U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT
AND LISTING PRIORITY ASSIGNMENT FORM
January 4, 2024

SCIENTIFIC NAME: *Canis lupus*

COMMON NAME: Gray wolf

LEAD REGION: Mountain-Prairie Region (Region 6)

LEAD REGION CONTACT: Marjorie Nelson, Acting Assistant Regional Director, Ecological Services, Mountain-Prairie Region, 720-582-3524, marjorie_nelson@fws.gov

LEAD FIELD OFFICE CONTACT: Tyler Abbott, Field Supervisor, Wyoming Ecological Services Field Office, 307-757-3707, tyler_abbott@fws.gov

DATE INFORMATION CURRENT AS OF: January 4, 2024

STATUS/ACTION

_X_ Species petitioned for listing which we have determined is not a listable entity

_X_ Species petitioned for listing which we have determined does not warrant listing (does not meet the definition of a threatened or endangered species)

___ Non-listed species for which we have not received a petition but for which we have undertaken a species status assessment on our own initiative and which we have determined does not warrant listing (does not meet the definition of a threatened or endangered species)

Petition Information:
___ Non-petitioned
_X_ Petitioned; Date petition received: Received two petitions; received one petition on June 1, 2021, and a second on July 29, 2021 (as well as an addendum to the second petition dated August 10, 2021)

90-day "substantial" finding FR publication date; citation: 86 FR 51857; September 17, 2021

PREVIOUS FEDERAL ACTIONS:

Gray wolves (*Canis lupus*) were originally listed as subspecies or as regional populations of subspecies in the lower-48 United States and Mexico. Early listings were under legislative predecessors of the Endangered Species Act (Act)—the Endangered Species Preservation Act of 1966 and the Endangered Species Conservation Act of 1969. Later listings were under the Endangered Species Act of 1973. We detail these various original rulemakings in the November 3, 2020, rule delisting the gray wolf throughout much of its range in the lower-48 states and Mexico (85 FR 69778).

In 1978, we published a rule reclassifying the gray wolf in Minnesota as a threatened species and gray wolves elsewhere in the lower-48 United States and Mexico as an endangered species. We later revised this listing by designating the population of gray wolves in the Northern Rocky Mountains (NRM) (which includes Idaho, Montana, and Wyoming; the eastern one-third of Oregon and Washington; and a small portion of north-central Utah (Figure 1)) as a Distinct Population Segment (DPS) and, following legal challenges and several rulemakings, ultimately delisting this population (with the exception of wolves in Wyoming) due to recovery (74 FR 15123, April 2, 2009; 76 FR 25590, May 5, 2011; 77 FR 55530, September 10, 2012; 82 FR 20284, May 1, 2017). States and Tribes have managed gray wolves in the NRM since delisting.

In the 2009 rule delisting the NRM DPS, we identified three scenarios that could lead us to initiate a status review and analysis of threats to determine if relisting was warranted: (1) if the wolf population falls below the minimum NRM recovery level of 10 breeding pairs of wolves and 100 wolves in either Montana or Idaho at the end of the year; (2) if the wolf population segment in Montana or Idaho falls below 15 breeding pairs or 150 wolves at the end of the year in any one of those states for 3 consecutive years; or (3) if a change in state law or management objectives would significantly increase the threat to the wolf population (74 FR 15123, April 2, 2009, p. 15186). The scenarios in the 2009 delisting rule were not intended to identify situations that would prompt automatic relisting or require us to determine that the species is in danger of extinction or likely to become so in the foreseeable future. Rather, they were situations that would lead us to consider whether to initiate a status review that would use the best available scientific and commercial data to determine if the NRM wolf population warrants listing. In addition, if any of the scenarios occurred during the mandatory 5-year post-delisting monitoring period, it would trigger a 5-year extension of the monitoring period in the affected state.

As part of post-delisting monitoring in the NRM, we conducted annual assessments of the NRM wolf population; every year during the post-delisting monitoring period, we determined that the NRM wolf population remained biologically recovered and well above Federal recovery levels with no identifiable threats that imperiled its recovered status (Bangs 2010, entire; Jimenez 2012, 2013, 2014, 2015, 2016, entire). We made similar assessments and determinations for Wyoming after delisting in 2017 (Becker 2018, entire; Becker 2019, entire). In short, during the post-delisting monitoring period, monitoring information never indicated that a status review under the Act was necessary for the NRM.

On November 3, 2020, we published a final rule removing the Act's protections for gray wolves everywhere they were listed in the lower-48 States and Mexico, not including the Mexican wolf subspecies (*Canis lupus baileyi*) (85 FR 69778). The rule took effect in January 2021.

On June 1, 2021, we received a petition from the Center for Biological Diversity, the Humane Society of the United States, Humane Society Legislative Fund, and the Sierra Club requesting that the gray wolf in the NRM be emergency listed as a threatened species or an endangered species under the Act. The petition included, as an alternative option, a request that we list a Western DPS of gray wolf that would include all of California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming (Figure 1 of first petition), and, if the Service chose to include them, Arizona and New Mexico, north of Interstate-40 (I-40) (first petition). The Act does not provide a process to petition for emergency listing; therefore, we evaluated this petition under the normal process of determining if it presented substantial scientific or commercial data indicating that the petitioned action may be warranted.

On July 29, 2021, we received a petition from Western Watersheds Project and 70 other organizations requesting that gray wolves in Idaho, Montana, Wyoming, Utah, Oregon, Washington, Colorado, California, Nevada, and northern Arizona be listed as an endangered species under the Act (second petition). On August 10, 2021, we received an addendum to the second petition, which provided minor clarifications and corrections to the original petition but did not change the scope of the petitioned entity.

On September 17, 2021, we published a 90-day finding (86 FR 51857) that both petitions contained substantial information indicating that the petitioned actions may be warranted, and we initiated a status review to determine whether the petitioned actions were warranted. This document, and the accompanying *Federal Register* Notice, constitutes our 12-month finding in accordance with section 4(b)(3)(B) of the Act as to whether the petitioned actions are warranted.

On February 10, 2022, the gray wolf 2020 final delisting rule was vacated and remanded by the U.S. District Court for the Northern District of California. As a result of the court's order, all gray wolves in the lower-48 States, outside of the NRM, are currently listed under the Act. On November 3, 2023, we published a final rule to amend the Code of Federal Regulations to reflect the district court's order (88 FR 75506).

On March 1, 2022, we received a petition from the International Wildlife Coexistence Network and nine other organizations, requesting that a DPS of the gray wolf in the NRM or in the Western United States be emergency listed under the Act. As stated previously, we evaluate petitions requesting emergency listing under our normal petition-review process. However, because we were actively engaged in a status review of the entities for which the petitioners requested listing, we did not issue a 90-day finding; rather we evaluated the information provided by the petitioners in the context of this status review.

On August 9, 2022, petitioners (first petition) filed a lawsuit to compel us to complete a 12-month finding on their petition by a date certain. On March 31, 2023, the parties entered into a settlement agreement under which we agreed that, on or before February 2, 2024, we would submit to the *Federal Register* a determination as to whether listing a Northern Rocky Mountains DPS or a Western United States DPS of the gray wolf as a threatened species or an endangered species is warranted, not warranted, or warranted but precluded by other pending proposals.

ANIMAL GROUP AND FAMILY:
Mammals, Canidae

ANALYSIS AREA

To inform this 12-month finding, we compiled a Species Status Assessment (SSA) Report for the Gray Wolf in the Western United States (Service 2023, entire; see “Biological Information” below for more details on this SSA report). The geographic scope of our analysis in this SSA Report included: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming (Figure 1). We only included the portions of Arizona and New Mexico north of I-40 in our analysis area because the Service has promoted the recovery of the Mexican wolf subspecies (*Canis lupus baileyi*), rather than the gray wolf (*Canis lupus*), in areas south of I-40 (Service 2022, entire). Although individual gray wolves from this 11-state area have been known to disperse outside of the area, the primary remaining habitat for the gray wolf in the Western United States occurs within these states. The analysis area encompasses all states that were included in the two petitions. The Mexican wolf, a subspecies of the gray wolf, occupies parts of the Southwestern United States, but was not considered in the SSA Report (Service 2023, p. 1). Therefore, when we refer to gray wolves throughout this finding, we are referencing *Canis lupus*, excluding *Canis lupus baileyi* (the Mexican wolf subspecies).

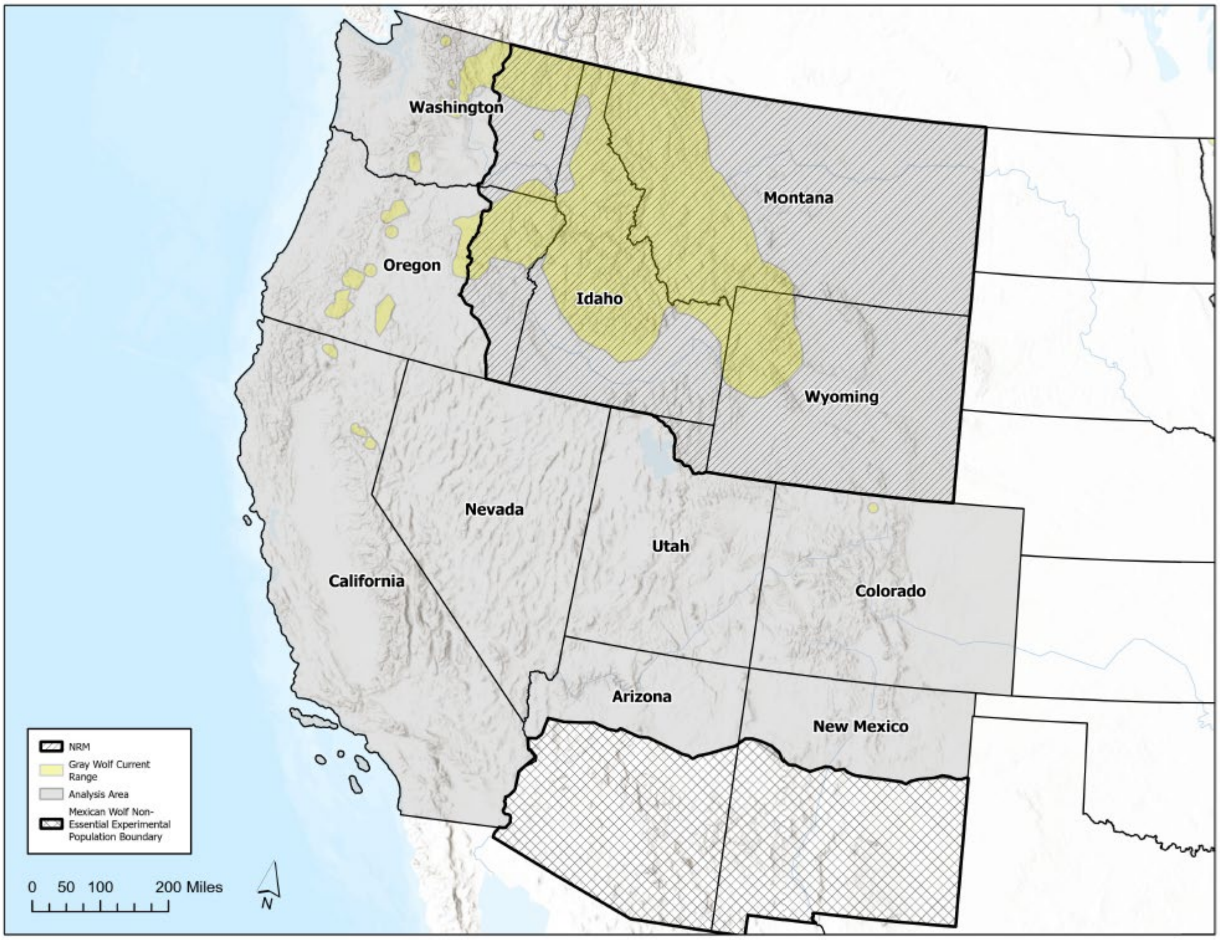

Figure 1. Analysis area of the SSA Report for the gray wolf in the Western United States. Analysis area includes the States of California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming; and portions of the States of Arizona and New Mexico. The gray shading of the analysis area on this map does not indicate historical, current, or potential range, nor does it represent the delineation of a Distinct Population Segment (DPS); rather, this map illustrates the area we considered in our SSA. The black hatched area on the map depicts the delisted NRM area. The yellow shaded area indicates current range of the gray wolf within the analysis area (as of December 31, 2022, except California, which is current as of May 2023) (see Chapter 1 of SSA Report (Service 2023) for references and details). The cross-hatched area delineates the Mexican Wolf Nonessential Experimental Population Area, which is not part of our analysis.

DISTINCT POPULATION SEGMENT (DPS) ANALYSIS

Each of the 2021 petitions requested that we list a DPS of the gray wolf in the Western United States. Collectively, the petitions included two alternative DPSs for listing the gray wolf in the Western United States, excluding the range of the listed Mexican wolf: (1) an NRM DPS, or (2) a Western United States DPS (which includes the NRM and additional areas outside of the

NRM). Because the petitions did not include the listed Mexican wolf, which is a separate listed entity, we do not further discuss the Mexican wolf in this finding.

To interpret and implement the DPS provisions of the Act, the Service and the National Oceanic and Atmospheric Administration published in the *Federal Register* the Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act on February 7, 1996 (61 FR 4722) (DPS Policy). Under the DPS Policy, we consider three elements: (1) the discreteness of the population segment in relation to the remainder of the species to which it belongs; (2) the significance of the population segment to the species to which it belongs; and (3) the population segment's conservation status in relation to the Act's standards for listing, delisting, or reclassification. If we determine a population segment is both discrete and significant then it is a valid DPS (i.e., a valid listable entity) and we may consider whether the DPS warrants listing under the Act. Below, we evaluate whether either petitioned entity constitutes a valid DPS.

The NRM petitioned entity is consistent with the NRM area described in our April 2, 2009, final rule identifying the NRM population as a DPS (74 FR 15123, p. 15126) and is depicted above (Figure 1). The NRM includes all gray wolves in Idaho, Montana, and Wyoming, the eastern one-third of Oregon, a small portion of north-central Utah, and the eastern one-third of Washington. The largest additional area we were petitioned to consider listing in the Western United States included California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming, and northern New Mexico and Arizona. Therefore, we also considered whether gray wolves (excluding Mexican wolves) within this larger petitioned area represent a valid DPS.

Throughout the SSA Report for the Gray Wolf in the Western United States (Service 2023, entire) and this finding, we often refer to the wolves in each state as a "population" and frequently discuss each state's population separately, because wolves are managed at the state level in the Western United States. However, the wolves in each state are connected to wolf populations in other states in the Western U.S. metapopulation.[1] Our use of the term "population" as shorthand to refer to the wolves in each state should not be interpreted as a determination that each state represents a biologically separate population or a DPS.

[1] In nature, many populations exist as partially isolated sets of subpopulations, collectively termed "metapopulations." A metapopulation is widely recognized as being more secure over the long term than are several isolated populations that contain the same total number of packs and individuals (Service 1994, Appendix 9). This is because adverse effects experienced by one of its subpopulations resulting from genetic drift, demographic shifts, and local environmental fluctuations can be countered by occasional influxes of individuals and their genetic diversity from the other components of the metapopulation.

Discreteness

Under our DPS Policy, a population segment of a vertebrate species may be considered discrete if it satisfies either of the following two conditions: (1) it is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors (quantitative measures of genetic or morphological discontinuity may provide evidence of this separation); or (2) it is delimited by international governmental boundaries within which significant differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act. In determining whether the test for discreteness has been met under the DPS policy, we allow, but do not require, genetic evidence to be used.

NRM Discreteness Analysis

Although we previously determined that wolves in the NRM met the standards for designation as a DPS, the best available scientific data indicate that the wolves in the NRM are no longer discrete from other populations of the taxon. Specifically, gray wolves within the boundaries of the NRM DPS described in the 2009 rule are no longer discrete from gray wolves in the remainder of the Western United States for the reasons explained below.

In the 2009 rule, we determined that the NRM population segment of the gray wolf was discrete from other populations of the taxon because: (1) it was markedly separated from other populations of the taxon in the lower-48 United States due to physical factors; and (2) it was delimited by cross-border differences in control of exploitation and regulatory mechanisms between the United States and Canadian wolf populations (74 FR 15123, April 2, 2009). With respect to marked separation due to physical factors, we determined that other populations of the taxon in the United States were of sufficient distance from the NRM boundary (i.e., more than three times the known dispersal distance of NRM wolves) and/or were separated from the NRM by intervening unsuitable habitat that would physically limit wolf movement (74 FR 15123, p. 15127–15129). When we designated the NRM DPS, only one wolf pack existed west of the NRM boundary (a wolf pack in Washington) (74 FR 15123, p. 15128). Therefore, the best available scientific data at that time indicated that the NRM DPS met the DPS Policy standard for discreteness.

In 2013, we revisited the 2009 NRM discreteness analysis in the context of a status review for gray wolves in the Pacific Northwest (wolves to the west of the NRM DPS within the contiguous United States) and found no significant physical separation delimiting wolves in the Pacific Northwest from the population of the taxon in the NRM such that they were markedly separated due to physical factors (78 FR 35664, June 13, 2013, pp. 35712–35713). Our review of several wolf habitat models, including Carroll et al. 2006 (entire), showed that there was little separation between occupied wolf habitat in the NRM and suitable habitat in western Oregon, Washington, and northern California (78 FR 35664, p. 35712). Available genetic information also did not lead us to conclude that wolves on either side of the Western boundary of the NRM DPS had marked genetic differences (78 FR 35664, p. 35713). Since the 2009 delisting, wolves in the NRM had continued to expand in number and distribution. By 2013, two breeding pairs had been documented outside of the NRM boundary in Washington, lone wolves were more frequently being reported in western Oregon and Washington, and one wolf had even ventured as far as northern California (78 FR 35664, p. 35710–35711). We concluded that wolves in the Pacific Northwest were not discrete from wolves in the NRM; rather, they constituted the expanding front of large, robust, and recovered wolf populations to the north (Canada) and east (NRM).

As we describe further below, the best available scientific data continue to support our 2013 conclusion that gray wolves in the NRM are not markedly separated from other populations of the taxon to the west of the NRM boundary due to genetics or physical factors. Because the gray wolves in the NRM are not markedly separated from wolf populations in adjacent areas within the United States, they are not markedly separated from other populations of the same taxon and therefore do not satisfy the first condition for discreteness under the DPS policy.

First, gray wolves in the Western United States, both within and outside of the NRM boundary, primarily descended from the same founding population (see Figure 1 above). Therefore, wolves in the NRM are not markedly genetically separated from other populations of the taxon that occur in the surrounding states, or portions of surrounding states, in the Western United States. Wolves in the NRM are the result of natural immigration from Canada into northwest Montana and reintroduction from inland Alberta and British Columbia into central Idaho and Yellowstone National Park (YNP) in 1995 and 1996, respectively (Bangs and Fritts 1996, entire; Fritts et al. 1997, entire). An additional 10 wolves were translocated from northwestern Montana to YNP in 1997. As populations within the NRM have grown, wolves have expanded into areas outside of the NRM boundary (i.e., California, western Oregon, and western Washington; and, more recently, wolves have been documented in Colorado). In California at the end of 2022, there were a minimum of 18 wolves in two packs and at least one individual dispersing wolf (California Department of Fish and Wildlife (CDFW) 2022, entire). At the end of 2022, there were also a minimum of 38 wolves distributed between six packs and four additional groups[2] in the western two-thirds of Oregon (outside of the NRM boundary) (Oregon Department of Fish and Wildlife (ODFW) 2023, p. 5) and a minimum of 57 wolves in 10 packs in the western two-thirds of Washington (outside of the NRM boundary) (Washington Department of Fish and Wildlife (WDFW) et al. 2023, pp. 16–17; Service 2023, pp. 134–136). At the end of 2022, a minimum of two wolves were confirmed in the northcentral part of Colorado (Odell 2023, pers. comm.).

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[2] The Oregon Department of Fish and Wildlife (ODFW) defines a pack of wolves as group of at least four wolves traveling together in winter. ODFW deems wolves exhibiting resident or territorial activity (i.e., wolves repeatedly seen in the same area) that do not yet meet these criteria for a pack as a “group” of wolves. In Oregon, these groups typically contain two to three wolves each (ODFW 2019, p. 1; ODFW 2022, p. 4).

A genetic study in the Western United States and Canada found that all wolves in Oregon and the majority of wolves in Washington descended exclusively from wolves in the NRM and interior Alberta and British Columbia (Hendricks et al. 2018, p. 140) (see "Western United States Discreteness Analysis" below). Wolves are naturally recolonizing California (CDFW 2021, entire) via Oregon. An adult female wolf that became half of the first known reproductively active pair in Colorado in modern history dispersed from the Snake River Pack in Wyoming, and it is likely her mate also dispersed from Wyoming, although his origin remains unknown (Colorado Parks and Wildlife (CPW) 2022, unpaginated). Thus, NRM wolves are not markedly genetically separated from other populations of the taxon (or, in the case of Colorado, individual members of the taxon) that occur in the surrounding states, or portions of surrounding states, in the Western United States (see Figure 1 above).

Second, gray wolves in the NRM are also not markedly separated from other populations of the taxon in the rest of the Western United States as a result of physical factors. Our generalized map of potentially suitable gray wolf habitat in the SSA Report illustrates that there is little separation between occupied wolf habitat within the boundaries of the 2009 NRM DPS and potentially suitable habitat in the surrounding states in the Western United States (Service 2023, Figure 8, p. 117). Any gaps in suitable habitat are unlikely to preclude dispersal between the NRM and other portions of the Western United States because gray wolves can travel long distances through a variety of habitats (Smith et al. 2020, p. 88). Dispersal distances in North America typically range from 40 to 96 miles (mi) (65 to 154 kilometers (km)) (Boyd and Pletscher 1999, p. 1102; Jimenez et al. 2017, p. 585), although dispersal distances of several hundred miles are occasionally reported (Boyd and Pletscher 1999, pp. 1102–1103; Mech and Boitani 2003, pp. 14–15; ODFW 2011, pp. 5–6; ODFW 2016, p. 10; Jimenez et al. 2017, p. 585; CDFW 2021, p. 2). In sum, wolves in the NRM are not genetically or physically discrete from other populations of the taxon in the surrounding states, or portions of surrounding states, in the Western United States.

Because gray wolves within the boundaries of the NRM DPS described in the 2009 rule are not markedly separated from other populations of the taxon in the Western United States, the NRM does not meet the discreteness standard in the DPS Policy and is not a valid listable entity under the Act. We acknowledge that, for the same reasons described in the "Western United States Discreteness Analysis" below, the NRM is (1) markedly separated from other populations of the taxon in the Great Lakes area and (2) delimited by cross-border differences in control of exploitation and in regulatory mechanisms between the United States and Canada. The international boundary remains a valid basis for determining that the NRM is discrete from Canada. However, the current western boundary of the NRM excludes wolves in Washington, Oregon, and California that are not markedly separated from wolves in the NRM because they are part of the same metapopulation. Therefore, the western boundary of the NRM does not delineate a discrete population.

Western United States Discreteness Analysis

The population segment of gray wolves in the Western United States is discrete from other populations of the taxon because of: (1) marked separation from the population of gray wolves in the Great Lakes area (another population of the taxon) due to physical and genetic factors; (2) marked separation from "coastal wolves" (another population of the taxon) due to physical and genetic factors; and (3) cross-border differences in control of exploitation and regulatory mechanisms between the United States and Canadian wolf populations.

The gray wolf has a circumpolar range and is known to occur in North America, Europe, and Asia. The analysis below addresses discreteness of the gray wolf in the Western United States from other populations of the taxon that occur in the vicinity of the population in the Western United States (i.e., other gray wolf populations in the lower-48 United States and Canada). However, we conclude that other populations of the taxon not directly addressed below (i.e., populations in Europe and Asia) are markedly separated from the gray wolf in the Western United States due to physical factors (great distance) and therefore are discrete from the gray wolf in the Western United States.

First, the gray wolf population in the Western United States is markedly separated from another population of the taxon in the Great Lakes area of the United States due to both physical and genetic factors. The Great Lakes area population is located just over 1,000 km (621 mi) to the east of the wolf metapopulation in the Western United States, a physical separation that is greater than wolves' typical dispersal distance. Although there is ongoing debate about the taxonomy and evolutionary origins of wolves within the Great Lakes area (see Service 2020, entire, and references therein), there is general agreement that these wolves are genetically, morphologically, and ecologically distinct from those in the Western United States. This distinction has been clearly demonstrated with genetic markers (vonHoldt et al. 2011, p. 1301; Sinding et al. 2018, pp. 3–6) and morphological analyses (Nowak 2002, pp. 199–120; Chambers et al. 2012, pp. 14–25 and references therein). This topic is covered in greater detail in the SSA Report (Service 2023, pp. 6–9).

