 and individual project final reports).

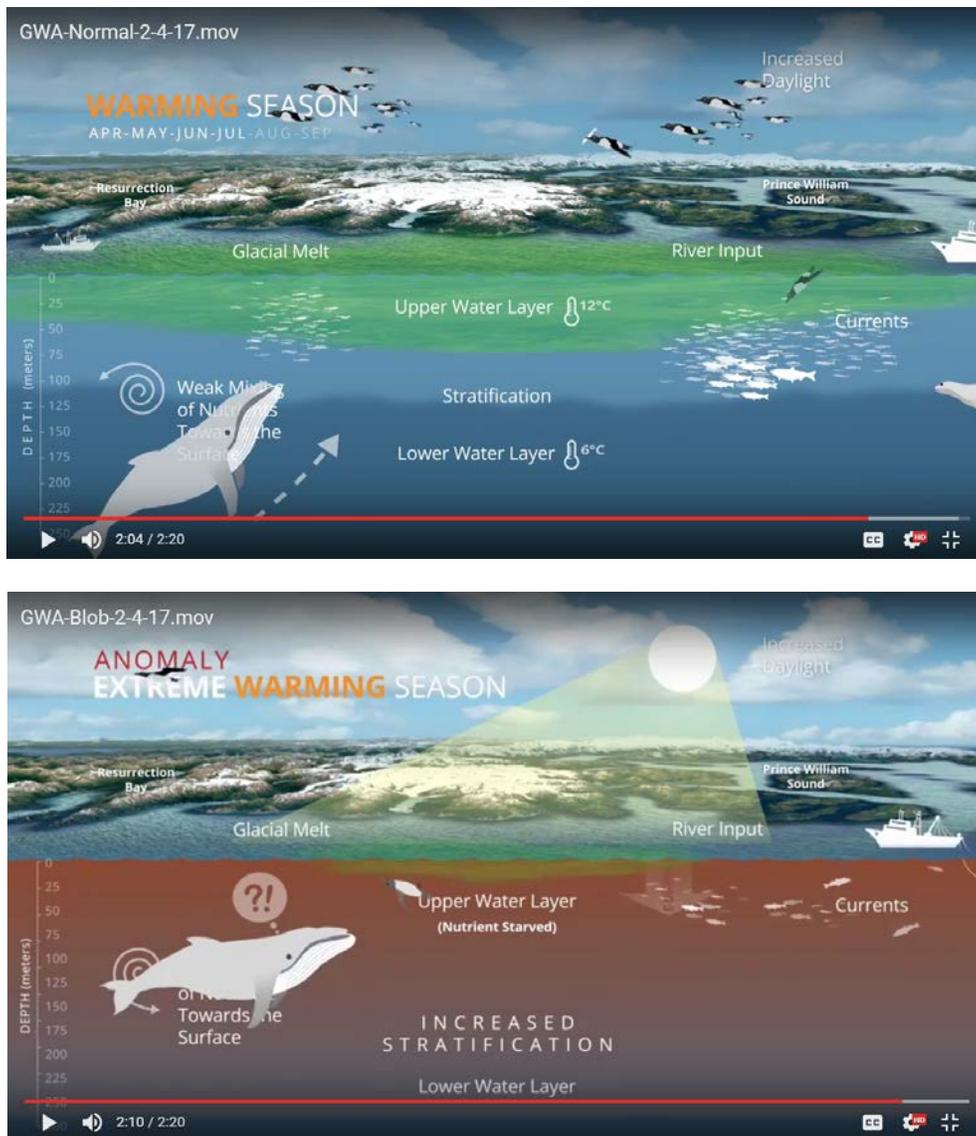


Figure 12. Stills from animated videos demonstrating the Gulf of Alaska ecosystem during normal (top) and anomalously warm (bottom) periods. The animations were developed to demonstrate the ecosystem changes from the warm anomaly that began in late 2013.

