ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
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Alaska Department of Fish and Game
Wildlife Restoration Grant

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PROJECT TITLE: Evaluating methods to control an infestation by the dog louse in gray wolves

PROJECT DURATION: 1 July 2006–30 June 2011

REPORT PERIOD: 1 July 2009–30 June 2010

REPORT DUE DATE: 1 September 2010

PRINCIPAL INVESTIGATORS: Craig L. Gardner and Kimberlee B. Beckmen

WORK LOCATION: Units 20A and 20C

I. PROBLEM OR NEED THAT PROMPTED THIS RESEARCH

The dog louse (*Trichodectes canis*), an obligate ectoparasite of canids (Tompkins and Clayton 1999; Durden 2001), was first identified in Alaska on wolves (*Canis lupus*) on the Kenai Peninsula during winter 1981–1982 (Schwartz et. al. 1983; Taylor and Spraker 1983). No other infestations were documented in Alaska until 1998 when dog lice were found on wolves and coyotes (*Canis latrans*) in the Matanuska-Susitna Valley (Golden et al. 2000) and then in 2004 in Interior Alaska (this study). Schwartz et al. (1983) reported that dog louse were not identified on wild canid populations in Alaska prior to 1981 but occurred in a low-level enzootic stage on domestic dogs. It is not known how dog louse infestation was transmitted to the Matanuska-Susitna Valley; Golden et al. hypothesized that the vectors were domestic dogs but it could have been carried by wolves dispersing from the Kenai Peninsula. Louse transmission occurs from direct physical contact and use of denning and bedding sites (Durden 2001).

Infestation by this parasite often results in loss of hair, but the severity of hair loss appears to be variable among individuals. Pups are usually the most affected (Schwartz et al. 1983). Dog louse infestation spread rapidly in both the Kenai Peninsula and in the Matanuska-Susitna Valley and the effects are chronic; 10–29 years following detection, the majority of wolves in these areas continue to be infested and have exhibited little adaptation to the parasite. On the Kenai Peninsula, in about 10 years, 100% of the known packs were infested and in the Matanuska-Susitna Valley 68% were affected within a few years after detection. No additional wolf mortality attributed to louse infestation was observed in either the Kenai Peninsula or Matanuska-Susitna Valley suggesting that dog louse infestation does not affect population trends. However, severely infested wolves have a higher probability of contracting other diseases (Schwartz et al. 1983).

Poor pelt condition reduces monetary and aesthetic value of wolves to trappers and wildlife viewers; therefore, louse infestations can cause economic loss. Unless there are unknown environmental factors that may limit dog louse range expansion in Alaska, there is management concern that lice will continue to spread into different areas of the state because the parasite does not kill its host and wolves disperse long distances. The *Wolf Conservation and Management Policy for Alaska* addresses the issue of disease and parasite control. The policy recognizes that wolves have evolved in the presence of many natural diseases and parasites and, in most cases, are capable of responding to any effects without human intervention. However, the policy also recognizes that there may be cases where management actions would be appropriate to halt the spread of diseases or parasites for the benefit to the overall wolf population, particularly if the disease or parasite is from an unnatural source.

II. REVIEW OF PRIOR RESEARCH AND STUDIES IN PROGRESS ON THE PROBLEM OR NEED

Due to the life cycle of a dog louse, multiple treatments of all infested wolves are necessary if infestations are to be managed. ADF&G attempted to manage louse infestation of wolves on the Kenai Peninsula (1983) and Matanuska-Susitna Valley (1999). Taylor and Spraker (1983) found that ivermectin (Ivomec®; Merial Limited, Duluth GA), developed to eliminate ectoparasites in horses and cattle, could be used as a possible treatment for louse-infested wolves and coyotes. When administered orally, subcutaneously, or intramuscularly at twice the recommended dosage, ivermectin eliminated the adult lice and any hatching nymphs before the lice could reproduce. Ivermectin was tested on 3 infested wolves held in captivity and was determined to be a possible alternative to killing the infested packs (Taylor and Spraker 1983).

