

FEDERAL AID ANNUAL RESEARCH 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 Wildlife Restoration Grant

Grant Number: W-33 **Segment Number:** 10
Project Number: 18.74
Project Title: Wildlife Health and Disease Surveillance in Alaska
Project Duration: July 1, 2011 – June 30, 2013
Reporting Period: July 1, 2011 – June 30, 2012
Report Due Date: September 1, 2012

PRINCIPAL INVESTIGATOR: Kimberlee Beckmen

COOPERATORS: US Department of Agriculture/APHIS, Alaska Department of Environmental Conservation, University of Alaska Fairbanks, National Marine Fisheries Service, National Marine Mammal Laboratory, Alaska Department of Health and Human Services, US Fish and Wildlife Service, US Geological Survey, North Slope Borough, University of Calgary, Section of Arctic Veterinary Medicine of the Norwegian School of Veterinary Science in Tromsø, Norway.

WORK LOCATION: Alaska, Statewide

I. PROGRESS ON PROJECT OBJECTIVES DURING LAST SEGMENT

OBJECTIVE: Document, evaluate, and monitor the incidence of diseases in free-ranging wildlife as well as the potential impacts of disease on wildlife populations in Alaska. Ensure animal welfare considerations in the capture and handling of wildlife by the Division for research or management purposes.

II. SUMMARY OF WORK COMPLETED ON JOBS IDENTIFIED IN ANNUAL PLAN THIS PERIOD

JOB/ACTIVITY 1: Maintain the Chronic Wasting Disease Surveillance Program.

- Supervised technician in Anchorage and performed necropsies on target animals (cervids having signs consistent with CWD, are found dead unexplained, or are hit by vehicle). Samples collected from 343 cervids [Moose (n = 329) and caribou (n = 14)] were tested for CWD at Colorado State University's Veterinary Diagnostic Lab, and all results received thus far have been negative. Quarterly reports were submitted, the surveillance results were posted to the ADFG website. A meeting of the Alaska CWD Task Force was coordinated and held at the ADFG office in Anchorage. Some sample analysis, travel to collect samples, attend meetings, conduct training and a portion of the technician salary were covered under a cooperative agreement with USDA.

Federal funds were used to pay for salaries other than the above portion of the Anchorage technician's salary; Dr. Beckmen's salary, a technician's salary, a college intern's salary and other expenses are included.

JOB/ACTIVITY 2: Maintain the blood, serum and tissue banks.

- Accessioned 582 blood / serum samples from new / recaptured individuals [moose (n = 317), brown bear (n = 10), wolf (n = 15), muskox (n = 29), mountain goat (n = 43), red fox (n = 1), and caribou (n = 167, representing 5 herds)]. Other tissues, such as fecal samples or swabs for bacterial or viral culture, were also collected / archived for the many of the above samples.
- Re-organized, consolidated, and updated the electronic inventory for approximately 100,000 individual archived vials of blood, plasma, and serum.
- Accessioned frozen and fixed tissues for 170 new pathology cases (see details under Job 3).
- More than 3300 samples were accessed to outside investigators and graduate students, including the: University of Alaska Fairbanks (UAF) Museum of the North, UAF Institute of Arctic Biology, National Marine Fisheries, Colorado State University, University of Calgary, Norwegian School of Veterinary Science, Haartman Institute- Finland, US National Parasite Collections and Animal Research Laboratories/USDA, Southeast Cooperative Wildlife Disease Study, University of Pittsburg, and US Geological Survey, who are working on collaborative projects with ADFG or requested samples. An additional 1019 samples were sequestered during FY12 from the archive and are ready to ship during FY13 pending a CITES permit.

Federal funds were used to pay for salaries, supplies and services on this task.

JOB/ACTIVITY 3: Conduct disease and parasite surveillance and monitor changes in disease patterns.

- Conducted post-mortem examinations on 170 accessions of tissues, parasites, or whole carcasses presented by the public, as well as incidental takes such as road-kill, capture mortalities of other investigators, and animals found dead.
 - Mammalian Cases: 148 total (52 hoofstock, 53 terrestrial carnivores, 10 marine mammals, 16 rodents/lagomorphs, 17 bats).
 - Other Cases: 15 birds and 7 ectoparasite only cases.
 - Gross diagnoses assigned when possible, and parasite identification or histopathological diagnoses pursued on unusual cases or those with lesions of concern (n = 124 cases).
 - Identified 2 additional cases of chokecherry (cyanide) poisoning in moose and a Japanese yew toxicosis.
- Serosurveillance: Submitted samples for nearly 3000 serologic tests; once completed, test results entered into the DWC Serology Database. Approximately 3000 results produced in previous years were updated to a new, more complete format of data entry into our database.

