

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

Grant Number: AKW-10 Wildlife Restoration FY2016

Project Number: 18.74

Project Title: Wildlife Health and Disease Surveillance in Alaska

Project Duration: July 1, 2015 – June 30, 2016

Report Due Date: September 1, 2016

PRINCIPAL INVESTIGATOR: Kimberlee Beckmen

COOPERATORS: US Department of Agriculture/APHIS, Alaska Department of Environmental Conservation.

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.

- Performed necropsies and collected appropriate tissues on target animals (cervids having signs consistent with CWD, are found dead unexplained, scientific collections or hit by vehicle).
- Samples for CWD testing were collected from 18 wild cervids (13 moose, 3 deer) during FY16 and were submitted to Colorado Veterinary Diagnostic Laboratory. All results were negative for CWD.

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

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

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- Accessioned 124 blood / serum samples: 74 caribou, 25 moose, 20 muskox and 5 wood bison.
- Accessioned 414 nasal swabs 295 caribou, 114 moose, 3 elk, 2 Sitka blacktailed deer.
- Accessioned frozen and/or fixed tissues for 165 new pathology cases
- More than 2,500 samples were distributed to research collaborators, DWC and non-DWC investigators as well as graduate students to fulfill requests for tissue, blood, serum or carcasses. Research colleagues and investigators from the following institutions were represented: University of Alaska Fairbanks: Museum of the North, Department of Veterinary Medicine, Institute of Arctic Biology Wildlife Toxicology Lab as well as Colorado State University, University of Calgary, Norwegian School of Veterinary Science, US National Parasite Collections and Animal Research Laboratories/USDA, US Fish and Wildlife Service, Finland Production Animal and Wildlife Health Research Unit.

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

- **Passive pathogen surveillance:** Conducted post-mortem examinations on 165 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.
 - Gross observations and morphometric (on carcasses) data recorded, diagnoses assigned when possible, and samples for ancillary diagnostic testing or research requests were collected. Whenever feasible, parasite identification and definitive diagnoses will be pursued through histopathology.
 - Monitored and recorded numerous public and department personnel reports regarding disease and parasites in wildlife. Callers, email correspondence as well as drop-ins occur throughout the year but questions are particularly heavy during the first months of the hunting season and during the calving periods.
- **Active pathogen surveillance:** As requested by biologists, there was a continuing investigation into the causes of neonate/fetal mortalities, animal found dead and capture mortalities, especially caribou, moose, and mountain goats.
- **Serosurveillance:** Serosurveillance was reduced in favor of swabs for PCR compared to previous years to only select cases such as animals that were to be translocated, moved or ongoing disease projects. Submitted 83 caribou and 10 muskox sera samples for *Brucella*; 33 muskox sera for *Chlamydia*, *Coxiella*, and Parapox (contagious ecthyma) testing at the National Veterinary Services Lab.

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- **Respiratory Pathogen Screen:** *Mycoplasma* surveillance was expanded after *M. bovis* was found in wood bison. Subsequently an apparently moose specific *Mycoplasma* very similar but distinct from *M. ovipneumoniae* as well as a unique Adenovirus were detected on diagnostic testing of two deceased orphan moose. Screening in free-ranging moose and caribou was expanded greatly. We submitted 411 swabs: 82 caribou, 2 moose, 2 deer for *Mycoplasma* and Adenovirus PCR at Athens Diagnostic lab. Furthermore, and additional 213 caribou, 112 moose failed to detect the Adenovirus outside of the captive facility. The presence of Adenovirus as the cause of death in the captive moose was confirmed. *Mycoplasma spp.* were detected in free-ranging moose but not caribou.
- **Caribou and Muskox Health Assessment:** Continued collaboration with University of Calgary colleagues including having the graduate student come to Fairbanks for a week an aliquot out over 1000 sera samples to determine the epizootiology and emergence of the agent involved in mass mortality events in Canada and detected in Alaska (*Erysipelothrix*). The original ADFG Muskox health assessment manuscript was finalized and submitted to the Journal Wildlife Diseases.
- **Canine Distemper viruses in Alaskan Canids:** Collaborated with the Wildlife Conservation Society, Cornell University and USGS to conduct surveillance for morbilliviruses in brainstem samples that had been collected and tested for rabies by DWC WHDS. Over 300 samples were tested at Cornell to enhance the availability of canine distemper virus sequences from wildlife in Arctic regions. Only brain samples from foxes were found to be positive. These isolates have been sequenced and compared to other distemper sequences.
- ***Brucella spp.*:** Continued a collaborative research project on *Brucella* with colleagues in the Arctic Section of the Norwegian School of Veterinary Science in Tromsø, Norway utilizing a multi-species indirect ELISA. Results presented at meetings, three manuscripts drafted, 2 submitted, one published and one in press. An MPH/DVM student from Colorado State University completed analyses of archived caribou and walrus serum, conducted CARD tests and ELISA on caribou and walrus. She continued the work on identifying the pathogens in testicles from 98 reindeer culled on Nunivak Island. Routine surveillance for *Brucella* in live captured wildlife (93 samples) were submitted and tested by the Department of Environmental Conservation or submitted to diagnostic laboratories as listed in the serosurveillance section.
- **Parapoxvirus:** Dr. Morten Tryland, of the Section of Arctic Veterinary Medicine of the Norwegian School of Veterinary Science in Tromsø, Norway completed parapoxvirus isolation, identification and phylogeny from caribou, muskox, Dall's sheep and mountain goat. A manuscript was prepared and ready for submission in FY17.

