DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

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

RIN 1018–BD85

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), 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 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, which was revised from the 2014 proposed rule. This revised delineation identified the West Coast DPS as comprising the two extant historically native subpopulations, 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 subpopulation groups occur geographically in essentially two groupings: NCSO (including NSN and SOC subpopulations) and the wholly separate SSN subpopulation.

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

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 subpopulations 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 subpopulations 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 subpopulations 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 each of the extant subpopulations 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 subpopulations (i.e., SOC and ONP) established with non-California/Oregon fishers. This Alternative excluded the areas to the north of NCSO where fisher subpopulations were likely extirpated; it included both NCSO (which includes NSN) and SSN subpopulations, which each have unique genetic characteristics; and it allowed for management of the subpopulations as separate DPSs, recognizing the unique genetic characteristics within each. 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 subpopulations 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 subpopulations 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 subpopulations (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 subpopulation and allowing for separate management of these 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 subpopulations 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 subpopulation 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.

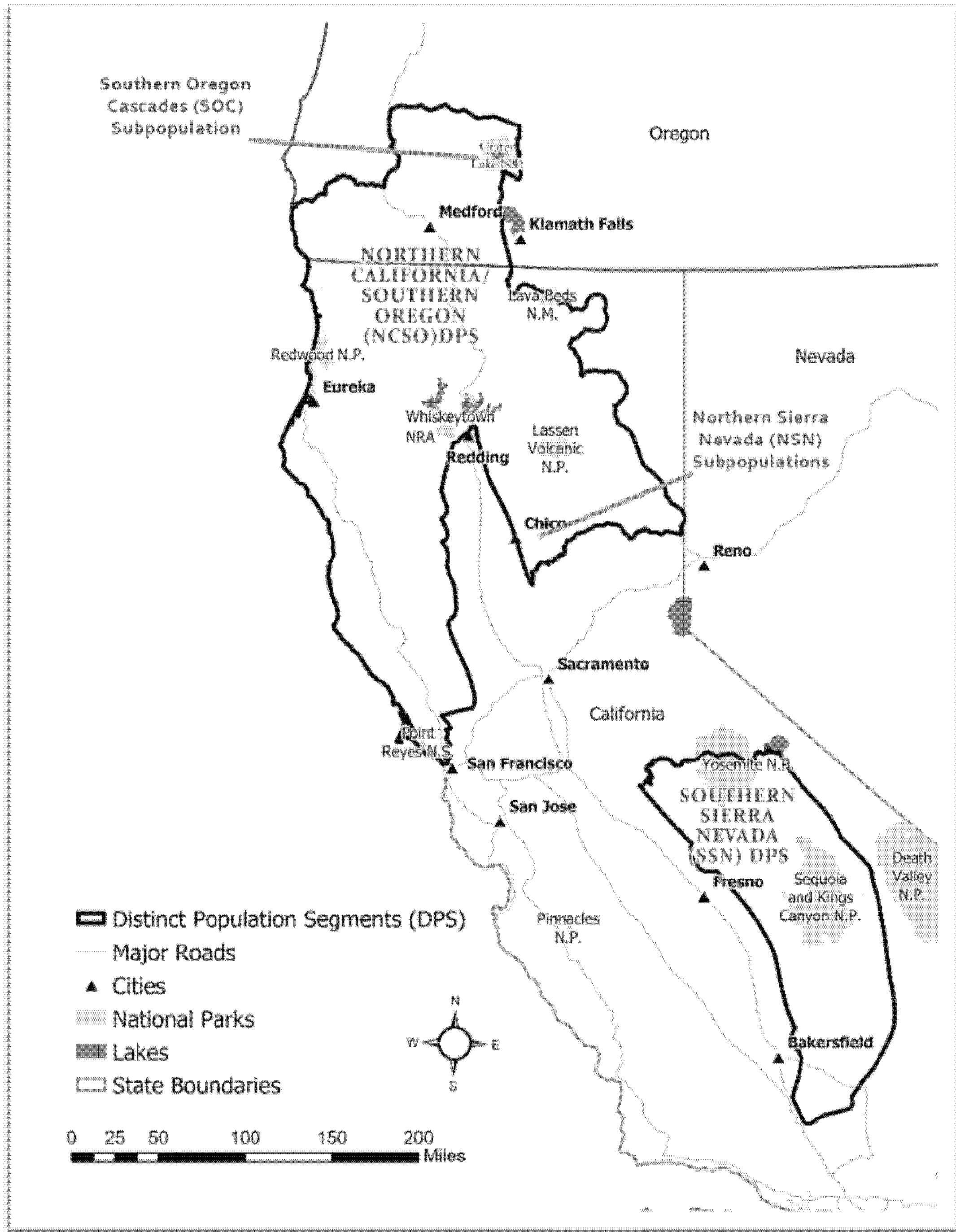

Figure 1. Distinct population segments (DPSs) and subpopulations of fisher in California and Oregon.

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 subpopulations 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 subpopulations 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 conclusion 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.

Significance

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.

Summary

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 InformationMadeline and I will work on Kerry's edits here

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 related to vegetation management; exposure to toxicants; the potential for effects from small population size; disease or predation; and collision with vehicles. While our assessment of the status of each DPS was based on the cumulative impact of all threats acting upon them, we are only presenting our analyses on these specific, potentially significant 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 potentially significant threat drivers were relevant to both DPSs, much of the fundamental information pertaining to the threats were also applicable to both DPS analyses. Although the ultimate conclusion about the significance of each threat varied between the DPSs, below we present scientific information about these threats common to both DPSs, followed by DPS-specific evaluations.

<u>Wildfire and Wildfire Suppression</u>

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.

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.

Climate Change

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. All of this adds to the uncertainty associated with climate change and how it relates to fisher.

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. 2019b, 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 they accumulate more and more anticoagulant (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). The comparison suggests larger-bodied rodents may be impacted by rodenticides more than smaller bodied rodents. Further, illegal grow sites may act as "sinks" for prey moving in from neighboring areas meaning less prey is available for fisher (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., insecticides (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 Medical Marijuana Regulatory and Safety Act of 2016 specifies that 20 percent of the marijuana tax fund shall be given to CDFW for 1) cleanup, remediation, and restoration on environmental damage in watersheds affected by marijuana cultivation (a portion of which may be distributed through grants), and 2) for the stewardship and operation of state-owned wildlife habitat areas and state park units to prevent illegal cultivation, and use (Comprehensive Medical Cannabis Regulation and Safety Act 2016) [I don't think this is how a state law should be cited]. In response, CDFW develop the Cannabis Restoration Grant Program in 2017. The program funds the restoration of watersheds impacted marijuana cultivation, including removing trash and equipment, diversion removal, riparian enhancements, and streambank stabilization (CDFW 2017, p. 1). Funds for projects in 2017 totaled $1,500,000 (CDFW 2017, p. 2). [I can't find that any grants were awarded in 2018 or 2019?]

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.

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:

(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.

At this point in time, fishers in both the NCSO DPS and SSN DPS are reduced from their original/historical range within the West Coast states. The best available information suggests these populations are expected to remain isolated from one another (as has been apparent since pre-European settlement). Estimates of fisher population growth rates for the NCSO DPS and the portion of the SSN DPS surveyed do not indicate any overall positive or negative trend (see Current Condition section for the NCSO DPS below), with the exception of the recently reintroduced Stirling subpopulation in the NSN, which has steadily grown since its translocation beginning in 2009. The vulnerabilities related to small population size for each DPS are further described below.

Disease and Predation

We evaluate information on disease and predation in our 2016 Species Report (Service 2016, pp. 128-132). In addition, we evaluated the following new information available regarding disease or predation since the time of our 2014 proposed rule (e.g., Gabriel *et al.* 2015, pp. 5-8, 12-16; Sweitzer *et al.* 2016 pp. 444-448; IERC 2017, p. 2; Barry 2018, pp. 39-40; Green *et al.* 2018, p. 549; Purcell *et al.* 2018, pp. 39-40, 50-51, 53, 72; CDFW 2019, entire). Although we did not analyze this threat in the 2019 Proposed Rule, we believe this new information warrants inclusion in this Final Rule, particularly because we analyzed each DPS separately as we expect these threats are likely to act differently based on population size. Predation and disease are the two greatest sources of mortality for fishers of identified mortality sources studied in California (Gabriel *et al.* 2015, p. 6; Sweitzer *et al.* 2016, p. 447). Of 183 California fishers where the mortality source was identified, 67 percent died from predation and 13 percent from a combination of disease, injury, or starvation (Sweitzer *et al.* 2016, p. 447). Gabriel *et al.* (2015, p. 7) was able to separate disease from other mortality sources and found that 15 percent of 136 necropsied fishers died of disease.

Several viral and bacterial diseases are known to affect mustelids, including fishers. Known diseases that have caused fisher mortality in the area of the NCSO and SSN DPSs include canine distemper virus, *Toxoplasma gondii* (a protozoal infection), and several bacterial infections (Gabriel *et al.* 2015, pp. 7-8; see Service 2016, pp. 128-130 for diseases summary). Disease only has a minor impact where it has been studied in the SSN DPS (Spencer *et al.* 2015, p. 66), and it comprises a substantially smaller portion of fisher mortalities compared to predation.

We do not know if current predation rates are similar to historical rates in the area of the NCSO DPS and SSN DPS. Comparing predation rates to populations outside of the West Coast is not informative because most of those populations are trapped, skewing the mortality source results (e.g. Lofroth *et al.*, 2010, p. 62, Table 6.3). Recent research in California suggests that landscape changes as a result of disturbances over the past century may have altered the carnivore community and affected predation rates on fishers by bobcats (Wengert 2013, pp. 59–66, 93, 97–100) where an increased proximity to open and brushy areas (vegetation selected for by bobcats) increases the risk of predation on fishers. Mountain lions and bobcats are major predators of fishers. Of 90 fishers that died from predation or were killed by other animals, 90 percent were killed by members of the cat family (Felidae) (Gabriel *et al.* 2015, p. 5). Sublethal effects of toxicants may also result in higher than normal mortality rates associated with disease and predation, but we do not know what portion of identified mortalities would not have occurred but for the presence of sublethal levels of toxicants in the individual (Gabriel *et al.* 2015, p. 16; Sweitzer *et al.* 2016, p. 448).

Disease and predation are naturally occurring sources of mortality, although the associated mortality rates may be increased by human-caused factors such as vegetation management or toxicants (Gabriel *et al.* 2015, pp. 14, 16). High levels of predation may explain why fisher populations have not expanded into unoccupied suitable habitat throughout much of the NCSO and SSN DPSs with the exception of the Stirling area (Gabriel *et al.* 2015, p. 16). Predation has been identified as the most important factor limiting fisher populations in California (Sweitzer *et al.* 2016, p. 448).

Vehicle Collisions

Fisher collisions with vehicles have been documented at multiple locations within the NCSO DPS and SSN DPS. We summarize this information in the final fisher Species Report (Service 2016, pp. 137-138). Although we did not analyze this threat in the 2019 Proposed Rule, we believe this information warrants inclusion in this Final Rule, particularly because we expect this threats to act differently in the NCSO DPS and SSN DPS based on population size and proximity to human development. In general, fisher collisions with vehicles documented in California are relatively rare, representing <2 percent of documented mortalities (Gabriel *et al.* 2015, p 15). And, vehicle-related mortalities may be a more local concern associated with specific high-traffic areas (Gabriel *et al.* 2015, pp. 7 and 15, Table 2).

Existing Regulatory Mechanisms

Many Federal and State existing regulatory mechanisms provide a benefit to fishers and their habitat. For example, trapping restrictions have substantially reduced fisher mortality throughout the NCSO DPS and SSN DPS of fisher. In some places, forest management practices are explicitly applied to benefit fishers or other species with many similar habitat requirements, such as the northern spotted owl. State and Federal regulatory mechanisms have abated the large-scale loss of fishers to trapping and minimized the loss of fisher habitat, especially on Federal land (Service 2014, pp. 117–141). Additionally, rodenticides are regulated under Federal and State laws. However, fishers are still exposed to rodenticides where they are used (see NCSO and SSN DPS specific sections on Exposure to Toxicants and Existing Regulatory Mechanisms).

Finally, voluntary conservation measures are in place that provide a benefit to fishers and their habitat. These measures include Habitat Conservation Plans (HCPs), Candidate Conservation Agreements with Assurances (CCAAs), Safe Harbor Agreements (SHAs), Memorandum of Understandings (MOUs), and other conservation strategies, as described for each DPS below (see NCSO and SSN DPS specific sections on Voluntary Conservation Measures below).

Final Listing Determination for NCSO DPS of Fisher

Current Condition

Population condition and abundance information for the NCSO DPS is presented for three different geographic portions of this DPS. First, the SOC portion west and south of Crater Lake in the Southern Oregon Cascade Range is predominantly represented by nonnative, reintroduced individuals. However, recent analyses have documented that at least some of these nonnative SOC individuals and native NCSO individuals are overlapping in range, with confirmed interbreeding (Pilgrim and Schwartz 2016, entire; Pilgrim and Schwartz 2017, entire). Second, the NSN portion is represented by native, reintroduced fishers whose genetic stock is from fishers relocated from the Klamath-Siskiyou and Shasta-Trinity subregions (in the historically native NCSO DPS). These animals were relocated into the northern Sierra Nevada. This geographic portion of the NCSO DPS occurs on land known as the Sierra Pacific Industries (SPI) Stirling Management Unit in Butte, Plumas, and Tehama Counties, California (Powell et al. 2019, p. 2). Third, the remainder of the native fishers in the NCSO DPS occupy the Klamath-Siskiyou Mountains in southern Oregon and northern California, the California Coast Range Mountains, the Shasta-Trinity subregions in northern California, and the western portion of the southern Cascades in northern California.

Fishers in the SOC portion of the NCSO DPS stem from a translocation of 30 fishers from British Columbia and Minnesota to the southeastern Cascade Range and west of Crater Lake between 1977 and 1981, after an earlier reintroduction in 1961 failed (Aubry and Lewis 2003, p. 84; Lofroth et al. 2010, pp. 43–44). Based on survey and research efforts starting in 1995, genetic evidence shows these fishers continue to persist (Drew et al. 2003, p. 57; Aubry et al. 2004, pp. 211–215; Wisely et al. 2004, p. 646; Pilgrim and Schwartz 2014–2017, entire; Moriarity et al. 2017, entire; Barry 2018, pp. 6, 22–24; Moriarty et al. in press, p. 23).

Prior to 2015, survey work in the Oregon Cascades north of the NCSO DPS was limited to opportunistic or small-scale efforts. Verifiable fisher detections did not exist, except for two single fishers: one just north of the SOC subpopulation in 2014 (Wolfer 2014, pers. comm.) and a single dispersing juvenile male detected in the same general area in the 1990s (Aubry and Raley 2006, p. 5); this suggests occasional individuals may disperse north through the central Oregon Cascades. Over the winter of 2015–2016, systematic camera surveys occurred in the northern Oregon Cascades (specifically, the southern portion of the Mt. Hood National Forest and northern portion of the Willamette National Forest). No fishers were detected (Moriarty et al. 2016, entire), suggesting fishers may not reach this far north in the Oregon Cascades. Additionally, surveys over the past 3 years have not detected fishers north of the Rogue River in the central Oregon Cascades (Barry 2018, pp. 22–23) (see below).

Information is not available on population size for the SOC portion of the NCSO DPS. In the northern portion of the SOC area, fishers were detected in the northern and eastern portions of Crater Lake National Park between 2013 and 2015 (Mohren 2016, pers. comm.). Outside of the Park, large-scale systematic surveys were conducted in 2016 and 2017 north and west of Crater Lake National Park and south to the Klamath Falls Resource Area (KFRA; south of the reintroduction area) of the Bureau of Land Management (BLM) Lakeview District (Barry 2018, entire). Few fishers were detected in an area west of Crater Lake National Park where fishers were captured and radio-collared in the early 1990s by Aubry and Raley (2002, entire). Within the Klamath Plateau (generally the KFRA area described above, but including surrounding non-Federal lands), Moriarty et al. (in press, pp. 5, 21) identified 31 to 41 individuals from 2015 to 2018, concluding that fishers in the SOC area do not appear to be expanding from where they were initially reintroduced. . In comparing his range estimate with a baseline range estimate provided by the Service, Barry (2018, pp. 22-24) determined that there was a 67 percent range reduction for the SOC subpopulation, concluding that SOC fishers “appear to have contracted, shifted south, or the previous population extent was incorrectly estimated” (Barry 2018, pp. 22–24). The author, however, urges caution when comparing their analysis with the baseline range estimate provided by the Service, and we agree. Comparing our coarse range map with Barry’s distribution quantitatively modeled from systematic detection surveys leads us to conclude that the magnitude of change in the distribution of SOC fishers over the past 2 decades is not nearly so dramatic (Service 2020, entire). We concur that SOC fishers seem to have shifted their distribution, and acknowledge that their distribution may be contracting to some degree. Furthermore, we acknowledge Barry's (2018, pp. 22-24) assertion that the SOC subpopulation has had ample time since their reintroduction to colonize beyond the reintroduction area and have failed to do so, suggesting that either our understanding of suitable habitat may be incorrect, there may be unknown barriers limiting their distribution, or other factors may limit this subpopulation.

Barry (2018, p. 23) also concluded that the SOC subpopulation appears small and relatively isolated given the number and spacing of detections. However, there is interbreeding with indigenous fishers near the Klamath Plateau area , suggesting fishers in the southern part of the SOC subpopulation are not isolated.