- Embarked on a collaborative research project on Brucellosis with the Norwegian School of Veterinary Science to utilize a multi-species indirect ELISA they developed and validated. Over 2200 serum samples have been shipped to Norway and an additional 1046 are awaiting permits to ship.
- A serological survey on Alaskan caribou samples was performed at the Section of Arctic Veterinary Medicine of the Norwegian School of Veterinary Science in Tromsø, Norway. Two agents were screened: alphaherpesvirus and pestivirus, which we presume to be represented by specific caribou/reindeer viruses, cervid herpesvirus 2 and reindeer pestivirus respectively. A longitudinal approach was taken selecting samples representing the last 28 years ranging from 1986 to 2012. Two herds were selected: Denali and the Western Arctic, based on the presence or absence of contact with the reindeer herds. This principle was followed to investigate the dynamics of viral transmissions between these two herds or if these viral infections are independent of this contact between subspecies. To date, 359 caribou samples from those two herds were tested by ELISA for both viruses and additionally virus neutralization assays were performed. In the case of alphaherpesvirus, the following viruses were used for neutralization: cervid herpesvirus 2, bovine herpesvirus 2, elk herpesvirus, cervid herpesvirus 1. For pestivirus the following were used: bovine viral diarrhea virus, border disease virus type 1, border disease virus type 2 – reindeer v60. For alphaherpesvirus overall prevalence over the entire 26 years period was as follows: Denali herd 79% (n=134/170); Western Arctic 64% (n=121/189). For pestivirus prevalence was: Denali herd 0% (n=0/170); Western Arctic 58% (n=110/189). Neutralization assays for alphaherpesvirus carried out for 46 samples representing both herds, prevalence results and years showed an unequivocal higher neutralization for cervid herpesvirus 2 with an average neutralizing titre of 1:101 against Elk herpesvirus 1:18,7 followed by lower titres for other viruses. Neutralization results for pestivirus are currently being validated and will be available soon. Additionally some caribou nasal and ocular swabs have been screened by PCR for the identification of cervid herpesvirus 2 viral DNA. From 2 samples PCR results amplified CvHV2 as confirmed by sequencing of the target. Other samples are still being processed and results validated.
- A continuing investigation into neonate/fetal mortalities was conducted for the Teshekpuk (n = 6) and Mulchatna (n = 6) caribou herds, moose, and Dall's sheep. We identified notable pathogens not previously documented such as *Klebsiella pneumoniae* in caribou in Alaska. In moose calves we identified the first cases of neural larval migrans from *Baylisascaris*, *Cryptosporidium*, *Arcanobacterium pneumoniae*.
- Sampled three MRC moose calves to serve as controls/comparison for tests run on animals reared through our orphan moose calf program.
- Rabies Surveillance: Using the DRIT method of rabies testing (+ = positive, I = indeterminate), we tested 412 (14+, 27 I overall) samples of mammalian brain tissue and are awaiting confirmation from the CDC on these results: black bear (2 total: 0+, 0 I), brown bear (1 total: 0+, 0 I), polar bear (1 total: 0+, 0 I), arctic fox (1 total: 1+, 0 I), red fox (320 total: 11+, 9 I), 9 wolf (1+, 0 I), little brown bat (8 total: 1+, 7 I), moose (66 total: 0+, 11 I), domestic dog (submitted as a wolf)

(total 1: 0+, 0 I), ermine (1 total: 0+, 0 I), and muskox (2 total: 0+, 0 I) during this segment.

- Monitored and recorded numerous public and department personnel reports regarding disease and parasites in wildlife.
- Assisted in the production of a web article “Ticks in Alaska” for the *Alaska Fish and Wildlife News* online magazine. Resulted in a greatly heightened public awareness and numerous calls, reports, and submissions of ticks for identification, other than the endemic rodent ticks.
- Identified numerous parasite infections and diseases not previously recognized in Alaskan wildlife.
- Attended the Arctic Pinniped Disease Investigation Workshop in Anchorage in conjunction with the Alaska Marine Science Symposium.

