DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R8–ES–2018–0105; 4500030113]

RIN 1018–BD85

Retitle

Endangered and Threatened Wildlife and Plants; Threatened Species Status for West Coast Distinct Population Segment of Fisher With Section 4(d) Rule

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), determine threatened species status under the Endangered Species Act (Act), as amended, for the West Coast Distinct Population Segment (DPS) of fisher (*Pekania pennanti*) as a threatened species under the Endangered Species Act (Act). This DPS occurs in California and Oregon. The effect of this regulation will be to add this DPS to the List of Endangered and Threatened Wildlife. We also finalize a rule under the authority of section 4(d) of the Act that provides measures that are necessary and advisable to provide for the conservation of this species.

DATES: This rule becomes effective [insert date 30 days after date of publication in the FEDERAL REGISTER].

ADDRESSES: This final rule is available on the internet at http://www.regulations.gov in Docket No. FWS–R8–ES–2018–0105 and at https://www.fws.gov/Yreka. Comments and materials we received, as well as supporting documentation we used in preparing this rule, are available for public inspection at http:// www.regulations.gov. Comments, materials, and documentation that we considered in this rulemaking will be available by appointment, during normal business hours at: U.S. Fish and Wildlife Service, Yreka Fish and Wildlife Office, 1829 South Oregon Street, Yreka, CA 96097; telephone 530–842–5763.

FOR FURTHER INFORMATION CONTACT: Jenny Ericson, Field Supervisor, Yreka Fish and Wildlife Office, telephone: 530–842–5763. Persons who use a telecommunications device for the deaf may call the Federal Relay Service at 1–800–877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Act, if we determine that a species may be an endangered or threatened species throughout all or a significant portion of its range, we are required to promptly publish a proposal in the *Federal Register* and make a determination on our proposal within 1 year. To the maximum extent prudent and determinable, we must designate critical habitat for any species that we determine to be an endangered or threatened species under the Act. Listing a species as an endangered or threatened species and designation of critical habitat can only be completed by issuing a rule.

What this document does. This rule will add the Southern Sierra Nevada DPS of fisher (*Pekania pennanti*) (SSN DPS) as an endangered species to the List of Endangered and Threatened Wildlife in title 50 of the Code of Federal Regulations at 50 CFR 17.11(h).

The basis for our action. Under the Act, we may determine that a species is an endangered or threatened species based on any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. We identified multiple threats under various factors that are acting on, and will continue to act on the SSN DPS, the full list of which can be found in our final Species Report 2016 (Service 2016, entire). Of particular significance regarding implications for the DPS's status were loss and fragmentation of habitat resulting from high-severity wildfire and wildfire suppression (i.e., loss of snags and other large habitat structures on which the species relies, which are removed for human safety concerns), climate change, and tree mortality from drought, disease, and insect infestations. Also of significance were threats related to potential direct impacts to individual fishers (e.g., increased mortality, decreased reproductive rates, increased stress/hormone levels, alterations in behavioral patterns), including wildfire, increased temperatures resulting from climate change, disease and predation, exposure to toxicants, collisions with vehicles, and potential effects associated with small population size. These factors are resulting in a cumulative effect to such a degree that the best available information indicates the Southern Sierra Nevada DPS of fisher meets the definition of an endangered species.

Peer review and public comment. We sought comments from independent specialists to ensure that our consideration of the status of the species is based on scientifically sound data, assumptions, and analyses. As directed by the Service's Peer Review Policy dated July 1, 1994 (59 FR 34270) and a memo updating the peer review policy for listing and recovery actions (August 22, 2016), we invited these peer reviewers to comment on both the draft SSA report and our listing proposal. We also considered all comments and information received during three public comment periods (and one extension) for the 2014 Proposed Rule (79 FR 60419, 79 FR 76950, 80 FR 19953, 84 FR 644) and two comment periods for the 2019 Revised Proposed Rule (84 FR 60278, 84 FR 69712). All comments received during the peer review process and the public comment periods have either been incorporated in the final Species Report (Service 2016, entire), throughout this rule, or addressed in the Summary of Comments and Recommendations section.

Previous Federal Actions

We first found the West Coast DPS of fisher (previously delineated as a contiguous area encompassing parts of the three States of Washington, Oregon, and California) to be warranted for listing in 2004 and each subsequent year in the annual Candidate Notice of Review. On October 7, 2014, we proposed to list the West Coast DPS of fisher as a threatened species under the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 *et seq.*) (79 FR 60419; Docket No. FWS–R8–ES–2014–0041) (hereafter referred to as 2014 Proposed Rule). On April 18, 2016, we withdrew the proposed rule to list the West Coast DPS of fisher (81 FR 22710), concluding that the potential threats (stressors) acting upon the DPS were not of sufficient imminence, intensity, or magnitude to indicate that they were singly or cumulatively resulting in significant impacts at either the population or rangewide scales.

On October 19, 2016, the Center for Biological Diversity, Environmental Protection Information Center, Klamath-Siskiyou Wildlands Center, and Sierra Forest Legacy filed a complaint for declaratory and injunctive relief, alleging that our determination on the West Coast DPS of fisher violated the Act. By Order Re: Summary Judgment issued on September 21, 2018, the District Court for the Northern District of California vacated the listing withdrawal and remanded the Service's final determination for reconsideration. The Court's amended order, dated November 20, 2018, directs the Service to prepare a new determination by September 21, 2019.

On January 31, 2019, we reopened the comment period on the October 7, 2014, proposed rule to list the West Coast DPS of fisher as a threatened species (84 FR 644).

On May 17, 2019, the District Court for the Northern District of California granted a request by the Service for a 35-day extension to comply with the November 20, 2018, order as a result of delays due to the Federal Government's lapse in appropriations that prohibited the Service from working on this determination. The Court's amended order directed the Service to submit for publication a final listing determination or notice of a revised proposed rule by October 26, 2019, and in the event of publishing a revised proposed rule, submit for publication a final listing determination by April 25, 2020.

On November 7, 2019, we published a revised proposed rule to list the West Coast DPS of fisher (84 FR 60278) (hereafter referred to as 2019 Revised Proposed Rule). In the 2019

Revised Proposed Rule, we evaluated new information available since 2014 and reconsidered the best available information already in our files (including all peer, partner, and public comments received during previous comment periods as well as the two recent comment periods on the 2019 Revised Proposed Rule). In the 2019 Revised Proposed Rule, we concluded that the West Coast DPS of fisher continued to meet the definition of a threatened species based on cumulative effects associated with multiple threats across the DPS's range.

Additional information on Federal actions concerning the West Coast DPS of fisher prior to October 7, 2014, is outlined in the 2014 Proposed Rule (October 7, 2014, 79 FR 60419).

Summary of Changes from the 2019 Revised Proposed Rule

In this final listing rule, we incorporate additional information regarding the fishers, their habitat, and threats potentially impacting the species or its habitat (e.g., new information received during the open comment periods), and we further revise our approach to implementing the DPS policy with regard to fishers. Specifically, in the 2019 revised proposed rule, we presented our delineation of the DPS for West Coast populations of fishers that was revised from the 2014 proposed rule. This revised delineation identified the West Coast DPS as comprising the two extant historically native populations, Northern California/Southern Oregon (NCSO) and Southern Sierra Nevada (SSN), as well as the Northern Sierra Nevada (NSN) and Southern Oregon Cascades (SOC) subpopulations that resulted from reintroductions within a portion of the historical range of the DPS. These four groups of individuals occur geographically in essentially two groupings: NCSO (including NSN and SOC subpopulations) and the wholly separate SSN population.

In the 2014 proposed rule, we explained that the DPS we proposed to list included all the fisher populations in the three western States (WA, OR, CA) known to be extant at that time. Thus, the DPS included the fisher populations in NCSO, SOC, NSN, SSN, and Olympic National Park (ONP) in Washington. Both the ONP and SOC populations were established with fishers translocated from areas outside the three western States, e.g., British Columbia, Alberta, and Minnesota; the NCSO and SSN populations were existing populations historically indigenous to this three-State area, and NSN was established with fishers translocated from the NCSO source population.

However, we also included a discussion of potential alternative DPS configurations in the 2014 rule, and we requested public comment and peer review on the two alternative DPS configurations.

DPS Alternative 1 consisted of a single DPS encompassing the extant populations with unique genetic characteristics in California and southern Oregon (i.e., NCSO, NSN, and SSN). Alternative 1 focused on conservation of known fishers indigenous to this California and southern Oregon region, and it excluded all reintroduced populations established with non-California/Oregon fishers (i.e., SOC and ONP). In addition, Alternative 1 excluded areas to the north of NCSO where subpopulations of historically indigenous fishers were likely extirpated. It included both SSN and NCSO (which includes NSN), which each have unique genetic characteristics; this inclusion would allow for management of both these native populations as a single DPS. In addition, this would allow for recovery efforts throughout the historical range in California and southern Oregon.

DPS Alternative 2 consisted of two narrowly drawn DPSs around the extant populations with unique genetic characteristics in California and southern Oregon (i.e., NCSO with NSN, and SSN). This alternative also focused on conservation of known fishers indigenous to this California and southern Oregon region with unique genetic characteristics, and it excluded all reintroduced populations (i.e., SOC and ONP) established with non-California/Oregon fishers. This Alternative excluded the areas to the north of NCSO where fisher populations were likely extirpated; it included both NCSO (which includes NSN) and SSN populations, which each have unique genetic characteristics; and it allowed for management of the populations as separate DPSs, recognizing the unique genetic characteristics within each population. In addition, if the magnitude of threats was found to be different in the two DPSs, this would allow for different management for each DPS with regard to recovery.

