Wildlife Research Study Plan

Wolverine Population Ecology in Berners Bay, Alaska

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Introduction

This report provides a summary of planned activities for the field season from December 2007 to June 2008.

Background

The wolverine (*Gulo gulo*) is one of the rarest and least-known carnivores in North America (Banci 1994, Ruggiero et al. 2007). Wolverines occur at low densities and tend to be found in areas removed from human influence (Banci 1994, Aubry et al. 2007). Because of this, relatively little was known about wolverine ecology until recently (Banci 1994, Squires et al. 2007). Research has shown that wolverines are susceptible to human disturbance (Krebs et al. 2007), that suitable denning habitat is a critical habitat component for wolverine population persistence (Magoun and Copeland 1998), and that harvest is an additive mortality that can significantly affect population demographics and cause local extirpation of wolverine populations (Hornocker and Hash 1981, Krebs et al. 2004, Squires et al. 2007).

Wolverines are managed as a commercial furbearer in Alaska for which trapping and hunting is allowed. Based on sealing records from southeast Alaska, 19 wolverines (on average) were harvested in Units 1 – 4 over the last 12 years; 42% of these were taken from Units 1C and 1D in northern southeast Alaska. Over that time, 0-4 wolverines were harvested in the Berners Bay area annually. Although sealing provides managers with some useful information on each animal sealed (e.g., sex and general location of harvest) and general trend of harvest, it provides no information about the wolverine ecology or insight about current or future population levels.

In southeast Alaska, access during the winter trapping season is logistically challenging because of limited road access to wolverine habitats. Near Juneau Alaska, the Alaska Department of Transportation and Public Facilities (DOT) is planning to construct an all-season

highway that will extend the existing highway from Juneau approximately 50 miles northwest. This road will pass through habitats occupied by wolverines and provide significantly increased access to these areas. Increased access to wolverine habitats, provided by this road, will significantly change human access to wolverines, and likely increase exploitation rates. In addition, this road could provide snow machine access to habitats used by female wolverines for denning and kit rearing (Magoun and Copeland 1998), potentially resulting in conflicts between female wolverines at their dens and recreational snow machine riders.

Knowledge of wolverine ecology and population dynamics is limited and field studies are needed to fill critical information gaps (Ruggiero et al. 2007). This is especially true in coastal areas like southeast Alaska (Magoun et al. 2007). Information on basic ecology, including home-range size and habitat use, movements and dispersal characteristics, and diet are needed to determine factors affecting wolverine abundance and ultimately to ensure sustainable populations (Krebs et al. 2004, Lafroth and Ott 2007). By learning the role and relative importance of these factors, we will be able to appropriately manage this species in a responsible manner per the Alaska Department of Fish and Game, Division of Wildlife Conservation's mission to "Conserve and enhance Alaska's wildlife and habitats and provide for a wide range of public uses and benefits".

Objectives

This research is designed to investigate the ecology of wolverines in the Berners Bay area of northern southeast Alaska. The specific objectives are as follows:

1) Determine spatial-use patterns (i.e., home range, movements) and habitat selection of wolverines in the Juneau Access study area;

2) Derive a wolverine population estimate for the Juneau Access study area, and;

3) Investigate wolverine food habits in the Juneau Access study area.

Methods

Study Area

This study will take place on the mainland coast of southeast Alaska, 55 to 120 km north of Juneau, Alaska (Figure 1). The research will be focused in the drainages of Berners Bay and the Katzehin River, including the drainages intercepted by the Juneau Access Project (Alaska Department of Transportation and Public Facilities 2005).

Wolverine Capture and Handling

We will capture wolverines using log box-traps (Copeland et al. 1995). The number and location of traps will be determined as the season progresses depending on logistics and capture success. We will bait traps with salvaged carcasses of beaver (*Castor canadensis*), mountain goat (*Oreamnos americanus*) or black-tailed deer (*Odocoileus hemionus sitkensis*). Traps will be fitted with a trap-site transmitter so that each can be checked for success remotely. Each trap-site transmitter will be checked daily and all traps will be visited every 5th day (at the least). In addition, we will investigate the feasibility of using a portable barrel-trap to target ephemeral sites with natural attractants (e.g., winter-killed goat carcasses). We will attempt to capture wolverines throughout the study area (Figure 1), but initial efforts will target potential travel corridor that facilitate movement during months of deep snow at high elevations and sites with potential natural attractants that may result in seasonal concentrations of wolverines (e.g.,

eulachon runs). In addition, we will evaluate the feasibility of using helicopter darting techniques to capture wolverines (Golden et al. 2002).

