

**FEDERAL AID  
ANNUAL PERFORMANCE REPORT**

ALASKA DEPARTMENT OF FISH AND GAME  
DIVISION OF WILDLIFE CONSERVATION  
PO Box 115526  
Juneau, AK 99811-5526

**Alaska Department of Fish and Game  
State Wildlife Grant**

**Grant Number:** E-18 **Segment Number: 1**

**Project Number:** 1.0

**Project Title:** Pacific Walrus Harvest Sample Analysis

**Project Duration:** November 1, 2011 to September 30, 2016

**Report Period:** October 1, 2013 to September 30, 2014

**Report Due Date:** September 30, 2014

**Principle Investigator:** Lori Quakenbush, WB IV, ADF&G

**Project Location:** Saint Lawrence Island, Alaska

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**I. Objective 1:** Analyze samples to assess and monitor the status and health of the walrus population.

**Job/Activity 1a:** Work with USFWS and cooperators to determine baseline samples that should be collected annually to allow for monitoring the status and health of walruses.

*Accomplishments: We worked with USFWS, USGS, researchers from universities and agencies, and veterinary pathologists from the seal and walrus Unusual Mortality Event (UME) group to develop a sample list based on the report of the 2003 Walrus Bio-monitoring Workshop and the 2004–2014 Pacific Walrus Research and Bio-Monitoring Plan sponsored by the Eskimo Walrus Commission (EWC) and funded by USFWS for samples they identified as important and based on samples collected in previous years. We also asked EWC and the communities of Gambell and Savoonga, during the pre-hunt meetings for sample analyses that were important to them.*

**Job/Activity 1b:** Work with USFWS and cooperators to determine the sample list for the spring harvest.

*Accomplishments: Working with the entities listed above we finalized the sample list, prepared a sampling protocol booklet, developed a voucher payment system for completed sample kits, and worked with the Gambell and Savoonga IRA's to make sure hunters got reimbursed for their time and expertise in sampling and answering questions on the datasheets. In 2013 and 2014, at the request of the Savoonga IRA we made*

*arrangements with the store to accept vouchers or store credit. The sample lists for 2012–2014 are presented in Appendix A.*

**Job/Activity 1c:** Evaluate samples received and prioritize analyses according to importance of information and available funding. Archive samples not analyzed for future studies.

*Accomplishments: Samples collected in 2012–2014 are included in Appendix B. In 2012, we received samples from a total of 83 walruses; 30 were sampled for contaminants, 51 were sampled for diet/disease, and two had incomplete samples. Of the 83 walruses sampled, 24 were males, 57 were females and two were of unknown sex. In 2013, we received samples from a total of 66 walruses; 28 were sampled for contaminants, 38 were sampled for diet/disease, and two had samples that were mixed together and could not be identified to an individual. Of the 66 walruses sampled, 41 were males, 23 were females and two were of unknown sex. In 2014, a total of 55 walruses were sampled; 39 were sampled for contaminants, 15 were sampled for diet and disease, and one was sampled for a swimming physiology study. Of the 55 walruses sampled, 37 were males, 15 were females, and 3 were of unknown sex.*

**Contaminants.** *Samples from 14 selected walruses collected in 2012 have been analyzed for contaminants and samples from 14 more selected walruses collected in 2013 have been shipped for analysis. In order to determine which of the 39 animals collected for contaminants in 2014 will be selected for analysis we will evaluate the quality of the tissues collected along with age determined from their teeth. We do not expect age results until December 2014. Some contaminants accumulate with age and some may vary by sex. Our priority is to develop a dataset for contaminants that represents all sex and age class categories as much as possible. Ages are grouped by 5 year categories: <5, 6–10, 11–15, 16–20, 21–25, and >26. We will analyze up to three per age group per sex. Thus, with two sexes, six age categories, and three samples in each category we need to analyze tissues from at least 36 individuals. We will analyze blubber, liver, kidney, and muscle for organochlorine compounds (e.g., PCBs and pesticides) and liver, kidney, and muscle for metals (e.g., iron, copper, and magnesium, cadmium, lead, and mercury). We will also evaluate methyl mercury in a separate analysis. Methyl mercury is the most bioavailable and therefore the most toxic form of mercury. A preliminary analysis and comparison to data on ringed, bearded, spotted, and ribbon seals was provided to the Eskimo Walrus Commission in December 2013 (Appendix C). Summary statistics of preliminary contaminants data are provided in Appendix D.*