In 1983, wolves from 5 infested packs on the Kenai Peninsula were captured and treated with ivermectin. Furthermore, baits injected with ivermectin were distributed in areas near wolf-killed moose in an attempt to treat any infested wolves not captured. The program was halted after the second treatment year. During 1999, 3 of the 14 packs in the vicinity of Wasilla and Talkeetna were found to be infested with lice. Twenty-seven of the 34 wolves in the 3 packs were caught and treated with ivermectin and 1200 baits were distributed throughout the area of infestation. Treatment only occurred during that year.

Both attempts used the same methodology; captured infested individuals and injected the antiparasitic drug ivermectin and distributed ivermectin-treated baits during late winter in the vicinity of kill sites and along travel routes. Both attempts failed because of the difficulty in adequately treating all exposed individuals over large areas and because funding was not adequate to treat over multiple years.

Theresa Woldstad, a Masters student at University of Alaska Fairbanks, studied the possible ecological constraints of dog louse infestation on wolves in Alaska (Woldstad 2010 [In press]). She is currently writing up her results for publication.

III. APPROACHES USED AND FINDINGS RELATED TO THE OBJECTIVES AND TO PROBLEM OR NEED

OBJECTIVE 1: Determine extent of louse infestation in wolf packs in Unit 20A using visual observations of live wolves, hide inspections of trapper-caught wolves, and collection.

During FY06–FY10 we radiocollared 40 wolves and evaluated 19 of 23 Unit 20A packs (83%) for louse infestation. We documented wolf dispersal patterns and frequency of inter-pack conflicts and are analyzing the effects of these factors in louse transmission.

During the study, we maintained a sample of 15–19 radiocollared wolves in 11–15 packs to help estimate the extent and spread of louse infestation. During FY06–FY09, our sampling in Unit 20A indicated that 7 of 12 (58%), 4 of 12 (33%), 1 of 13 (8%), and 0 of 16 (0%) were infested with lice. In FY10 we inspected 31 wolves from 17 packs in Unit 20A for louse infestation using hide digestion (9), visual inspection (18), and skin biopsies (4). Overall, we inspected 17 of the 23 known wolf packs (73.9%) in Unit 20A during FY10 and none of these were infested with lice.

OBJECTIVE 2: Determine efficacy of den-rendezvous site treatment to manage lice infection.

We treated louse infested packs by dropping baits (fist size chunks of moose meat) injected with ivermectin at the den-rendezvous sites from aircraft (Piper Super Cub) during May–August. We varied the dose depending on pup presence and size. During the period when pups are 0–6 weeks old and not very mobile (early May–19 June) we treated the adult wolves by dropping 5–20 baits injected with 12 mg ivermectin at the den site. We completed 3 adult treatments/pack/year. The number of baits dropped at each den or rendezvous site varies by pack size. After 19 June we reduced the dosage to safely treat both the pups and adults. During 19 June–5 July the dose was 0.15 mg/bait. We increased the dosage to 0.18 ml and 0.20 ml during 15–31 July and 1–26 August. Our dose was based on estimated pup weights obtained from the literature. We completed 4 pup treatments/pack/year.

We treated 5 packs in 2006, 4 packs in 2007, and 0 packs during 2008–2010. We did not treat during 2008–2010 because none of the radiocollared packs were infected. The one known infested pack during 2008 was trapped and the newly established pack in the area was found not infested.

During FY10, to evaluate short- and long-term treatment effects, we collected one pup or performed biopsies on captured wolves from each of the treated and untreated radiocollared packs in Unit 20A during the winter. We also purchased from trappers 1 wolf from each of our 2 louse infested control packs in Unit 20C to evaluate longevity of louse infestations. The hides of the collected wolves were chemically digested to detect occult lice infestations. This technique is highly sensitive in detecting louse presence.

OBJECTIVE 3: Establish rate of transmission between packs.

We maintained 1–3 radiocollared wolves in 12 Unit 20A packs in FY10. We identified dispersals and pack interactions and evaluated the effects of these factors on louse

transmission. We monitored 12–15 packs during 2006–2009 in Unit 20A. During the course of the study, we documented 13 dispersals of radiocollared wolves. Five of these established territories in the study area and 8 dispersed outside the study area. Six of the long distance dispersers were from packs that had been infested with lice but were treated and clean at the time of dispersal. We documented that at least 4 of these 6 were observed with other wolves after dispersal. We documented 5 episodes of pack conflict. In one of these cases lice were transmitted from an infected pack to an uninfected pack.