Fishers in the NSN portion of the NCSO DPS stem from a 2009 to 2011 translocation of 40 fishers (24 females, 16 males) from Humboldt, Siskiyou, and Trinity Counties, California, to the SPI Stirling Management Unit. Ongoing monitoring has confirmed that fishers born onsite have established home ranges and have successfully reproduced. Trapping efforts in the fall of 2017 as part of ongoing monitoring of the reintroduced subpopulation indicate a minimum of 61 fishers (38 females, 23 males), which is 21 more than were originally introduced (Powell *et al.* 2019, p. 2). Overall, 220 individual fishers were identified between 2009 and 2017 with a young age structure, suggesting healthy reproduction and recruitment (Powell *et al.* 2019, p. 2). Although the subpopulation appears to be stable or growing, statistical conclusions will be difficult to draw until year 10 in 2020 (Powell *et al.* 2019, p. 2). The authors also concluded that the subpopulation is unlikely to go extinct in the next 20 years, barring dramatic decreases in survival and reproduction caused by stochastic events. We also recently received a draft manuscript concluding that estimated recruitment and survival probability of fishers in the Stirling subpopulation area “had stabilized and were quite high, indicating that this new population of fishers may be self-sustaining” (Green *et al.* 2020, p. 11).

Older estimates for the NCSO DPS (minus SOC and NSN) using various methodologies range from a low of 258–2,850 individuals, based on genetic data (Tucker *et al.* 2012, pp. 7, 9–10), to a high of 4,018 individuals based on extrapolation of data from two small study areas within the NCSO DPS to the entire NCSO DPS (Self *et al.* 2008, pp. 3–5). In 2017, a new estimate was developed for the NCSO DPS that includes southern Oregon and coastal California but still excludes SOC and NSN (Furnas *et al.* 2017, pp. 2–3). This study used detection/non-detection survey data from across much of the NCSO DPS to calculate an average density of 6.6 fishers per 39 mi^2 (100 km^2) across the area they defined for the NCSO DPS (Furnas *et al.* 2017, pp. 12–15). Using this estimate of fisher density, the NCSO DPS is estimated to be 3,196 individuals (2,507–4,184; 95 percent Confidence Interval (C.I.)) and fishers were detected at 41 percent of 321 paired camera stations (Furnas *et al.* 2017, pp. 10, 12). Density models indicate a core area of predicted high density (>10 fishers per 39 mi^2 (100 km^2) from between about 25 to 50 mi (40 to 80 km) inland from the coast in the California Coast Range and southern Klamath Mountains in California (Furnas *et al.* 2017, pp. 12-13). CDFW determined in their status assessment for fishers in California that the assessment done by Furnas, when applied to fishers in the California portion of NCSO, suggests that fishers are common and widespread (estimated to occur at 60 percent of sample units in California) (CDFW 2015, p. 55).

The indigenous population of fishers in Oregon was estimated to have a 26 percent range reduction compared to verifiable fisher records collected since 1993 (Barry 2018, p. 22). However, the author notes this comparison should be treated with caution, and we elaborate further on this analysis in Service (2020, entire), concluding that this estimate of the magnitude may be overstated.

Trend information for fishers within the NCSO DPS is based on the following two long-term study areas. As indicated above, we now consider the NCSO DPS to include the areas previously represented as the SOC and NSN reintroduced fisher subpopulations.

The Hoopa study area is approximately 145 mi^2 (370 km^2) on the Hoopa Valley Indian Reservation north of California State Highway 299 and near Highway 96, which is largely surrounded by the Six Rivers National Forest and other private lands. The study area represents the more mesic portion (containing a moderate amount of moisture) of the NCSO DPS. Fisher studies have been ongoing since 1996. The population trend in the period 2005–2012 indicates declining populations with lambda of 0.992 (C.I. 0.883–1.100) with a higher lambda rate for females 1.038 (0.881–1.196) than males 0.912 (0.777–1.047) (Higley et al. 2014, p. 102, Higley 2015, pers. comm.). The authors concluded that, “the population as a whole is essentially stable” (Higley et al. 2014, p. 31), but they raised concerns about declines in survival of males over the last 3 years of the study; they believed the decline was associated with toxicant poisoning associated with illegal marijuana growing and that males were at a higher risk because of their larger home ranges compared to females (Higley et al. 2014, pp. 32, 38).

The Eastern Klamath Study Area (EKSA) is approximately 200 mi^2 (510 km^2) in size straddling the California/Oregon border. This study area represents the more xeric portion (containing little moisture; very dry) of the NCSO DPS. Monitoring has occurred since 2006 (Green *et al.* 2018a, entire). The estimate for population growth rate in the period 2006–2013 is increasing (lambda = 1.06; C.I. 0.97–1.15) (Powell *et al.* 2014, p. 18). Fishers in this study area were a source for translocating fishers to the Stirling reintroduction site elsewhere in the DPS. Nine fishers removed over a two-year period (equivalent to 20 percent of the population) did not affect fisher abundance or density in the study area (Green *et al.* 2017b, p. 9).

After fires in this study area in 2014, the estimated number of fishers declined by 40 percent (Green *et al.* 2019, p. 8). While the fate of the fishers affected by the fire is unknown, it is possible that some fishers may have emigrated out of the burned areas (Green *et al.* 2017, pp. 9-10) or may reoccupy areas that burned at lower severities in the future. In addition, population data is only available through 2016, and post-fire fisher numbers may be within the normal range of population variation when compared to pre-fire population data (Green *et al.* 2019a, p. 18; Matthews 2020 pers. comm.). Data since 2016 has not yet been calculated to allow for a definitive conclusion as to the effects of the fire on fishers in this study area.

In the absence of limiting factors, populations tend to steadily increase (lambda >1) until the population growth becomes restricted. Within the NCSO DPS, this has been occurring in the Stirling reintroduced population as it expands to fill available habitat (Powell et al. 2019, p xxx) Healthy populations will then naturally fluctuate around their upper limit, or carrying capacity, increasing in some years and decreasing in other years (Figure 2). This is exhibited in the data from the EKSA, where annual estimates of abundance for fishers have varied, yielding increasing and decreasing growth rates from year to year prior to the 2014 fires (Table 1). This is consistent with normal variation for populations that are neither growing nor declining, but fluctuating near carrying capacity. For both the Hoopa and the EKSA studies, the authors' use term "stable" (Higley *et al.* 2014, p. 31; Green *et al.* 2016, p. 8) implies that the lambda rates are not swinging dramatically from year to year, but rather annual abundance estimates are fluctuating around a steady value consistent with normal population variation. There are still uncertainties regarding the post fire declines from the EKSA study area (addressed below in Wildfire and Wildfire Suppression section) as well as the reduced male survival rates in the Hoopa study area. However, the best available data suggests that populations are exhibiting variability that may be consistent with populations at or near carrying capacity.

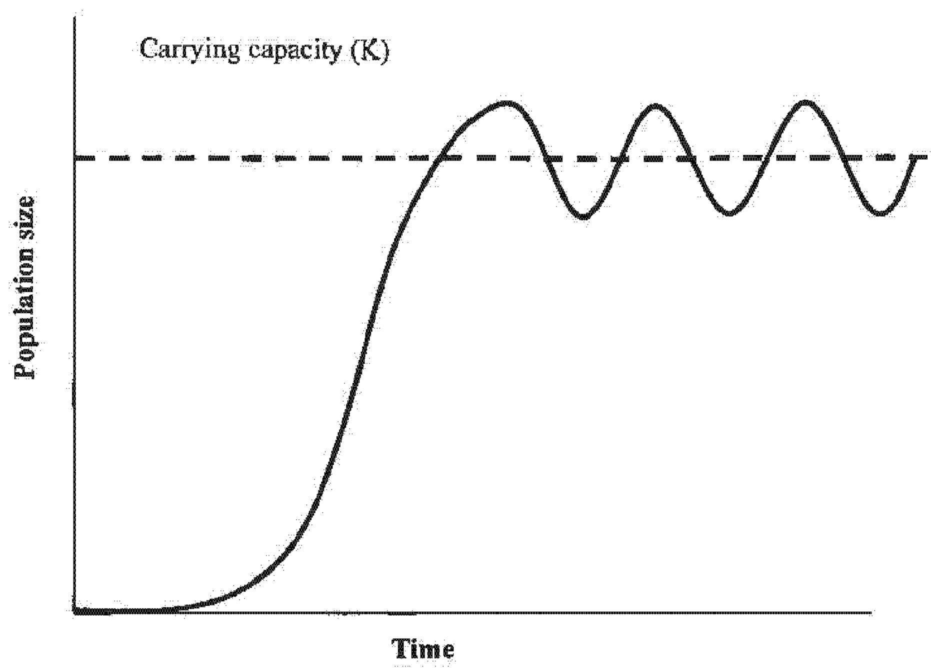

Figure 2. Theoretical population trend with respect to carrying capacity (K). When the population is low, growth rate is rapid. When the population is at or near K, growth rates decelerate and may temporarily decrease as population size fluctuates around K.

Table 1. Derived posterior parameter estimates of annual population density, abundance, and population growth of fishers in the Klamath. Parameters are presented as median [95% credible interval] (Greene et al. 2016, p. 15).

Year	Density (fishers/100 km2)	Abundance	Lambda
2006	6.64 [4.94, 8.35]	39 [29, 49]	-
2007	6.64 [4.94, 8.18]	39 [29, 48]	1 [0.71, 1.35]
2008	6.99 [5.62, 8.69]	41 [32, 50]	1.06 [0.78, 1.4]
2009	6.47 [5.11, 8.18]	38 [29, 47]	0.92 [0.67, 1.2]
2010	5.79 [4.43, 7.33]	34 [26, 43]	0.91 [0.64, 1.21]
2011	6.47 [5.11, 8.18]	38 [28, 46]	1.09 [0.78, 1.45]
2012	6.3 [4.94, 8.18]	37 [27, 46]	0.98 [0.72, 1.33]
2013	6.99 [5.62, 8.69]	41 [32, 50]	1.11 [0.81, 1.49]

Fishers in the NCSO DPS have rebounded substantially from their low in the late 1800s and early 1900s. Grinnell et al. (1937, p. 227) suggested no more than 300 fishers occurred in all of California. Fishers currently occupy much of their historical range in northwestern California and may have expanded into the redwood region (CDFW 2015, p. 23); fisher detections have increased in northern coastal California since the 1990s, though it is not known as to whether this increase is due to a range expansion, recolonization, increased survey effort, or whether fishers remained undetected in earlier surveys (CDFW 2015, p. 50). Recent monitoring information submitted during the public comment period on the 2019 revised proposed rule indicates fishers continue to occur across much of northern coastal California; systematic camera surveys on private timber lands found fishers at 65 of 93 (70 percent) camera stations (Green Diamond 2019, p. 8) during the 2018-2019 winter, suggesting fishers are well-distributed across the company's lands. In Oregon, fishers also appear to have expanded from low numbers in the 1940s, when fishers were considered extremely rare and perhaps close to extirpation (see Barry 2018, pp. 16-17 for summary), to being "relatively common" where the indigenous population is found (Barry 2018, p. 22). Fishers also appear to be widespread and common throughout much of the DPS (CDFW 2015, pp. 54-55).

The major habitat-based threats experienced by the NCSO DPS are loss of complex canopy forests and den/rest sites and fragmentation of habitat from high-severity wildfire, wildfire suppression activities (e.g., backburning, fuel breaks, and snag removal), and vegetation management (e.g., fuels reduction treatments, salvage, hazard tree removal). Major non-habitat related threats are exposure to toxicants and, in some areas, predation. In addition to these threats acting on the NCSO DPS, there are also several conservation efforts designed to benefit fishers. These efforts include those being implemented within the portion of the range covered by the Northwest Forest Plan (NWFP), including measures associated with Endangered Species Act section 7 consultations in overlapping northern spotted owl (*Strix occidentalis caurina*) designated critical habitat. We summarize conservation measures and regulation mechanisms that address some of these threats below in the Existing Regulatory Mechanisms section.

Threats SSN had additional paragraphs here

The immediacy of each threat was assessed independently based upon the nature of the threat and time period that we can be reasonably certain the threat is acting on fisher populations or their habitat. In general, we considered that the trajectories of the threats acting on fisher subpopulations across the DPS's range could be reasonably anticipated over the next 35–40 years. We estimated this timeframe as a result of our evaluation of an array of time periods used in modeling. For example, climate models for areas with fisher habitat, habitat conservation plans (HCPs), and timber harvest models generally predict 50 to 100 years into the future, and forest planning documents often predict over shorter timeframes (10 to 20 years). We considered 40 years at the time of the 2014 Proposed Rule, and given the 5-year time period since, we are modifying the foreseeable future time period to a range of 35–40 years. This is a timeframe that we can reasonably determine that both the future threats and the species' responses to those threats are likely. This time period extends only so far as the predictions into the future are reliable, including a balance of the timeframes of various models with the types of threats anticipated during the 35- to 40-year time period.

Wildfire and Wildfire Suppression

Direct evidence of fisher population response to wildfire is limited. In a monitored fisher population in the Klamath-Siskiyou area, declines in the overall fisher population occurred after wildfires in the study area in 2014 (Green et al. 2019a, entire). This population of fishers has been monitored since 2006 and the population was considered relatively stable, despite 20 percent of the population having been removed for translocation purposes during that time (Green et al. 2019a, p. 4). Fisher numbers in the study area declined 40 percent from 2013, the year prior to the fires. This decrease became apparent the first full year following the fires (2015) and persisted into the following year (Green et al. 2019a, p. 8, Figure 2). However, though as yet untested, the decline appears to be within the range of variability shown by the population during pre-fire monitoring, as evidenced by overlapping confidence intervals between the post-fire and pre-fire population estimates. The post-fire population data was compared only with abundance data from 2013, and it was not evaluated in context with the overall pre-fire population trend to assess the decline in context with the overall historical population trend; in addition, monitoring data since 2016 is not yet fully evaluated. Both of these tasks are currently underway (Matthews pers. comm. 2020). Fisher densities declined across all wildfire severity types, but they declined the most in areas with more than a 50 percent loss of tree basal area, consistent with other studies (Green et al. 2019, pp. 6, 9). The authors note that their data represent only the short-term effects of fires, and any negative effects may not persist. We do not know the fate of individual fishers that left the population after the fire and whether their fitness was ultimately compromised.

Within the Biscuit Fire area in southwest Oregon, which burned in 2002, surveys conducted in 2016 and 2017 did not detect fishers within the burn perimeter (Barry 2018, pp. 22–23), suggesting the fires have resulted in fishers no longer occurring in the burn area. Detection records do not suggest fisher was ever abundant in the area prior to the fire (Service 2016, pp. 24, 33, 34, and 35, Figures 4, 6, 7, and 8), however much of the Kalmiopsis Wilderness Area, which is within the burn perimeter, does not appear to have been surveyed, likely due to limited access.

Given projected changes in climate, forests are expected to become more vulnerable to wildfires over the coming century. For example, the proportion of forests considered highly suitable for wildfire in the Klamath Mountains is projected to increase from 18 percent to 48–51 percent by the end of the century, with most of that increase projected to occur on Federal lands (Davis et al. 2017, p. 180). Fire return intervals in low to mid elevation forests in Northwest California and the Sierra Nevada Mountains have among the highest departure rates from historical fire return intervals in the State (Safford and Van de Water 2014, pp. iii, 17, 22, 36-37). And, fire return intervals in the Coast Range and Klamath mountains in Oregon are expected to decrease by half, which would result in a near tripling of the annual area burned in this century compared to last (Sheehan et al. 2015, pp. 20–22; Dalton et al. 2017, p. 46). We note that the projected increases include fires of all severity types, so the losses do not translate directly to an amount of fisher habitat removed by fires. In the case of low- and moderate-severity fires, these may actually create elements used by fishers.

An analysis of fire effects on fisher habitat was done centering on the Klamath Basin and encompassing the NCSO (Conservation Biology Institute, 2019a and 2019b, entire). The study looked at fisher habitat patches large enough to support five or more breeding female home ranges and labeled them as core habitat; the study also identified fisher linkage areas, which were areas on the landscape identified as least-cost pathways to connect the core habitats (Conservation Biology Institute 2019a, pp. 3, 16). They found that 24 percent of modeled fisher core areas, and 24 percent of modeled fisher linkage areas were considered at risk of at least temporary loss due to severe fires (Conservation Biology Institute, 2019b, pp. 22, 25). It is important to note that this does not total to 48 percent of the fisher habitat in the study area; core areas are larger patches of fisher habitat, while linkage areas may or may not comprise suitable habitat, but instead represent "least cost" paths between core areas.

To update our 2014 analysis of wildfire effects within the NCSO DPS, we conducted an analysis similar to the one completed for the 2014 draft Species Report (Service 2014, pp. 62–64; Service 2019b, unpublished data). Using the fisher habitat map developed for the 2014 Proposed Rule (Fitzgerald et al. 2014, entire) and U.S. Forest Service data for burn severity for

2008–2018 (USDA Forest Service 2019), we estimated the effects of high-severity wildfire to fisher habitat (high and intermediate categories) over the past 11 years. We assumed wildfires that burned at high severity (greater than 50 percent basal area loss) changed fisher habitat to a condition that would not be selected by fishers for denning and resting (although this may not always be the case, as described above in the General Species Information section). Use of >50 percent basal area loss is consistent with recent fire effects analyses on fishers based on the recent results as reported in Green *et al.* (2019a, p. 6). Overall, high and intermediate quality fisher habitat in the NCSO DPS decreased by 526,424 ac (213,036 ha) from 7,050,035 ac (2,853,047 ha) to 6,523,610 ac (2,640,011 ha), or approximately 7.5 percent was lost as a result of wildfires since 2008; this is an average loss of 6.8 percent per decade.

The geography of the Klamath ecoregion, which makes up much of the NCSO where fishers occur, is steep and complex. The variation in elevation and aspect shapes vegetation composition and distribution. This influences fuels and ultimately fire behavior and location (Taylor and Skinner 1998, p. 297; Taylor and Skinner 2003, p. 714; Skinner et al. xxx p. 179-180). Consequently, fires tend to be more prevalent on drier sites, while less frequent on moister sites, which tends to be areas more consistent with fisher habitat. While these patterns may or may not continue with the effects of climate change, we can use management such as the recent fuels reduction MOUs (see Existing Regulatory Mechanisms below) to leverage existing topography and vegetation condition to better manage for wildfires.