Second, the gray wolf population in the Western United States is also markedly separated from another population of the taxon, commonly referred to as "coastal wolves," due to physical and genetic factors. The majority of wolves that occur in the Western United States within our analysis area appear to share a common taxonomic history. A distinct taxonomic group of wolves (referred to as "coastal wolves" in our SSA Report) is found from the coast of British Columbia into southeastern Alaska. These wolves are the subject of a separate status review by the Service (88 FR 57388, August 23, 2023)). Genetic markers associated with coastal wolves have been identified in historical museum specimens from as far south as Southwestern Oregon (Hendricks et al. 2015, p. 763), indicating the presence of coastal wolves in that area prior to extirpation. However, contemporary data do not indicate that coastal wolf range extends that far south; rather, wolves currently found in California and Oregon all appear to be of NRM origin

(Hendricks et al. 2018, p. 143). Although the same is largely true in Washington, where most wolves show NRM ancestry, two wolves sampled within the state appear to be admixed with both NRM and coastal wolf origins (Hendricks et al. 2018, p. 141). It is not clear from the data whether the admixture occurred in Washington or admixed individuals dispersed into the state. Nevertheless, this admixture is consistent with the view that the borders between wolf subdivisions, whether identified as ecotypes or subspecies, may be porous, particularly where suitable habitat exists between them (Chambers et al. 2012, p. 43; Schweizer et al. 2016, p. 395; Hendricks et al. 2018, p. 143; González-Bernal et al. 2022, p. 6). Although Western Washington may represent an area of potential overlap between coastal wolves and other gray wolves in the Western United States, there is little coastal habitat remaining to support a viable population of coastal wolves in the Western United States (Carroll et al. 2006, p. 32; Larsen and Ripple 2006, pp. 26–27, 31) when compared to their roughly 84,595 square mile (mi^2) (219,101 square kilometer (km^2)) range in Alaska and British Columbia (Service 2015, Appendix I). Therefore, although we acknowledge there is likely to be admixture of wolf genes across ecotype or subspecies boundaries, the vast core of the coastal wolf's range is outside of the Western United States. Further, the DPS policy does not require complete reproductive isolation from other populations of the taxon to satisfy the discreteness standard, only that the populations be markedly separated. In conclusion, the gray wolf population in the Western United States, including any admixed individuals, is markedly separated from other populations of the taxon found in Alaska and British Columbia (i.e., coastal wolves).

Third, there are cross-border differences between United States and Canadian wolf populations that are significant in light of section 4(a)(1)(D) of the Act. The border between the conterminous United States and Canada has been used as the northern boundary of listed gray wolf entities since gray wolves were reclassified in the lower-48 States and Mexico in 1978. There remain significant cross-border differences in control of exploitation and in regulatory mechanisms between the United States and Canada. In general, Canadian gray wolf populations are large and healthy and have been for many years. The species is found in 80 percent of its original historical range in the country (Government of Canada 2014, unpaginated), and there are likely over 18,000 wolves in Alberta, British Columbia and Saskatchewan (B.C. Ministry of Forests, Lands and Natural Resource Operations (B.C. Ministry) 2014, p. 6; Saskatchewan Ministry of Environment 2020, p. 76; Frame 2022, pers. comm.; Boyd et al. 2023, p. 7). In the Canadian government's most recent *Wild Species 2020* report, the gray wolf population ranks as nationally secure in all of Canada, apparently secure in Alberta and Saskatchewan, and secure/apparently secure in British Columbia (Canadian Endangered Species Conservation Council 2022, unpaginated). Because of the abundance and distribution of gray wolves in Canada, the species is not protected by Federal laws in the country, with the exception of wolves described as either *C. l. lycaon* or *C. lycaon*, which occur in Eastern Canadian provinces (i.e., central Ontario and Southwestern Quebec). Wolf harvest occurs in all 10 provinces and territories in which gray wolf populations occur (Government of Canada 2014, unpaginated).

In Western Canada, wolves are managed by the provinces of Alberta, British Columbia, and Saskatchewan (Alberta Forestry Lands and Wildlife 1991, entire; B.C. Ministry 2014, entire; Saskatchewan Ministry of Environment 2020, entire). Alberta regulates trapping and allows year-round wolf hunting with minimal regulation, a more liberal approach than Montana. British Columbia manages wolves as a game species and generally employs an approach to wolf hunting and trapping similar to that of Idaho and Montana. Saskatchewan manages wolves as a furbearer and big-game species with regulated wolf trapping and hunting seasons which are open only to provincial residents. There are measures in place to benefit wolves, including British Columbia's commitment to sustainable wolf harvest (B.C. Ministry 2014, p. 20), Alberta's goal of protecting the wolf population from irreversible decline (Alberta Forestry Lands and Wildlife 1991, p. 61), and Saskatchewan's wildlife management objectives, which include ensuring maintenance of sustainable populations (Saskatchewan Ministry of Environment 2020, pp. 14, 77). However, none of the provinces has a population management threshold that is comparable to the existing commitments by Idaho, Montana, and Wyoming (Groen et al. 2008, p. 1; Talbott and Guertin 2012, p. 1; Idaho Fish and Game (IDFG) 2023, pp. 38–44). In the Western United States, state managers monitor and manage wolves with the goal of maintaining wolf populations above a specific management threshold or to achieve state management objectives (see Chapter 3 of SSA Report).

Therefore, even though biologically the Western United States wolf population is a well-connected southern extension of the wolf population in Canada, it is consistent with our DPS policy to use the United States–Canada border to mark the northern boundary of the Western United States wolf population due to the difference in control of exploitation and in regulatory mechanisms between the two countries. We conclude, as we have previously (74 FR 15123, April 2, 2009, pp. 15125–15129; 68 FR 15804, April 1, 2003, pp. 15818–15819), that the Western United States wolf population is discrete from other populations of the taxon in Canada.

In sum, the Western United States gray wolf population satisfies both conditions for discreteness under the DPS policy (61 FR 4722, February 7, 1996).

Significance

Under our DPS policy, once we have determined that a population segment is discrete, we consider its biological and ecological significance to the larger taxon to which it belongs. Our DPS policy provides several factors that we may consider to evaluate the significance of a population segment to the remainder of its taxon, including: (1) persistence of the discrete population segment in an ecological setting unusual or unique for the taxon, (2) evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon, (3) evidence that the population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range, or (4) evidence that the discrete population segment differs markedly from the remainder of the species in its genetic characteristics.

NRM Significance Analysis

Because the NRM is not discrete, we need not evaluate its significance to the taxon (61 FR 4722, February 7, 1996, p. 4725).

Western United States Significance Analysis

As stated previously, the gray wolf has a circumpolar range and is known to occur in North America, Europe, and Asia. Prior to European settlement in North America, the range of the gray wolf included most of the continent (Young and Goldman 1944, pp. 9–10). As discussed above, Canadian gray wolf populations are large and healthy and have been for decades (see "Western United States Discreteness Analysis" above). In the Western United States, wolves were historically common and widely distributed (Young and Goldman 1944, pp. 9–58). Extensive human-caused mortality led to the species' near extirpation from the region (Young and Goldman 1944, pp. 56–58; Service 1987, pp. 1–3) and its eventual listing under the Act (39 FR 1171, January 4, 1974; 43 FR 9607, March 9, 1978). The restoration of wolves to the Western United States has filled a significant gap in the range of the taxon and provides an important re-expansion of the range of gray wolves in North America since gray wolves were first listed in the Western United States in 1973 (38 FR 14678, June 4, 1973). The loss of gray wolves in the Western United States would, therefore, represent a significant gap in the taxon's range because it would create a gap of more than 1,000 mi (1,600 km) between the Mexican wolf subspecies of gray wolf to the south of the Western United States wolf metapopulation and gray wolves in Canada to the north. Therefore, the Western United States wolf population meets the element for significance under our DPS policy because the loss of this population would represent a significant gap in the range of the taxon (61 FR 4722, February 7, 1996).

<u>Gray wolf in the NRM DPS Determination</u>

Based on our analysis above, we find that gray wolves within the boundaries of the NRM DPS described in the 2009 rule no longer constitute a valid DPS. Gray wolves in the NRM are not markedly separated from other populations of the taxon outside of the NRM's Western boundary (i.e., the wolves in the eastern one-third of Oregon and Washington are not markedly separated from the wolves in the Western two-thirds of Oregon and Washington, and in California, Figure 1). Therefore, the NRM does not meet the discreteness standard of the DPS Policy. Thus, gray wolves in the NRM area do not, on their own, represent a valid DPS and we do not consider the status of the NRM as a separately listable entity. However, we consider the status of gray wolves in the NRM area below in our analysis for the gray wolf in a significant portion of its range in the Western United States.

From this point forward, we refer to the wolves within the boundaries of the NRM DPS described in the 2009 rule as the "NRM" or the "NRM population" when we discuss the status of wolves in this delisted portion of the range. However, in using the term "NRM" or "NRM population" to refer to this area, we are not indicating that the wolves in this area represent a separate population from wolves elsewhere in the Western United States or that this area still qualifies as a DPS.

Gray wolf in the Western United States DPS Determination

Based on our review of the best available scientific data, we determine that the gray wolf in the Western United States qualifies as a DPS, a valid listable entity under the Act. We find that the gray wolf in the Western United States meets the discreteness element of the DPS Policy because: (1) it is markedly separated, genetically and physically, from other populations of the taxon (i.e., wolves in the Great Lakes area and coastal wolves); and (2) it is delimited by international governmental boundaries (the United States–Canada border) within which differences in control of exploitation and in regulatory mechanisms exist for gray wolves. We find that the population meets the significance element of the DPS Policy because the loss of the Western United States population would result in a significant gap in the range of the taxon. The Western United States population of gray wolf qualifies as a valid DPS under the policy because it is both discrete and significant (61 FR 4722, February 7, 1996). However, because we conclude that wolves in the Western United States do not warrant listing under the Act for the reasons described below, it is not necessary for us to delineate the precise geographic boundaries of a possible Western United States DPS in this finding.

ANALYTICAL FRAMEWORK

To assess the viability of the gray wolf in the Western United States, we conducted a species status assessment (SSA) using the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306–311). Briefly, resiliency supports the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry years, warm or cold years, variation in demographic rates), redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the ability of the species to adapt to both near-term and long-term changes in its physical and biological environment (for example, climate change, disease). A species with a high degree of resiliency, representation, and redundancy is better able to adapt to novel changes and to tolerate environmental stochasticity and catastrophes. In general, species viability will increase with increases in resiliency, redundancy, and representation (Smith et al. 2018, p. 306). Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species' viability.

We used the SSA framework to assemble the best scientific and commercial data available for this species. The SSA framework consists of three sequential stages. During the first stage, we evaluate the species' needs. The next stage involves an assessment of the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition (i.e., how threats and conservation actions have influenced the species). The final stage of the SSA framework involves assessing the species' plausible range of future responses to positive and negative environmental and anthropogenic influences. The SSA framework uses the best available data to characterize viability as the ability of a species to sustain populations in the wild over time and is used to inform our regulatory decision.

The SSA Report does not represent a decision by the Service on whether the gray wolf in the Western United States should be listed under the Act. However, it does provide the scientific basis that informs our regulatory decisions, which involve the further application of the standards within the Act and its implementing regulations and policies. The Species Status Assessment Report for the Gray Wolf (*Canis lupus*) in the Western United States – December 2023, Version 1.2 (SSA Report). is a summary of the information we have assembled and reviewed and incorporates the best scientific and commercial data available for this species. Excerpts of the SSA Report are provided in the sections below. For more detailed information, please refer to the SSA Report (Service 2023, entire).

BIOLOGICAL INFORMATION

Species Description

As we discuss in greater detail in Chapter 1 of the SSA Report (Service 2023, p. 10), gray wolves are the largest wild members of the *Canidae* or dog family, with adults ranging from 40 to 175 pounds (18 to 80 kilograms), depending on sex and geographic locale (Mech 1974, pp. 11–12) (see Figure 2 below). Gray wolves have a circumpolar range including North America, Europe, and Asia. Gray wolves have long legs that are well adapted to running, allowing them to move fast and travel far in search of food, and large skulls and jaws that are well suited to catching and feeding on large mammals (Mech 1970, pp. 11–15). In North America, wolves are primarily predators of medium and large mammals and are efficient at using available food resources (Newsome et al. 2016, pp. 260–261; Janeiro-Otero et al. 2020, p. 2).

Figure 2. Gray wolf. Photo Credit: Oregon Department of Fish and Wildlife.

<u>Taxonomy</u>

We discuss the best available science regarding the taxonomy of gray wolves in detail in the SSA Report (Service 2023, pp. 6–9). The gray wolf is a member of the canid family (*Canidae*) in a global genus (*Canis*) that includes the domestic dog (*C. familiaris*), coyote (*C. latrans*), red wolf (*C. rufus*), golden jackal (*C. aureus*), Ethiopian wolf (*C. simensis*), and African golden wolf (*C. lupaster*). Among *Canis* species found in North America, taxonomic relationships have been studied extensively, though with a notable lack of consensus, even on issues such as the phylogenetic history of dogs, wolves, and coyotes (e.g., Cronin et al. 2014, entire and references therein; Freedman and Wayne 2017, entire; Fitak et al. 2018, pp. 380–381; National Academies of Sciences Engineering and Medicine 2019, pp. 68–69; Sacks et al. 2021, entire). Despite ongoing debate about canid taxonomy, there is wide recognition that gene flow or hybridization among different lineages of canids has played a significant role in shaping the genus, both globally (Gopalakrishnan et al. 2018, entire; Pilot et al. 2019, entire; Krofel et al. 2022, pp. 157–159) and within North America (Koblmuller et al. 2009, pp. 2321–2323; vonHoldt and Aardema 2020, entire; Sacks et al. 2021, p. 4301; Wilson and Rutledge 2021, entire). Such interspecific admixture may have, at times, conferred selective advantages, allowing for adaptation to environmental change or different habitats (Kays et al. 2010, entire; Pilot et al. 2019, p. 8).

There is general agreement within the scientific community that wolves occupying the Rocky Mountains and Pacific Northwest are genetically distinct from those inhabiting the Great Lakes area (Service 2023, pp. 6–9). This distinction has been clearly demonstrated with genetic markers (vonHoldt et al. 2011, p. 1301; Sinding et al. 2018, pp. 3–6) and morphological analyses (Nowak 2002, pp. 199–120; Chambers et al. 2012, pp. 14–25 and references therein). Wolves currently occupying the Western United States are the result of natural immigration from Canada into northwest Montana and reintroduction from inland Alberta and British Columbia into central Idaho and YNP (Bangs and Fritts 1996, entire; Fritts et al. 1997, entire). As we discuss in greater detail in the SSA Report (Service 2023, p. 8) and under "Distinct Population Segment" above, as these populations have grown, wolves have expanded into northern California, Oregon, and Washington. More recently, wolves have been detected in Colorado.

In summary, wolf taxonomy and evolutionary history are complex in North America, but the taxonomic picture is clearer for wolves in the Western United States than in Eastern North America (Service 2023, pp. 6–9). Scientific understanding of wolf subspecies, unique evolutionary lineages, ecotypes, and admixture of formerly isolated populations continues to develop (Service 2023, pp. 6–10). Given the ongoing debates and continuing scientific efforts aimed at clarifying the taxonomic relationships among various canid groups, we have an imperfect understanding of their evolutionary history in North America. Nonetheless, the best available scientific data indicate that wolves are subdivided, to some degree, based on ecological and climatic factors (Service 2023, pp. 6–9). In the Western United States, these subdivisions are represented by the Mexican wolf subspecies *C.l. baileyi* and all other wolves in the Western United States. As we discuss under "Distinct Population Segment" above, while there is some evidence of admixture with coastal wolves, we do not have information confirming that this admixture is common or that it is occurring within our analysis area. Nor is there evidence of non-admixed coastal wolves outside of their presumed range in Alaska and Canada. Because the specific taxonomic and evolutionary relationships within North American canid species are not yet fully resolved, for the remainder of this finding we use the term "gray wolf in the Western United States" to describe gray wolves that occur in the Western United States, excluding the Mexican wolf subspecies.

Habitat/Life History

As we discuss in greater detail in the SSA Report (Service 2023, pp. 10–13), gray wolves are highly territorial, social animals and group hunters, normally living in packs of seven or fewer wolves, but sometimes attaining pack sizes of 20 or more wolves (Mech 1970, pp. 38–43; Mech and Boitani 2003, p. 8; Stahler et al. 2020, p. 46). Generation time for gray wolves—the average time between two consecutive generations—is estimated to be 4.2 to 4.7 years (vonHoldt et al. 2010, p. 4422; Mech et al. 2016, pp. 9–10; Mech and Barber-Meyer 2017, entire).

In wolf populations, pack social structure is very adaptable (Service 2023, pp. 11–12). Oftentimes, breeding members can be quickly replaced from either within or outside the wolf pack, and pups can be reared by another pack member should their parents die (Packard 2003, pp. 58–60; Brainerd et al. 2008, entire; Borg et al. 2015, pp. 184–185; Stahler et al. 2020, p. 49). This pack social structure, and the resulting wolf breeding strategies, leads to high potential fecundity and the ability for packs to act as "dispersal pumps" (see discussion of dispersal in paragraph below) (Mech 1970, pp. 41–42; Fuller et al. 2003, p. 181; Mech and Boitani 2003, pp. 2–6, 11; Paquet and Carbyn 2003, pp. 485–486). Consequently, wolf populations can overcome severe disruptions, such as intensive human-caused mortality or disease (e.g., Mech 1995, entire; Boyd and Pletscher 1999, entire; Treves et al. 2009, entire; Mech 2017, entire; Hendricks et al. 2019, entire; Service 2023, pp. 11–12).

Gray wolves rarely disperse before 10 months of age, and most commonly disperse between 1 and 3 years of age (Gese and Mech 1991, pp. 2947–2948; Treves et al. 2009, p. 193; Jimenez et al. 2017, p. 589). By the age of 3 years, most wolves will have dispersed from their natal pack to locate social openings in existing packs or to find a mate and form a new pack (Mech and Boitani 2003, pp. 11–17; Jimenez et al. 2017, p. 590; Service 2023, p. 11). Dispersers may become nomadic and cover large areas as lone animals, or they may establish their own territorial wolf pack upon locating unoccupied habitats and members of the opposite sex (Mech and Boitani 2003, pp. 11–17). Dispersal distances in North America typically range from 40 to 96 mi (65 to 154 km) (Boyd and Pletscher 1999, p. 1102; Jimenez et al. 2017, p. 585), although dispersal distances of several hundred miles are occasionally reported (Boyd and Pletscher 1999, pp. 1102–1103; Mech and Boitani 2003, pp. 14–15; ODFW 2011, pp. 5–6; ODFW 2016, p. 10; Jimenez et al. 2017, p. 585; CDFW 2021, p. 2). The innate ability of wolves to disperse long distances (Smith et al. 2020, p. 88) allows wolf populations to quickly expand and recolonize vacant habitats (e.g., Mech 1995, entire; Boyd and Pletscher 1999, entire; Treves et al. 2009, entire; Mech 2017, entire; Hendricks et al. 2019, entire).

Gray wolves are habitat generalists, meaning they can thrive in a variety of habitats (Mech and Boitani 2003, p. 163). They once occupied or transited most of the United States, except the Southeast (Nowak 2002, pp. 103–121; Nowak 2009, pp. 242–244; Hohenlohe et al. 2017, pp. 1–2). We consider suitable wolf habitat to be areas of large, contiguous tracts of land containing adequate wild ungulate populations (e.g., elk and deer) with a low risk of conflict with humans and livestock (conflict generally increases the likelihood of human-caused wolf mortality) (see Mech 2017, pp. 312–315 and Service 2023, p. 13).

<u>Historical and Current Range/Distribution</u>

We discuss historical distribution and abundance of gray wolves in detail in Chapter 1 of our SSA Report (Service 2023, pp. 14–17) and in the 2020 Gray Wolf Biological Report (Service 2020, pp. 9–12), and include a summary here. Prior to European settlement, the range of the gray wolf included most of North America except for the Southeastern United States (Young and Goldman 1944, pp. 9–10; Mech 1974, pp. 1–2; Hall 1981, pp. 928–934; Schmidt 1991, entire; Nowak 1995, p. 395; Nowak 2002, pp. 96–97; Service 2020, Figure 1) (see Figure 3 below).

In the Western United States, wolves were historically common and widely distributed (Young and Goldman 1944, pp. 9–58). Estimates of historical populations are notoriously difficult to verify, but genetic data and extrapolations of known wolf densities have been used to estimate that there were likely hundreds of thousands of gray wolves once occupying the Western United States (Hampton 1997, pp. 22, 258; Leonard et al. 2005, pp. 14–15). As a result of poisoning, unregulated trapping and shooting, and the public funding of wolf extermination efforts, gray wolf populations were essentially eliminated from the Western United States by the 1930s (Young and Goldman 1944, pp. 56–58). After human-caused mortality of wolves in Southwestern Canada was regulated in the 1960s, populations expanded southward (Carbyn 1983, p. 240). Dispersing wolves occasionally reached the Rocky Mountains of the United States (Service 1994, pp. 4–5), but they lacked legal protection there until 1973 when they were first listed under the Endangered Species Conservation Act of 1966, a predecessor of the Act (38 FR 14678, June 4, 1973). Wolves were then listed and protected under the Act in 1974 (39 FR 1171, January 4, 1974).

The reintroduction of wolves from inland Alberta and British Columbia to central Idaho and YNP in 1995 and 1996, along with natural recolonization of wolves from Canada into northwest Montana since the 1980s, led to increased numbers and distribution of wolves in the NRM (Service 2023, p. 16). Over the course of the last several decades, wolves have continued to expand their range in the Western United States and wolf packs have become established in California, Oregon, and Washington; more recently, wolves have been documented in Colorado (Service 2023, pp. 129–140). Within our analysis area, dispersing wolves have also been observed in Arizona, Nevada, New Mexico and Utah, but they have not established packs there (Service 2023, p. 135–136). At the end of 2022, the best available science indicates there were an estimated 2,797 gray wolves in the Western United States (CDFW 2022; Cassidy et al. 2023; IDFG 2023a; IDFG 2023a, in litt.; IDFG 2023b, in litt.; Odell 2022, pers. comm.; Odell 2023, pers. comm.; ODFW 2023; Parks et al. 2023; WDFW et al. 2023; Wyoming Game and Fish Department (WGFD) et al. 2023; Service 2023, pp. 129–140).

Wolves in the Western United States currently have high levels of genetic diversity and have had low levels of inbreeding in the decades since their establishment, without any indications of negative genetic effects (see discussion in "Current Resiliency" below) (vonHoldt et al. 2010, pp. 4420–4421; WGI 2021, p. 8; Ausband 2022, p. 5; IDFG 2023b, p. 11; Service 2023, pp. 140–142, Appendix 2). For example, wolves in the NRM have consistently demonstrated high levels of heterozygosity (greater than 0.64), indicating healthy levels of genetic diversity (vonHoldt et al. 2010, pp. 4420–4421; WGI 2021, p. 8; Ausband 2022, p. 5). Three factors likely contribute to these characteristics. First, the 66 wolves reintroduced into Idaho and Wyoming (and the 10 wolves translocated from northwest Montana to YNP in 1997), combined with the naturally dispersing wolves in Montana, constituted a much larger group of founders than most of the examples of small wolf populations that have experienced deleterious genetic effects (Bang and Fritts 1996, pp. 407–408; vonHoldt et al. 2008, p. 267; vonHoldt et al. 2010, pp. 4420–4421; WGI 2021, entire; Ausband 2022, p. 539; Service 2023, p. 141). Second, wolves appear to avoid inbreeding when possible, preferentially mating with unrelated individuals (vonHoldt et al. 2008, pp. 267–268; Ausband 2022, p. 539; Service 2023, p. 141). Finally, researchers have concluded that there has been consistent gene flow within and among the NRM states and Canada (vonHoldt et al. 2010, pp. 4421–4422; Jimenez et al. 2017, entire; Clendenin et al. 2019, entire; Ausband and Waits 2020, pp. 3192–3193; WGI 2021, entire; Ausband 2022, p. 539; IDFG 2023b, p. 11; Service 2023, pp. 141–142).

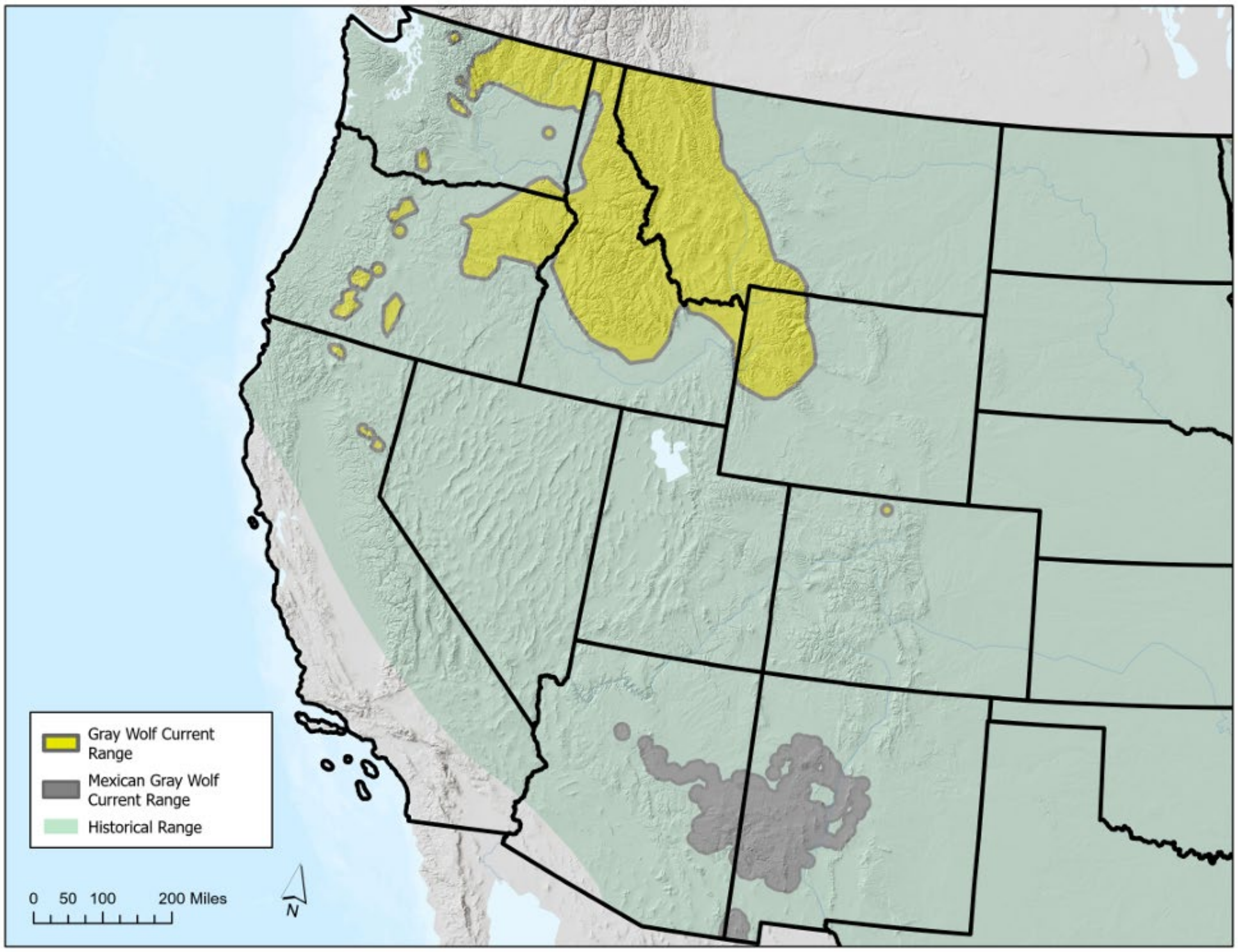

Figure 3. Historical (green) and current (yellow) gray wolf range in the Western United States. The U.S. portion of Mexican wolf range is depicted in gray. Historical range based on Nowak (1995). Current range based on most recent state distribution data (as of December 31, 2022, except California, which is current as of May 2023), among other sources (see Chapter 1 of SSA Report (Service 2023) for references and details).