Wolverine capture will take place in January – April during a time when brown (*Ursus arctos*) and black bears (*Ursus americanus*) are denning and thus will not molest traps. Once trapped, we will immobilize wolverines using Ketamine (8 mg/kg) and Medetomidine (0.3 mg/kg) administered with a jab-stick (log traps) or Telazol® administered with a Palmer Cap-Chur® projectile system (helicopter) at a dosage of 13 mg/kg estimated body weight (Golden et al. 2002). We will follow capture and handling protocols approved by the Department's Animal Care and Use Committee (ACUC # 07-20).

We will process all animals in the field by recording gender, weight, body measurements, and physical condition. We will collect hair, blood, and tissue for genetic identification and stable isotope analysis. We will age wolverines based on tooth wear and take a set of standard photographs of each animal's teeth to compare with known-aged specimens. We will examine mammary glands of females for evidence of current or previous lactation. All captured wolverines will be marked with a small (5cm x 0.5cm) ear tags (Minitag, Dalton ID Systems, Ltd., Oxon, United Kingdom) and we will outfit each animal with a GPS collar (Lotek® GPS_3300S; store-on-board). GPS collars will be programmed to obtain location data at 2-4 hr intervals, year-around. Collars will be deployed with a programmable, remote-release mechanism so that animals will not need to be recaptured to obtain the data; collars will need to be recovered to access data.

Study Animal Monitoring

All marked animals will be periodically monitored with VHF telemetry to check for dropped collars. All dropped collars will be retrieved, downloaded, and refurbished for possible

redeployment. Additional aerial monitoring will take place in the spring to attempt to locate female den sites. Wolverines generally give birth from February to April (Banci 1994, Magoun and Copeland 1998). Reproductively-mature females will be closely monitored with fixed-wing aircraft March and April to attempt to determine areas where the animal is localized (i.e., staying in the same general area over several locations), possibly signifying a maternal den site (Magoun and Copeland 1998, Copeland and Yates 2006).

Spatial Data Analysis

The seasonal spatial distribution of locations in relation to habitats and landscape features (e.g., streams, beach zones) will be examined and displayed using GIS software. A resource selection analysis model (RSA; Manly et al. 2002) will be constructed for each sex by season (i.e., winter, summer; depending on sample sizes) with habitat and physiographic features as explanatory variables. The distance of each location to habitat and landscape features and the road corridor will be described using measures of central tendency and their distributions. The seasonal vulnerability of wolverines to human activities along the road corridor will be expressed by plotting percentage of wolverine locations versus distance to the road. This data will be summarized by sex and season.

DNA-based Mark-Recapture

During this first field season, we will experiment with techniques to estimate the number of wolverines in the study area using a DNA-based capture-mark-recapture procedure (Mowat and Strobeck 2000). The study area will be divided into a grid (cell size to be determined later based on use area size and movement data obtained from collared animals) with baited hair snares established in each grid-cell (Mowat and Strobeck 2000, Beier et al. 2005, Mulder et al. 2007). Each hair snare will consist of a ~ 3m long piece of barbed wire mounted on a tree or post with

bait secured above it (Mulder et al. 2007). Barbed wire will be nailed into place from the base of the tree to ~ 2m height. At this height, meat bait will be nailed to the tree. The bait will be such that after one visit, the bait will be eaten and thus no longer provide attractant for other wolverines. The bait stations will be visited using a helicopter or skiff and checked 2-4 times at about 14-day intervals. All visible hair will be collected and the barbed wire will be cleaned using a butane torch to remove any remaining hair. All discrete hair samples will be collected for analysis.

Hair from each snare will be removed and placed in individual paper envelopes for storage. The paper envelopes will be kept in a dry place until ready for shipping. Upon the end of the season, the hair samples will be sent to a commercial genetics laboratory (Wildlife Genetics International Lab, Nelson, BC) for individual wolverine identification using DNA microsatellite markers (Kyle and Strobeck 2001, Kyle and Strobeck 2002, Flagstad et al. 2004). We will use seven microsatellite markers (Gg-4, Gg-7, Ggu101, Ggu216, Ma-2, Mvis-75, Ba-4) based on results from Kyle and Strobeck (2002) and Mulder et al. (2007). Samples missing >1 marker will be eliminated from the analysis. Quality assurance methods will be used to ensure the accuracy of individual identification (Paetkau 2003).

With the genetic data identifying individual wolverines, we will estimate the wolverine population size using a DNA-based mark-recapture model (Williams et al. 2001). Using data from both years of the study, all sampling within a year will be pooled into a single 'capture period'. We will explore various models depending on our data (i.e., number of capture, number of recaptures) to determine the most appropriate model.