We acknowledge that large scale wildfires affect fisher habitat, particularly given the predicted increases in wildfire associated with climate change by the end of the century. We also acknowledge that fires, even large fires, are part of the natural fire regime within the NCSO

DPS, and fishers have sustained themselves and coexisted with wildfire for centuries. Into the future, it will be important to have areas that can maintain reproducing fishers while severely burned areas can regenerate into fisher habitat again, whether that is foraging habitat within a decade or two, or denning and roosting habitat several decades beyond. Existing land allocations like late-successional reserves from the NWFP on Federal lands throughout much of the NCSO DPS, especially in the areas with the greatest fire severities, will be necessary to manage these areas to return to forest habitat with complex structure. This will ensure suitable habitat lost to fires will be managed to develop the overstory and structural features conducive to fishers. In the interim, retaining important structural features in burned areas, per reserve land allocation standards and guidelines, will facilitate the use of these areas by prey and foraging fishers within a few decades following high severity fires.

Although fire risk is expected to increase with climate change, fishers are well distributed across the NCSO DPS, including coastal areas such as the redwood region, which may be less prone to wildfire risk. This redundancy and representation (see Resiliency, Redundancy, and Representation section) should allow fishers to redistribute themselves into habitat remaining after individual fires.

Climate Change

The general climate change related effects discussed above (see Climate Change) apply to the NCSO DPS, in addition to the following effects, which are more specific to the NCSO DPS. In particular, Siskiyou and Trinity Counties in interior northern California are projected to see the greatest temperature increases for the North Coast Region (Grantham 2018, p. 17). In the Klamath Mountains, models suggest precipitation is likely to fall increasingly as rain rather than snow, becoming mainly rain-dominated by mid-century (Dalton et al. 2017, p. 17). Significant or amplified wildfire activity, with increased area burned and severity can result in reduced denning habitat availability for fishers in the Coast Range and Klamath Mountains. These two areas are projected to experience wildfire return intervals decreased by half and thus result in a near tripling of the annual area burned in this century compared to last (Sheehan et al. 2015, pp. 20–22; Dalton et al. 2017, p. 46). Fire return intervals in low to mid elevation forests in Northwest California and the Sierra Nevada Mountains have among the highest departure rates from historical fire return intervals in the State (Safford and Van de Water 2014, pp. iii, 17, 22, 36-37).

Overall, the best available scientific and commercial information suggests that changing climate conditions (particularly warmer and drier conditions) are influencing other threats to fishers and their habitat within the NCSO DPS, in particular wildfire. However, this is not to say that the NCSO will experience widespread or an even distribution of climate driven wildfire events, rather, they are likely to be moderated by the wide variety of topography, vegetation, and climate conditions within the NCSO physiographic provinces (Service 2016, pp. 15-17, 28-29, 38-39). Please see additional discussion about potential impacts to fishers or their habitat associated with wildfire (Wildfire and Wildfire Suppression above).

Tree Mortality from Drought, Disease, and Insect Infestation

Specific to the NCSO DPS, sudden oak death (*Phytophthora ramorum*) has caused some tree mortality in southwestern Oregon and northwestern California (COMTF 2019, p. 1; Oregon Department of Forestry (ODF) 2016, pp. 1–2), but it is not causing widespread losses of oaks used by fisher for denning or resting or food sources for fisher prey. Overall, warmer and drier climate conditions are projected for the NCSO DPS; however, the varied composition of the vegetation (e.g., Lofroth *et al.* 2011, pp. 34–90) in the DPS suggests insect outbreaks and disease due to drought related stress on trees are more likely to be localized should they occur; therefore, future widespread tree mortality impacts to fisher habitat are not anticipated in the NCSO DPS.

Vegetation Management

Although local analyses across the NCSO DPS have assessed fisher habitat at several scales (see Lofroth et al. 2011, pp. 34–90 for study summaries, and Raley et al. 2012, pp. 234–235 for list of additional studies), there is no analysis available that explicitly tracks changes in fisher habitat in recent decades across large portions of the DPS, and which includes fisher habitat ingrowth as well as habitat loss to specific disturbances. Therefore, we used other available information, as described below, to analyze the potential effects of this threat on fishers in the NCSO DPS. In addition to the draft Species Report (Service 2014, pp. 85–96), we used several different sources of information to depict forest vegetation changes caused by vegetation management activities and offset by ingrowth within the range of the NCSO DPS. With the exception of the non-Federal timber harvest database in California (California Department of Forestry and Fire Protections (CAL FIRE) 2013), all of these sources are either new or updated since 2014 (Davis et al. 2015, entire; USDA Forest Service 2016, entire; Spencer et al. 2016, entire; Spencer et al. 2017, entire; gradient nearest neighbor (GNN) data/maps). With these available data, we did not need to rely on northern spotted owl habitat data as a surrogate for fisher habitat data in this evaluation. Our revised methodology is described in detail for the historical, three-State range of the DPS in the 2016 final Species Report (Service 2016, pp. 98–111); we summarize it below and describe how it applies to the NCSO DPS.

Within the portion of the NCSO DPS overlying the Northwest Forest Plan region (generally most of the NCSO DPS except for the northern Sierras), we used information from the draft late-successional and old-growth forest monitoring report (Davis *et al.* 2015, entire) to assess changes in structural habitat elements associated with fisher habitat (i.e., large trees, down wood, snags) as a result of vegetation management. This information included use of the "old growth structure index" (OGSI), which is an index that consists of four structural elements associated with older forests: (1) the density of large live trees; (2) the density of large snags; (3) the amount of down wood cover; and (4) the tree size diversity of the stand. Over a 20-year period (1993–2012), Davis *et al.* (2015, pp. 5–6, 16–18) tracked changes in forests classed as OGSI–80, which represents forests that begin to show stand structures associated with older forests (e.g., large live trees, snags, down wood, and diverse tree sizes). Though OGSI–80 forests are not a comprehensive representation of fisher habitat, the condition does track forests that contain structural elements consistently used by fishers in habitat studies across the DPS, even in areas with substantially open areas and managed young stands (Lofroth *et al.* 2016, pp. 81–121; Service 2016, pp. 15–21; Niblett *et al.* 2017, pp. 16–17; Powell *et al.* 2017, pp. 24–26; Matthews et al. 2019, p. 1,309, 1,313; Moriarty et al. 2019, pp. 29–30, 46–49). We acknowledge there is some unknown level of overrepresentation of stands that may not be occupied by fishers and underrepresentation of stands that fishers may actually occupy (Service 2016, p. 102), and we do not suggest that OGSI-80 is a surrogate for fisher habitat proper. Hence, we do not consider it a model of fisher habitat.

However, OGSI-80 does cover a majority of the NCSO DPS and provides a way to assess regional-scale trends in forests that contain the structural elements consistently used by fishers (e.g., large snags, down wood, and large live trees). This information was the only data set available that identified the amount of acres lost to timber harvest or vegetation management (as well as disturbances from fire and insects) and the amount recruited by forest ingrowth. This OGSI-80 data set allows us to track changes as a result of vegetation management and forest recruitment. In using the OGSI-80 data, we do not expect there to be substantial differences in relative trends for disturbances and ingrowth effects on OGSI-80 stands compared to trends in their effects on fisher habitat.

Details of our analysis of Davis et al. (2015, entire) are explained in the 2016 final Species Report (Service 2016, pp. 101–102). We have since modified that analysis to only include data for the areas (physiographic provinces) that cover the current range of fishers in the NCSO DPS. The California portion of the NCSO DPS covers all of the California physiographic provinces analyzed in Davis et al. (2015, pp. 10, 30–31). The Oregon portion of the NCSO DPS occurs mostly within the Oregon Klamath province, but overlaps somewhat into small portions of the western and eastern Cascades provinces (Davis et al. 2015, pp. 10, 30–31). We assessed the results of including and excluding the data from these two Cascades provinces. Because no substantial differences were revealed between the two data sets, we report here the results of including only the Oregon Klamath province data along with data for all of the California physiographic provinces that are covered by the NWFP.

Although loss of OGSI-80 forests due to timber harvest on non-Federal lands (11.1 percent since 1993) was substantially greater than on Federal lands (1.0 percent since 1993), in combining all ownerships, the percent loss due to timber harvest from 1993 to 2012 was low (5.0 percent). This translates to a 2.5 percent loss per decade. However, this may underestimate future harvest trends because timber harvest volume within the NWFP area on Federal lands has been on a general upward trend since 2000. During the first decade of NWFP implementation, Federal agencies offered, on average annually, 54 percent of the timber harvest sale goals (probable sale quantity or PSQ) identified in the Plan, whereas volume offered in 2012 was at about 80 percent of the PSQ identified in the NWFP, as agencies became more familiar with implementing the NWFP (USDI BLM 2015, p. 340; Spies et al. 2018, pp. 8–9). In addition, BLM has recently revised their management plans in western Oregon and is no longer operating under the NWFP. Consequently, that agency is predicting an increase in timber volume above the NWFP sale quantity in the first decade of implementation (through circa 2025) (USDI BLM 2015, pp. 350–352). Recent litigation may also increase timber harvest on BLM (see Existing Regulatory Mechanisms section). Hence, overall harvest trends on Federal lands may be increasing and may be closer to or more than rates observed in the last decade of NWFP implementation (2003 to 2012).

The net loss of OGSI-80 conditions to timber harvest, however, is somewhat less because 2.5 percent per decade does not include ingrowth of OGSI–80 stands. Ingrowth represents those stands that did not meet the OGSI–80 structural thresholds at the beginning of the 20-year monitoring period but, through vegetation succession, reached those thresholds at the end of the monitoring period. Stands that grow into the OGSI-80 condition are assumed to offset the loss of other OGSI-80 to disturbance such as vegetation management. However, we acknowledge that OGSI-80 stands exist on a continuum, and OGSI-80 stands lost to timber harvest or some other disturbance are not necessarily equivalent in structural quality to stands that recently cross a threshold of being classified as OGSI-80. That is, the longer stands remain in the OGSI-80 classification, the more likely they are to contain more old-forest structural conditions that benefit fishers.

Ingrowth of OGSI–80 stands within the NWFP portion of the DPS occurred at a rate of 8 percent over the 20-year period, or 4 percent per decade (calculated from Davis et al. (2015, tables 6 and 7, pp. 30–31)). This ingrowth more than offsets the OGSI–80 stands lost to vegetation management. However, there is still an overall net loss of OGSI-80 stands in the DPS because all disturbances (i.e. wildfire and forest insects and pathogens) need to be considered. When all disturbances and ingrowth are factored in, there is a net loss of 1 percent per decade. However, vegetation management is affects a small portion of those habitat components used by fisher within the NWFP area. Furthermore, ingrowth rates are expected to increase in the foreseeable future on Federal lands within the NWFP area because forests regenerating from the post-World War II harvest boom starting in the 1940s are beginning to meet the OGSI–80 threshold (Davis et al. 2015, p. 7).

We note that we incorporated the loss of OGSI-80 stands to wildfire into this analysis of vegetation management only to fully consider the degree to which ingrowth can offset loss of OGSI-80 stands to disturbance. We use a different metric to address the loss of fisher habitat to wildfire (see the Wildfire and Wildfire Suppression section). For the wildfire analysis, we were able to obtain data from past wildfires and overlay it on fisher habitat to better represent fisher habitat loss to high-severity wildfires as well as to incorporate the effects from more recent wildfires than those analyzed by Davis et al. (2015, p. 29).

Outside of the NWFP portion of the DPS (primarily Sierra Nevada region), while we could track vegetation changes over time, the available data did not indicate the amount or types of disturbances affecting the specific vegetation types; that is, we could determine net change in a particular vegetation type, but could not quantify the amount lost to a specific disturbance type, unlike in the NWFP area. Timber harvest records were available for the Sierra Nevada region, but idiosyncrasies in the FACTS (Forest Service Activity Tracking System) database (see Spencer et al. (2016, p. A–30)) and the fact that the available private lands database (CAL FIRE timber harvest plans) did not indicate types of treatment or what portion of the plans may have actually been implemented, led to concerns in translating acres of "treatment" as depicted in these databases into on-the-ground changes in forest vegetation types that could represent fisher habitat. Instead, we relied on net vegetation change data to display actual changes in forests that approximate conditions suitable for fisher habitat, realizing that net changes include other disturbances and that vegetation management will be some unknown portion of that change.

For the Sierra Nevada Range (note that this includes the entire range, as we were not able to split out the SSN DPS from the NCSO DPS), we approximated fisher habitat change using a vegetation trend analysis to track changes in forests with large structural conditions thought to be associated with fisher habitat (see Service 2016, p. 106 for a description related to using gradient nearest neighbor (GNN) data). The vegetation category tracked in this analysis is not equivalent to the OGSI–80 forests used by Davis et al. (2015, entire). Instead, the available data limited us to using predefined structure conditions describing forests with larger trees (greater than 20 in (50 cm)). We realize this may not include all vegetation types used by fishers. This analysis showed that net loss of forests with larger structural conditions in the Sierra Nevada Range was 6.2 percent across all ownerships over the past 20 years, which equates to a loss of 3.1 percent per decade. However, this is loss associated with all disturbance types, including wildfire and insects and disease, that occurred from 1993 through 2012. Hence, vegetation management is some unknown subset of this loss. .

Vegetation management is not affecting large areas of the NCSO DPS, though fragmentation could be restricting fisher movements in localized areas or increasing predation risk. For example, fishers continue to persist in actively managed landscapes (Green Diamond 2019), and fishers reintroduced into the Sierra Nevada portion of the NCSO DPS on SPI lands, which are managed for timber production, suggest that fisher populations can become established and persist in a landscape where substantial portions were historically and are currently managed for timber production (Powell et al. 2019, entire; Green et al. 2020, entire). Hence, we conclude that vegetation management is a low level threat because of the small proportion of area harvested in the NCSO DPS and because of the widespread distribution of fishers and their occurrence in actively managed landscapes.

Exposure to Toxicants

As described above in the General Threat Information, rodenticides analyzed as a threat to the NCSO DPS of fishers include first- and second-generation anticoagulant rodenticides and neurotoxicant rodenticides. Both the draft and final Species Reports detail the exposure of the NCSO DPS of fishers to rodenticides in northern California and southern Oregon (Service 2014, pp. 149–166; Service 2016, pp. 141–159). Data available since the completion of the final Species Report in 2016 continue to document exposure and mortalities to fishers from rodenticides in the NCSO DPS (Gabriel and Wengert 2019, unpublished data, entire). Data for 48 fishers collected in the range of the NCSO DPS in the period 2007–2018 indicate 36 fishers (75 percent) tested positive for one or more rodenticides (Gabriel and Wengert 2019, unpublished data), while 13.5 percent of fisher mortalities with a known-cause in the NCSO DPS from 2007 through 2014 were attributable to rodenticides (7 of 52 mortalities) (Gabriel et al. 2015, p. 6). Mortalities due to rodenticide toxicosis have increased from 5.6 to 18.7 percent since the collection and testing of fisher mortalities began in 2007 (Gabriel and Wengert 2019, unpublished data). From 2015 to 2018, additional NCSO DPS fisher mortalities due to both anticoagulant and neurotoxicant rodenticides have been documented (Gabriel and Wengert 2019, unpublished data, p. 4). At the Hoopa study site, population monitoring found "the population as a whole is essentially stable" (Higley et al. 2014, p. 31), but there are concerns about declines in survival of males over the last 3 years of the study. This decline in male survival is attributed to toxicant poisoning associated with illegal grow sites and that males were identified as being at a higher risk for poisoning because of their larger home ranges compared to females (Higley et al. 2014, pp. 32, 38).

To evaluate the risk to NCSO DPS fishers from illegal grow sites, we use a Maximum Entropy model to identify high and moderate likelihood of illegal grow sites being located within fisher habitat (Gabriel and Wengert 2019, unpublished data, pp. 7–10) in Oregon and California. This model indicates that 54 percent of habitat modeled for NCSO DPS fishers is within areas of high and moderate likelihood for marijuana cultivation.

The majority of our illegal grow site data comes from California and data are limited for the amount of pesticides used in Oregon. The U.S. Forest Service documented 63 trespass grows between 2006 and 2016, with toxicants present for all sites visited (Clayton 2019, pers. comm.). To date, only one illegal grow site in southern Oregon has been visited using the same protocol as 300 illegal grow sites in California where the amount and type of rodenticide at a site is tracked. This southern Oregon location had 54 pounds (lb) (24.5 kilograms (kg)) of first-generation anticoagulant rodenticide and 8 lb (3.6 kg) of neurotoxicant rodenticide dispersed around the site (Gabriel and Wengert 2019, unpublished data, p. 7).

As of January 24, 2020, 2,138 legal marijuana cultivation permits were active in Counties within the NCSO and SSN DPSs in California (California Department of Food and Agriculture 2020, entire), and 423 legal marijuana operations have been approved as of January 17, 2020, in Oregon Counties occupied by fishers (Oregon Liquor Control Commission 2020, entire).

Toxicant use on the landscape, and especially anticoagulant rodenticides is a problem for fisher. However, the Stirling subpopulation has grown to the point of becoming self-sustaining (Greene et al. 2020, draft, p. 11; Powell et al. 2019, p. 4) in spite of 11 of 12 fishers testing positive for anticoagulant rodenticides (Powell et al. 2019, p. 17). This suggests that toxicants are not limiting population growth in this area. And, at EKSA only small annual variations were seen in the lambda value (Tabe 1) from 2006 to 2013 (Greene et al. 2016, p. 15). This is at the same time as toxiacant data was being collected and presumably there were illegal grow sites distributed throughout the landscape. Illegal marijuana cultivation has been occurring in California since the mid 1970s, and California has been the primary source of marijuana in the United States for many years. To some degree, the fisher's widespread distribution and relative commonness in the NCSO DPS diffuses the potential for a significant percentage of the subpopulation to be exposed to these toxicants. The presence of illegal grow sites on the landscape since the mid 1970s suggests that the fisher has been living with this threat for some time.