Federal funds were used to pay for salaries, supplies, travel and services on this task.

JOB/ACTIVITY 4: Monitor levels of environment contaminants in species of concern.

- Analyzed 71 tissue samples from caribou, muskox and moose for heavy metals, generating nearly 800 results, ready for entry into the Wildlife Clinical Pathology database.
- Collected samples from Steller sea lions during capture trip and marine mammals at necropsy for contaminants monitoring.
- Completed the collaborative studies of mercury in wolves and marine mammals.

JOB/ACTIVITY 5: Assess the nutritional trace mineral status of Dall’s sheep, moose, muskox, mountain goat, and caribou.

- Submitted over 450 blood, serum, liver, muscle, and/or kidney samples from Dall’s sheep (n = 16), moose (n = 313), muskox (n = 11), mountain goat (n = 47) and caribou (n = 70) for trace element screening, conducted at the Wyoming State Veterinary Laboratory.
- More than 1800 results generated from these analyses were returned and are ready for entry into the DWC Clinical Pathology database.
- Began development of a laboratory assay to investigate the potential of serum superoxide dismutase (SOD) to serve as an index to liver copper, the gold standard for assessing an animal’s copper status. We used paired liver and serum samples from caribou for our preliminary investigations, and are optimistic that our initial results will lead us to estimates of liver copper in live, free-ranging ruminants. The preliminary results from work during FY12 will be presented at The Wildlife Society meeting in Portland, Oregon during October 2012.

Federal funds were used to pay for salaries, supplies and services on this task.

JOB/ACTIVITY 6: Review literature; prepare annual progress reports, a final report, and manuscripts for publication in refereed literature.

- Progress reports generated for Federal Aid and CWD Surveillance Program.

- Quarterly reports of rabies surveillance testing prepared for the Office of the State Veterinarian (DEC) and Section of Epidemiology (HSS).
- Presented an oral summary report of research projects and disease surveillance at the Region III summer and winter staff meetings.
- Co-authored manuscripts were drafted, prepared for submission or submitted for review (*accepted and published listed in V. Publications section*).
 - A. *Prepared for submission*: Guilherme G. Verocai; Manigandan Lejeune; Kimberlee B. Beckmen; Cyntia K. Kashivakura, Carmen Fuentealba; Eric P. Hoberg; Susan J. Kutz ***Onchocerca cervipedis* Wehr & Dikmans, 1935 (Nematoda: Onchocercidae) in moose and caribou at high latitudes of North America**
 - B. *Submitted for review*: Ashley K. McGrew, Lora R. Ballweber, Sara K. Moses, Craig A. Stricker, Kimberlee B. Beckmen¹, Mo D. Salman, and Todd M. O'Hara **Total mercury (THg) and C, N, and S stable isotopes in Alaskan gray wolves (*Canis lupus*): negative implications of dietary sources in a top carnivore.** Environmental Toxicology and Chemistry.
 - C. *Submitted for review (accepted as of Aug 2012)*: **Experimental Treatment of Dog Louse Infestation in Interior Alaskan Wolf Packs**, Craig L. Gardner, Kimberlee Beckmen, Nathan Pamperin, Patty Del Vecchio. Journal of Wildlife Management.
- Co-authored papers and posters presented at meetings:
 - Annual meeting of the Alaska Chapter of the Wildlife Society, Anchorage, AK, April 10-13, 2012. **Ketamine / Medetomidine used for the Chemical Immobilization of Wolves and Wolf Hybrids.** Poster presented: Cassandra Pauling, Stephanie Crawford, and Kimberlee Beckmen.
 - Wildlife Disease Association 60th International Conference, August 14-19, 2011, Quebec City, Canada. Oral presentation: **Management of *Trichodectes canis* Infestation of Wolves in Interior Alaska**). Two posters: **Mass Mortality Event of Moose from Consumption of Toxic Ornamentals**, and **Remotely-Delivered Chemical Immobilization of Adult Female Steller Sea Lions (*Eumetopias jubatus*) for Physiological Sampling and Satellite Telemetry Attachment.**
 - The Wildlife Society (TWS) 18th Annual Conference in Kona, HI. November 11-12, 2011, Oral presentation: **“Prevention of remote dart-delivery system and net-gun capture related morbidity and mortality.** Poster presentations: **Remotely-delivered chemical immobilization of adult female Steller sea lions for physiological sampling and satellite telemetry attachment.**
 - 23rd International Conference of the World Association for the Advancement of Veterinary Parasitology, 21-25 August 2011 in Buenos Aires, Argentina. **“*Onchocerca cervipedis* (Nematoda: Onchocercidae) in moose and caribou at high latitudes of North America”**, presented by Guilherme G. Verocai; Kimberlee B. Beckmen; Manigandan Lejeune; Carmen Fuentealb; Eric P. Hoberg; Susan J. Kutz

