ATTACHMENT C ***EVOSTC Annual Project Report Form***

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

12120114-M

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

Long-term killer whale monitoring in Prince William Sound/ Kenai Fjords

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

Craig O. Matkin

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, 2014

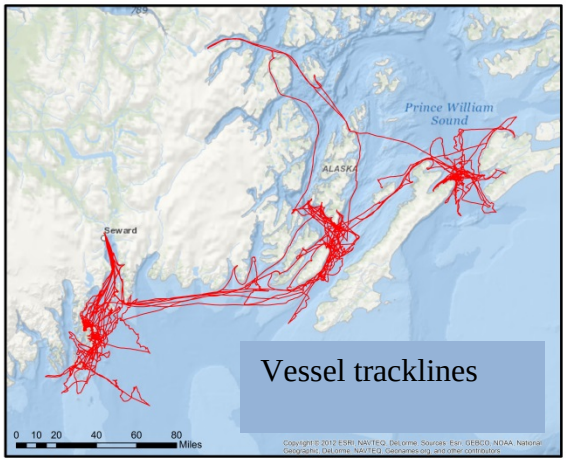
6. Project Website (if applicable): *See*, Reporting Policy at III (C) (6).

www.whalesalaska.net

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

February–April 2014. The current killer whale photographic reference catalogue was updated with 2013 field data. Matriline diagrams were updated as well. The updated catalogue was provided electronically to all tour boat operators and to the Kenai Fjords National Park. Initial analysis and preparation of a paper on habitat use and pod ranges was completed. Preparation for field work also occurred in this period. Updated databases were uploaded to the Gulf Watch Alaska work site.

May-October 2014. All fieldwork occurred during this period. During 67 days of fieldwork on the Natoa and 12 days of time contributed by other vessels. We logged 52 encounters with killer whales, 41 with residents, 1 with AT1 transients, 11 with Gulf of Alaska transients and none with offshores. Survey tracklines totaled 4922 km while searching for whales and we traveled 1084km during encounters with whales.



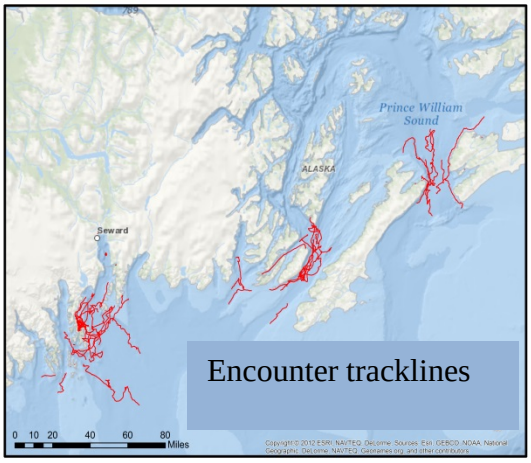


Figure 1. Vessel and encounter tracklines for sampling in 2014

We emphasized photoidentification over other aspects of the study this year because we did not have complete photographic coverage of some groups in recent years. This focus was in part successful and we had much more complete coverage than in recent years, however, some groups seem to have de-emphasized portions of their range where we focus our work. Some pods have split and the resulting new groups no longer focus activities in the same portions of the range. In the future, it will likely be necessary to examine population dynamics using matrilineal groups, rather than a pods.

AB pod, including the AB17 matriline that was not photographed last year, was encountered on five occasions. There was no change in the AB17 matriline; however the fin of the adult male AB35 has collapsed. A new calf (AB78) was born to AB53 in 2014, and AB45 (a 23 year old male orphaned at the time of the spill) was again missing and confirmed dead. The number of whales in AB pod remains at 20. Only the AT2,3 and 4 matriline and AT6 were photographed from the AT1 population this year. Because it would seem unlikely for the entire AT9,10 and 18 matriline to die in the same year, we have not yet considered them dead or missing. However, we are concerned with the lack of encounters with this group. For now the number of whales in the AT1 group is still considered to be seven.