We received multiple comments on our DPS approach in the 2014 proposed rule. These comments spanned a broad range of responses from support for the full three-State DPS to support for each of the possible Alternatives to support for other configurations. The basis for the commenters' positions was equally varied; these positions ranged from supporting differing genetics between populations to supporting the need for different management considerations. After consideration of all of these comments, we moved forward with a modified Alternative 1 in the 2019 revised proposed rule, with the exception that we included SOC in the DPS (as part of NCSO). In the 2019 revised proposed rule, we did not specifically state that the DPS was based on focusing on conservation of the extant populations with unique genetic characteristics, but we did explain that the DPS was centered on what we called the "historically native" subpopulations (i.e., those subpopulations of known fishers indigenous to the California and southern Oregon region with unique genetic characteristics) and included SOC because of the recent interbreeding with indigenous NCSO fishers.

We also received numerous comments regarding DPS in our 2019 revised proposed rule, both during the initial 30-day comment period and in the subsequent 15-day comment period. Similar to the comments received on the 2014 proposed rule, the comments received on the 2019 revised proposed rule expressed support for a wide range of DPS approaches. Various commenters suggested reverting back to the three-State DPS (i.e., include Washington State again), making all populations (NCSO, SSN, NSN, and SOC) individual DPSs, having two separate DPSs as in Alternative 2, and not including SOC in any DPS configuration.

While the comments presented a broad range of positions regarding DPS approaches, there was also a relatively consistent theme regarding management considerations. Many comments pointed to a concept we presented in the 2014 proposed rule which outlined alternative DPSs based on recognizing the unique genetic characteristics within each population and allowing for separate management of the two population segments (NCSO [including NSN and SOC] and SSN).

In light of the numerous comments received during multiple comment periods over the last five years recommending we re-examine our DPS configuration, we re-evaluated our DPS approach. We determined that the most appropriate path forward was to evaluate the two population segments (1. NCSO [including NSN and SOC] and 2. SSN) as individual DPSs (similar to Alternative 2 in the 2014 proposed rule). For each population segment, if both the discreteness and significance criteria were met, we then evaluated the status for that individual DPS. We determined our analysis would focus on the conservation of extant populations historically indigenous to the California and southern Oregon region with unique genetic characteristics (as outlined in the 2014 proposed rule) while also allowing for separate management of the two DPSs if either or both were warranted for listing. The concept of the possible need for different management between the two DPSs was further strengthened, in part, by the recent limited introduction of non-California/Oregon fisher genes into the NCSO population via interbreeding between NCSO and SOC fishers. We have now determined that the singular West Coast DPS configuration should instead be two separate DPSs: the NCSO DPS and the SSN DPS.

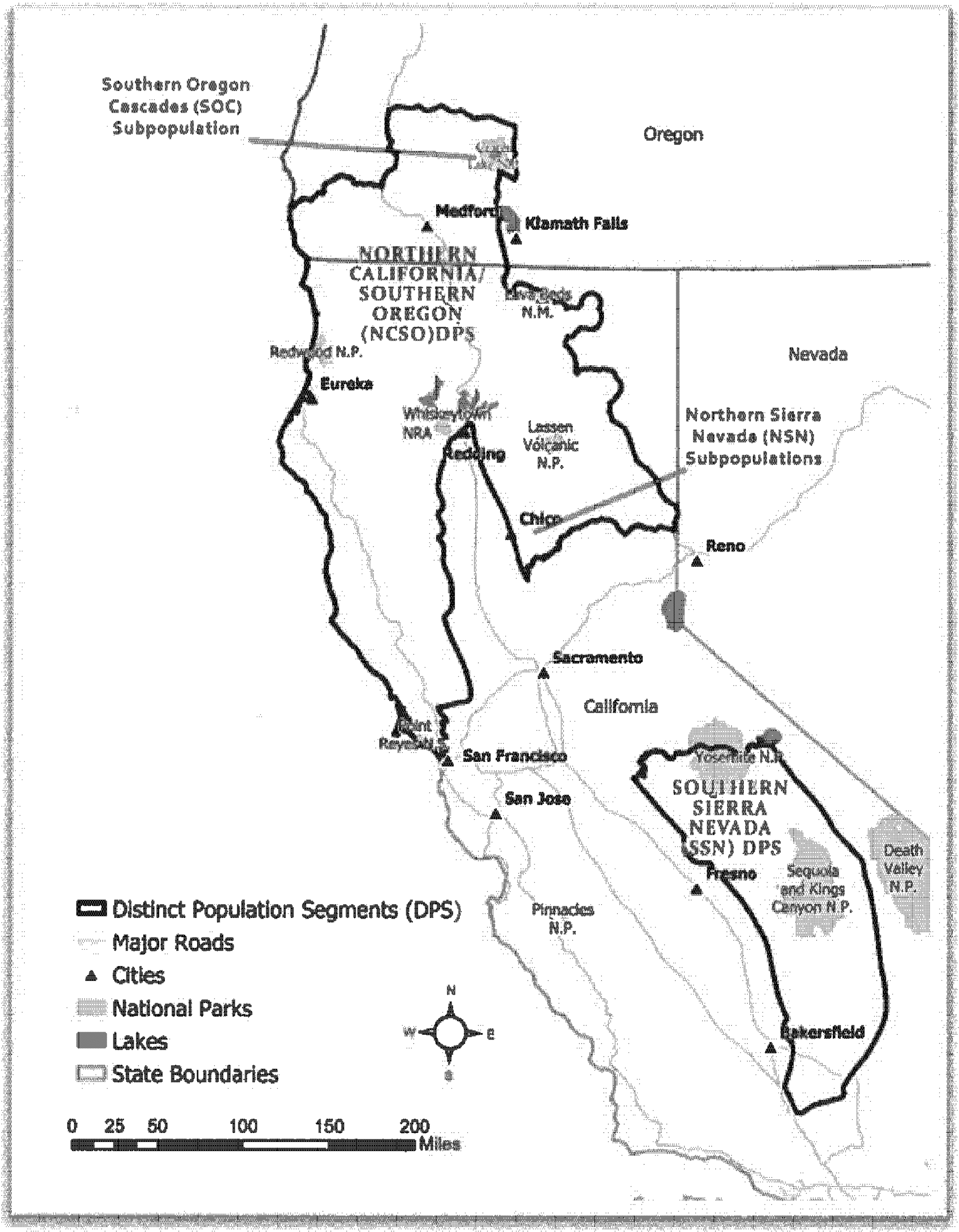

Figure 1. Distinct population segments (DPSs) and subpopulations of fisher in California and Oregon.

We believe this approach is a logical outgrowth from our previous proposed rules for the following reasons:

First, our 2014 proposed rule outlined various DPS Alternatives for consideration. One of these alternatives was Alternative 2 that consisted of two narrowly drawn DPSs around the extant populations with unique genetic characteristics in California and southern Oregon; Alternative 2 is extremely similar to the two DPS approach we use here. Therefore, the public has seen this approach presented before, was aware that we were considering it, and had an opportunity to provide comments on the approach.

Second, we outlined the uncertainty associated with our DPS approach in the 2014 proposed rule and alerted the public to this uncertainty. Specifically, p. 60441 of our 2014 proposed rule stated "We seek peer review and public comment on the uncertainties associated with the specific topics outlined above in the Information Requested section and in this Other Alternatives section. We envision that specific information from the peer reviewers and the public on the proposed DPS and the two alternatives will inform our final listing decision." In addition, our 2014 proposed rule explained to the public that the DPS approach in our final rule may differ from the proposed rule as a result of public comment. On p. 60438, we stated "Through peer review and public comment we may determine that the proposed DPS as set forth in this document is the most appropriate for fisher conservation. Alternatively, we could determine that one of the alternative DPSs set forth below would be most appropriate for the conservation of fisher. Therefore, any final listing determination may differ from this proposal."

Finally, our 2019 revised proposed rule also discussed how potential changes from the proposed rule to the final rule regarding status would constitute a logical outgrowth. On p. 60279, we stated "Because we will consider all comments and information received during the comment period, our final determination may differ from this proposed rule. Based on the new information we receive (and any comments on that new information), we may conclude that the species is endangered instead of threatened, or we may conclude that the species does not warrant listing as either an endangered or a threatened species. Such final decisions would be a logical outgrowth of this proposal as long as we: (1) Base the decisions on the best scientific and commercial data available after considering all of the relevant factors; (2) do not rely on factors Congress has not intended us to consider; and (3) articulate a rational connection between the facts found and the conclusions made, including why we changed our conclusion."

We believe that this DPS approach is made at the discretion of the Secretary as outlined in policy; the DPS policy "has instructed the Secretary to exercise this authority with regard to DPSs *** sparingly and only when the biological evidence indicates that such action is warranted (p. 4722)." Our 2014 proposed rule also discusses this discretion on p. 60438 where we state "...the range of a species may theoretically be divided into any of several potential configurations that may all meet the discreteness and significance criteria of our DPS policy. In the case of the fisher, we have identified smaller areas within the larger DPS boundary that would also potentially constitute a valid DPS, and that may warrant listing under the Act." Lastly, even though the DPS policy states that DPSs should be used sparingly, it qualifies this statement by adding "while encouraging the conservation of genetic diversity (p. 4725)." We believe that our DPS approach of evaluating the two fisher population segments (1. NCSO [including NSN and SOC] and 2. SSN) as separate DPSs encourages the conservation of genetic diversity by focusing on conserving extant native populations with unique genetic characteristics.

