

**Wildlife Restoration MULTI-YEAR GRANT
INTERIM 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: AKW-B-SW-2020

PROJECT NUMBER: 18.74

PROJECT TITLE: Wildlife Health and Disease Surveillance in Alaska

PERIOD OF PERFORMANCE: July 1, 2020- June 30, 2021

PERFORMANCE YEAR: July 1, 2018- June 30, 2022

REPORT DUE DATE: August 27, 2021

PRINCIPAL INVESTIGATOR:

CO-PRINCIPAL INVESTIGATOR:

Authorities: 2 CFR 200.328
2 CFR 200.301
50 CFR 80.90

I. PROGRESS ON PROJECT OBJECTIVES DURING PERFORMANCE YEAR

OBJECTIVE 1: Perform the duties of Attending Veterinarian.

ACCOMPLISHMENTS:

A new veterinary services office has been established at a leased building at the University of Alaska, Fairbanks Experimental Farm location in Palmer, AK. This includes one office room, a general storage room, multi-purpose 'wet' room and a secure, lockable capture drug storage room. Work continues for the re-purposing of the space from past use. Examples of this include installing a security system, basic flooring, electrical outlets, work sink, creating a door-way in a wall, etc.

The veterinarian and wildlife biologist staff positions are in regular contact with research and management biologists and technicians to provide capture and handling support, equipment consultation, epidemiology support, sampling advice, and procedure recommendations. Twenty-five to fifty request calls, emails, and texts per week are received from staff. For better wildlife handling techniques and standards, humane Animal Care and Use Committee handling protocols

are being updated and created. Completed protocols for caribou capture, premolar removal for aging of carnivores, capture mortality response, and DEA-controlled drug storage are now in use. In-field support by working directly with biologists has occurred nine times this past year. These trips allow us to better understand field conditions for capturing a species or geographic area and provides us time to demonstrate capture techniques and methods. Directly working with biologists and technicians allows us to re-enforce training and messages that improve capture knowledge and safety. Through assessing capture success with multiple species, several areas of data collection have been identified for better use of capture drugs and techniques.

As a part of providing veterinary services field support, two remote-delivery wildlife capture update and refresher workshops have been conducted. In addition, two remote learning wildlife capture refresher workshops was done in 2020. There is continual effort to discuss and demonstrate capture skills and equipment as needed for staff working from approximately 15 locations state-wide.

There are two research centers and more than a dozen exhibition locations that house ADFG-permitted wildlife in Alaska. These have not been inspected in 2020 due to COVID restrictions, but will be attended to as possible in 2021. In addition, health care, necropsies, and disease surveillance services are provided. Live animal import testing and treatment requirements have been addressed in close collaboration with the ADFG Permit Biologist.

An important function of the office is to oversee and carry out the ordering, storage, dispensing, disposal, and inventory control of all veterinary drugs. This amounts to approximately \$250,000 worth of purchases per year of 1500-2000 individual drug vials. To accomplish this work, it is necessary to work closely with department finance staff. Currently a system to track drug ordering and field use for wildlife capture relies on a relational database that has significant limitations. Work has been done in 2019 and 2020 to modernize functions and reporting. Forms for gathering necessary drug tracking and immobilization records have been reformatted and combined to simplify completion. The relational database in use had long-term structural data table and template errors and redundancies. Basic fixes have been applied to this database, but a needed system-wide overhaul involving ordering, tracking, and reporting is needed to meet the legal responsibilities of a DEA-controlled Schedule II-IV drug registration.

OBJECTIVE 2: Preserve, protect and archive wildlife health data, as well as tissues, blood components and related specimens derived from wildlife for a wide range of present and future uses and users.

ACCOMPLISHMENTS: We started configuring the database, ItemTracker, with the software's developer but were stalled due to the developers focused on Covid-19 specimen tracking in the UK. During FY22 we hope to be able to configure the program to accommodate all the specimen information and locations for the wildlife sample types the Division staff collects.

We collected and preserved specimens (tissues/parts) or parasites from wildlife from 156 accessions during FY21. Additionally, 1,067 samples or swabs were collected, and subsamples preserved before surveillance or diagnostic samples were sent to laboratories. Tissues and skeletal remains of mammals that were of interest to the Mammals collection were collected and

transferred for archival at the University of Alaska Museum of the North and available for loan via ARCTOS.

