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: **W-33-8** **Segment Number: 3**

Project Number: 18.74

Project Title: Wildlife Health and Disease Surveillance in Alaska

Project Duration: July 1, 2007 – June 30, 2012

Report Period: July 1, 2009 – June 30, 2010

Report Due to HQ: September 1, 2010

PRINCIPAL INVESTIGATORS: Kimberlee Beckmen

WORK LOCATION: Alaska, Statewide

COOPERATORS: US Department of Agriculture, Alaska Department of Environmental Conservation, University of Alaska Fairbanks, National Marine Fisheries, National Marine Mammal Laboratory, Alaska Department of Health and Human Services, US Fish and Wildlife Service, The North Slope Borough, University of California Davis and the University of Tennessee

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.

Job 1. Maintain the Chronic Wasting Disease Surveillance Program. Supervised and sampled cervids for and conducted education on CWD according to surveillance plan approved by the Alaska CWD Task force. Supervised the development contingency plans in case a positive CWD cervid was detected in captivity or a free-ranging context in Alaska. All samples tested were negative for CWD. Drafted and submitted workplan to USDA to continue cooperative funding agreements.

Job 2. Maintain the blood, serum and tissue banks. Supervised and collected blood and/or serum from live captured or collected animals that were accessioned into the archive. Collected blood, serum or tissues as suitable for archival purposes at necropsy on specimens presented for postmortem examination. Distributed samples to outside investigators and graduate students for collaborative research projects. Supervised and maintained of freezers and equipment.

Job 3. Conduct disease and parasite surveillance and monitor changes in disease patterns. 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 were examined. Gross diagnoses were assigned when possible and parasite identification or histopathological diagnoses were pursued on unusual cases or those with lesions of concern. Serosurveillance and herd health assessments were conducted. Wood bison quarantine health testing was completed.

Job 4. Monitor levels of environment contaminants in species of concern. Tissues were collected and submitted for metals and persistent organic pollutants analysis on various species. The heavy metal residues were determined in caribou tissues to monitor safety for human consumption.

Job 5. Assess the nutritional trace mineral status of Dall sheep, moose and caribou. Blood, serum and tissues samples were collected and submitted for analysis. The trace minerals studies were expanded to include muskoxen and data analyzed.

Job 6. Review literature; prepare annual progress reports, a final report, and manuscripts for publication in refereed literature. Progress reports were generated for Federal Aid and CWD Surveillance program as well as periodic reports on disease surveillance activities. Co-authored manuscripts were drafted, submitted for review and published.

Job 7. Perform duties of the attending veterinarian. Duties of the attending veterinarian including giving advice, consultation and services to staff that were related to wildlife capture, disease, mortality, euthanasia, zoonotic disease risk/diagnosis, drug purchase and dispensing, and veterinary supply. Training in these areas were provided to staff. Public concerns about wildlife disease, parasites and lesions in game meat, zoonotic disease and animal welfare were addressed on a case by case basis (walkins, phone calls, emails and public information requests). Import permit issues and responses to the Board of Game were addressed.

II. SUMMARY OF WORK COMPLETED ON JOBS FOR LAST SEGMENT PERIOD ONLY

JOB/ACTIVITY 1: Maintain Chronic Wasting Disease Surveillance Program
Accomplishments: The Chronic Wasting Disease section of the Alaska Dept of Fish & Game's Wildlife Conservation website was updated to reflect the recent additions of states detecting CWD for the first time. Drafts contingency plans for response in the event of initial detection of CWD in Alaska on a game farm or in a free-ranging cervid population were revised by the project leader and prepared for review by the Alaska CWD Task Force for finalization. Necropsies were performed on target cases. Moose, caribou and deer samples for CWD testing were collected and submitted for IHC testing at CSVDL. Selected tissues were submitted for histopathology, ancillary diagnostic testing and diagnoses as well as CWD test results and all were negative for CWD. A workplan was submitted to USDA to continue cooperative funding agreements. Federal funds were used to pay salaries on this task.