We do not know what level of toxicant exposure is occurring in live fishers. The best available mortality data are limited (19 individuals in California (Gabriel and Wengert 2019, unpublished data, p. 5), and of the two fishers found in Oregon that were tested for rodenticide exposure, both tested positive (Clayton 2016, pers. comm.). We also do not know how the legalization of marijuana will change grow-site location and potentially affect exposure and mortality rates of fishers due to rodenticides.

We view toxicants as a potentially significant threat to fishers in the NCSO DPS because of the reported exposure rate of toxicants in the NCSO DPS, the reported mortalities of fishers from toxicants in the NCSO DPS, the variety of potential sublethal effects due to exposure to rodenticides (including potential reduced ability to capture prey and avoid predators), and the degree to which illegal cannabis cultivation overlaps with the range and habitat of fisher in the NCSO DPS. The exposure rate of 75 percent of fisher carcasses tested in the NCSO DPS has not declined between 2007 and 2018 (Gabriel and Wengert 2019, unpublished data, pp. 3–4), while toxicosis has increased since 2007 (Gabriel et al. 2015, p. 7). Again, we do not know the exposure rate of live fishers to toxicants because this data is difficult to collect. In addition, the minimum amount of anticoagulant and neurotoxicant rodenticides required for sublethal or lethal poisoning of fishers is currently unknown.

In spite of the widespread nature or illegal grow sites associated with toxicant exposure, as well as the prevalence on toxicants occurring in tested fishers, the NCSO population seems to withstand this threat (considering increasing and stable trends at Stirling, EKSA, and Hoopa). Overall, rodenticides are likely a threat to fisher within the NCSO DPS now and in the foreseeable future, although we lack significant information about the magnitude or mechanisms of population-level effects at this point in time. We recognize there is a lot we don't know about toxicant exposure. But, because fisher populations in NCSO are increasing (Stirling) or stable (EKSA and Hoopa), we expect the fisher's widespread distribution in the NCSO DPS and its relative commonness may provide a buffer to the effects of toxicants in this DPS.

Potential for Effects Associated With Small Population Size

The NCSO DPS, which encompasses both the SOC and NSN reintroduction sites, covers a relatively large geographic area of approximately 15,444 mi^2 (40,000 km^2). Overall, the NCSO DPS has not expanded beyond our previous estimates; however, the SOC subpopulation may have contracted (Barry 2018, p. 22; Moriarty et al. in press, p. 5) while the NSN subpopulation continues to grow (Powell et al. 2019, p. 2). Please see the Current Condition section above for detailed information on subpopulation size estimates.

Generally, a species (or DPS) with relatively few populations may be a concern when there are significant threats to the species such that one or more populations may be permanently lost in the future. Fisher subpopulations in the NCSO DPS, as a whole, have not appeared to grow or expand, despite the availability of suitable habitat; however, multiple, well-distributed subpopulations (i.e., NCSO, NSN, and SOC) continue to exist across the DPS; this includes aggregates of individuals in geographic areas within NCSO (i.e., EKSA fishers, fishers in and around Redwood National Park, Hoopa fishers, or fishers spread downslope of the Siskiyou Crest). At this time, the best available information for monitored fishers within the DPS (e.g., Green 2017, Higley et al. 2014, Powell et al. 2014, entire; Sweitzer et al. 2015a, entire) does not indicate whether the NCSO DPS is increasing, stable, or declining. Tucker et al. (2012, pp. 8, 11) found low genetic diversity within the NCSO population (and SSN population) that may have occurred prior to the late 1800s when historical samples were taken. However, fishers have rebounded from substantial population reductions as a result of trapping and habitat loss since then and they are currently widespread and common across the DPS. Fishers are well distributed across the NCSO DPS, without barriers for genetic exchange within the DPS (e.g., genetically homogeneous fishers occupy either side of the Klamath River adjacent to a 2-lane, paved highway (Service 2016, p. 113). Furthermore, there is no indication that effects of small population size (e.g. inbreeding depression) are resulting in negative fitness effects to the NCSO DPS. Further, genetic diversity decreases moving southward with the peripheral areas (e.g. SSN DPS) having the lowest genetic diversity (Wisely *et al.* 2004). An effective population size estimate of 128 by Tucker et al. (2012, pp. 8, 10) does not indicate inbreeding depression when compared to suggested effective population size thresholds of 50 or 100 established in the literature (Jamieson and Allendorf 2012, entire; Frankham et al. 2014, entire). In light of all of this information, fishers are not exhibiting signs associated with vulnerabilities from small population size and are likely to continue to occupy the DPS amid stochastic events, in particular wildfire.

Disease and Predation

A general description of disease and predation on fishers is provided above (see General Species Information and Summary of Threats). Specific to the California portion of the NCSO DPS, of 42 fisher mortalities analyzed, 54 percent were a result of predation and 19 percent were caused by disease (Gabriel et al. 2015, p. 7, Table 2). It is not unexpected that predation is the greatest source of mortality given the suite of larger, generalist predators that occupy the NCSO DPS (e.g., coyotes, bobcats, and mountain lions). As noted in the General Species Information and Summary of Threats section, we do not know whether observed predation rates are substantially different from historical rates, or whether they are comparable with other populations not subjected to trapping. We acknowledge that sublethal effects of toxicants as well as a possible increase in exposure to generalist predators as a result of habitat modification may result in higher predation rates than what historically occurred (Gabriel et al. 2015, p. 14). However, fishers continue to remain widely distributed across the DPS and populations continue to grow (e.g. Stirling subpopulation) or exhibit seemingly normal variability (e.g. EKSA) in spite of these stressors.

Vehicle Collisions

Vehicle related mortalities make up a small portion of overall fisher mortality across California (see General Species Information and Summary of Threats above) and particularly in the NCSO DPS (Service 2016, p. 138). Although major paved highways with high-speed traffic occur throughout the DPS, available records do not indicate localized areas of concentrated mortalities that may substantially decrease local fisher populations. Hence, we do not consider vehicle collisions to be a substantial threat to fishers in the NCSO DPS.

<u>Existing Regulatory Mechanisms</u>

Forest Service and BLM

A number of Federal agency regulatory mechanisms pertain to management of fisher (and other species and habitat). Most Federal activities must comply with the National Environmental Policy Act of 1969, as amended (NEPA) (42 U.S.C. 4321 et seq.). NEPA requires Federal agencies to formally document, consider, and publicly disclose the environmental impacts of major Federal actions and management decisions significantly affecting the human environment. NEPA does not regulate or protect fishers, but it requires full evaluation and disclosure of the effects of Federal actions on the environment.

Other Federal regulations affecting fishers are the Multiple-Use Sustained Yield Act of 1960, as amended (16 U.S.C. 528 et seq.), and the National Forest Management Act of 1976, as amended (NFMA) (90 Stat. 2949 et seq.; 16 U.S.C. 1601 et seq.). The NFMA specifies that the Forest Service must have a land and resource management plan to guide and set standards for all natural resource management activities on each National Forest or National Grassland. Additionally, the fisher has been identified as a sensitive species and a species of conservation concern by the Forest Service, requiring Forest Plans to include Standards and Guidelines designed to benefit fisher. Overall, per USFS guidelines under the NFMA, planning rules must consider the maintenance of viable populations of species of conservation concern.

BLM management is directed by the Federal Land Policy and Management Act of 1976, as amended (43 U.S.C. 1704 et seq.). This legislation provides direction for resource planning and establishes that BLM lands shall be managed under the principles of multiple use and sustained yield. This law directs development and implementation of resource management plans, which guide management of BLM lands at the local level. Fishers are also designated as a sensitive species on BLM lands.

In addition, the NWFP was adopted by the Forest Service and BLM in 1994 to guide the management of more than 24 million ac (9.7 million ha) of Federal lands within the range of the northern spotted owl, which overlaps with portions of the NCSO DPS of fisher in Oregon and northwestern California (U.S. Department of Agriculture (USDA) and U.S. Department of the

Interior (USDI) 1994, entire). The NWFP Record of Decision amended the management plans of National Forests and BLM districts and provided the basis for conservation of the northern spotted owl and other late-successional and old-growth forest associated species on Federal lands. However, in 2016 the BLM revised their Resource Management Plan (RMP), replacing NWFP direction for BLM-administered lands in western Oregon, totaling approximately 2.5 million ac (1 million ha) (USDI BLM 2016a, 2016b, entire).

Compared with management under the NWFP, BLM's revised RMP results in a decrease in land allocated for timber harvest, from 28 percent of their planning area in the Matrix allocation under NWFP to 20 percent under their revised RMP. However, volume of timber harvest is expected to increase to 278 million board feet per year through the first decade, up from the highest NWFP annual amount of about 250 million board feet, and the average NWFP annual amount of 167 (USDI BLM 2015, pp. 350–352). Forest stand conditions assumed to represent fisher habitat are expected to decline in the first two decades under the revised RMP, similar to projections under the NWFP. However, by decade three, habitat is projected to increase under the revised plan compared to the NWFP because more fisher habitat is in reserve allocations under the revised plan (75 percent of fisher habitat on BLM land) than under the NWFP (49 percent) (USDI BLM 2015, pp. 1,704–1,709). We acknowledge that BLM recently lost a lawsuit on its revised RMP that could result in increased timber harvest and reduced protections for fisher habitat (*American Forest Resources Council, et al., v. Hammond, et al.*, 2019 WL 6311896 (D.D.C. 11/22/2019)(appeal pending, *American Forest Resources Council, et al. v. United States, et al.*, (D.C. Cir., appeal filed 1/24/2020))), but the ultimate remedy is still unknown. Hence, we must use the existing RMP in our analysis of regulatory mechanisms.

Federal lands are important for fishers because they have a network of late-successional and old-growth forests (LSRs) that currently provide habitat for fisher, and the amounts of fisher habitat are expected to increase over time. Also, the National Forest and BLM units with anadromous fish watersheds provide buffers for riparian reserves on either side of a stream, depending on the stream type and size. With limited exceptions, timber harvesting is generally not permitted in riparian reserves, and the additional protection guidelines provided by National Forests and BLM for these areas may provide refugia and connectivity between blocks of fisher habitat. Also, the Forest Service under the NWFP, while anticipating losses of late-successional and old-growth forests in the initial decades of plan implementation, projected that recruitment would exceed those losses within 50 to 100 years of the 1994 NWFP implementation (Davis et al. 2015, p. 7). Furthermore, BLM, under its revised management plans, is also projecting an increase in forest stand conditions, that are assumed to represent fisher habitat, above current conditions beginning in the third decade of plan implementation (USDI BLM 2015, p. 875).

National Park Service

Statutory direction for the National Park Service lands within the NCSO DPS is provided by the provisions of the National Park Service Organic Act of 1916, as amended (54 U.S.C. 100101). Land management plans for the National Parks within Oregon and California do not contain specific measures to protect fishers, but areas not developed specifically for recreation and camping are managed toward natural processes and species composition and are expected to maintain fisher habitat where it is present.

Tribal Lands

Several tribes within the NCSO DPS recognize fishers as a culturally significant species, but only a few tribes have fisher-specific guidelines in their forest management plans. Some tribes, while not managing their lands for fishers explicitly, manage for forest conditions conducive to fisher (for example, marbled murrelet (*Brachyramphus marmoratus*) habitat, old-forest structure restoration). Trapping is typically allowed on most reservations and tribal lands, but it is typically restricted to tribal members. Whereas a few tribal governments trap under existing State trapping laws, most have enacted trapping laws under their respective tribal codes. However, trapping (in general) is not known to be a common occurrence on any of the tribal lands.

Rodenticide Regulatory Mechanisms

The threats posed to fishers from the use of rodenticides are described under "Exposure to Toxicants," above. In the 2016 final Species Report (Service 2016, pp. 187–189), we analyzed whether existing regulatory mechanisms are able to address the potential threats to fishers posed from both legal and illegal use of rodenticides. As described in the 2016 final Species Report, the use of rodenticides is regulated by several Federal and State mechanisms (e.g., Federal Insecticide, Fungicide, and Rodenticide Act of 1947, as amended, (FIFRA) 7 U.S.C. 136, et seq.; California Final Regulation Designating Brodifacoum, Bromadiolone, Difenacoum, and Difethialone (Second Generation Anticoagulant Rodenticide Products) as Restricted Materials, California Department of Pesticide Regulation, 2014). The primary regulatory issue for fishers with respect to rodenticides is the availability of large quantities of rodenticides that can be purchased under the guise of legal uses, but are then used illegally at marijuana grow sites within fisher habitat. Both the Environmental Protection Agency (EPA) and California's Department of Pesticide Regulation are attempting to reduce the risk posed by second-generation anticoagulants through the 2008 Risk Mitigation Decision for Ten Rodenticides (EPA 2008, entire), which issued new legal requirements for the labeling, packaging, and sale of second-generation anticoagulants, and through a rule effective in July 2014, which restricts access to second-generation anticoagulants (citation?).

State Regulatory Mechanisms

Oregon

The fisher is a protected wildlife species in Oregon, meaning it is illegal to kill or possess fishers (Oregon Administrative Rule (OAR) 635–044–0430). In addition, Oregon Department of Fish and Wildlife (ODFW) does not allow trapping of fishers in Oregon. Although fishers can be injured and/or killed by traps set for other species, known fisher captures are infrequent. State parks in Oregon are managed by the Oregon Parks and Recreation Department, and many State parks in Oregon provide forested habitats suitable for fisher.

The Oregon Forest Practice Administrative Rules (OAR chapter 629, division 600) and Forest Practices Act (Oregon Revised Statutes (ORS) 527.610 to 527.770, 527.990(1) and 527.992) (ODF 2018, entire) apply to all non-Federal and non-tribal lands in Oregon, regulating activities that are part of the commercial growing and harvesting of trees, including timber harvesting, road construction and maintenance, slash treatment, reforestation, and pesticide and fertilizer use. The OAR provides additional guidelines intended for conserving soils, water, fish and wildlife habitat, and specific wildlife species while engaging in tree growing and harvesting activities, and these rules may result in retention of some structural features (i.e., snags, green trees, downed wood) that contribute to fisher habitat.

Management of State forest lands is guided by forest management plans. Managing for the structural habitats as described in existing plans should increase habitat for fishers on State forests. However, we acknowledge that the Oregon Department of Forestry recently lost a lawsuit on its State Forest Management Plans that could result in increased timber harvest and reduced retention or development of forest area suitable for fishers, but the ultimate remedy is still unknown. Hence, we must use the existing plans in our analysis of regulatory mechanisms.

California

On June 10, 2015, CDFW submitted its status review of the fisher to the California Fish and Game Commission, indicating that listing of the fisher in the Southern Sierra Nevada Evolutionarily Significant Unit (ESU) as threatened was warranted, but that fishers in the Northern California ESU were not threatened (CDFW 2015, entire). CDFW made their determination after concluding that the cumulative effects of threats would not threaten the continued existence of fishers due to the size and widespread distribution of the fisher population in the ESU (CDFW 2015, p. 141).

It remains illegal to intentionally trap fishers in California (Cal. Code Regs. title 14, §460 (2017).

The California Environmental Quality Act (CEQA) can provide protections for a species that meets one of several criteria for rarity (CEQA 15380). Fishers throughout the NCSO DPS's range in California meet these criteria, and under CEQA, a lead agency can require that adverse impacts be avoided, minimized, or mitigated for projects subject to CEQA review that may impact fisher habitat. All non-Federal forests in California are governed by the State's Forest Practice Rules (FPR) under the Z'Berg Nejedly Forest Practice Act of 1973, a set of regulations and policies designed to maintain the economic viability of the State's forest products industry while preventing environmental degradation. The FPRs do not contain rules specific to fishers, but they may provide some protection of fisher habitat as a result of timber harvest restrictions.

Voluntary Conservation Mechanisms

An intergovernmental MOU for fisher conservation was signed by Federal and State agencies in Oregon (DOI et al. 2016, entire) to facilitate fisher conservation activities, but it does not direct any actual work on the ground. Multiple interagency MOUs are also in place in California with the intention to coordinate and collaborate on actions that may reduce wildfire risk across multiple ownerships; actions that reduce wildfire may also provide reduce risk to habitat loss for multiple species including the fisher. Since the publication of the 2019 Revised Proposed Rule, an interagency MOU (titled "Forest Fuels Reduction and Species Conservation in California") was signed on February 7, 2020, by the U.S. Forest Service, the State, SPI, and the National Fish and Wildlife Foundation to facilitate coordinated actions that may contribute to fuels reduction efforts across the various land ownerships and species conservation (USDA FS *et al.* 2020a). This MOU supersedes and replaces the 2017 MOU for California spotted owl as well as the 2019 MOU for northern spotted owl which are discussed in the next paragraph. Fisher-specific conservation measures were included in an amendment to this MOU that, in addition to the parties listed above, adds numerous other commercial forest landowners (USDA FS *et al.* 2020b). The measures promote fisher occupancy and habitat through increased resilience and resistance of habitat from multiple disturbances, including uncharacteristic wildfire. Under the MOU, participants will implement activities consistent with the conservation needs of the fisher including retention of known natal dens, retention or recruitment of hardwoods and structurally diverse forests, retention of shrubs and smaller trees in areas with sparse overstory cover, and avoid poisoning potential prey species.

There are additional MOUs in California within the range of the NCSO DPS for wildfire and fuels management, but with no specific conservation measure for fisher. An MOU was signed in 2015 by multiple conservation groups, California Department of Forestry and Fire Protection, two Federal agencies, and two prescribed fire councils (USDA FS 2015). The MOU is titled "Cooperating for the purpose of increasing the use of fire to meet ecological and other management objectives." The purpose of this MOU is to document the cooperation between the parties to increase the use of fire to meet ecological and other management objectives. Two other MOUs were signed in Spring of 2019 by large and small industrial timber companies, California Department of Forestry and Fire Protection, National Fish and Wildlife Foundation, and the USDA, Forest Service, Pacific Southwest Region, Regional Office. One is titled "Forest Fuels Reduction and Species Conservation in California" (USDA FS 2019a) and the other is titled "Forest Fuels Reduction and Species Conservation in California, Northern Spotted Owl" (USDA FS 2019b). The purpose of theseMOUs is to document an agreement to coordinate on actions that can reduce fuels and provide species conservation, with an emphasis on conservation of the northern spotted owl in the latter MOU. Finally, a challenge cost share agreement was signed in 2017 by the National Fish and Wildlife Foundation, and the USDA, Forest Service, Pacific Southwest Region, Regional Office (USDA FS 2017). The agreement is titled "Pacific Southwest Fuels Management Strategic Investment Partnership." The purpose of this agreement is to document the cooperation between the parties to implement a hazardous fuels management program that reduces the risk of severe wildfire, protects ecological values, and reduces the change of damage to public and private improvements.