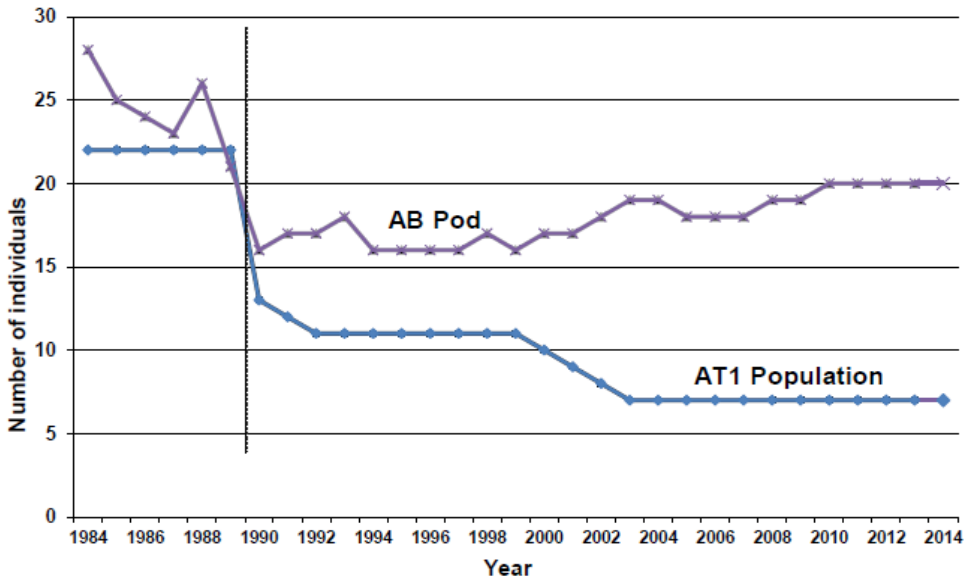


Figure 2. Number of whales in AB pod and AT1 population from 1984 to 2014

We collected 6 biopsy samples in 2014; one from a stranded juvenile, and one from a whale of uncertain haplotype (both these samples important for genetics). The other four samples were collected in the early season (May-June) with a focus on lipid/stable isotopes for ongoing feeding studies. All samples are sequenced for mtDNA, and analyzed for lipid, stable isotope and contaminant analysis. Analysis of 2013 samples is complete and in database held at NWFSC as well as in the NGOS database.

We attached Spot 5™ location only tags to two whales (AY11, AX110), and a Mk10 ™ time/depth/location tag on one whale (AT179) in 2014. The attachment to AY11 was only the second on an AY pod whale-a pod frequently observed in Kenai Fjords. The range of this whale was very similar to another individual in the pod (AY 07, tagged in 2011) and indicates the adherence of this pod to a general range, at least over that period of years (Figure 3A). AX110 tagged in 2014 also confirmed the range for AX 48 pod established by tags applied to AX 111 in 2009 and to AX106 in 2007 (Figure 3B.) The two pods have differing ranges, AY focused in Kenai Fjords and north of Kodiak, and AX48 stretching from Kodiak across to the Copper River Delta and well into Prince William Sound.