Publications for General Audiences

In addition to the outreach methods presented above, several PIs wrote articles for newspapers, books, and short stories regarding the findings of GWA LTM program projects. Much of this work was completed on PIs' personal time. Journalists with newspapers and magazines sought out GWA LTM program PIs and wrote articles based on interviews. These types of publications are listed in the Other References section. The GWA Program final report (McCammon et al. 2018) has a full listing of publications, presentations, and posters.

DISCUSSION

Administration of the LTM program was highly successful. This was largely due to the tight collaboration of the PMT, timely completion of fiscal tasks by PWSSC finance staff, excellent input from the Science Review Team, outreach expertise provided by the OSC, open communication with EVOSTC and NOAA staff, and close collaboration with the HRM program manager.

Fiscal Management Tasks

PWSSC finance staff have extensive experience managing federal grants and subawards as well as annual audits. Efficiencies were achieved by having all non-Trustee Agency funds come through NOAA to PWSSC for both LTM and HRM programs. This enabled NOAA to receive proposals, semi-annual reports, and fiscal report from a single source and reduced the number of contacts interfacing with EVOSTC staff. Administering this program was consistent with PWSSC's mission to support community resilience and the understanding and sustainable use of ecosystems.

Formation and Operation of a Scientific Review Team

The Science Review Team brings to bear considerable expertise on the program. Their input strengthens science synthesis and improves the quality of published work and unpublished reports. When the majority of PIs are embroiled in the minutiae of each project, Science Review Team members take a high level view and help advance the program by asking challenging questions, encouraging new hypotheses, helping make connections between projects, and ensuring the quality of reports. Integrating the Science Review Team has strengthened the program overall providing a means for scientific flexibility in a long-term monitoring program.

Travel Expenses for the Annual Meeting of Long-term Monitoring Principal Investigators

The greatest program gains were made during multi-day collaborative meetings. Away from the distractions and many responsibilities of their day jobs, the PIs engaged in a workshop-like atmosphere and made great strides in methods refinement, data

management, analyses, and paper writing. Ideas for additional collaborations among PIs and how to evolve the program across the next five years were all things born from or solidified during annual PI meetings. These meetings also provided an opportunity to deliver administrative reminders about everything from deadlines to schedules to budgeting and community engagement.

Travel Expenses for Outreach Team

The LTM program represents a significant investment by the EVOSTC in long-term monitoring of the spill affected area. However, since very few people actually encounter scientists in the field, providing funds for program members to travel to villages and communities in the spill affected area allowed for a valuable exchange of information. PIs were able to share formative results of their work and were also able to hear concerns and observations of community members. This community engagement in spill affected communities would not have been possible if the administrative budget did not provide support for travel to these areas.

Long-term Monitoring Project Outreach and Community Involvement

Outreach and community involvement was an important and successful part of the overall LTM program. The five-year program was kicked off with multifaceted Ocean Fests in Cordova and Valdez, with heavy participation from program scientists. The Ocean Fests served as a kickoff to raise awareness of the program's existence and were attended by hundreds of people in each community. The emphasis on hands-on activities at the Ocean Fests were echoed by the hands-on activities offered in Discovery Lab programs at the KBRR in Homer and the GWA display and kiosk at the ASLC. The interactive nature of outreach programming was taken up a notch with the digital storytelling opportunities afforded by See Stories as youth from spill-affected communities and villages were engaged as video journalists to learn and tell stories of the spill, spill impacts, recovery, and ecosystem change from their perspective and the perspective of elders in the communities. One student remarked that it was the only thing he felt he had ever done in high school that really meant something more than "just trying to get a passing grade." The many classroom visits throughout the spill affected region were another means of connecting scientists with youth, and the workshop to explore community-based monitoring opportunities connected LTM scientists to adults, as did lecture series in Cordova, Homer, Anchorage, and beyond. More virtual arenas allowed us to extend program results to even broader audiences. The *Delta Sound Connections* publication; Field Notes radio/podcast programs, ASLC Virtual Field Trips, webinar for marine resource managers, YouTube and Vimeo channels, and program website all ensured that no matter where the interested party was located, they could learn about the practices and impacts of all the projects within GWA. The success was partially due to the way the OSC leveraged the strengths of each of the committee member

organizations to ensure that information about the LTM program was appropriately and broadly disseminated.