All of these MOUs and the cost share agreement provide collaboration between federal partners and non-governmental organizations to coordinate and fund fuel reduction projects within the NCSO DPS, which could reduce the impact of large-scale high severity fire. So far, we are aware of two fuel reduction projects that have been funded as part of the MOUs within the NCSO DPS, one on the Lassen National Forest and one on the Six Rivers National Forest.

A template CCAA for fishers in western Oregon (81 FR 15737, March 24, 2016) has been published, and we have negotiated site plans and issued permits to five private timber entities (with three more site plans under review), as well as Oregon Department of Forestry (84 FR 4851, February 19, 2019; 84 FR 31903, July 3, 2019). Conservation actions in the CCAA include protection of occupied den sites as well as landowner participation and collaboration with fisher surveys and research as part of a defined program of work. To date, permittees have committed $200,000 in cash or in-kind support towards this program of work as part of meeting conservation measures within the CCAA.

In 2009, a programmatic Safe Harbor Agreement (SHA) was completed for northern spotted owls in Oregon (74 FR 74 35883, July 21, 2009). The agreement authorizes the ODF to extend incidental take coverage with assurances through issuance of Certificates of Inclusion to eligible, non-Federal landowners who are willing to carry out habitat management measures benefitting the northern spotted owl. The purpose of the agreement is to encourage non-Federal landowners to create, maintain, and enhance spotted owl habitat through forest management, which would also benefit fishers given the two species' use of similar habitat components.

For the portion of the NCSO DPS in California, reintroduction efforts have resulted in establishment of a fisher subpopulation in the SPI Stirling Management Area within the NSN with the potential to connect with fishers in the remainder of the NCSO DPS to the north. In 2016, an approximately 1.6 million-ac (647 thousand-ha) CCAA for fishers on lands in Sierra Pacific Industries (SPI) ownership in the Klamath, Cascade, and Sierra Nevada mountains was completed (SPI and Service 2016, entire). This CCAA encompasses approximately 5 percent of potentially suitable fisher habitat in the California portion of the NCSO DPS, 2.7 percent of which is currently occupied. Implementation and monitoring has been under way since that time. The objectives of this CCAA are to secure general forested habitat conditions for fishers for a 10-year time period (2016 to 2026) and the retention of important fisher habitat components (large trees, hardwoods, and snags) suitable for denning and resting into the future. Although this CCAA expires in six years, SPI has a track record of partnering with the Service and has demonstrated a commitment to fisher conservation through the development of this CCAA. We anticipate at the end of the CCAA SPI will continue to conserve fisher. This conservation could be embodied in a new or renewed CCAA, or fisher conservation could be added to an HCP that is currently in development for northern and California spotted owls.

In 2019, the Service finalized an incidental take permit for the Green Diamond Forest HCP (Green Diamond Resource Company (GDRC) 2018, entire), which is anticipated to provide a conservation benefit for fishers and their habitat in Del Norte and Humboldt Counties, California (portions of forests on the west slope of the coastal and Klamath Mountains). Conservation benefits anticipated by GDRC include (but are not limited to): identifying and retaining fisher denning and resting trees, including maintaining a 0.25 mi (0.4 km) radius no-harvest buffer around active fisher dens; fisher-proofing water tanks and pipes; implementing measures that detect, discourage, and remove unauthorized marijuana cultivation and associated pesticide use; and cooperating with any Federal or State-approved fisher capture and relocation/reintroduction recovery programs (Service 2019a, p. 2).

In 1999, the Service finalized an incidental take permit for the Pacific Lumber Company (now Humboldt Redwood Company) HCP (The Pacific Lumber Company 1999, entire), which is anticipated to provide a conservation benefit for fishers and their habitat in Humbolt County, California). Conservation benefits anticipated include (but are not limited to): 1) retention of late seral habitats that is likely to provide denning and resting habitat for fishers, 2) channel migrations zones and riparian management zones that are expected to provide connectivity across the landscape, and 3) retention and recruitment of suitable habitat structural elements that should provide features for fishers from later seral habitats when cut stands reach mid-succession.

Resiliency, Redundancy, and Representation

Resiliency, Redundancy, and RepresentationIn this section, we use the conservation biology principles of resiliency, redundancy, and representation to evaluate how the threats, regulatory mechanisms, and conservation measures identified above relate to the current and future condition of the NCSO DPS.

Resiliency is defined the ability of populations to withstand stochastic events (events arising from random factors). Measured by the size and growth rate of populations, resiliency gauges the probability that the populations comprising a species (or DPS) are able to withstand or bounce back from environmental or demographic stochastic events.

Redundancy is defined as the ability of a species (or DPS) to withstand catastrophic events, and may be characterized by the degree of distribution of the species, either as individuals of a single population or as multiple populations, within the species' ecological settings and across the species' range. The greater redundancy a species exhibits, the greater the chance that the loss of a single population (or a portion of a single population) will have little or no lasting effect on the structure and functioning of the species as a whole.

Representation is defined as the ability of a species (or DPS) to adapt to changing environmental conditions. Measured by the breadth of genetic or environmental diversity within and among populations, representation gauges the probability that a species is capable of adapting to environmental changes.

As noted above, the resiliency of species' population(s), and hence an assessment of the species' overall resiliency, can be evaluated by population size and growth rate. While data on these parameters are often not readily available, inferences about resiliency may be drawn from other demographic measures. In the case of the NCSO DPS, the population size component of resiliency for the overall DPS may be lower than historical levels to some degree, based simply on historical losses. However, we also know that fishers in the DPS have rebounded from the lows of the early-and mid-1900s, and continue to remain widely distributed and common across the DPS. Furthermore, forest carnivores generally occur at low densities (Ruggiero et al. 1994, p. 146), and fisher density estimates are widely variable for many reasons, including changes in prey populations, seasonal changes caused by pulses in births or mortalities, and sampling error (Powell et al. 1994, p. 43). Consequently, existing density estimates across the NCSO DPS, though variable over time and space, do not indicate any population declines. Effective population size estimates for the California portion of the DPS do not indicate that inbreeding depression is occurring, and there are no other concerns related to small population size (see Effects Associated with Small Population Size). This, combined with the widespread distribution of fishers in the DPS, leads us to conclude that existing populations have a high level of resiliency.

Threats acting on a species or DPS that cause losses of individuals from a population have the potential to affect the overall resiliency of that population, and should losses occur at a scale large enough that the overall population size and growth rate are negatively impacted, this could reduce the population's ability to withstand stochastic events. Although we identify threats acting upon the NCSO DPS that likely cause losses of individuals, evaluation of all the available information relevant to the demographic condition of the DPS supports our conclusion of resiliency. In addition to the analysis outlined above, we point to the evidence of population resilience exhibited by aggregates of individuals in specific geographic areas in the NCSO DPS in response to known disturbances or threats. Namely, fishers in the EKSA were resilient to removal of 20 percent of the fisher population within the study area, with no changes in abundance or density. In addition, the fisher population at Stirling has grown at a near steady rate since reintroduction in spite of exposure to toxicants in 11 of 12 tested fishers in the study area (Powell et al. 2019, p. 16). Overall, the NCSO DPS of fisher has remained resilient across its current range, despite the presence of threats acting upon it.

With regard to redundancy, multiple, interacting populations across a broad geographic area or a single wide-ranging population (redundancy) provide insurance against the risk of extinction caused by catastrophic events. The NCSO DPS exhibits redundancy by being well distributed and common across a broad geographic range, and being comprised of multiple smaller subpopulations (i.e., NCSO, NSN, and SOC) and aggregates of individuals in geographic areas (i.e., EKSA fishers, fishers in and around Redwood National Park, Hoopa fishers, or fishers spread downslope of the Siskiyou Crest). Consequently, should catastrophic events such as wildfire affect a portion of the DPS, substantial numbers of fishers will still occur elsewhere in the DPS. Remaining fishers may continue to serve as a source for recolonizing disturbed areas as they return to fisher habitat, contributing to the probability that fishers in the DPS will persist into the future and contribute to the long-term genetic and demographic viability across the range.

Fishers in the NCSO DPS exhibit a high degree of representation as exhibited by ecological variability across the DPS. Fishers are found across multiple physiographic provinces (a geographic region with a specific geomorphology) in the NCSO DPS that represent a wide variety of forest types and ecological conditions, from the Coastal California province that is wetter with lower elevations and redwoods forests, to the Klamath province with greater forest diversity and abundant hardwoods, including several endemic tree and other plant species, to the Sierra and Cascade provinces with higher elevations and forests that have adapted to colder and drier conditions. Within the NCSO DPS, fishers have a capacity to occupy these different provinces and environments, reflecting an ability to adapt to changing environmental conditions, further contributing to long-term viability across their range. Although genetic diversity among fishers sampled in northwest California is low and has been since pre-European settlement (Tucker et al. 2012, p. 8), fishers have rebounded from substantial population reductions as a result of trapping and habitat loss since then and they are currently widespread and common across the DPS.

Determination

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 meets the definition of "endangered species" or "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 a species meets the definition of "endangered species" or "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.

Status Throughout All of Its Range

We evaluated threats to the NCSO DPS of fishers and assessed the cumulative effect of the threats under the section 4(a)(1) factors. Our 2016 final Species Report (Service 2016, entire) is the most recent detailed compilation of fisher ecology and life history, and has a significant amount of analysis related to the potential impacts of threats within the NCSO DPS's range. In addition, we collected and evaluated new information available since 2016, including new information made available to us during the recent comment periods in 2019, to ensure a thorough analysis, as discussed above. We also held numerous internal Service discussions regarding interpretation of the best available information and what it meant for the status of fisher both prior to and following both the October 7, 2014 (79 FR 60419) and November 7, 2019 (84 FR 60278), Proposed Rule and Revised Proposed Rule, respectively, for the West Coast DPS of fisher. During these internal discussions, varied opinions were expressed and vetted. The extensive disparity in comments received (including those from peer reviewers and others) during the comment periods highlighted the fact that there is considerable variation in the interpretation of potential threats to fisher and its current and future status.

Our regulations direct us to determine if a species is endangered or threatened due to any one or combination of the five threat factors identified in the Act (50 CFR 424.11(c)). We consider cumulative effects to be the potential threats to the species in totality and combination; this finding constitutes our cumulative effects analysis. The discussions summarized above and provided in detail in the final Species Report evaluated the individual impact of the following potential threats to the NCSO DPS of fisher and its habitat: (1) wildfire and fire suppression (Factor A); (2) tree mortality from drought, disease, and insect infestation (Factor A); (3) effects of climate change (Factors A and E); (4) vegetation management (Factor A); (5) disease or predation (Factor C); (6) collision with vehicles (Factor E); (7) exposure to toxicants (Factor E); and (8) effects associated with small population size (Factor E). We also evaluated the inadequacy of existing regulatory mechanisms (Factor D). Our determination as reflected in this document is based upon an analysis of these stressors in accordance with the five factors required by the statute.

Upon careful consideration and evaluation of all of the information before us, we have reanalyzed the status of fishers within the NCSO DPS. In our 2019 Revised Proposed Rule, we evaluated the status of the West Coast DPS, the NCSO DPS and SSN DPS combined, and concluded that both the NCSO and SSN were reduced in size from historical conditions, and that threats were acting on fishers across the range of both. However, we also noted that the distribution of threats and their effects, both singly and cumulatively, were likely unequal in magnitude and scale across the full landscape. Specifically, we noted that the potential for effects from small population size would primarily be associated with the SSN subpopulation, as it is significantly smaller than the NCSO subpopulation. We also noted that the potential for effects from threats such as vehicle collisions and disease, may be increased for the SSN subpopulation. In addition, we noted that modeling completed to the SSN subpopulation demonstrated that a 10-20 percent increase in mortality rates could prevent fisher populations there from the opportunity to expand in the future (Spencer et al., 2011, pp. 10-12).

In evaluating the status of the NCSO DPS, we found that the potential for effects associated with small populations are not a substantial threat given the widespread distribution and no evidence of small population effects or indications that fishers are not able to find mates and reproduce. We further conclude that the widespread distribution of fishers in the NCSO DPS, their continued occurrence over the past decades in the face of stressors, and the recent conclusion that the northern Sierra Nevada subpopulation may be self-sustaining, results in a resilient, redundant, and representative DPS that is able to withstand threats now and in the foreseeable future. We acknowledge that toxicant exposure and associated mortalities have increased in the range, but population growth is still occurring despite the fact that this populations is comprised of exposed fishers. Recent post-fire declines in fisher abundance in the Klamath study area have occurred, but declines may be within the range of previous population variability (Matthews 2020, pers. comm.). Additional analyses are in the works to assess whether that decline in abundance continues or whether fishers in the study area have rebounded. In addition, fisher numbers and distribution across the NCSO DPS are such that they are expected to withstand any losses from potential catastrophic events such as wildfire (see Resiliency, Representation, and Redundancy section). Furthermore, we believe existing conservation measures provide for the retention of fisher habitat in some areas, and retention of fisher structural elements as a result of other agreements. In addition, existing conservation measures in the form of a recently signed MOU will help to ameliorate the loss of habitat due to wildfire. While multiple threats such as toxicants, predation, and habitat loss to wildfire and vegetation management will continue to occur in the NCSO DPS, we conclude that the cumulative effect of threats will not threaten the continued existence of fishers within the NCSO DPS now or in the foreseeable future, due to the size and widespread distribution of fisher in the NCSO DPS combined with recent conservation measures. Hence, based on the best available scientific and commercial information, we conclude that the NCSO DPS of fishers is not in danger of extinction, nor likely to become so in the foreseeable future.

There are extensive uncertainties regarding population limiting factors for the DPS and the fishers within, more specifics on what comprises suitable habitat (especially related to disturbances) suitability, and the degree to which the threats affect the DPS over the long term. We recommend continuation of population monitoring studies as well as studies assessing the effects of specific stressors on fisher populations.

Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range (SPR). Where the best available information allows the Service to determine a status for the species rangewide, that determination should be given conclusive weight because a rangewide determination of status more accurately reflects the species' degree of imperilment and better promotes the purposes of the Act. Under this reading, we should first consider whether the species warrants listing "throughout all" of its range and proceed to conduct a "significant portion of its range" analysis if, and only if, a species does not qualify for listing as either an endangered or a threatened species according to the "throughout all" language.

Having determined that the NCSO DPS of fisher is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, we now consider whether it may be in danger of extinction or likely to become so in the foreseeable future in an SPR. The range of a species or DPS can theoretically be divided into portions in an infinite number of ways, so we first screen the potential portions of the range to determine if there are any portions that warrant further consideration. To do the "screening" analysis, we ask whether there are portions of the DPS's range for which there is substantial information indicating that: (1) the portion may be significant; and, (2) the species may be, in that portion, either in danger of extinction or likely to become so in the foreseeable future. For a particular portion, if we cannot answer both questions in the affirmative, then that portion does not warrant further consideration and the species does not warrant listing because of its status in that portion of its range. Conversely, we emphasize that answering both of these questions in the affirmative is not a determination that the species is in danger of extinction or likely to become so in the foreseeable future throughout a significant portion of its range—rather, it is a threshold step to determine whether a more-detailed analysis of the issue is required.

If we answer these questions in the affirmative, we then conduct a more thorough analysis to determine whether the portion does indeed meet both of the SPR prongs: (1) the portion is significant and (2) the species is, in that portion, either in danger of extinction or likely to become so in the foreseeable future. Confirmation that a portion does indeed meet one of these prongs does not create a presumption, prejudgment, or other determination as to whether the species is an endangered species or threatened species. Rather, we must then undertake a more detailed analysis of the other prong to make that determination. Only if the portion does indeed meet both SPR prongs would the species warrant listing because of its status in a significant portion of its range.

At both stages in this process—the stage of screening potential portions to identify any that warrant further consideration, and the stage of undertaking the more detailed analysis of any portions that do warrant further consideration—it might be more efficient for us to address the "significance" question or the "status" question first. Our selection of which question to address first for a particular portion depends on the biology of the species, its range, and the threats it faces. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the second question for that portion of the species' range.

For the NCSO DPS, we chose to address the status "screening" question first, asking whether there are any portions of the range for which there is substantial information indicating that the DPS in that portion may be in danger of extinction or likely to become so in the foreseeable future. To conduct this screening, we considered whether any of the threats acting on the DPS are geographically concentrated in any portion of the range at a biologically meaningful scale (e.g., there are novel threats not seen elsewhere in the DPS; there is a greater concentration or intensity of threats, relative to the same threats seen elsewhere in the range; or there is a disproportionate response to the threats by the individuals in a portion of the range, relative to individuals in the remainder of the range).

In our assessment of the NCSO DPS's overall status, we evaluated throughout its range all of the threats identified in our Species Report, including those with the potential to become significant drivers of the DPS's future status: high-severity wildfire, wildfire suppression activities, and post-fire management actions (Factor A); climate change (Factor A); tree mortality from drought, disease, and insect infestation (Factor A); vegetation management (Factor A);. exposure to toxicants (Factor E); and potential effects associated with small population size (Factor E). As we conducted our threats analysis, we determined that the most significant drivers of the NCSO DPS's future status were: wildfire and wildfire suppression, and the potential for climate change to exacerbate this threat, as well as the threats related to vegetation management and exposure to toxicants. However, for the purposes of our SPR analysis, we examined the entirety of the DPS to evaluate whether there may be a geographic concentration of any of the identified threats in any portion of the range at a biologically meaningful scale.