Many accomplishments resulted from archived samples, sera and data which also address Objective 3. Such as archived and contemporarily collected sera, tissues and data were compiled and included in manuscripts published, accepted in press or drafted during the reporting period:

Mavrot, F., K. Orsel, W. Hutchins, L. G. Adams, **K. Beckmen**, J. E. Blake, M. Branigan, S. Checkley, T. Davison, B. Elkin, L.-M. Leclerc, A. Schneider, M. Tomaselli, S. Kutz. 2020. Novel insights into serodiagnosis and epidemiology of *Erysiplothrix rhusiopathiae*, a newly recognized pathogen in muskoxen (*Ovibos moschatus*). PLoS ONE 15(4): e0231724. <https://doi.org/10.1371/journal.pone.0231724>

Brandell, E.E., Paul C. Cross, Meggan E. Craft, Douglas W. Smith, Edward J. Dubovi, Marie L.J. Gilbertson, Tyler Wheeldon, John A. Stephenson, Shannon Barber-Meyer, Bridget L. Borg, Mathew Sorum, Daniel R. Stahler, Allicia Kelly, Morgan Anderson, H. Dean Cluff, Daniel R. MacNulty, Dominique E. Watts, Gretchen Roffler, Helen Schwantje, Mark Hebblewhite, Kimberlee Beckmen, Peter J. Hudson. 2021. Patterns and processes of pathogen exposure in gray wolves across North America. Scientific Reports. 11:3722 <https://doi.org/10.1038/s41598-021-81192-w>

Burek-Huntington, K., Miller, M., Beckmen, K. 2021. Adenovirus Hemorrhagic Disease in Moose (*Alces americanus gigas*) in Alaska. Journal of Wildlife Diseases vol 57(2):418-422

Aleuy, O.A., Michele Anholt, Karin Orsel, Fabien Mavrot, Catherine A. Gagnon, Kimberlee Beckmen, Steeve D. Côté, Christine Cuyler, Andrew Dobson, Brett Elkin, Lisa-Marie Leclerc, Joëlle Taillon, and Susan Kutz: Environmental factors determine the intensity of seasonal seropositivity of *Erysipelothrix rhusiopathiae*, an emerging pathogen in Arctic caribou. In review. Emerging Infectious Diseases.

Presentations were made in several forums to disseminate information accomplished under this Objective and are listed under Objective 5.

OBJECTIVE 3: Provide expertise and cooperative surveillance and monitoring of wildlife populations for changes in health status i.e. detection of introduction, change in prevalence or distribution of pathogens or parasites, environmental conditions.

ACCOMPLISHMENTS: Two major zoonotic disease outbreaks were investigated with state, federal and local cooperators, Brucellosis in the Mulchatna caribou herd and rabies in red foxes in Nome. A response to decrease rabies transmission was coordinated with Nome area biologists and the USDA Wildlife Services. A simultaneous canine distemper outbreak was also investigated and WHDS staff participated in the informational campaign and response.

Disease surveillance and health monitoring samples from live captures as well as ‘natural’ mortalities were sent to laboratories, including on behalf of cooperative studies as follows:

	Bats	Bears	Bison	Caribou	Dall's Sheep	Foxes	Moose	Muskox	Mtn Goats	Misc	Wolf
Fecal parasites	-	-	-	75	-	15	9	1	2	11	-
Histopathology	2	1	0	7	1	10	9	5	-	14	1
Serology	-	-	-	64	-	17	1	0	30	1	1
Other Tissues	3	12	-	114	4	109	109	18	10	115	26
Rabies	2	7	-	1	-	46				5	4

Specimens (swabs, fluids, or tissues) were sent to laboratories to be analyzed for *Mycoplasma* bacteria, broken down as follows:

Source	Number samples collected	Number of samples analyzed at each lab (note: one sample could be analyzed at multiple labs)		Sum of Samples Analyzed
		WADDL	Univ FL	
Capture	225	0	3	3
Dead/Necropsy	32	15	1	19
Hunt	77	1	185	186
Grand Total	334	16	189	208

The above table includes a cooperative study with the University of Florida to determine the sensitivity and specificity of the LM40 assay that was begun after COVID-19 lock down at UFL was lifted. The project was completed in FY21 and a report received. Developments and results of the *Mycoplasma* study were presented to the public and Board of Game. One manuscript was submitted on the laboratory *M. ovipneumoniae* test concordance and one manuscript describing the genome of the moose *Mycoplasma* was published:

Herndon, D.R., K. Beckmen, M.A. Highland. 2021. Draft genome sequence of a novel *Mycoplasma* species identified from the respiratory tract of an Alaska moose (*Alces alces gigas*). Microbiology Resource Announcements. Feb 25;10(8):e01371-20. doi: 10.1128/MRA.01371-20. PMID: 33632866; PMCID: PMC7909091.

Lieske, C.L., D.R. Herndon, M.A. Highland, K.B. Beckmen. In review. Laboratory concordance study for the molecular detection of *Mycoplasma ovipneumoniae*. Journal of Wildlife Diseases.

Approximately 39 caribou samples were analyzed at the University of Miami Acute Phase Protein laboratory and Kansas State University to develop reference ranges and laboratory result conversion factors for inflammatory biomarkers.