Population Needs

In Chapter 2 of the SSA Report, we describe the needed resources and demographic factors that support resiliency of gray wolf populations in the Western United States (Service 2023, pp. 18–21). Wolves in the Western United States need suitable habitat, including a sufficient quantity of prey, to complete their life cycle (Service 2023, p. 18). We consider suitable habitat for gray wolves to be large, contiguous tracts of land containing adequate wild ungulate populations (e.g., elk and deer) and a low potential for conflicts with humans and livestock, which generally allows for increased wolf pack persistence (see Mech 2017, pp. 312–315). The combination of reproduction, mortality, immigration, and emigration determines the distribution, size, and demographic health (or resiliency) of wolf populations at any given time (Service 2023, p. 18). Another key component in assessing demographic health (resiliency) is the retention of genetic diversity. Connectivity or effective dispersal between populations or subpopulations is a critical component in the maintenance of genetic diversity in wolf populations (Service 2023, pp. 20–21). Due to their high reproductive capacity and their ability to disperse long distances, wolf populations are remarkably resilient as long as food supply (a function of both prey density and prey vulnerability) is adequate and human-caused mortality is not excessive (Fuller et al. 2003, pp. 170–171, 181, 187, 189; Adams et al. 2008, pp. 18–22; Creel and Rotella 2010, pp. 5–6; Gude et al. 2012, pp. 112–113).

Species Needs

In Chapter 2 of the SSA Report, we also describe the factors that contribute to redundancy and representation of the gray wolf in the Western United States (Service 2023, pp. 21–22). In general, to maintain populations in the wild over time, wolves in the Western United States need well-connected and genetically diverse subpopulations that function as a metapopulation distributed across enough of their range to be able to withstand stochastic events; rebound after catastrophes (e.g., severe disease outbreaks); and adapt to changing environmental conditions (Service 2023, pp. 21–22, 31).

FACTORS INFLUENCING THE STATUS

The Act directs us to determine whether any species is an endangered species or a threatened species because of any factors (or threats) affecting its continued existence (i.e., whether it meets the definition of a threatened species or an endangered species). We use the term "threat" to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term "threat" includes actions or conditions that have a direct impact on individuals, as well as those that affect individuals through alteration of their habitat or required resources. The term "threat" may encompass—either together or separately—the source of the action or condition, or the action or condition itself.

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

Threats

Stressors we evaluated in our SSA Report for wolves in the Western United States include: human-caused mortality, disease and parasites, inbreeding depression, climate change, disease in prey species, and other sources of habitat modification (Service 2023, pp. 32–114). We discuss the potential influence of these stressors in detail in Chapter 3 of the SSA Report (Service 2023, pp. 32–114), and we provide a summary below. We also discuss the state, tribal, and Federal management regimes that provide for the conservation of wolves in the Western United States by reducing the influence of a stressor, improving the condition of wolf habitat, or improving wolf demographic factors (Service 2023, pp. 32–114). Figure 4 below illustrates the relationships between these stressors, relevant conservation efforts, and the species' needs.

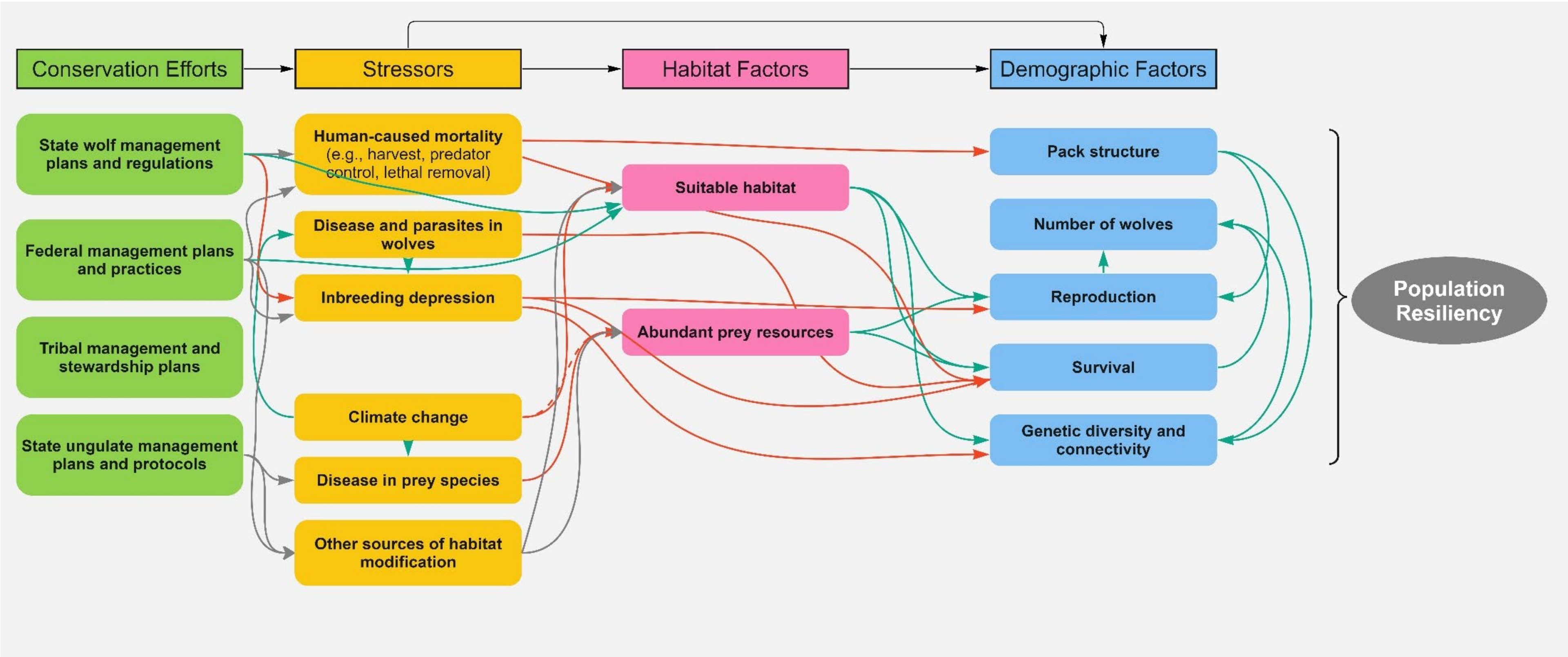

Figure 4. A conceptual model for the primary stressors that may affect individuals or cumulatively influence the resiliency of the gray wolf in the Western United States. Green arrows represent positive relationships between nodes and red arrows represent negative relationships between nodes. Gray arrows indicate the relationship between nodes could be either positive or negative. Dotted lines indicate where there is uncertainty or debate in current research regarding the relationship between conservation efforts, stressors, and/or resource needs.

Human-Caused Mortality

In the Western United States, the primary stressor influencing wolf populations is human-caused mortality (Service 2023, pp. 34–97); this stressor was identified as a threat when the species was originally listed (43 FR 9607; March 9, 1978). The main sources of human-caused mortality are regulated harvest in Idaho, Montana, Washington, and Wyoming; lethal control of wolves depredating livestock throughout the NRM where wolves are federally delisted; and illegal take throughout the range of the wolf metapopulation in the Western United States (Service 2023, pp. 41–48). Within current wolf range, most states, Tribes, and Federal agencies have management protocols, rules, and regulations that govern conservation and management of wolves, which we summarize under "Conservation Measures and Existing Regulatory Mechanisms" below and discuss in greater detail in the SSA Report (Service 2023, pp. 49–96).

The effects of increased mortality on an animal population can be described as compensatory or additive (Service 2023, pp. 35–37). Compensatory mortality involves a change in the primary type of mortality, but no change in the overall mortality rate (e.g., if animals were not harvested, they would have died anyway through a different cause) (Service 2023, p. 35–37). Additive mortality causes an immediate increase in the mortality rate because these additional individuals would have otherwise survived if the cause of the additive mortality was removed (Péron 2013, p. 409). Many wildlife populations can compensate for changing levels and types of mortality up to a certain point; after this point, mortality becomes additive and survival rates begin to decline (Service 2023, pp. 35–37). Wolves are no exception. The three primary mechanisms with which wolf populations may compensate for increased human-caused mortality include a reduction in natural mortality (Fuller et al. 2003, pp. 185–186; Murray et al. 2010, pp. 2514, 2522; Webb et al. 2011, pp. 748–749; O'Neil 2017, pp. 218–219), increased natality rates and/or recruitment (Ballard et al. 1987, p. 44; Webb et al. 2011, pp. 748–750; Schmidt et al. 2017, pp. 18, 25; Smith et al. 2020, p. 81), and immigration from dispersing individuals into the affected area (Ballard et al. 1987, p. 44; Adams et al. 2008, pp. 20–21; Bassing et al. 2019, pp. 585–586; Ausband et al. 2023, p. 11).

There is considerable research and continued debate surrounding the level of human-caused mortality for which wolf populations can compensate and maintain population stability, which we discuss in detail in the SSA Report (Service 2023, pp. 35–37). Depending on the analysis, researchers estimate that wolf populations remain stable, or could continue to increase, within a range of human-caused mortality rates between 17 and 48 percent, though a wolf population's specific response to human-caused mortality may vary due to a variety of other factors (e.g., population dynamics and other stressors the population is experiencing) (Fuller 1989, pp. 24–25, 34; Fuller et al. 2003, pp. 182–186; Adams et al. 2008, pp. 18–21; Creel and Rotella 2010, pp. 3–6; Gude et al. 2012, pp. 112–113; Vucetich and Carroll 2012, entire; ODFW 2015, p. 31). A commonly accepted guiding principle is that wolves are able to compensate for annual rates of human-caused mortality up to approximately 29 percent of the known or estimated population (Adams et al. 2008, pp. 18–21) (Service 2023, p. 37); this threshold represents a general observation but many factors influence how wolf populations respond to specific rates of mortality (Service 2023, p. 37). As discussed in greater detail in the SSA Report (Service 2023, pp. 49–90), while rates of human-caused mortality fluctuate annually, estimates of average rates of human-caused wolf mortality in Idaho, Montana, and Wyoming are similar to or slightly below this 29 percent threshold and wolf populations in these states have remained relatively stable through the end of 2021 (Service 2023, p. 90).

Since 2011, during the periods when wolves have been under state management, Idaho, Montana, and Wyoming (which make up the majority of the NRM) have used an adaptive management approach to manage wolves with the objective of reversing or stabilizing population growth while continuing to maintain wolf populations above Federal recovery targets (Service 2023, pp. 41–43, 49–90). The primary method these states have used to manage wolf populations and achieve management objectives has been regulated public harvest. Overall, harvest rates have not always increased despite progressively less-restrictive harvest regulations in Idaho and Montana (e.g., extended seasons, removal of harvest limits, increased bag limits), and populations remained relatively stable through the end of 2020, with slight population decreases observed in Idaho and Montana at the end of 2021 and 2022[3] (Service 2023, pp. 49–90). Current levels of mortality in the NRM have not prevented the continued natural recolonization of suitable habitat in Oregon and Washington (where known wolves now total close to 400 individuals), California, or, more recently, in Colorado (Service 2023, pp. 134–136). This demonstrates that the life-history characteristics of wolf populations can provide natural resiliency to certain levels of human-caused mortality (Service 2023, p. 50).

In 2021, the state legislatures of Idaho and Montana each passed legislation intended to decrease the size of wolf populations in their states to reduce conflicts with livestock and impacts on ungulate populations (Service 2023, pp. 52–60, 65–72). These statutes allowed for the extension of season lengths, an increase in or the removal of individual bag limits, legalization of new harvest methods, and other changes to harvest practices (e.g., additional opportunities for reimbursement for the legal harvest of a wolf and, in the case of Idaho, state financial support for this reimbursement program) (Service 2023, pp. 52–60, 65–72). However, through state law and commission regulation, both states' fish and game commissions and/or departments continue to have significant regulatory authority to amend, adjust, or close wolf harvest seasons, as needed (Service 2023, pp. 54, 72). Moreover, these laws did not remove or replace the states' previous commitments to manage for at least 15 breeding pairs and 150 wolves to ensure that a minimum of 10 breeding pairs and 100 wolves are maintained. These commitments are stated in Memoranda of Understanding (MOUs) with the Service and are codified in Montana law

[3] Specifically, consistent with current wolf-management objectives in Idaho and Montana, the year-end wolf abundance estimates in 2021 and 2022 in both states decreased slightly compared to the year-end estimate from the previous years (a 44-wolf decrease in Idaho and a 33-wolf decrease in Montana between year-end 2020 and year-end 2021 and an 86-wolf decrease in Idaho and a 56-wolf decrease in Montana between year-end 2021 and year-end 2022); however, in Montana, the confidence intervals around these year-end estimates for 2021 and 2022 encompass the previous years' estimates, suggesting that uncertainty remains in the exact trajectory of the population between year-end 2020 and year-end 2022 (Service 2023, pp. 50–51).

(Montana Code Annotated (MCA) 87-1-901) (see discussion of "Conservation Efforts and Existing Regulatory Mechanisms" below) (Groen et al. 2008, p. 1; Talbott and Guertin 2012, p. 1). These statutes, and the associated regulatory changes implemented during the 2021/2022 wolf hunting and trapping seasons in Idaho and Montana, were the primary subject of the 2021 petitions to list the gray wolf in the Western United States under the Act.

While harvest rates documented in Idaho and Montana during the 2021/2022 and 2022/2023 wolf seasons are within the range of harvest rates that occurred during seasons that pre-dated these new laws (Service 2023, pp. 52–60, 65–72), it remains unclear how recent statutory and regulatory changes will affect wolf abundance and distribution in each state and throughout the West in the long-term. Our analysis of future condition in the SSA Report (Service 2023, pp. 186–195) presents modeled results illustrating how these recent regulatory changes may affect population estimates beyond 2022.

Disease in Wolves

Disease outbreaks are the most common natural cause of die-offs in carnivores (Young 1994, pp. 414–415). Although disease and parasites were not identified as a threat at the time we listed the gray wolf, a wide range of diseases and parasites have been reported for the gray wolf during the past several decades, and some of them have had localized impacts (Brand et al. 1995, p. 419; Wisconsin Department of Natural Resources 1999, p. 61; Kreeger 2003, pp. 202–214; Stronen et al. 2011, entire; Bryan et al. 2012, pp. 785–788; Brandell et al. 2021, entire). In our SSA Report, we provide a detailed discussion of diseases that have been documented in wild wolves (Service 2023, pp. 98–101).

According to the best available science, disease in wolves has caused episodic, yet short-term and localized population decreases (Service 2023, pp. 98–101, 114). In some circumstances, disease outbreaks can interact with density-dependent mortality to regulate population sizes at lower levels than prior to the introduction of the disease(s) (e.g., DeCandia et al. 2021, p. 430). Given the potential of disease to affect wolf populations now and in the future, we projected the future condition of wolves in the Western United States considering the potential impact of known and novel disease outbreaks (Service 2023, pp. 159–160). We also discuss the potential for future climate-related changes in disease distribution, frequency, and severity (Service 2023, pp. 103–105, 201).

Inbreeding Depression

At the time of listing, the Service did not identify any genetic health concerns for the gray wolf because, in the late 1970s, our understanding of the link between genetic diversity and population health was in its infancy (Service 2023, p. 101). Since the original listing, enhanced genetic techniques have vastly improved our understanding of population genetics and the potential consequences of range and population contraction and expansion. For example, research has firmly established that genetic issues, such as inbreeding depression, can be a significant concern in small populations, with potentially serious implications for population viability (Frankham 2010, entire; Hasselgren and Noren 2019, entire).

Inbreeding, or the mating of related individuals within a population, has been documented to result in negative impacts on a variety of traits linked to fitness across a wide range of taxa, with the impacts collectively referred to as inbreeding depression (Crnokrak and Roff 1999, entire; Hedrick and Kalinowski 2000, entire; Liberg et al. 2005, entire; Frankham 2010, entire). Inbreeding is generally attributed to small population size, isolation from other populations, or both (Service 2023, pp. 101–103). As we discuss in greater detail in the SSA Report (Service 2023, pp. 101–103), inbreeding depression, as evidenced by physiological anomalies or other effects on fitness, has been documented in several wild wolf populations (Service 2023, p. 102). These include the population in Isle Royale National Park, Scandinavian wolves in Norway and Sweden, Mexican wolves, wolves in the Apennine Mountains in Italy, and wolves in the Sierra Moreno mountains on the Iberian Peninsula (Vilà et al. 2003, pp. 94–95; Liberg et al. 2005, entire; Räikkönen et al. 2006, entire; Fabbri et al. 2007, entire; Räikkönen et al. 2013, entire; Gomez-Sanchez et al. 2018, entire; Robinson et al. 2019, entire; Taron et al. 2021, entire; Service 2023, p. 102). In all of these populations, their demographic history has included some degree of population bottleneck along with limited or non-existent connectivity with other populations (Service 2023, pp. 101–103).

Although inbreeding depression has been documented in wolves, they are adept at avoiding inbreeding when possible (for example, preferentially breeding with unrelated individuals or dispersing away from natal sites to breed) (vonHoldt et al. 2008, p. 262; Ausband 2022, p. 539). To date, reintroduced and naturally expanding populations in the NRM have shown low levels of inbreeding, likely due to a relatively large and genetically diverse founding population and wolves' propensity to avoid inbreeding when possible (Bang and Fritts 1996, pp. 407–408; Bensch et al. 2006, entire; vonHoldt et al. 2008, p. 267–268; vonHoldt et al. 2010, pp. 4420–4422; Wildlife Genetics International (WGI) 2021, entire; Ausband 2022, p. 539; Service 2023, pp. 101–103, 140–142). Additionally, researchers have concluded that there has been consistent gene flow within and among the NRM states and Canada, which further supports genetic diversity in the Western metapopulation (vonHoldt et al. 2010, pp. 4421–4422; Jimenez et al. 2017, entire; Clendenin et al. 2019, entire; Ausband and Waits 2020, pp. 3192–3193; WGI 2021, entire; Ausband 2022, p. 539; IDFG 2023b, p. 11; Service 2023, pp. 101–103, 140–142, Appendix 2). Moreover, in both the Scandinavian and Mexican wolf populations, many of the effects of inbreeding depression appeared to be mitigated by relatively small influxes of additional wolves (i.e., new genetic material) into the population, either through natural dispersal or human intervention (Vilà et al. 2003, entire; Fredrickson et al. 2007, entire; vonHoldt et al. 2008, p. 262; vonHoldt et al. 2010, p. 4421; Wayne and Hedrick 2011, entire; Akesson et al. 2016, entire).

In many cases, wolf populations may be able to avoid or recover from the effects of inbreeding if sufficient population size and connectivity among populations are maintained. As we discuss further in Chapter 4 of the SSA Report (Service 2023, pp. 140–142), the best available data does not provide evidence of inbreeding depression in wolves in the Western U.S. metapopulation. We discuss whether inbreeding depression could occur in this metapopulation in the future in Chapter 6 of our SSA Report (Service 2023, pp. 201–205).

Other Stressors Considered

We also considered the potential effects of diseases in prey species, climate change, and other sources of habitat modification on gray wolves in the Western United States, but we did not further analyze their future effect on gray wolf viability (Service 2023, pp. 103–109). To date, based on the best available scientific data, diseases in prey species have not resulted in significant, rangewide prey reductions nor have they led to wolf population declines in the Western metapopulation (Service 2023, pp. 98–101). Considerable uncertainty remains as to the potential of diseases in prey species to change in the future, which makes it difficult to analyze any future effects on wolf populations (Service 2023, pp. 105–108). Each state within the range of wolf species in the Western United States has comprehensive ungulate management plans and strategies to address disease outbreaks and manage for sustainable populations of ungulates (Service 2023, pp. 123, 201). We anticipate that wolf populations—given their high fecundity and long-range dispersal capabilities—would quickly respond to ungulate population recovery following any future disease outbreaks.

Gray wolves are highly adaptable and efficient at exploiting available food resources and have even been called “climate generalists” (Barber-Meyer et al. 2021, pp. 1, 11; van den Bosch et al. 2023, p. 4). As we discuss further in the SSA (Service 2023, pp. 103–105), because of their generalist, adaptable life history, climate change is not likely to strongly affect wolf populations directly throughout North America (van den Bosch et al. 2023, pp. 8–9). There is no evidence indicating that climate change, in isolation, is currently causing direct negative effects to the viability of the gray wolf in the Western United States, nor do we expect it to do so in the future (Service 2023, pp. 103–105). However, climate change has the potential to influence disease rates in wolves, and we quantitatively analyzed the effects of rare but severe disease catastrophes in our analysis of future condition (these disease catastrophes could manifest as a result of climate change or other causes).

Habitat modification (i.e., from sources other than human-caused mortality, namely the human footprint and wildfire) is not a primary stressor on wolf populations. Based on the best available scientific data, the impacts of habitat modification are localized relative to the wide range of the species (Service 2023, pp. 108–109). Thus, we did not further consider the effects of habitat modification in our analysis of current and future condition (Service 2023, p. 114).

Conservation Measures and Existing Regulatory Mechanisms

It is well recognized that the future conservation of wolf populations depends almost entirely on regulation of human-caused mortality. In the SSA Report, we provide a detailed discussion of the various management plans and regulations that govern wolf management throughout their range in the Western United States and how these plans and regulations affect levels of human-caused mortality and other stressors (Service 2023, pp. 49–96, 110–113). We provide a summary of these conservation measures in each state in our analysis area below. Wolves have likely always been scarce in Nevada due to the biogeography of the Great Basin and limited prey resources (Young and Goldman 1944, p. 30; Service 2023, p. 16). Therefore, we do not discuss the conservation measures in Nevada below.

Recovery Criteria for Wolves in the NRM

The NRM Wolf Recovery Plan was completed in 1980 (Service 1980, p. i) and revised in 1987 (Service 1987, p. i). The minimum recovery goal for the NRM was regularly reviewed, reevaluated, and, when necessary, modified as new scientific information warranted (Service 1987, p. 12; Service 1994, Appendix 8 and 9; Fritts and Carbyn 1995, p. 26; Bangs 2002, p. 1; 73 FR 10514, February 27, 2008; 74 FR 15123, April 2, 2009, pp. 15130–15135). The final demographic recovery criterion for the NRM gray wolf population was 30 or more breeding pairs comprising at least 300 wolves equitably distributed amongst Idaho, Montana, and Wyoming for 3 consecutive years, with genetic exchange (either natural or, if necessary, agency managed) between the populations in each of these three states. To provide a buffer above these minimum recovery levels, Idaho and Montana each agreed to manage for at least 15 breeding pairs and 150 wolves in mid-winter (74 FR 15123, April 2, 2009, p. 15132). Wyoming agreed to manage for 10 breeding pairs and 100 wolves in areas of the state under its jurisdiction, and the National Park Service and the Eastern Shoshone and Northern Arapaho Tribes would maintain a minimum of 5 breeding pairs and 50 wolves combined (77 FR 55530, September 10, 2012, pp. 55538–55539). We summarize the process the Service used to develop these recovery criteria, including various past revisions, in the SSA Report (Service 2023, pp. 23–27).

Management of Wolves in Idaho

Since Federal delisting, wolves have been classified and managed as a big-game species in Idaho, which allows for controlled take and enforcement for illegal take under big-game rules and regulations. Until recently, wolf management in Idaho was guided by the legislatively adopted *2002 Idaho Wolf Conservation and Management Plan* (*2002 Idaho Plan*) (Idaho Legislative Wolf Oversight Committee (ILWOC) 2002, entire). The primary goal of the *2002 Idaho Plan* was to manage for a viable, self-sustaining wolf population that was well-connected to neighboring states and provinces while, concurrently, working to minimize negative impacts to livestock and ungulates (ILWOC 2002, p. 4, 18; 74 FR 15123, April 2, 2009, pp. 15166–15167). Under the *2002 Idaho Plan*, when there were more than 15 packs documented in the state, wolf management was similar to management of other predators in the state, whereas management became more restrictive when 15 or fewer packs were documented (ILWOC 2002, p. 5). Wolf management in Idaho was also guided by a memorandum of agreement between the State of Idaho and the Nez Perce Tribe that defined roles and responsibilities for the conservation and management of wolves in the state (State of Idaho and Nez Perce Tribe 2005, entire).