CONCLUSIONS

Coordinating administration, logistics, and outreach under one project was beneficial to the functioning of the LTM program and will be repeated in the second 5-year program during 2017-2021 (though outreach activities will be reduced based on the requirements of the invitation for proposals). Through an iterative emphasis on fiscal accountability, reporting, annual meetings, and outreach opportunities, the administrative project required PIs to think beyond their individual project towards the holistic integration of all aspects of the program. This project and its emphases are one of the key reasons this program truly functioned as an integrated program. In the absence of strong integrative leadership, the PIs would naturally drift towards what we know as the more traditional, stovepipe model of conducting research in their discipline with perhaps only occasional collaboration across boundaries. The administration, logistics, and outreach project, especially due to PWSSC's parallel administration of non-Trustee Agency subawards for the HRM program, was a key driver of the high level of integrative success achieved by the LTM program. Having program administration as one of the distinct legs holding up the management stool of LTM was a beneficial design and is worth replicating in future iterations of the program. Outreach during the first five years was important to demonstrate to the public and stakeholders the status of recovery following the spill and the importance of long-term monitoring to understanding ecological processes.

ACKNOWLEDGEMENTS

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AOOS Gulf of Alaska data portal containing GWA LTM program publically available data: <http://portal.aos.org/gulf-of-alaska.php>

ASLC virtual field trips and middle school grade lesson plans featuring the GWA LTM program (also available on CD): http://www.alaskasealife.org/virtual_field_trips

Videos posted to GWA website and YouTube channel:

<https://www.youtube.com/channel/UChuBiBD49ttpFLdqGRgiFCQ>

Online catalog of humpback whale fluke photos for identification:

http://www.alaskasealife.org/uploads/vft/gulf_watch/for_teachers/gulf_watch_whale_fluke_id.pdf

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<https://vimeo.com/133696379>

Community-based films from Cordova, Valdez, Whittier, and Chenega Bay:

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- Matkin, C. 2014. Killer whale predation. Killer Whale Wildlife Wednesday, Juneau.

- Matkin, C. 2015. Alaskan killer whales from Ketchikan to the Pribilofs. UAA Lifelong Learning Class.
- Matkin, C. 2015. Killer whales. Discovery lab public lecture, Kachemak Bay Research Reserve, Homer.
- Matkin, C. 2015. Latest killer whale research findings. Kenai Fjords Tourboat Operators Meeting, Seward.
- Matkin, C. 2016. Killer whales. KPC/UAA Biology Class, Homer. Guest lecturer.
- Matkin, C. 2016. Migrations: A closer look at killer whale movements. Alaska SeaLife Center, Seward.
- Matkin, C., and E. Bradfield. 2016. A history of the threatened AT1 killer whale population. State University of New York.
- Matkin, C. O., and E. L. Saulitis. 2014. Into great silence. Week-long Seminar, St. Catherine University, Minneapolis.
- Matkin, C. O., and E. L. Saulitis. 2014. Into great silence. ORCA program for pre-college students, Everett, WA.
- Matkin, C. O., and E. L. Saulitis. 2014. Into great silence. Southern Resident Killer Whale Symposium, Friday Harbor.
- McCammom, M., K. Hoffman, K. Holderied, T. Neher, B. Ballachey, R. Hopcroft, M. Lindeberg, and T. Weingartner. 2015. Gulf Watch Alaska: Monitoring the pulse of changing ecosystems in the Gulf of Alaska. Kachemak Bay Science Symposium, Homer.
- Moran, J. 2014. Living in a humpback world. How does an increasing humpback whale population affect humans? Prince William Sound Science Center weekly lecture series, Cordova.
- Moran, J. 2014. Living in a humpback whale world. University of Eastern Finland, Finland.
- Moran, J. 2014. Challenges of photo ID during the Alaskan winter. Wildlife Photo-ID Workshop, Joensuu, Finland.
- Moran, J. 2015. Sea birds as indicators of humpback whale prey. Juneau Marine Naturalist Symposium, Juneau.
- Moran, J. 2016. Hawaii's humpbacks: What are they doing in Alaska? Whale Tales Event, Kapalua, Maui, Hawaii.