JOB/ACTIVITY 2: Maintain serum and tissue banks
Accomplishments: Blood and/or serum from approximately 900 samples were accessioned into the archive from mammals that are captured by ADFG personnel. Blood, serum or tissues as suitable were also collected at necropsy on approximately 200 specimens presented for postmortem examination. 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, Colorado State University, University of California – Davis, California Department of Fish and Game, University of Calgary, Hedmark University College (Norwegian School of Veterinary Science), Haartman Institute- Finland, Tufts University, University of Alberta, Minneapolis Zoo, US National Parasite Collections and Animal Research Laboratories/USDA, who are working on collaborative projects with ADFG. Federal funds were used to pay salaries, supplies and services on this task.

JOB/ACTIVITY 3: Conduct disease and parasite surveillance
Accomplishments: 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 were examined. Accessions exceeded 200 specimens. Gross diagnoses were assigned when possible and parasite identification or histopathological diagnoses were pursued on unusual cases or those with lesions of concern.
A health assessment of the Teshekpuk Caribou was continued during annual capture operations. Investigation and disease diagnosis on muskoxen captured or found dead was continued.

Serosurveillance results for over 5000 serologic tests were completed and test results entered into the DWC Serology Database.

Samples of brains from foxes and wolves suspected or rabies or involved in human attacks were submitted to the Alaska State Virology Lab for rabies testing.

Wood Bison Herd Health Surveillance for *Brucella abortus*, Johnes disease, Bovine tuberculosis, Bovine Respiratory virus complex and additional diseases and parasites of concern were complete in collaboration with the Alaska Department of Environmental Conservation Office of the State Veterinarian and the USDA. Consultations and clinical examinations of wood bison were conducted.

I continued to participate on the Wolf Lice mitigation project with co-PI Craig Gardner. Related to the project, I served as a thesis committee member (as Affiliated Faculty) for UAF Master' candidate Theresa Woldstad whose thesis is based on samples and data collected during our studies with lice on wolves. The student successfully defended her thesis, graduated, presented her thesis work at various conferences and symposia and prepared co-authored manuscripts for submission to the Journal of Wildlife Diseases.
I also mentored a DVM/PhD student from Colorado State University who presented the following at listed conferences and symposia:

College of Veterinary Medicine and Biomedical Sciences Phi Zeta Research Day (Colorado State University), Fort Collins, Colorado,January 23rd, 2010, Poster presentation: Intestinal macroparasites and mercury (Hg): the chemical ecology within the alimentary tract of a piscivore host. A Linton, TM O'Hara, **KB Beckmen**, M Salman, LR Ballweber. Abstract: In recent years, parasites have been receiving recognition for their role in evaluating ecosystem-health, and for their potential use as indicators of marine pollution. Cestodes and acanthocephalans have been shown to accumulate heavy metals at much higher concentrations than detected in host tissues. The primary objective of this project is to study toxicant-parasite interactions in a piscivore host, specifically, by assessing the role of gastrointestinal macroparasites in mercury distribution and biotransformation (ecotoxicoparasitology). We hypothesize that parasites alter the dynamics of mercury absorption (bioavailability), and that these toxicant-parasite interactions affect the overall health of the host. Intestinal tracts from wild canids, which will serve as a reference population for this study, were processed; parasites were removed, weighed, counted, and identified to species. Luminal contents and various tissue samples were also collected. Samples were analyzed for mercury at the Wildlife Toxicology Laboratory, University of Alaska—Fairbanks (UAF). Determination of trophic levels of intestinal fauna will be instrumental in delineating ecological relationships within the host intestine, and will be accomplished by stable isotope analysis in the coming months. To date, total mercury (THg) analysis has been carried out on 83 wolves. Hepatic THg concentrations ranged from 5.7 ppb wet weight (ww) to 7,300 ppb ww. Renal THg concentrations ranged from 11.2 ppb ww to 4,600 ppb ww. Total mercury concentrations measured in the livers of "coastal" wolves (n=19) were significantly higher than those in the livers of wolves from interior Alaska (n=64) ($Z = 5.23$, 1 d.f., $p = <0.0001$), with mean concentrations of 2,216.89 and 128.17 ppb ww, respectively. This newly recognized difference in THg concentrations between land-locked and coastal wolves identifies a geographical "hot spot" for Hg and will provide important insight into the feeding ecology of these animals.