Food Habits

We will investigate the diet of wolverines using stable isotope analysis (Ben-David et al. 1997, Szepanski et al. 1999). Hair collected from captured wolverines, from the hair snares, and from harvested wolverines will be sent to Merav Ben-David (University of Wyoming) for stable isotope analysis and comparison with known isotopic signatures of a suite of potential prey species (Ben-David et al. 1997, Ben-David et al. 2004, Flynn et al. in prep.). To determine the isotopic signatures of wolverine prey, muscle tissue samples will be collected from mammals in this study (i.e., moose, mountain goat). For other potential food items (e.g., squirrels, berries, and salmon), we used values obtained from Chichagof Island and other parts of southeast Alaska (Ben-David et al. 1997, Flynn et al. in prep.). We will also send a portion of collected blood for stable isotope analysis to understand the diet just previous to capture because stable isotope analysis of hair describes the diet while that hair is growing (i.e., late summer and fall).

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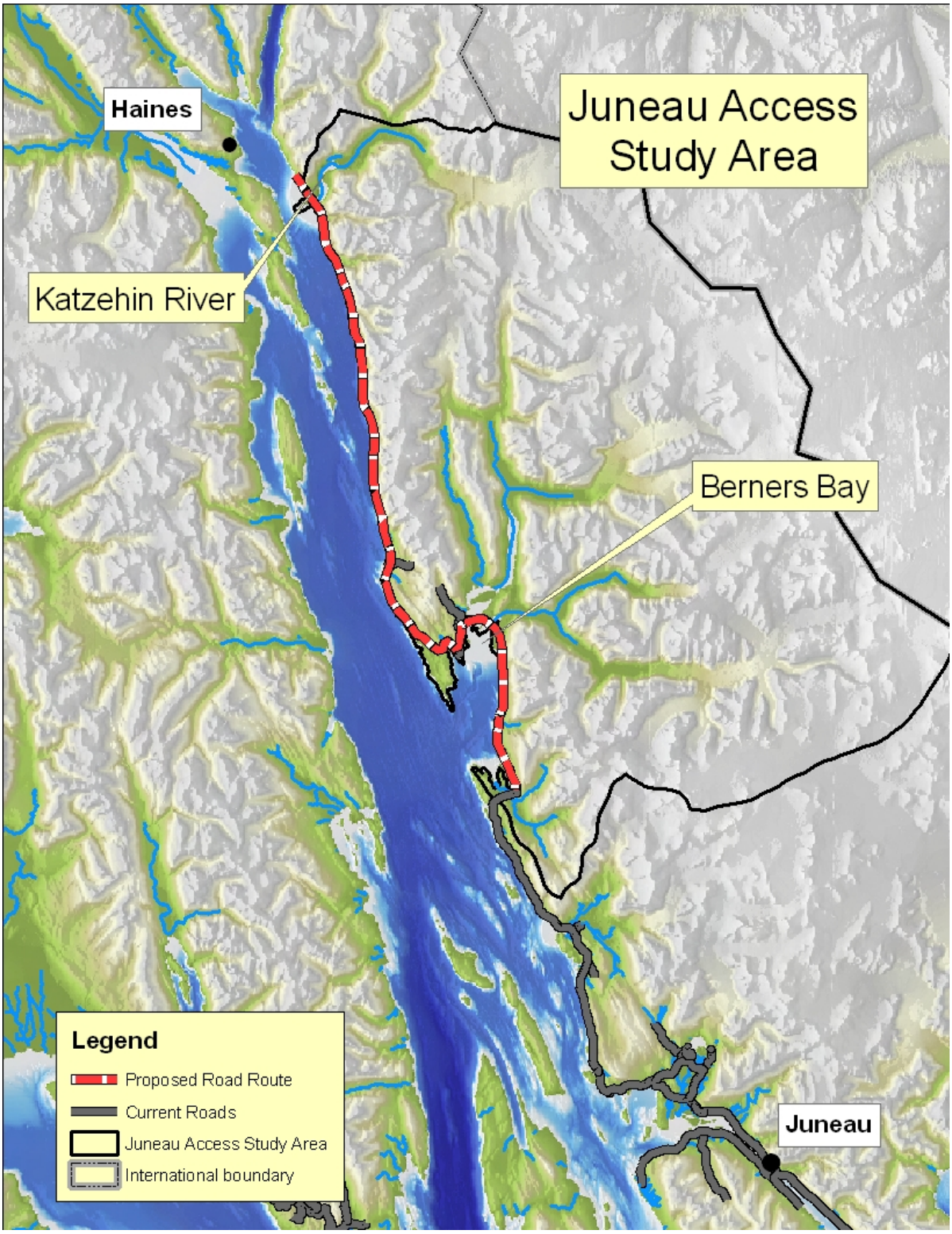

Figure 1. Juneau Access study area in northern Southeast Alaska, showing proposed and current road routes.