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Project Title: Balancing fuels reduction and wildlife conservation: Monitoring of fisher response to fuels management in northern California forests

Project Number:

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Project Description:

Project Duration

Our proposed project will start on 1 January 2025 and be completed by 31 March 2027. Preparations for field work will be conducted between 1 January and 30 June 2025. The first field season and data analyses will be conducted between 1 July 2025 and 30 June 2026. The second field season, data analyses, and reporting will be conducted between 1 July 2026 and 31 March 2027.

Background and Justification

The conservation of forest-dependent wildlife persisting in small, remnant populations under changing wildfire and climate patterns will require the implementation and evaluation of fuels-reduction treatments and post-wildfire restoration to increase both forest and wildlife resiliency and connectivity (Steel et al. 2023). Fishers (*Pekania pennanti*) are a forest- dependent species that is federally endangered in the southern Sierra Nevada, under federal listing status review in northern California and southern Oregon, a Species of Greatest Conservation Need in California, and culturally significant for regional Tribes (California Department of Fish and Wildlife 2015, U.S. Fish and Wildlife Service 2016, 2020). The conservation of fishers in California epitomizes the challenges of considering pre- and post-wildfire management alternatives and associated forest practice rules (California Department of Fish and Wildlife 2015, Sweitzer et al. 2016). Concerns have arisen over the potential effects of fuels and post-fire management resulting in reductions in forest complexity as a risk to the persistence of fishers (Thompson et al. 2011, Garner 2013, Truex and Zielinski 2013, Zielinski et al. 2013, Sweitzer et al. 2016, U.S. Fish and Wildlife Service 2020). The explicit effects of fuels treatments and post-fire management

on the space-use and demography of fishers in northern California, however, are largely unknown. Understanding these effects has been identified as a research and conservation priority (California Department of Fish and Wildlife 2015, U.S. Fish and Wildlife Service 2020, 2022). This information is needed to assist in project planning and the development of decision-support tools for fuels treatments and post-fire management. An assessment of the effects of these forest practices on fisher space-use and demography in northern California will provide time sensitive information to improve our current scientific understanding of the effectiveness of the California forest practice rules and support the conservation of fishers and other forest-dependent species (California Department of Fish and Wildlife 2015, U.S. Fish and Wildlife Service 2020, 2022).

Since 2006, Oregon State University has collaborated with a suite of private-industry, federal, state, Tribal, and academic partners to monitor the population dynamics of fishers in northern California. Our history of monitoring fishers on private timberlands and the neighboring Klamath National Forest provides long-term data needed to disentangle the potential effects of fuels treatments and post-fire management from naturally occurring variation in population dynamics (e.g., Green et al. 2018). For example, our work on fishers provided the opportunity to investigate the effects of the mixed-severity Beaver Fire that occurred in 2014 and the short-term effects of post-fire management (e.g., salvage logging, replanting) on this population of fishers. Results from these efforts indicate that the fisher population decreased by 27% due to the Beaver Fire and resultant post-fire salvage logging (Green et al. 2022).

Objectives and Scope

We propose to evaluate fisher responses to fuels-reduction treatments and post-wildfire management practices implemented on managed conifer forests in northern California. Specifically, we will empirically evaluate the response of fishers to fuels-reduction treatments by quantifying fisher space-use and density patterns pre- and post-treatment relative to control sites adjacent to treated areas in the 1,002-ha McKinley Scott Fuels Reduction Project in the Klamath River Basin.

We will also evaluate changes in fisher density following the 2022 McKinney Fire and post-fire management. The McKinney Fire consumed 24,440 ha, a majority at high severity, including 11,400 ha (24.5%) of our 46,500-ha study area. We hypothesize that reductions in ladder fuels and shrub cover associated with fuels management activities will lead to short-term, localized decreases in fisher space-use but predict the magnitude and duration of these decreases will not be as great as the negative effects of severe wildfire. Pre-treatment and pre-McKinney Fire surveys were supported by a grant from the CAL FIRE California Climate Investments Forest Health Program.

Research Methods

We will use remotely-triggered cameras (Long et al. 2008) and occupancy analyses (Mackenzie et al. 2006) to estimate fisher space-use in and adjacent to treated units. We will deploy five remotely-triggered cameras on wildlife trails within 100 m of five random locations selected within each forested stand scheduled for treatment. We will also deploy five cameras on wildlife trails within 100 m of five random locations selected within the mean home range radius for fishers outside each treated stand to evaluate as control sites. Photographs taken by our remotely-triggered cameras will be archived and species photographed identified using the Wildlife Insights online platform. Fisher detection data will be

analyzed in an occupancy framework to evaluate variation in fisher space use between pre- and post-treatment and control sites (Mackenzie et al. 2006).

We will estimate fisher density using non-invasive, genetic-based survey techniques and spatial-capture recapture analyses (Green et al. 2018, 2022) to estimate the short-term, population-level effects of fuels treatments and wildfire on fishers. We will implement non-invasive genetic survey methods at 100 sites that have been surveyed annually within a 46,500-ha area in and adjacent to the contemporary fuels-reduction project area. Surveys will occur for six consecutive weeks using established monitoring techniques (Green et al. 2018). Sites will be spaced 1.3 ± 0.4 km (mean ± SD) apart and consist of a box made of corrugated plastic (Zielinski et al. 2006) baited with a raw chicken leg and a can of wet cat-food. The back of the box will be closed with ½ inch (1.3 cm) galvanized hardware cloth and the front will be partially obstructed with three wooden slats (Zielinski et al. 2006). We will attach a strip of non-poisonous glue-board to the underside of the bottom wooden slat so that mammals coming into the box leave hair with follicles attached to the glue strip to be used for genetic analyses. DNA will be extracted from hair samples at the U.S. Forest Service National Genomics Center for Wildlife and Fish Conservation. All hair samples will be identified to species and samples identified as fisher will be subsequently genotyped to identify individual fishers (Tucker et al. 2014). We will estimate fisher population density pre- and post-treatment and pre- and post-wildfire with a spatial Jolly-Seber open population model (Jolly 1965, Seber 1965). Jolly-Seber models fit with spatial capture-recapture data integrate the movements of individuals to provide spatially-explicit estimates of population density, as well as estimates of apparent survival and recruitment (Gardner et al. 2010, Royle et al. 2014).