In the 2019 revised proposed rule, we proposed to list the West Coast DPS as a threatened species under the Act, and we also proposed a concurrent rule under section 4(d) of the Act for that DPS. We now add the SSN DPS as an endangered species to the List of Endangered and Threatened Wildlife, and we present our finding that the NCSO DPS does not warrant listing under the Act. In addition, new information has been added to this final rule that was not available for the 2014 Proposed Rule, the 2014 draft Species Report (Service 2014, entire), the 2016 final Species Report (Service 2016, entire), or the 2019 Revised Proposed Rule. We reviewed an extensive amount of new information available since 2016, some of which was included in the 2019 revised proposed rule, and all of which is available in the decisional record for this rule; however, we note that not all of this literature and other sources are cited within this final rule.

Distinct Population Segment Analysis

Under section 3(16) of the Act, we may consider for listing any species, including subspecies, of fish, wildlife, or plants, or any DPS of vertebrate fish or wildlife that interbreeds when mature (16 U.S.C. 1532(16)). Such entities are considered eligible for listing under the Act (and, therefore, are referred to as listable entities), should we determine that they meet the definition of an endangered or threatened species.

Under the Service's DPS Policy, three elements are considered in the decision concerning the determination and classification of a possible DPS as threatened or endangered. These elements include:

(1) The discreteness of a population in relation to the remainder of the species to which it belongs;

(2) The significance of the population segment to the species to which it belongs; and

(3) The population segment's conservation status in relation to the Act's standards for listing, delisting, or reclassification (i.e., is the population segment endangered or threatened).

A population segment of a vertebrate taxon may be considered discrete under the DPS policy if it satisfies either one of the following conditions:

(1) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.

(2) It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

If a population segment is considered discrete under one or more of the conditions described in the Service's DPS policy, its biological and ecological significance will be considered in light of Congressional guidance that the authority to list DPSs be used "sparingly" (see Senate Report 151, 96th Congress, 1st Session). In making this determination, we consider available scientific evidence of the DPS's importance to the taxon to which it belongs. Since precise circumstances are likely to vary considerably from case to case, the DPS policy does not describe all the classes of information that might be used in determining the biological and ecological importance of a discrete population. However, the DPS policy describes four possible classes of information that provide evidence of a population segment's biological and ecological importance to the taxon to which it belongs. As specified in the DPS policy (61 FR 4722, February 7, 1996), this consideration of the population segment's significance may include, but is not limited to, the following:

(1) Persistence of the DPS in an ecological setting unusual or unique to the taxon;

(2) Evidence that loss of the DPS would result in a significant gap in the range of a taxon;

(3) Evidence that the DPS represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historical range; or

(4) Evidence that the DPS differs markedly from other populations of the species in its genetic characteristics.

To be considered significant, a population segment needs to satisfy only one of these conditions, or other classes of information that might bear on the biological and ecological importance of a discrete population segment, as described in the DPS policy (61 FR 4722, February 7, 1996). Below, we summarize discreteness and significance for each of the DPSs.

Northern California/Southern Oregon DPS of Fisher (NCSO DPS)

<u>Discreteness</u>

The NCSO DPS is markedly separate from other North American fisher populations to the east by enormous distances, geographical barriers, unsuitable habitat, and urban development. Fishers in this DPS are separated from the Rocky Mountains and the rest of the taxon in the central and eastern United States by natural physical barriers including the non-forested high desert areas of the Great Basin in Nevada and eastern Oregon. Other physical barriers that separate the NCSO DPS from Rocky Mountain and eastern United States fisher populations include large areas without forests, including urban and rural open-canopied areas, agricultural development, and other non-forested areas.

The NCSO DPS is also markedly separate from fisher populations to the north by approximately 560 miles (mi) (900 kilometers (km)) (to the current populations of fishers in Canada) and 270 mi (430 km) (to the reintroduced fisher populations in Washington). These distances are well beyond the various reported fisher dispersal distances (as described in more detail in Service 2016, pp. 13–14). An additional component contributing to marked separation between the NCSO DPS and fishers in Washington is the Columbia River and adjacent human developments (e.g., roads and towns); these likely act as a physical impediment to crossing by fishers dispersing in either direction. While juvenile fishers dispersing from natal areas are capable of moving long distances and navigating various landscape features such as highways, rivers, and rural communities to establish their own home range (Service 2016, pp. 13–14), the magnitude of these impediments and the distance between the NCSO DPS and Washington State fishers would preclude this possibility. Therefore, it is extremely unlikely that any transient individuals from the NCSO DPS could disperse far enough to reach the Washington range of reintroduced fishers, and even if they attempted to do so, they would likely not be able to cross the Columbia River. Not only is the river especially wide and deep year-round, but in the Cascade Range, it is bordered on one side by an interstate highway, a 2-lane state highway on the other side, as well as a railroad track on both sides. These impediments further restrict the ability of fishers to surpass this obstacle.

In addition, the NCSO DPS is also markedly separate from the SSN DPS to the southeast by approximately 130 mi (209 km) from the southern end of the NCSO DPS to the northern end of the SSN DPS. This distance, although less than that between the NCSO DPS and Washington fishers, is still several times beyond the known the maximum dispersal distances for fishers (Zielinski et al. 2005, p. 1402). The intervening habitat between the NCSO DPS and SSN DPS is additionally characterized by habitat that is highly altered with reduced forest density and increased human development of the landscape further limiting potential fisher dispersal across this region (Zielinski et al. 2005, p. 1403).

In summary, the NCSO DPS is geographically isolated from all other populations of the species. Therefore, the marked separation condition for discreteness is met by geographical barriers, urban development, unsuitable habitat, and distances that are beyond the known dispersal distance of fishers.

Significance

For the NCSO DPS, we found that a combination of several of the criteria listed above provide evidence of its biological and ecological importance to the taxon. First, the NCSO DPS persists in an ecological setting unusual or unique to the taxon. As we noted in our 2014 proposed rule, fishers in the Pacific west coast inhabit landscapes dominated by different forest types, climate, and predator–prey relationships compared to fishers in the rest of the range of the taxon, i.e., the eastern and northern North American populations. And while the landscapes in the SSN DPS area to the southeast in California share some of those same differences as the NCSO DPS from the rest of the range of the taxon (i.e., forest types, climate, predator relationships), the NCSO DPS and SSN DPS are also ecologically different from each other.

Fishers across the range of the taxon are known to use hardwood trees for resting and denning, but the hardwood composition varies in different regions of the taxon's range. For example, Oregon white oak, black oak, canyon live oak, madrone, tanoak, and big leaf maples are the most common hardwoods in the NCSO DPS, while fishers in the SSN DPS tend to use interior live oak, canyon live oak, and black oak species for resting structures; aspen is the most common hardwood used by fishers in other regions like the Rocky Mountains. In addition, conifers in the range of the SSN DPS provide a greater resource for fishers as resting structures than hardwood species when compared to the majority of the NCSO DPS and the rest of the taxon's range. Similar to the SSN DPS, fishers in the SOC subpopulation and the eastern Cascades of the NCSO DPS predominantly use conifers for rest and den sites, as hardwoods comprise less than 4 percent of the tree species present (Lofroth *et al.* 2011, pp. 36, 39).

Climate conditions and elevation are also different between the NCSO DPS and SSN DPS. Climate within the NCSO DPS varies with a more mesic, maritime influence along the coast to a more xeric landscape in the interior and the east (Lofroth *et al.* 2011, pp. 36-89), while the SSN experiences overall hotter and drier conditions. Elevations within the NCSO DPS range from sea level along the coast to 9,515 ft (2,900 m), with fisher occurring at elevations mostly below 6,000 ft (1,830 m) (Lofroth *et al.* 2011, pp. 36-89); whereas, elevations in the SSN DPS range from 956 ft to 14,435 ft (294 to 4,400 m), with fisher occupying elevations as high as 9,000 ft (2,740 m) (Spencer et al. 2015, p. 7; Lofroth et al. 2011, pp. 91-104).

For the next line of evidence of the NCSO DPS's significance, we note that the NCSO DPS represents a large portion of the taxon's range along the Pacific coast, and its loss would leave a significant gap between the SSN DPS and all fisher populations to the north. While we recognize that the NCSO DPS is geographically separated from other fisher populations, and this separation likely precludes the NCSO DPS from ever acting as a connection for a contiguous range of fishers from the SSN DPS to Canada, we note that its loss would still result in an even greater break in the west coast range of fishers than what currently exists. Furthermore, the NCSO DPS supports thousands of individuals while the SSN just a few hundred and populations in Washington are still small. Therefore, a loss of the NCSO DPS would mean the majority of the fishers in the West Coast states would be lost.