American Association of Veterinary Parasitologists (AAVP) Annual Meeting, Atlanta, Georgia, July 31st to August 3rd, 2010, Oral Presentation: Toxicant-Parasite Interactions: the Role of Macroparasites In Mercury Dynamics Within the Gastrointestinal Tract of Mammalian Hosts**.** A Linton: Department of Microbiology, Immunology, and Pathology, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO**, KB Beckmen**: Alaska Department of Fish & Game, Fairbanks, Alaska TM O'Hara: The Wildlife Toxicology Lab, at Department of Biology and Wildlife and Institute of Arctic Biology, University of Alaska Fairbanks, Fairbanks, Alaska M Salman: Department of Clinical Sciences, Colorado State University, College of Veterinary Medicine and Biomedical Sciences, Fort Collins, CO, LR Ballweber: Department of Microbiology, Immunology, and Pathology, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO. Abstract: Certain intestinal macroparasites have been shown to bioaccumulate heavy metals (e.g. Pb, Cd) at significantly higher concentrations than that of their fish hosts. We, therefore, hypothesize that toxicant-parasite interactions within the host intestine may have a positive effect on overall host-health. Thus, the objective of this ongoing study is to assess the ability of gastrointestinal macroparasites to bioaccumulate mercury,

and to determine their role in mercury distribution and biotransformation within the host. Intestinal tracts were processed from Alaskan Gray wolves (*Canis lupus*). Macroparasites were removed and weighed, and nematodes were enumerated; additionally, host luminal contents and various tissue samples were collected for total mercury (THg) analysis. Prevalence of cestodes and ascarids in the 89 intestinal tracts examined was 61.8% (55/89) and 19.1% (17/89), respectively. Nine wolves contained both cestodes and ascarids, out of 63 parasitized animals (14.3%). Ascarids from 15 of the 17 animals were identified morphologically, and prevalence of *Toxocara canis* and *Toxascaris leonina* was found to be 33.3% (5/15) and 80.0% (12/15), respectively. Two individuals were co-infected with both *Toxocara canis* and *Toxascaris leonina.* All cestodes were of the genus *Taenia.* Preliminary THg results showed concentrations in pooled, homogenized cestodes ranging from 2.95 to 75.03 ppb (ww), with a median of 12.98 ppb (ww). Nematode THg concentrations ranged from 3.34 to 6.32 ppb ww, with a median of 4.72 ppb (ww), possibly suggesting a greater potential for uptake by the cestodes. Initial results confirm that these parasites are capable of mercury uptake, and that THg concentrations in these parasites lie within a detectable range. These data will be of critical importance as we move forward in addressing the role of macroparasites in mercury distribution and biotransformation within the host.

Graduate Women in Science Nell I. Mondy Fellowship Application (Funded, June 2010), Project abstract included in application. **Dr. K. B. Beckmen** was specifically identified in this fellowship application as a collaborator for my PhD project; her integral role in my training, her mentorship and support, and her service as a role model was discussed in the application, which was funded in June of 2010: Project title: Intestinal macroparasites and mercury (Hg): the chemical ecology within the alimentary tract of a piscivore host Abstract: In recent years, parasites have been receiving recognition for their role in evaluating ecosystem-health, and for their potential use as indicators of marine pollution. Cestodes and acanthocephalans, in particular, have been shown to accumulate heavy metals at much higher concentrations than detected in surrounding host tissues. The objective of this project is to determine the toxicant-parasite interactions in a piscivore host, specifically, by assessing the role of gastrointestinal macroparasites in mercury distribution and biotransformation (ecotoxicoparasitology). It is hypothesized that parasites alter the dynamics of mercury absorption, and that these toxicant-parasite interactions affect the overall health of the host.

I also co-sponsored a PhD candidtate, Alina Evans, at Hedmark University College in Norway, who received a fellowship and grant funding for her project entitled "Epidemiology of Infectious Keratoconjunctivitis and Alphaherpesviruses in Arctic Ungulates". Federal funds were used to pay salaries, supplies, travel and services on this task.

