U.S. Fish & Wildlife Service

Recovery Outline for the Southern Sierra Nevada Distinct Population Segment of Fisher (Pekania pennanti)

Photo Credit: Emerson Paton, Kings River Fisher Project, Pacific Southwest Research Station, US Forest Service

Common Name:	Fisher, Southern Sierra Nevada Distinct Population Segment
Scientific Name:	*Pekania pennanti*
Recovery Priority Number	6c; southern Sierra Nevada fisher is a distinct population segment (DPS) with a high degree of threat and low recovery potential (explanation provided below)
Listing Status:	Endangered; final rule May 15, 2020 (85 FR 29532)

Critical Habitat Designation:	To be designated at a future time[1]
Lead Region:	U.S. Fish and Wildlife Service Pacific Southwest Region
Lead Field Office:	Sacramento Fish and Wildlife Office 2800 Cottage Way, Room W-2605 (916) 414-6600
Cooperating Field Office:	Reno Fish and Wildlife Office
Lead Contact:	Sarah Markegard, Acting Division Chief, Listing and Recovery Division, U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office; Sarah_markegard@fws.gov
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Date: 2020.06.16 17:16:46 -07'00'

[1] In the 2019 Revised Proposed Rule (84 FR 60278, November 7, 2019), the Service determined that designation of critical habitat was prudent but not determinable because specific information needed to analyze the impacts of designation was lacking. We are still in the process of assessing this information. We plan to publish a proposed rule to designate critical habitat for the southern Sierra Nevada DPS of fisher in the near future.

Purpose of the Recovery Outline: This document lays out a preliminary course of action for the survival and recovery of the southern Sierra Nevada Distinct Population Segment (DPS) of fisher (*Pekania pennanti*). It is meant to serve as interim guidance to direct recovery efforts and inform consultation and permitting activities until a comprehensive draft recovery plan has been completed. Recovery outlines are intended primarily for internal use by the U.S. Fish and Wildlife Service (Service) and formal public participation will be invited upon the release of the draft recovery plan. However, we will consider any new information or comments that members of the public offer in response to this outline during the recovery planning process. For more information on Federal recovery efforts for *P. pennanti*, or to provide additional comments, interested parties may contact the lead field office, Sacramento Fish and Wildlife Office, for this species at the above address and telephone number.

1. BACKGROUND

The proposed, revised proposed, and final listing rules (79 FR 60419, October 7, 2014 [Service 2014]; 84 FR 60278, November 7, 2019 [Service 2019]; 85 FR 29532, May 15, 2020 [Service 2020], respectively) for the southern Sierra Nevada DPS of fisher, provide detailed background information on the listing history of fisher (including previous DPS designations), as well as more in-depth information regarding the species biology, ecology, and threats. Additional documents detailing species information are identified below.

1.1 Type and Quality of Available Information to Date

1.1.1 Summary

- Southern Sierra Nevada Fisher Conservation Assessment (Spencer et al. 2015);
- 2016 Final Species Report, Fisher (*Pekania pennanti*) (Service 2016);
- Southern Sierra Nevada Fisher Conservation Strategy (Spencer et al. 2016);
- Southern Sierra Nevada Fisher Conservation Strategy Interim Recommendations (Thompson et al. 2020); and
- Numerous peer-reviewed research publications incorporated into and/or referenced by the above documents.

1.1.2 Important Information Gaps

There are a number of areas where information on the DPS likely is outdated or is otherwise unknown. These are identified below:

- Lack of recent population estimates (size, occupancy, survival, recruitment, trends), specifically after the substantial habitat changes from the 2012-2015 drought, insect infestation, and wildfire. These effects may have caused population declines since the most recent years for which estimates are available. While studies have been initiated to address this gap, it currently is unknown how occupancy and survival of the DPS have changed in response to changes in their habitat.