Finally, we point to other evidence of significance by noting that the NCSO DPS differs markedly from other populations of the species in their genetic characteristics. The NCSO DPS is primarily comprised of fishers native to this region of the country and which are genetically distinct from fishers in the remainder of North America (for example, Canada, Rocky Mountains, and Great Lakes). In addition, fishers in the NCSO DPS are also genetically distinct from those found in the SSN DPS. We note the NCSO DPS does include the translocated SOC subpopulation, which was established with fishers not native to this region (i.e., British

Columbia and Minnesota) and which do not share all the same genetic characteristics of the native fishers. However, it is highly unlikely that the unique genetic characteristics that have evolved over time as native fishers in the NCSO DPS have adapted to the environmental conditions of this area will be lost as a result of this very limited introduction of genes from fishers not indigenous to this region. Although there is interbreeding between SOC and indigenous fishers, we base this on the fact that SOC fishers do not appear to have expanded their range far from their original reintroduction area since their translocation over 40 years ago (Barry 2018, p. 23).We therefore conclude that the loss of fishers in the NCSO DPS would result in a reduction of the species' overall genetic diversity.

Summary

Given that both the discreteness and the significance elements of the DPS policy are met for fisher in the Northern California/Southern Oregon portion of its range, we find that the NCSO DPS of fisher is a valid DPS. Therefore, the NCSO DPS of fisher is a listable entity under the Act.

Southern Sierra Nevada DPS of Fisher (SSN DPS)

Discreteness

Similar to the NCSO DPS, the SSN DPS is markedly separate from other North American fisher populations to the east by enormous distances, geographical barriers, unsuitable habitat, and urban development. Fishers in this DPS are separated from the Rocky Mountains and the rest of the taxon in the central and eastern United States by natural physical barriers including the non-forested high desert areas of the Great Basin in Nevada and eastern Oregon. Other physical barriers that separate the SSN DPS from Rocky Mountain and eastern United States fisher populations include large areas of unsuitable habitat such as urban and rural open-canopied areas, agricultural development, and other non-forested areas.

As noted above, the SSN DPS is markedly separate from the NCSO DPS by approximately 130 mi (209 km). The intervening habitat between the NCSO DPS and SSN DPS is additionally characterized by habitat that is highly altered with reduced forest density and increased human development of the landscape further limiting potential fisher dispersal across this region (Zielinski et al. 2005, p. 1403). In addition, the SSN DPS is also considerably farther away from the Washington State and Canada fisher populations than the NCSO DPS, clearly meeting the marked separation condition of discreteness.

In summary, the SSN DPS is geographically isolated from all other populations of the species. Therefore, the marked separation condition for discreteness is met by geographical barriers, urban development, unsuitable habitat, and distances that are beyond the known dispersal distance of fishers.

<u>Significance</u>

For the SSN DPS, we also found that a combination of several of the criteria listed above provide evidence of its biological and ecological importance to the taxon. First, as with the NCSO DPS, the SSN DPS persists in an ecological setting unusual or unique to the taxon. As we noted in our 2014 proposed rule, fishers in the Pacific west coast inhabit landscapes dominated by different forest types, climate, and predator–prey relationships compared to fishers in the rest of the range of the taxon (i.e., the eastern and northern North American populations). And while the landscapes in the NCSO DPS area to the northwest in California and southern Oregon share some of the same differences that the SSN DPS has from the rest of the range of the taxon (i.e., forest types, climate, predator relationships), the NCSO DPS and the SSN DPS are also ecologically different from each other.

Fishers across the range of the taxon are known to use hardwood trees for resting and denning, but the hardwood composition varies in different regions of the taxon's range. For example, Oregon white oak, black oak, canyon live oak, madrone, tanoak, and big leaf maples are the most common hardwood in the range of the NCSO DPS, while fishers in the SSN DPS tend to use interior live oak, canyon live oak, and black oak species for resting structures; aspen is the most common hardwood used by fishers in other regions. In addition, conifers in the range of the SSN DPS provide a greater resource for fishers as resting structures than hardwood species compared to the NCSO DPS and the rest of the taxon's range. Climate conditions and elevation are also different between the NCSO and SSN DPSs. Overall, the SSN DPS is hotter and drier than the NCSO DPS (Zielinski et al. 2004, p. 488). In addition, the SSN DPS occupies habitat at higher elevations than any other population within the United States. The Kern Plateau within the SSN DPS has recorded fisher occupancy up to 2,740 m (9,000 ft.) (Spencer et al.

2015, p. 7). This habitat receives less snow than other habitat at similar elevations, allowing fisher to occupy this unique habitat setting (Spencer et al. 2015, p. 7).

For the next line of evidence of the NCSO DPS's significance, we note that the SSN DPS represents the southernmost periphery of the taxon's range. Loss of the SSN DPS would shift representation of the taxon at its southern boundary approximately 400 miles northward to the range of the NCSO DPS.

Finally, we point to other evidence of significance by noting that the SSN DPS differs markedly from other populations of the species in its genetic characteristics. The SSN DPS is wholly comprised of fishers native to this region of the country, and these fishers are genetically distinct from fishers in the remainder of North America (for example, Canada, Rocky Mountains, and Great Lakes). In addition, fishers in the SSN DPS are also genetically distinct from those found in the NCSO DPS. Further, there is high genetic divergence between the SSN DPS and NCSO DPS with the populations being separated for thousands of years (Tucker et al. 2014, p. 3). The SSN DPS has only a single mitochondrial DNA haplotype which is genealogically distinct from the NCSO DPS (Knaus et al. 2011, p. 11; Tucker 2019 personal communication). We therefore conclude that the loss of fishers in the SSN DPS would result in a reduction of the species' overall genetic diversity.

<u>Summary</u>

Given that both the discreteness and the significance elements of the DPS policy are met for fisher in the Southern Sierra Nevada portion of its range, we find that the SSN DPS of fisher is a valid DPS. Therefore, the SSN DPS of fisher is a listable entity under the Act.

Background

General Species Information

Species Information and Distribution

The fisher is a medium-sized, light brown to dark blackish-brown mammal found only in North America, with the face, neck, and shoulders sometimes being slightly gray, and the chest and underside often having irregular white patches. The fisher is classified in the order Carnivora, family Mustelidae, which is a family that also includes weasels, mink, martens, and otters (Service 2016, p. 8). The occurrence of fishers at regional scales is consistently associated with low- to mid-elevation coniferous and mixed conifer and hardwood forests with characteristics of mid- and late-successional forests (e.g., diverse successional stages, moderate to dense forest canopies, large-diameter trees, coarse downed wood, and singular features of large snags, tree cavities, or deformed trees). Throughout their range, fishers are obligate users of tree or snag cavities for denning, and they select denning and resting sites with a high proportion of characteristics associated with late-successional forests, such as snags, down wood, and vertical and horizontal diversity. These characteristics are maintained and recruited in the forest through ecological processes such as fire, insect-related tree mortality, disease, and decay (e.g., Service 2016, pp. 64, 123–124).

Fishers on the west coast of the continent have historically occurred in British Columbia, Washington, Oregon, and California. Fishers indigenous to the west coast in the contiguous United States were historically well distributed in the habitats described above, from the State of Washington south through Oregon, and into northern California and the Sierra Nevada mountains. Subpopulations of these indigenous fishers still occur in northern California/southwestern Oregon and the Sierra Nevada; however, populations of indigenous fishers were extirpated from Washington (Lewis and Hayes 2004, p. 1) and northern Oregon (Aubry and Lewis 2003, pp. 81–82). Recent surveys in the northern Oregon Cascades yielded no fishers (Moriarty et al. 2016, entire), suggesting they remain absent in this area, whereas surveys in the southern Oregon Cascades suggest fisher range may be contracting to the south (Barry 2018, pp. 22–23) compared to their distribution in the late 1990s (Service 2014 and 2016, entire, though see current condition section for NCSO). Fishers now occurring and reproducing in Washington were established using fishers translocated from outside this three-State region. Fishers from British Columbia were reintroduced to the Olympic Peninsula from 2008 to 2010 (Happe et al. 2017, p. viii; Happe et al. 2019, p. 2) and to the Washington Cascade Range south of Mt. Rainier from 2015 to 2017 (Lewis et al. 2018, p. 5). Reproduction has been documented in both areas. Beginning in 2018, fishers from Alberta were released in the northern Washington Cascades in North Cascades National Park; all animal translocations are expected to be completed in 2020 (Hayes and Lewis 2006, p. 35; Lewis *et al.* 2019, p. 19).

Fishers were once well distributed throughout their historical range in the habitats described above. In Oregon and California, outside of the existing NCSO DPS and SSN DPS (see Figure 1, above), fishers are considered likely extirpated, though occasional sightings, verifiable and unverifiable, are reported. Additionally, in California, recent survey efforts have not detected fishers south of the reintroduced NSN subpopulation or north of the SSN DPS.

Additional information on the species' biology and distribution is described in the final Species Report (Service 2016, pp. 9–12, 25–53).

General Threat Information

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an "endangered species" or a "threatened species." The Act defines an endangered species as a species that is "in danger of extinction throughout all or a significant portion of its range," and a threatened species as a species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The Act requires that we determine whether any species is an "endangered species" or a "threatened species" because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

We use the term "threat" to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term "threat" includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term "threat" may encompass—either together or separately—the source of the action or condition or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an "endangered species" or a "threatened species." In determining whether a species meets either definition, we must evaluate all identified threats by considering the expected response by the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, and then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species—such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an "endangered species" or a "threatened species" only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future. In our determination, we correlate the threats acting on the species to the factors in section 4(a)(1) of the Act.