We found no concentration of any of these threats in any portion of the NCSO DPS's range at a biologically meaningful scale. While high-severity wildfires, and associated suppression activities and post-fire management, act in a site-specific manner, the occurrence of them in the DPS's range is random (i.e., not geographically concentrated in any portion), and the threat of wildfire is present throughout the range. Similarly, climate change, and its associated influence on the potential threat of wildfires, will largely act throughout the NCSO DPS range. All other potential threats either present a risk of manifesting randomly in small, localized places across the range (e.g., toxicant exposure, disease or predation, and vehicle collisions), or manifesting in a focused manner, but still only having localized, site-specific effects (e.g., vegetation management). Regarding small population size, the potential for negative effects can arise in portions of a species' range in instances where there are small, isolated aggregations of individuals. However, there is no evidence to suggest that the NCSO DPS as a whole is experiencing the types of negative effects that result from small population size.

If both (1) a species is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range and (2) the threats to the species are not geographically concentrated in any portion of the DPS at a biologically meaningful scale, then the species can not be in danger of extinction or likely to become so in the foreseeable future in any biologically meaningful portion of the DPS. For the NCSO DPS, we found both: the species is not in danger of extinction or likely to become so in the foreseeable future throughout the DPS, and there is no geographical concentration of threats within the DPS at a biologically meaningful scale. Therefore, no portions warrant further consideration through a more detailed analysis, and the species is not in danger of extinction or likely to become so in the foreseeable future in any significant portion of its range. Our approach to analyzing SPR in this determination is consistent with the court's holding in Desert Survivors v. Deportment of the Interior, No. 16-cv-01165-JCS, 2018 WL 4053447 (N.D. Cal. Aug. 24, 2018).

Determination of Status

Based on the best available scientific and commercial information, we conclude that the NCSO DPS of fishers is not in danger of extinction, nor likely to become so in the foreseeable future.

Available Conservation Measures

SAE not sure if this section needs to be in NCSO too b/c it was in our placeholder carryover document from the 2019 proposed listing rule outline

Final Listing Determination for SSN

Current Condition

The SSN DPS of fisher is small and is geographically separated from the remainder of the species. The SSN DPS is found in Mariposa, Madera, Fresno, Tulare, and Kern Counties in California. Historically, the SSN DPS likely extended farther north, but may have contracted due to unregulated trapping, predator-control efforts, habitat loss and fragmentation, or climatic changes. Today the approximate northern boundary is the Tuolumne River in Yosemite National Park (Mariposa County) and the southern limit is the forested lands abutting the Kern River Canyon, while the eastern limit is the high-elevation, granite-dominated mountains, and the western limit is the low-elevation extent of mixed-conifer forest. Multiple lines of genetic evidence suggest that the isolation of the SSN DPS from other populations of native fishers to the north in California is longstanding and predates European settlement (Knaus *et al.* 2011, entire; Tucker *et al.* 2012, entire; Tucker 2015, pers. comm., p. 1–2).

Estimates for the SSN DPS range from a low of 100 to a high of 500 individuals (Lamberson *et al.* 2000, entire). A recent estimate of 256 female fishers was based on habitat availability at the time (Spencer *et al.* 2016, p. 44). Other population estimates are: (1) 125–250 adult fishers based on fisher carrying capacity in currently occupied areas (Spencer *et al.* 2011, p. 788); and (2) fewer than 300 adult fishers or 276–359 fishers that include juveniles and subadults based on extrapolation from portions of the DPS where fishers have been intensely studied to the range of the entire population (Spencer *et al.* 2011, p. 801–802).

An 8-year monitoring study throughout the SSN DPS sampled an average of 139.5 units (range 90–189) comprised of six baited track plate stations per year during the period 2002–2009 throughout the SSN DPS showed no declining trend in occupancy (Zielinski *et al.* 2013, p. 3-4, 10–14; Tucker 2013, p. 82, 86–91). Recent analyses conducted over a 14-year period (2002-2015) showed that occupancy rates in 2015 were not statistically different from 2002, although rates dipped slightly from 2005-2011 (Tucker 2019 pers. comm.). Although occupancy patterns show no declining trends, these analyses do not provide details on demographic rates, such as survival and recruitment that provide more detailed information on population growth rates, size, or status.

Another study (SNAMP Fisher Project) of radio-collared fishers monitored from 2007 through 2014 in the northern portion of the SSN DPS on 49 mi^2 (128 km^2) of the Sierra National Forest showed the survival rate (calculated using demographic parameters) of adult males, but not females, is lower than sites in the NCSO DPS. Specifically, Sweitzer *et al.* stated that their analysis "suggested slightly negative growth ($\lambda = 0.966$) for the period of the research. The upper range for λ (1.155) was well above 1.0, however, suggesting stability or growth in some years. The estimated range for λ was consistent with the estimated population densities, which did not indicate a persistent decline during 4 years from 2008–2009 to 2011–2012" (2015a p.

781–783; 2015b, p. 10). Additionally, the SNAMP Fisher Project (later called Sugar Pine) was extended through 2017. They reanalyzed the data for radio-collared fishers monitored from 2007 through 2017 (totaling 139 collared fishers) and concluded the population was stable with an estimated lambda of 0.99 (C.I. 0.826 to 1.104) based on female fisher survival rates (Purcell *et al.* 2018, p. 5-6, 17). These population estimates for the SSN DPS do not take into consideration the extensive tree mortality that has impacted the habitat from 2015 to present. Research is currently being conducted to determine any potential effects that tree mortality may have on fisher in the SSN DPS, but results are not yet available (Green *et al.* 2019, entire).

Extensive areas of suitable habitat within the SSN DPS remain unoccupied by fishers, suggesting that habitat may not be the only limiting factor for this DPS (Spencer *et al.* 2015, p. 9). In the SSN DPS, the northern portion of the Stanislaus National Forest is largely unoccupied, with at least one confirmed detection north of the Merced River in Yosemite National Park and the Stanislaus National Forest (Sarah Stock 2020 pers. comm.). The interaction of all the threats within the SSN DPS are likely limiting northward expansion into what is considered suitable habitat for fisher. Fisher habitat is lacking landscape scale forest heterogeneity in the SSN DPS compared to historic conditions, with wildfire and severe drought disturbances creating large patches of homogenous habitat, which are exacerbated by past logging practices and wildfire suppression (Thompson *et al.* 2019a, p. 13).

The Sierra tree mortality event is affecting many of the key components of fisher habitat such as complex forest canopy structure and connected closed-canopy forest conditions. Only preliminary analyses have been completed with updated vegetation information from 2016, revealing that almost 40 percent (reduction - 2.3 million acres to 1.4 million acres) of potential fisher foraging habitat has been lost to drought, insects and tree diseases, and wildfire between 2014 and 2016 (Thompson *et al.* 2019a, p. 7-8). The spatial configuration of fisher foraging habitat also changed, with patch number increasing from 74 to 558 and patch size declining from 31,500 ac (12,748 ha) to 2,600 ac (1,052 ha), indicating a significantly more fragmented landscape (Thompson *et al.* 2019a, p. 8). Within the same affected area (i.e. not an additive loss), denning habitat availability also declined by almost 40 percent and overall patch size declined from 3,169 ac (1,283 ha) to 2,868 ac (1,161 ha) (Thompson *et al.* 2019a, p. 9). Current efforts are underway to incorporate the most recent and precise vegetation data into a full revision of the SSN Fisher Conservation Strategy in 2020 (Thompson 2019, personal communication).

The major threats for the SSN DPS are loss and fragmentation of habitat resulting from 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. Potential conservation measures are discussed in more detail in *Voluntary Conservation Mechanisms* below, and include the development of the Southern Sierra Nevada Fisher Conservation Strategy (Spencer *et al.* 2016, entire) and the associated interim guidelines that consider the recent tree mortality (Thompson *et al.* 2019a, entire).

Threats

Potential threats currently acting upon the SSN DPS of fisher or likely to affect the species in the future are evaluated and addressed in the final Species Report (Service 2016, p. 53–162). 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 here.

The immediacy of each threat was assessed independently based upon the nature of the threat and time period that we can be reasonably certain the threat is acting on fisher populations or their habitat. In general, we considered that the trajectories of the threats acting across the SSN DPS's range could be reasonably anticipated over the next 35–40 years. We estimated this timeframe as a result of our evaluation of an array of time periods used in modeling. For example, climate models for areas with fisher habitat, habitat conservation plans (HCPs), and timber harvest models generally predict 50 to 100 years into the future, and forest planning documents often predict over shorter timeframes (10 to 20 years). We considered 40 years at the time of the 2014 Proposed Rule, and given the 5-year time period since, we are modifying the foreseeable future time period to a range of 35–40 years. This is a timeframe that we can reasonably determine that both the future threats and the species' responses to those threats are likely. This time period extends only so far as the predictions into the future are reliable, including a balance of the timeframes of various models with the types of threats anticipated during the 35- to 40-year time period.

As we conducted our threats analysis, we determined that the most significant drivers of the species' future status were: wildfire and wildfire suppression, tree mortality from drought, disease, and insect infestation, and the potential for climate change to exacerbate both of these threats, as well as the threats related to vegetation management, exposure to toxicants, disease or predation, collisions with vehicles, and the potential for effects from small population size. While our assessment of the species' status was based on the cumulative impact of all identified threats, as explained above, we are only presenting our analyses on these specific primary threat drivers for the purposes of this final rule. For detailed analyses of all the other individual threats, we refer the reader to the Species Report (Service 2016, entire).

Wildfire and Wildfire Suppression

In the SSN DPS, the mean proportion of high severity fire and patch size have shifted compared to historical conditions (Safford and Stevens 2017, p. viii.) with increases in the frequency of large wildfires greater than 24,700 acres (9,996 (ha) (Westerling 2016, p. 6–7). Changes in future climate continue to predict large increases in the area burned by wildfire (Dettinger *et al.* 2018, p. 72). We expect these predicted changes to the fire regime to reduce the habitat available for fisher in the SSN DPS (see Climate Change section for further detail on future conditions).

Recent analyses show habitat loss from high severity fire throughout the SSN DPS (Thompson *et al.* 2019a, p. 10). For this new analysis of effects of wildfire on fisher habitat in the southern Sierra Nevada, high severity fire data was analyzed from 2003 to 2017 (CBI 2019, p. 26–28) and showed a loss of fisher denning (8.5 percent), resting (9.3 percent), and foraging (7.6 percent) habitat of approximately 25 percent, with most of the loss occurring between 2013 and 2017 (approximately 22 percent) (CBI 2019, p. 28). However, some areas of denning, resting, and foraging habitat overlap each other, so the total amount of habitat lost to high severity is likely less than 25 percent. In addition, the wildfires occurring on the Sierra and Sequoia National Forests bisected and disrupted connectivity between—or reduced the overall size of—key core areas as identified in the SSN fisher conservation strategy, likely inhibiting northward population expansion (Spencer *et al.* 2016, p. 10; CBI 2019, p. 26–28).

Prior to these substantial habitat changes as a result of recent fire, the northern portion of the SSN DPS had lower fisher occupancy in units burned by either prescribed burning or wildfire but less than 1 percent of the study area burned; however, there was no consistent negative effect of fire on fisher's use of habitat, likely because most fires burned at lower severities and maintained habitat elements important to fisher (Sweitzer *et al.* 2016b p. 208, 214, and 221-222). Results of modeling the variables of forest structure important to fishers for denning habitat on the Sierra National Forest and Yosemite National Park suggest that suitable denning habitat is maintained in burned forests, though primarily those with low-severity wildfire conditions, as less than 5 percent of areas burned at high severity were associated with a high probability of fisher den presence (Blomdahl 2018, entire).

Fisher avoided areas affected by high- and moderate-severity wildfires in the French (2014) and Aspen Fires (2013) and there was a higher probability of finding fishers in ravines or canyon bottoms in combination with unburned or lightly burned patches (Thompson *et al.* 2019a, p. 13–14). In our final Species Report we reported fisher use of high severity fire (Hanson 2015, p. 500; Service 2016, p. 66), so results from these studies may differ due to the type of analysis used, the values chosen to identify wildfire severity classes, or the 2–4 year vs. 10-year post-wildfire sampling period (Thompson *et al.* 2019a, p. 15–18). Without demographic data on age class, survival, or reproduction, it is difficult to say with certainty whether fisher use of post-wildfire landscapes is for dispersal or whether such areas act as population sinks (Thompson *et al.* 2019a, p. 17–18).

When considering the best available scientific and commercial information regarding wildfire and wildfire suppression activities, we maintain that wildfire is a natural ecological process. Forests that burn at lower fire intensities can create important habitat elements to fisher (e.g., den trees) within a home range such that the burned habitat may continue to support both fisher foraging and reproduction. As stated above, wildfire has already resulted in habitat loss and is increasing in terms of frequency, severity, and magnitude in the Sierra Nevada. There are mixed findings as to whether current conditions are outside of the natural range of variation and wildfire severity is increasing (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; Spies *et al.* 2018, p. 140), 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 being observed on the landscape (Safford and Stevens, p. 48-50).

We conclude that if the severity and extent of wildfires are such that substantial areas of canopy and large trees are lost, multiple decades of forest growth and structural development are necessary for those burned areas to support fisher reproduction. Therefore, based on the research and data currently available (as described above and in Service 2014, p. 64; Sequoia Forest Keeper 2019, pers. comm.; Spencer *et al.* 2016, p. 10), we believe that large high-severity fires that kill trees and significantly reduce canopy cover in fisher habitat (of high and intermediate quality) are likely to negatively affect fisher occupancy and reproduction. In contrast, burned areas that contain all fire severities are likely to provide habitat consistent with the needs of fishers, and the degree to which wildfire affects fisher populations depends on the forest type, landscape location, patch configuration, size, and intensity of the wildfire.

Climate Change

In the Sierra Nevada region, mean annual temperatures have generally increased by around 1 to 2.5 degrees °F (0.5 to1.4 °C) over the past 75–100 years (North *et al.* 2012, p. 25). By the end of the 21st century, temperatures are projected to warm within the SSN DPS by 6 to 9 °F (3.3 to 5 °C) on average, enough to raise the transition from rain to snow during a storm by about 1,500 to 3,000 ft (457 to 914 m) (Dettinger *et al.* 2018, p. 5). In addition, California recently experienced extreme drought conditions due to lack of precipitation from 2007–2009 and from 2012–2014 (Williams *et al.* 2015, p. 6823–6824). Climate change likely contributed to the 2012–2014 drought anomaly, and increases the overall likelihood of drier conditions, including extreme droughts, within the SSN DPS into the future (Williams *et al.* 2015, p. 6819, 6826; Bedsworth *et al.* 2018, p. 25).

The observed increases in wildfire activity and tree mortality in the SSN DPS are partially due to climate change. The red fir forests in the SSN DPS, currently found at the upper edge of fisher elevation range, are expected to have more frequent fire with species composition shifting to more fire-prone species, but it is unclear whether these forests will become more central to the range of fisher with warming climate conditions or if it will remain on the elevation edge of the SSN DPS (Restaino and Safford 2018, p. 497; Service 2016, p. 87, 138–139). Climate change will likely continue to increase tree mortality events into the future because drought conditions will increase which will continue to weaken trees and make them susceptible to bark beetles and disease (Millar and Stephenson 2015, p. 823–826; Young *et al.* 2017, p. 78, 85).

Overall, at this time, the best available scientific and commercial information suggest that changing climate conditions (particularly increasing air temperatures coupled with prolonged and more frequent drought conditions) are exacerbating other threats to the fishers and their habitat within the SSN DPS, including high-severity wildfires, and tree mortality. Please see additional discussion about potential impacts to fishers or their habitat associated with wildfire ("Wildfire and Wildfire Suppression" above) and tree mortality ("Tree Mortality from Drought, Disease, and Insect Infestation" below).

Tree Mortality from Drought, Disease, and Insect Infestation

The recent drought and subsequent beetle outbreak in the Southern Sierra Nevada from 2012 to 2015 is one of the most severe and largest beetle outbreaks in recent decades (Fettig *et al.* 2018, p. 176). Over half of the potential fisher habitat in the SSN DPS has been significantly impacted by canopy loss from tree mortality, which is disproportionately affecting the largest conifer trees and which are most likely to serve as den or rest trees for fisher (CBI 2019, p. 3–9, 29; Fettig *et al.* 2019, p. 167–168). Although fisher often use hardwoods for denning and resting, conifers appear to be more important for denning and resting in the SSN DPS than other fisher populations, and overall den tree size is much larger than other portions of the fisher range, so the loss of large trees has the potential to disproportionately alter den availability in the landscape (Green *et al.* 2019c, p. 139). Drought effects on over 6 million hectares of forest in California occurred over a multi-year period from 2011-2015 and over 500 million large trees have been affected, primarily from canopy water content loss, with some of the largest impacts to forested areas within the range of the SSN DPS (Asner *et al.* 2016, p. E252). These trees, spread over millions of hectares of forest, are more vulnerable in future droughts, likely resulting in death and altering future forest structure, composition, and function (Asner *et al.* 2016, p. E253; Fettig *et al.* 2018, p. 176).

There is limited information on the direct impacts to fisher or their habitat from tree mortality; however, the combination of drought, forest insects, disease, and fire has led to a decrease in the number and size of suitable foraging and denning habitat patches for fisher (Thompson *et al.* 2019b, p. 8–9). The habitat changes associated with drought, forest insects, disease, and fire may result in increased use of areas by large predators that in turn could increase predation rates on fisher (Thompson *et al.* 2019b, p. 15; also see “Predation and Disease” above in the “General Species Information and Summary of Threats” above). The usual pattern of localized outbreaks and low density of tree-consuming insects and tree diseases are beneficial and can create snags, providing structures conducive to rest and den site use by fishers or their prey. This large scale beetle kill is concerning because U.S. Forest Service personnel are already reporting snag failures, indicating these snags may fall at a faster rate than other methods of snag creation (e.g. wind, fire, age; Larvie *et al.* p. 11). Further, large, area-wide epidemics of forest disease and insect outbreaks may displace fishers if canopy cover is lost and salvage and thinning prescriptions in response to outbreaks degrade the habitat (Naney *et al.* 2012, p. 36; Tucker 2019, personal communication).