In May 2023, Idaho Fish and Game (IDFG) completed an updated *Idaho Gray Wolf Management Plan (2023 Idaho Plan)* that will guide wolf management from 2023 through 2028 (IDFG 2023b, entire; Service 2023, pp. 51–52), at which time the state expects to develop and implement a new plan. If a new plan is not completed by the end of 2028, we expect, based on past practice, that this 2023 plan would continue to guide wolf management in Idaho until an updated plan is completed. Similar to the *2002 Idaho Plan*, IDFG states its continued commitment to maintaining a viable, self-sustaining wolf population that is well-distributed across suitable habitat in the state and remains well connected to neighboring states and provinces (IDFG 2023b, p. 38). IDFG will closely monitor wolf populations to ensure they remain well above the state's previous commitment to manage for at least 150 wolves and 15 breeding pairs (Groen et al. 2008, p. 1; 74 FR 15123, April 2, 2009; IDFG 2023b, p. 38). The four primary goals of the *2023 Idaho Plan* are to: (1) manage for a viable wolf population that fluctuates around 500 wolves annually (they expect that wolf numbers would fluctuate from a high of 650 wolves after the birth pulse in the spring to a low of 350 wolves just prior to the birth pulse in the spring); (2) monitor wolf population dynamics annually and continue to improve wolf monitoring and population abundance estimation methods; (3) reduce wolf depredations on livestock; and (4) reduce wolf depredations on ungulate populations not meeting objectives (IDFG 2023b, pp. 38–44). To achieve these goals, IDFG intends to increase wolf mortality in the state to reduce the wolf population so that the population fluctuates around an average of 500 wolves annually by the end of 2028 (IDFG 2023b, p. 39). This management goal exceeds the state's previous commitments to manage for at least 150 wolves and 15 breeding pairs (Groen et al. 2008, p. 1; 74 FR 15123, April 2, 2009; IDFG 2023b, p. 38). Public hunting and trapping will continue to be the primary methods IDFG uses to achieve its wolf population objective (IDFG 2023b, p. 39). When it achieves this population objective, IDFG will adjust hunting and trapping to maintain the population around an average of 500 wolves annually (IDFG 2023b, p. 41).

Idaho has used adaptive management to manage a regulated hunting season for wolves every year since 2009, with the exception of the 2010/2011 season when wolves were briefly relisted (Service 2023, p. 52). Over time, IDFG has gradually implemented less-restrictive harvest regulations in an attempt to reverse wolf population growth and manage wolves at a lower population size in the state (Oelrich et al. 2022, in litt.; Service 2023, pp. 52–61). Since 2012, an outside organization has been allowed to reimburse individual hunters/trappers for costs associated with legal wolf harvest in Idaho and, beginning with the 2021/2022 wolf harvest season, the IDFG Commission has contributed financing to these reimbursements (Service 2023, pp. 54–56). However, even with the 2021 legislation to further expand harvest opportunities, the

IDFG Commission or IDFG Director continues to have significant regulatory authority to amend, adjust, or close wolf harvest seasons as needed (Service 2023, p. 54).

Wolf–livestock depredation management in Idaho is guided by Idaho Statute (I.S.) 36-1107 and the provisions in the *2023 Idaho Plan* (IDFG 2023b, pp. 43–44; Service 2023, pp. 61–62). I.S. 36-1107 authorizes the IDFG Director or his designated authorities to control, trap, and/or remove animals doing damage to or destroying any property (e.g., depredating livestock). Section (c) of the statute permits owners of livestock or domestic animals, their employees, agents, or agency personnel to lethally remove wolves molesting or attacking livestock without obtaining a permit from IDFG. However, private individuals or their contractors must obtain a permit from IDFG to lethally remove wolves that are not attacking or molesting livestock or domestic animals, or to remove wolves via methods other than state-regulated harvest. A primary goal of the *2023 Idaho Plan* is to reduce wolf depredation on livestock (IDFG 2023b, p. 43). Although the state will encourage the voluntary use of nonlethal and prevention methods, wolf–livestock conflict mitigation will favor the use of lethal control as well as hunter and trapper incentives to direct harvest to areas that have high levels of wolf–livestock conflicts until the wolf population reaches the goal of fluctuating around 500 individuals (IDFG 2023, p. 43). Once the wolf population goal is achieved, the agency may consider nonlethal responses to resolve conflicts in some circumstances (IDFG 2023b, p. 43).

Under the IDFG Policy for Avian and Mammalian Predator Management (IDFG 2000, entire) where there is evidence that predation is a significant factor limiting prey populations from achieving management objectives, management actions to mitigate the effects of predators may be developed in a predation management plan. Initial management options may include habitat improvements, changes to regulations governing take of the affected species, or regulatory changes that increase hunter/trapper opportunity for predators. If these methods are implemented and do not achieve the desired management objective, predator management may be used to reduce predator populations where their effects are most significant. As explained in the *2023 Idaho Plan*, if regulated harvest, lethal removal in response to livestock depredation, and natural mortality are insufficient to achieve the population goal, the state may increase lethal control efforts to reduce wolf populations to benefit ungulate populations (IDFG 2023b, p. 39). IDFG anticipates that reducing the population size in the state to fluctuate around the goal of 500 wolves will “reduce predation on wild ungulates in general” (IDFG 2023b, p. 44). To date, predator management plans have been developed for five elk management zones in Idaho with wolves being one of the, if not the primary, targeted predators (IDFG 2011, entire; IDFG 2014a, entire; IDFG 2014b, entire; IDFG 2014c, entire).

Management of Wolves in Montana

In Montana, after removal as a state endangered species, wolves were classified as a “Species in Need of Management” under the Montana Nongame and Endangered Species Conservation Act of 1973 (MCA 87-5-101 to 87-5-123). This classification created the legal mechanisms to protect wolves from unauthorized take and regulate human-caused mortality (including regulated public harvest), beyond the allowances for immediate defense of life/property situations under Montana State law (Service 2023, pp. 63–64). Illegal human-caused mortality is prosecuted under state law and Montana Fish and Wildlife (MFW) Commission regulations. However, some regulations that make it illegal to take game animals using certain methods (i.e., use of aircraft, use of telemetry) do not apply to wolves because of their classification as a species in need of management.

Montana finalized and adopted the *Montana Wolf Conservation and Management Plan* (*Montana Plan*) in 2003 (Montana Fish, Wildlife and Parks (MFWP) 2004, entire). The primary goal of the *Montana Plan* is to manage gray wolves as a native species in sufficient numbers to preclude Federal relisting (MFWP 2004, p. 2). Under the *Montana Plan*, the wolf population would be maintained above the recovery level of 10 breeding pairs by managing for a total of at least 15 packs (MFWP 2004, p. 22). The *Montana Plan* specifies a management threshold whereby wolf management is less restrictive when 15 or more packs are documented in the state, but it becomes more restrictive if the number of packs is at or below 15 (MFWP 2004, pp. 61–63). Wolf harvest would not be authorized if 15 or fewer packs were documented in the state (MFWP 2004, pp. 22, 62). Wolves are not deliberately confined to any specific geographic areas of Montana, nor is the population size deliberately capped at a specific level. Rather, wolf abundance and distribution are managed adaptively based on biological and social factors (MFWP 2004, pp. 21–22). According to the *Montana Plan*, wolves will be managed in a manner that encourages connectivity among resident wolves in Montana as well as to wolf populations in Canada, Idaho, and Wyoming to maintain metapopulation structure in the NRM (Service 2023, p. 64). Overall, wolf management in Montana includes: population monitoring, routine analysis of population health, management in concert with prey populations, law enforcement, control of domestic animal/human conflicts, implementation of a wolf-damage mitigation and reimbursement program, research, information dissemination, and public outreach (Service 2023, p. 60).

In January 2023, the governor of Montana directed Montana Fish, Wildlife and Parks (MFWP) to draft an updated wolf management plan (Montana Governor's Office 2023, unpaginated; Service 2023, p. 64). In October 2023, MFWP completed a draft Montana Gray Wolf Conservation and Management Plan (*Draft 2023 Montana Plan*; MFWP 2023, entire). The *Draft 2023 Montana Plan* is subject to revision prior to being finalized and we did not rely on it for our determination; however, because it is the most recent information indicating how the state expects to manage wolves in the future, we used it to understand Montana's future intent for wolf management. The *Draft 2023 Montana Plan* highlights nine gray wolf management objectives that include: "(1) maintain a viable and connected wolf population in Montana; (2) maintain authority for the State of Montana to manage wolves; (3) maintain positive and effective working relationships with all stakeholders; (4) reduce wolf impacts on livestock and big game populations; (5) maintain sustainable hunter opportunity for wolves; (6) maintain sustainable hunter opportunity for ungulates; (7) increase broad public acceptance of sustainable harvest and hunter opportunity as part of wolf conservation; (8) enhance open and effective communication to better inform decisions; and (9) learn and improve as we [MFWP] go" (MFWP 2023, pp. 41–42). The *Draft 2023 Montana Plan* uses 450 wolves as a "benchmark" to ensure the population in Montana maintains at least 15 breeding pairs (MFWP 2023, p. 43). Although there is no specific management objective, if the plan is finalized as drafted, wolves in Montana would be managed above this "benchmark" (MFWP 2023, pp. 41–46; Service 2023, pp. 164–165). If wolf numbers in Montana approach the 450-wolf level, MFWP would increase monitoring intensity and may transition to methods that document minimum counts and the number of breeding pairs to ensure that numbers remain well above 15 breeding pairs and 150 wolves (the management buffer above the Federal recovery level) (MFWP 2023, p. 44). In addition, wolf harvest and lethal control of depredating wolves may become more restrictive if wolf numbers in Montana approach the 450-wolf level (MFWP 2023, pp. 52, 70).

Montana held its first-ever regulated wolf hunt in 2009 and regulated harvest has occurred every year since 2009, with the exception of the 2010/2011 season when wolves were briefly relisted in the NRM (Service 2023, p. 66). Montana Fish, Wildlife and Parks (MFWP) uses an adaptive management process to develop wolf harvest recommendations to achieve management objectives (MFWP 2004, pp. 21–22; Sells et al. 2020, pp. 60–74; Parks et al. 2022, pp. 35–41; Parks et al. 2023, pp. 34–41). Harvest regulations have gradually become less restrictive over time in Montana (Service 2023, pp. 65–73), and starting in the 2021/2022 harvest season, a state statute has allowed an outside organization to reimburse individual hunters/trappers for costs associated with legal wolf harvest (Service 2023, pp. 66–67). However, even with the 2021 legislation to further expand harvest opportunities, the Montana Fish and Wildlife Commission continues to have significant regulatory authority to amend, adjust, or close wolf harvest seasons as needed (Service 2023, p. 72). Moreover, SB 314, passed in 2021 and codified into law (MCA 87-1-901), states that wolf hunting and trapping seasons must be designed to reduce the population to a sustainable level, but not fewer than the number of wolves necessary to support at least 15 breeding pairs (Service 2023, p. 66).

As we discuss in greater detail in the SSA Report, MFWP encourages the use of preventative and nonlethal methods to address conflicts (Service 2023, pp. 74–76). It also actively participates and cooperates in many preventive conflict-reduction programs (Wilson et al. 2017, p. 247; Inman et al. 2019, p. 14). Current rules and regulations to address wolf–livestock conflicts provide opportunities for livestock producers and/or private landowners to address wolf-related conflicts. These methods become more restrictive when there are fewer than 15 packs in the state, and more liberal when 15 packs or more are documented (MFWP 2004, pp. 26, 55–57). Agency-directed lethal control of depredating wolves may be considered to resolve repeated conflict situations, but it will only be used in extreme circumstances if 15 or fewer packs are documented in Montana. In Montana, conflict resolution using nonlethal and/or lethal means is a cooperative effort between MFWP and U.S. Department of Agriculture Wildlife Services.

In Montana, the Confederated Salish and Kootenai Tribes and the Blackfeet Nation have also developed wolf management plans (the *CSKT Plan* and *Blackfeet Plan*, respectively), which we describe in our SSA Report (Service 2023, p. 65). The Confederated Salish and Kootenai Tribes of the Flathead Reservation and the Blackfeet Nation both provide harvest opportunities on their reservations (BTBC 2021, entire; CSKT 2021, entire; Service 2023, p. 64). Although it is unknown if any wolves have been harvested from either Reservation, given the relatively small proportion of wolf habitat that exists on these tribal lands, harvest levels are presumed to be low and would not significantly increase total harvest in Montana (Service 2023, p. 70). The *CSKT Plan* and *Blackfeet Plan* each provide similar management responses to address conflicts based on potential wolf conflict scenarios that may occur on their respective reservations (see Table 1 in BTBC 2008, p. 7; see Table 1 in CSKT 2020, p. 11). In most instances, initial management responses emphasize preventative and nonlethal methods to resolve conflicts (BTBC 2008, pp. 6–7; CSKT 2020, pp. 10–11). If these methods are unsuccessful at resolving the conflict, more aggressive techniques, including agency-directed lethal control, may be implemented until the conflict is resolved.

Management of Wolves in Wyoming

The Wyoming Game and Fish Department (WGFD) and Wyoming Game and Fish Commission (WGFC) manage wolves under the 2011 *Wyoming Gray Wolf Management Plan* (*Wyoming Plan*) (WGFC 2011, entire), as amended in 2012 (WGFC 2012, entire). Under WGFC Chapter 21 regulations, which govern the management of wolves in Wyoming outside of National Parks and the Wind River Reservation (WRR), wolves are classified as trophy game animals and are actively managed by WGFD in the Wyoming Trophy Game Management Area (WTGMA), which covers the northwest part of the state (where most wolves reside). Wolves outside of the WTGMA, National Parks, and the WRR, except for non-Indian owned fee title lands, are classified as predatory animals and are managed by the Wyoming Department of Agriculture under title 11, chapter 6 of the Wyoming Statutes. As we have previously concluded (73 FR 10513, February 27, 2008; 74 FR 15123, April 2, 2009; 77 FR 55530, September 10, 2012), wolf packs are unlikely to persist long-term in portions of Wyoming where they are designated as predatory animals. However, the WTGMA is large enough to support Wyoming's management goals (77 FR 55530, September 10, 2012; WGFD et al. 2023, entire). Furthermore, Wyoming wolf management regulations commit to managing wolves such that genetic diversity and connectivity issues do not negatively influence the population. To accomplish this, WGFC Chapter 21 regulations provide for a seasonal expansion of the WTGMA from October 15 through the end of February of the following year to facilitate natural dispersal of wolves between Idaho and Wyoming (WGFC 2011, Figure 1, pp. 2, 8, 52). WGFD manages wolf populations at or near an objective of 160 wolves in the WTGMA (WGFD et al. 2022, p. 17; WGFD et al. 2023, p. 18).

Wyoming Statute (W.S.) 23-1-304 provides authority for the WGFC to promulgate rules and regulations related to the management of wolves in Wyoming where they are classified as trophy game animals, as described in W.S. 23-1-101 (Service 2023, pp. 76–77). Wolf harvest regulations within the WTGMA are annually evaluated and revised based on current population objectives and past demographic and mortality information. WGFD manages significantly fewer wolves than Idaho and Montana, so the state has less margin for error to ensure wolf numbers remain above Federal wolf recovery criteria (i.e., 10 breeding pairs and 100 wolves) (Service 2023, p. 77). As a result, regulated take is managed more conservatively than other states that allow wolf harvest and it is used to adaptively manage wolves at or near the population objective of 160 wolves within the WTGMA (Service 2023, pp. 78–79). Each year, a WTGMA harvest limit is calculated by using abundance and mortality data from wolves in the WTGMA to predict the percentage of the population that can be harvested each season to maintain wolf numbers at or near the objective of 160 wolves (WGFD et al. 2022, p. 17; WGFD et al. 2023, p. 18). Once calculated, this harvest limit is distributed across all hunt areas within the WTGMA so each hunt area, or groups of hunt areas, have a specific harvest limit. Hunting is the only legal method of take for harvesting a wolf within the WTGMA; trapping is not permitted (Service 2023, p. 78).

Within the WTGMA, WGFD emphasizes conflict prevention and minimization of livestock depredation risk through education and outreach (WGFC 2011, p. 30). When depredations occur, agency response is determined on a case-by-case basis and may include: no action, nonlethal control (if it is deemed appropriate or the landowner requests it), capture and radio-collaring a wolf or wolves, issuance of a lethal take permit to the property owner, or agency-directed lethal control. W.S. 23-1-304, W.S. 23-3-115, and WGFC Chapter 21 authorize WGFD and its designated agents or private citizens (under certain circumstances) to consider the use of lethal control to resolve wolf–livestock conflicts. However, if wolf removal would result in wolf abundance falling below the 10-breeding pair and 100-wolf threshold within the WTGMA in the state, WGFD will not use agency-directed lethal control and it may revoke any take permits already issued to private landowners (WGFC 2012, p. 7).

WGFC Chapter 21 regulations, state statute, and the *Wyoming Plan* (WGFC 2011, p. 1; WGFC 2012, p. 4) all codify WGFD's commitment to manage for at least 10 breeding pairs and 100 wolves within the WTGMA (Service 2023, p. 77). In addition, YNP and the WRR combined will maintain at least five breeding pairs and 50 wolves, so that the totality of Wyoming's wolf population is managed at or above 15 breeding pairs and 150 wolves (which provides a buffer above the 10-breeding pair and 100-wolf Federal recovery level) (Service 2023, p. 77). Since 2009, wolf abundance in YNP has ranged between 80 and 123 wolves annually (Smith et al. 2020, pp. 77–78; Cassidy et al. 2021, p. 4; WGFD et al. 2023, p. 14; Service 2023, p. 155). Wolves within YNP are managed under the National Park Service authority and, for the most part, are allowed to naturally fluctuate within National Park borders (Service 2023, p. 77). While wolf harvest is not authorized within YNP, wolves that den and have territories primarily within YNP may be harvested in surrounding states if they leave YNP, consistent with rules and regulations that guide wolf harvest in each surrounding state (Service 2023, p. 73). The WRR typically contains a small number of wolves relative to the remainder of Wyoming (approximately 10 to 20 wolves annually for the past 10 years) (Service 2023, pp. 77–78). The

WRR adopted a *Wolf Management Plan* (*WRR Plan*) in 2007 (Eastern Shoshone and Northern Arapaho Tribes 2007, entire) and updated the *WRR Plan* in 2008 (Eastern Shoshone and Northern Arapaho Tribes 2008, entire). Wolves are managed as game animals on the WRR (Eastern Shoshone and Northern Arapaho Tribes 2008, pp. 3, 9). Wolf–livestock conflict resolution on the WRR is guided by the *WRR Plan* (Eastern Shoshone and Northern Arapaho Tribes 2008, entire). Under this *WRR Plan*, lethal take by private citizens or agencies is authorized if a wolf or wolves are caught in the act of depredating livestock or if it is deemed necessary to resolve repeated conflicts with livestock.

Management of Wolves in Oregon

Currently, wolves are listed as endangered under the Act in the western two-thirds of Oregon, whereas wolves inhabiting the eastern one-third of Oregon are federally delisted and managed under state authority. Thus, management differs in these two portions of the state. Wolves in Oregon achieved state-defined recovery objectives and were removed from Oregon's list of threatened and endangered species in 2015. The *Oregon Wolf Conservation and Management Plan* (*Oregon Plan*), its associated regulation (Oregon Administrative Rule 665-110), and Oregon's wildlife policy guide current wolf management in the federally delisted portion of Oregon and illustrate how the State of Oregon would manage wolves statewide should their Federal protected status change. In sum, the *Oregon Plan* and Oregon's wildlife policy (Oregon Revised Statute 496.012) guide long-term management of wolves into the future in Oregon (ODFW 2019, p. 6).

The *Oregon Plan* was developed prior to wolves becoming established in Oregon. The *Oregon Plan* was first finalized in 2005 and it contains provisions that require it to be updated every five years. The first revision occurred in 2010 and a second revision was completed in June of 2019. Oregon Department of Fish and Wildlife (ODFW) is required by state regulations to follow the *Oregon Plan*. The *Oregon Plan* includes program direction, objectives, and strategies to manage gray wolves in Oregon and it defines the gray wolf's special-status-game-mammal designation (Oregon Administrative Rule 635-110; Service 2023, pp. 81–82).

The *Oregon Plan* includes two wolf management zones (WMZ) that roughly divide the state into western and eastern halves. The two management zones do not align with the boundary between the federally listed and delisted portions of Oregon; the division line between the state-defined management zones is farther west. Each WMZ has a "conservation population objective" and a "management population objective," which are used to determine when the state will shift to a different phase of management within a specific WMZ (ODFW 2019, pp. 14–17). Within each WMZ, management phases (Phase I, Phase II, and Phase III) are used to assess population objectives, which, in turn, influence conservation and management objectives. As WMZs progress from Phase I to Phase III, wolf management options gradually become less restrictive. Currently, wolves in the West WMZ are managed under Phase I, which provides a level of protection comparable to that of the Oregon Endangered Species Act. Wolves in the East WMZ are managed under Phase III (a maintenance phase), which strikes a balance such that populations do not decline to Phase II levels or reach unmanageable levels resulting in conflicts with other land uses (Service 2023, pp. 81–82).

To date, regulated wolf harvest has never been permitted under the contemporary wolf management regime anywhere in Oregon, but it could be considered in the future in any portion of the state where wolves are federally delisted (Service 2023, p. 82). Currently, the *Oregon Plan* only discusses and considers public involvement in controlled take as a management tool in specific areas in response to repeated livestock-depredation incidents (ODFW 2019, pp. 51–52); this controlled take would be highly regulated, require a permit, and would only be allowed under Phase III. We discuss management direction and regulations regarding depredation control in more detail below and in the SSA Report (Service 2023, pp. 82–83). The ODFW Commission would need to go through a public season-setting process before regulated public wolf harvest could be authorized (ODFW 2019, p. 31).

When addressing wolf–livestock conflicts, ODFW's primary objective is to implement a three-phased approach based on population status that minimizes conflicts with livestock while ensuring conservation of wolves in Oregon (ODFW 2019, p. 44). This phased approach to wolf management emphasizes preventive and nonlethal methods in Phase I, and it provides for increased management flexibility when the wolf population is managed under Phase III guidelines. The state will prioritize the use of nonlethal methods to address wolf conflicts with livestock regardless of wolf population status. However, lethal control of depredating wolves may be authorized to address repeated conflict situations in all phases of management where wolves are not federally protected in Oregon (ODFW 2019, pp. 45–52; Service 2023, pp. 82–83). Through a public process, in parts of the state where wolves are not federally protected, the ODFW Commission may also authorize controlled take in specific areas to address long-term, recurrent depredations or significant wolf–ungulate interactions. Control options are currently limited to preventative and nonlethal methods within the federally listed portion of Oregon. In the eastern one-third of Oregon, where the state has full management authority, agency-directed lethal control of depredating wolves has been authorized to resolve wolf–livestock conflicts following guidelines outlined in Oregon's management plan (ODFW 2019, pp. 41–54).

Management of Wolves in Washington

Currently, wolves are listed as endangered under the Act in the western two-thirds of Washington, whereas wolves inhabiting the eastern one-third of Washington are federally delisted and managed under state authority. Thus, management differs in these two portions of Washington. Wolves are also classified as endangered under the Washington state Endangered Species Act (Washington Administrative Code 220-610-010). Unlawful taking of state endangered fish or wildlife (when a person hunts, fishes, possesses, maliciously harasses, or kills endangered fish or wildlife and the taking has not been authorized by rule of the commission) is prohibited in Washington (Revised Code of Washington (RCW) 77.15.120). In May 2023, WDFW published a draft periodic status review for gray wolves that recommended reclassifying wolves from state endangered to a state sensitive status (Smith et al. 2023, entire). In Washington, a state sensitive species is defined as: “vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats” (WAC 220-610-110). Even if Washington were to downlist wolves to state sensitive status, wolves would continue to be protected from unauthorized taking under RCW 77.15.130 and protections precluding hunting (outside of tribal reservations) would remain in place (Smith et al. 2023, pp. 30, 40–42).

The *2011 Wolf Conservation and Management Plan* for Washington (*Washington Plan*) (Wiles et al. 2011, entire) was developed in response to the state endangered status for the species. The plan reflects the expectations that the wolf population in Washington would continue to increase through natural recolonization of unoccupied suitable habitat from adjacent wolf populations and that the state would be responsible for wolf management after Federal delisting. The purpose of the *Washington Plan* is to facilitate reestablishment of a self-sustaining population of gray wolves in Washington and to encourage social tolerance for the species by addressing and reducing conflicts (Service 2023, pp. 84–85).

The *Washington Plan* provides recovery goals for downlisting and delisting the species under Washington state law, and it identifies strategies to achieve recovery and manage conflicts with livestock and ungulates. According to the *Washington Plan*, wolf recovery will be achieved in Washington when a minimum of 15 breeding pairs are equitably distributed across three wolf recovery areas in the state for 3 consecutive years or when 18 breeding pairs are equitably distributed across the state for a single year (Wiles et al. 2011, pp. 58–70).

Upon achieving recovery at the state level, wolves in Washington may be reclassified as a game animal (or other similar designation). When wolf reclassification occurs at the state level, the Washington Department of Fish and Wildlife (WDFW) Commission may consider regulated public harvest through a season-setting process that is open to public input (Wiles et al. 2011, pp. 70–71). To date, the WDFW Commission has not authorized regulated wolf harvest in the parts of the delisted portion of Washington where WDFW is responsible for management (Service 2023, p. 85).

