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.

Predation and Disease

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).

— Perhaps this is true but if they overcome it & reintroduction we should know the circumstance where it was successful.

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

Summary of Biological Status and Threats

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. 10).

Older estimates for the NCSO DPS (excluding the SOC and NSN reintroduced subpopulations) 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 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. .

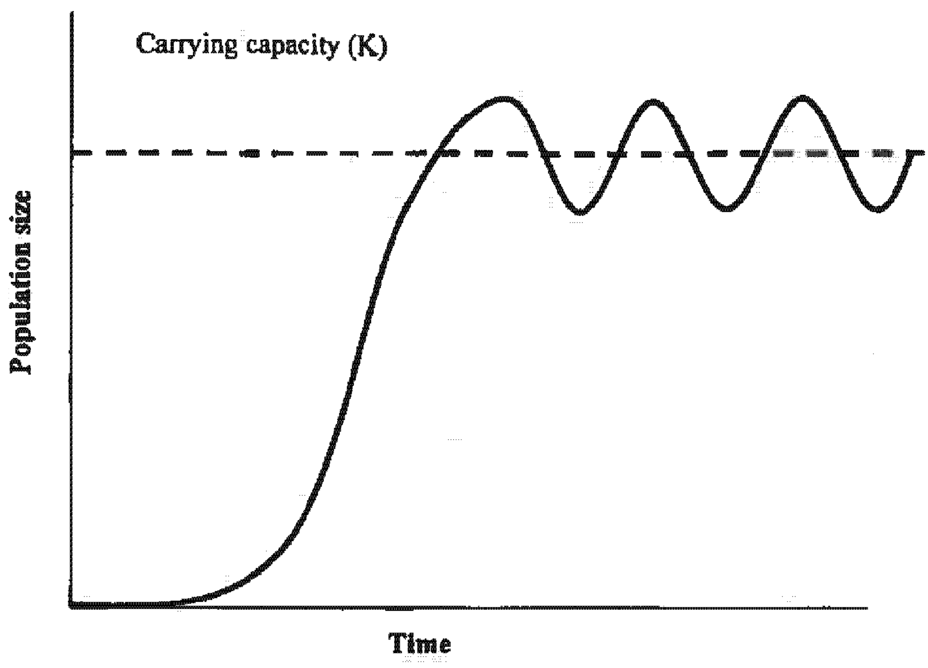

Figure 2. Theoretical population trend with respect to carrying capacity (K). When the population is low, growth rate is rapid. When the population is at or near K, growth rates decelerate and may temporarily decrease as population size fluctuates around K.

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.

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. 2019, 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. 2019, 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. 2019, 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 (Matthews 2020, pers. comm.). 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 whether the decline overlaps with prior year confidence intervals; 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 (Green et al. 2019, p. 6).

On p. 60 we point out the we don't know fate of the fish they have moved. Might we to repeat that here

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 as defined by CBI ?

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

"The author speculate. In the previous "General Threat" sect this was written definitively.

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 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.

Overall, it is unclear what the population level effects are to fisher in the NCSO DPS. 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.

Overall, rodenticides are likely a threat to fisher within the NCSO DPS now and in the foreseeable future, although we do not have information about the magnitude or mechanisms of population-level effects at this point in time. Given the unknowns and because the reintroduced fisher subpopulation at Stirling continues to grow, 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.

Predation and Disease

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.

Existing Regulatory Mechanisms

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).

How much of this is in NCSO.

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 what does it do? this is rather pessimistic,

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 these MOUs 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 we anticipate the CCAA will be renewed at the end of the 10 year period.

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 (need citation), 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 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 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 with 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 support 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, fisher 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 stressors 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