Potential threats currently acting upon the both the NCSO DPS and SSN DPS, or likely to affect them in the future, are evaluated and addressed in the final Species Report (Service 2016, pp. 53–162). The reader is directed to the Species Report (Service 2016, entire) for a more detailed discussion of the threats summarized in this document (http://www.fws.gov/cno/fisher/). However, please note that our most recent consideration of new data since 2016 coupled with our reevaluation of the entirety of the best available scientific and commercial information (including comments and information received during the two comments periods associated with the 2019 Revised Proposed Rule) is represented and summarized in the various analyses below.

Our analyses below represent an evaluation of the biological status of the two DPSs, based upon our assessment of the cumulative impact of all effects anticipated from the identified threats, and how that cumulative impact may affect each DPS's continued existence currently and in the future. We used the best available scientific and commercial data, and the expert opinions of the analysis team members. The threats identified as having the potential to act upon both DPSs include: habitat-based threats, including high-severity wildfire, wildfire suppression activities, and post-fire management actions; climate change; tree mortality from drought, disease, and insect infestation; vegetation management; and human development (Factor A). We also evaluated potential threats related to direct mortality of fishers including trapping and incidental capture (Factor B), research activities (Factor B), disease or predation (Factor C), collision with vehicles (Factor E), exposure to toxicants (Factor E), and potential effects associated with small population size (Factor E). Finally, we also evaluated the inadequacy of existing regulatory mechanisms (Factor D).

As we conducted our threats analyses, we determined that those with the greatest potential to become significant drivers of the future status of both DPSs were: wildfire and wildfire suppression; tree mortality from drought, disease, and insect infestation; the potential for climate change to exacerbate both of these threats and threats related to vegetation management and exposure to toxicants. While our assessment of the species' status was based on the cumulative impact of all threats identified above, we are only presenting our analyses on these specific threat drivers for the purposes of this finding. We refer the reader to the Species Report (Service 2016, entire) for full detailed analyses of all the other individual threats.

As these potential significant threat drivers are relevant to both DPSs, much of the fundamental information pertaining to the threats are also applicable to both DPS analyses. Below we present scientific information about the threats common to both DPSs, followed by DPS-specific evaluations.

Wildfire and Wildfire Suppression

Our evaluation includes both the effects of wildfire on fisher habitat as well as those activities associated with wildfire suppression that may result in changes to fisher habitat (for example, backburning, fuel breaks, and snag removal). Naturally occurring fire regimes vary widely within the range of both the NCSO DPS and SSN DPS (Service 2014, p. 58), and fisher habitat has been burned across a spectrum from low- to high-severity.

Mixed-severity wildfire includes patches of low-severity wildfire and patches of high-severity wildfire (Jain et al. 2012, p. 47). At the landscape scale, mixed-severity wildfire effects to fisher habitat may only affect an area's ability to support fishers for a short period of time due to the patchy nature of burned and unburned areas. Additionally, a beneficial aspect of mixed-severity wildfires (as opposed to just high-severity wildfires) is that these wildfires may contribute to the regeneration of the hardwood component of mixed-conifer forest used by fisher (Cocking et al. 2012, 2014, entire). Further these types of fires can sustain patches of unburned refugia that are important for maintaining patches of higher canopy cover, acting as a source for future tree regeneration, and providing habitat for fisher (Blomdahl et al. 2019, p. 1049). Mixed-severity wildfire may reduce some elements of fisher habitat temporarily, but also helps to contribute to the ecological processes necessary to create tree cavities and other decay and structural abnormalities essential for denning and resting fishers (Weir et al. 2012, pp. 237–238).

Low-severity wildfire is unlikely to remove habitat, and post-wildfire areas are likely still used by fishers (Naney et al. 2012, p. 6; Truex and Zielinski 2013, p. 90).

The potential for large high-severity wildfires to affect fisher habitat and fisher populations is concentrated in northern California–southwestern Oregon and the Sierra Nevada areas as compared to the remainder of the fisher's historical range in the West Coast States (Service 2014, p. 62–63). In general, high-severity wildfire can alter fisher habitat by removing forest canopy, large trees, and structurally diverse understories, which can take from decades to a century or more to regrow (Service 2014, p. 59–60), but it may also provide foraging opportunities for fishers since these post-fire areas are often abundant in the small mammals that fishers eat (Hanson 2013, p. 27; Service 2016, p. 66). For example, there is evidence of fishers associated with high-severity burned areas, or a mix of moderate- and high-severity burns (Service 2016, p. 66), particularly if the area was structurally complex prior to the fire (Hanson 2013, p. 28). However, another study found fishers avoiding areas of high and moderate severity fire (Thompson et al. 2019a, p. 15), so there is likely a threshold in high severity patch size that influences fisher use of these areas (also see individual DPS sections).

Within shrub, grassland, and forested lands across the western United States (including the Sierra Nevada, southern Cascades, and Coast ranges), the wildfire season length increased over each of the last 4 decades, from 65 days in the 1970s to 140 days in the 2000s (Westerling 2016, p. 3, 8, 10). The lengthening of the wildfire season is largely due to declining mountain snowpack and earlier spring snowmelt, which contributes to a decrease in vegetation moisture; this causes wildfires to be more frequent and larger with an overall increase in the total area burned (Westerling 2016, p. 8–9). Throughout the western United States there has been an increase in the patch size and total area of fires in recent decades. The evidence for an increasing area of high-severity fire is mixed given that studies present different historical levels of high-severity fire (Mallek *et al.* 2013, p. 11–17; Stephens et al. 2015, p. 12–16; Hanson and Odion 2016, p. 12–17; Odion et al. 2016, entire; see Spies et al. 2018, p. 140 for summary of recent literature), but the scientific consensus accepts that mixed conifer forests were characterized by areas burned at low-, moderate-, and high-severity, with higher proportions of low-severity than is currently observed (Safford and Stevens 2017, p. 50). Given projected changes in climate, forests are expected to become more vulnerable to wildfires over the coming century. Long et al. (2018, entire) found some indication that hardwoods, in particular black oak (*Quercus kelloggii*) on National Forest lands in inland California, may be experiencing downward trends from fire. Finally, vegetation shifts as a result of wildfire may become "self-reinforcing" when interactions between wildfire, vegetation, and climate interact in such a way that forest growth and regeneration is impeded (Skinner et al. 2018, p. 187–188).

Recent publications on wildfire occurrence and severity within the NCSO DPS and SSN DPS continue to support our conclusions ~~about this threat in the 2014 Proposed Rule~~ that fire is likely to have a negative impact on fisher populations but will depend on fire size, burn severity, and proximity to occupied habitat (79 FR 60419, October 7, 2014; p. 60429). Recent information on fishers' behavioral and localized population response to wildfires is available for both the NCSO DPS and SSN DPS and is discussed further below.

<u>Climate Change</u>

Overall, fisher habitat is likely to be affected by changing climate conditions, but the severity will vary, potentially greatly, among different regions, with effects to fishers ranging from negative, neutral, or potentially beneficial. Climate throughout the West Coast States is projected to become warmer over the next century, and in particular, summers will be hotter and drier, with heat waves that are more frequent (Hayhoe et al. 2004, p. 12,423; Tebaldi et al. 2006, pp. 191–200; Mote and Salathé 2010, p. 41; Salathé et al. 2010, p. 69; Cayan et al. 2012, p. 4, 10; Mote et al. 2013, p. 34; Pierce et al. 2013, p. 844, 848; Ackerly et al. 2018, pp. 6-8; Bedsworth et al. 2018, pp. 23, 26, 30; Dettinger et al. 2018, p. 5; Grantham 2018, p. 6).

In Oregon, Dalton et al. (2017, pp. 4, 8) evaluated greenhouse gas emissions via global climate models with future emission pathways called "representative concentration pathways" (RCPs). They considered multiple greenhouse gas emission scenarios, including low (RCP 4.5) and what they termed "business-as-usual" (RCP 8.5). Their analysis indicates that extreme heat events are expected to increase in frequency, duration, and intensity by the 2050s due to warming temperatures (RCP 4.5 = mean annual temperature increase predicted on average 3.6 degrees Fahrenheit (°F) (2.0 degrees Celsius (°C)); RCP 8.5 = mean annual temperature increase predicted on average 5.0 °F (2.8 °C). Summers are expected to warm more than the annual average and will likely become drier. Annual precipitation is projected to increase slightly, although with a high degree of uncertainty. Extreme heat and precipitation events are expected to increase in frequency, duration, and intensity.

In California, information from Pierce *et al.* (2013) and Safford *et al.* (2012) used multiple general circulation models and downscaling with regional climate models to develop probabilistic projections of temperature and precipitation changes over California by the 2060s. Predictions indicate an annual mean temperature increase of 4.3 °F (2.4 °C) by 2060 (Pierce *et al.* 2013, p. 844). Similarly, and more recently, Bedsworth *et al.* (2018, entire) summarizes forty-four technical peer reviewed reports to provide a California-wide climate change assessment. Under two modeled scenarios, average temperatures are projected to increase by 2.5 to 2.7 °F (1.4 to 1.5 °C) in the early century (2006 to 2039), 4.4 to 5.8 °F (2.4 to 3.2 °C) in the mid-century (2040 to 2069), and 5.6 to 8.8 °F (3.1 to 4.9 °C) in the late-century (2070 to 2100) (Bedsworth *et al.* 2018, p. 23). Precipitation models suggest that northern California may become wetter, while most southern parts of California will become drier (Bedsworth *et al.* 2018, p. 25). The authors caution that "due to large annual variation, changes in annual mean or long-term precipitation are not the best metrics to understand" the effects to changes in precipitation in California (Bedsworth *et al.* 2018, p. 25). Specifically, the models project less overall precipitation with more extreme daily precipitation, inter-annual precipitation will be more erratic, and the number of dry years will increase (Bedsworth *et al.* 2018, p. 25 citing others; Polade *et al.* 2017, p. 1).

