Sierra Nevada Adaptive Management Project

Fisher Study Workplan

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INTRODUCTION

The SNAMP fisher study is designed to determine whether the fisher population in the southern study area is decreasing or not, which vital rate is most important in population change, and which environmental factors are correlated with these changes. The working hypothesis is that the population is declining over the long term, low survival rates are the key problem, and that these low survival rates are related to decreased canopy cover in the study area, which in turn is a function of forest management practices on the Sierra National Forest.

The approach proposed for the fisher study is to daily monitor the entire fisher population in a circumscribed area to be determined once at least 20 fishers are radio-collared and their home ranges delineated. The goal is to have all fisher using the circumscribed study area identified and monitored throughout the eight-year study. By the end of the study it is expected there will be a sample of about 40 fisher mortalities of individuals whose home ranges and other characteristics are well known. This sample of fisher fitness measures (e.g. lifespan, reproductive output) will be correlated with habitat and other environmental measures (e.g. canopy closure within home range, length of roads within home range). Environmental variables will be provided by other SNAMP teams or the Bass Lake Ranger District of the Sierra National Forest.

The methods used will include camera trapping a 1km grid, live trapping un-collared fisher when detected, determining home range via ground and aerial tracking, and detecting all fisher mortalities soon enough to enable detailed necropsies. Detectability of fisher on grid cells and fitness measures of individual fisher will be correlated with environmental variables using a variety of multivariate statistical techniques. Detectability by camera traps will also be used to determine trend in fisher distribution and abundance over the study period.

CAMERA TRAPPING

Motion-triggered, automatic digital cameras (RECONYX model PC85) will be deployed for a month in each 1km grid cell throughout the study area. Bait and lure will be replenished weekly. Program PRESENCE will be used with four (week-long) occasions to calculate detectability. The grid will extend from the Merced River south to the San Joaquin River and from 3000ft elevation east to 7000ft elevation. Sampling will begin in the Nelder Grove area and extend outwards as needed to encompass the habitat for a minimum of 20 contiguous home ranges. Sampling may begin on a 4km2 grid and intensify to a 1km grid where fishers are detected. Once the study area is defined the 1km grid will be sampled annually. Camera trapping will continue year-round throughout the study.

LIVE TRAPPING AND RADIO-COLLARING

When an un-collared fisher is detected a Tomahawk live trap fitted with a cubby will be deployed to capture the animal. Fisher will be handled with a capture cone and sedated with ketamine. Weight, body measurements, sex, age, external parasites, body condition and reproductive status will be recorded. Samples will be taken for genetic, disease and dietary analysis. PIT tags will be placed under the skin above the shoulders, and a radio-collar will be

fitted before placing the animal back into the cubby to recover. Fisher will be released from the trap when fully recovered. All procedures for handling animals have been approved by the UC Berkeley Animal Care and Use Committee, and are carried out under a Scientific Collection permit from the California Department of Fish and Game.

RADIO-TRACKING

Daily aerial flights will be made in a light plane fitted with appropriate antennas. All collared fisher will be located and any mortalities reported to a ground crew for immediate recovery. All mortalities will be submitted to the Veterinary School at UC Davis for necropsy, including detailed analysis of parasites, disease and nutritional status in addition to determining cause of death. As time permits, ground crews will "walk in" to resting fisher and record natal, maternal and resting dens. Females will be closely monitored during spring time to locate as many natal dens as possible. Camera traps will be deployed at natal and maternal den sites to detect young.

DATA ANALYSIS

Data on the distribution and abundance of fisher across the 1km grid will be used to determine if the local population is trending up, down or is stable. These data will be supported by modeling the local population's growth based on vital rates monitored throughout the study.

A fisher habitat model produced by Conservation Biology Institute (CBI) is an important component of the adaptive management process we are undertaking. The CBI model represents the best available scientific understanding of fisher habitat relationships in the southern Sierra at the outset of this study. Data on individual fisher fitness will be correlated with a number of environmental variables, including those used by the CBI model. Both the detectability data and the radio-tracking data will be used to test the CBI model's prediction of source and sink habitat for the fisher in the southern Sierra. Multivariate statistical methods will include logistic regression, generalized additive modeling, and use of the HyperNiche software for non-parametric multiplicative regression.

In addition to the focus on habitat relationships, all available data will be used to determine the most likely limiting factor for the fisher population. It is possible that environmental factors other than habitat are important. The roles of predation, competition, disease, poaching and toxins in the ecology of fisher in the southern Sierra are unknown at this time. It is possible that preferred prey are no longer present due to direct removal by humans rather than as a result of habitat change. Further genetic analyses may provide incite as to the effects of inbreeding on this population.