Scientific Uncertainty and Geographic Application

The California Forest Practice Act calls for the production of high-quality timber products in diverse and healthy forests by maintaining biological diversity and watershed integrity and reducing adverse cumulative impacts. A changing climate and shifts in fire-behavior patterns have introduced additional levels of uncertainty to achieving the goals of the Act. Increasingly severe wildfires threaten the persistence of wildlife species that require a mosaic of forest conditions, including late-seral stands with large trees and multilayered canopies (Jones et al. 2016, Steel et al. 2023). Although the predominant adaptation strategy implemented to reduce severe wildfire is proactive fuels management, concerns have arisen over the potential effects of fuels management and resulting reductions in forest complexity as a risk to the persistence of forest-dependent species (Jones et al. 2022, Wright et al. 2023). Our proposed project will provide decision support for managers weighing the potential short-term tradeoffs among fuels-reduction activities, wildfire severity, post-fire management, and the persistence of a forest-dependent mammal of conservation concern.

Our project will provide empirically-supported results and reduce uncertainty for the management of the 4,779,100 ha of forest in the Klamath Siskiyou Ecoregion, a majority of which is occupied by fishers. Additionally, our results will provide insights for the management of approximately 1,607,047 ha of forests occupied by fishers in the northern and southern Sierra Nevada of California.

Collaborations and Project Feasibility

Our proposed project is supported by a diverse group of private and public partners and stakeholders. FWS Forestry, Klamath National Forest, and the Shasta Valley Resource Conservation District in coordination with Siskiyou County and CAL FIRE are implementing the 1,002-ha McKinley Scott Fuels

Reduction Project across private timberlands and adjacent National Forest ownerships. FWS Forestry provides forest operations management for 176,038 ha in northern California and is working closely with the Klamath National Forest to implement strategic fuels reduction projects within the ownership matrix of the Oregon and California Railroad Revested (O&C) Lands in northern California. Oregon State University is collaborating with the Quartz Valley Indian Reservation Natural Resources Department, the U.S. Fish and Wildlife Service, and the McKinley Scott Fuels Reduction Project partners to monitor changes in fisher space use and density following fuels treatments and the 2022 McKinney Fire. Our diverse partnership is ensuring the successful completion of the McKinley Scott Fuels Reduction Project and post-project evaluation of fuels management and wildlife conservation objectives.

Literature Cited Available Upon Request

Critical Question Themes and Forest Practice Rules Addressed:

Theme 6: Wildfire Hazard

- *6c: Are the FPRs and associated regulations effective in managing fuel loads, vegetation patterns and fuel breaks for fire hazard reduction?
- 6f: Are the FPRs and associated regulations effective in mitigating or reducing the cumulative impacts of post-fire recovery and management actions in affected watersheds?
- 14 CCR § 1051.3 Modified THP for Fuel Hazard Reduction
- 14 CCR § 1038; Exemption
- 14 CCR § 1052 Emergency Notice

Theme 9: Wildlife Habitat – Cumulative Impacts

- 9a: Are the FPRs and associated regulations effective in protecting wildlife habitat and associated ecological processes?
- 9b: Are the FPRs and associated regulations effective in avoiding significant adverse impacts to wildlife species?
- 14 CCR § 919, 939, 959; Wildlife Practice

Theme 12: Resilience to Disturbance in a Changing Climate

- 12c: Are the FPRs and associated regulations effective in meeting ecological objectives and adaptation to future climate?
- 14 CCR § 897 Implementation of Act Intent

*Priority thematic question for fiscal year 2024/25.

Requested Funding:

Our proposed project will be conducted between 1 January 2025 and 31 March 2027. We will prepare for field work, meet with project partners, hire temporary field staff, and purchase and prepare field supplies in FY2024/2025. We will survey for fishers and conduct data analyses in FY2025/2026. We will survey for fishers, conduct data analyses, and complete project reporting in FY2026/2027.

	FY2024/2025	FY2025/2026	FY2026/2027	Total
Salary	62,105	113,094	116,431	285,879
Benefits	39,747	50,274	51,746	138,086
Supplies	10,850	6,610	6,610	24,070
Travel	0	47,488	55,648	103,135
Genetic Analyses	0	19,000	19,000	38,000
Indirect Costs (15%)	16,905	35,470	37,415	89,790
Total	**129,608**	**271,935**	**286,850**	**688,393**

Salaries and benefit costs represent two research scientists, two faculty research assistants, and three temporary field crew members. Supplies include 25 remotely-triggered cameras, a laptop computer, and general field supplies needed to collect hair samples and maintain remote cameras. Travel includes the rental, fuel, and maintenance of three field vehicles, field crew housing at the study area, travel to the field site, and travel to present results to partners. Genetic analyses will be conducted by the National Genomics Center for Wildlife and Fish Conservation. Indirect costs are calculated as 15% of direct costs.