- Climate change likely will increase tree mortality events in the future because drought conditions will increase, resulting in weakened trees and increased susceptibility to the negative effects of bark beetles and disease. It is unknown how frequently such events will occur and what the effect to fisher will be.
- It is unknown if the current level of habitat loss will significantly impact the DPS throughout its range, and it is uncertain how patches of suitable habitat are connected across the changing landscape.
- Limited data on how habitat changes associated with drought, forest insects, disease and fire influence habitat use of fisher predator species and whether predation rates on fisher will increase.
- The extent to which the use of toxicants occurs on illegal private marijuana grow sites within the range of the DPS, as well as other agricultural, commercial, and public land sites within the range, is unknown.
- The toxicant exposure rate of live fishers is unknown because data on exposure comes predominantly from deceased individuals.

1.1.3 Treatment of Uncertainties

Currently there is uncertainty regarding the degree to which wildfire affects fisher populations, how fishers will utilize the new spatial configuration of their habitat, and how effects differ depending on forest type, landscape location, patch configuration, and intensity of the wildfire. There are uncertainties in how to manage and restore the existing habitat so fisher can effectively move between the remaining suitable habitat patches. There is also uncertainty in understanding the magnitude of effects from vegetation management activities, as it likely depends on the amount of habitat treated each year. Vegetation management effects will depend on the spatial distribution of activities and whether structural elements important to fishers are maintained. Together, these uncertainties are likely to create challenges for managers seeking to implement vegetation management and fuels reduction projects, either for the benefit of general forest health, or for the improvement of fisher habitat.

1.2 Brief Life History

Species description and life history of the southern Sierra Nevada DPS of fisher are summarized in the final listing rule (Service 2020) and detailed in the final Species Report (Service 2016) as well as the Conservation Assessment (Spencer et al. 2016). The southern Sierra Nevada DPS of fisher is one of two DPSs on the west coast of North America and represents the southern-most range of the species. Currently the DPS occurs from the Tuolumne River in Yosemite National Park south through the forested lands abutting the Kern River Canyon. The eastern limit is the high-elevation, granite-dominated mountains of the Sierras, while the western boundary of the range is the low elevation extent of mixed conifer forests. Historically, the DPS likely extended north of their current occupied range but may have contracted due to unregulated trapping, predator-control efforts, habitat loss and fragmentation, and/or climatic changes; however, genetics indicate this DPS has been isolated from other populations since prior to European settlement. Fisher habitat in the southern Sierra Nevada consists of core

habitat areas separated primarily by major river canyons, across which fishers may occasionally disperse via linkage areas (Spencer et al. 2016). Primary habitat for the southern Sierra Nevada DPS of fisher consists primarily of dense, mature mixed-conifer and ponderosa pine forests that support many large trees and do not accumulate as much deep or persistent snow as higher elevations; individuals occupy distinct but sometimes overlapping home ranges. Areas with moderate or greater canopy cover, denning trees and resting sites, adequate prey availability, and protection from predators are necessary to support the species' life history.

1.3 Limiting Life History Characteristics

Aspects of the southern Sierra Nevada DPS of fisher biology that limit its recovery potential include low reproductive rate, small litter size, and limited dispersal distance, as well as habitat requirements for denning. These are described in detail in the Conservation Assessment (Spencer et al. 2015), the Conservation Strategy (Spencer et al. 2016), and Final Species Report (Service 2016) and summarized below.

The southern Sierra Nevada DPS of fisher has the lowest average litter size reported for the species (1.4 pups), and it takes two or more years for individuals to reach reproductive maturity. The average lifespan is approximately six to seven years, equating to an approximate maximum of five litters over an individual female's life. Fishers have large home ranges relative to their body size (up to 21,295.51 acres on average for adult males and up to 5,666.12 acres on average for adult females); however, for their size, fishers are relatively poor dispersers. Female dispersal is more limited than that of males and genetics studies suggest that female movement between core habitat areas is rare. As a result, (re) colonization of suitable habitat is likely to be slow. Fishers also require specific habitat features (e.g., snags with cavities suitable for natal and maternal dens) in order to support reproduction and rearing of kits, and these features are limited across the landscape.