JOB/ACTIVITY 4: Monitor levels of contaminants in species of concern
Accomplishments: A collaboration with UAF faculty, Dr. Todd O'Hara continued a study of mercury contamination in Steller sea lions. Hair, blood, liver, kidney and muscle were collected for trace metals analysis on caribou. The heavy metal residue levels will be used to determine if the caribou are accumulating heavy metals in excess of recommendations

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

JOB/ACTIVITY 5: Assess trace mineral status of sheep, moose & caribou
Accomplishments: Blood, serum and tissues samples were collected and submitted for analysis at Wyoming State Veterinary Laboratory. The trace minerals studies were expanded to include muskoxen and data analyzed. A UAF student performed ceruloplasmin assays for determining copper status and prepared a poster on copper status in caribou. Federal funds were used to pay salaries, supplies and services on this task.

JOB/ACTIVITY 6: Review literature, preparing reports and manuscripts, and travel
Accomplishments: Progress reports were generated for Federal Aid and CWD Surveillance program as well as periodic reports on disease surveillance activities.
I gave an invited (travel paid) presentation entitled: Tackling Wildlife Welfare Issues within a Wildlife Management Agency: Perspectives of the Division of Wildlife Conservation. The presentation and participation was at the Animal welfare in wildlife management, research, and harvest**,** Canadian Cooperative Wildlife Health Centre, Carleton University, Ottawa, February 23, 2010.

I attended the Alaska Chapter of The Wildlife Society Meeting in Anchorage, February 9-10, 2010 and presented the oral presentation: Diseases of Muskox, Dall's Sheep and Mountain Goats: What They've Got, What We Are Looking tor and How to Recognize Them. **Kimberlee B. Beckmen** and Kathleen A. Burek. I was also a co-author on the presentation: Population Status and Potential Causes of a Decline in Muskoxen In Northeastern Alaska. Steve M. Arthur, Kimberlee Beckmen and Patricia A. Del Vecchio. I was also a co-author on the poster presentation: Muskoxen in Alaska
Hughes, Letty J., Patricia Reynolds, Kimberlee Beckmen, Philip Perry, and Geoff Carroll.

I attended the 58th Annual International Conference of the Wildlife Disease Association Semiahmoo, Blaine, Washington USA August 2- 7 2009. I made an oral presentation entitled: Hypophosphatemia and Associated Rickets in Hand-Reared Moose (Alces alces) calves in Alaska which was authored by myself and Kathy A. Burek. I also presented a poster by Stephanie Crawford, Leigh E. Strehlow and myself : Chemistry Reference Ranges in a Captive Herd of Wood Bison (*Bison bison athabascae*). I presented at second poster by myself and Camilla Lieske entitled: Serum Prevalence and Distribution of Respiratory Disease Complex Viruses in Alaskan Caribou and Moose.

I prepared a poster that was presented at the biennial conference on the biology of marine mammals however I did not attend. The title was: Intestinal Hookworm (*Uncinaria sp.)* Burdens and Egg Shedding in Declining and Increasing Stocks of Steller Sea Lions in Alaska. **Beckmen, Kimberlee B**.; Burek, Kathy A.; Hughes, Letty; Gelatt, Tom.
Abstract: Recent disease surveys in Steller sea lions (SSLs) in Alaska have detected the presence of a hookworm, *Uncinaria lucasi*. Our objectives were to determine hookworm prevalence and potential adverse effects on pup health in two populations of SSLs. We