**Disease.** *Blood sera from 153 walruses were collected in 2012 (n=49), 2013 (n=60), and 2014 (n=44) and have been screened for the presence of antibodies that indicate exposure to diseases. Exposure to morbillivirus (distemper), brucella, herpes, leptospira, and toxoplasma are provided in Appendix E. In 2012, we participated in an experiment to test whether nasal swabs could detect morbillivirus, however all 47 of the swabs and corresponding blood samples were negative so the experiment could not be done with walruses although it is being conducted with other marine mammal species.*

*If successful, this method would allow detection of morbillivirus by swabs alone, which would simplify our sera collections by reducing special equipment and handling. In addition to the general test for brucella, sera from 81 walrus collected in 2012 and 2013 are also being tested for the presence of two species of brucella that is specific to marine mammals. There is evidence that marine mammals may have two species of brucella that are different and possibly have a lower zoonotic potential than brucella in terrestrial and domestic animals. Knowing more about the specific type of brucella in walrus could allow for more specific information about disease transmission to people and how to minimize exposure.*

*We tested intestinal material from walrus collected in 2012–2014 for a toxic by-product of algae responsible for harmful algal blooms (HABs). In 2012, we tested the contents of 53 walrus intestines for the toxic algae, domoic acid. We found that 34 (64%) had undetectable concentrations, 10 (19%) had very low concentrations, and 9 (17%) had higher concentrations. Two walrus were much higher than the others. G12-0023, an adult female with a calf sampled at Gambell, had 857 ppb and S12-0014, an adult male sampled at Savoonga, had 991 ppb. In 2013, we tested the contents of 29 intestines for domoic acid and found that 14 (48%) had undetectable concentrations, 6 (21%) had low concentrations, and 9 (31%) had high concentrations. One of those with high concentrations in 2013 was the highest recorded to date; an adult female with 6,457 ppb. In 2013, we tested another HABs, saxitoxin, and found that 15 (52%) were undetectable, 8 (28%) were low, and 6 (21%) were of higher concentrations. Overall, HABs concentrations were higher than we expected and although they indicate a significant exposure, none were high enough to impair an animal as large as an adult walrus. There may, however, be consequences for calves, because although HABs are not found in muscle or blubber they are found in amniotic fluid and milk. In 2014, we expanded the tissues collected for toxic algae to include stomach contents and amniotic fluid. Results from the 2014 tissues are pending.*

*Samples of skin, liver, kidney, and muscle from six walrus, and samples of heart and spleen from three animals were sent to Dr. Kathy Burek, Alaska Veterinary Pathological Services to develop a database of healthy walrus tissues. During the 2011 Unusual Mortality Event it became apparent that there was limited sources and information regarding healthy walrus tissue for which to compare to those suspected to be diseased. Remaining tissues from 2012 that have been processed and analyzed were sent to USFWS to archive.*

**Diet.** *We also analyzed intestinal contents for diet items from 26 walrus collected in 2012 and 2013, and identified items to the lowest possible taxonomic level. Although two intestines contained fish, only one fish species, Pacific sand lance, was identifiable; all other prey items were invertebrates (Appendix F). In 2014, stomach contents from 13 walrus and intestines from 16 were collected but have not been processed.*

*Whiskers from 31 walrus collected in 2012 have been analyzed for the stable isotopes of Carbon and Nitrogen by Dr. Seth Newsome, University of New Mexico, for diet*

*related information. Additional whiskers from 36 walruses collected in 2013 have been sent for analysis. See Stable isotopes from whiskers in Appendix G for preliminary details. Muscle and/or liver from 33 walruses collected in 2012 and 2013 were also sent to Dr. Newsome for comparison with the whisker values. We also provided whiskers to Dr. Lara Horstmann-Dehn for hormone and stable isotope analysis.*

**Blubber thickness.** *Hunters measured blubber thickness over the sternum in 2012–2014 as an index of body condition. The results of the blubber measurements are problematic (i.e., highly variable), possibly due to measurements being made at locations on the body other than at the sternum. We are working with the hunters to see what we can do to improve the measurements.*

**Adult female reproductive condition.** *Hunters and local samplers provided information about the reproductive condition of the adult females sampled and harvested. Information included whether the female was pregnant or had a calf, or yearling with her and if she had milk or not. From this information we can estimate annual pregnancy rate for harvested females. In 2012, 57 adult females were sampled and 46 (90%) of them either had calves with them or were pregnant. In 2013, 23 adult females were sampled and 21 (91%) had calves or yearlings with them or were pregnant. In 2014, 15 adult females were sampled and 13 (87%) had calves or yearlings with them or were pregnant.*