1.4 Primary Threats

The major threats for the southern Sierra Nevada DPS of fisher are loss and fragmentation of habitat resulting from climate change, high-severity wildfire and wildfire-suppression activities, vegetation management, and forest insects and tree diseases, as well as direct impacts that include high mortality rates from predation, exposure to toxicants, and potential effects associated with small population size. Reduced availability of prey due to habitat loss is also considered a potential threat to the species.

1.5 Current Biological Status of the Species

1.5.1 Overview

The southern Sierra Nevada DPS of fisher is small and geographically separated from the remainder of the species. While genetics indicate the population has persisted in isolation since prior to European settlement, the DPS has recently experienced substantial loss of

habitat and an increase in habitat fragmentation following the 2012-2015 drought. This period of drought and associated insect infestation, fire, and tree mortality has resulted in a 39 percent decline in foraging and denning habitat within a period of five years. The remaining habitat is much more fragmented and the average patch size of remaining habitat is 92 percent smaller than prior to the drought (Thompson et al. 2020).

As acknowledged in the "Information Gaps" section, above, no information is currently available on population size or occupancy since the drought. Prior to the drought, the most recent population estimate was as low as 100 and as high as 500 individuals, and occupancy patterns showed no declining trends. However, it is anticipated that the drought-related effects to habitat have or will have a negative impact on the DPS's population, occupancy, survivorship, and recruitment.

1.5.2 3 Rs

The Service's Final Rule for the southern Sierra Nevada DPS of fisher describes the current and anticipated resiliency, representation, and redundancy (3 Rs) of the DPS (Service 2020). This information is summarized below.

1.5.2.1 Resiliency

The resiliency of a species' population(s) can be evaluated by population size and growth rate. While data on these parameters often are not readily available, inferences about resiliency can be drawn from other demographic and habitat measures. The population size and distribution of the Southern Sierra Nevada DPS is lower than historical levels because of fragmentation. While there is some evidence that the DPS may have persisted for some time at relatively low numbers, the DPS has recently experienced substantial losses in foraging and denning habitat, reductions in habitat patch size, and increases in habitat fragmentation as a result of drought. Reductions in resources and increased potential for inbreeding have resulted from continued habitat loss and fragmentation, as well as decreases in the long-term suitability of habitat (e.g., appropriate canopy cover, availability of denning trees) and sustained presence of toxicants from marijuana grow sites that result in mortalities and sublethal effects. The best available science and information at this time indicate that the current resiliency of the Southern Sierra Nevada DPS is low and will likely decrease further in the near future.

1.5.2.2 Representation

The current representation across the southern Sierra Nevada DPS of fisher is limited, considering the DPS's existence as a single fragmented population with low genetic diversity. The DPS exists in a limited range of environmental conditions and has narrow representation in the environments in which it occurs. An additional concern for current and future representation in the DPS is that fragmented populations can be more susceptible to local declines, contributing further to the loss of genetic diversity. As future droughts, wildfire, and tree mortality continue to fragment remaining fisher habitat, the loss of genetic diversity may increase because of limited connectivity among habitat patches. Overall, southern Sierra Nevada DPS fishers are represented across a small, fragmented range and occur in small numbers.

1.5.2.3 Redundancy
With regard to redundancy, multiple interacting populations across a broad geographic area or a single wide-ranging population provide insurance against the risk of extinction caused by catastrophic events. Prior to the 2012-2015 drought, redundancy was limited across the range of the southern Sierra Nevada DPS of fisher as a result of the DPS being a single fragmented population distributed over a relatively confined (for a carnivorous mammal) geographic area. Redundancy was further limited by the range-wide loss of foraging and denning habitat along with the associated increase in habitat fragmentation and decrease in habitat patch size, making the DPS more susceptible to catastrophic events by further limiting their distribution.

1.5.3 Conservation Actions to Date

No Candidate Conservation Agreements, Candidate Conservation Agreements with Assurances, or Habitat Conservation Plans exist or are in development within the range of the southern Sierra Nevada DPS of fisher; however, several Federal agencies have, and continue to support conservation actions directed at protecting the fisher and habitat for the DPS.