- Alaska Marine Science Symposium. **Histopathological and Ancillary Diagnostic Findings from Seals and Walrus in the 2011 Disease outbreak in the Arctic. Oral presentation by: K.A. Burek, S.Raverty, J. Herreman, R. Stimmelmayer, C. Hanns, K. Beckmen, J. Garlich-Miller, J. Saliki, C Romero, O Nielsen, T. Rowles.**
- XXII International Conference Rabies in The Americas (RITA) to be in San Juan, Puerto Rico from October 16-21, 2011. Presented by: Karsten Hueffer “**Rabies Surveillance of trapped Foxes in a changing Arctic**”.

Federal funds were used to support salary and expenses this task.

JOB/ACTIVITY 7: Perform duties of the attending veterinarian.

- Provided advice, consultation, and services to Division staff related to wildlife capture, disease, mortality, euthanasia, and zoonotic disease risk/diagnosis.
 - Provided multiple training seminars in Animal Welfare Policy, Wildlife Diseases and Parasite, Answering public inquires about wildlife disease and parasites and Handling of Controlled Substances. Created a new training, Introduction to Chemical Immobilization for DWC employees. Created training materials and a Sharepoint website.
 - Prepared capture and sampling supplies for 20+ capture events (including moose, caribou, Steller sea lion, plains bison, muskox, and wolf) and dedicated 23 personnel days to assisting biologists with captures and/or sample collection.
 - Assisted the Alaska State Troopers and the State Attorney serve a warrant to collect evidence from ~50 illegal wolves or wolf-hybrids by anesthetizing them for sample collection.
 - Coordinated and conducted a free-ranging wolf captures to assess a new drug combination used with success in other northern countries. Took blood samples and performed clinical assessments.
 - Performed anesthesia and sample collection during Steller sea lion captures in the western Aleutian Islands during a joint project with National Marine Fisheries.
 - Provided veterinary care and advice for husbandry for the captive animals at the Moose Research Center, Palmer moose and caribou facility and the Alaska Wildlife Conservation Center.
- Provide veterinary drugs/supplies to Division staff.
 - Coordinated and completed 6 veterinary drug/supply orders for Divisional staff and dispensed drugs/supplies throughout year.
 - Conducted annual controlled substances inventory (2000+ individual vials of drugs), involving all staff that have been dispensed drugs (n = 120 staff) throughout the entire state (n = 23 area offices).
 - Throughout the year, dispense drugs/supplies, receive and process controlled substance use reports and individual capture records, and empty/partial vials for destruction.

- All data related to controlled substance procurement, dispensing, and use are entered into a drug tracking database.
- Purchased supplies, compiled necropsy/forensic investigation kits and distributed them to area offices for handling fatal wildlife attacks.
- Address public concerns about wildlife disease, parasites, and lesions in game meat, zoonotic diseases, and animal welfare. Attended to on a case by case basis (walk-ins, phone calls, e-mails, and public information requests).
- Produced a one-page informational aid of “Some Common Wildlife Parasites and Diseases” for inclusion in the 2012-2013 Alaska Hunting Regulations, to increase awareness of the precautions the public should take when processing/consuming harvested meat, as well as to highlight diseases urgently under surveillance as that are not presently found in Alaska.
- Performed the duties of the Attending Veterinarian for the DWC Animal Care and Use Committee. Provided training to new staff on the Animal Welfare Policy. Consulted on the development of new protocols, reviewed protocols submitted to the committee. Conducted research facility inspections. Responded to all personnel calls and reports of capture related morbidities and mortalities.

Federal funds were used to pay for salaries, supplies and services on this task.