Cooperative projects with academic or agency partners that made progress in sample analysis, data analysis, or preliminary results reporting include: Phylogenetics and genomic characteristics of canine distemper virus in Arctic foxes with Nicole Nova at Stanford University. Additional samples from the canine distemper outbreak in red and arctic foxes during 2020-21 were sent to Stanford for sequencing.

In addition to the publications and drafts listed under Objective 2 (because they utilized significant amounts of data or specimens that had been preserved/archived or previously collected, several publications were drafted or published which will resulting dissemination of new knowledge about parasite and pathogen distributions or wildlife health including:

Verocai, Guilherme G., Eric P. Hoberg, Manon Simard, Kimberlee B. Beckmen, Marco Musiani, Sam Wasser, Christine Cuyler, Micheline Manseau, Umer N. Chaudhry, Cyntia K. Kashivakura, John S. Gilleard, Susan J. Kutz. 2020. The biogeography of the caribou lungworm, *Varestrongylus eleguneniensis* (Nematoda):

Protostrongylidae) across northern North America. *International Journal of Parasitology: Parasites and Wildlife* 11:93-102

Fernandez, A. X., Nymo I.H., Beckmen K., Dresvyanikova S., Egorova I., Kutz S. In Press. Brucellosis in the Arctic and northern regions. In: Tryland M, editor. *Arctic One Health: Challenges for Arctic Animals and People*. Springer Nature.

White, K.S., D.E. Watts, K.B.Beckmen. In Press. Helicopter-based chemical immobilization of mountain goats in coastal Alaska. *Wildlife Society Bulletin*.

Data on contemporary and previous pathology, parasite, serologic and health indices analyses expedited and interpreted by WHDS from several caribou herds was utilized by herd managers for reporting purposes.

Presentations were made in several forums to disseminate information accomplished under this Objective and are listed under Objective 5.

Objective 4: Assess the nutritional trace mineral status of Dall’s sheep, moose, and caribou.

ACCOMPLISHMENTS: Samples/specimens including serum, liver, kidney, bone and/or bone from 27 moose, 1 Dall’s sheep, and 46 caribou were analyzed for trace mineral content at laboratories including Purdue U, Texas A&M U., University of Calgary, University of Idaho and Wyoming State Veterinary Lab. Additionally, 39 samples from caribou were analyzed haptoglobins, to assist in interpreting the herd wide nutritional/health status. Hair, wool and qiviut samples were archived from all available live captures and mortalities from these ungulates. The break down of samples collected from individuals (live captured or deceased) was: Moose- 48, Dall’s Sheep- 3, Caribou- 118, Muskox-23.

Nutritional status especially trace minerals are a major concern to muskox populations. Although muskoxen are not listed in Objective 4 specifically, trace minerals analyses are integral to assessing muskox population health. Thus, 3 samples from muskoxen were analyzed for trace minerals. Additionally, and included under this Objective is the one related publication that was drafted from analyses conducted by the University of Calgary utilizing a portion of 130 Alaska muskox hair samples sent in FY20: “Hair element analysis as an indicator of muskox population status and trends.” That project utilized data and hair samples collecting and preserved under Objective 2.

Data on contemporary and previous trace mineral analyses expedited and interpreted by WHDS from several caribou herds was utilized by herd managers for reporting purposes.

Objective 5: Provide informational printed and web-based materials, training workshops, and direct responses to ADF&G staff, decision makers, and public on wildlife health, including significance for human, animal, and environmental health.

ACCOMPLISHMENTS: Ten thousand informational pamphlets, *Moose Health and Disease: A Pocket Guide*, were printed and paid for partially under this project. This pamphlet was also web

published, promoted on social media and through the Alaska Fish and Wildlife News:<https://www.adfg.alaska.gov/index.cfm?adfg=disease.main>

A similar pocket guide on Caribou Health and Disease was drafted and formatted to be published in FY22.

Parasites and Diseases website updated, and new links added on Brucellosis and Rabies outbreaks

Multiple presentations were made regarding the Brucellosis outbreak in the Mulchatna caribou herd, the Rabies outbreak in the northwest and southwest, the canine distemper outbreak and risk to seals in the Bering Strait region.

Objective 6: Develop and Maintain a Cervid Health Program

ACCOMPLISHMENTS: Progress toward developing a strategic Cervid Health Program was minimal during the current period. However, high priority cervid health issues and specific disease surveillance and monitoring plans were conducted. Region III caribou biologists met with WHDS staff and biometricians to plan caribou health assessment parameters. Mulchatna caribou managers and researchers worked with Dr. Beckmen on a Brucella surveillance and diagnostic testing.

Numerous assays including serosurveillance and diagnostic testing, validation of biomarkers was conducted. Specific surveillance that was included under the objective included twenty-one sets of tissue samples that were tested for Chronic Wasting Disease as follows: Moose- 3, Sitka black-tailed deer- 7, Elk- 0, Caribou- 2. One batch of seven samples from a Sitka Black Tail Deer were sent to Dr. Walsh as negative controls for the development of new CWD detection techniques.