U.S. Forest Service

Approximately 39 percent of the range of the southern Sierra Nevada DPS of fisher occurs on National Forest Lands. The Forest Service has identified the southern Sierra Nevada DPS of fisher as a species of conservation concern; therefore, all Forest Plans within the DPS include Standards and Guidelines designed to benefit fisher, and, per the National Forest Management Act of 1976, as amended, planning rules must consider the maintenance of viable populations of species of conservation concern. In 2004, the Forest Service amended all Forest Plans within the range of the DPS. This amendment included a number of measures to retain and increase features that are characteristic of fisher habitat (e.g., late successional forest, large diameter snags). In addition, the amendment established an approximately 1.5 million-acre Southern Sierra Fisher Conservation Area, with additional requirements intended to maintain and expand the fisher population in the southern Sierra Nevada.

The Forest Service also has and continues to undertake a number of other actions to conserve fisher on National Forest Lands in the Southern Sierra Nevada. These actions include:

- Partnering with the Conservation Biology Institute to develop a Resilience Working Group to (1) develop resilience metrics and targets; (2) inform management to increase resilience and reduce the risk of fire and/or mortality; and (3) track resilience over time.
- Entering into a 2015 Memorandum of Understanding (MOU) with ten partners to increase the use of fire to meet ecological and other management objectives, including habitat restoration.
- Entering into a 2017 MOU with the California Department of Forestry and Fire Protection, the National Fish and Wildlife Foundation, and Sierra Pacific

Industries (SPI) to collaborate on conservation of California spotted owls and other wildlife while coordinating wildfire risk reduction measures on Federal, State, and SPI lands in the Sierra Nevada.
- Long-term monitoring of the fisher, including in the southern Sierra Nevada. Monitoring efforts include the Forest Service Region 5 Sierra Nevada Carnivore Monitoring Program: a program to detect potential fisher and marten population changes throughout National Forest Lands in the Sierra Nevada.
- Partnering with the Pacific Southwest Research Station and University of California, Berkeley to support the Sierra Nevada Adaptive Management Project fisher research (aka the Sugar Pine Fisher Project) and the Kings River Fisher Project.
- Conducting surveys to inform project planning and sharing collected data with partner agencies.

National Park Service

Approximately 14 percent of the range of the southern Sierra Nevada DPS of fisher overlaps lands managed by the National Park Service. Land management plans for National Parks within California do not currently contain specific measures to protect fishers; however, areas not developed specifically for recreation or camping are managed towards natural processes and species composition and are therefore anticipated to maintain existing fisher habitat.

In addition, two National Parks within the range of the southern Sierra Nevada DPS have and continue to undertake conservation activities for the fisher. These past and ongoing activities include:

- Ongoing forest carnivore research aimed at detecting fishers within the National Parks and collecting genetic information, including the use of hair snares, cameras, and track plate boxes.
- Past collaboration with the University of California Berkeley's Sierra Nevada Adaptive Management Project and the Forest Service Pacific Southwest Research Station on studies documenting fisher presence and habitat use in Yosemite National Park.
- Ongoing park-wide survey efforts to document northward fisher expansion in Yosemite National Park.
- Ongoing targeted fisher surveys in conjunction with park projects in both parks.
- Ongoing evaluation of conservation measures associated with project-specific activities to protect fisher and their habitat (e.g. retain important fisher structural elements for den and rest trees, consider road closures, limiting night-work, installing fisher-friendly culverts, etc.).
- Past implementation of nightly road closures in an area where an occupied maternal den was adjacent to a Park Service road to reduce the potential for vehicle strikes.

1.5.4 Recovery Priority Number

Recovery priority numbers are assigned to a species based on degree of threat, recovery potential, taxonomic status, and conflict with economic activity (Service 1983). The Southern Sierra Nevada DPS of fisher is recognized as a distinct population with a high degree of threat and low recovery potential resulting in a recovery priority number of 6c.

