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-R1-2020

PROJECT NUMBER: P7.02

PROJECT TITLE: Fisher colonization and competition with marten in Southeast Alaska

PERIOD OF PERFORMANCE: July 1, 2019 to June 30, 2020

REPORT DUE DATE: September 1, 2020

PRINCIPAL INVESTIGATOR: Anthony P. Crupi, Sophie L. Gilbert

COOPERATORS: Dr. Lisette Waits, University of Idaho

Authorities: 2 CFR 200.328
2 CFR 200.301
50 CFR 80.90

I. SUMMARY OF WORK COMPLETED ON PROJECT

Objective 1: Estimate fisher occupancy and density.

Accomplishments: Using data collected from 25 remote camera stations (50 unique cameras) and Alaska remotely-sensed datasets, we conducted single-species occupancy analyses at both site (local) and grid (broad) scales using 7-day occasions. There were 17 fisher detections across the study season at 7 clusters (9 unique stations). At both local and broad scales, we found evidence that vegetation height had a positive effect on fisher occupancy in SEAK. Mean fisher occupancy at the local scale was estimated at 0.32 (95% CI = 0.12, 0.68), whereas broad-scale mean fisher occupancy was 0.40 (95% CI = 0.003, 0.83).

Analysis of genetic samples collected in the field continued at the Laboratory for Ecological, Evolutionary and Conservation Genetics (LEECG) at the University of Idaho, with a total of 204 genetic samples extracted. Of those, 36 samples amplified under the original standard protocol, and an additional 81 samples amplified after being run with twice as much DNA and more cycles. In total, 117 samples amplified and 16 of those samples underwent sequencing to clarify species identification. Analysis at LEECG determined that 64 samples were from marten and 16 were from fisher. Twenty-seven samples were identified as beaver (the bait). Samples identified as fisher and marten by

mtDNA fragment analysis or sequencing were sent to Dr. Michael Schwartz's lab at the U.S. Forest Service Rocky Mountain Research Station and National Genomics Center for Wildlife and Fish Conservation (NGCWFC) to obtain individual identification and sex-ratios. When marten and fisher samples were analyzed at NGCWFC, 7 of the samples previously identified as marten were found to belong to ermine, one was identified as beaver, and 7 samples that had previously been identified as marten had DNA that was too poor for species identification at the Schwartz lab. One female fisher and two male marten were individually identifiable. Given the single individual fisher identification, we were unable to estimate fisher density.

Objective 2: Determining fisher competition with marten in Southeast Alaska.

Accomplishments: Using data collected from 25 remote camera stations (50 unique cameras), and single and two-species occupancy models, we found evidence of temporal, rather than spatial, avoidance patterns among fisher, marten, and ermine in Southeast Alaska. Best-supported two-species occupancy models did not support spatial avoidance hypotheses. Marten occupancy and detection were not impacted by fisher presence. Similarly, ermine detection and occupancy were not affected by fisher or marten presence, and fisher occupancy and detection was not affected by either marten or ermine presence. Analysis of diel activity patterns showed that ermine and marten adjusted their activity in the presence of fisher to reduce temporal overlap, whereas fisher activity patterns did not differ significantly in the presence of marten and ermine. Overall, these results show that mustelids in Southeast Alaska during winter display a pattern of hierarchical temporal partitioning, with smaller-bodied mustelids avoiding larger, more dominant mustelids.

Objective 3: Data analysis, synthesis, and preparation of publications.

Accomplishments: Following data analyses, Caitlin Kupferman reported research findings in her master's thesis entitled "An expanding meso-carnivore: fisher (*Pekania pennanti*) occupancy and coexistence with native mustelids in Southeast Alaska." Fisher occupancy results (Objective 1) were included in Chapter 1: "Assessing environmental covariates associated with fisher occupancy in Southeast Alaska." Chapter 2, titled "Spatial and temporal partitioning of mustelids in Southeast Alaska," addressed Objective 2. Additional genetic results were discussed in Appendix A. "Determining fisher (*Pekania pennanti*) density in Southeast Alaska: limitations and suggestions for the future."

We have submitted two manuscripts for publication to Ecosphere and Journal of Mammalogy. These papers have recently been reviewed and revisions will be submitted to address reviewer comments.

II. SIGNIFICANT DEVELOPMENT REPORTS AND/OR AMENDMENTS.

None.

III. PUBLICATIONS

We submitted two manuscripts to journals for publication.

Kupferman, C., A. Crupi, L. Waits, S. Gilbert. 2020 *In review.* Environmental covariates associated with fisher (*Pekania pennanti*) occupancy and colonization in Southeast Alaska. Journal of Mammalogy.

Kupferman, C., A. Crupi, L. Waits, S. Gilbert. 2020 *In review*. Spatial and temporal partitioning of mustelids in Southeast Alaska. Ecosphere.