II. SUMMARY OF WORK COMPLETED ON PROJECT TO DATE.

This project that fulfills the overarching need within the Division of Wildlife Conservation to manage wildlife and maintain healthy wildlife populations with veterinary services for wildlife captures and handling, training, epidemiology, import support, controlled capture drugs, research, and captive facilities.

This project has six main objectives that are all ongoing and never truly ‘completed’. Major accomplishments and significant progress towards the goals and objectives of the program were made and listed specifically under each objective.

The office of the Palmer-based wildlife veterinarian and wildlife biologist I has been established and key advancements and improvements have occurred this fiscal year in the general areas of facilities, equipment, training, disease testing, communication with field staff, and capture drug supervision. Training has been provided for 2 in-person veterinary students and 2 remote-delivery classes available to staff statewide due to 2020 public health concerns. It is predicted that the next 6-12 months may require restricted travel and in-person delivery of services due to

continued public health concerns. Data collection for improvements in the use of capture drugs may be affected by these potential restrictions for travel to remote communities in-state.

III. SIGNIFICANT DEVELOPMENT REPORTS AND/OR AMENDMENTS.

None

IV. PUBLICATIONS

Informational materials:

Print and web published: Moose Health and Disease: A Pocket Guide. Editors: **K. Beckmen**, M. Taras, J. Curl. <https://www.adfg.alaska.gov/index.cfm?adfg=disease.main>

Peer reviewed publications:

Herndon, D.R., K. Beckmen, M.A. Highland. 2021. Draft genome sequence of a novel *Mycoplasma* species identified from the respiratory tract of an Alaska moose (*Alces alces gigas*). Microbiology Resource Announcements. Feb 25;10(8):e01371-20. doi: 10.1128/MRA.01371-20. PMID: 33632866; PMCID: PMC7909091.

Brandell, E.E., Paul C. Cross, Meggan E. Craft, Douglas W. Smith, Edward J. Dubovi, Marie L.J. Gilbertson, Tyler Wheeldon, John A. Stephenson, Shannon Barber-Meyer, Bridget L. Borg, Mathew Sorum, Daniel R. Stahler, Allicia Kelly, Morgan Anderson, H. Dean Cluff, Daniel R. MacNulty, Dominique E. Watts, Gretchen Roffler, Helen Schwantje, Mark Hebblewhite, Kimberlee Beckmen, Peter J. Hudson. 2021. Patterns and processes of pathogen exposure in gray wolves across North America. Scientific Reports. 11:3722 <https://doi.org/10.1038/s41598-021-81192-w>

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Verocai, Guilherme G., Eric P. Hoberg, Manon Simard, Kimberlee B. Beckmen, Marco Musiani, Sam Wasser, Christine Cuyler, Micheline Manseau, Umer N. Chaudhry, Cyntia K. Kashivakura, John S. Gilleard, Susan J. Kutz. 2020. The biogeography of the caribou lungworm, *Varestrongylus eleguneniensis* (Nematoda: Protostrongylidae) across northern North America. International Journal of Parasitology: Parasites and Wildlife 11:93-102

Submitted, in peer review:

Aleuy, O.A., Michele Anholt, Karin Orsel, Fabien Mavrot, Catherine A. Gagnon, Kimberlee Beckmen, Steeve D. Côté, Christine Cuyler, Andrew Dobson, Brett Elkin, Lisa-Marie Leclerc, Joëlle Taillon, and Susan Kutz. Environmental factors determine the intensity of seasonal seropositivity of *Erysipelothrix rhusiopathiae*, an emerging pathogen in Arctic caribou. In review. Emerging Infectious Diseases.

Lieske, C.L., D.R. Herndon, M.A. Highland, K.B. Beckmen. In review. Laboratory concordance study for the molecular detection of *Mycoplasma ovipneumoniae*. Journal of Wildlife Diseases.

In press book chapters:

Fernandez, A. X., Nymo I.H., Beckmen K., Dresvyanikova S., Egorova I., Kutz S. In Press. Brucellosis in the Arctic and northern regions. In: Tryland M, editor. Arctic One Health: Challenges for Arctic Animals and People. Springer Nature.

Chapter, section: Diseases and Parasites, **Rabies**, In: Wild Furbearer Management and Conservation in North America. Author: **Kimberlee Beckmen**

Drafted publications for peer review:

Rovani, E.R., K.B. Beckmen, T.E.Cornish. in draft. Diffuse Intravascular coagulation in a moose following presumptive umbilical infection. To be submitted to Journal of Wildlife Diseases.

V. RECOMMENDATIONS FOR THIS PROJECT

Project should continue as written.

Prepared by:

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