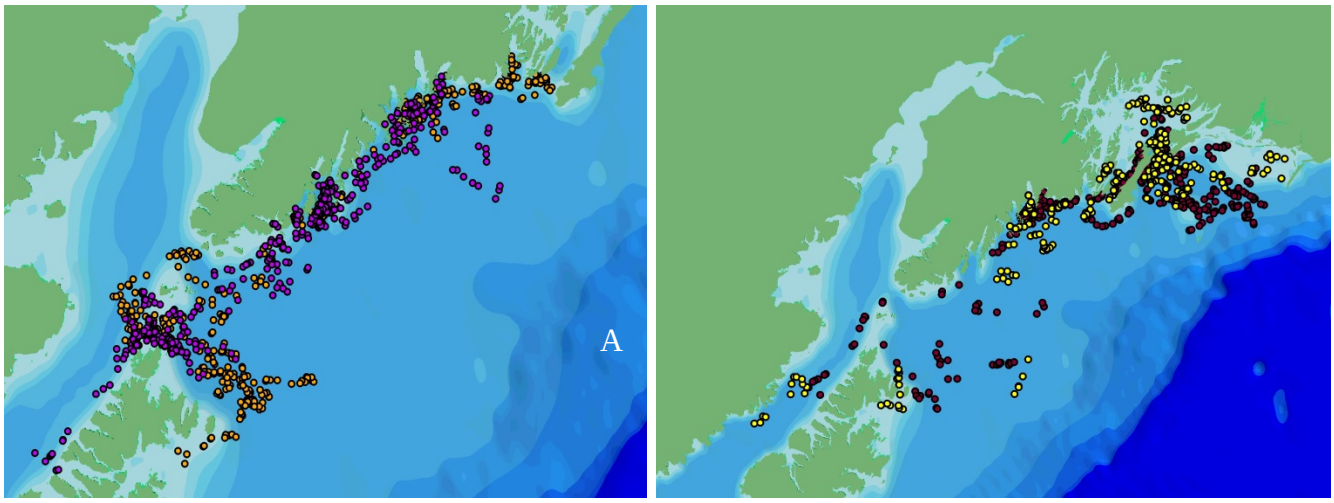


Figure. 3 A. Transmission locations for AY7 (gold) tagged in 2011 and for AY11 (purple) tagged in 2014 indicating a similar range for this pod, at least during the May-July period. B. Transmission locations for AX110 (yellow) in 2014 and AX111 in 2009 and AX106 in 2007 (both maroon) indicating the similarity in range of AX48 pod from 2007-2014 at least during May-July

The attachment of a time-depth-recorder (TDR) Mk 10 ™ tag to AT 179 was the first applied to a member of the Gulf of Alaska transient population. The whale moved through Prince William Sound over a couple days and then headed offshore near the shelf break before moving in along the shallow Copper River delta. It was surprising that the whale made regular dives to over 50 meters and occasional dove to over 100 meters and as deep as 175 meters. Since its primary prey are marine mammals (sea lion, harbor seals, Dall's porpoise), this suggests they may at times forage at depth when their prey are occupied with foraging and compromised by a finite supply of oxygen. A similar pattern was observed by Miller et al. (2010) in examining diving of West Coast transient killer whales using TDR tags. They noted that the large body size of the killer whale may enable them to exceed the aerobic diving capacities of their prey. Although transient killer whales may ambush prey at the surface as we have also observed, attacking prey at depth may be an additional foraging strategy.

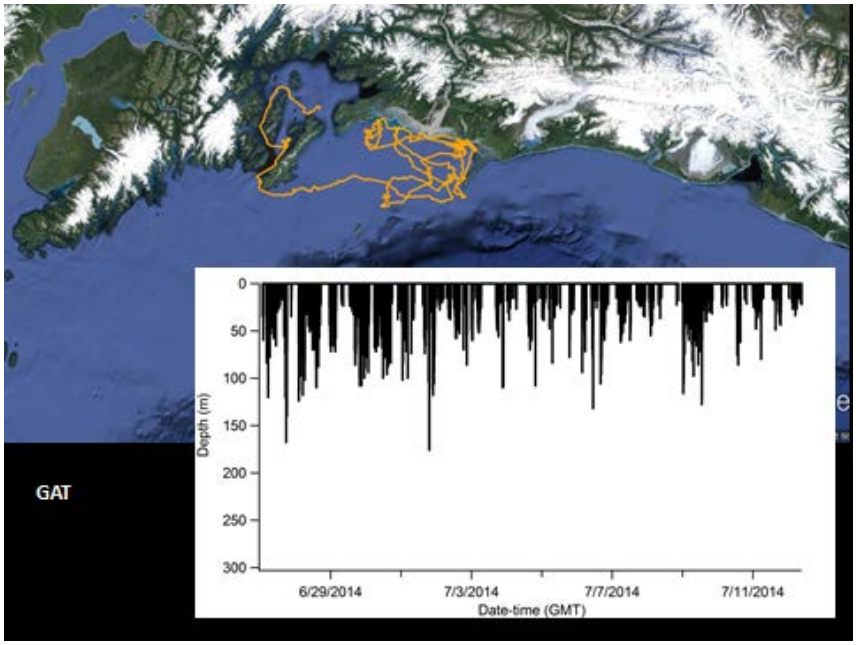


Figure. 3 Track line for AT179 and dive depth data over time of the attachment

Unfortunately the feeding aggregations of resident type killer whales that occur during September and October in southwestern Prince William Sound and often include all of AJ pod and AB pod did not form this year. Smaller groups of whales did occasionally forage through the area. It appeared from late season encounters and tags that most of the fall 2014 feeding activity occurred in the Port Bainbridge area and outside waters where poor weather precluded activity.