A primary goal of wolf management in Washington is to minimize livestock losses in a way that continues to provide for the recovery and long-term perpetuation of a sustainable wolf population (Wiles et al. 2011, p. 14). The state prioritizes nonlethal management of wolf conflicts (Wiles et al. 2011, p. 85; WDFW 2017, pp. 2–9; Service 2023, pp. 86–87). Control options are currently limited to preventative and nonlethal methods within the federally listed portion of Washington. In the eastern one-third of Washington, where wolves are federally delisted and under the management authority of WDFW, state law (RCW 77.12.240) authorizes WDFW to lethally remove wolves to resolve repeated wolf–livestock conflicts when other methods have been unsuccessful at preventing conflicts. The WDFW wolf–livestock interaction protocol provides specific guidelines for when lethal control may be implemented (WDFW 2017, pp. 17–19). When lethal control is implemented, WDFW uses an incremental removal approach followed by an evaluation period to determine the effectiveness of any control action (WDFW 2017, pp. 18–19). Under state law (RCW 77.36.030 and RCW 77.12.240), administrative rule (Washington Administrative Code 220-440-080), and the provisions of the *Washington Plan*, a private individual may kill a wolf attacking livestock under certain conditions in the federally delisted portion of Washington. Any removal of a wolf under these provisions must be reported to WDFW within 24 hours of the take and the carcass must be surrendered to the agency.

The Confederated Tribes of the Colville Reservation (CTCR) is located in north-central Washington (where wolves are federally delisted). The *CTCR Gray Wolf Management Plan* (*CTCR Plan*) was finalized in 2017, and it guides management and conservation of gray wolf populations and their prey on the CTCR (Colville Confederated Tribes Fish & Wildlife Department (CCTFWD) 2017, p. 5; Service 2023, p. 86). The goals of the *CTCR Plan* include developing a strategy for maintaining viable wolf populations while also maintaining healthy ungulate populations to support the cultural and subsistence needs of tribal members and their families (CCTFWD 2017, p. 20). The *CTCR Plan* also seeks to resolve wolf–livestock conflicts early to avoid escalation (CCTFWD 2017, p. 24).

The Colville Business Council of the CTCR and Spokane Tribe of Indians have promulgated regulations to allow wolf harvest for tribal members on tribal lands in the federally delisted portions of Washington (Service 2023, pp. 86–87). On CTCR tribal lands and on the Spokane Indian Reservation, wolf harvest regulations have gradually become less restrictive over time to allow for increased harvest opportunities for individuals, but regulations have remained unchanged since 2019 on CTCR tribal lands and since 2017 on the Spokane Indian Reservation (Service 2023, p. 87). Despite less-restrictive regulations for harvest on tribal lands in Washington, the total number of wolves legally harvested has been low relative to total wolf population size and it has had minimal impact on wolf population growth and distribution in the state (Service 2023, p. 87).

Management of Wolves in California

Wolves are currently listed as endangered at the Federal level in California. Wolves in California are also classified as endangered under the California Endangered Species Act (CESA; California Fish and Game Commission 2014, entire). Under CESA, take (defined as hunt, pursue, catch, capture, kill, or attempts to hunt, pursue, catch, capture, or kill) of listed wildlife species is prohibited (California Fish and Game Codes § 86 and § 2080). California also adopted a wolf-management plan intended to provide for the conservation and reestablishment of wolves in the state (CDFW 2016a, entire; CDFW 2016b, entire). The 2016 *Conservation Plan for Gray Wolves in California* (*California Plan*) includes education and public outreach goals, damage-management strategies, and monitoring and research plans. Wolves will remain on the state endangered species list in California until state recovery objectives have been reached, though those objectives have not yet been defined (Service 2023, p. 91).

The *California Plan* was developed in coordination with stakeholder groups in anticipation of the return of wolves to California (CDFW 2016a, p. 2). The *California Plan* included direction to develop alternatives for wolf management, specified that California Department of Fish and Wildlife (CDFW) would not reintroduce wolves to California, and acknowledged that historical distribution and abundance of wolves in California are not achievable (CDFW 2016a, pp. 3–4). The goals include the conservation of biologically sustainable populations, management of wolf distribution, management of native ungulates for wolf and human uses, management of wolves to minimize livestock depredations, and public outreach (CDFW 2016a, p. 4). The *California Plan* recognizes that wolf numbers in the state will increase with time, and the *California Plan* needs to be flexible to account for information gained during the expansion of wolves into the state (CDFW 2016a, pp. 19–24). Similar to plans for other Western states, the *California Plan* uses a three-phase strategy for wolf conservation and management, which we describe in greater detail in the SSA Report (Service 2023, pp. 91–92).

Currently, harvest or lethal control of depredating wolves is not permitted in California because the species is listed as endangered under the Act and classified as a state endangered species. The 2016 *California Plan* does not contemplate public harvest in the state (Service 2023, p. 92). Lethal control of depredating wolves could be allowed in the state in the future if (1) wolves are no longer federally listed; (2) wolves are no longer protected under CESA; (3) other state laws change to allow for it; and (4) CDFW authorizes the control (CDFW 2016b, pp. 280–281; Service 2023, p. 92).

Management of Wolves in Colorado

Wolves are currently listed as endangered at the Federal level in Colorado; therefore, harvest is not allowed in the state. However, due to designation as an experimental population under section 10(j) of the Act, gray wolves may be lethally removed under limited circumstances, in accordance with the final 10(j) rule (88 FR 77014, November 8, 2023), which we discuss in more detail below and in the SSA Report (Service 2023, pp. 92–94, 197). Gray wolves are also listed as an endangered species by the State of Colorado and are protected under Colorado Revised Statutes ((CRS) 33–6–109), making it illegal under state law for any person to hunt, take, or possess a gray wolf in Colorado (Service 2023, p. 92).

Recognizing the potential for increasing numbers of wolves to enter Colorado from growing populations in the NRM, the Colorado Division of Wildlife (now Colorado Parks and Wildlife (CPW)) convened a multi-disciplinary Wolf Management Working Group in 2004 to formulate management recommendations for wolves that naturally enter and possibly begin to recolonize the state. The Working Group did not evaluate what would constitute wolf recovery in Colorado, but did recommend that wolves that enter or begin to recolonize Colorado should be free to occupy available suitable habitat and that managers should balance the ecological needs of the wolf with the social aspects of wolf management (Colorado Wolf Management Working Group 2004, pp. 1, 3–5). Although the Working Group's recommendations were not a formal management plan, they were adopted by the CPW Commission in 2005 and were reaffirmed in 2016 (CPW Commission Resolution 16-01) (Service 2023, p. 92).

In November 2020, Colorado voters passed a ballot initiative (Proposition 114) that later became CRS 33-2-105.8, which required the CPW Commission to prepare a plan to restore and manage gray wolves in Colorado and take the steps necessary to begin reintroductions by December 31, 2023. The CPW Commission convened a Technical Working Group and a Stakeholder Advisory Group that provided input and recommendations for CPW staff during development of the draft Colorado Wolf Restoration and Management Plan. The final Colorado Wolf Restoration and Management Plan was presented to and approved by the CPW Commission in May 2023 (*Colorado Plan*; CPW 2023, p. 3). The primary goal of the *Colorado Plan* is to "identify the steps needed to recover and maintain a viable, self-sustaining wolf population in Colorado while concurrently working to minimize wolf-related conflicts with domestic animals, other wildlife, and people" (CPW 2023, p. 3). Wolf restoration and management in Colorado is guided by a three-phased approach that ensures wolf populations progress towards self-sustainability while also providing flexibility to manage conflicts in the state (CPW 2023, pp. 23–25; Service 2023, pp. 92–93).

Concurrent with the development of the *Colorado Plan*, the Service embarked on a rulemaking process to designate wolves reintroduced into Colorado as an experimental population under section 10(j) of the Act. On November 8, 2023, the Service published a final rule designating wolves that will be reintroduced into Colorado as a nonessential experimental population; this rule clearly defines under what circumstances take may be allowed, up to and including lethal control of depredating wolves (88 FR 77014, November 8, 2023). As long as wolves remain federally listed in Colorado, wolf management in the state must be consistent with this final 10(j) rule (Service 2023, p. 94). In accordance with CRS 33-2-105.8 and the *Colorado Plan*, during the week of December 18, 2023, CPW began releasing wolves translocated from Oregon into Colorado.

If wolves were to be federally delisted, the *Colorado Plan* would guide all aspects of wolf conflict management in the state (CPW 2023, pp. 26–30). The state will prioritize prevention and nonlethal management of wolf conflicts in Colorado during the early phases of wolf restoration. However, under the *Colorado Plan*, CPW may authorize lethal control of depredating wolves during all phases of wolf management. The CPW Commission would need to approve any rules concerning the take of wolves while they are on the state endangered and threatened list (Service 2023, p. 94).

Regulated public harvest of gray wolves may only be considered in Colorado if wolves are reclassified as a game species at some point in the future (and are federally delisted). Any possible harvest recommendations that may be considered in the future will be vetted through a public process prior to CPW Commission approval, similar to harvest recommendations for all other game species in the state (Service 2023, p. 93).

Management of Wolves in Utah

Wolves were federally delisted in a small portion of north-central Utah, along with the rest of the NRM (except Wyoming), in 2011 (76 FR 25590, May 5, 2011). Any wolf documented in the remainder of Utah is federally listed as endangered. Gray wolves are designated as a species of greatest conservation need in Utah. They are protected under Utah Code (Section 23-20-3), which prohibits the taking of protected wildlife, except as authorized by the Wildlife Board. Wolves are also classified as furbearers and Utah Code (Section 23-18-2) prohibits furbearer take without a license. At present, there is no harvest season authorized for wolves in the federally delisted portion of Utah and take is not allowed in the remainder of the state due to the Federal protected status of wolves. However, wolves may be lethally removed to mitigate wolf conflicts with livestock in the federally delisted portion of Utah (i.e., the portion that is within the boundaries of the NRM; see Figure 1 above) (Service 2023, p. 95).

In June 2005, the Utah Wildlife Board formally approved the *Utah Wolf Management Plan* (*Utah Plan*) (Utah Division of Wildlife Resources (UDWR) and Utah Wolf Working Group 2005, entire). The goal of the *Utah Plan* is to manage, study, and conserve wolves moving into Utah while avoiding conflicts with the elk and deer management objectives of the Ute Indian Tribe; minimizing livestock depredation; and protecting wild ungulate populations in Utah from excessive wolf predation. The Utah Wildlife Board has since extended the implementation of the *Utah Plan* through 2030. The *Utah Plan* contains six adaptive management strategies intended to guide wolf management once the species is federally delisted statewide and until 2030, or until two naturally occurring wolf packs occupy the state (Service 2023, p. 95).

In 2010, the Utah Legislature passed SB 36 (Wolf Management Act). The Wolf Management Act was passed, in part, because the state concluded it could not "adequately or effectively manage wolves on a pack level in the small area of the state where the species is currently delisted without significantly harming other vital state interests" (Utah Code 23-29-103). Utah Code 23-29-201 directs Utah Division of Wildlife Resources (UDWR) to prevent the establishment of a viable wolf pack in the delisted portion of Utah until wolves are federally delisted in the entirety of the state, at which time the *Utah Plan* would again guide wolf management. To comply with Utah Code 23-29-201, wolves may be aggressively managed in the delisted portion of the state when documented. Individual wolves have been documented, depredations have been confirmed, and some wolves have died from human causes in the delisted portion of Utah; additionally, the state has attempted to remove wolves in response to livestock depredations in this portion of the state. However, despite these efforts, no known wolves have been killed through state action or by private individuals in response to conflicts with livestock in the delisted portion of the state (although one was killed just across the border in Idaho for depredating sheep in Utah) (Service 2023, pp. 95–96).

Additionally, the States of Arizona, New Mexico, and Utah signed an MOU with Colorado and the Service stating their "intent to relocate gray wolves that leave the Colorado nonessential population area back to Colorado, should they disperse to Utah, Arizona, or New Mexico and establishes mutual agreement for the 10(a)(1)(A) permits issued by the [Service] that would provide authority for Arizona, Colorado, New Mexico, and Utah to return both gray wolves and Mexican wolves back to their nonessential population areas" (Gray et al. 2023, p. 2). The purpose of the MOU is "to maintain geographic separation of the gray wolf and Mexican gray wolf subspecies to prevent hybridization that may threaten the genetic integrity of the Mexican gray wolf population" (Gray et al. 2023, p. 2). On November 7, 2023, the Service signed a 10(a)(1)(A) permit under the Act authorizing the capture and transport of gray wolves originating from Colorado back to Colorado should they disperse to Arizona, New Mexico, and Utah while the species is federally listed as endangered (Service 2023, p. 198).

Management of Wolves in Arizona and New Mexico

Although non-Mexican gray wolves are not known to occur in Arizona, any gray wolves that disperse to this state would be federally listed as endangered north of I-40. Therefore, harvest and lethal depredation control of gray wolves is not authorized. Additionally, all wolves receive protections from illegal take under Arizona statutes regulating management of game and fish (Arizona Revised Statutes (A.R.S.) 17-309 and A.R.S. 17-314) (Gray in litt. 2021, p. 4). If gray wolves were to be federally delisted, an Arizona statute allows "the taking of a wolf that is actively threatening or attacking a person, livestock or other domestic animal" (A.R.S. 17-302.01) (Service 2023, p. 94).

As in Arizona, gray wolves north of I-40 in New Mexico are currently listed as endangered under the Act and have been listed as endangered under New Mexico's Wildlife Conservation Act (WCA) (§17-2-37 through §17-2-46 New Mexico Statutes Annotated) since 1975 (New Mexico Department of Game and Fish 2022, p. iv). Therefore, harvest and lethal depredation control of gray wolves is not authorized. If gray wolves were to be federally delisted in New Mexico, the WCA would continue to provide protections for gray wolves. Under the WCA, it is illegal "for any person to take, possess, transport, export, process, sell or offer for sale or ship any species of wildlife" that is listed as endangered (WCA §17-2-41). The WCA provides that state endangered species "may be removed, captured or destroyed where necessary to alleviate or prevent damage to property or to protect human health" (WCA §17-2-42D). However, unless that action is in response to "an immediate threat to human life or private property," prior authorization through a state issued permit would be required (§17-2-42D) (Service 2023, p. 94).

As mentioned above, the States of Arizona, New Mexico, and Utah signed an MOU with Colorado and the Service indicating their "intent to relocate gray wolves that leave the Colorado nonessential population area back to Colorado, should they disperse to Utah, Arizona, or New Mexico" (Gray et al. 2023, p. 2).

Other Conservation Efforts

In the SSA Report, we also discuss conservation efforts on Federal lands (Service 2023, pp. 110–113) and state efforts to mitigate disease in ungulate prey species (Service 2023, pp. 123, 201).

<u>Cumulative Effects</u>

We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA Report, we have analyzed the cumulative effects of identified threats and conservation actions on the species. To assess the current and future condition of the species, we evaluate the effects of all the relevant factors that may be influencing the species, including threats and conservation efforts. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire species, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative-effects analysis.

CURRENT CONDITION

Chapter 4 of our SSA Report provides a detailed discussion of the current condition of the gray wolf in the Western United States (Service 2023, pp. 115–147); we provide a summary of that analysis here.

<u>Current Resiliency</u>

The current availability of western wolves' individual and population needs (i.e., current availability of suitable habitat, current availability of prey, current population size and trends, and current levels of genetic diversity and connectivity) characterize the current resiliency of wolves in the western United States.

In the SSA Report, we include a detailed accounting of the amount of suitable habitat and prey currently available to the gray wolf in the Western United States (Service 2023, pp. 115–123; see map of suitable habitat in Figure 5 below). Based on our evaluation of the extent of suitable habitat in the Western United States, sufficient suitable habitat remains for a viable gray wolf metapopulation (Service 2023, pp. 115–120). Additionally, based on decades of sustained wolf range expansion in the Western United States, as well as our evaluation of prey numbers, there is sufficient prey (millions of deer-equivalent units) to support thousands of wolves (Service 2023, pp. 120–123); however, in many areas, wolf distribution is likely to be more influenced by human tolerance related to wolf conflict rather than prey availability (see Mech 2017, pp. 314–315).

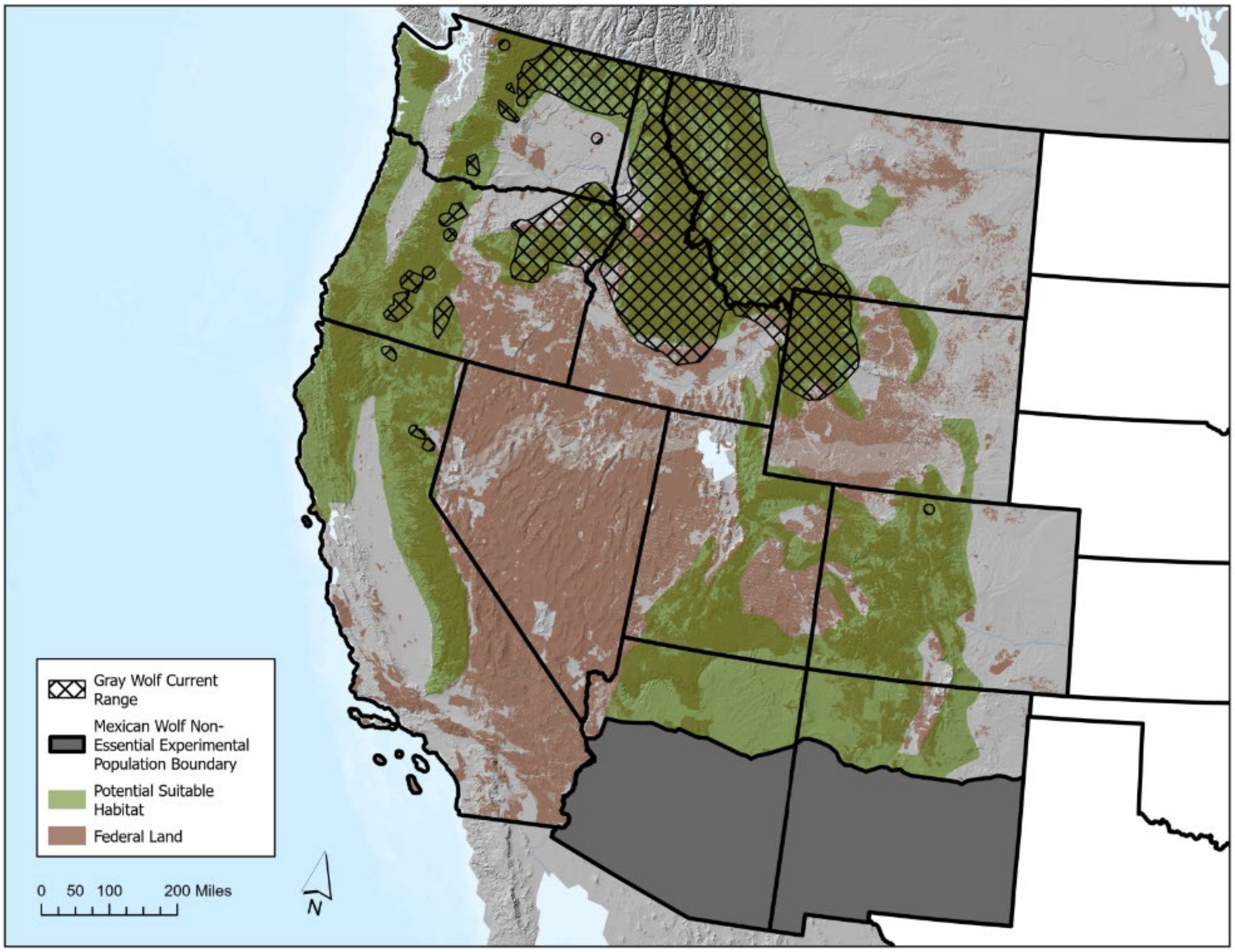

Figure 5. Potentially suitable gray wolf habitat, land ownership, and current range of the gray wolf in the Western United States. Our potentially suitable habitat map was developed as a coarse-scale visual aid based on ecological subregions and is not intended to provide a fine-scale rendering of gray wolf suitable habitat across the Western United States. We provide detailed accounting of the amount of suitable habitat in each state in our analysis area in the SSA Report (Service 2023, pp. 115–120). The gray wolf's current range in the Western United States is in the hatched area (this current range is as of December 31, 2022, except California, which is current as of May 2023). The Mexican Wolf Nonessential Experimental Population Area is colored in dark gray.

The best available science indicates that, at the end of 2022, there were an estimated 2,682 wolves inside of the NRM and 115 wolves outside of the NRM[4], distributed between at least 286

[4] At year-end 2022, there were an estimated 958 wolves in Idaho, an estimated 1,087 wolves in Montana, a minimum of 338 wolves in Wyoming, a minimum of 216 wolves in Washington, a minimum of 178 wolves in Oregon, a minimum of 18 wolves in California, and a minimum of 2 wolves in Colorado (Service 2023, p. 138).

packs[5] (Service 2023, pp. 131–140; see Table 5 in the SSA Report for detailed population counts and estimates). Mean growth rates (lambdas) over the most recent four years (2018–2022), derived from the best available scientific data on population counts, indicate populations are increasing in Washington and Oregon (Service 2023, p. 139). Mean lambdas in Idaho, Montana, and Wyoming, derived from the best available scientific data on population estimates or counts through the end of 2022, indicate populations in these states are slightly decreasing or slightly increasing (Service 2023, p. 139). Confidence intervals for lambda in Idaho, Montana, and Wyoming include lambda values less than and greater than one, which indicates that the populations in these states could be annually declining at a rate of 16 percent, 4 percent, or 1 percent or increasing at a rate of 12 percent, 2 percent, or 10 percent, respectively (Service 2023, p. 139). This fluctuation of lambdas around one in Idaho, Montana, and Wyoming is typical of populations fluctuating around a maximum population size. However, because wolf populations in the Western United States are highly managed and influenced by human activities, both environmental and societal factors likely limit maximum population sizes in these states (see Service 2023, p. 152 for more information on "maximum population size").

The wolf population size in the Western United States decreased slightly between year-end 2011 and year-end 2012, decreasing by a total of 116 wolves; however, the wolf population in the Western United States rebounded in 2013 and continued to increase through 2021 (Service 2023, p. 138). Consistent with current wolf-management objectives in Idaho and Montana, the year-end wolf abundance estimates in 2021 and 2022 in both states decreased slightly compared to the year-end estimate from the previous years (a 44-wolf decrease in Idaho and a 33-wolf decrease in Montana between year-end 2020 and year-end 2021 and an 86-wolf decrease in Idaho and a 56-wolf decrease in Montana between year-end 2021 and year-end 2022). However, in Montana, the confidence intervals around these year-end estimates for 2021 and 2022 encompass the previous years' estimates, suggesting that uncertainty remains in the exact trajectory of the population between year-end 2020 and year-end 2022 (Service 2023, pp. 50–51). However, the population remains well above Idaho's objective of fluctuating around a population size of 500 wolves and above Montana's commitment to maintain 15 breeding pairs or 150 wolves. Additionally, population sizes continue to increase in California, Oregon, Washington.

Overall, the best available scientific data indicates that the metapopulation in the Western United States remains large (with almost 2,800 wolves) and the occupied range has continued to expand despite current levels of human-caused mortality and the slight reductions in population size in Idaho and Montana discussed under "Human-Caused Mortality" above. Moreover, wolves in the Western United States currently have high levels of genetic diversity and connectivity, further supporting the resiliency of wolves throughout the West (vonHoldt et al. 2010, pp. 4420–4421; WGI 2021, p. 8; Ausband 2022, p. 5; IDFG 2023b, p. 11; Service 2023, pp. 140–142, Appendix 2).

[5] Idaho no longer reports the number of packs in the state at the end of the calendar year. There are likely considerably more than 286 packs in the Western United States, if Idaho's packs are considered.

Current Redundancy

Wolves in the Western United States currently occur in one metapopulation, structured in a constellation of subpopulations spread across six states (and one known pack in Colorado); this metapopulation is also connected demographically to a larger population of wolves in Canada. At the end of 2022, there were at least 286 packs distributed between: California, Colorado, Montana, Oregon, Washington, and Wyoming, further contributing to redundancy of the species. The best available scientific information does not provide a minimum number of wolf packs in Idaho for the end of 2022, though wolf distribution extends into this state. Disease is the prevailing causal factor of high mortality events in carnivore species (Chapron et al. 2012, p. 14). Therefore, to assess current catastrophic risk to wolf populations in the Western United States (i.e., redundancy), we evaluated the frequency and impact of disease on wolf populations and the current and future ability of wolf populations to rebound from high-mortality disease events (see analysis of disease effects in our future-condition models, Service 2023, pp. 159–160). While outbreaks of several diseases have occurred in the wolf population in the Western United States in the recent past, population decreases have been localized to specific regions, with the overall metapopulation continuing to expand to new areas (Service 2023, pp. 98–101). Although it is possible a novel disease may arise, given the wolf's currently wide distribution in the Western United States (i.e., redundancy) and our understanding of current wolf-disease ecology, it is unlikely that a disease outbreak would cause the wolf metapopulation in the entire Western United States to crash, even given current management objectives to reduce wolf abundance in some states (Service 2023, pp. 146–147).