Preliminary information in the SSN DPS indicates fishers are avoiding areas with tree mortality and are more likely to be found in areas close to streams, drainages, and ravines where tree mortality effects were dampened (Green *et al.* 2019b, entire). In addition, increased tree mortality on the landscape may be associated with reduced female fisher survival within the SSN population due to increased stress hormones (cortisol) (Kordosky 2019, p. 31–34, 36–40, 54–61, 65–68, 94); however, reduced fisher survival is also likely influenced by other factors . Although other studies indicate fishers tolerate certain levels of canopy loss in small scale projects, fisher response to tree mortality may have been influenced by the large scale of the tree mortality event (Thompson *et al.* 2019a, p. 16).

Loss of canopy cover and large trees from tree mortality caused by insects and tree diseases likely reduces habitat suitability for fishers, but it is unknown if the level of habitat loss will significantly impact the SSN DPS throughout its range. Although fishers are keying in on riparian areas with intact forest canopy, it is uncertain how patches with sufficient canopy cover are connected in this changing landscape. It is likely that tree mortality will continue to be a threat into the future due to predicted increases in drought conditions that will likely continue to weaken trees and make them susceptible to bark beetles and disease (Millar and Stephenson 2015, p. 823–826; Young *et al.* 2017, p. 78, 85), so we expect this threat will continue to exacerbate conditions for fishers on the landscape.

Vegetation Management

In the SSN DPS, we approximated fisher habitat change using a vegetation trend analysis to track changes in forests with large structural conditions thought to be associated with fisher habitat (Service 2016, p. 98-101). Available data limited us to using predefined structure conditions describing forests with larger trees (greater than 20 in (50 cm)), realizing this may not include all vegetation types used by fishers. This analysis showed that net loss of forests with larger structural conditions in the SSN DPS from 1993 to 2012 was 6.2 percent across all ownerships, which equates to a loss of 3.1 percent per decade.

In the single analysis where fisher habitat was actually modeled and tracked through time for the SSN DPS, ingrowth of fisher habitat actually replaced habitat lost by all disturbances between 1990 and 2012, showing a net increase in fisher habitat at the female home range scale, albeit this net increase is less than 8 percent over 30 years (Spencer *et al.* 2016, p. 44, A–21, A-26). However, the authors of this report have since cautioned that these conclusions may no longer be accurate based on “dramatic changes [that] have occurred in Sierra Nevada mixed conifer forests due to drought and extraordinary tree mortality” (Spencer *et al.* 2017, p. 1). Consequently, they recommended delaying application of habitat conservation targets until vegetation data can be updated and fisher habitat condition reassessed (Spencer *et al.* 2017, p. 1–2). Hence, although our earlier analysis concluded that fisher habitat in the SSN DPS may actually be increasing, we can no longer support that conclusion based on recent vegetation mortality.

In one portion of the SSN DPS, fishers were less influenced by vegetation management activities than by initial site conditions (Purcell *et al.* 2018, p. 60), highlighting the importance of ensuring that post-treatment structural complexity and canopy cover reflect pre-treatment conditions. Overall, vegetation management in this study area resulted in short-term avoidance of fuels reduction treatments, with no longer-term shift in fisher behavior, but less than 1 percent of the study area was treated each year (Purcell *et al.* 2018, p. 69).

On all ownerships combined, loss of forest with old-forest structures in the past two decades (1993-2012) was 3.1 percent per decade as a result of all disturbance types within the SSN DPS. Additionally, fisher habitat appeared to be increasing until recent vegetation mortality due to fires and drought. However, it is difficult to conclude the degree to which vegetation management threatens fishers in the SSN DPS. Given the large home range of fishers and the geographic extent of forest management activities throughout the range of the SSN DPS, some fisher individuals are likely affected as a result of habitat impacts (e.g., Purcell *et al.* 2018,

p. 60–61). In addition, still other factors unrelated to habitat may be limiting fisher distribution. Consequently, based on the best available scientific and commercial information, we find that some levels of vegetation management may threaten fisher and will continue to do so in the foreseeable future, but many of the effects are exacerbated by other forms of habitat loss such as tree mortality from drought and severe wildfires.

Exposure to Toxicants

As described above in the general threats section, rodenticides analyzed as a threat to the SSN DPS of fishers include first- and second-generation anticoagulant rodenticides and neurotoxicant rodenticides. Both the draft and final Species Reports detail the exposure of the SSN DPS of fishers to rodenticides in the Sierra Nevada (Service 2014, p. 149–166; Service 2016, p. 141–159). Data available since the completion of the final Species Report in 2016 continue to document exposure and mortalities to fishers from rodenticides in the SSN DPS (Gabriel and Wengert 2019, unpublished data, entire). Data for 97 fishers collected in the range of SSN DPS in the period 2007–2018 indicate 83 fishers (86 percent) tested positive for one or more rodenticides (Gabriel and Wengert 2019, unpublished data), while 5.2 percent of known-cause SSN DPS fisher deaths from 2007 through 2014 were attributable to rodenticide toxicosis (6 of 115 total known-cause mortalities) (Gabriel et al 2015, p. 6). The probability of fisher mortality increases with the number of anticoagulant rodenticides to which a fisher has been exposed (Gabriel *et al.* 2015, p. 15). 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). From 2015 to 2018, additional SSN DPS fisher mortalities due to both anticoagulant and neurotoxicant rodenticides have been documented (Gabriel and Wengert 2019, unpublished data, p. 4).

In order to evaluate the risk to SSN DPS fishers from illegal grow sites, we use a Maximum Entropy model that was developed to identify high and moderate likelihood of illegal grow sites within habitat selected for by fisher (Gabriel and Wengert 2019, unpublished data, p. 7–10). This model indicates that 22 percent of habitat modeled for SSN DPS fishers is within areas of high and moderate likelihood for marijuana cultivation. The extent to which the use of toxicants occurs on legal private land grow sites within the SSN DPS, as well as other agricultural, commercial, and public land sites within the range of the SSN DPS of fisher (and habitats that fishers select for) is unknown.

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 the SSN DPS have died from toxicant exposure. Data indicate a total of 19 mortalities specifically within the monitored fisher populations (in both NCSO and SSN DPSs in California) have been directly caused by toxicant exposure (Gabriel and Wengert 2019, unpublished data, p. 5). We view toxicants as a potentially significant threat given the small population size of the SSN DPS fishers because of the reported exposure rate of toxicants in the SSN DPS, reported mortalities of SSN DPS fishers from toxicants, the variety of potential sublethal effects due to exposure to rodenticides (including potential reduced ability to capture prey and avoid predators), and the degree to which illegal grow sites overlap with the range and habitat of the SSN DPS of fisher.

The effect of these impacts to the SSN DPS is of particular concern because of the small number of individuals in the SSN DPS. The exposure rate of more than 80 percent of fisher carcasses tested in the SSN DPS has not declined between 2007 and 2018 (Gabriel and Wengert 2019, unpublished data, p. 3–4), while toxicosis has increased since 2007 (Gabriel *et al.* 2015, p. 6-7). We do not know the exposure rate of live fishers to toxicants because this data is difficult to collect. In addition, the minimum amount of anticoagulant and neurotoxicant rodenticides required for sublethal or lethal poisoning of fishers is currently unknown; however, we have evidence of fisher mortality and sublethal effects as a result of rodenticides. Although uncertainty existing in the effect of toxicants on the SSN DPS, in a small population, such as the SSN DPS of fisher, the lethal and sublethal effects of toxicants on individuals have the potential to have population-level effects and reduce the resiliency of the DPS as a whole. Overall, rodenticides are a threat to fisher within the SSN DPS now and in the foreseeable future.

Potential for Effects Associated With Small Population Size

Some information is available that demonstrates fisher's vulnerability to small population effects in the SSN DPS, including overall low genetic diversity (mitochondrial DNA haplotype and nuclear DNA allelic richness) for the entire SSN DPS, limited gene flow, and existing barriers to dispersal (Wisely *et al.* 2004, p. 642–643; Knaus *et al.* 2011, p. 7; see also additional discussion in Service 2016, p. 134–137; Tucker *et al.* 2014, p. 131-134), albeit some of these barriers allow some gene flow (Tucker *et al.* 2014, p. 131). However, the recent tree mortality and several recent large-scale fires acting on the narrow, linear range of the SSN DPS are likely to increase barriers to dispersal, potentially preventing northward expansion, particularly for females, given female genetic connectivity is facilitated by dense forest habitat (Tucker *et al.* 2017, p. 10).

At this point in time, the SSN DPS is considered relatively small, especially when taking into account the original/historical range of the species within the West Coast states, and the population growth rates does not indicate that the SSN DPS is increasing. The best available information suggests the SSN DPS is expected to remain isolated from other fisher (as has been apparent since pre-European settlement). The SSN DPS is likely to remain small into the future, primarily given the other stressors that have the potential to exacerbate the impacts from threats on small populations. In addition, average litter size for the SSN DPS is the lowest reported for the species, potentially due to diet limitations, smaller body size, and lower genetic diversity compared to other populations (Green *et al.* 2018b, p. 545, 547). Estimates of fisher population growth rates for the SSN DPS do not indicate any overall positive or negative trend.

The SSN DPS is estimated to range anywhere in size from 100 to 500 individuals (Service 2016, p. 48–50). Population growth rate analyses have been estimated as 0.97 (C.I. 0.79–1.16) from 2007-2014 throughout the SSN DPS (Sweitzer *et al.* 2015a, p. 784), and more recently 0.99 (C.I. 0.826 to 1.104) from 2007-2017 in a small portion of the SSN DPS at Sugar Pine (Purcell *et al.* 2018, p. 5-6, 17). Available population estimates and trend information for the SSN DPS does not take into consideration extensive tree mortality that has impacted the habitat from 2015 to present. Research is currently being conducted to determine any potential effects that tree mortality may be having on the SSN DPS, but results are not yet available (Green *et al.* 2019, entire). At this point in time, we do not have sufficient information to predict whether population trends of the SSN DPS will be positive or negative into the foreseeable future.

Overall, a species (or DPS) with relatively few individuals may be a concern when there are significant threats to the species. The SSN DPS is considered relatively small and has not appeared to grow or expand, despite the availability of unoccupied suitable habitat. The SSN DPS has been found to have relatively low genetic diversity, but there is currently no evidence of inbreeding depression. The small population may make the SSN DPS more vulnerable to threats, but there is no evidence at this time that small populations are causing impacts such loss of genetic variability or large fluctuations in demographic parameters of the SSN DPS.

Disease and Predation

A general description of disease and predation on fishers overall was provided earlier (see “General Species Information and Summary of Threats” above). Specific to the SSN DPS, of 94 fisher mortalities analyzed, 71 percent were a result of predation and 14 percent were caused by disease (Gabriel *et al.* 2015, p. 7, Table 2). Further, predation may be one of the limiting factors in overall population growth for fishers in the SSN DPS. For example, research on effects of mortalities on population growth of fishers in the SSN DPS found that reducing predation by 25 or 50 percent would increase lambda from 0.96 to 1.03 or 1.11, respectively; conversely, removing all mortality sources but predation would only increase lambda to 0.97 (Sweitzer et al 2016a, p. 438). While we did not consider this threat in the 2019 proposed rule, we received information during a public comment period that identified this information.

Vehicle Collisions

In the SSN DPS, vehicle collisions contributed to 8 percent of documented causes of mortality for fishers (Sweitzer *et al.* 2016a, p. 438). At the northernmost boundary of the SSN DPS, 10 fisher roadkill mortalities have been documented in Yosemite National Park over the past two decades (Service 2016, p. 137). Although many factors affect dispersal and northward population expansion, it is likely that roads and associated traffic in Yosemite National Park combined with other stressors may inhibit northward expansion of the SSN DPS (Spencer *et al.* 2015, p. 21).

Existing Regulatory Mechanisms

Forest Service

A number of Federal agency regulatory mechanisms pertain to management of fisher (and other species and habitat). Most Federal activities must comply with the National Environmental Policy Act of 1969, as amended (NEPA) (42 U.S.C. 4321 et seq.). NEPA requires Federal agencies to formally document, consider, and publicly disclose the environmental impacts of major Federal actions and management decisions significantly affecting the human environment. NEPA does not regulate or protect fishers, but it requires full evaluation and disclosure of the effects of Federal actions on the environment. Other Federal regulations affecting fishers are the Multiple-Use Sustained Yield Act of 1960, as amended (16 U.S.C. 528 et seq.) and the National Forest Management Act of 1976, as amended (NFMA) (90 Stat. 2949 et seq.; 16 U.S.C. 1601 et seq.).

The NFMA specifies that the Forest Service must have a land and resource management plan to guide and set standards for all natural resource management activities on each National

Forest or National Grassland. Additionally, the fisher has been identified as a species of conservation concern by the Forest Service in the SSN DPS; thus all Forest Plans within the DPS include Standards and Guidelines designed to benefit fisher. Overall, per USFS guidelines under the NFMA, planning rules must consider the maintenance of viable populations of species of conservation concern.

In 2004 the Forest Service amended the Forest Plans in the SSN DPS with the Sierra Nevada Forest Plan Amendment (SNFPA; USFS 2004, entire). The SNFPA included measures to increase late-successional forest, retention of important wildlife structures such as large diameter snags and coarse downed wood, and management of about 40 percent of the plan area as old forest emphasis areas. The SNFPA also established a 602,100 ha (1,487,800 ac) Southern Sierra Fisher Conservation Area (SSFCA) with additional requirements intended to maintain and expand the fisher population of the southern Sierra Nevada. Conservation measures for the SSFCA includes maintaining a minimum of 50 percent of each watershed in mid-to-late successional forest (28 cm [11 in] dbh and greater) with forest canopy closure of 60 percent or more. The plan also includes seasonal protections for known fisher natal and maternal den sites. The Forest Service is currently updating the NFMPs within the SSN DPS according to the Forest Service 2012 Planning Rule (36 CFR Part 219). A conservation strategy is in progress (described below in SSN Voluntary Conservation Measures) that will provide fisher specific guidance for the updated NFMPs.

National Park Service

Statutory direction for the National Park Service lands within the SSN DPS is provided by provisions of the National Park Service Organic Act of 1916, as amended (54 U.S.C.

100101). Land management plans for the National Parks within California do not contain specific measures to protect fishers, but areas not developed specifically for recreation and camping are managed toward natural processes and species composition and are expected to maintain fisher habitat where it is present. In addition, hunting and trapping are generally prohibited in National Parks (e.g., 16 U.S.C. sections 60, 98, 127, 204c, and 256b).

Rodenticide Regulatory Mechanisms

The threats posed to fishers from the use of rodenticides are described under "Exposure to Toxicants," above. In the 2016 final Species Report (Service 2016, p. 187–189), we analyzed whether existing regulatory mechanisms are able to address the potential threats to fishers posed from both legal and illegal use of rodenticides. As described in the 2016 final Species Report, the use of rodenticides is regulated by several Federal and State mechanisms (e.g., Federal Insecticide, Fungicide, and Rodenticide Act of 1947, as amended, (FIFRA) 7 U.S.C. 136, et seq.; California Final Regulation Designating Brodifacoum, Bromadiolone, Difenacoum, and Difethialone (Second Generation Anticoagulant Rodenticide Products) as Restricted Materials, California Department of Pesticide Regulation, 2014). The primary regulatory issue for fishers with respect to rodenticides is the availability of large quantities of rodenticides that can be purchased under the guise of legal uses, but are then used illegally in marijuana grows within fisher habitat. Both the Environmental Protection Agency (EPA) and California's Department of Pesticide Regulation are attempting to reduce the risk posed by second-generation anticoagulants through the 2008 Risk Mitigation Decision for Ten Rodenticides (EPA 2008, entire), which issued new legal requirements for the labeling, packaging, and sale of second-generation anticoagulants, and through a rule effective in July 2014, which restricts access to second-generation anticoagulants (AB-2657).

State Regulatory Mechanisms

California

At the time of the 2014 Proposed Rule, fishers were a Candidate Species in California; thus, take (under the CESA definition) was prohibited during the candidacy period. On June 10, 2015, CDFW submitted its status review of the fisher to the California Fish and Game Commission, indicating that listing of the fisher in the Southern Sierra Nevada Evolutionarily Significant Unit (ESU) was warranted as threatened (CDFW 2015, entire). It remains illegal to intentionally trap fishers in California (Cal. Code Regs. title 14, §460 (2017).

The California Environmental Quality Act (CEQA) can provide protections for a species that meets one of several criteria for rarity (CEQA 15380). Fishers in the SSN DPS meet these criteria, and under CEQA, a lead agency can require that adverse impacts be avoided, minimized, or mitigated for projects subject to CEQA review that may impact fisher habitat. All non-Federal forests in California are governed by the State's Forest Practice Rules (FPR) under the Z'Berg Nejedly Forest Practice Act of 1973, a set of regulations and policies designed to maintain the economic viability of the State's forest products industry while preventing environmental degradation. The FPRs do not contain rules specific to fishers, but they may provide some protection of fisher habitat as a result of timber harvest restrictions.

Voluntary Conservation Mechanisms

There are currently two MOU agreements in California within the range of the SSN DPS for wildfire and fuels management, but they have no specific conservation measures for fisher. The first MOU was signed in 2015 by Sierra Forest Legacy, California Department of Forestry and Fire Protection, State of California Sierra Nevada Conservancy, The Wilderness Society, The Nature Conservancy, The Sierra Club, Center for Biological Diversity, USDI National Park Service-Pacific Region, Northern California Prescribed Fire Council, Southern Sierra Prescribed Fire Council, and the USDA, Forest Service, Pacific Southwest Region. The MOU is titled "Cooperating for the purpose of increasing the use of fire to meet ecological and other management objectives." The purpose of this MOU is to document the cooperation between the parties to increase the use of fire to meet ecological and other management objectives. A second MOU was signed in 2017 by National Fish and Wildlife Foundation, and the USDA, Forest Service, Pacific Southwest Region, Regional Office. The MOU is titled "Pacific Southwest Fuels Management Strategic Investment Partnership." The purpose of this agreement is to document the cooperation between the parties to implement a hazardous fuels management program that reduces the risk of severe wildfire, protects ecological values, and reduces the change of damage to public and private improvements. Both of these more broad fuel reduction MOUs provide collaboration between Federal partners and non-governmental partners to organize and fund fuel reduction projects within the SSN DPS, which could reduce the impact of large-scale high severity fire. So far, no projects have been funded within the SSN DPS.