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- **Zoonotic fecal parasites of ungulates:** We continue to monitor for pathogenic strains of *Cryptosporidium* and *Giardia*. Eighteen fecal samples from 6 species were tested for *Cryptosporidium* and *Giardia* and the isolates sequenced Colorado State University in order to assess the prevalence and potential risk factors with this zoonotic parasite.
- **Enhanced Rabies Surveillance:** Using the Direct Rapid Immunoassay Test (DRIT) we tested 289 samples of mammalian brain tissue for rabies. The majority were arctic fox (155), followed by wolf (52), red fox (37), wolverine (10), marten (9) black bear (7), bats (5), river otter (5), brown bear (3) 2 coyotes and one each beaver and Sitka blacktailed deer. Positive and indeterminate samples were sent to the CDC in Atlanta for confirmation. The Section of Epidemiology and Office of the State Veterinarian were apprised of results. Some of the supplies and staff salary was funded through RSA's with USDA funds.
- **Trichinella:** USDA collaborators continue analysis of masseter muscle and tongue samples collected at necropsy or during predator control operations for *Trichinella* prevalence and determining genotypes (52 wolf samples and 1 each brown bear and wolverine).
- **Neospora:** Sera from 120 brown bears were sent from the archived samples for *Neospora* serology at USDA.
- **Bat health:** A cooperative project proposal was drafted, "Determination of causes of Morbidity and Mortality in Bats of Alaska". Aim 1: Determine general patterns of disease in bats utilizing archived histological specimens and routine histological stains and microscopy. Aim 2: Determine viral contribution to respiratory lesions in bats. Sick and dead bats that were received by ADFG were necropsied and sampled for this project with Dr. Molly Murphy. Previous pathology records of all bats necropsied in the past decade were shared.
- **Zoonotic Disease Risk Assessments:** Established a data sharing agreement with the Alaska Native Health Consortium and University of Alaska Fairbanks to estimate the seroprevalences of *Coxiella* and *Toxoplasma* in 228 caribou sera.

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 available tissue samples from caribou, Dall's sheep, mountain goat, moose, and muskox for heavy metals.

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

- Submitted 41 bone samples from these species for fat, calcium and phosphorus analysis. Forty-seven blood, serum, liver, muscle, and/or kidney were analyzed for

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trace element screening, conducted at the Wyoming State Veterinary Laboratory. Drafted co-authored report “Evaluation of serum copper and serum ceruloplasmin concentrations as indicators of copper deficiency in wood bison (*Bison bison athabasca*)”.

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 report generated for Federal Aid.
- Quarterly reports of rabies surveillance testing prepared for the Office of the State Veterinarian (DEC) and Section of Epidemiology (HSS).
- Orphan Moose: Finalized report on the “Analysis of 2015 Orphan Moose Calf Health Parameters”.
- Presented an oral summary report of research projects and disease surveillance at meetings.
- Co-authored manuscripts were drafted, prepared for submission or submitted for review (*accepted and published listed in V. Publications section*).

Co-authored papers and posters presented at meetings:

Did not attend scientific meetings during this period due to travel restrictions.

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

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

Provided advice, consultation, and services to Division staff and the public related to wildlife capture, disease, mortality, euthanasia, and zoonotic disease risk/diagnosis.