Current Representation

We used the Thurman et al. (2020, entire) standardized method to assess representation (i.e., adaptive capacity) of the gray wolf in the Western United States by examining 36 attributes related to the species' distribution, movement, evolutionary potential, ecological role, abiotic niche, life history, and demography (Service 2023, pp. 142–146). Taken together, these attributes provide a holistic picture of how well a species, in this case the gray wolf, may be able to adapt to environmental changes (e.g., climate change). We assessed each of these attributes for the gray wolf relative to a standardized scoring rubric for each attribute (see Appendix 4 of SSA Report for our scoring). Overall, wolves have an adaptable life history that allows them to disperse broadly, colonize new suitable habitat readily, and tolerate or exploit a range of habitat, prey, and climatic conditions (Service 2023, pp. 142–146). They currently possess high genetic diversity, which contributes to the fact that evolutionary genetic capacity of wolves in the Western United States appears to be stable, with no current indications of a decline (Service 2023, pp. 140–141). Based on this categorical analysis of Thurman et al.'s (2020) 36 attributes, we determined that wolves' dispersal and colonization capability, phenotypic and behavioral plasticity, and evolutionary genetic capacity are not limiting current adaptive capacity in the Western United States (Service 2023, pp. 142–144).

In addition to the attributes from Thurman et al. (2020, p. 522), we also analyzed current distribution on the landscape throughout different ecoregional provinces as an additional proxy for representation (Service 2023, pp. 144–146). A metapopulation structure, with subpopulations connected by some level of gene flow, can facilitate increased adaptive capacity because selective pressures may vary among subpopulations (Razgour et al. 2019, p. 10421; Carroll et al. 2021, p. 74); different environmental conditions or ecological factors can create these varied selective pressures. As shown in Figure 6, wolves in the Western United States are currently found in five ecoregional provinces: (1) Southern Rocky Mountain Steppe; (2) Rocky Mountain Steppe; (3) Northern Rocky Mountain Steppe; (4) Cascade Mixed Forest; and (5) Sierran Steppe (Service 2023, p. 145). Occurrence in these different ecoregional provinces demonstrates the ecological flexibility of the species, which has become established in two new provinces (i.e., Cascade Mixed Forest and Sierran Steppe) since the NRM DPS (without Wyoming) was delisted in 2011. The evolutionary processes that result from different selection regimes in these differing provinces are likely to positively contribute to the adaptive capacity of the species (Service 2023, pp. 144–146).

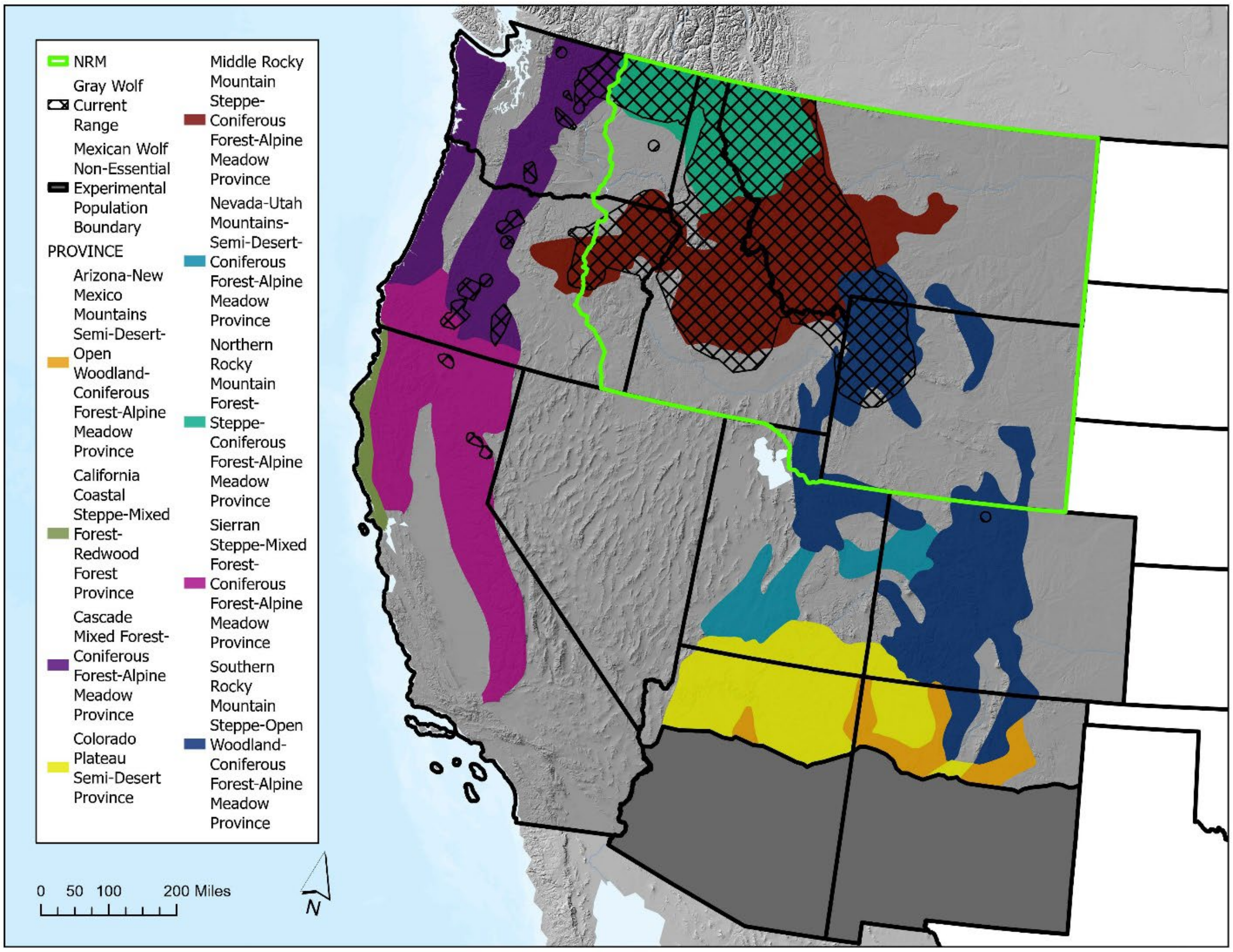

Figure 6. Ecoregional provinces, as defined by Bailey (2016), and the current range of wolves in the Western United States. The NRM is delineated in green. The gray wolf's current range in the Western United States is in the hatched area (this current range is as of December 31, 2022, except California, which is current as of May 2023). The Mexican Wolf Nonessential Experimental Population Area is colored in dark gray.

Overall, wolves in the Western United States have adaptive capacity characterized by life history traits that confer dispersal and colonization capability and phenotypic and behavioral plasticity, with contributing factors such as their current population size, distribution, connectivity, and genetic diversity that allow for evolutionary genetic adaptation. These traits, in combination with a range that extends into five different ecoregional provinces, demonstrate that wolves in the Western United States currently retain the ability to adapt to changes in their environment (Service 2023, pp. 142–146).

Summary of Current Condition

Habitat and prey for wolves are abundant and well distributed in the Western United States. This, in conjunction with the high reproductive potential of wolves and their innate behavior to disperse and locate social openings or vacant suitable habitats, has allowed wolf populations to withstand relatively high rates of human-caused mortality (Service 2020, pp. 8–9). Our analysis of the current condition of gray wolves in the Western United States demonstrates that, despite current levels of regulated harvest, lethal control, and episodic disease outbreaks, wolf abundance across the Western United States has generally continued to increase and occupied range has continued to expand since reintroduction in the 1990s, with the exception of three years during which wolf abundance in the Western metapopulation decreased slightly (i.e., a decrease of approximately 50 to 100 wolves in one year). As of the end of 2022, states estimated that there were 2,797 wolves distributed between at least 286 packs in seven states[6]. This large population size and broad distribution contributes to the resiliency and redundancy of wolves in the Western United States. Moreover, wolves in the Western United States currently have high levels of genetic diversity and connectivity, further supporting the resiliency of wolves throughout the West. Finally, based on several metrics for assessing adaptive capacity, wolves in the Western United States currently retain the ability to adapt to changes in their environment (Service 2023, p. 147).

FUTURE CONDITION

Methodology for Evaluating Future Condition

As we explain in detail in Chapter 5 of the SSA Report, we developed a density-dependent population-growth model to project the future population size of wolves in Idaho, Montana, Oregon, Washington, and Wyoming (inclusive of YNP) under a range of future scenarios (Service 2023, pp. 148–183). We modeled the annual size of the wolf population in these states for every year between 2022 and 100 years into the future (Service 2023, p. 168). We then used these projections to conduct a population-viability analysis by evaluating the likelihood of falling below several thresholds related to extinction risk and genetic health (Service 2023, pp. 169–170). Our model structure and thresholds were specifically chosen to evaluate the ability of wolves to persist in multiple areas under various harvest scenarios and disease rates (resiliency and redundancy), and to evaluate the ability of wolves to maintain effective population sizes above those needed to prevent inbreeding depression, which is another component of resiliency (Service 2023, pp. 159–170). In the SSA Report, we qualitatively discuss (1) resiliency in the states for which we were unable to model future population size (i.e., Arizona, California, Colorado, Utah, Nevada, and New Mexico) and (2) potential future changes in factors related to suitable habitat, prey availability, genetic diversity, connectivity, and representation (Service 2023, pp. 195–208).

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[6] Note that this estimate of the number of packs does not include the numerous packs in Idaho; thus, there are likely considerably more than 286 packs distributed throughout this seven-state analysis area.

In the SSA Report, we quantitatively projected the future population size of wolves at two geographic scales (the NRM and the entirety of Idaho, Montana, Oregon, Washington, and Wyoming) under multiple future scenarios (Service 2023, pp. 148–149, 159–166). Future scenarios allow us to explore a range of possible future conditions for wolves in the Western United States given the uncertainty in the stressors they may face, uncertainty in the potential response to those stressors, and the potential for possible conservation efforts to improve future conditions (Smith et al. 2018, p. 306). We developed scenarios to evaluate the potential effects of harvest and disease, the two primary stressors that could influence wolf populations in the future (Service 2023, pp. 159–166). Given our uncertainty about future disease and harvest rates, the scenarios reflect estimates of the plausible range of these stressors in the future and their effects on future population sizes based on the best available science. Not all scenarios are equally likely and, in the case of our analysis of the gray wolf in Idaho, Montana, Oregon, Washington, and Wyoming, some scenarios may be extremely unlikely.

In our future scenarios, we simulated two levels of disease frequency and severity to explore the potential effects of disease and other catastrophic events on wolf population dynamics (Service 2023, pp. 159–160). First, we applied the frequency and severity of disease that we have recently observed in a wolf population in the Western United States. This first level of disease (i.e., “observed YNP disease rates”) was estimated from data on wolves in YNP, where three instances of canine distemper virus resulting in 20 to 30 percent reductions in the population were observed over 25 years (Brandell et al. 2020, p. 126). In half of our future scenarios, we applied a second level of disease (i.e., “added vertebrate black swan events”), which included the effects of high severity, but low probability, disease outbreaks on top of these past observed rates of disease (Reed et al. 2003, p. 110; Service 2023, p. 160).

Our future scenarios also included variation in harvest rates, which we define as the annual percent of wolves killed through legal hunting and trapping (Service 2023, pp. 160–165). For Washington and Wyoming, we used the average of past observed harvest rates from the most recent 4 years for each state across all scenarios; in other words, we assumed that harvest in Washington and Wyoming would stay the same as current levels into the future (Service 2023, pp. 161–163). We also assumed that Oregon would not initiate any wolf harvest. Any increased harvest levels in Oregon and Washington would be speculative because the states’ management plans do not indicate when harvest would occur outside of tribal lands or how much harvest would be allowed. Moreover, our future projections for Oregon and Washington were already conservative in that future projected population sizes in Washington and Oregon remain similar to present abundance because of the relatively low maximum population size parameter we used in our modeling for these states (Service 2023, pp. 162–163, 252–256).

As we discuss in greater detail in “Management of Wolves in Wyoming” above, the WGFD manages wolves within the WTGMA based on a numerical objective of 160 wolves. At the end of 2022, there were 163 wolves in the WTGMA (WGFD et al. 2023, p. i). Given Wyoming’s objective, and the number of wolves currently in the WTGMA, wolf harvest is unlikely to increase substantially unless wolf abundance significantly increases in the WTGMA (which our model projections indicate it would not) (Service 2023, pp. 161–162, 251–252). Therefore, it is reasonable to assume that average observed harvest rates will continue into the future in Wyoming (Service 2023, pp. 161–162; 251–252).

Due to many factors that affect hunter/trapper effort and success, uncertainty remains as to how the new harvest regulations in Idaho and Montana may affect their future harvest rates (Service 2023, pp. 42, 163). Therefore, to examine a range of potential effects of these recent changes to harvest regulations in Idaho and Montana, we projected future population sizes for these two states under three different harvest scenarios (Service 2023, pp. 163–166). Under Harvest Scenario 1, the harvest rate in each state reflected the average estimated harvest rates from the most recent 4 years. Under Harvest Scenario 2, the harvest rate in Idaho and Montana reflected the maximum harvest rate observed in the state (since delisting) plus 20 percentage points, to represent an increase in harvest over observed rates (see Service 2023, p. 163 for additional explanation of this scenario). Under Harvest Scenario 3, harvest rates in Idaho and Montana reflected the harvest rate necessary to reduce the population in Idaho and Montana to 150 wolves each within 5 years, which reflects a rapid (within approximately one wolf generation) decline from the current population size to the management buffer above the recovery criteria (i.e., 150 wolves) (Groen et al. 2008, p. 1; Talbott and Guertin 2012, p. 1; Service 2023, p. 164). Both states have repeatedly committed to manage for the buffer above the recovery criteria (i.e., 15 breeding pairs/150 wolves), the new regulations in each state are consistent with that commitment, and it is codified into Montana law (MCA 87-1-901). Under each of these harvest scenarios, we also varied the rate at which wolves that primarily reside in YNP would be harvested in areas surrounding YNP (Service 2023, pp. 163–164). Although we considered the mortality rates under these three scenarios to result from harvest, the increased mortality we modeled could come from any source and it would have the same effect (e.g., lethal control, illegal take).

Based on state commitments and other regulatory mechanisms (which we summarize under “Conservation Measures and Existing Regulatory Mechanisms” above), in our model projections we assume that regulated public harvest of wolves would cease when 150 wolves remain in each state (Service 2023, p. 164). For over a decade, wildlife management agencies in Idaho and Montana have committed to manage for at least 15 breeding pairs/150 wolves each in order to maintain a population of at least 10 breeding pairs/100 wolves each (commitments detailed in MOUs and, in the case of Montana, state law) (Groen et al. 2008, p. 1; MCA 87-1-901). These states have managed above these thresholds since removal of Federal protections in the NRM, and the 2021 state laws in Idaho and Montana did not change these commitments. Additionally, a primary goal of wolf management plans in Idaho and Montana is to manage wolves in sufficient numbers to preclude relisting under the Act so they can maintain the authority to manage wolves under state rules and regulations (IDFG 2023b, p. 38, 18; MFWP 2004, p. 1).

It is unlikely that an individual future scenario will occur exactly as we describe above because not all scenarios are equally likely to accurately represent future harvest rates (Service 2023, pp. 164–165, pp. 171–177). Moreover, new state regulatory mechanisms indicate states will or could manage for population sizes larger than our model assumes or projects under these future scenarios (see "Conservation Measures and Existing Regulatory Mechanisms" above). For example, Idaho's new 2023 gray wolf management plan (*2023 Idaho Plan*), which was released after we developed these scenarios, indicates that Harvest Scenarios 2 and 3 are extremely unlikely for Idaho because they would result in population sizes below Idaho's stated objective of managing for a viable wolf population that fluctuates around an average of 500 wolves annually (varying between a low of 350 wolves just prior to spring reproduction and a high of 650 wolves following spring reproduction) (IDFG 2023b, pp. 39–42; Service 2023, pp. 164–165). Similarly, the recently released *Draft 2023 Montana Plan* uses 450 wolves as a "benchmark" to ensure the population in Montana maintains at least 15 breeding pairs (MFWP 2023, p. 43). Although there is no specific management objective, if the plan is finalized as drafted, wolves in Montana would be managed above this "benchmark" (MFWP 2023, pp. 41–46; Service 2023, pp. 164–165). Because our future scenarios were developed before these new management plans were available, our models do not incorporate the objective in Idaho's new management plan or the benchmark in Montana's draft management plan. However, although these management plans indicate that some of our scenarios may be extremely unlikely, we elected to retain the original construction of our future scenarios because any revisions to our future scenarios to reflect these new state population objectives would have resulted in higher population projections; we wanted to retain our more conservative future scenarios, consistent with the conservative approach we took elsewhere in the analysis, such as our estimate of starting population size for Idaho (Service 2023, p. 153). We also determined that the higher population projections would not appreciably alter our conclusions regarding viability (which we detail below) because higher population sizes in the future would only increase the gray wolf's ability to withstand stochastic and catastrophic events and adapt to future changes in the environment.

Moreover, factors such as the high reproductive rates of wolves, the amount of refugia habitat for wolves, the high costs of control efforts, and states' adaptive approach to wildlife management make the increased harvest rates modeled in Harvest Scenarios 2 and 3 unlikely throughout an entire state over an extended period of time (Service 2023, pp. 172–177). Therefore, our projections of future abundance under Harvest Scenarios 2 and 3 likely underestimate true future abundance, given the difficulty of achieving and sustaining the harvest rates in these scenarios at the temporal and/or spatial scales we modeled, and Idaho's stated objective to manage for a larger population than our model assumes or projects. We discuss the factors that influence the likelihood of our future scenarios in detail in Chapter 5 of the SSA Report. We also detail key assumptions and uncertainties in our modeling in Table 12 in the SSA Report (Service 2023, pp. 178–182).

In our projections, we estimated the future number of wolves in each state under six total combinations of disease and harvest scenarios, spanning two disease scenarios and three harvest scenarios (Service 2023, pp. 164–166). For each scenario combination, in addition to projecting the median future population size (and a credible interval around this projection), we also calculated the proportion of simulations that fell below pre-determined thresholds for at least one year during the 100-year timeframe. These values illustrate the probability that the population will fall below critical thresholds that represent likely extirpation (quasi-extinction, or 5 wolves) or a potential risk of inbreeding depression (an effective population size of 50, or 192 to 417 wolves) (Service 2023, pp. 169–170). The assumptions and parameters in our modeling are detailed in Table 12 of the SSA Report (Service 2023, pp. 178–182).

Future Resiliency and Redundancy

Within the range of scenarios modeled, neither the projected future wolf population in Idaho, Montana, Oregon, Washington, and Wyoming (inclusive of YNP) nor the projected future wolf population in the NRM reached quasi-extinction levels (modeled at fewer than 5 wolves) in 100 years. Additionally, depending on the scenario, there was either a zero percent probability or a less than 0.02 percent probability of the projected future wolf population in Idaho, Montana, Oregon, Washington, and Wyoming (inclusive of YNP) or the projected future wolf population in the NRM falling below an effective population size of 50 (192 to 417 wolves) in 100 years, demonstrating a negligible risk of future inbreeding depression (Service 2023, pp. 185–194). The wolf populations in Idaho, Montana, Oregon, Washington, and Wyoming (inclusive of YNP) and in the NRM are extremely likely to remain above both thresholds (quasi-extinction or a level at which inbreeding may occur) in the future, even if Idaho and Montana immediately increase harvest to over 65 percent and catastrophic levels of disease occur throughout the range (the most impactful combination of harvest and disease scenarios we analyzed) (see Figure 7 and Figure 8) (Service 2023, pp. 185–194). Overall, the median projected total population sizes for the entirety of Idaho, Montana, Oregon, Washington, and Wyoming in 100 years ranged from 935 wolves (95% Credible Interval 739–1,091) for the most impactful combination of disease and harvest scenarios we analyzed (Harvest Scenario 3 with observed YNP disease rates and added black swan events) to 2,161 wolves (95% Credible Interval 1,684–2,586) for the least impactful combination of disease and harvest scenarios we analyzed (Harvest Scenario 1 with observed YNP disease rates) (Service 2023, p. 188; see Figure 7 below). Projections for the NRM were similar, with median projected population sizes in 100 years ranging from 829 wolves (95% Credible Interval 667–940) for the most impactful combination of disease and harvest scenarios (Harvest Scenario 3 with observed YNP disease rates and added black swan events) to 2,048 wolves (95% Credible Interval 1,579–2,462) for the least impactful combination of disease and harvest scenarios (Harvest Scenario 1 with observed YNP disease rates) (Service 2023, p. 192; see Figure 8 below).

The vast majority of the projected population decline in Idaho, Montana, Oregon, Washington, and Wyoming (inclusive of YNP) and in the NRM, which was primarily a result of modeled disease and human-caused mortality, took place in the initial 5 to 10 years of the simulations in our model, after which the population stabilized around a new equilibrium population size. This equilibrium population size varied depending on the combination of disease and harvest scenarios. As the population declines, wolves' intrinsic rate of growth increases because of the density-dependent nature of wolf population growth, which is partly due to wolves' fecundity and connectivity. Simultaneously, as the population declines, the actual number of gray wolves removed through harvest or lethal depredation control decreases because we modeled harvest and lethal depredation control as a constant annual proportion. Therefore, as the number of wolves added to the population increases (due to increasing intrinsic rates of growth as population sizes decrease) and the number removed decreases (due to declining population size), at some point the number of wolves removed from the population due to mortality will be the same as the number of wolves added to the population due to reproduction and immigration, producing population stability after initial decline (i.e., the population reaches an equilibrium point) (Service 2023, pp. 188–189).

Our model results project that, although the number of wolves in Idaho and Montana will decline in the future, the wolves in Idaho, Montana, Oregon, Washington, and Wyoming, as a whole, will maintain the ability to withstand stochastic and catastrophic events into the future. This conclusion is contingent on Idaho, Montana, and Wyoming ceasing harvest of wolves if the populations in those states decline to 150 wolves each (and on the satisfaction of other assumptions in our model) (Service 2023, pp. 185–194).

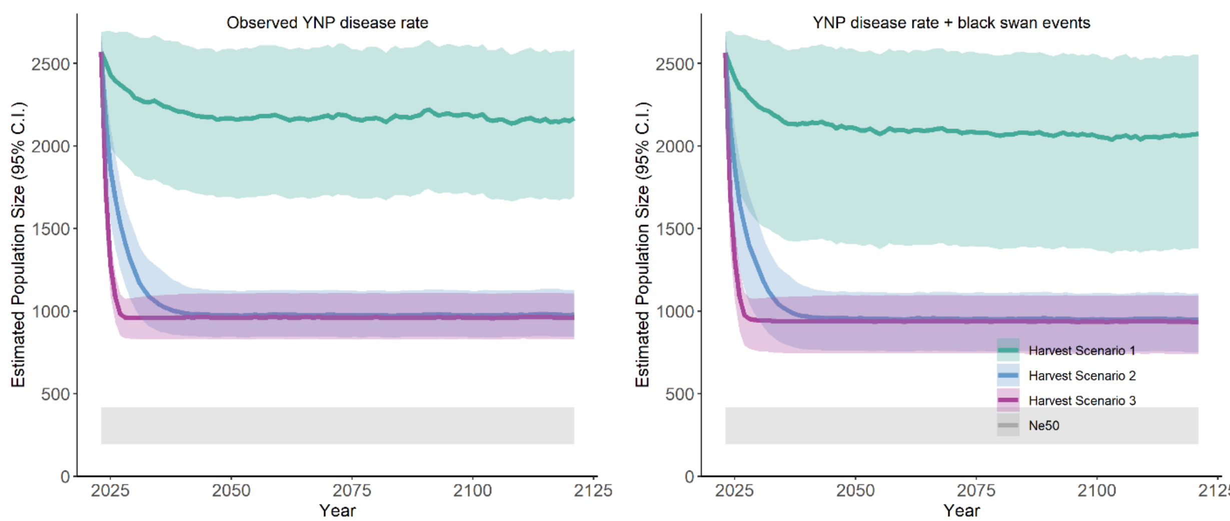

Figure 7. Median projected wolf population size (solid line) and 95% Credible Interval (shaded area) in Idaho, Montana, Oregon, Washington, and Wyoming (inclusive of YNP) in Harvest Scenario 1 (green), Harvest Scenario 2 (blue), and Harvest Scenario 3 (pink) for the 100-year timespan of our simulations. The shaded gray box represents the range of estimated wolf population sizes (192–417 wolves) we calculated to be equivalent to an effective population size of 50.

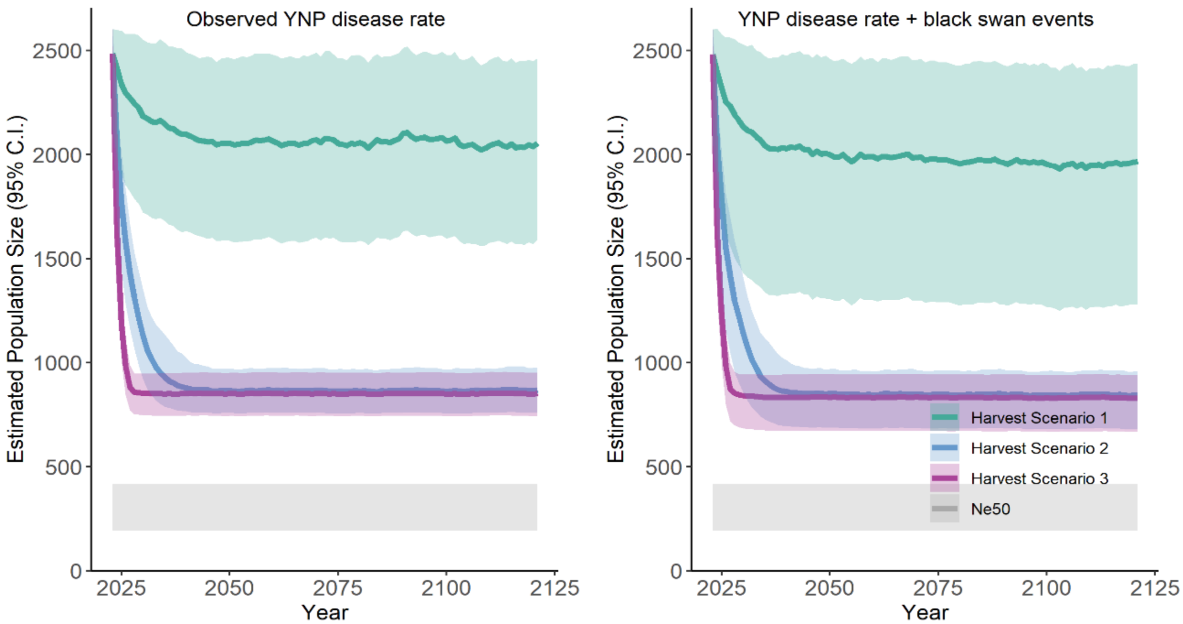

Figure 8. Median projected wolf population size (solid lines) and 95% Credible Interval (shaded area) in the NRM (Idaho, Montana, Oregon (within the NRM), Washington (within the NRM), and Wyoming (inclusive of YNP)) in Harvest Scenario 1 (green), Harvest Scenario 2 (blue), and Harvest Scenario 3 (pink) for the 100-year timespan of our simulations. The shaded gray box represents the range of estimated wolf population sizes (192–417 wolves) we calculated to be equivalent to an effective population size of 50.