Higher temperatures during spring and summer, coupled with early snow melt, will reduce the moisture of both live fuels and dead surface fuels by increasing evaporative demands during the dry season and lengthening the fire season (Keeley and Syphard 2016, pp. 2–3; Restaino and Safford 2018, p. 500). In addition, models project an increase in lightning frequency that may be associated with an increase in potential fire ignitions (Restaino and Safford 2018, p. 500).

Studies specific to predicting the effects of climate change on suitable fisher habitat have produced a wide range of results. Ecotype conversion from conifer forest to woodland, shrubland, or grassland will result in the loss of suitable fisher habitat. This type of shift is predicted, for example, in the southern Sierra Nevada (Gonzalez *et al.* 2010, fig. 3; Lawler *et al.*

2012, p. 388; Dettinger *et al.* 2018, pp. 31-34; Restaino and Safford 2018, p. 500). On the other hand, shifts from conifer forest to hardwood-dominated mixed forest in the southern Sierra Nevada or Klamath region could either increase or decrease the habitat available to fishers (Lawler *et al.* 2012, pp. 384–386; Loarie *et al.* 2008, p. 4 and fig. 4). Given the more significant contribution of hardwood trees to fisher habitat in the drier parts of both the NCSO DPS and SSN DPS, a shift to increasing hardwoods in more coastal or higher elevation forest types could improve habitat, but shifts to hardwood dominated stands may also reduce protective cover from rain and snow fall (Suffice *et al.* 2019, pp. 10, 11, 13). Nevertheless, trees are long-lived and mature forests can persist under suboptimal conditions, and this can prevent better-suited vegetation from becoming established until disturbance removes the original forest (Sheehan *et al.* 2015, p. 27). Consequently, the increase in the hardwood component of fisher habitat in predominantly conifer areas may not occur until after fires have changed the composition of the existing stand to allow hardwood establishment.

Other studies suggest that climate change will adversely impact forest habitat by intensifying large-scale, high-severity wildfire, drought, and tree mortality (Kadir *et al.* 2013, pp. 132, 137; Westerling 2016, pp. 1–2; Westerling 2018, pp. 21-23; Bedsworth *et al.* 2018, p. 64; Dettinger *et al.* 2018, pp. 28–29; Stephens *et al.* 2018a, p. 77; Stephens *et al.* 2018b, p. 162; Restaino and Safford 2018, pp. 493-505). A wide range of assumptions and caveats typically accompanies these types of predictions. For example, fire modeling shows a decline in future (approximately 100 years) fire intensities after the existing woody vegetation is burned (Restaino and Safford 2018, p. 499), but it is uncertain if the resulting vegetation and composition will be suitable for fisher.

Variables predicting fisher resting habitat as described by Zielinski and Gray 2018 (p. 903) include stand characteristics such as high canopy closure, large basal area of conifer and hardwood trees, and diameter and age of dominant conifers. To date, climate change has not significantly affected resting habitat for fishers, which, according to Zielinski and Gray (2018, pp. 899, 903), has remained stable over the past 20 years across the California-portion of the range, although habitat suitability tends to be lower on private lands than public lands. However, when considering resting habitat trends over these 20 years to determine potential future resting habitat conditions in light of climate change projections, data from the Sierra National Forest (within a portion of the SSN DPS) indicates the beginning of a negative trend in resting habitat suitability (Zielinski and Gray 2018, p. 903), whereas resting habitat examined within the NCSO DPS varied greatly (i.e., suitable resting habitat decreased in the Shasta-Trinity National Forest, increased in the Six Rivers National Forest, and remained unchanged over time for both the Klamath and Mendocino National Forests).

In addition to the potential climate change effects to fisher habitat discussed above, some researchers have suggested climate change may cause direct effects to fishers, including increased mortality, decreased reproductive rates, alterations in behavioral patterns, and range shifts. Fishers may be especially sensitive, physiologically, to warming summer temperatures (Zielinski *et al.* 2004, p. 488; Slauson *et al.* 2009, p. 27; Facka 2013, pers. comm.; Powell 2013, pers. comm.). As a result, researchers (e.g., Burns *et al.* 2003, Zielinski *et al.* 2004, Lawler *et al.* 2012, Olson *et al.* 2014) theorize that fishers likely will either alter their use of microhabitats or shift their range northward and upslope, in order to avoid the thermal stress associated with increased summer temperatures. Preliminary research on fisher occupancy and climate begins to support these theories. For example, during a drought in central and southern California from 2012 to 2015, fisher utilized higher elevation areas that were otherwise inaccessible due to snowpack during other years (Tucker 2019 pers. comm.). Although fisher occur across a wide range of precipitation levels and minimum temperatures, and appear able to utilize higher elevations in years with less snowpack, it is unknown how the interaction of vegetation, fire regimes, and competition with other species will influence future fisher occupancy patterns in a changing climate (Zielinski *et al.* 2017, p. 542–543).

The best available information indicates there is a link between changing climate conditions and the resulting changes to overall habitat suitability and availability for fishers throughout their range. There is also a link between changing climate conditions and the potential to increase fisher stress levels when habitat changes occur. More specifically, these changes affect the amount and distribution of habitat necessary for female fishers to be able to have places to den and raise their young. We provide three examples below.

First, ongoing climate change in California is likely to result in significant or amplified wildfire activity, with the area burned and fire severity likely to increase (Hurteau *et al.* 2019, pp. 1, 3; Moritz *et al.* 2018, p. 36). This in turn can result in reduced denning habitat availability for fishers (e.g., Sheehan *et al.* 2015, p. 20–22; Dalton *et al.* 2017, p. 46).

Second, under modeled increases in drought conditions, tree mortality and large-scale high-severity wildfire are likely to increase in frequency, size, and severity, especially if fuel loads in forests are not decreased (Young *et al.* 2017, p. 78; Westerling and Bryant 2008, pp. S244–S248; Abatzoglou and Williams 2016, pp. 11,770, 11,773; Bedsworth *et al.* 2018, pp. 29–30; Larvie *et al.* 2019, p. 1; Westerling 2018, pp. 21–23). Some models suggest that fire severity may be independent from fire intensity; thus, a lower intensity fire could kill more trees if they are also experiencing a severe drought (Restaino and Safford 2018, p. 500). Although we can expect that future droughts may be more intense, it is unknown whether or not droughts in the future will be worse than our worst droughts in the past (Keeley and Syphard 2016, p. 6; Bedsworth *et al.* 2018, pp. 26, 57). Regardless, it appears that climate change is intensifying the effects of drought, given that changing climate conditions are estimated to have contributed 5 to 18 percent to the severity of one of the worst recent droughts in 20th-century California history (Williams *et al.* 2015, p. 6,819; Keeley and Syphard 2016, p. 6). The combination of drought and wildfire can result in loss of adequate forest canopy cover and individual trees that provide habitat suitable for denning female fishers (e.g., CBI 2019, p. 9).

Third, the observed increases in wildfire activity in Oregon and California are partially due to climate change; increasing wildfire activity is expected under future warming, which in turn can increase tree mortality from disease and insects like mountain pine beetles (Dalton *et al.* 2017, p. 46; Bedsworth *et al.* 2018, p. 64). Widespread tree mortality (climate related or not) is likely to result in fishers experiencing reduced fitness (e.g., a positive relationship between higher amounts of tree mortality and higher cortisol levels in fishers; Kordosky 2019, p. 14, 36) and an overall reduction in forest stand conditions suitable for denning (CBI 2019, entire; Green *et al.* 2019, p. 3–4). Most forests will experience some form of climate stress by the late 21st century and higher temperatures will result in more droughts in California, revealing the interconnected nature of climate, wildfire, and tree mortality that collectively can shift forest composition and structure (Larvie *et al.* 2019, p. 12–14; Restaino and Safford 2018, p. 502) and further challenge the ability of fishers to locate suitable habitat.

Tree Mortality from Drought, Disease, and Insect Infestation

In our 2019 Revised Proposed Rule, this section was entitled "Forest Insects and Tree Diseases," we have changed the title to more accurately describe the threat. Localized tree mortality from insect outbreaks and tree diseases are natural processes, and they provide structures used by fisher for rest and den site as well as their prey. However, wide-spread insect and disease outbreaks can alter the overall distribution and abundance of fisher habitat. For example, severe drought events in California since 2010, combined with insect outbreaks and tree diseases, have led to more than 147 million dead trees in California (CAL FIRE and USFS 2019, no page number). Although both the NCSO DPS and SSN DPS experienced tree mortality during the recent drought, the magnitude of this effect on the landscape differed tremendously between each DPS, with the highest tree mortality occurring in the southern Sierra Nevada due to increased susceptibility to forest insects and tree disease from the severe drought (CAL FIRE and USFS 2019, no page number).