- Conducted two 5-day courses in Chemical Immobilization of Wildlife for DWC staff (26 participants).
- Developed and updated drug dosing/capture protocols for ACUC Capture manual.
- Developed wildlife capture and handling protocols.
- Reviewed ACUC protocols for drug doses and veterinary procedures.
- Trained DWC staff in the handling of Controlled Substances in accordance with changes in DEA regulations.

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- Addressed public concerns about wildlife disease, parasites, and lesions in game meat, zoonotic diseases, and animal welfare. Responded to walk-ins, phone calls, e-mails, and public information requests. Provided updates for the Alaska Dept of Fish and Game website on Wildlife Diseases and Parasites
- Presented workshops for dog owners on protecting pets from wildlife disease risk and the recent tick invasion, removing pets from traps/snares, first aid and CPR on pets. Provided public outreach materials including FAQs on rabies, Tularemia, Q-fever and Avian Cholera.
- Continued to review staff training and supply preparations for responding to wildlife caused human morbidity and mortalities.
- Provided multiple training seminars in Animal Welfare Policy, Wildlife Diseases and Parasites, Drug Handling and Chemical Immobilization training via DWC Vimeo.
- Updated Drug/capture training and informational materials for the public on wildlife disease on the Sharepoint website.
- Prepared capture and sampling supplies for ~12 capture events (including moose and caribou) and supported 50 personnel days to assisting biologists with captures and/or sample collection.
- Provided veterinary care and advice for husbandry for the captive animals at the Moose Research Center, the Alaska Wildlife Conservation Center, and Moose Mamas.
- Advised the DWC Permit office on disease testing requirements for the import and holding of wildlife.

Provide veterinary capture 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 (~1100 individual vials of drugs) involving DWC staff that have been dispensed drugs (n = ~120 staff) throughout the state (n = 23 area offices).
- Throughout the year, order and dispense drugs/supplies (> 2000 individual items), 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.

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

III. 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.
 - Monitor Promed and Wildlife Health Alerts listservs for disease outbreaks and infectious disease discoveries pertinent to Alaskan wildlife and zoonotic disease risks or introductions of exotic (non-endemic) disease. Alert or report pertinent issues to DWC staff via an email list.
 - Attend remotely and presented at the Animal Determinants of Emerging Disease Seminar Series “Zoonoses” rounds.
 - Participate as a member of the Wildlife Health Committee of AFWA, WAFWA, the Alaska One Health Group, Marine Mammal Health MAP Data committee, and other subcommittees related to wildlife health and zoonotic disease. Report pertinent issues to DWC staff.
 - Veterinary Fall Conference meeting in Urbana IL (Sept 2015 to obtain continuing education credits required for maintenance of Alaska veterinary licensure.
 - Continued to participated in developing the “Best Practices for Management and Use of Controlled Substances for Fish and Wildlife Management Agencies”
 - Attended UAF Department of Veterinary Medicine staff meetings. Taught one lab on marine animal anatomy to the veterinary class.
 - Established relationships with the UAF DVM program pathologist and anatomist for the benefit of shared research, teaching and disease surveillance goals.
- Trained 3 college interns who are primarily involved with assisting in necropsy, processing blood/tissues samples, archiving/inventory/shipment of samples and preparing field supplies.

Federal funds were used to pay for salaries, supplies, services, and some travel costs for this work.

IV. PUBLICATIONS

Published (attached as appendices in alphabetical order by first author):

Beckmen, Kimberlee B., Mandy J. Keogh, Kathleen A. Burek-Huntington, Gina M. Ylitalo, Brian S. Fadely, KennethW. Pitcher. 2016. Organochlorine contaminant concentrations in multiple tissues of free-ranging Steller sea lions (*Eumetopias jubatus*) in Alaska. Science of the Total Environment 542:441-452

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Nymo, I. H., **Beckmen, K.B.**, Godfroid, J. 2016. Anti-*Brucella* antibodies in moose, muskox, and plains bison in Alaska, USA. *Journal of Wildlife Diseases*; 52(1):96-99

Lian, M., **Beckmen, K.B.**, Bentzen, T.W., Demma, D.J., Arnemo, J.M. 2016. Thiafentanil-Azaperone-Xylazine and Carfentanil-Xylazine Immobilizations of Free-Ranging Caribou (*Rangifer tarandus granti*) in Alaska, USA. *Journal of Wildlife Diseases* 52(2) 327-334

Calero-Bernal, R., Cerqueira-Cézar, C.K., Verma, S.K., Mowery, J., Carmena, D., **Beckmen, K.**, Dubey, J.P. 2016.