For the other states within our analysis area, where we lacked sufficient data to quantitatively forecast future wolf abundance (i.e., Arizona, California, Colorado, Nevada, New Mexico, and Utah), we qualitatively describe how the number of wolves may change in the future (Service 2023, pp. 194–199). Without concerted efforts to minimize human-caused mortality in Utah and with low levels of immigration from neighboring populations, wolves recolonizing Utah would likely exist in small numbers and increase slowly (Switalski et al. 2002, p. 16; Service 2023, p. 198). Given the efforts to actively restore wolves in Colorado, gray wolves (*Canis lupus spp.* other than *Canis lupus baileyi*) could occupy the northern portions of Arizona and New Mexico, outside of the Mexican Wolf Experimental Population Area, during our analysis timeframe (i.e., 100 years). Moreover, wolf occupancy in Arizona, New Mexico, and Utah within the next 5 years seems unlikely because these states signed an MOU with Colorado and the Service stating their "intent to relocate gray wolves that leave the Colorado nonessential population area back to Colorado, should they disperse to Utah, Arizona, or New Mexico" (Gray et al. 2023, p. 2; Service 2023, pp. 198–199). Wolves have likely always been scarce in Nevada and there is only a very limited amount of suitable habitat in the state; therefore, we do not expect more than the occasional breeding pair, border pack, or disperser in Nevada in the future (Service 2023, p. 199). Under all of our future scenarios, the number of wolves in California and Colorado will likely increase due to dispersal from neighboring states, the growth of resident packs already in the states, and, in the case of Colorado, a state statute that requires the reintroduction of wolves to the state (Service 2023, pp. 195–197). This likely future increase in wolf abundance in California and Colorado in the future would further expand the number and distribution of wolves relative to current condition, and would contribute to increased resiliency and redundancy of wolves in the Western metapopulation (Service 2023, p. 205).

Our future scenarios analysis demonstrates that the wolves in the Western metapopulation are likely to maintain the ability to withstand stochastic and catastrophic events (i.e., disease) into the future even with the projected declines in the number of wolves in Idaho and Montana (Service 2023, pp. 204–205).

Our expectations for habitat and prey availability and genetic health further support the maintained resiliency of wolves in the Western United States and the NRM 100 years into the future (Service 2023, pp. 199–204). Although some changes in habitat and prey are expected over the next century, we do not anticipate these changes will substantially alter the wolf's risk of extinction in the Western United States in the future (Service 2023, pp. 199–200). Given our expectation of continued connectivity in the Western United States and wolves' life history, we do not expect any decreases in genetic diversity to be significant enough that inbreeding depression will be a concern under any of our future scenarios (Service 2023, pp. 200–204). In addition, existing MOUs between the Service, Idaho, Montana, and Wyoming establish a commitment to ensure effective dispersal is maintained among those states (Groen et al. 2008, entire; Talbott and Guertin 2012, entire). These agreements increase the likelihood of continued gene flow within the Western United States metapopulation in the future, with associated benefits for genetic diversity (Service 2023, p. 201).

Future Representation

As we discuss in greater detail in the SSA Report, significant shifts in the core attributes that contribute to dispersal and colonization ability or behavioral and phenotypic plasticity[7] seem highly unlikely to occur in any of our future scenarios, either naturally or as influenced by management or other human interaction (Service 2023, pp. 205–206). Many of the attributes that contribute to those abilities are consistent among wolf life histories globally, including high dispersal ability, high physiological tolerances to environmental variation, and early sexual maturity and fecundity that facilitate population growth and range expansion. Therefore, we expect gray wolves to continue to be able to adapt to environmental changes by dispersing to and exploiting available habitat and establishing and reproducing in a range of climatic and habitat conditions.

[7] Phenotypic and behavioral plasticity refers to the phenomenon when a specific genotype can manifest in different behaviors or physical characteristics in response to different environmental conditions (Rodriguez-Casariego et al. 2023, p. 1).

The attribute of adaptive capacity that is susceptible to change is evolutionary genetic potential (Service 2023, p. 206). This potential is in large part reflective of genetic diversity, the continued retention of which could be affected by changes in population size, particularly effective population size, and connectivity, as discussed further in the SSA (Funk et al. 2019, p. 120; Kardos et al. 2021, p. 8; Service 2023, pp. 200–204). The projected reductions in population size in all our scenarios indicate wolves in the Western United States may experience some loss of evolutionary genetic potential (see Flagstad et al. 2003, p. 878; Kardos et al. 2021, pp. 3–7; Ausband 2022, p. 539 for information regarding the relationship between population size and genetic diversity or evolutionary genetic potential). However, connectivity to Western Canada will likely continue to provide dispersers and gene flow that will act to buffer any potential losses of genetic diversity. Therefore, as we discuss in greater detail in the SSA Report, considering this lack of isolation and wolf-specific population viability assessments that indicate retention of genetic diversity at population sizes between 200 and 800 wolves (e.g., Liberg 2005, pp. 39–40; Liberg and Sand 2012, p. 12), although reductions in abundance may lead to some decreases in genetic diversity, those decreases are unlikely to be significant or sustained under the future scenarios we analyzed (Service 2023, pp. 206–207).

Thus, given the adaptable nature of wolves and the projections for changes in population sizes in the future scenarios we analyzed, it is likely that wolves will remain capable of adapting to environmental change (Service 2023, pp. 205–207). As it does currently, this capability would result from: (1) a strong ability to disperse and colonize suitable habitat; (2) tolerance to a range of environmental conditions, facilitated in part by behavioral and phenotypic plasticity; and (3) the ability to respond genetically through natural selection acting on the available pool of genetic diversity, maintained by connectivity throughout the metapopulation (Service 2023, pp. 205–207).

We also examined the degree to which wolf occurrence in different ecoregional provinces in the Western United States, which also contributes to adaptive capacity, might change under our future projections. In all scenarios, we expect wolves to remain present in each of the five ecoregional provinces that are currently occupied. Most of the population reductions projected under Harvest Scenarios 2 and 3 are expected to occur in Idaho and Montana, neither of which contain unique ecoregional provinces. As a result, we expect the different selective pressures and evolutionary processes facilitated by different ecoregional provinces to be maintained within the Western United States into the future (Service 2023, p. 207).

Although our projections display a wide range of outcomes for future population size and the primary stressor, human-caused mortality, is one for which sufficient adaptation is unlikely, we expect wolves in the Western United States to otherwise be well suited to adapt to a variety of environmental change in the future, as long as human-caused mortality is kept within the limits described in our future scenarios (Service 2023, pp. 205–207).

Summary of Future Condition

Our analysis indicates that wolves will avoid extirpation in the NRM and Western United States over the next 100 years. Even in the extremely unlikely scenarios in which harvest substantially increases and is maintained at high rates over time in Idaho and Montana, while population sizes decrease in these states, overall populations remain well above quasi-extinction levels in the NRM and Western United States; the median projected population sizes for the entirety of Idaho, Montana, Oregon, Washington, and Wyoming in 100 years ranged from 935 wolves (95% Credible Interval 739–1,091) for the most impactful combination of disease and harvest scenarios we analyzed to 2,161 wolves (95% Credible Interval 1,684–2,586) for the least impactful combination of disease and harvest scenarios we analyzed. More generally, gray wolves in the NRM and the Western metapopulation will retain the ability to withstand stochastic and catastrophic events in the future (resiliency and redundancy) despite the decrease in the number of wolves relative to current condition under our future scenarios. We also expect the population size to remain large enough, with sufficient connectivity and genetic diversity, to avoid consequential levels of inbreeding or inbreeding depression in the future. Given this maintained connectivity, combined with wolves' adaptable life-history characteristics, we expect wolf populations in the NRM and Western United States will be able to maintain their evolutionary potential and adapt to future change (representation). The likelihood of additional wolves in California and Colorado (and possibly in Arizona, New Mexico, and Utah in the long term), the continued recolonization of Western Oregon and Washington, and the availability of suitable wolf habitat and prey further support the continued viability of the gray wolf in the NRM and the Western metapopulation under the existing management commitments, albeit at potentially reduced population sizes compared to current numbers.

FINDING

Regulatory Framework

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an "endangered species" or a "threatened species." The Act defines an endangered species as a species that is "in danger of extinction throughout all or a significant portion of its range," and a threatened species as a species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The Act requires that we determine whether any species is an "endangered species" or a "threatened species" because of any one or a combination of the following factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;
(B) Overutilization for commercial, recreational, scientific, or educational purposes;
(C) Disease or predation;
(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

The Act does not define the term "foreseeable future, which appears in the statutory definition of "threatened species." Our implementing regulations at 50 CFR 424.11(d), as revised in 2019, set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term "foreseeable future" extends only so far into the future as we can reasonably determine that both the future threats and the species' responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. "Reliable" does not mean "certain"; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions.

It is not always possible or necessary to define the foreseeable future as a particular number of years. Analysis of the foreseeable future uses the best scientific and commercial data available and should consider the timeframes applicable to the relevant threats and to the species' likely responses to those threats in view of its life-history characteristics. Data that are typically relevant to assessing the species' biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors.

In undertaking the analysis of species' status below, we evaluated the effects of lost historical range on the viability of the gray wolf in the Western United States. When we consider the status of a species, we are considering whether the species is currently (i.e., without the species occupying parts of its historical range) an endangered species or a threatened species. Range reduction may result in: reduced numbers of individuals and populations; changes in available resources (such as food) and, consequently, carrying capacity; changes in demographic characteristics (survival, reproductive rate); changes in population distribution and structure; and changes in genetic diversity and gene flow. These, in turn, can increase a species' vulnerability to a wide variety of threats, such as habitat loss, restricted gene flow, reduced genetic diversity, or having all or most of its populations affected by a catastrophic event. In other words, past range reduction can reduce the current and future redundancy, resiliency, and representation of a species in its current range, such that a species may, in some cases, meet the definition of an "endangered species" or "threatened species" under the Act. In addition to considering the effects that loss of historical range has had on the current and future viability of the species, we must also consider the causes of that loss of historical range. If the causes of the loss are ongoing for the species, then that loss is also relevant as evidence of the effects of an ongoing threat. However, loss of historical range is not necessarily determinative of a species' status;

rather, it must be considered in the context of other factors affecting a species. Even though a species only occupies a portion of its historical range, the species may still retain sufficient levels of redundancy, resiliency, and representation in its current range such that it does not meet the definition of an endangered or threatened species.

As indicated above, gray wolves historically occupied a large portion of the Western United States (see Figure 3). The range of the gray wolf began receding after the arrival of Europeans as a result of deliberate killing of wolves by humans and government-funded bounty programs aimed at eradication (Service 2023, pp. 14–17). The resulting reductions in range and population were dramatic—gray wolf populations were essentially eliminated from the Western United States by the 1930s (Young and Goldman 1944, pp. 56–58). Although the range of the gray wolf in the Western United States has significantly expanded since the species was listed under the Act, its size and distribution remain below historical levels.

In our analysis of the gray wolf in the Western United States' viability in our SSA Report, we consider this historical range loss, whether the range contraction affects the species' current and future condition, and how that may affect the ability of the gray wolf in the Western United States to maintain populations in the wild over time within its current range. In the SSA framework, we explicitly analyze the species' demographic response to historical and ongoing threats. Historical range is one factor in our analysis of the species' condition, along with current stressors and current conservation efforts. All of those factors together influence the species' current condition (i.e., number of wolves, growth rates, genetic diversity, and other demographic measures). Specifically, in our SSA Report for the gray wolf in the Western United States, we reported the current abundance, distribution, trends, genetic health, and adaptive capacity of the wolf metapopulation in the Western United States, in addition to the current availability of suitable habitat and prey. The current condition of these demographic and habitat factors demonstrates the species' current response to a combination of influences, including past range contraction, ongoing threats, and current conservation efforts. Because we used the species' current demographics as an input parameter for the future population projections, our conclusions regarding the species' future condition account for any ongoing negative impacts from past range loss, because these impacts would be reflected in the species' current demographics. Therefore, our SSA accounted for any lingering negative effects on the species' condition due to past threats (including historical range loss) and considered how, if at all, those threats might negatively affect the species' condition in the future. If past range loss was elevating current extinction risk in the Western United States, such that the species is warranted for listing as endangered or threatened, this risk would be reflected in otherwise inexplicable population decline, compromised genetic health, insufficient suitable habitat, or other negative demographic responses. Based on the best available scientific data, and as we describe further below, we did not find any evidence of these negative demographic responses to historical range loss in our SSA analysis.

Status Assessment

Status Throughout All of Its Range

After evaluating threats to the species and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we determined, based on the best available data, including the variety of conservation efforts and regulatory mechanisms that either reduce or ameliorate stressors (Factor D; see "Conservation Measures and Existing Regulatory Mechanisms" above), that impacts from human-caused mortality (Factor C), disease and parasites (Factor C), and genetic diversity and inbreeding (Factor E) are not of sufficient imminence, intensity, or magnitude to indicate that the gray wolf in the Western United States is in danger of extinction or likely to become so in the foreseeable future throughout all of its range. We also determined that habitat and prey availability (Factor A), climate change (Factor E), disease in prey species (Factor E), or other threats, singly or in combination, are not having population- or species-level effects. Therefore, these threats are not driving the species to be in danger of extinction or likely to become so in the foreseeable future throughout all of its range. In short, gray wolves in the Western United States are not in danger of extinction or likely to become so in the foreseeable future because of any of these threats, and the combined management and regulatory frameworks in Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming (Factor D) are adequate to ensure that human-caused mortality, where it occurs, is sufficiently minimized.

In order to assess whether wolves in the Western United States are in danger of extinction throughout all of their range, we examined both the information on species' "current condition" from the SSA Report and the projections of species' condition approximately 10 years into the future from our future condition modeling. This allowed us to consider any delayed response to past and ongoing influences and the effects of imminent influences in our analysis of whether the species meets the definition of an "endangered species." Given the lag in reporting of wolf population sizes in each state, the current-condition analysis in the SSA Report (Chapter 4) only characterizes the viability of the species through the end of 2022 (the most recent year for which year-end population size counts or estimates were available from every state in our analysis area) (Service 2023, p. 130). Therefore, this current condition analysis only represents the effect of one full harvest season under Idaho and Montana's new harvest laws and regulations (i.e., the 2021/2022 harvest season), the legal and regulatory changes that sparked the petitions to list the species under the Act. In the SSA Report, our future condition modeling illustrates how these recent regulatory changes may affect the species' viability beyond 2022. Based on these modeling results, the most significant population decline is projected to occur in the initial 5 to 10 years of the modeling period (depending on the future scenario), after which the populations are projected to stabilize (Service 2023, pp. 186–189; see "Methodology for Evaluating Future Condition" above for further explanation of this stabilization).

Given the petitioners' claims about the risk these legal and regulatory changes may present to the wolf metapopulation in the Western United States, we determined that it was appropriate to examine the near-term future potential effect of these existing laws and regulations to determine whether wolves in the Western United States were currently in danger of extinction ("endangered determination"). Accordingly, in addition to the information presented on the species' current condition, we examined the results from the first 10 years of our model's projections to inform our endangered determination to account for the abrupt population decline that may occur if harvest increases significantly as a result of these recent legal and regulatory changes in Idaho and Montana.

While existing management plans, legislation, and regulations (described under "Conservation Measures and Existing Regulatory Mechanisms" above) currently allow Idaho and Montana to increase harvest opportunities in an effort to reduce the size of wolf populations, given the natural resiliency of wolf populations (e.g., high fecundity, dispersal abilities), connectivity within the Western U.S. metapopulation, and the existing management commitments, wolves currently have and will retain sufficient resiliency, redundancy, and representation in the next 10 years such that the gray wolf in the Western United States is not in danger of extinction throughout all of its range.

Specifically, wolves in the Western United States can withstand stochastic events, both now and up to 10 years into the future (resiliency). Wolves currently have, and will maintain, a healthy abundance, even with projected population declines within 10 years under some future scenarios. As of the end of 2022, the most recent year for which year-end population counts or estimates are available from all states in our analysis area, there were almost 2,800 wolves distributed throughout the Western United States. Even with regular changes to harvest regulations over the past decade and periodic disease disturbances, wolf abundance in the Western United States has generally continued to increase and occupied range has continued to expand since reintroduction in the 1990s, with the exception of three years during which wolf abundance in the Western metapopulation decreased slightly (i.e., a decrease of approximately 50 to 100 wolves in one year) (Service 2023, pp. 129–140). Although overall population size decreased in the Western United States in 2021 and 2022, primarily due to population decreases in Idaho and Montana, these decreases are consistent with Idaho and Montana's stated objective to reduce wolf population size. Moreover, the observed population decreases in 2021 and 2022 align with the population declines we project in our model. Although we expect, and have already observed, wolf population decreases in the Western metapopulation, according to our forecasting model (Service 2023, pp. 186–188), which incorporates Idaho, Montana, and Wyoming's minimum management commitments since delisting (Service 2023, pp. 163–164), we project there would be at least 753 wolves in Idaho, Montana, Oregon, Washington, and Wyoming in the next 10 years. This is based on the lower credible interval of the population projection from the most impactful combination of disease and harvest scenarios we analyzed (i.e., Harvest Scenario 3 with catastrophic ("black swan") levels of disease), scenarios we find unlikely for the reasons explained in the SSA Report (Service 2023, pp. 172–177). If states continue to harvest wolves at past observed rates (Harvest Scenario 1), which they have yet to significantly exceed despite implementing less-restrictive regulations and which are more consistent with new management objectives in Idaho (IDFG 2023b, pp. 39–42), the projected population size would remain above approximately 1,500 to 1,700 wolves, even with catastrophic levels of disease (Service 2023, pp. 186–188). There are also multiple areas throughout the species' range that currently provide refugia for wolves (i.e., areas that are difficult to access where human-caused mortality is low, such as wilderness areas) (Service 2023, pp. 112–113, 174). Additionally, prey and habitat for wolves are not currently limiting, and we do not anticipate they will become so in the next 10 years (Service 2023, pp. 115–123, 199–200). Based on all of the above contributing factors, wolves can and will exhibit resiliency to stochastic events within the next 10 years.

Wolves in the Western United States currently have healthy levels of genetic diversity (vonHoldt et al. 2010, pp. 4420–4421; WGI 2021, p. 8; Ausband 2022, p. 5; Service 2023, pp. 140–142, Appendix 2) and this will be retained in the next 10 years, also contributing to wolves' ability to withstand stochastic events (Service 2023, pp. 147, 200–204, 207–208). Our models project a negligible risk of the population in Idaho, Montana, Oregon, Washington, and Wyoming (the Western states we modeled) dropping below a threshold that would indicate risk of inbreeding depression in the next 10 years, and wolves exhibit behaviors that specifically minimize the potential for inbreeding (e.g., preferentially breeding with unrelated individuals) (Service 2023, pp. 102–103, 203–204). In addition, existing state management plans and MOUs between the Service, Idaho, Montana, and Wyoming establish a commitment to maintain high levels of genetic diversity by ensuring that effective dispersal among those states continues (IDFG 2023b, p. 38; MFWP 2004, p. 36; Groen et al. 2008, entire; WGFC 2011, pp. 1–2, 4; Talbott and Guertin 2012, entire; WGFC 2012, pp. 6–7). These agreements, combined with the observed benefits of even a small number of effective dispersers (Vilà et al. 2003, entire; Wayne and Hedrick 2011, entire; Akesson et al. 2016, entire), increase the likelihood of continued gene flow within the Western U.S. metapopulation in the next 10 years, with associated benefits for genetic diversity (Service 2023, p. 201). Moreover, the connectivity of the metapopulation of gray wolves in the Western United States with the larger metapopulation in Canada provides a regular influx of dispersers and genes into the Western United States, further supporting current and sustained genetic diversity, even if abundance in the Western United States declines (Service 2023, pp. 140–142, 201–202).

Wolves in the Western United States can also withstand catastrophic events, now and up to 10 years into the future (redundancy). There are at least 286 packs of wolves distributed between: California, Colorado, Montana, Oregon, Washington, and Wyoming (and additional packs in Idaho), reducing the risk that a catastrophic disease would cause the entire wolf population in this area to crash (Service 2023, pp. 146–147). To date, disease events have caused only localized and temporary population reductions (Service 2023, pp. 98–101, 146–14). Given the assumptions in our model and our future scenarios (Service 2023, pp. 178–182), our analysis of our model projections indicates that there is no risk of quasi-extinction (modeled at fewer than 5 wolves) in Idaho, Montana, Oregon, Washington, and Wyoming in the next 10 years. According to our population projections, even with the high rates of disease we analyzed under our "black swan" scenarios, the wolf population would not decline below a lower 95% credible interval of approximately 753 wolves in the next 10 years (Service 2023, p. 188). Together, this analysis illustrates the current ability of wolves to withstand stochastic events, increased harvest, and catastrophic disease (Service 2023, pp. 185–205).

Finally, wolves in the Western United States currently have and will retain the ability to adapt to changing conditions in the next 10 years (representation). Wolves have an extremely adaptable life history given their high fecundity, ability to exploit a wide range of prey (i.e., generalist tendencies), and dispersal capabilities (Service 2023, pp. 142–146). Wolves also currently have healthy levels of genetic diversity, which contribute to the evolutionary genetic capacity and, therefore, adaptive capacity of the species (Service 2023, pp. 140–142, Appendix 2). In addition, wolves are currently distributed in a metapopulation that extends into five different ecoregional provinces, including two into which they have become established since the NRM DPS (without Wyoming) was delisted in 2011 (Service 2023, pp. 144–146). This distribution not only demonstrates the ecological flexibility of the species, but also that the evolutionary processes that result from different selection regimes in these differing provinces are likely to positively contribute to the overall adaptive capacity of the species.

In sum, throughout their range in the Western United States, now and 10 years into the future, wolves in the Western metapopulation can withstand environmental and demographic stochasticity, increased human-caused mortality, potential disease events, and changing environmental conditions. Given the natural resiliency of wolf populations, the conservation efforts and regulatory mechanisms in place reinforce that states within the Western U.S. metapopulation will continue to manage human-caused mortality such that this stressor does not compromise the current viability of the metapopulation. Thus, after assessing the best available data, we conclude that the gray wolf in the Western United States is not in danger of extinction throughout all of its range.

Therefore, we proceed with determining whether the gray wolf in the Western United States is likely to become endangered within the foreseeable future throughout all of its range. In our SSA Report, we projected the future population size of wolves in Idaho, Montana, Oregon, Washington, and Wyoming, based on varying levels of disease and harvest, up to 100 years in the future. In determining whether the species is likely to become endangered within the foreseeable future, we examined our projections for the entirety of this 100-year timeframe, given that we were able to project reliably the threats of disease and harvest, and the species' response to those threats, over this entire timeframe. Based on observed disease frequencies in gray wolves and black swan events in vertebrates, examining the species' status 100 years into the future is sufficient to capture multiple disease outbreaks; the potential for black swan events; and the impact of these events on the population (Service 2023, p. 168). Additionally, 100 years is sufficient to capture a broad range of variation in the population's response to known stressors over time, including increases in human-caused mortality (Service 2023, p. 168). Therefore, we determined that the 100-year timeframe of our population projections in the SSA Report encompassed the foreseeable future.

However, as we note above, although we assessed viability 100 years into the future in our SSA Report, our models project that the majority of population decline would occur in the initial 5 to 10 years of the modeling period, after which the populations are projected to stabilize (Service 2023, pp. 188–189). Given the projected stability of wolf populations in Idaho, Montana, Oregon, Washington, and Wyoming after this initial decline, we found that the status of wolves in the Western United States was unlikely to change significantly after the first decade of the modeling period. Therefore, any timeframe between 10 years and 100 years into the future for foreseeable future would have resulted in the same status determination. Additionally, we examined the viability of the gray wolf in the Western United States approximately 10 years into the future in order to determine whether wolves in the Western United States were endangered (in danger of extinction now) (see above). Therefore, we considered the immediate effect of increased harvest and disease (i.e., this potential abrupt decline) in our determination that wolves were not endangered. Given the projected stability of wolf populations in Idaho, Montana, Oregon, Washington, and Wyoming after this initial 10-year decline, we found that the status of wolves in the Western United States was unlikely to change significantly in the foreseeable future as compared to their status within the next 10 years. In other words, if wolves are not in danger of extinction within the next 10 years (even considering the rapid decline that occurs under some scenarios), they would not be likely to become in danger of extinction within the foreseeable future for the same reasons. Therefore, we found that, although existing management plans, legislation, and regulations (described under "Conservation Measures and Existing Regulatory Mechanisms" above) allow Idaho and Montana to increase harvest opportunities and reduce the size of wolf populations, given the natural resiliency of wolf populations (e.g., high fecundity, dispersal abilities), connectivity within the Western U.S. metapopulation, and the existing management commitments, wolves will retain sufficient resiliency, redundancy, and representation into the foreseeable future such that the gray wolf in the Western United States is not likely to become endangered within the foreseeable future throughout all of its range.