Vegetation Management

Vegetation management techniques of the past (primarily timber harvest) have been implicated as one of the two primary causes for fisher declines across the United States. Many fisher researchers have suggested that the magnitude and intensity of past timber harvest is one of the main reasons fishers have not recovered in the western United States as compared to the northeastern United States (Service 2014, pp. 54–56). At the time of the 2014 proposed rule, we stated that vegetation management techniques have, and can, substantially modify the overstory canopy, the numbers and distribution of structural elements available for use by fisher, and the ecological processes that create them. An increase in open areas, such as those resulting from timber harvest, may increase the risk of predation on fishers by bobcats and other predators that frequent these areas (see the Predation and Disease section below). Overall, fisher home ranges are comprised of mosaics of forest stand types and seral (stand age) stages but often with a high proportion of mid- to late-seral forests (Raley et al. 2012, p. 231). Fishers occupy managed landscapes and stands where timber harvest and other vegetation management activities occur; the degree to which fishers tend to be found in these areas often depends on a multitude of factors, including the scale, intensity, and rate of activities, the composition and configuration of suitable habitat, and the amount and type of retained legacy structures (Service 2016, pp. 59–60; Thompson and Clayton 2016, pp. 11–16, 22; Niblett et al. 2017, pp. 14–17; Marcot et al. 2018, p. 400; Powell et al. 2017, pp. 24–26; Parsons 2018, pp. 31, 53–55, 63; Purcell et al. 2018, pp. 60–61, 69–70). Fishers tolerate some clearcuts in their home ranges, though the mean proportion tends to be below 25 percent of their home range area (Powell et al. 2017, p. 26). Fishers are also observed denning in areas where as much as 25 percent of the area near the den sites is in openings (Niblett et al. 2017, p. 17). Some level of open areas or younger stands may provide suitable prey for fishers (Parsons 2018, pp. 26–29, 53–55). Yet even in these situations, fishers are associated with forests that contain structures associated with older forests, such as complex canopies, down wood, hardwoods, and trees with microsites conducive to denning, resting, or supporting prey (Niblett et al. 2017, pp. 16–17; Powell et al. 2017, p. 26). Therefore, for vegetation management it is important to maintain decadent structures that serve as den and rest trees and that likely required much time and site specific conditions to develop (Matthews et al. 2019, pp. 1,313). Overall, it appears fishers can tolerate management activities that promote forest heterogeneity (variation) and that consider the natural range of variation in forest structure, distribution, and composition when identifying and protecting valuable habitat elements (Thompson et al. 2019a, pp. 13–14).

While historical loss of mature and older forests via timber harvest through much of the 1900s resulted in a substantial loss of fisher habitat in California and Oregon, harvest volume has sharply declined throughout this area since 1990, primarily on Federal lands, but also on non-Federal lands. Although timber harvest is still ongoing throughout the NCSO and SSN DPSs, habitat ingrowth (i.e., forest stands becoming habitat as a result of forest succession) is also occurring, offsetting some of those losses. We address this for each of the DPS's below.

Exposure to Toxicants

Wildlife can encounter a wide range of chemicals in the environment. Fertilizers and pesticides (e.g., herbicides, insecticides, and rodenticides) are among the most common chemicals wildlife are exposed to and impacted by, especially near urban and agricultural areas. Of these chemicals, the rodenticides are the longest lasting and therefore the easiest to test for, track, and understand impacts to species. Both the draft and final Species Reports detail the exposure of fishers to rodenticides in Oregon and California (Service 2014, pp. 149–166; Service 2016, pp. 141–159).

The rodenticides impacting fishers include first- and second-generation anticoagulant rodenticides and neurotoxicant rodenticides. First-generation anticoagulant rodenticides are in a bait form that rodents consume for several consecutive feedings (i.e., sublethal doses) to deliver a lethal dose. Second-generation rodenticides are significantly more potent than first-generation rodenticides, and a lethal dose can be ingested in a single feeding. Additionally, second-generation rodenticides are more likely than first-generation rodenticides to poison predatory wildlife (e.g., fishers) that eat live or dead poisoned prey because they are more persistent in the environment. Neurotoxicant rodenticides are delivered in either single or multiple doses and have highly variable potency (multiple hours or days). Both first- and second-generation anticoagulant rodenticides as well as neurotoxicant rodenticides are used to kill small mammals that are destroying crops. Rodenticides impair an animal's ability to produce several key blood-clotting factors (anticoagulant rodenticides) or affect brain and liver function (neurotoxicant rodenticides). Anticoagulant rodenticide exposure causes bleeding nose and gums, extensive bruises, anemia, fatigue, difficulty breathing, and also damage to small blood vessels, resulting in spontaneous and widespread hemorrhaging.

A sublethal dose of a rodenticide can produce significant clotting abnormalities and hemorrhaging, leading to a range of symptoms, such as difficulty moving and a decreased ability to recover from physical injury. Ingestion of the neurotoxicant bromethalin has fast-acting and physical effects such as unsteadiness and weakness, and at higher dosage levels, seizures. Both anticoagulant and neurotoxicant rodenticides can change or impede normal fisher movement and foraging behaviors and therefore may increase the probability of mortality from other sources such as predation or vehicle collision. In addition, anticoagulants bioaccumulate and become increasingly more prevalent in predators because as they continue to eat contaminated prey (Lopez-Perea and Mateo 2018, p. 165). Contaminated rodents are found within and adjacent to treated areas weeks or months after bait application (Geduhn et al. 2014, pp. 8–9; Tosh et al. 2012, pp. 5–6; Sage et al. 2008, p. 215).

Rodenticide use in agricultural or urban areas is common and wildlife exposure rates can be high. For example, in California 70 percent of tested mammals were positive for at least one anticoagulant rodenticide (Hosea 2000, p. 238). And across the world, 58 percent of tested predators were positive for anti-coagulant rodenticides (Lopez-Perea and Mateo 2018, p. 172). Not surprisingly, mammals are most impacted by rodenticides, when compared to birds, reptiles, and insects; and generalist species that eat a variety of prey species are more likely to be contaminated relative to specialist species that feed on one or a few species (Lopez-Perea and Mateo 2018, pp. 163, 173).

Predators that are (a) nocturnal, (b) opportunistic in feeding habitats where rodents are an important part of their diet, and (c) nonmigratory and live close to or within landscapes that are heavily impacted by human activities are more likely to be exposed to rodenticides and have relatively high liver residue concentrations of multiple rodenticide compounds (Hindmarch and Elliott 2018, p. 251). Because fishers are territorial, nonmigratory mammals, and females remain particularly tied to their territories (Arthur et al. 1993, p. 872), they are among the species that are more vulnerable to rodenticide exposure. Additionally, fisher diets consist primarily of small mammals (Golightly et al. 2006, entire), which are the target species for rodenticides (Gabriel et al. 2015, entire; Thompson et al. 2014, pp. 97–98). Top predators within the range of fishers including northern spotted owls and barred owls have also been exposed to rodenticides (Franklin et al. 2018, p. 1; Gabriel et al. 2018, p. 1).

Data available since completion of the final Species Report in 2016 continue to document exposure and mortalities to fishers from rodenticides in both the NCSO and SSN DPSs (Gabriel and Wengert 2019, unpublished data, entire; Powell et al. 2019, p. 16). Here we discuss data specific to both the NCSO and SSN DPS, and below we provide more DPS-specific information. Dead fishers have been collected and tested for their cause of death and their exposure to rodenticides (Gabriel and Wengert 2019, unpublished data). Data for 97 fishers collected in California in the period 2007–2014 indicate 81 percent of fishers tested positive for one or more rodenticides; and 48 fishers collected from 2015–2018 indicate 83 percent tested positive (Gabriel and Wengert 2019, unpublished data). Mortalities due to rodenticide toxicosis have increased from 5.6 to 18.7 percent since collection and testing of fisher mortalities began in 2007 (Gabriel and Wengert 2019, unpublished data). And, from 2015 to 2018, additional fisher mortalities due to both anticoagulant and neurotoxicant rodenticides have been documented, including the toxicosis of neonatal kits in the womb (Gabriel and Wengert 2019, unpublished data, p. 4). The probability of fisher mortality increases with the number of anticoagulant rodenticides a fisher has been exposed to, and most fishers are exposed to more than one (Gabriel et al. 2015, p. 15).

The primary source of rodenticide exposure to fishers is from illegal marijuana grow sites on public, private, and tribal lands in California and Oregon (Gabriel et al. 2015, pp. 14–15; Thompson et al. 2014, pp. 97–98). In the mid- to late 1970s, 90 percent of the marijuana consumed in the United States came from abroad (Brady 2013, pp. 50-57). Marijuana cultivation in California really began in 1974 or 1975, and by 1979, 35 percent of the marijuana consumed in California was from California (Brady 2013, pp. 50-57) By 2010, 79 percent of all the marijuana consumed in the United States came from California (Brady 2013, pp. 50-57).

Information on the amount and types of rodenticides have been collected at over 300 illegal grow sites in California from 2012–2018 (Gabriel and Wengert 2019, unpublished data, pp. 5–7). Through this time period the use of second-generation rodenticides decreased. This is likely because of policy changes in 2014 that placed additional restrictions on the use of second-generation rodenticides in California. The change in policy has led to a more intensive use of first-generation anticoagulant rodenticide and the highest amount of neurotoxicant rodenticide use since 2012 (Gabriel and Wengert 2019, unpublished data, pp. 5–7).