Sarcocystis arctica (Apicomplexa: Sarcocystidae): ultrastructural description and its new host record, the Alaska wolf (*Canis lupus*). *Parasitol Res* 115:2893-2897

McGrew Ashley K., Todd M. O'Hara, Craig A. Stricker, J. Margaret Castellini, **Kimberlee B. Beckmen**, Mo D. Salman, and Lora R. Ballweber. 2015. Ecotoxicoparasitology: Understanding mercury concentrations in gut contents, intestinal helminths and host tissues of Alaskan gray wolves (*Canis lupus*). *Science of the Total Environment* 536:866-871

Bodenstein Barbara, **Kimberlee Beckmen**, Gay Sheffield, Kathy Kuletz, Caroline Van Hemert, Brenda Berlowski and Valerie Shearn-Bochsler. 2015. Avian Cholera Causes Marine Bird Mortality in the Bering Sea of Alaska *Journal of Wildlife Diseases*, 51(4), 2015, pp. 934-937.

Accepted during the period (subsequently published are attached):

Durden, L.A., **Beckmen, K.B.**, Gerlach, R.F. 2016. New Records of Ticks (Acari: Ixodidae) from Dogs, Cats, Humans, and some Wildlife Vertebrates in Alaska: Invasions Potential. *Journal of Medical Entomology* 2016:1-5 Open Access

Simard, A.-A., Kutz, S., Ducrocq, J., **Beckmen, K.**, Broderur, V., Campbell, M., Croft, B., Cuyler, C., Davidson, T., Elkin, B., Giroux, T., Kelly, A., Russell, D., Taillon, J., Veitch, A., Cote, S.D. 2016. Variation in intensity and prevalence of macroparasites in migratory caribou: a quasi-circumpolar study. *Can.J.Zool.* 94: 607-617

Godfroid, J., **Beckmen, K.**, Nymo, I.H. 2016. Removal of Lipid from Serum Increases Coherence between Brucellosis Rapid Agglutination Test and Enzyme-linked Immunosorbent Assay in Bears in Alaska, USA. *Journal of Wildlife Diseases* 52(4): online DOI 10.7589/2015-11-298

Accepted In Press:

Lian M, Evans AE, **Beckmen KB**, Caulkett NA, Arnemo JM. Restraint and immobilization. In: Tryland M, Kutz S, Oksanen A, eds. Reindeer and caribou. Health and disease. Boca Raton, FL, USA: Taylor & Francis, 2016.

Accepted pending review of revision:

Afema, J.A., **Beckmen, K.B.**, Arthur, S.M., Burek Huntington, K.A. and Mazet, J.A.K. Disease Complexity in a Declining Alaskan Muskox (*Ovibos moschatus*) Population. *Journal of Wildlife Diseases*

Manuscript drafted:

Tryland, M., **Beckmen, K.B.**, Burek-Huntington, K.A., Breines, E.M., Klein, J. Orf virus in Alaskan, mountain goat, Dall's sheep, muskoxen, caribou and Sitka black-tailed deer – a zoonotic risk for hunters and game management people. *Emerging Infectious Diseases*

Foster, G., Nymo, I.H., Beckmen, K.B., Quakenbush, L. First Report of the isolation of *Brucella pinnipedialis* from a bearded seal (*Erignathus barbatus*)

V. 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 by Alaskans (and demanded by DWC personnel), veterinary staffing levels and funding for wildlife disease surveillance must be increased as well as a decrease in some less critical tasks. The division director has approved the assembly of a Cervid Health and Disease Surveillance Task Force which will require additional DWC staff support as well as this program. 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. A veterinary technician stationed in Anchorage or Palmer, and a Collections Manager in Fairbanks would allow the program to fulfill the demands for service. The dedicated assistance of a biometrician or statistician is critical to analyze, appropriately interpret and report the comprehensive, complicated data generated through these surveillance programs. Consultations with colleagues with wildlife epidemiologic expertise are needed to advance the understanding of the role of these potential pathogens on Alaska's wildlife populations and determine if and when there is a need for intervention, mitigation or further study and monitoring for wildlife disease management purposes.

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Attachments: 9 PDFs of publications