documented *Uncinaria* in the small intestines of dead pups (n=14) and egg shedding in feces of live and dead pups (n=225) collected on 6 rookeries from 2003-2005. Samples were collected per rectum from live pups, 2-4 weeks of age, at branding during the last week of June/first week of July. We compared the prevalence of patent *Uncinaria* infections between stocks and individual rookeries. Prevalence was higher in the eastern (52%) versus western (16%) stock and varied by rookery. Prevalence was lowest in the farthest west rookery, Ugamak, (10%) and highest at the farthest southeast rookery, Lowrie Island (50%). Prevalence varied between eastern rookeries but the two western rookeries were not significantly different (10% and 12%). Egg counts ranged from 25 to 9333 eggs/g. Mean egg counts differed by stock with higher shedding in the eastern stock. Within the eastern stock, mean egg counts also varied by rookery with the lowest at the most recently established rookery in Glacier Bay. Eggs counts and hematocrit were negatively correlated in 2-4 week old pups while there was no correlation in the 2 month olds. Total intestinal worm burdens ranged from 1 to 3477 (mean= 490) with 93 % of the intestines examined containing worms but only 21% were patent infections. In patent infections, there was an increasing trend in egg shedding with worm burden. Increased prevalence with increasing population density is consistent with density-dependent parasite transmission. Further studies on hookworm-associated pathology are critical considering that parasite loads encountered are well above those associated with significant mortalities in other pinniped species.

The following co-authored manuscripts were completed and submitted for review: Serendipitous discovery of a resemblance between the enigmatic schizonts inducing fatal hepatic disease and the sarcocysts of a newly recognized ursine species, *Sarcocystis arctosi*, n. sp. (Apicomplexa: Sarcocystidae) from the brown bear (*Ursus arctos*) by J. P. Dubey, B. M. Rosenthal, N. Sundar, G.V. Velmurugan, and **K. B. Beckmen**, Submitted Acta Parasitologica.

Effects of Predator Control, Individual Traits, and Environment on Moose Survival, Alaska. Mark A. Keech, Mark S. Lindberg, Rodney D. Boertje, Patrick Valkenburg, Brian D. Taras, Toby A. Boudreau, **Kimberlee B. Beckmen**, Submitted Journal of Wildlife Management.

The following manscripts co-authored with UAF Master's candidate Theresa Wolsatd are in draft and preparing for submission to the Journal of Wildlife Diseases: Evaluation of *Trichodectes canis* Detection Methods In Alaska Gray Wolves**.** Theresa M. Woldstad, Kimberly Dullen, **Kimberlee B. Beckmen**, Kris J. Hundertmark. Abstract: *Trichodectes canis*, (Ischnocera: Trichodectidae), was first documented on Alaska gray wolves (*Canis lupus*) on the Kenai Peninsula in 1981. In subsequent years, numerous wolves exhibited visually apparent, moderate to severe infestations. Currently, Alaska Department of Fish and Game utilizes visual inspection, histopathology examination, and potassium hydroxide (KOH) hide dissolution for *T. canis* detection. However, prospective sampling locations for *T. canis* on Alaska gray wolves are undefined. Our objective was to assess optimal sampling locations for *T. canis* detection. Wolves were subject to lice enumeration using KOH hide dissolution. Observed total body parasite loads ranged from mild infestations of 14 lice to severe infestations of 80,878 lice. The highest mean

proportion of *T. canis* in sampled 100 cm^2 hide subsections was the back and was significantly different from the lowest mean proportion, found in the neck. However, 100 cm^2 subsections failed to detect all cases of pediculosis. We determined that a larger hide section from the caudal region, representing one-eighth of a hide, possessed the highest mean proportion of *T. canis* and was most sensitive for detection of lice for all cases of pediculosis. We recommend that KOH dissolution of the caudal region of the wolf be utilized for lice surveillance. However, the practical application of *T. canis* surveillance of hunter and trapper harvested hides utilizing large hide sections is limited.

Distribution of *Trichodectes Canis* within Alaska: An Invasive Ectoparasite of Gray Wolves? Theresa M. Woldstad, **Kimberlee B. Beckmen**, Craig L. Gardner, And Kris J. Hundertmark. Abstract: In 1981, *Trichodectes canis* (Ischnocera: Trichodectidae), an obligate ectoparasite of canids, was first documented in Alaska on wolves (*Canis lupus*) from the Kenai Peninsula. The infestation was detected because wolves exhibited moderate to severe alopecia. In 1998, *T. canis* was identified north of the Kenai Peninsula in the Matanuska-Susitna River Valleys, north of the Alaska Range near Fairbanks in 2004, and the Upper Kuskokwim River in 2005. Two hypotheses may explain why *T. canis* was not observed in Alaska wolves until the 1980s. Symptomatic wolves could be predisposed to pediculosis, whereas mild infestations outside the observed infestation region are undetected by visual inspection. A second possible explanation is that *T. canis* is an invasive ectoparasite. In that case, Alaska wolves are unable to mount an effective response to this novel parasite, whereas wolves outside the infestation region in Alaska do not harbor *T. canis*. We examined wolf hides outside of the known distribution of the louse from December 2003 to February 2009, to determine the current distribution of *T. canis* on wolves within Alaska; thereby testing the hypothesis that *T. canis* occurs naturally as a parasite of Alaska wolves. Lice were documented on wolves in a contiguous distribution from Southcentral Alaska to immediately north of the Alaska Range, (estimated area 174,000 km^2). Wolves outside of the infestation zone do not possess occult infestations of *T. canis*. This pattern of occurrence suggests that *T. canis* is a novel parasite within Alaska.