OBJECTIVE 4: Determine if lice-infected packs have lower productivity and survival rates.

Due to funding restraints and to the success of treatment resulting in few infested wolves, we did not pursue this objective.

IV. MANAGEMENT IMPLICATIONS

Our study results indicate that repeated treatments at den and rendezvous sites of wolves infested with dog lice can be successful in managing this ectoparasite. Based on results from our control packs and from the Kenai Peninsula and Matanuska-Susitna Valley, once a pack becomes infested it will remain so unless it is treated or dies out. We also found that infestations can reoccur due to immigration. Possible factors that slow infestation rate are reduced immigration.

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

JOB/ACTIVITY 1: Literature review

Accomplishments: We reviewed published literature and management reports concerning lice infestation within Alaska. We also consulted with fellow colleagues and the literature on treatment and detection methods for other types of ectoparasites in canids that may apply to managing dog lice in wolves. Federal funds were used to pay salaries while working on this task.

JOB/ACTIVITY 2: Wolf collection and sampling

Accomplishments: We collected one 6- to 7-month-old wolf from 9 of 12 packs we had radiocollared during the collection period (October 2008–November 2009) in Unit 20A. We also inspected the hides of 18 wolves harvested by trappers in Unit 20A and 2 wolves from Unit 20C. We evaluated skin biopsies from 4 live-captured wolves in Unit 20A. We used these data to evaluate the presence and transmission of lice and the long-term effectiveness of treatment. We documented that the 17 monitored packs in Units 20A were lice free and the 2 packs in Unit 20C continued to be louse infested. Eight (47.0%) of the 17 Unit 20A packs had been infested prior to treatment within the last 4 years. Both Unit 20C packs had remained infested for 4 years. Federal funds were used to pay salaries for project personnel.

JOB/ACTIVITY 3: Maintain radio collar sample (1–2 wolves/pack) in 10–15 packs in Unit 20A

Accomplishments: We maintained 1–3 radio collars (<2 years operating time) in 12 packs during the report period. We caught and radiocollared 4 wolves from 4 packs in October 2009. Federal funds were used to pay salaries for project personnel.

JOB/ACTIVITY 4: Radiotracking packs

Accomplishments: During the report period, we completed 10 radiotracking flights and located 2–12 of the radiocollared packs/flight. Our intent was to monitor pack movement patterns and inter-pack conflict, determine pack territory boundaries, and identify dispersal patterns to help delineate louse transmission through Unit 20A. We did not document inter-pack conflicts during FY10. There were 2 dispersals from the area. Both dispersing wolves were from packs that had been successfully treated for lice prior to dispersal.

JOB/ACTIVITY 5: Maintain radio collar sample in Unit 20C to act as a control

Accomplishments: During FY10, we did not radiocollar any additional wolves in Unit 20C but continued to monitor 2 packs that were instrumented previously in 2007. Federal funds were used to pay salaries for project personnel to monitor these wolves.

JOB/ACTIVITY 6: Data analysis and report preparation

Accomplishments: We tested 9 wolf hides using hide digestion, and biopsied 4 live wolves in the field for lice presence. None tested positive for lice. We did not detect lice through visual inspection of 18 wolf hides harvested by trappers in Unit 20A. We verified that both of our control packs in Unit 20C continued to be infested following visual inspection of wolves harvested by trappers. We continued to analyze movement data to evaluate louse transmission in the wolf population.

VI. PUBLICATIONS

None.

Literature Cited:

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TOMPKINS, D. M., AND D. H. CLAYTON. 1999. Host resources govern the specificity of swiftlet lice: Size matters. Journal of Animal Ecology 68:489–500.

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VII. RECOMMENDATIONS FOR THIS PROJECT

Prepare manuscript for publication during FY11.

Prepared by: Craig L. Gardner
Date: 14 August 2010