**Job/Activity 1d:** Seek other partners for sample analysis.

*Accomplishments: We have identified partners that will analyze samples collected and provide results. Dr. Tracey Goldstein, Wildlife Health Center, School of Veterinary Medicine, University of California, Davis, CA, analyzed nasal swabs for morbillivirus. Dr. Elizabeth Frame, NOAA, Northwest Fisheries Science Center, Seattle, WA, analyzed intestinal contents for toxic algae (e.g., domoic acid and saxitoxin). Dr. Chad Jay, USGS, Anchorage, AK, received blubber for blubber quality, diet, and energetic studies in 2012, but needs to work out measures of body condition and samples for other times of year before analysis will begin. Dr. Seth Newsome, University of New Mexico, has analyzed whiskers for isotopes for diet studies. Samples of skin, liver, muscle, kidney, spleen, heart, and blood will be analyzed by members of the UME group to describe healthy tissues as a standard for comparison. Dr. Lara Horstmann-Dehn, University of Alaska Fairbanks, has received whiskers, blubber, muscle, liver, and bone for hormone and stable isotope analysis. Most of the above analyses will be at no cost to this project, however, the results will be available to us for overall determination of health and for reporting to the communities.*

**Job/Activity 1e:** Analyze samples and prepare technical report for use in the proposed listing determination for Pacific walruses in 2017. This technical report will include recommendations for future samples, protocols, and analyses.

*Accomplishments: A technical report is being prepared as results of analyses become available. Sections of the draft technical report are presented here as Appendices. We*

*also prepare posters and other forms of information for the hunting communities. A report was provided to the Eskimo Walrus Commission at their November 2012 meeting (Appendix H) and at their December 2013 meeting (Appendix C). Oral and written reports on the results from sampling were presented at the hunter meetings in February 2013 and 2014 (Appendix I). We have also prepared an abstract on the walrus sampling program for submission to the 2015 Alaska Marine Science Symposium (Appendix J).*

**Job/Activity 1f:** Make recommendations for future samples, protocols, and analyses.

*Accomplishments: Recommendations for future samples will depend on results of the analyses, input from EWC, hunters, USFWS, and researchers. For example, results from disease samples and research by the UME group may suggest different samples for next year. We are collecting recommendations for samples, protocols, and analyses from hunters and research partners as we progress and will be discussing these prior to the next sampling period. We will also discuss the sample analysis priorities with our partners and with EWC and the hunters.*

**Objective 2:** Communicate with EWC, Native Village of Gambell (NVG), Native Village of Savoonga (NVS), communities, and walrus hunters.

**Job/Activity 2a:** Seek hunter/community input on research topics relevant to them.

*Accomplishments: We asked EWC at their December 2013 meeting and Gambell and Savoonga at their pre-hunt meetings what information they thought was important. We presented a draft list for their comments and feedback. We reviewed the Bio-monitoring Workshop proceedings prepared by the Eskimo Walrus Commission as a basis for the original draft list.*

**Job/Activity 2b:** Present sample numbers and explain results or potential results at EWC and community meetings.

*Accomplishments: Sample numbers are presented in Appendix B. We discussed the samples collected and the available results with EWC at their November meeting in 2012 and their December meeting in 2013. Results are also presented at community meetings and the pre-hunt meetings.*

## **II. PUBLICATIONS**

None.

## **III. ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD**

None.

**Prepared by:** Lori Quakenbush

**Date:** 30 September 2014

**List of Appendices:**

Appendix A. Walrus Sample Lists – Spring 2012 – 2014.

Appendix B. Walrus samples collected from Gambell and Savoonga in spring 2012 – 2014.

Appendix C. Report on spring 2012 and 2013 walrus sampling to the Eskimo Walrus Commission, December 2013.

Appendix D. Summary statistics for contaminants from 2012 walrus samples.

Appendix E. Disease Exposure from 2012 – 2014 walrus samples.

Appendix F. Diet from intestinal contents.

Appendix G. Diet from isotopes in walrus whiskers.

Appendix H. Report on spring 2012 walrus sampling to the Eskimo Walrus Commission, November 2012.

Appendix I. Report to Hunters — Walrus Bio-sampling on St. Lawrence Island, 2012 and 2013.

Appendix J. Abstract for 2015 Alaska Marine Science Symposium.