Throughout their range, wolves in the Western United States are likely to retain a healthy level of abundance into the foreseeable future, which contributes to their resiliency. According to the population projections from our forecasting model (Service 2023, pp. 185–188), which incorporates Idaho, Montana, and Wyoming's minimum management commitments since delisting (Service 2023, pp. 163–164), we project there would be at least 739 wolves throughout Idaho, Montana, Oregon, Washington, and Wyoming for the next 100 years (Service 2023, pp. 185–188) (according to the lower credible interval of the population projection from the most impactful combination of disease and harvest scenarios we analyzed (i.e., Harvest Scenario 3 with catastrophic levels of disease), scenarios we find unlikely for the reasons explained in the SSA Report (Service 2023, pp. 172–177)). If states continue to harvest wolves at past observed rates of harvest (Harvest Scenario 1), which they have yet to significantly exceed despite implementing less-restrictive regulations and which are more consistent with new management objectives in Idaho (IDFG 2023b, pp. 39–42), the projected population size would remain above approximately 1,300 to 1,600 wolves for the next 100 years, even with catastrophic levels of disease (Service 2023, pp. 185–188).

Moreover, continued population growth and expansion in California and Colorado is likely in the foreseeable future, given the vast amounts of suitable habitat in these states, current state regulatory protections for wolves, connectivity to other stable wolf populations (e.g., in Oregon and Wyoming), and, in the case of Colorado, a reintroduction program mandated by state law (Service 2023, pp. 194–199). Additionally, given the assumptions in our model and our future scenarios (Service 2023, pp. 178–182), our analysis of our model projections indicates that there is no risk of quasi-extinction (modeled at fewer than 5 wolves) in Idaho, Montana, Oregon, Washington, and Wyoming for the next 100 years; as we discuss in greater detail above, we project there would be at least 739 wolves throughout Idaho, Montana, Oregon, Washington, and Wyoming for the next 100 years (according to the lower credible interval of the population projection from the most impactful combination of disease and harvest scenarios we analyzed (i.e., Harvest Scenario 3 with catastrophic levels of disease), scenarios we find unlikely for the reasons explained in the SSA Report (Service 2023, pp. 172–177)). Expanding populations in California and Colorado further reduce future extinction risk for the gray wolf in the Western United States (Service 2023, pp. 185–205).

The availability of wolf habitat and prey is also unlikely to become a limiting factor on wolf populations in the future, given wolves' generalist habitat and prey needs, the broad distribution of suitable wolf habitat, state plans that manage the effects of disease to maintain robust ungulate populations, and the continued availability of refugia (e.g., wilderness areas) throughout their range where rates of human-caused mortality are low (Service 2023, pp. 112–113, 174, 199–200). This maintained habitat and prey availability further supports the gray wolf's continued ability to withstand stochastic events (resiliency) into the foreseeable future.

As we discuss in greater detail in our SSA Report, wolves are also likely to retain their connectivity within the Western United States and to Canada, supporting healthy levels of genetic diversity into the foreseeable future, which supports both wolves' ability to withstand stochastic events (resiliency) and their retention of adaptive capacity (representation) (Service 2023, pp. 200–204, 205–207). Specifically, while uncertainty about specific impacts of increased human-caused mortality on dispersal and connectivity makes precise projection difficult (Service 2023, p. 38), it is unlikely that dispersal would be completely prevented in areas where wolves are currently well-established under any future scenario (Service 2023, p. 201–202). In addition, existing state management plans and MOUs between the Service, Idaho, Montana, and Wyoming establish a commitment to maintain high levels of genetic diversity by ensuring that effective dispersal among those states continues (IDFG 2023b, p. 38; MFWP 2004, p. 36; Groen et al. 2008, entire; WGFC 2011, pp. 1–2, 4; Talbott and Guertin 2012, entire; WGFC 2012, pp. 6–7). These agreements, combined with the observed benefits of even a small number of effective dispersers (Vilà et al. 2003, entire; Wayne and Hedrick 2011, entire; Akesson et al. 2016, entire), increase the likelihood of continued gene flow within the Western U.S. metapopulation in the future, with associated benefits for genetic diversity (Service 2023, p. 200–204). Connectivity between the Western United States and Canada is likely to continue given extensive suitable habitat along the border and wolves' inherent dispersal ability (Service 2023, p. 201). Not only did wolves from Canada naturally recolonize portions of Montana in the 1980s, prior to wolf reintroductions in YNP and Idaho in the mid-1990s (Ream et al. 1989, entire), but there are also wilderness areas that may act as refugia from human-caused mortality and, subsequently, serve as corridors between the Western United States and Canada in several parts of the range, including Montana near Glacier National Park and in eastern Washington (Service 2023, p. 202).

Finally, based on the results of our modeling for all future scenarios, it is extremely likely the wolf population in the Western United States will remain above a range of threshold values that would indicate a risk of inbreeding depression (namely, 192 to 417 wolves), demonstrating that concerns about significant inbreeding or inbreeding depression in the future are negligible (Service 2023, p. 187). That result is consistent with the very low levels of inbreeding observed in wolves in the Western United States since their re-establishment, even where harvest occurred, likely due in part to wolf behaviors that specifically minimize the potential for inbreeding (e.g., preferentially breeding with unrelated individuals) and wolves' dispersal ability (Service 2023, pp. 102–103, 203–204).

Our analysis also demonstrates that wolves are likely to be able to withstand catastrophic events into the foreseeable future (redundancy). Our model's population projections illustrate the wolf's ability to rebound after high-mortality events (i.e., disease). Given their high fecundity and dispersal abilities, our modeled wolf population in Idaho, Montana, Oregon, Washington, and Wyoming never declined to quasi-extinction levels due to disease catastrophes (Service 2023, pp. 186–188, 204–205). Moreover, we find that continued population growth and expansion in California and Colorado is likely in the future, which further contributes to the species' broad distribution and ability to withstand catastrophic events.

In addition to their retention of genetic diversity, wolves' generalist life history and broad distribution across a variety of ecoregional provinces will also support their continued ability to adapt to future changes in their environment (representation). Many of the attributes that currently contribute to wolves' adaptive capacity are consistent among gray wolf populations globally, including high dispersal ability, high physiological tolerances to environmental variation, and early sexual maturity and fecundity that facilitate population growth and range expansion (Service 2023, pp. 205–206). These intrinsic-life history traits of the gray wolf have developed over evolutionary time scales and, therefore, we do not expect these characteristics to change in the foreseeable future. Wolves' adaptable life history allowed them to exploit available prey and habitat and recolonize large areas of vacant, suitable habitat, while maintaining high levels of connectivity and genetic diversity (vonHoldt et al. 2008, p. 267;

vonHoldt et al. 2010, pp. 4420–4421; WGI 2021, entire; Service 2023, pp. 140–142), Appendix 2). Therefore, we expect gray wolves to continue to be able to adapt to environmental changes by dispersing to and exploiting available suitable habitat and being able to establish and reproduce in a range of habitat conditions into the future (Service 2023, pp. 205–206). Moreover, according to our future projections, wolves would continue to occupy each of the five ecoregional provinces they currently occupy, preserving the different selective pressures and evolutionary processes facilitated by occupation of these different ecoregional provinces into the foreseeable future (Service 2023, p. 207).

In sum, wolves in the Western United States will retain their ability to withstand stochastic and catastrophic events into the foreseeable future, given their abundance, wide distribution, dispersal capability, high fecundity, genetic diversity, connectivity, and avoidance of quasi-extinction, even if levels of harvest or disease increase considerably. Wolves will also retain their ability to adapt to changing conditions given their continued distribution across a diversity of ecoregional provinces, their generalist life history, and their maintained genetic diversity. Given the natural resiliency of wolf populations, the conservation efforts and regulatory mechanisms in place are adequate to ensure that states within the Western U.S. metapopulation will continue to manage human-caused mortality such that this stressor does not compromise the continued viability of the wolf metapopulation in the Western United States into the foreseeable future. After assessing the best available data, we conclude that the gray wolf in the Western United States is not likely to become endangered within the foreseeable future throughout all of its range.

Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. Having determined that the gray wolf in the Western United States is not in danger of extinction, or likely to become so in the foreseeable future, throughout all of its range, we now consider whether it may be in danger of extinction or likely to become so in the foreseeable future in a significant portion of its range—that is, whether there is any portion of the species' range for which it is true that both (1) the portion is significant; and (2) the species is in danger of extinction now or likely to become so in the foreseeable future in that portion. Under our policy regarding the significant portion of the range analysis, we interpret "range" as currently occupied range (for additional information, see 79 FR 37578, July 1, 2014). Therefore, a significant portion of the range must be currently occupied and must be a significant portion of the overall occupied range. Thus, we do not consider unoccupied historical range or unoccupied suitable habitat as potentially significant portions of the range.

In undertaking this analysis for the gray wolf in the Western United States, we considered past litigation regarding our prior gray wolf actions and took a conservative approach to ensure that we did not overlook any portions of the range that could potentially be significant and in danger of extinction or likely to become so in the foreseeable future. Given the species' wide range and because the range of this species can theoretically be divided into portions in an infinite number of ways, we first identified portions that may warrant further review as potentially significant portions of the range in which the species may be in danger of extinction now or likely to become so in the foreseeable future. To determine whether an area should be included among the portions we further evaluated, we considered the area's: (1) potential status (i.e., areas where there are elevated threats such that the status may be different than the status of the species throughout its range) and (2) potential significance (i.e., areas that may contribute to the viability of the species because they serve a particular role in the life history of the species (such as the breeding grounds or food source for the species), include high-quality or unique-value habitat relative to the rest of the habitat in the range, represent a large percentage of the range, or other factors). During this first step of our analysis, we identified four portions of the range of the gray wolf in the Western United States that warranted further consideration: (1) Idaho; (2) Montana; (3) Western Washington, Western Oregon, and California (i.e., the wolves in West Coast states that occur outside of the NRM); and (4) the NRM.

We identified Idaho and Montana as portions necessitating further review because these are the states in which the primary threat of increased human-caused mortality is concentrated, given that the legislatures in both states recently passed legislation to increase public harvest opportunities with the stated goal of reducing wolf population size. Therefore, the status of wolves in these two portions may be different than the status of wolves in the entire Western United States. Additionally, these states may be significant because Idaho and Montana represent a large portion of currently occupied range (Figure 1). We considered Idaho and Montana as separate portions because human-caused mortality is managed at the individual state level.

We also determined that the portion of the range that includes the wolves in Western Washington, Western Oregon, and California (i.e., the West Coast states) warranted further evaluation. While the threats of human-caused mortality and disease are not elevated in this portion, nor are they likely to become so relative to the entire range in the future, we selected this portion for two reasons. First, it contains substantially fewer wolves than the remainder of the gray wolf's range in the Western United States and, therefore, the status of wolves in this portion may be different than the status of wolves in the entire Western United States. Second, the portion of the range containing the wolves in Western Washington, Western Oregon, and California ("the West Coast states") may be significant because the wolves in these states occupy unique ecoregional provinces not otherwise represented in the NRM (i.e., the Sierran Steppe and Cascade Mixed Forest ecoregional provinces; see Figure 6 above), which may contribute to adaptive capacity. We did not further analyze smaller portions of the species' range outside of the NRM (e.g., occupied range within individual states outside of the NRM) because we determined they could not be considered significant in light of the small proportion of occupied current range that exists in those individual states (Figure 1).

Finally, we further analyzed the NRM portion of the range because petitioners requested that we list wolves in the NRM as a DPS. However, as we explain in greater detail above in "NRM Discreteness Analysis," because wolves in the NRM are not markedly separated from other populations of the taxon in the Western United States, the NRM is not discrete and is not a valid DPS. Therefore, in order to be responsive to the petitions, we considered the status of wolves in the NRM as a potential basis for listing by analyzing it as a possible significant portion of the range.

In the second step of our analysis, for each of the portions of the range we identified using the process described above, we then conducted a more thorough analysis to determine whether the species is in danger of extinction or likely to become so in the foreseeable future in that portion. In general, depending on the circumstances, it might be more efficient for us to address the "status" question first for significant portion of the range analyses, which may render it unnecessary to more thoroughly consider the "significance" question. We may choose to address either question (i.e., status or significance) first. Regardless of which question we address first, if we reach a negative answer with respect to one question, we do not need to further evaluate the other question for that portion of the species' range. In undertaking this analysis for the gray wolf in the Western United States, we chose to address the status question first for all four portions described above. In examining the status question, we considered whether the threats and their effects on the species are greater in any biologically meaningful portions of the species' range than in other portions, such that the species is in danger of extinction now or likely to become so in the foreseeable future in that portion. We examined the combined effects of the following threats: human-caused mortality, disease, and inbreeding depression, including the cumulative effects of these threats.

First, we examined Idaho and Montana, individually. For each of these portions, despite already observed and projected population decreases, we determined that wolves in these states are not in danger of extinction now or likely to become so in the foreseeable future for two reasons. First, the population size would range between 84 and 687 wolves in Idaho and 50 and 919 wolves in Montana (the range between lower 95 percent credible interval for the projected population size in each state under the most impactful combination of disease and harvest scenarios we analyzed and the upper 95 percent credible interval for the projected population size in each state under the least impactful combination of disease and harvest scenarios we analyzed) (Service 2023, pp. 245–249), indicating the 95 percent credible intervals around the population size projections for each state do not overlap the quasi-extinction threshold, which we modeled at five wolves (which means the probability of the population declining below our quasi-extinction threshold in either state is extremely low). Second, Idaho and Montana are highly connected to other stable portions of the larger wolf metapopulation in the Western United States and Canada, which will continue to provide a source of wolves available to recolonize vacant suitable habitats in Idaho and Montana even if populations in these two states decline (Service 2023, pp. 200–204).

Moreover, considering this lack of isolation, the challenges associated with achieving the harvest rates under Harvest Scenarios 2 and 3 at the spatial and/or temporal scales we modeled, and current state management direction (Service 2023, pp. 172–177), there will likely be hundreds of wolves in Idaho and Montana into the foreseeable future (Service 2023, pp. 245–249). Based on Idaho's current management plan and Montana's draft plan, the states intend to use their regulatory authorities to adjust wolf harvest opportunities to ensure that wolf abundance remains well above the population sizes projected in Harvest Scenarios 2 and 3 (IDFG 2023b, pp. 39–42; MFWP 2004, pp. 29–30; MFWP 2023, pp. 41–46). Idaho's new 2023 management plan (*2023 Idaho Plan*) includes a primary goal of managing for a viable wolf population that fluctuates around 500 wolves annually, a population size far above the management buffer of 150 wolves to which we assume Idaho will manage in Harvest Scenario 3 (IDFG 2023b, pp. 39–42). This population objective renders Harvest Scenarios 2 and 3 extremely unlikely for Idaho, when combined with our disease scenarios, because they would result in population sizes contrary to its objective. States also retain more management flexibility (e.g., to resolve conflicts and provide for public wolf harvest opportunities) when they manage populations above their minimum commitments. We expect Montana will manage for populations above its minimum commitment to retain this management flexibility (Service 2023, p. 173), and its draft management plan indicates an intention to do so (MFWP 2023, pp. 41–46).

Second, we analyzed the portion of the range that includes the wolves in Western Washington, Western Oregon, and California (the West Coast states, or the area in the Sierran Steppe and Cascade Mixed Forest ecoregional provinces). We find that wolves within this portion of the range are not in danger of extinction now or likely to become so in the foreseeable future. The number of wolves within this portion has been consistently increasing and wolves originating from both within and outside of this area have been recolonizing suitable habitat in this portion since 2008 (Service 2023, Table 5, pp. 134–136). At the end of 2022, there were a minimum of 107 wolves (32 in these ecoregional provinces in Western Oregon, 57 in the ecoregional province in Western Washington, and 18 in California) distributed between 18 packs and 1 group[8] in this portion. Moreover, all three states have management plans and/or regulatory mechanisms in place with the goal of conserving wolf populations in this area into the future (Service 2023, pp. 81–82, 84–85, 91–92).

Additionally, while our model projects that populations within Oregon and Washington, both statewide and within the NRM, will occur at approximately current levels (or slightly increased or decreased population sizes) into the future (Service 2023, pp. 252–256), projections in other Oregon-specific (ODFW 2015, pp. 30–33) and Washington-specific (Maletzke et al. 2016, pp. 372–374; Converse 2022, entire; Petracca et al. 2023a, entire; Petracca et al. 2023b, entire) wolf population-viability analyses project wolf populations will continue to grow in these states.

[8] The Oregon Department of Fish and Wildlife (ODFW) defines a pack of wolves as group of at least four wolves traveling together in winter. ODFW deems wolves exhibiting resident or territorial activity (i.e., wolves repeatedly seen in the same area) that do not yet meet these criteria for a pack as a "group" of wolves. In Oregon, these groups typically contain two to three wolves each (ODFW 2019, p. 1; ODFW 2022, p. 4).

Although these population-viability analyses provide state-level projections for Oregon and Washington, projected increases in the number of wolves in these states are likely to be concentrated in the Western portions of Oregon and Washington due to the greater availability of vacant suitable habitats in these parts of the states, trends we have already observed in the past few years (Service 2023, pp. 137–139). Therefore, the number of wolves in the Western portions of Oregon and Washington will likely remain relatively stable or increase in the future.

In addition, as we discuss in greater detail in our SSA Report, given the vast amounts of suitable habitat in California, current state regulatory protections for wolves in California (i.e., listed as a state endangered species), and connectivity to other stable or growing wolf populations (i.e., in Oregon), we anticipate continued expansion of wolf populations into California in the foreseeable future (Service 2023, pp. 195–196). This connectivity of wolves in Western Oregon, Western Washington, and California to other wolf populations in the Western United States and Canada lends further support to continued wolf population stability or growth and the maintenance of high levels of genetic diversity (including avoiding inbreeding depression) in this portion into the foreseeable future; in short, the wolves in this portion are not an isolated population but are connected to the large and genetically diverse metapopulation in the Western United States and Canada (Service 2023, pp. 200–204).

Therefore, given the ongoing growth and expansion of wolf populations in this portion, the likelihood this population will continue to grow and expand, or at least remain stable, into the foreseeable future, and these states' goals to conserve wolf populations, we find that wolves in this portion are not in danger of extinction now or likely to become so in the foreseeable future.

Finally, we analyzed the NRM portion of the range. First, the wolf population in the NRM, like the wolf population throughout its range in the Western United States, currently has, and will retain, the ability to withstand stochastic and catastrophic events between now and 100 years into the future. There are currently, and will continue to be, a healthy number of wolves in the NRM, even considering projected population declines under some future scenarios. As of the end of 2022, there were approximately 2,682 wolves inside the NRM (Service 2023, p. 130). Although we expect, and have already observed, wolf population decreases in the NRM, according to our forecasting model (Service 2023, pp. 190–192), which incorporates Idaho, Montana, and Wyoming's minimum management commitments since delisting (Service 2023, pp. 163–164), we project there would be at least 667 wolves in the NRM in the next 100 years. This is based on the lower credible interval of the population projection from the most impactful combination of disease and harvest scenarios we analyzed (i.e., Harvest Scenario 3 with catastrophic levels of disease), scenarios we find extremely unlikely for the reasons explained in the SSA Report (Service 2023, pp. 172–177). If states continue to harvest wolves at past observed rates (Harvest Scenario 1), which they have yet to significantly exceed despite implementing less-restrictive regulations and which are more consistent with new management objectives in Idaho (IDFG 2023b, pp. 39–42), the projected population size would remain above approximately 1,250 to 1,500 wolves, even with catastrophic levels of disease (Service 2023, pp. 190–192).

Additionally, given the assumptions in our model and our future scenarios (Service 2023, pp. 178–182), our analysis of our model projections indicates that there is no risk of quasi-extinction (modeled at fewer than 5 wolves) in the NRM in the next 100 years, further illustrating the current ability of wolves to withstand stochastic events, increased harvest, and catastrophic disease (Service 2023, pp. 189–207).

Despite being colonized by a limited number of translocated and naturally dispersing founders, the population in the NRM has maintained high levels of genetic diversity and low levels of inbreeding in the decades since their establishment, without any indications of negative genetic effects (vonHoldt et al. 2010, pp. 4420–4421; WGI 2021, p. 8; Ausband 2022, p. 5; IDFG 2023b, p. 11; Service 2023, pp. 140, Appendix 2). The wolf population is likely to retain healthy levels of genetic diversity into the future, further contributing to its current and future ability to withstand stochastic events (Service 2023, pp. 200–204). Specifically, our models project a negligible risk of the population in the NRM dropping below a threshold that would indicate risk of inbreeding depression over the course of the next 100 years, and wolves exhibit behaviors that specifically minimize the potential for inbreeding (e.g., preferentially breeding with unrelated individuals) (Service 2023, pp. 102–103, 203–204). In addition, existing state management plans and MOUs between the Service, Idaho, Montana, and Wyoming establish a commitment to maintain high levels of genetic diversity by ensuring that effective dispersal among those states within the NRM continues (IDFG 2023b, p. 38; MFWP 2004, p. 36; Groen et al. 2008, entire; WGFC 2011, pp. 1–2, 4; Talbott and Guertin 2012, entire; WGFC 2012, pp. 6–7). These agreements, combined with the observed benefits of even a small number of effective dispersers (Vilà et al. 2003, entire; Wayne and Hedrick 2011, entire; Akesson et al. 2016, entire), increase the likelihood of continued gene flow within the NRM, now and into the foreseeable future, with associated benefits for genetic diversity (Service 2023, p. 201). Moreover, the connectivity of the metapopulation of gray wolves in the NRM with the larger metapopulation in Canada, which is likely to continue into the foreseeable future for the reasons we discuss under "Status Throughout All of Its Range" above, provides a regular influx of dispersers and genes into the NRM, further supporting current and sustained genetic diversity, even if abundance in the NRM declines (Service 2023, pp. 140–142, 201–202). This retained genetic diversity, along with wolves' adaptable life history and dispersal capabilities, will also support the ability of wolves in the NRM to adapt to future change.

Therefore, based on the current and projected levels of resiliency, redundancy, and representation in the NRM area, we conclude that wolves within the NRM are not in danger of extinction now or in the foreseeable future.

We found no portion of the range of the gray wolf in the Western United States where the biological condition of the species differs from its condition elsewhere in its range, such that the status of the species in that portion differs from its status in any other portion of the species' range.

Therefore, we find that the species is not in danger of extinction now or likely to become so in the foreseeable future in any significant portion of its range. This does not conflict with the courts' holdings in *Desert Survivors v. Department of the Interior*, 321 F. Supp. 3d 1011, 1070-74 (N.D. Cal. 2018), and *Center for Biological Diversity v. Jewell*, 248 F. Supp. 3d 946, 959 (D. Ariz. 2017), because, in reaching this conclusion, we did not apply the aspects of the Final Policy on Interpretation of the Phrase "Significant Portion of Its Range" in the Endangered Species Act's Definitions of "Endangered Species" and "Threatened Species" (79 FR 37578; July 1, 2014), including the definition of "significant" that those court decisions held to be invalid.

Determination of Status

Our review of the best available scientific and commercial data indicate that the gray wolf in the Western United States does not meet the definition of an endangered species or a threatened species in accordance with sections 3(6) and 3(20) of the Act. Therefore, we find that listing the gray wolf in the Western United States is not warranted at this time. Our analysis for this decision applied our current regulations, portions of which were last revised in 2019. Given that we proposed further revisions to these regulations on June 22, 2023 (88 FR 40764), we have also undertaken an analysis of whether the decision would be different if we were to apply those proposed revisions. We concluded that the decision would have been the same if we had applied the proposed 2023 regulations. The analyses under both the regulations currently in effect and the regulations after incorporating the June 22, 2023, proposed revisions are included in our decision file.

COORDINATION WITH STATES AND TRIBES

We sent "Dear Interested Party" letters soliciting new information to inform our SSA Report to relevant agencies in all of the states within our analysis area (i.e., Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming). We received submissions of information from Arizona, Idaho, Montana, Utah, Washington, and Wyoming.

During our technical review process in July 2022, we also provided sections of our draft SSA Report to a technical expert from the state wildlife agencies in California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming for them to review for accuracy and completeness. Representatives from all but Nevada provided feedback on these sections.

Over the course of the status review of the gray wolf in the Western United States and the development of the SSA Report, we corresponded and met with various Tribes across the West, including sending "Dear Interested Party" letters requesting information for our SSA Report from over 370 Tribes within the analysis area. We received submissions and correspondence from the All Pueblo Council of Governors, the Assembly of First Nations, the Makah Tribal Council, the National Congress of American Indians, the Nez Perce Tribe, the Redding

Rancheria Tribal Chairman, the Union of British Columbia Indian Chiefs, and the Global Indigenous Council. We also sought technical review of sections of our draft SSA Report from 14 Tribes with active roles in gray wolf management on their lands within our analysis area. We received feedback from one Tribe (the Nez Perce Tribe). Finally, we specifically interviewed tribal representatives from seven tribal entities (Nez Perce Tribe, Blackfeet Nation, Eastern Shoshone Tribe, Crow Tribe, Confederated Salish and Kootenai Tribes, Arapaho Tribe, and Chippewa Cree Tribe of the Rocky Boy Reservation) within the analysis area to discuss traditional ecological knowledge surrounding the gray wolf; we summarized the information from these interviews in an appendix to the SSA Report (Service 2023, pp. 209–219).

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Date:

Martha Williams
Director,
U.S. Fish and Wildlife Service