IV. SIGNIFICANT DEVIATIONS AND/OR ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

- Frequent monitoring of wildlife disease related reports via the internet and electronic newsletter as well as notifications of outbreaks were conducted. In addition, meetings (phone as well as in person) related to urgent zoonotic, human health or agricultural disease issues were attended.

V. PUBLICATIONS

- A. *Published (Appendix 1)*: Carrasco, S.E., Burek, K.A., Beckmen, K. B., Oaks, J.L., Davis, J.A., Baker, K.N.K., Mazet, J.A.K. 2011. **Aerobic oral and rectal bacteria of free-ranging Steller sea lion pups and juveniles (*Eumetopias jubatus*) in Alaska.** *J Wildlf Dis* 47(4): 807-820.
- B. *Published (Appendix 1)*: A. L. Evans, C. G. das Neves, G. F. Finstad, **K. B. Beckmen**, E. Sjerve, I. H. Nymo, M. Tryland. 2012. **Evidence of alphaherpesvirus infections in Alaskan caribou and reindeer.** *BMC Veterinary Research* 8:5.
- C. *In Press*: J.P. Dubey, G.V. Velmurugan, C. Rajendran, M.J.. Yabsley, N.J. Thomas, K.B. Beckmen, D. Sinnett, D. Ruid, J. Hart, P..A. Fair, W.E. McFee, V. Shearn-Bochsler, O.C.H. Kwok, L.R. Ferreira, S. Choudhary, E.B. Faria, H. Zhou, T.A. Felix, C. Su 2012. **Genetic Characterisation of *Toxoplasma gondii* in wildlife from North America revealed in widespread and high prelevance of the fourth clonal type.** *International Journal for Parasitology* 41(11):1139-1147.
- D. *Published (Appendix 1)*: Keech, M.A., Lindberg, M.S., Boertje, R.D., Valkenburg, P., Taras, B.D., Boudreau, T.A., Beckmen, K.B. 2012. **Effects of predator treatments, individual traits, and environment on moose survival in Alaska.** *Journal of Wildlife Management* 75(6): 1361-1380.
- E. *Published*: Antti Lavikainen, Sauli Laaksonen, Kimberlee Beckmen, Antti Oksanen, Marja Isomursu, Seppo Meri. 2012. **Molecular identification of *Taenia* spp. in wolves (*Canis lupus*), brown bears (*Ursus arctos*) and cervids from North Europe and Alaska.** *Parasitology International* 60(3): 289-295.
- F. *Accepted for publication (Appendix 1)*: J. Margaret Castellini,¹ Lorrie D. Rea,² Camilla L. Lieske,³ Kimberlee B. Beckmen,² Brian S. Fadely,⁴ John M. Maniscalco,^{1,5} and Todd M. O'Hara 2012. **Mercury Concentrations in Hair from Neonatal and Juvenile Steller Sea Lions (*Eumetopias jubatus*): Implications Based on Age and Region in this Northern Pacific Marine Sentinel Piscivore.** 2012. *Ecohealth*.
- G. *Accepted for publication*: Susan J. Kutz, Julie Ducrocq, Guilherme G. Verocai, Bryanne M. Hoar, Doug D. Colwell, Kimberlee B. Beckmen, Lydden Polley, Brett T. Elkin, Eric P. Hoberg. 2012. **Parasites in Ungulates of Arctic North America and Greenland: A View of Contemporary Diversity, Ecology, and Impact in a World Under Change.** *Advances in Parasitology*.

VI. RECOMMENDATIONS FOR THIS PROJECT

Disease surveillance and veterinary activities have continued to steadily increase in scope and intensity over the course of this performance period. To continue to provide wildlife veterinary services at the level currently expected, staffing levels and funding must be increased as well as a decrease in some duties. Federal funding of CWD surveillance is no longer available, so we will

no longer be able to maintain a significant level of CWD surveillance of free-ranging cervids in Alaska unless allocated additional funding and staff. The WBII in support of the CWD sampling and disease monitoring in southcentral left the position and there is not currently a biologist or technician in Region II or IV that is available to take up the tasks. These deficiencies will need to be mitigated by other funding sources including Federal Aid. Additional field and captive studies testing the effects of diseases and parasites on wildlife health are needed to understand the role of these factors on populations so they can be manipulated as needed for research and management purposes.

Prepared by: Kimberlee Beckmen, M.S., D.V.M., Ph.D.

Date: 8/29/2012

Attachments: Appendix 1: PDFs of publications