- Moran, J. 2016. Impacts of a recovering humpback whale population. University of Alaska Southeast, Juneau.
- Olsen, D.W. 2012. Killer whales of Alaska. KPC/UAA Biology Class, Homer.
- Olsen, D. W. 2012. Killer Whales of Kenai Fjords National Park. Kenai Fjords National Park Service Interpreter Training, Seward.
- Olsen, D. W. 2013. Killer Whales of Coastal Alaska. Juneau Naturalist Symposium, Juneau.
- Olsen, D. W. 2014. Killer Whale Culture in Alaska. Juneau Naturalist Symposium, Juneau.
- Olsen, D. W. 2014. A comparison of satellite telemetry and photographic surveys in determining important foraging habitat for resident killer whales in the Gulf of Alaska. Alaska Coastal Rainforest Center Brown Bag Series, Juneau.
- Olsen, D. W. 2014. Killer whales of Alaska. UAS Biology Class, Juneau.
- Olsen, D. W. 2014. Killer whale culture in Alaska. Wildlife Wednesday Series, Juneau.
- Olsen, D. W. 2015. Shifting hotspots: Core habitat use for resident killer whales in the Northern Gulf of Alaska. American Fisheries Society Student Chapter, Juneau.
- Olsen, D. W. 2015. Killer whale culture in Alaska. Seward Guide Training, Seward.
- Olsen, D. 2016. Family habits are hard to break: Killer whale culture in Prince William Sound. Prince William Sound Science Center community lecture series, Cordova.
- Olsen, D. W. 2016. Killer whale culture in Alaska. UAS Biology Class, Juneau.
- Olsen, D. W. 2016. Killer whale culture in Alaska. KPC/UAA Biology Class, Homer.
- Olsen, D. 2016. Killer whale culture in Alaska. Prince William Sound Science Center community lecture series, Cordova.
- Olsen, D. 2016. Killer whale culture in Alaska. Science after the spill: How are our ecosystems changing? Homer.
- Olsen, D. W. 2016. Mom knows best, killer whale culture in PWS. Prince William Sound Regional Citizens' Advisory Council, Anchorage.
- Robinson, B. H., L. M. Phillips, and A. N. Powell. 2016. Accelerated energy intake increases survival of black oystercatchers broods. Alaska Bird Conference, Cordova.
- Schaefer, A. 2016. Winter seabirds of PWS. Prince William Sound Science Center community lecture series, Cordova.

Weitzman, B. P., A. K. Fukuyama, G. Shigenaka, H. A. Coletti, T. A. Dean, J. L. Bodkin, K. A. Kloecker, G. G. Esslinger, D. H. Monson, D. Esler, B. Konar, K. Iken, and B. E. Ballachey. 2016. Happy as a clam? Variation in bivalve abundance throughout the northeastern Pacific. NPS Centennial Science Symposium, Fairbanks.

Classroom Visits and Student Presentations

Bodkin, J. 2015. Gulf Watch Alaska and the nearshore food web. Cordova High School marine biology class visit.

Kloecker, K. 2016. Anchorage classroom visits during Alaska Marine Science Symposium.

Kloecker, K. 2017. Anchorage second grade classroom visits during Alaska Marine Science Symposium.

Kloecker, K., and S. Tschappat. 2016. Whittier classroom visits: Mock oil spill clean-up.

Moran, J. Students in summer Sun-to-Sea Camp in Juneau taken on a marine mammal survey aboard R/V Sashin.

Traiger, S. 2016. Fairbanks second grade classroom visit.