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

JOB/ACTIVITY 7: Perform duties of the attending veterinarian
Accomplishments: Duties of the attending veterinarian including giving advice, consultation and services to staff that were related to wildlife capture, disease, mortality, euthanasia, zoonotic disease risk/diagnosis, drug purchase, prescribing and dispensing, and veterinary supply. Training in these areas were provided to staff. Wood bison were given clinical treatment as needed. Public concerns about wildlife disease, parasites and lesions in game meat, zoonotic disease and animal welfare were addressed on a case by case basis (walkins, phone calls, emails and public information requests). Import permit issues and responses to the Board of Game were addressed. Gave consultations and attended meetings to provide veterinary expertise to staff and other state departments as requested. Provided testimony in state court regarding caribou diseases and zoonotic risk. Provided training on and updated the DWC Animal Welfare Policy. Performed duties related to the Institutional Animal Care and Use Committee including facility inspections

and protocol review, drafting standard operation procedures for animal capture and anesthesia. Assist in animal capture work. Federal funds were used to pay salaries, supplies, travel 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

Orphan moose raising and testing protocols were developed, orphan moose were examined, monitored and health checks provided. Sick or injured calves were examined and euthanized/necropsied as appropriate.

Wolves suspected of attacking and killing a person were necropsied and forensic specimens collected in consultation state medical examiner's office.

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

Expression and self-assembly of virus-like particles from two genotypes of marine vesiviruses and development of an ELISA for the detection of antibodies. Shasta D. McClenahan, Karin Bok, Stanislav V. Sosnovtsev, John D. Neill, Kathy A. Burek, **Kimberlee B. Beckmen**,, Alvin W. Smith, Kim Y. Green, Carlos H. Romero. Veterinary Microbiology 142 (2010) 184–192

Neospora caninum and *Toxoplasma gondii* seroprevalence in wildlife of Alaska. Erica Stieve, **Kimberlee Beckmen**, Steve Kania, and Sharon Patton, Journal of Wildlife Diseases. 2010. 46 (2) :348-355..

Genomic characterization of novel marine vesiviruses from Steller sea lions (*Eumetopias jubatus*) from Alaska. McClenahan, Shasta D.; Kathy A. Burek; **Kimberlee B. Beckmen**; Nick J. Knowles; John D. Neill, and Carlos H. Romero. In Press: Virus Research.

Aerobic Oral and Rectal Bacteria of Free-Ranging Steller Sea Lion Pups and Juveniles (*Eumetopias jubatus*) in Alaska by Sebastian E. Carrasco, Kathleen A. Burek, J. Lindsay Oaks, **Kimberlee B. Beckmen**, Margaret A. Davis, Katherine N.K. Baker, Jonna A.K. Mazet. In Press: Journal of Wildlife Diseases.

VI. RECOMMENDATIONS FOR THIS PROJECT

Disease surveillance and veterinary activities have continued to steadily increased in scope and intensity over the course of this performance period. The Wood Bison Reintroduction Project animals under quarantine and the orphan moose added at tremendous amount of work that not anticipated. 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

continues to decrease and it is no longer sufficient to maintain adequate surveillance of free-ranging cervids in Alaska. The WBII in support of the CWD project 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. Likewise, funding for West Nile Virus surveillance is no longer available for Alaska. 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: 31 August 2010