In order to evaluate the risk to fishers from illegal grow sites and any differences between populations, we use a Maximum Entropy model to identify high and moderate likelihood of illegal grow sites being located within habitat selected by fisher in California and Oregon (Gabriel and Wengert 2019, unpublished data, pp. 7–10). This model indicates that 44 percent of the habitat modeled (combined NCSO and SSN DPSs) for fishers is within areas of high and moderate likelihood for illegal grow sites—see also the individual DPS sections below. However, the extent to which the use of toxicants occurs on private land marijuana grow sites, as well as other agricultural, commercial, and public land sites within the range of the fisher (and habitats that fishers select for) is unknown.

A known 617 illegal grow sites have been located in California from 2012-2018, and, from 2004-2018, 2,039 illegal grow sites were discovered (Gabriel and Wengert 2019, unpublished data, p. 7). Law enforcement specialists estimate they locate and raid roughly 20 to 40 percent of sites each year and only about 10 percent of those are remediated (Thompson et al. 2017, p. 45). If these estimates are accurate, it is reasonable to conclude that thousands of illegal grow sites—known and unknown, and with an undetermined amount of toxicants present—remain scattered within both the NCSO DPS and SSN DPS (Gabriel et al. 2015, entire; Thompson et al. 2017, p. 45). Rodenticides persist in the landscape, with first generation rodenticides having a half-life of up to 16 days and second generation rodenticides having a half-life up to 307 days (Shore and Coeurdassier 2018, p. 146).

As discussed, both the draft and final Species Reports detail the exposure of fishers to rodenticides (Service 2014, pp. 149–166; Service 2016, pp. 141–159). Below we summarize new information:

(1) *Rodent diversity*—Rodent diversity at illegal grow sites that were treated with rodenticides contained only mice, as compared to untreated sites where rodenticides were not used and where larger-bodied rodents (e.g., woodrats, squirrels, chipmunks) were located. These larger bodied rodents are the prey species fishers prefer (Gabriel et al. 2017, p. 10). Further, illegal grow sites may act as "sinks" for prey from neighboring areas (Gabriel 2018, pers. comm).

(2) *Unreclaimed sites*—During the "Operation Forest Watch, Department of Justice" campaign in California between October 2017 and September 2018, more than 20,000 pounds of fertilizer, pesticides, and chemicals were removed from 160 illegal grow sites (Department of Justice (DOJ) 2018, p. 2). Of these, 89 percent were confirmed or strongly suspected to have carbofuran or methamidophos (i.e., non-rodenticides that cause central nervous system dysfunction), up from the previous year's total of 75 percent (DOJ 2018, p. 2). Estimates vary of the number of illegal grow sites that necessitate reclamation of toxicants, but currently, 766 known illegal grow sites are still in need of reclamation (DOJ 2018, p. 2).

(3) *Effect of legalization*—Since the 2014 Proposed Rule, recreational marijuana cultivation and use became legal in Oregon (2015) and California (2016). The data are mixed with respect to how legalization is affecting illegal grows sites on public lands. Illegal grow sites

on National Forests have decreased in States where marijuana was legalized (Klassen and Anthony 2019, p. 39; Prestemon et al. 2019, p. 1). Conversely, many law enforcement officials have found no indication that illegal grow sites have decreased with cannabis legalization, and it may in fact be increasing, in part due to legalization providing an effective means to launder illegal marijuana (Hughes 2017, entire; Bureau of Cannabis Control California 2018, pp. 28, 30; Sabet 2018, pp. 94–95; Fuller 2019, no page number; Klassen and Anthony 2019, p. 45). Data from fisher monitoring suggests that illegal grow sites are dropping in number but are getting larger (impacting more fisher home ranges) (Gabriel 2018, pers comm). And, law enforcement actions have caused illegal grow sites to disperse further which makes them more difficult to locate (Gabriel 2018, pers comm.). Other uncertainties make it difficult to reach conclusions about trends in the abundance and frequency of illegal grow sites this soon after legalization, including legal marijuana market forces, the clandestine nature of the black market, federal illegality and trends of legalization in other States, State taxation of marijuana, local employment and economic conditions, and regulatory and law enforcement responses (Hughes 2017, entire; Bureau of Cannabis Control California 2018, pp. 28, 30; Sabet 2018, pp. 94–95; Fuller 2019, no page number; Klassen and Anthony 2019, pp. 45–46; Prestemon et al. 2019, pp. 9–11).

Legalization has resulted in an increase in legal marijuana cultivation. At this time, we have limited data about the prevalence of rodenticide use on legal private grow sites and whether fishers are at risk from rodenticide use on private land. In urban-wildland interfaces, or where private lands abut public forestland or occur as inholdings, legal grow sites are more likely within fisher home ranges (e.g., Franklin et al. 2018, p. 3).

(4) *Reclamation Efforts*—Existing law enforcement cannot keep up with illegal marijuana activities (Bureau of Cannabis Control California 2018, p. 30; Wendt 2019, pp. 4–6). In addition, support from States and local governments to Federal law enforcement on public lands (e.g., Forest Service) has dwindled in an effort to redirect resources to regulate the legalized marijuana industry (Bureau of Cannabis Control California 2018, p. 30; Klassen and Anthony 2019, p. 45). The CROP Project (Cannabis Removal on Public Lands) is a citizen-based organization established in 2018 with the primary goals of: (1) Securing and increasing State and Federal resources for illegal grow site reclamation; (2) increasing Forest Service law enforcement and overall presence on National Forests; and (3) implementing a statewide public education campaign, focusing on the human health risks associated with ingesting unregulated marijuana (www.cropproject.org). Successful accomplishment of these goals could substantially improve the discovery and reclamation of illegal grow sites, but it is too early to determine the degree to which this program reduces the threat of toxicants to fishers.

There's still zero discussion of fund expected to support clean up from the states' legaliz

At this time, our evaluation of the best available scientific and commercial information regarding toxicants and their effects on fishers leads us to conclude that individual fishers within both DPSs have died from toxicant exposure, fishers suffer a variety of sublethal effects from exposure to rodenticides, and the potential for illegal grow sites within fisher habitat is high. The exposure rate of more than 80 percent of fisher carcasses tested in California has not declined between 2007 and 2018 (Gabriel and Wengert 2019, unpublished data, pp. 3–4), while poisoning has increased since 2007 (Gabriel et al. 2015, p. 7). We do not know the exposure rate of live fishers to toxicants since this information is difficult to gather and has not been collected. In addition, the minimum amount of anticoagulant and neurotoxicant rodenticides required for sublethal or lethal poisoning is unknown. Specific information on fishers and toxicants within the NCSO DPS and the SSN DPS is described in the DPS-specific sections below.

Potential for Effects Associated With Small Population Size

In general, species that occupy a narrow geographic range with specific habitat requirements and that occur in small populations have a high conservation priority (Primack 2014, p. 158). We note that forest carnivore populations, including fisher, are often isolated and generally occur in low densities (Service 2016, p. 29). Small populations are vulnerable to a rapid decline in their numbers and localized extinction due to the following: (1) loss of genetic variability (e.g., inbreeding depression, loss of evolutionary flexibility), (2) fluctuations in demographic parameters (e.g., birth and death rates, population growth rates, population density), and (3) environmental stochasticity or random fluctuations in the biological (e.g., predation, competition, disease) and physical environment (e.g., wildfire, drought events, flooding) (Primack 2014, pp. 252–268). While we do not have data across the entire fisher range on the West Coast demonstrating that fishers are exhibiting specific effects associated with small population size, consideration of these three elements along with life-history traits can provide an extinction vulnerability profile for both the NCSO DPS and SSN DPS. In sum, the DPSs in Oregon and California exhibit the following attributes, to varying degrees, which may affect their distribution and population growth:

Do we agree with the premise that NCSO is a small popn? To the extent it applies to both it seems that SSN is of much higher relative concern

(1) Loss of large contiguous areas of historical habitat in combination with restriction of the species to forested habitats that have been lost or modified due to timber harvest practices;

human development; large, high-severity wildfires whose frequency and intensity are in turn influenced by the effects of climate change; and increasing forest fuel density from fire suppression and a lack of low-severity fire over the recent long term.

(2) Dependence on specific elements of forest structure that may be limited on the landscape, including microsites for denning and resting.

(3) Susceptibility to injury or mortality due to predation from co-occurring larger predators.

Each of these vulnerabilities may separately, or together, influence the magnitude of other threats described in this analysis for the NCSO DPS and SSN DPS of fisher.

Fishers in the Oregon and California are currently restricted to two historically extant indigenous populations (NCSO and SSN), one extant reintroduced subpopulation (NSN, established with fishers from NCSO), and one subpopulation established with fishers from outside this region(SOC). We recognize the two geographic areas of fisher, SSN and NCSO, (the latter of which includes the SOC and NSN for this analysis) are geographically isolated from one another with no evidence of and very little opportunity for genetic interchange. Our evaluation of the best scientific and commercial information available indicates that the separation of the SSN and NCSO populations occurred a very long time ago, possibly on the order of more than a thousand years, pre-European settlement (Tucker *et al.* 2012, pp. 1, 7; Knaus *et al.* 2011, p. 11). Despite their isolation and the small size of the SSN DPS, the native NCSO DPS and SSN DPS have persisted over a long period of time.