Throughout the project, we have publicized the study and disseminated the findings to the public and scientific community.

Kupferman, C, A. Crupi, L. Waits, and S. Gilbert. Environmental covariates associated with fisher (*Pekania pennanti*) occupancy in Southeast Alaska. Poster session presented at the 99th Annual Meeting of the American Society of Mammalogists, 2019, June 28–July 2, Washington, D.C.

Kupferman, C. 2019. An expanding meso-carnivore: fisher (*Pekania pennanti*) occupancy and coexistence with native mustelids in Southeast Alaska. M.S. Thesis, University of Idaho, Moscow, Idaho.

We contributed to the revision of the ADF&G fisher species profile https://www.adfg.alaska.gov/index.cfm?adfg=fisher.printerfriendly,

We have also updated the PNW fisher species distribution map and included an article in Alaska Fish and Wildlife News.

Fisher are Carving out a New Niche Near Juneau – ADF&G Launches New Study on this Elusive Carnivore

http://www.adfg.alaska.gov/index.cfm?adfg=wildlifenews.view_article&articles_id=856

Fisher are Carving out a New Niche Near Juneau
ADF&G Launches New Study on this Elusive Carnivor

By Abby Lowell

Fisher are cat-sized weasels, two or three times larger than their close cousins, marten. USFWS photo.

Fisher are a new species in northern Southeast Alaska. And, they are here to stay.

That's why biologists with the Alaska Department of Fish and Game launched a new study that began Jan. 15, 2018, to learn roughly how many fisher are now calling the Juneau area home. That study has already proved successful.

The project is still in its early phase, but Caitlin Kupferman, a master's student from the University of Idaho who is heading up the project, has already captured at least one fisher on camera at one of her sites. The series of photos proves that these members of the weasel family are, indeed, in the Juneau area.

Historically, fisher — a cousin to the marten with a larger, stockier body — have been transients to the Juneau area. Like coyotes, they come and go, but have never seemed to have an established population. Reports of fisher in the area began surfacing in the 1990s and since then have persisted.

Anthony Crupi, a wildlife biologist with the ADF&G's Division of Wildlife Conservation, said, "We believe fisher could have an established population at this point because we are seeing both males and females. But, we don't have any idea about their population dynamics."

Fisher are one of the elusive carnivores that roam the forests of Northern America and, like the wolverine, they are hard to study since they are rarely seen. The males and

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

The fisher (*Pekania pennanti*) is a habitat specialist occupying forests with dense canopy structure across northern North America. In the Northwest, their historic range extended from California to northern British Columbia (BC), although west of the coastal mountain ranges they likely ranged only as far north as southern BC (Weir 2003, Jung and Slough 2011, Tucker et al. 2014). Although fishers' historic range has been reduced considerably by over-trapping, timber harvest, and predator removal (Aubry and Lewis 2003, Wisely et al. 2004), fisher have also proven resilient and capable of recovery, as evidenced by regional increases in abundance (Wisely et al. 2004).

In addition to the recent recoveries of fishers in parts of their historic range, fishers are now expanding their range north and westward, including into the coastal temperate rainforest of Southeast Alaska (SEAK). Fisher colonization has been confirmed in the Juneau area from trapper records near Eagle River and along the Taku River (MacDonald and Cook 2009), including 24 taken within the last 7 years since sealing became required (Winfonet 2020). Moreover, fishers have recently colonized southwest Yukon and far northwest BC (Jung and Slough 2011), increasing the likelihood of colonization in other parts of SEAK (e.g., northern and central SEAK mainland) in the future. This recent northwest range expansion is likely due in part to climate-driven decreases in winter snow accumulation, as fisher range is thought to be limited by deep, high-density snow (Raine 1983, Krohn et al. 1995). In the future, snowfall is projected to decrease further in SEAK, despite increases in total annual precipitation (Cherry et al. 2010, McAfee et al. 2013, Shanley et al. 2015), likely increasing potential fisher habitat in the region.

We have successfully completed this project and effectively met our project objectives. At this time there are no additional studies on fisher colonization in progress. This grant allowed us to conduct baseline research and support a graduate student at the University of Idaho, in successfully completing her master's degree. The department now has a better understanding for fisher ecology in northern Southeast Alaska. We used fisher detections from remote camera photos to estimate fisher occupancy and activity patterns. We also examined the patterns of spatial and temporal overlap between the mustelid species at both local and landscape scales. Analysis of diel activity patterns showed that marten and ermine reduced temporal overlap with fisher, exhibiting less activity during times of peak fisher activity. Overall, these results show that mustelids in SEAK displayed a pattern of hierarchical temporal partitioning during winter, with smaller-bodied mustelids avoiding larger, more dominant mustelids. With the completion of this project, we recommend continuing the support for future conservation objectives and small-mammal research studies in Alaska.

Prepared by: Anthony P. Crupi, Wildlife Biologist III

Date: 8/19/2020