2 INTERIM RECOVERY PROGRAM

2.1 Interim Recovery Strategy

Recovery of the southern Sierra Nevada DPS of fisher will require long-term commitment and collaboration to conserve and appropriately manage suitable habitat to carry out all life history needs, including to conserve and restore linkage areas that are critical for dispersal and expansion of the DPS into its historical range. In addition, research to gain a better understanding of the population status and trends, demographic rates, and habitat use of the DPS in the years since the 2012-2015 drought, as well as future climate- and disease-driven habitat changes, are necessary in order to understand the DPS's population-level responses to these impacts and to inform adaptive management and recovery approaches, such as the creation of translocation plans and standard monitoring methods.

2.2 Action Plan

As described previously, the greatest threats to the southern Sierra Nevada DPS of fisher stem from habitat loss and fragmentation. The Conservation Strategy (Spencer et al. 2016) and Conservation Strategy Interim Recommendations (Thompson et al. 2020) identify three broad-scale conservation goals that are critical for recovery of the DPS through the protection and restoration of habitat:

1. <u>Stabilize key habitat for the southern Sierra Nevada DPS of fisher</u>: The stabilization of key habitat (e.g., snags, logs, den sites, live trees) is critical for protecting important habitat for the DPS. This task requires the identification, retention, and creation of key fisher habitat elements at multiple spatial scales (e.g., microsites, clustered denning habitat) as well as active management to increase habitat resilience and protect it from future disturbances.

2. <u>Restore landscape permeability</u>: Restoration of landscape permeability is necessary to ensure that fishers can move between remnant patches of high-quality habitat as necessary to maintain population viability. In order to restore this permeability, an understanding of the types of habitat fishers are willing to use for dispersal is needed. Additionally, it will be necessary to identify management activities that can help restore the functionality of movement corridors where such functionality has been lost.

3. <u>Promote landscape heterogeneity</u>: Heterogeneity of landscapes at multiple scales has been shown to reduce the effect of ecological disturbances and to reduce the

risk of large-scale habitat loss. The promotion of landscape heterogeneity within fisher habitat is necessary to assist in ensuring long-term functionality.

In order to meet these broad-scale conservation goals, as well as to increase the resiliency, redundancy, and representation of the southern Sierra Nevada DPS of fisher, a number of priority actions must be implemented, including: habitat conservation and restoration; collection of current data on population trends, habitat suitability (including availability of prey), occupancy, habitat use, and responses to disturbance and climatic events; and evaluation of whether translocation or other population interventions are warranted. While habitat conservation and restoration to promote the heterogeneity of forest conditions and increase the resiliency of fisher habitat are long-term efforts, such actions should be initiated immediately in order to maximize their impact. Additionally, implementation of land management approaches that utilize methods to minimize effects to fisher are critical to ensuring that ongoing activities on Federal lands within the range of the DPS adversely impact the population to the lowest extent possible.

The Conservation Strategy (Spencer et al. 2016) and Conservation Strategy Interim Recommendations (Thompson et al. 2020) identify priority actions for conservation and recovery of the DPS. These actions are identified below. The Forest Service and National Park Service, participatory agencies in the Conservation Strategy, have already initiated implementation of numerous aspects of the Strategy, including many of the land management approaches described in this recovery outline.

2.2.1 Land Management

- Use guidance detailed in the Conservation Strategy and Interim Recommendations to implement land management activities common within the range of the DPS in a manner that reduces adverse effects to fisher. The guidance in these documents on project design and timing activities, including fuelbreak placement, hazard tree removal, and salvage logging, is aimed at minimizing additional fragmentation of habitat, removal of key habitat features such as denning trees, and disturbance of mothers and kits during the critical maternal denning season.

2.2.2 Research Needs

<u>General Habitat Information</u>

- Research and model the most appropriate metrics of habitat resiliency and fire risk to allow the tracking of progress towards resiliency goals and to inform management decisions regarding use of wildfire and prescribed fires.
- Develop a statistical tool that predicts changes in flame lengths or other appropriate metrics of habitat resiliency as a result of changing habitat conditions.
- Develop statistical equations or cross-walk tables to convert between differing approaches to measuring canopy cover.

- Investigate fire behavior and effects on vegetation in different arrangements of fuels, such as open versus closed canopies or stands or differing spatial heterogeneity.
- Develop and implement a predictive model of trespass marijuana grow site probability on the landscape in order to aid law enforcement and remediation efforts in fisher habitat.