The Sierra Nevada Fisher Working Group, which includes Conservation Biology Institute, Sierra Nevada Conservancy, USDA Forest Service, National Park Service, US Fish and Wildlife Service, and California Department of Fish and Wildlife, completed a conservation strategy in 2016 (Spencer *et al.* 2016, entire). The authors of the conservation strategy later released a changed circumstances letter due to new tree mortality information (Spencer *et al.* 2017, entire). The changed circumstances letter provides details on the conservation measures that may no longer be applicable and an interim process for designing and evaluating vegetation management projects. Current benefits that still exist for fisher from the conservation strategy and the changed circumstances letter include long-term desired conditions representing a range of characteristics to strive for in various areas to inform fine-scale assessment of key fisher habitat elements, including their connectivity within potential home ranges and across the landscape (Spencer *et al.* 2017, p. 2–6). A revised/final conservation strategy that addresses the new tree mortality information is still in progress by the Conservation Biology Institute. However, preliminary Draft Interim Recommendations from February 2020 recognize the importance of stabilizing key habitat, restoring landscape permeability, and promoting landscape heterogeneity while offering a suite of suggestions to mitigate potential negative effects of management actions (Thompson *et al.* 2019, p. 17–33).

Resiliency, Redundancy, and Representation

In this section, we use the conservation biology principles of resiliency, redundancy, and representation to evaluate how the threats, regulatory mechanisms, and conservation measures identified above relate to the current and future condition of the SSN DPS.

Resiliency is defined the ability of populations to withstand stochastic events (events arising from random factors). Measured by the size and growth rate of populations, resiliency gauges the probability that the populations comprising a species (or DPS) are able to withstand or bounce back from environmental or demographic stochastic events.

Redundancy is defined as the ability of a species (or DPS) to withstand catastrophic events, and may be characterized by the degree of distribution of the species, either as individuals of a single population or as multiple populations, within the species' ecological settings and across the species' range. The greater redundancy a species exhibits, the greater the chance that the loss of a single population (or a portion of a single population) will have little or no lasting effect on the structure and functioning of the species as a whole.

Representation is defined as the ability of a species (or DPS) to adapt to changing environmental conditions. Measured by the breadth of genetic or environmental diversity within and among populations, representation gauges the probability that a species is capable of adapting to environmental changes.

As noted above, the resiliency of species'population(s), and hence an assessment of the species' overall resiliency, can be evaluated by population size and growth rate. While data on these parameters is often not readily available, inferences about resiliency may be drawn from other demographic measures. In the case of the SSN DPS, the population size component of resiliency may be lower than historical levels to some degree because the total population size is small and fragmented and has been reduced in distribution relative to historical levels.

Threats acting on a species or DPS that cause losses of individuals from a population have the potential to affect the overall resiliency of that population, and should losses occur at a scale large enough that the overall population size and growth rate are negatively impacted, this could reduce the population's ability to withstand stochastic events. The SSN DPS faces a variety of threats that will result in losses of individual fishers or impediments to population growth, including loss and fragmentation of habitat (i.e., from high-severity wildfire and wildfire suppression actions, climate change, tree mortality from drought, disease, and insect infestation, vegetation management, and development) and potential direct impacts to individuals (e.g., increased mortality, decreased reproductive rates, increased stress/hormone levels, alterations in behavioral patterns) from wildfire, increased temperatures, increased tree mortality, disease and predation, exposure to toxicants, vehicle collisions, and potential effects associated with small population size. These threats cumulatively play a large role in both the current and future resiliency of the DPS. Of greatest importance at this time are:

(1) The long-term suitability of habitat conditions throughout the range of the SSN DPS given the continued presence/extent of high-severity and wide-ranging wildfires and prolonged drought conditions that exacerbate tree mortality from drought, disease, and insect infestation. These conditions: (a) Reduce the availability of the natural resources (e.g., appropriate canopy cover, old growth forest structure with large trees and snags, patch size) that the species relies on to complete its essential life-history functions, (b) contribute to increased stress hormones (cortisol) and reduced female fisher survival (as noted in one study in a portion of the SSN DPS), and (c) increase habitat fragmentation within and between populations.

(2) The sustained presence of toxicants from marijuana grow sites across a likely significant proportion of the landscape that contribute to continued fisher mortalities and sublethal effects. Fisher mortalities continue to occur either by direct consumption or sublethal exposure to anticoagulant rodenticides, the latter of which may increase fisher death rates from other impacts such as predation, disease, or intraspecific conflict. In a small population, such as the SSN DPS of fisher, the lethal and sublethal effects of toxicants on individuals have an even greater potential to reduce the resiliency of the population.

(3) Continued fragmentation of habitat in conjunction with the isolation and potential inbreeding of the SSN DPS, especially when taking into account the threats of toxicant exposure and habitat losses. The ongoing threats increase this DPS's vulnerability to extinction from stochastic events. Regardless of this DPS's potential for growth into the small amount of available but unoccupied suitable habitat present, we do anticipate this DPS will be small into the long-term future (see also Service 2016, p. 133–137). Comments on the 2014 Proposed Rule and 2019 Revised Proposed Rule received to date generally agree that the SSN DPS is small.

The SSN DPS of fisher has maintained its presence across its current range despite the degree of habitat loss and fragmentation from prolonged drought conditions and wildfire impacts, coupled with mortalities from toxicants (both anticoagulant and neurotoxicant rodenticides), and at least some reduced female survival associated with increased stress hormones and reduced habitat suitability documented in a portion of the SSN DPS (see "Tree Mortality from Drought, Disease, and Insect Infestation" above). However, considering the best available science and information at this time, it is likely that the resiliency of the SSN DPS will decrease in the near-term future given the cumulative impacts associated with current climate change model predictions for continued periodic but prolonged drought conditions, predictions of continued and increased intensity of wildfires and subsequent habitat loss and fragmentation in the southern Sierra Nevada, the high likelihood of continued presence and spread of forest insect and tree diseases, and the low likelihood that a significant proportion of existing toxicants on the landscape would be removed in the near-term future.

With regard to redundancy, multiple, interacting populations across a broad geographic area or a single wide-ranging population (redundancy) provide insurance against the risk of extinction caused by catastrophic events. Redundancy is limited across the range of the SSN DPS as a result of the DPS being a single fragmented population distributed over a relatively confined geographic area for a carnivorous mammal. The limited redundancy of the SSN DPS decreases the DPS's chance of survival in the face of potential environmental, demographic, and genetic stochastic factors and catastrophic events (extreme drought, wildfire, Allee effects, etc.).

Lastly, we consider representation across the SSN DPS of fisher to be limited at this point in time, considering the DPS's existence as only a single fragmented population. The SSN DPS exists in a limited range of environmental conditions and has narrow representation in the environments that it occupies. An additional concern for current and future representation in the SSN DPS of fisher is that fragmented populations can be more susceptible to local declines and associated loss of genetic diversity. Overall, SSN DPS fishers are represented across a small, fragmented range and occur in small numbers.

Determination

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 meets the definition of "endangered species" or "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 a species meets the definition of "endangered species" or "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.

Status Throughout All of Its Range

We evaluated threats to the SSN DPS of fishers and assessed the cumulative effect of the threats under the section 4(a)(1) factors. Our 2016 Species Report (Service 2016, entire) is the most recent detailed compilation of fisher ecology and life history, and it has a significant amount of analysis related to the potential impacts of threats within the SSN DPS's range. In addition, we collected and evaluated new information available since 2016, including new information made available to us during the recent comment periods in 2019, to ensure a thorough analysis, as discussed above. Our analysis as reflected in this rule included our reassessment of the previous information and comments received on the 2014 Proposed Rule regarding the potential impacts to the SSN DPS of fisher, as well as our consideration of new information regarding the past, present, and future threats to the DPS, and the comments and information received during the two comment periods associated with the 2019 Revised Proposed Rule.

The threats that are currently acting on fishers in the SSN DPS are expected to continue into the future (see below), and we find that the SSN DPS is in danger of extinction throughout all of its range. Because it is limited to a single, fragmented population with few individuals and given the threats acting upon it, the current condition of the SSN DPS across the southern Sierra Nevada does not demonstrate resiliency, redundancy, and representation such that persistence into the future is likely.

At this time, the best available information suggests that future resiliency for the SSN DPS of fisher is low. As discussed above in the "Risk Factors for the SSN DPS of Fisher" section (along with some detail in the 2014 draft and 2016 final Species Reports (Service 2014 and 2016, entire)), the SSN DPS faces a variety of threats including: loss and fragmentation of habitat resulting from high-severity wildfire and wildfire suppression, climate change, tree mortality from drought, disease, and insect infestations, vegetation management, and development; and potential direct impacts to individuals (e.g., increased mortality, decreased reproductive rates, increased stress/hormone levels, alterations in behavioral patterns) from wildfire, increased temperatures, increased tree mortality, disease and predation, exposure to toxicants, vehicle collisions, and potential effects associated with small population size.

Currently, fishers in the SSN DPS exist in one small population. The estimate of the SSN DPS is approximately 300 individuals (range = low of 100 to a high of 500 individuals), but there is no statistically detectable trend in population size or growth. Overall, the SSN DPS of fisher exists as a single small population that has persisted but does not appear to be expanding and has experienced recent substantial habitat loss, fragmentation, and reduction in habitat patch size.

We took into consideration all of the threats operating within the range of SSN DPS. This DPS is reduced in size due to historical trapping and past loss of late-successional habitat and, therefore, is more vulnerable to extinction from random events and increases in mortality. In addition, just as threats are not occurring in equal scope and degree across the DPS's range, it is reasonable to conclude that the effects from these threats are occurring more in some areas than others. Some examples of multiple threats on the SSN DPS of fisher include:

- destruction, modification, or curtailment of habitat, which may increase fisher's vulnerability to predation and loss of genetic diversity (Factors A, C, and E);
- impacts associated with climate change, such as increased risk of wildfire and tree mortality (tree insects and disease), and environmental impacts of human development, that will likely interact to cause large-scale changes to habitat distribution and abundance including ecotype conversions away from habitat types used by fisher, which could impact the viability of populations and reduce the likelihood of reestablishing connectivity (Factors A, C, and E); and
- human development, which is likely to cause increases in vehicle collisions (Factors A and E).

Depending on the scope and degree of each of the threats and how they combine cumulatively, these threats can be of particular concern where populations are small and isolated. The cumulative effect (all threats combined) is of concern currently and in the foreseeable future in the SSN DPS, mainly in areas not managed for retention and recruitment of fisher habitat attributes, areas sensitive to climate change, areas susceptible to large high-severity fires, and areas where direct mortality of fishers reduces their ability to maintain or expand their populations (Service 2014, p. 166–169). Additionally, although there is currently a wide array of regulatory mechanisms and voluntary conservation measures in place to provide some benefits to the species and its habitat (see "Existing Regulatory Mechanisms" and "Voluntary Conservation Measures," above), these measures are currently insufficient to ameliorate the threats to such a degree that the DPS would not be in danger of extinction, or likely to become so in the foreseeable future. In particular threats acting on this small population related to illegal rodenticide use, increasing high-severity wildfires, and prolonged droughts that exacerbate the effects from wildfire, forest insects, and tree disease are operating at a scale much larger than the current scope of the beneficial actions. Further, the two MOU agreements in California within the range of the SSN DPS for wildfire and fuels management have no specific conservation measures for fisher.

The best available information suggests that identified threats are of concern across the range of the SSN DPS because of the narrow band of habitat that comprises this DPS and its vulnerability to negative impacts associated with small population size. As noted in our analysis, preliminary habitat-based population models suggest that the configuration of habitat affects population numbers in this region, and that some areas with high-quality habitat may remain unoccupied even at equilibrium population sizes, probably due to restricted connectivity between these locations and the main body of the population (Service 2016, p. 44; Rustigian-Romsos 2013, pers. comm.). Therefore, the cumulative impacts related to the habitat-based threats are likely to have a negative effect on the SSN DPS because connectivity would likely decrease further (Service 2016, p. 69).

For the mortality-related threats, we reaffirm our quantitative assessment from 2014 regarding potential cumulative impacts in those portions of the range of the SSN DPS where data were available to do so. Modeling completed for the SSN DPS demonstrates that a 10 to 20 percent increase in mortality rates could prevent fisher populations from the opportunity to expand in the future (Spencer *et al.* 2011, p. 10–12). Coupled with an increasing trend in habitat-related threats, the best available information suggests that cumulative effects to the SSN DPS of fisher are reducing its resiliency to such a degree that the DPS is in danger of extinction throughout all of its range. Based on our review of the best scientific and commercial data available, we have determined the SSN DPS of fisher meets the definition of an endangered species under the Act. Per our 2014 draft and 2016 final Species Reports, as well as our most recent analysis summarized herein and based on the comments and information received on the 2019 Revised Proposed Rule, we find the cumulative impact of all identified threats on the SSN DPS, especially habitat loss and fragmentation due to high-severity wildfire (Factor A) and vegetation management (Factor A) (noting that tree mortality from drought, disease, and insect infestation is exacerbated by changing climate conditions and thus also play a role under Factor A), and exposure to toxicants (Factor E), are acting upon the SSN DPS to such a degree that it is in danger of extinction. The existing regulatory mechanisms (Factor D) are not sufficient to address these threats to the level that the species does not meet the definition of an endangered species.

Determination of Status

Thus, after assessing the best available information, we conclude that the SSN DPS of fisher is currently in danger of extinction throughout all of its range. In reaching this conclusion, we have considered all information received from species experts, partners, the public, and other interested parties, including the variety of available conservation measures and existing regulatory mechanisms that may ameliorate the threats.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened species under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness and conservation by Federal, State, tribal, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and other countries and calls for recovery actions to be carried out for listed species. The protection required by Federal agencies and the prohibitions against certain activities are discussed, in part, below.

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Subsection 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

Recovery planning includes the development of a recovery outline shortly after a species is listed and preparation of a draft and final recovery plan. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan also identifies recovery criteria for review when a species may be ready for downlisting or delisting, and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) are often established to develop recovery plans. When completed, the recovery outline, draft recovery plan, and the final recovery plan will be available on our website (http://www.fws.gov/endangered), or from our Yreka Fish and Wildlife Office (see FOR FURTHER INFORMATION CONTACT).

Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (for example, restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and tribal lands.

Following publication of this final listing rule, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the State of California would be eligible for Federal funds to implement management actions that promote the protection or recovery of the SSN DPS of fisher. Information on our grant programs that are available to aid species recovery can be found at: http://www.fws.gov/grants.

Please let us know if you are interested in participating in recovery efforts for this species. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see FOR FURTHER INFORMATION CONTACT).

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as an endangered or threatened species and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service.

Federal agency actions within the species' habitat that may require conference or consultation or both as described in the preceding paragraph include management and any other landscape-altering activities as well as toxicant use on Federal lands administered by the U.S. Fish and Wildlife Service, U.S. Forest Service, BLM, and National Park Service; issuance of section 404 Clean Water Act permits by the Army Corps of Engineers; and construction and maintenance of roads or highways by the Federal Highway Administration.

It is our policy, as published in the Federal Register on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a listing on proposed and ongoing activities within the range of the species being listed. The discussion in Section III below about the 4(d) rule complies with our policy.

Critical Habitat

Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12), require that, to the maximum extent prudent and determinable, the Secretary shall designate critical habitat at the time the species is determined to be an endangered or threatened species. In the revised proposed listing rule (84 FR 60278; November 7, 2019), we 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 SSN DPS of fisher in the near future.

Summary of Comments and Recommendations

XXX

Required Determinations

<u>National Environmental Policy Act (42 U.S.C. 4321 et seq.)</u>

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 et seq.), need not be prepared in connection with listing a species as an endangered or threatened species under the Endangered Species Act. We published a notice outlining our reasons for this determination in the Federal Register on October 25, 1983 (48 FR 49244).

Government-to-Government Relationship with Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination With Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with tribes in developing programs for healthy ecosystems, to acknowledge that tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to tribes. In development of the 2014 Species Report, we sent letters noting our intent to conduct a status review and requested information from all tribal entities within the historical range of the West Coast DPS of fisher, and we provided the draft Species Report to those tribes for review. We also notified the tribes via e-mail to ensure they were aware of the January 31, 2019, document in the Federal Register to reopen the comment period on the October 7, 2014, proposed rule to list the DPS as a threatened species. As we move forward in this listing process, we will continue to consult on a government-to-government basis with tribes as necessary.

References Cited

A complete list of references cited in this rulemaking is available on the Internet at http://www.regulations.gov and upon request from the Yreka Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this proposed rule are the staff members of the Unified Interior's California-Great Basin Regional Office.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 1531–1544; and 4201–4245; unless otherwise noted.

2. Amend part 17.11(h) by adding an entry for "Fisher (Southern Sierra Nevada DPS)" in alphabetical order under Mammals to the List of Endangered and Threatened Wildlife to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Common name	Scientific name	Where Listed	Status	Listing Citations and Applicable Rules
Mammals				
* * * * * * *				
Fisher (Southern Sierra Nevada DPS)	*Pekania pennanti*	U.S.A. (Southern Sierra Nevada, CA)	T	[Federal Register citation when published as a final rule]; 50 CFR 17.40(s).4d
* * * * * * *				

* * * * *

* * * * *

Dated: ____.

____

Aurelia Skipwith,

Director, U.S. Fish and Wildlife Service.

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