October 2014-January 2015. Field equipment was cleaned and stored. Preparation was made Gulf Watch meeting in November. We updated numerous databases at NGOS with 2014 field data including survey and encounter database (ACCESS) and biopsy and tagging summaries. We filtered tagging data and constructed maps and tracks and associated dive data for tagged whales. Initial analysis was completed for preparation of paper on habitat use and pod range based on tagging location and encounter data. In October 2014 samples of tissue and scales were sent to NWFSC for analysis. We supplied our humpback whale photo-identification and encounter data to Project 12120114-N (Humpback Whale Predation on Herring in Prince William Sound). Facebook and web sites were updated. Photo analysis was completed during this period which included frame by frame identification of all individuals. Tables indicating individuals present in each encounter created annually were updated. Dr. Matkin also attended Gulf Watch Meeting in November.

We followed our list of objectives as stated in the original proposal, although in some cases of tagging we are using the new time/depth recording Mark 10 tags instead of location only tags. With limited field time and the single vessel it was difficult to complete all aspects of project, especially sampling prey during deep diving bouts when prey are infrequently brought to the surface and focal follows are required. Because of poor photographic coverage of pods in some recent years, photo-identification had to be emphasized this year.

Outreach included the creation of a Facebook site for the North Gulf Oceanic Society that allows quicker posting of events and more direct interaction than the website. We will have databases on the Gulf Watch site updated by the beginning of the field season in May 2015.

Table 1. Status of project milestones for year 2

Deliverable/Milestone	Status
Initial analysis for paper on resident KW range and habitat use	Completed November 2014
Update of photographic catalogue, population database, mapping database, NWFSC tissue analysis	Completed May 10 2014 (for 2013 data)
Field work: PhotoID, behavioral observations, biopsy, prey sampling, tagging.	07 May through 1 October 2014
Annual meeting Gulf Watch AMSS Poster (Resident KW Population Dynamicsand impact on fish.)	November 2014 January 2015

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

A. Collaborated closely with Humpback Whale and Herring Predation project (Moran/Straley). Our field work provided photographic and other data from 36 humpback whale encounters with humpback whales photos and we received data from 5 killer whale encounters from their project. Collaboration with Nearshore component included receiving photographs from several killer whale encounters (via Dan Monson) and providing information to Angie Doroff for Discovery program at Islands and Oceans Center, Homer, AK.

B. There was no coordination with other EVOS projects outside of the Gulf Watch program

C. We annually provide our data to the National Marine Fisheries Service to update the killer whale stock assessments for Alaska and we provide a review of current Alaska stock assessments, in part based on data collected in this project. We contribute our analytical data annually to the genetic and environmental contaminant laboratory where they become part of a larger database open for analysis by others. Genetic samples/ data generated by this project is also provided to Southwest Fisheires Science Center (Phil Morin) for examination of worldwide stock structure.

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

- Publication of Journal Article (Marine Mammal Science) on resident killer whale population dynamics in Prince William Sound/Kenai Fjords
- Expansion of North Gulf Oceanic Society Facebook page with field updates and other information regularly posted
- Article for High Country News on residual oil spill effects after 25 years (March 2014)
- Production of film segment on our research for Kenai Fjords National Park (in collaboration with North Shore Productions, May 2014)
- Presentation to Kenai Fjords Tour Boat Association
- Article for Delta Sound Connection, annual publication of PWSSC
- Contribution of written and photographic material to book “To the Arctic” by Florian Schultz
- Two chapters were contributed to “Encylopedia of the Killer whale (Orca)” edited and translated by Hiroya Minakuchi and published in Japan

- Article requested and contributed to "On Earth" magazine on wild and captive killer whales based on 30 years of fieldwork (July 2014)
- Collaboration with Angie Doroff for program at Gulf Watch Discovery Lab, August 2014
- Week long seminar at St Catherine University centering on NGOS book "Into Great Silence" and our results from 30 years of fieldwork duri (September-October 2014)
- Presentations at ORCA program in Everett WA for 80 pre-college students (October 2014)
- Presentations at Whale Museum, Friday Harbor during symposium on Southern Resident Killer whales (October 2014)
- Presentation at "Wildlife Wednesday" UAF, Juneau, Alaska (Oct 2014)
- Data sets on Gulf Watch site updated for 2013 field season

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

We have responded to all past comments and recommendations

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

Our budget and billing typically runs about 6 months behind the EVOS/Prince William Sound schedule because of our offset with fiscal year (the NGOS fiscal year ends June 1). This has been the case for many years.

Attached budget form reflects the notification and acceptance of changes in annual budget category amounts and proposed changes in the next fiscal year (FY2016). There was no change in total project budget. At this time there has not been more than 10% deviation in budget categories for FY14.