Habitat Management

- Conduct studies to inform where vegetation treatments may warrant prioritization due to benefits to fisher habitat and where such treatments may need to be avoided due to high risk of significant adverse effects to fishers.
- Conduct studies to inform approaches to vegetation treatments in fisher habitat in order to maximize benefits to the DPS and minimize adverse impacts.
- Conduct studies to determine how denning fishers are affected by disturbance factors as a function of distance.

Population Status and Trends

- Determine the primary mortality factors, their relative magnitudes, and identify potential mitigation measures.
- Determine what factors are limiting the size of the DPS and its potential for expansion.
- Research climate change impacts on vegetation and fishers, and assess and refine potential climate adaptation measures.

Fisher Habitat Use

- Conduct a telemetry study of female fishers in the Kern Plateau area to measure home range and habitat use, and use the results of this study to develop or refine a specific habitat model and principal component analysis of home range composition, which can then be applied to develop conservation targets for use in management.
- Analyze habitat conditions that appear resilient and support breeding females in order to refine the desired conditions and conservation measures described in the Conservation Strategy (Spencer et al. 2016).
- Research fisher use of post-fire habitats, including relative use by fishers of different burn-severity classes and areas subject to post-fire management actions (e.g., salvage logging, planting).
- Use a spatially-explicit model to analyze the sensitivity of the DPS to changes in habitat value under alternative management and disturbance scenarios, the potential rate of population expansion into currently unoccupied areas, and other relevant questions.

2.2.3 Monitoring and Adaptive Management

- Develop a Fisher Monitoring and Adaptive Management Plan to achieve the goals identified in the Conservation Strategy. The monitoring plan should include, at minimum, the following components:

    - Fisher habitat monitoring, including trends in suitability status
    - Habitat resiliency monitoring, including trends in resiliency
    - Continue fisher population monitoring to track occupancy patterns and responses to habitat conservation efforts.
    - Fisher genetics monitoring to assess changes in genetic diversity, genetic connectivity, and dispersal, and to improve the accuracy of existing analyses by collecting samples from the entire range of the DPS.
- Develop regular and comprehensive vegetation map layers to inform the implementation of the fisher monitoring program and other recovery actions.
- Update and track modeled resting, denning, and foraging habitat.
- Implement project-specific effects and effectiveness monitoring so that future land management decisions can be informed by the results of previous decisions.

2.2.4 Mortality Factor Management

- Implement the Conservation Strategy and Interim Recommendations mitigation measures to reduce fisher mortalities from (1) pesticide poisoning as a result of trespass marijuana grows; (2) increased predator presence; (3) disease and infection; (4) vehicle strikes; and (5) human development and infrastructure.

2.2.5 Prey Management

- Implement habitat management recommendations to help increase populations of squirrels, woodrats, and other important prey species.
- Conduct research and monitoring to determine the presence/absence, and abundance of porcupines (a potentially important prey species) within the range of the DPS.
- Determine whether a porcupine management program, potentially including reintroduction or population supplementation, is warranted to benefit the DPS.

2.2.6 Population Intervention for Conservation and Recovery

- Develop a Translocation Plan to establish when and how population interventions are warranted based on identified intervention triggers, and how interventions will be implemented.
    - Evaluate the likely genetic and demographic effects of removing individuals from existing sub-populations.
    - Maximize potential success of establishing a breeding population north of the Merced River while minimizing potential harm to the existing population.
    - Consider the distribution of mortality factors, such as the known or inferred density and distribution of trespass marijuana grow sites and fisher predators (e.g., cougar, bobcat, coyote).
- Maintain awareness of opportunities for translocation of orphan kits following the death of a denning female.

- Consider additional or assisted dispersal across Yosemite Valley, if natural colonization is not documented by 2030.
- Consider the development of vaccination programs in the event of a significant disease-related mortality event, particularly targeted efforts to arrest the spread of an epizootic.
- In the event of extraordinary population decline, consider captive breeding.

3 REFERENCES

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